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**Steven E. Lederer**
Director

October 11, 2019

Mr. Craig Altare
GSP Review Section Chief
California Department of Water Resources
Attn: Sustainable Groundwater Management Office
P.O. Box 942836
Sacramento, CA 94236-0001

**SUBJECT: NAPA COUNTY RESPONSES TO DWR'S JULY 17, 2019 STAFF REPORT AND NOTIFICATION LETTER FOR THE NAPA VALLEY SUBBASIN ALTERNATIVE ASSESSMENT**

Dear Mr. Altare:

Napa County appreciates the California Department of Water Resources' (DWR's) efforts to implement the Sustainable Groundwater Management Act (SGMA), enacted in September 2014, and the companion Emergency Groundwater Sustainability Plan (GSP) Regulations (2016).

To demonstrate Napa County's historical and future commitment to sustainable groundwater management consistent with SGMA, the County submitted an Alternative Plan (Alternative): Napa Valley Groundwater Sustainability: A Basin Analysis Report for the Napa Valley Subbasin on December 16, 2016. DWR completed an Alternative Assessment Notification Letter and Staff Report dated July 17, 2019, which tentatively recommended not approving the Alternative.

The County would like to take this opportunity to respond to DWR's tentative recommendation and offer additional clarification of the Alternative. Furthermore, the County also appreciates the comment period extensions approved by DWR, as well as the receptiveness to clarifications of the Alternative content and DWR staff interpretations of technical content where applicable.

Please find enclosed the County's Global and Technical Responses to DWR's Staff Report. The County believes its submitted Alternative meets the SGMA requirements to provide for continued sustainable groundwater management of the Napa Valley Subbasin.

Napa County requests that DWR approve the Alternative on the condition that such approval will be revisited at the review of the Alternative update to ensure the Napa Valley Subbasin continues to be actively managed as a functional equivalent to a GSP.

Regards,

Steven Lederer
Director
Department of Public Works

Patrick Lowe
Natural Resources Conservation Manager
*Groundwater Sustainability Program*
Department of Public Works

cc:

Karla Nemeth, Director, DWR
Taryn Ravazzini, Deputy Director, SGMA/DWR
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Vickie Kretsinger Grabert, LSCE
Valerie C. Kincaid, O&P LLP

Enclosure:

Global and Technical Responses to DWR July 17, 2019 Staff Recommendation
Regarding the Napa Valley Subbasin Alternative

## Responses to the July 17, 2019 Alternative Assessment Staff Report and Notification Letter from DWR Regarding the Napa Valley Subbasin Groundwater Sustainability Plan Alternative

Napa County (County) reviewed the Department of Water Resources (DWR) Alternative Assessment Notification Letter and Staff Report (Staff Report) dated July 17, 2019 in response to the Napa Valley Subbasin Alternative[1] (Alternative) which was submitted to DWR on December 16, 2016. As the Staff Report is the first substantive feedback provided by DWR on the Alternative since the submittal in December 2016, the County appreciates the opportunity to provide this response in the interest of clarifying how the Alternative meets the requirements of the Sustainable Groundwater Management Act[2] (SGMA) and the Groundwater Sustainability Plan (GSP) regulations[3]. The County also appreciates DWR's willingness to receive comments on its pending review as indicated in the Staff Report.

The County agrees with DWR's statement in the Staff Report that the assessment of alternatives should be "focused on the ability of an alternative to satisfy the objectives of SGMA".[4] The sustainable yield analysis and sustainability criteria presented in the Alternative were developed consistent with the County's understanding of SGMA objectives at the time of submittal in 2016. The County believes the analysis of basin conditions and sustainable yield presented in the Alternative and the sustainability criteria that the Alternative establishes are consistent with the objectives of SGMA and the stated intent of the Legislature. As noted in the Staff Report, the Alternative and associated technical studies are "based on the best available information and best available science, and … the conclusions in the reports are scientifically reasonable".[5]

The County disagrees with the Staff Report's interpretation of the requirements for alternatives. The County firmly believes the Alternative demonstrates the sustainable management of groundwater resources in the Napa Valley Subbasin (Subbasin) for a period of at least 10 years, consistent with the requirements of Water Code Section 10733.6(b)(3), and that the Alternative describes the County's approach to providing for continued sustainable groundwater management, which is the objective of SGMA.

Since December 2016, as DWR has provided more guidance to agencies implementing SGMA, the County has continued to refine aspects of the Alternative consistent with the more recent DWR guidance on the interpretation of the GSP regulations. Also, during that time, the County has continued to implement SGMA in the Napa Valley Subbasin consistent with

[1] Napa Valley Groundwater Sustainability: A Basin Analysis Report for the Napa Valley Subbasin (2016), including thirteen appended documents and key references described in Table 1-1.
[2] CA Water Code Division 6, Part 2.74
[3] California Code of Regulations (CCR) Title 23, Division 2, Chapter 1.5, Subchapter 2
[4] Alternative Assessment Staff Report, p. 5; related language on pp. 4, 8, and 9
[5] Alternative Assessment Staff Report, p. 24

management actions and recommendations presented in the Alternative and in furtherance of its active role in managing groundwater resources since 1991.[6]

Through the following responses to the Notification Letter and Staff Report, the County seeks to provide DWR with the clarification requested in its July 17 Notification Letter and to continue the exchange of information regarding preparation and review of the Alternative and SGMA implementation for the Napa Valley Subbasin that the County has consistently pursued for over three years. Concurrently, the County continues to track, analyze, and document basin conditions relative to the sustainability criteria, as demonstrated in two SGMA Annual Reports submitted to DWR since 2017 and the 2018 Napa Valley Subbasin Alternative Amendment. [7,8,9]

Subsequent sections of this document provide responses to primary (global) comments made in the Staff Report and the Notification Letter. These Global Comment Responses clarify information already provided in the Alternative and explain how the Alternative meets the objectives of SGMA. The global responses are followed by detailed responses to other technical comments provided in the Staff Report (Attachment A). Although not required or necessary, the County has additionally included a section describing enhancements to the Alternative to be incorporated as part of the first 5-year Update due by January 1, 2022 (see Attachment A).

[6] Napa Valley Subbasin Basin Analysis Report (2016), Section 9, Appendix I, and key reference in Table 1-1 (Task 5 Technical Memorandum; LSCE, 2011)
[7] Napa County Groundwater Sustainability: Annual Report – Water Year 2017 (2018)
[8] Napa County Groundwater Sustainability: Annual Report – Water Year 2018 (2019)
[9] Napa Valley Groundwater Sustainability, Northeast Napa Management Area: An Amendment to the 2016 Basin Analysis Report for the Napa Valley Subbasin (2018)

## Global Comment Response A - Requirements of Section 10733.6(b)(3)

SGMA defines an alternative as: (1) a plan developed pursuant to SGMA requirements; (2) management to an adjudication action; or (3) an analysis of basin conditions that demonstrates that the basin has operated within its sustainable yield over a period of at least 10 years (see excerpt below). In reviewing the legislation, Napa County considered the following:

- The County's commitment to groundwater management, including for the Napa Valley Subbasin, since at least 1991 and the County's active role in monitoring groundwater conditions since the mid-1960s.
- Formation of the Watershed Information & Conservation Council (WICC) in 2002. Comprised of 17 members, the WICC includes elected officials from the County and cities, representatives from the County's various communities, including environmental, agricultural, and other stakeholders. WICC members represent the entire county and the watersheds including surrounding groundwater basins and subbasins in the county.
- Accelerated efforts since the 2008 General Plan update to "Conserve, enhance and manage water resources on a sustainable basis to attempt to ensure that sufficient amounts of water will be available for the uses allowed by this General Plan, for the natural environment, and for future generations."[10]
- Formation of the Napa County Board of Supervisors (County BOS) appointed 15-member Groundwater Resources Advisory Committee (GRAC) in 2011 and final GRAC recommendations to the County BOS in 2014, including the development of a sustainability goal[11] and objectives before SGMA was enacted, with some GRAC members continuing to serve on the WICC since completion of the three-year GRAC term.
- The County's investment in seven years (2008 – 2014) of technical groundwater studies preceding SGMA; these studies were aligned with the technical information now required by the GSP regulations, including the requirements for GSPs and functionally equivalent Alternatives.
- Decades of observed stable groundwater levels and groundwater quality in the Napa Valley Subbasin.[12]
- Conditions documented in the Napa Valley Subbasin, including the shallow groundwater table with depths to groundwater ranging from 5 to 35 feet, the low irrigation requirement for vineyards that comprise the major land use type and source of applied

[10] Napa County 2008 General Plan Update, Goal CON-10
[11] Napa Valley Subbasin Basin Analysis Report (2016), Section 7 and Appendix A
[12] Napa County Groundwater Conditions Report (2011)

water demand in the Subbasin, a hydrogeologic setting conducive to recharge, and that the "Napa Valley Subbasin remains full overall."[13]

- The absence of basin-wide adverse effects based on the County's studies and historical reports and studies by others, including DWR.

These factors supported the County BOS decision to develop and submit the Napa Valley Subbasin Alternative under Section 10733.6(b)(3). This decision was based on the requirement that DWR would evaluate basin conditions, not previous management actions. This section requires the alternate to include "an **analysis of basin conditions** that demonstrates that the basin **has operated within its sustainable yield** over a period of at least 10 years" (emphasis added).[14]

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*California Water Code Division 6, Part 2.74, Chapter 10, Section 10733.6*

*(a) If a local agency believes that an alternative described in subdivision (b) satisfies the objectives of this part, the local agency may submit the alternative to the department for evaluation and assessment of whether the alternative satisfies the objectives of this part for the basin.*

*(b) An alternative is any of the following:*

*(1) A plan developed pursuant to Part 2.75 (commencing with Section 10750) or other law authorizing groundwater management.*

*(2) Management pursuant to an adjudication action.*

*(3) An analysis of basin conditions that demonstrates that the basin has operated within its sustainable yield over a period of at least 10 years. The submission of an alternative described by this paragraph shall include a report prepared by a registered professional engineer or geologist who is licensed by the state and submitted under that engineer's or geologist's seal.*

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The **analysis of basin conditions** in the Napa Valley Subbasin Alternative demonstrates that the basin has operated within its sustainable yield over a period of at least 10 years. The County chose to prepare an "analysis of basin conditions" alternative in recognition of all of the above effort and also based on the intent of the Legislature, including (Section 10720.1):

- To provide for the sustainable management of groundwater basins.

[13] Napa Valley Subbasin Basin Analysis Report (2016), p. 135
[14] CA Water Code § 10733.6(b)(3)

- To establish minimum standards for sustainable groundwater management.
- To avoid or minimize subsidence.
- To improve data collection and understanding about groundwater.
- To manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner.

These expressly stated intentions are focused on actions related to the future condition of the State's groundwater basins; these statements do not reflect an expectation of what entities should have done more than 10 years prior to January 1, 2017, particularly with respect to the establishment of "minimum standards for sustainable groundwater management".

Unlike the County, DWR seems to be interpreting Section 10733.6(b)(3) to require much more than an analysis of basin conditions. Instead of focusing the Alternative evaluation on the basin conditions, it appears DWR may be interpreting Section 10733.6(b)(3) to require functional equivalence of a groundwater sustainability plan. The Notification Letter (see excerpt below) states that "two factors are central to the [staff recommendation]: the apparent *lack of thresholds or other objective criteria* that would have defined sustainable groundwater management practices for the subbasin, and an apparent lack of evidence that the subbasin was *deliberately managed* to any defined standards" (emphasis added).[15] The Staff Report includes similar language that "An alternative based on a demonstration that the basin has operated within its sustainable yield over a period of at least 10 years may be approved based on information that demonstrates that *objective criteria defining operating standards that governed groundwater management for the basin were established and consistently achieved*."[16]

[15] Notification Letter, p. 1
[16] Alternative Assessment Staff Report, p. 5

> *"Multiple factors contribute to the staff recommendation, but two factors are central to the outcome: the apparent lack of thresholds or other objective criteria that would have defined sustainable groundwater management practices for the subbasin, and an apparent lack of evidence that the subbasin was deliberately managed to any defined standards….*
>
> *The staff recommendation centers on the evaluation that the County did not establish and operate the subbasin to thresholds or objective management criteria for a period of at least 10 years prior to the adoption of SGMA and, because of that, nothing constrains the definition of "sustainable yield" for the subbasin."*
>
> - *DWR Notification Letter dated July 17, 2019*

Nowhere does SGMA require that Napa County prove that it has "deliberately managed," "successfully managed" or even "has operated" the Subbasin to standards established 10 years ago. Section 10733.6(b)(3) requires approval of the Alternative so long as the analysis of conditions "demonstrates that the basin has operated within its sustainable yield over a period of at least 10 years."

By requiring "deliberate management" and "objective criteria defining operating standards that governed groundwater management," DWR redefines an "analysis of basin conditions" using standards that do not appear in Water Code Section 10733.6(b)(3) and standards that are inconsistent with Water Code requirements that existed prior to SGMA.

The Legislature described an analysis of basin conditions as one "that demonstrates that the basin has operated within its sustainable yield over a period of at least 10 years."[17] **SGMA does not require an alternative demonstrate the basin was "deliberately managed" rather Section 10733.6(b)(3) calls for demonstrating that the *basin has operated within its sustainable yield*. In plain language, the Legislature specified that an alternative submitted as an analysis of basin conditions must show how the basin has functioned or how the basin has behaved.** Section 10733.6(b)(3) does not require "objective criteria defining operating standards that governed groundwater management," as the Staff Report asserts.

Section 10733.6(b)(3) uses the term "sustainable yield," which is defined in SGMA. It is unreasonable for DWR to require an alternative demonstrate the basin was managed in 2007 to meet definitions created for the first time in 2014.

If Section 10733.6(b)(3) required demonstration that a basin was managed to the six sustainability indicators identified in SGMA, using minimum thresholds or other identified management actions, no alternative could be successful as the requirements of SGMA could

[17] CA Water Code § 10733.6(b)(3)

not be predicted. Further, under the requirements that DWR staff are attempting to read into SGMA, this would not be called an alternative at all, but rather would simply be a plan that complies with the requirements of SGMA. In that case, the basin would submit the GSP not as an alternative, but as a Plan.

With respect to the Napa Valley Subbasin Alternative, it is more reasonable to infer from Section 10733.6(b)(3) that the Legislature was interested in an analysis of basin conditions to *demonstrate that the conditions were sustainable over a long period* (at least 10 years) and that, through all the other requirements contained in SGMA and the GSP regulations for an Alternative to a GSP, sustainability criteria would be developed and presented in the Alternative to *ensure that the Subbasin would remain sustainable*. It is unreasonable to invoke a definition of sustainable yield that encompasses all of the newly defined sustainability criteria and require that the County was "deliberately managing" the Napa Valley Subbasin to those criteria more than 10 years prior to the adoption of SGMA.

The Alternative includes an analysis of basin conditions that demonstrates that the Subbasin has operated within its sustainable yield over a period of 28 years. In addition to this demonstration, the Alternative also presents new SGMA sustainability criteria, including the sustainability goal, undesirable results, measurable objectives, and minimum thresholds. These sustainability criteria were considered when assessing whether Subbasin conditions had been sustainable over the 28-year analysis period. As per the intent of the Legislature (Section 10720.1) and the County BOS approval of the Alternative including the sustainability goal, the County continues to track, analyze, and document basin conditions relative to the sustainability criteria, as demonstrated in two SGMA Annual Reports submitted to DWR since 2017 and the 2018 Napa Valley Subbasin Alternative Amendment. The County's response to the SGMA requirements is consistent with the objectives of SGMA and the spirit and intent of the Legislature.

Summary:

- The Napa Valley Subbasin Alternative was prepared consistent with the plain language of SGMA (Water Code Section 10733.6(b)(3)) as "an **analysis of basin conditions** that demonstrates that the basin **has operated within its sustainable yield** over a period of at least 10 years" (emphasis added).
- No groundwater management legislation prior to SGMA and the GSP regulations required any determination of basin conditions, sustainability indicators, quantifiable measures of sustainability, or reporting.
- SGMA introduced new terms to the Water Code, including *sustainable yield* and *undesirable results*. The GSP regulations also brought new terms to the Water Code, including *sustainability indicator* and *minimum threshold*.

- The Staff Report introduces language such as “deliberately managed” and “objective criteria defining operating standards that governed groundwater management” to redefine an “analysis of basin conditions” using standards that do not appear in Section 10733.6(b)(3) and are inconsistent with Water Code requirements that existed prior to SGMA.

- It is unreasonable to invoke a definition of sustainable yield that encompasses all of the newly defined sustainability criteria and require that the County was “deliberately managing” the Napa Valley Subbasin to those criteria more than 10 years prior to the adoption of SGMA.

- With respect to the Alternative and 10-year analysis of basin conditions, DWR staff is misinterpreting the intent of the Legislature and holding the County to a higher standard than intended by the Legislature with respect to the requirement to demonstrate “the basin has operated within the sustainable yield.”

- The Alternative demonstrates the Subbasin has operated within its sustainable yield for at least 10 years.

- The Alternative also developed new SGMA sustainability criteria, including the sustainability goal, undesirable results, measurable objectives, and minimum thresholds. These sustainability criteria were considered when assessing whether Subbasin conditions had been sustainable over the 28-year analysis period.

## Global Comment Response B - Sustainability Criteria and Undesirable Results

As set forth above, the County respectfully disagrees with DWR Staff's interpretation of the requirements of an Alternative pursuant to section 10733.6(b)(3). However, the County believes it has complied with these requirements, despite the disagreement.[18] Specifically, the County is able to demonstrate that the Napa Valley Subbasin has been sustainably managed for more than 10 years in a manner that would be the functional equivalent to the requirements of SGMA, including defining undesirable results and demonstrating active management has avoided such results.[19] The Alternative presents those criteria in the context of prior management goals and groundwater management actions implemented to achieve those goals.

GSP regulations do not require criteria for sustainability indicators where an Agency (e.g., Napa County) "is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur. The Alternative nevertheless defines criteria for all six sustainability indicators based on the best available information about Subbasin conditions.[20] The purpose of including the criteria is to demonstrate the County's commitment to achieving the objectives of SGMA for the Napa Valley Subbasin by defining quantifiable criteria to ensure conditions are maintained or improved and to avoid significant and unreasonable effects due to groundwater conditions occurring throughout the basin, consistent with the definition of undesirable results established by SGMA.[21]

The Alternative achieves the objectives of SGMA because it defines criteria for all sustainability indicators, even though undesirable results have not historically occurred.

Based on seven years of prior technical studies and "an understanding of hydrogeologic conditions and management measures that demonstrate the basin has already been operated within the sustainable yield for at least 10 years,"[22] and the intent of the Legislature to provide for the sustainable management of groundwater basins, the County BOS approved the Alternative and the sustainability goal to "maintain groundwater sustainability indefinitely without causing undesirable results, including unacceptable economic, environmental, or social consequences." There is no mistaking the County BOS approved the Alternative with the understanding that the Napa Valley Subbasin was already sustainable and had not experienced undesirable results, as defined in the Alternative. The sustainability goal also demonstrates the County's commitment to maintain those conditions and to continue managing the basin to avoid undesirable results.

The SGMA sustainability criteria defined in the Alternative were established consistent with the County's understanding of SGMA in 2016. In November 2017, 11 months after the

[18] The County is in no way waiving its stated objections to the DWR interpretation or otherwise agreeing to forego any legal right to challenge DWR's interpretation and/or denial on this basis.
[19] Napa Valley Subbasin Basin Analysis Report (2016), Section 7
[20] Napa Valley Subbasin Basin Analysis Report (2016), Section 7.4
[21] CA Water Code § 10721(x)
[22] Napa Valley Subbasin Basin Analysis Report (2016), p. 134

deadline for DWR to receive alternatives, DWR published a draft Best Management Practices (BMP) document on the development of sustainable management criteria for agencies implementing SGMA.[23] The County reviewed the draft BMP and incorporated the new guidance into the January 2018 Amendment to the Napa Valley Subbasin Alternative (2018 Alternative Amendment) (see Global Comment Response E). The 2018 Alternative Amendment includes refined definitions for undesirable results in the Napa Valley Subbasin to better align the Alternative with guidance from DWR. These refinements did not change the minimum thresholds or measurable objectives presented in the Alternative; the refinements describe how an undesirable result would be identified based on representative monitoring sites and minimum threshold exceedances. As of October 2019, the Sustainable Management Criteria BMP has not yet been finalized by DWR.

The analysis of sustainable yield was developed for the Alternative, consistent with the definition created by the Legislature in 2014, with consideration of undesirable results in the Subbasin. Groundwater conditions information presented in Section 4 of the Alternative and in the 2011 Groundwater Conditions Report (submitted on December 16, 2016 with the Alternative) demonstrate that minimum thresholds established in the Alternative were not exceeded in such a way (i.e., "throughout the basin", as defined by SGMA[24]) that would constitute an undesirable result for the Subbasin. As noted above, the GRAC developed a sustainability goal and objectives in February 2014 prior to enactment of SGMA, the County BOS approved that goal in April 2014, and the County BOS expanded and reaffirmed the sustainability goal through approval of the Alternative.[25] The sustainability goal emphasizes the County's commitment to maintaining existing sustainable groundwater conditions and to continue managing the basin to avoid undesirable results.

DWR has recently conducted various independent analyses of groundwater conditions and related factors for the Napa Valley Subbasin. Information summarized by DWR in Bulletin 118 and related to California Statewide Groundwater Elevation Monitoring (CASGEM) program ranking shows no indication of impacts related to groundwater conditions in the Napa Valley Subbasin that rise to the level of adverse impacts pre-SGMA.

DWR has reported groundwater conditions information on the Napa Valley Subbasin in Bulletin 118 (see excerpt below, last updated June 30, 2014).

> *The Napa River and several tributaries, the largest of which is Conn Creek, drain the subbasin. Flow in the tributary streams is intermittent, yet flow continues in the Napa River during months of little or no precipitation. Flow during these dry periods is the result of groundwater discharge. The average annual net gain to the*

[23] DWR. 2017. *DRAFT Best Management Practices for the Sustainable Management of Groundwater, Sustainable Management Criteria*, November 2017.
[24] CA Water Code § 10721(x)
[25] Napa Valley Subbasin Basin Analysis Report (2016), p. 134

> *Napa River is estimated to be 12,700 acre-feet per year (AFY) (Montgomery 1991).*
>
> *Most of the wells currently monitored by the Department of Water Resources and Napa County are screened in the alluvial deposits of the Napa Valley. Annual fluctuations generally range from 5 to 10 feet. Long-term fluctuations generally follow climatic trends, with the lowest levels approximately corresponding to the 1976-1977 drought.* ***In general the long-term water levels in most of the county have remained unchanged*** (emphasis added)***.*** *An exception to this is the "Milliken-Sarco-Tulucay Creeks Area" located east and northeast of the city of Napa.*
>
> - *Bulletin 118 – Update 2003, Basin Description: Napa-Sonoma Valley Groundwater Basin, Napa Valley Subbasin*
>
> *(Note: the "Milliken-Sarco-Tulucay Creeks Area" (also referred to as the MST subarea) is characterized by hard rock and non-alluvial water bearing deposits and located largely outside the Napa Valley Subbasin; see Napa Valley Subbasin Basin Analysis Report (2016) Section 4.1.1.2, Figure 4-7, and Section 9.2.3.)*

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In November 2009, Senate Bill SBX7-6 mandated that the groundwater elevations in all basins and subbasins in California be regularly and systematically monitored with the goal of demonstrating seasonal and long-term trends in groundwater elevations. In accordance with the mandate, DWR developed the CASGEM program. As described in the Alternative (Section 1), on December 29, 2010, the County applied to DWR to become the local countywide Monitoring Entity responsible for designating wells as appropriate for monitoring and reporting groundwater elevations for purposes of the CASGEM program. The wells selected by the County for the CASGEM program are a *subset* of all the wells being monitored in the Subbasin (i.e., the County has a much larger overall monitoring network). The County's participation in the CASGEM program complements other groundwater monitoring that has been ongoing in Napa County for nearly 100 years (the earliest groundwater monitoring data were collected in 1920).

As described in the Alternative (Section 1), under the CASGEM program, DWR prioritized California's groundwater basins and subbasins based on evaluation of eight criteria, including population, reliance on groundwater, and the number of wells in a basin or subbasin. In Napa County, the Napa Valley Subbasin was ranked medium priority. The prioritization criteria utilized by DWR in 2014 primarily recognized the importance of groundwater in the Subbasin. However, in a 2019 re-evaluation of the prioritization, DWR also considered additional criteria, including documented impacts on groundwater (Component 7) and other information determined to be relevant including adverse impacts on local habitat and local streamflows (Component 8). DWR's 2019 ranking changed the Napa Valley Subbasin to high priority because of the importance of groundwater, which Napa County agreed with (Napa County comment letter to DWR dated April 2019). DWR's final determination of this ranking

(April 2019) contained the following findings relating to basin conditions, including Components 7 and 8:

- Component 7: “No documented groundwater level declines”
- Component 7 “No documented saline intrusion”
- Component 7: “No documented groundwater extraction induced inelastic subsidence”
- Component 8: Habitat and streams were identified as being present; “0” priority points were assigned by DWR for Components 8a, 8b, and 8c & 8d

It is evident that DWR’s April 2019 updated basin ranking showed no indication of documented impacts on groundwater within the basin or adverse impacts on local habitat and streamflow. Coupled with DWR’s (2014) description of **“long-term water levels in most of the county have remained unchanged,”** DWR’s April 2019 findings are clearly not based on just recent conditions.

## Global Comment Response C - Avoiding Undesirable Depletions of Interconnected Surface Water

The Alternative describes how the hydrogeologic conditions and interconnected nature of groundwater and surface waters in the Napa Valley Subbasin make streamflow depletion caused by groundwater conditions the most sensitive sustainability indicator for the Subbasin as a whole. For representative monitoring sites used to track multiple sustainability indicators, the Alternative defines minimum thresholds and measurable objectives with a focus on conditions that would constitute an undesirable result for the most sensitive sustainability indicator. The Alternative uses multiple analyses to demonstrate the suitability of groundwater elevations as a proxy metric for the streamflow depletion sustainability indicator and the absence of undesirable results during the base period from 1988 to 2015 (see additional discussion below). For representative monitoring sites where criteria are established for the avoidance of undesirable results due to depletions of interconnected surface water, those criteria also serve as criteria for other sustainability indicators, including chronic lowering of groundwater levels, reductions in groundwater storage, and land subsidence. The same groundwater elevation criteria established to avoid undesirable results due to depletions of interconnected surface water are used as criteria for other sustainability indicators, and they are set in such a way that is protective of all applicable indicators. This approach provides consistency with the objectives of SGMA by recognizing that groundwater conditions relevant to multiple sustainability indicators can be interrelated at a given monitoring site.

### Absence of Undesirable Results from 1988 to 2015

The Staff Report raises several concerns regarding the establishment of sustainability criteria for depletions of interconnected surface water.[26] The Alternative presents information regarding the undesirable results of interconnected surface waters. Specifically, the 2018 Alternative Amendment refined the definition of undesirable results for interconnected surface waters in the Subbasin as: (1) A reduction to the historical timing and duration of hydraulic connection between groundwater and surface water along the Napa River or its tributaries; OR

(2) Reduction of surface water flows compared to historic flows due to groundwater extraction.[27]

These undesirable results were extrapolated from County action and policy. The 1999 GW Conservation Ordinance included direction the County "assess any impact on the affected groundwater table . . . and the interference with surface water flows, or other adverse changes to the physical environment." The 1999 General Plan Amendment which explained the reason for its adoption of a groundwater permit system was, in part, to avoid the interference with

[26] Staff Report, pp. 24-25.
[27] Napa Valley Subbasin Alternative Amendment (2018), p. 17

"surface water flow."[28] In County Ordinance No.1162, the County Amended the County Code finding that groundwater regulation was necessary to address future "inadequacies in surface and groundwater supplies" and that "although adequate groundwater reserves may still be present in certain portions of the county, an overdraft in groundwater reserves is likely to be present . . . within the next several years unless the Board adopts long-term plans and use requirements regulating the extraction and use of groundwater in Napa County."[29]

The Alternative demonstrates, through the analysis of historical baseflow conditions, that management of the Subbasin has avoided the undesirable results defined above. Specifically, the Alternative demonstrates that active management has resulted in:[30]

- No substantial change in the relationship between no-flow conditions and rates of groundwater pumping during the base period and more recent years. Instead, precipitation is the much more dominant variable in the control of baseflow in the Subbasin.[31]

Section 4.2 of the Alternative describes that " Reaches of the Napa River, along its lower streambed surface, or thalweg, have over many decades (since the 1930s) experienced low to no-flow conditions during the fall as groundwater discharge into the stream channel decreases as a function of seasonal fluctuations of the water table and fall groundwater declines (Faye, 1973; Grossinger, 2012)."[32] Figure 4-22 demonstrates the seasonal and annual streamflow variability since the 1930s with data recorded at the two sites with the longest records in the Subbasin, U.S. Geological Survey gauges at St. Helena and near Napa.

Sections 4.2.2 and 4.2.3 of the Alternative provide additional detail regarding streamflow variability observed historically in the Subbasin and the relationship with water year type (see excerpt below).

*Historically the annual streamflow hydrograph for both the Napa River near Napa and the Napa River near St. Helena gauges have typically exhibited periods of low or no streamflow conditions. This has been characterized in prior USGS investigations by Faye (1973), which observed that the Napa River was perennial except during years of less than normal rainfall. Faye (1973) highlights that the Napa River did not flow for a significant amount of time during the 1930 and 1931 water years as a result of low precipitation and groundwater levels. Grossinger (2012) also explores the steep seasonal recession in Napa River flow observed in*

[28] Cave T., Johanson K., Redding J., Westermyer, R. 1999. General Plan Amendment #GPA98-04 and Napa County Code Amendment #98279-ORD [Staff Report to the Conservation, Development and Planning Commission]. Napa, CA. April 7, 1999. p. 5
[29] County of Napa. 1999. Napa County Ordinance No.1162. Adopted August 3, 1999. p. 4
[30] Napa Valley Subbasin Basin Analysis Report (2016), Section 4.2.3
[31] Napa Valley Subbasin Basin Analysis Report (2016), p. 60
[32] Napa Valley Subbasin Basin Analysis Report (2016), pp. 53 - 54

> *1910-11. The number of days in each year of the historical records at the USGS Napa River near St. Helena and Napa River near Napa gages during which measured flows less than 0.1 CFS are presented in **Figures 4-28a and 4-28b**. These data illustrate the historical occurrence of seasonal low flow conditions. During drier years, the low/no flow conditions typically start in early summer (June) with a greater number of days with low or no streamflow whereas during wetter years such low or no flow conditions tend to first occur in October and there are no or relatively fewer days experiencing low or no streamflow.*
>
> \- *Napa Valley Subbasin Basin Analysis Report (2016), pp. 55 - 56*

Section 4.2.2 of the Alternative also includes numerous analyses of baseflow conditions, comparing baseflow observed since the 1930s to baseflow observed during the hydrologic base period of 1988 to 2015. Analyses of daily mean baseflow demonstrate no significant difference between the base period data as compared to the entire historical period (see Figures 4-35 and 4-36, discussion excerpted below). Relatively minor differences noted "[correspond] with prior baseflow analyses results that show generally drier water years and lower streamflow conditions during the base period compared to the whole historical record."[33]

> *To determine to what extent water year types exert an influence on baseflow conditions in the Napa River near Napa, daily averages were computed for each grouping of the water year types that fell within the entire period of record as well as the base period (**Figure 4-35**). The average baseflows for various water year types shown on **Figure 4-35** reveals that the Napa River near Napa historically approaches little to no flow conditions in September during very dry water years. All other water year types appear to maintain baseflow above 0.1 CFS in terms of the daily averaging approach (**Figure 4-35**). Results from the same approach when applied to the Napa River near St. Helena station (**Figure 4-36**) shows a similar magnitude in distribution between average baseflows by water year types compared to the Napa River near Napa average baseflow results (**Figure 4-35**).*
>
> \- *Napa Valley Subbasin Basin Analysis Report (2016), p. 56*

The Alternative also evaluates the effects of groundwater pumping and precipitation, as an indicator of water year conditions, on Napa River baseflow variability. Although a correlation exists between groundwater pumping and no-flow conditions, the correlation between precipitation and no-flow conditions was found to be far more influential (see excerpt below). An additional analysis of the correlation between groundwater pumping and Napa River baseflow found no "substantial change in the relationship between no flow conditions and rates of

[33] Napa Valley Subbasin Basin Analysis Report (2016), p. 57

groundwater pumping between the 1988 to 2015 base period and more recent years [the period from 1995 to 2015]."[34]

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> *While the individual correlation coefficients address the relative strength of relationships between baseflow in the Napa River and precipitation, groundwater levels, and groundwater pumping in the Subbasin individually, a multiple linear regression analysis was performed to assess the degree to which groundwater pumping and precipitation, as independent variables, together correlate with baseflow. The analysis used monthly baseflow volumes calculated for the Napa River near Napa gage, monthly interpreted precipitation volumes for the Subbasin, and monthly groundwater pumping volumes calculated by the Root Zone Model. Cumulative monthly precipitation and groundwater pumping data were normalized for this analysis in order to account for the seasonal nature of both precipitation and groundwater pumping in the Subbasin. Regression coefficients suggest that the influence of precipitation and groundwater pumping on baseflow were, on average, 79% and 21%, respectively for the 1988 to 2015 period (**Table 4-6**). The multiple regression shows a strong coefficient of multiple correlation (multiple R = 0.97) and a high coefficient of determination ($R_2$ = 0.94). These coefficients show that precipitation and groundwater pumping are the primary controls of baseflow in the Subbasin, with precipitation being the much more dominant variable.*
>
> \- *Napa Valley Subbasin Basin Analysis Report (2016), p. 60*

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These baseflow analyses findings are consistent with the results of the Root Zone Model and water budget analysis presented in Section 6 of the Alternative. Through calculations of monthly root zone inflows, outflows and changes in storage, including applied water demands, across more than 16,000 land use units in the Subbasin, the Root Zone Model analysis shows that the Subbasin experienced more than five times as much recharge as outflow due to pumping on an average annual basis (see excerpt below). The Alternative also describes that even during the recent drought period from 2012 to 2015 average annual groundwater recharge processes amounted to more than twice the amount of groundwater pumped on average over the same period.[35]

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> *The results of the Root Zone Model analysis for the base period from the 1988 to 2015 show groundwater recharge to always exceed groundwater pumping within the Subbasin on a year-to-year basis, resulting in a net positive contribution to groundwater storage. Over the base period, average annual groundwater*

[34] Napa Valley Subbasin Basin Analysis Report (2016), p. 60
[35] Napa Valley Subbasin Basin Analysis Report (2016), p. 130

*recharge is calculated to be 68,900 AF, while average annual groundwater pumping to meet irrigation demands is 12,200 AF, with an average annual net contribution to groundwater storage of 56,700 AF.*

- *Napa Valley Subbasin Basin Analysis Report (2016), p. 105*

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Together these results support the conclusion that groundwater extractions during the 1988 to 2015 base period did not cause streamflow depletion beyond historic levels and therefore did not constitute an undesirable result.

The 2018 Napa Valley Subbasin Alternative Amendment (Amendment) provides further analysis of the effect of groundwater conditions on interconnected surface water using a MODFLOW numerical model developed as part of the Special Study described in Section 7.6 of the Alternative. The Amendment includes, as Appendix A, the Special Study report documenting development of the MODFLOW model for a portion of the Subbasin and presents the findings developed through application of the model.[36] The analyses presented in the Amendment and the Special Study report support and extend the findings of the Alternative (see Global Comment Response E). Among the additional analyses is a multiple linear regression analysis of flows into the Subbasin alluvial aquifer and flows leaving the subsurface as discharge to the Napa River (i.e., stream leakage). That analysis found that over the 1988 to 2015 base period groundwater pumping accounted for 8% to 13% of the variability in Napa River streamflow. The same analysis found that other effects related to climate and water year conditions account for 87% to 92% of Napa River streamflow variability (see excerpt below). The County's regulation of land use and groundwater use has contributed to the stable groundwater levels observed since 1988 and minimized the impact to streamflow (see Global Response D). The County's management actions including regulation have resulted in the avoidance of undesirable results, which is defined as lowering surface water flows beyond historic levels due to groundwater pumping, as demonstrated by the analysis showing that pumping accounts for such a minimal portion of streamflow variability.

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*Statistical analyses of water budget components (including recharge, lateral flows and pumping) relative to stream leakage (groundwater contributions to Napa River baseflow) show that, over the 28-year base period, climate effects have a much greater influence on stream leakage than pumping. Climate-driven variables account for 87 to 92% of the effect on groundwater discharge to Napa River, while pumping contributes to 8 to 13% of the effect on groundwater discharge to the River."*

- *Napa Valley Subbasin Alternative Amendment (2018), p. 14*

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[36] Northeast Napa Special Groundwater Study (2017)

Importantly, groundwater elevation data show that minimum thresholds were not exceeded at the six representative monitoring sites with longer-term records (i.e., more than 10 years), and undesirable results did not occur. Hydrographs for these six representative monitoring site wells are shown in Figures 4-6 and 4-7 in the Alternative and the minimum threshold values are provided in Table 7-3 (p.142).

**Suitability of Groundwater Elevations as Proxy Metric for Streamflow Depletion**

The Staff Report comments that "The Basin Analysis Report did not describe why the groundwater levels selected were a suitable proxy for undesirable results associated with depletions of interconnected surface water."[37] The selected groundwater levels reflect historic conditions. Because undesirable results for interconnected surface waters is defined as reduction in the historic timing/duration of interconnection or reduction in historic surface water flows due to groundwater extraction, the groundwater levels were selected as a proxy to determine if undesirable results occur. The Alternative describes in considerable detail historical streamflow and baseflow conditions and analyses of surface water and groundwater interconnections that provide the rationale for the use of groundwater elevations as a proxy for other sustainability indicators, particularly for streamflow depletion.[38] The Alternative discusses the correlation analysis of groundwater levels (i.e., groundwater elevation) and streamflow gauge data on pages 59 and 60. Figures 4-48 and 4-49 and Appendix G provide graphs showing the correlation between groundwater elevation in monitored wells and streamflow at sites in the Subbasin. The Alternative presents the following key considerations related to undesirable results from depletion of interconnected surface water:

- The baseflow data evaluated represented the best available data at the time the Alternative was prepared.
- The baseflow data used in the analysis are consistent with the conceptual model and Subbasin water budget analysis presented in the Alternative.
- The summer to fall period represents the time when the river system is most sensitive to this sustainability indicator.[39]
- While streamflow depletion is the specified sustainability indicator, for reasons described in the Staff Report (p. 26), baseflow and groundwater level (i.e., groundwater elevation) data are available in real-time for immediate use and evaluation.

Section 7.3 of the Alternative describes that groundwater elevations provide a suitable proxy metric for the streamflow depletion with consideration for the type of impacts resulting from streamflow depletion that are more likely to occur in the Subbasin, particularly depletions during the summer and fall.

[37] Staff Report, p. 26
[38] Napa Valley Subbasin Basin Analysis Report (2016), Sections 4 and 7
[39] Napa Valley Subbasin Basin Analysis Report (2016), p. 136-141

*Groundwater elevations are used at many sites for monitoring a number of sustainability indicators. As discussed in Chapter 4, there are strong relationships between surface water flow measured at gages along the Napa River system and groundwater level trends. Since the river system is the most sensitive sustainability indicator in the Napa Valley Subbasin, minimum thresholds and measurable objectives that are set to be protective of the river system (i.e., established to prevent the occurrence of further depletion of surface water that has significant and unreasonable adverse impacts on beneficial uses of the surface water, including avoidance of longer durations of no flow days in summer to fall at some locations) and ensure groundwater sustainability necessarily preclude the occurrence of undesirable results. By maintaining groundwater elevations at the selected representative monitoring sites at levels comparable to the hydrologic base period, this precludes the occurrence of significant and unreasonable chronic groundwater level declines, reduction of groundwater storage, land subsidence, and seawater intrusion.*

- *Napa Valley Subbasin Basin Analysis Report, Section 7.3, pp. 136 - 137*

Sixteen representative monitoring sites were selected for monitoring groundwater elevations as a proxy for the streamflow depletion sustainability indicator. Six of these representative monitoring sites have long periods of record, and the other 10 sites include newer groundwater monitoring facilities specially designed and constructed to assess surface water and groundwater interaction as part of a DWR Local Assistance Grant. The 16 representative monitoring sites are distributed throughout the Subbasin and the best available data for these sites were used to develop minimum thresholds.[40] The Alternative recognizes that for representative monitoring sites where long-term periods of record are not available, as in the case of the dedicated monitoring wells constructed in 2014 to monitor groundwater-surface water interactions, minimum thresholds established will be reviewed and reevaluated in future years as the collection of monitoring data expands to better reflect long-term conditions and variability at each site.[41]

The GSP regulations state that the "Department shall provide the California Central Valley Groundwater-Surface Water Simulation Model (C2VSIM) and the Integrated Water Flow Model (IWFM) for use by Agencies in developing the water budget", and the County agrees that such modeling tools can be used to estimate the "rate or volume of surface water depletions caused by groundwater use."[42] However, such a numerical modeling tool has not yet been developed that would be adequate to estimate a rate or volume of surface water depletion across the entire Subbasin, although steps made by the County towards development of a

[40] Napa Valley Subbasin Basin Analysis Report (2016), p. 138
[41] Napa Valley Subbasin Basin Analysis Report (2016), p. 139
[42] Water Code Section 354.28 (c)(6)

groundwater/surface water model for the Subbasin have occurred since submittal of the Alternative.[43]

Accordingly, per SGMA, “an Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.”[44] Even with an integrated groundwater-surface water model, groundwater elevations will continue to serve as a metric and an important real-time indicator for tracking basin conditions, including the relationship between surface water and groundwater. A numerical groundwater flow model will be helpful for estimating surface water depletion caused by groundwater extraction under different scenarios.

[43] Napa Valley Subbasin Basin Analysis Report (2016), p. 186 (Recommendation 4.1c)
[44] Water Code Section 354.28 (d)

## Global Comment Response D - Management Actions and Their Consistency with SGMA

The Alternative describes "the management actions, education and outreach, and projects that the County has implemented and will continue to use, along with other potential future programs, to achieve the sustainability goal for the basin."[45] The Notification Letter states that "two factors are central to the [staff recommendation]: the apparent *lack of thresholds or other objective criteria* that would have defined sustainable groundwater management practices for the subbasin, and an apparent lack of evidence that the subbasin was *deliberately managed* to any defined standards" (emphasis added).[46] As detailed in Global Response A, the County disagrees with DWR's interpretation of Section 10733.6(b)(3). Despite this disagreement, the County believes there is ample information demonstrating the County's groundwater management which has occurred for over two decades prior to submittal of the Alternative. The County appreciates the opportunity to clarify its prior approach in this response and to address the two factors that are central to the July 17 staff recommendation. The County is providing copies of documentation referenced in the following paragraphs as part of its response to the July 17 Staff Report.

#### Pre-SGMA Thresholds and Management

Prior to the passage of SGMA, the County had, for over two decades, acted to conserve and preserve groundwater resources and protect beneficial uses and users throughout the county, including the entirety of the Napa Valley Subbasin, consistent with the objectives of SGMA. Groundwater management actions taken by Napa County since 1991 are consistent with the objectives of SGMA and have included setting objective criteria to avoid undesirable results, identified as avoiding overdraft, maintaining historic groundwater level, protecting against water quality degradation, land subsidence, preventing increased surface water flow reductions, and other adverse environmental impacts.[47] Beginning in 1991, 25 years prior to submittal of the Alternative the County has acted deliberately to manage groundwater by taking the following actions :

- Limiting development in the unincorporated areas by increasing the minimum parcel size to 40 acres beginning in 1973 for the upland (hillside) areas surrounding the Napa Valley Subbasin and beginning in 1979 for the Napa Valley floor (Napa Valley Subbasin).[48]

- Conducting an **analysis of safe yield** for the Napa Valley aquifer system in 1991.[49]

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[45] Napa Valley Subbasin Basin Analysis Report (2016), p. 159
[46] Notification Letter, p. 1
[47] Napa County Ordinance No. 1162
[48] Napa County Ordinance No. 610
[49] James M. Montgomery Consulting Engineers (Montgomery). 1991. *Water Resource Study for the Napa County Region*. Prepared for Napa County Flood Control and Water Conservation District. January 1991. 148 p.

- Establishing **typical rates of water use across residential, agricultural, commercial, and industrial sectors** beginning in 1991.[50]

- Applying water use thresholds to the review and permitting of proposed new or modified uses of groundwater through **acre-foot per acre water use criteria with the intent to restrict overall groundwater use in Napa Valley to levels not exceeding the safe yield** beginning in 1991.[51]

- Enacting a **temporary moratorium on new well construction** in response to concerns about groundwater conditions in certain areas from 1996 through 1998, pending development of new county-wide regulations on the extraction and use of groundwater.[52]

- **Codifying the groundwater management program** in the County Code of Ordinances with the intent of **avoiding overdraft** and related concerns including **subsidence**, **groundwater level declines**, **water quality degradation**, and "**other adverse environmental impacts**" through procedures for groundwater permitting, including technical analysis and acre-foot per acre **water use criteria**, and **processes for public hearing and appeal** of County groundwater permitting decisions beginning in 1999.[53]

- Creating stakeholder advisory groups, including the Watershed Information and Conservation Council (WICC) and Groundwater Resources Advisory Committee (GRAC), to receive public input and provide recommendations to the County Board of Supervisors (County BOS) in decision-making related to county-wide natural resources management goals, policies, and regulations since 2002.[54,55]

- Updating and expanding County natural resources policies and goals through the County General Plan in 2008 to **"conserve, enhance and manage water resources on a sustainable basis to attempt to ensure that sufficient amounts of water will be available for the uses allowed by this General Plan, for the natural environment, and for future generations" (Goal CON-10)**.[56]

- Authorizing comprehensive studies and monitoring of groundwater conditions and regular reporting on groundwater conditions beginning in 2009.[57]

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[50] Redding, J. R. 1991. Water Availability Analysis Policy. Public Works Department Report on Water Availability Analysis [Memorandum] and Water Availability Analysis [Staff Report]. Napa, CA: Napa County Department of Conservation, Development, and Planning. February 27, 1991.
[51] Redding, 1991
[52] Napa County Ordinance Nos. 1117 (1996), 1119 (1997), 1130 (1997)
[53] Napa County Ordinance No. 1162
[54] Napa County Resolution No. 2011-79
[55] Napa County Resolution No. 02-103
[56] County of Napa. 2008. General Plan Update
[57] LSCE. 2011. *Napa County Groundwater Conditions and Groundwater Monitoring Recommendations*, prepared for Napa County Department of Public Works February 2011.

**Early Groundwater Management**

Napa County has proactively managed its environmental resources through land use controls and other regulations for over five decades. Although the terminology was different, the County BOS understood even in the 1960s that the “sustainable yield” should not be exceeded. They were concerned about water, air quality, roads capacity, open space, and other environmental and quality of life indicators. From 1966 to 1968, dozens of public hearings were held, and resulted in the passage of Ordinance No. 274, which established a 20-acre minimum parcel size on the valley floor, famously is known as the Agricultural Preserve. The “Ag Preserve” is the predominant zoning in the area that makes up today’s Napa Valley Subbasin. The County was immediately sued to overturn the new ordinance, but in 1971 the California Supreme Court upheld the validity of the ordinance. By strictly limiting the ability to create small parcels, the County BOS forever limited the amount of development that could occur in the valley and, correspondingly, the amount of groundwater that would be needed to support that development. Active groundwater monitoring was ongoing even then, and that information was included in the BOS’ thought processes (among many other factors) as they acted to create the Ag Preserve.

In 1973, the minimum parcel size in the Ag Watershed (essentially all of the hillside areas that make up the greater Napa Valley watershed) was established at 40 acres, preserving the runoff and recharge potential of the valley and its surroundings. In 1979, Ordinance No. 610 passed, raising parcel sizes in the Ag Preserve from 20 acres to 40 acres, effectively reducing future development in the valley even further.

In 1980, a voter approved initiative know as Measure A was passed, limiting housing growth in the unincorporated county to less than 1% per year (actual growth has been less than that).

In the 1980s as development pressures continued to grow, and monitoring of such resources as groundwater, surface water, air quality, and other resources continued to concern county officials and the population at large, many new initiatives were started. Then in 1990:

- The County BOS passed the Winery Definition Ordinance, which defined and greatly limited what could occur at a winery;
- The County BOS enacted the Conservation Regulations, which provided strict new rules for how and where vineyards could be constructed and how erosion and runoff would be managed to the benefit of the watershed;
- The voters continued their efforts, passing Measure J, which essentially locked in the Ag Preserve for 30 years by prohibiting the conversion of agricultural lands to non-agricultural uses without a vote of the people. In 2008, voters approved Measure P to extend Measure J subdivision prohibitions through 2058.

**Water Availability Analysis Procedure**

In 1991, the County Planning Commission approved an administrative process proposed by the Director of the Department of Conservation, Development and Planning, requiring use permit applicants and applicants seeking parcel subdivisions to provide a Water Availability Analysis (WAA) to demonstrate that proposed uses of groundwater would not result in impacts to neighboring wells nor on the overall aquifer system (the procedure applies to applications in all areas of the county, including those within Bulletin 118 groundwater basins and areas outside of Bulletin 118 groundwater basins).[58] The procedure established groundwater use thresholds across residential, agricultural, commercial, and industrial sectors. The policy also specified the water use thresholds would be used to evaluate proposed new or modified uses of groundwater through acre-foot per acre water use criteria with the intent to restrict overall groundwater use in Napa Valley to achieve long-term sustainability.[59]

As documented in the Napa County memorandum dated February 27, 1991, adopted by the Planning Commission, the 1991 Water Availability Analysis procedure, included water demand criteria for Napa Valley based on safe yield analyses published by the U.S. Geological Survey in 1973 and by J. M. Montgomery Engineers (for Napa County) in 1991 (see Attachment B).[60,61] The County memorandum describes that the motivation for the procedure included providing for continued groundwater availability and avoiding effects on neighbors.

> *As a result of the environmental review process and the current drought conditions, the Napa County Planning Commission has expressed concern over water availability for Use Permit and Parcel Map applications. The availability of groundwater and the effects of pumping (and) projected water demands of proposed facilities on the neighboring wells is of ultimate concern to both the Commission, neighbors and the applicant. …*
>
> *The most comprehensive study of groundwater in Napa County was done by the USGS in 1973. This study involved extensive monitoring of hundreds of wells within the Napa Valley floor from Calistoga south to the Oak Knoll Avenue. The Napa County Flood Control and Water Conservation District contracted the study and provided the monitoring program of these selected wells from 1962 to about 1975. The report concluded that the main Napa Valley aquifer was quite large, relatively stable and not in an overdraft situation. It was estimated that the basin contained about 200,000 acre-feet of water of which 24,000 acre-feet per year can be safely withdrawn without overdrafting the aquifer. The 1991 Montgomery*

[58] Napa County Planning Commission. 1991. *Minutes of the Meeting of the Conservation, Development and Planning Commission*, County of Napa. March 6, 1991.
[59] Redding, 1991
[60] Faye, R.E. 1973. Ground-water hydrology of northern Napa Valley California. Water Resources Investigations 13-73, US Geological Survey, Menlo Park, CA, 64 p
[61] Montgomery, 1991

*study is suggesting a slightly lower "safe yield" for the basin of 22,000 acre-feet per year. Current usage is estimated at 16,000 acre-feet per year…."*

*– Water Availability Analysis Staff Report (1991) pp. 1-2*

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The County memorandum also describes the process by which the County would evaluate proposed uses of groundwater relative to water use thresholds with consideration of effects that proposed uses may cause (see excerpt below).

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*At the application stage, the initial phase one study would be required to be submitted to the Department of Public Works for review prior to public hearing or permit issuance. This Department would review the letter report to determine the accuracy of the proposed water usage and it's (sic) initial evaluation of the water source and, if acceptable, compare to the threshold levels appropriate at the time and location. The applicant would then be advised to either submit additional study (phase two) or the probable acceptance by the (Planning) Commission. …*

*Should the phase two study result in "significant" effects on surrounding users, then the applicant would be required to do mitigate to an acceptable level. If the study results in "possibly significant" effects, then the applicant would be required to do the phase three study and develop a contingency plan….*

*– Water Availability Analysis Staff Report (Redding, 1991) p. 7)*

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The WAA procedure, including the water use criteria, have been applied by the County since 1991. The County has also revised the procedure over time, to provide for consistency with other actions by the County and to reflect new information about groundwater conditions. The WAA was revised in 2003, reiterating the commitment to long-term sustainability, explaining the following:

"Water Availability analysis is based upon the basic premise that each landowner has equal right to the groundwater resource below his or her property. By attempting to limit the extraction to a threshold amount, it is believed that sufficient groundwater will be available for both current and future property owners."[62]

The WAA was again updated in 2007 to reflect updated County regulations for groundwater permitting and use contained in the Napa County Groundwater Conservation Ordinance (see Attachment B). The 2003 and 2007 WAA procedure updates reaffirmed the water use criteria established in 1991 for Napa Valley and provided specific water use criteria for areas designated by the County as groundwater deficient areas.

The WAA procedure and objective criteria were most recently updated and expanded in 2015; the expanded WAA procedure now includes "a screening process for discretionary permit applications (both for new projects and for project modifications that change groundwater use) [to determine] if a proposal may have an adverse impact on the groundwater basin as a whole or on the water levels of neighboring non-project wells or on surface waters." [63] The objective criteria in the 2015 WAA revision include revised annual water use criteria for areas outside of Napa Valley and County-designated groundwater deficient areas, well spacing and construction criteria, and surface water setback and streamflow depletion criteria. Proposed projects are subject to site-specific study under certain conditions including projects that do not initially meet the applicable screening criteria and any project located in areas outside of the Napa Valley Floor, an area defined by the County with a boundary similar to that of the Napa Valley Subbasin.[64]

> *"At the height of the 1990 drought in Napa County, the Napa County Board of Supervisors and the Napa County Planning Commission became very concerned with the approval of use permits and parcel divisions that would cause an increased demand on groundwater supplies within Napa County. … On March 6, 1991 an interim policy report, prepared by County staff, was presented to and approved by the Commission requiring use permit and parcel division applicants to submit a Water Availability Analysis with their application. The staff policy report provided a procedure by which applicants could achieve compliance with the Commission policy. Oversight of groundwater development within the County's jurisdiction was later refined by the Board of Supervisors approval of*

[62] County of Napa. 2003. Water Availability Analysis Policy Report. Napa, CA. August 2003, p. 5
[63] Napa Valley Subbasin Basin Analysis Report (2016), p.165
[64] Napa Valley Subbasin Basin Analysis Report (2016), Appendix I

> *Napa County Ordinance No.1162 (Groundwater Conservation Ordinance) on August 3, 1999."*
>
> - *Napa Valley Subbasin Basin Analysis Report, pp. 163 - 164*

The County BOS continued groundwater management actions in the 1990s through the formation of a Water Advisory Committee (WAC) in collaboration with Napa Valley municipalities (Calistoga, St. Helena, Yountville, Napa, and American Canyon) in 1992. In 1993, the WAC provided the result of work synthesizing recent studies of Napa Valley water demands and supplies and recommending management strategies to avoid future shortfalls. The management strategies developed by the WAC included short-term, mid-term, and long-term strategies for coordinated actions. Those recommended strategies furthered the County's understanding of water supply conditions and projections that informed future actions, including the adoption of ordinances to regulate groundwater extraction and use (see below) and adoption of County policy through the 2008 General Plan Update, which included Goal CON-11: "Prioritize the use of available groundwater for agricultural and rural residential uses rather than for urbanized areas and ensure that land use decisions recognize the long-term availability and value of water resources in Napa County." Building on the work of the WAC, the County, through the Napa County Flood Control and Water Conservation District, in coordination with Napa Valley municipalities have avoided water supply shortfalls through a range of actions including conservation, expansion of recycled water supplies, and increases in surface water supplies available through the State Water Project.

**Groundwater Ordinances**

Since 1996 the County BOS has adopted ordinances to provide consistency between County policy and regulations. Between 1996 and 1998 the County BOS approved a series of ordinances establishing a **temporary moratorium on the construction of new wells intended to serve multiple parcels**. In these Ordinances (Nos. 1117, 1119, and 1130) the County BOS acknowledged the (scarcity) of groundwater "in some situations and locations".[65] These ordinances were approved in order to allow the County to develop new regulations for groundwater permitting to avoid potential future overdraft conditions, which the County considered to represent what SGMA would later define as an undesirable result for the Subbasin.

In 1999, the County BOS adopted Napa County Ordinance No.1162 (Groundwater Conservation Ordinance, Code of Ordinances, Title 13 Water, Sewers, and Services). "The ordinance is intended to regulate the extraction and use and promote the preservation of the county's groundwater resources" (see excerpt below).[66] In approving the ordinance, the County BOS declared that "groundwater basins of Napa County form significant water resources that must be managed in trust, and must be conserved so that they may be placed to the reasonable

[65] Napa County Ordinance No. 1117, Section One (d)
[66] Napa Valley Subbasin Basin Analysis Report (2016), p. 163

and beneficial use of all potential users, while avoiding the waste and unreasonable use of these resources".[67] The County BOS also affirmed its commitment to avoiding undesirable results by declaring that **"conserving water resources in the groundwater basins of Napa County to avoid overdrafts and maximize the long-term beneficial use of groundwater resources, best serves the health, safety and welfare of residents of Napa County"**.[68] The County's consideration of undesirable results was clarified and expanded later in Ordinance No. 1162, as described below.

The 1999 Groundwater Conservation Ordinance regulates extraction and use of groundwater by:

- Requiring groundwater permits for discretionary uses involving new water systems or improvements to existing water systems that may use groundwater as a source of supply, with certain exceptions. (Code of Ordinances, Chapter 13.15)
- Defining and delineating groundwater deficient areas where exceptions to groundwater permitting requirements are not applicable (Code of Ordinances, Chapter 13.15)
- Requiring a groundwater permit for parcel subdivision applications where groundwater is required or anticipated to provide a source of supply. (Code of Ordinances, Chapter 17.59)
- Revising the County Zone Code to include an objective "to avoid overdrafts in extraction from the groundwater basins of Napa County, to maximize the long-term beneficial use of Napa County's groundwater resources, and to ensure that sufficient groundwater is available for the long-term viability of agriculture in Napa County." (Code of Ordinances, Chapter 18.04)
- Requiring groundwater permits for zoning applications where groundwater is required or anticipated to provide a source of supply. (Code of Ordinances, Chapter 18.141)
- Requiring groundwater permits as a condition of building permit issuance for uses subject to groundwater permitting under Chapter 13.15. (Code of Ordinances, Chapter 15.08)

The Groundwater Conservation Ordinance provides consistency with the Water Availability Analysis policy adopted in 1991 by requiring that groundwater permit applicants "shall (be instructed to perform) any required Phase I, II, or III water availability analysis in accordance with procedures established by the Department of Public Works." The Director of Public Works is subsequently required to submit an appraisal to the Director of Planning, Building, and Environmental Services that **"shall assess any impact on the affected groundwater table**, **assess any potentially negative effect on agriculture in the affected**

[67] Napa County Ordinance No. 1162, Section One (b)
[68] Napa County Ordinance No. 1162, Section One (c)

**groundwater basins, and assess the degradation of water quality, adverse effects on reasonable and beneficial uses of groundwater, interference with surface water flows, or other adverse changes to the physical environment."** The Ordinance also specifies actions that the Director of Planning, Building, and Environmental Services must take to provide public notice of a tentative decision to approve or deny a groundwater permit, requirements for holding public hearings to accept public testimony regarding a tentative decision, and opportunities for appeal of the Director's final decision (Napa County Code Section 13.15.070).

The County has revised the Groundwater Conservation Ordinance over time, including in 2003 and 2007, to reflect new information about groundwater conditions and provide **additional objective criteria** to aid in avoiding impacts on groundwater conditions.

1. Ordinance No. 1230 (adopted November 5, 2003):

    a. Provides a definition for **overdraft** that explicitly references related concerns including **subsidence**, **groundwater level declines**, **water quality degradation**, and "**other adverse environmental impacts**".

    b. Implements groundwater restrictions by limiting single-family dwelling units and associated landscaping to 0.60 acre-feet of water per year. Applications involving single-family dwellings on parcels where other dwelling units, accessory uses, agricultural development of other discretionary uses also occur on the parcel are not eligible for ministerial approval and must seek discretionary approval.

    c. Implements groundwater restrictions on agricultural uses in areas designated by the County as groundwater-deficient to no more than 0.30 acre-feet of water per year on average.

2. Ordinance No. 1254 (adopted March 8, 2005):

    a. Further excludes ministerial approval for applications for single-family dwelling units if water from an approved public water system is available on the property.

*"The groundwater conservation ordinance makes a distinction with respect to permitting requirements within groundwater deficient areas of which one is currently recognized: the MST. The MST is located predominantly outside of the Napa Valley Subbasin; groundwater conditions in the MST are not representative of groundwater conditions typical of the overall Napa Valley Subbasin. Because the MST is considered a groundwater deficient area, additional regulations and review requirements under the CEQA have required application of "no net increase" and "fair share" principles in groundwater use associated with discretionary actions requiring county approval. The "no net increase" in groundwater use is required because there is no surplus water to support new projects without adverse environmental impacts. The County has established a water conservation program in the MST to disseminate information relevant to the unique needs of this area. The County has also recently completed a recycled water project pipeline and service program in the area."*

- *Napa Valley Subbasin Basin Analysis Report, p. 163*

**Groundwater Regulation Through General Plan**

The County coordinates the regulation of groundwater use and land use through its General Plan. Most recently updated in 2008, the Conservation Element of the General Plan, contains goals and policies and action items that serve to establish County objectives for the sustainable management of natural resources, including groundwater and surface water resources (see excerpt below).[69]

*As part of the General Plan update in 2008, and within the Conservation Element, six goals are set forth relating to the County's water resources, including surface water and groundwater. Complementing these goals are twenty-eight policies and ten water resources action items (one of which is "reserved" for later description). The County's six water resources goals are included below (the entire group of water resources goals, policies, and action items is included in the General Plan).*

***Goal CON-8**: Reduce or eliminate groundwater and surface water contamination from known sources (e.g., underground tanks, chemical spills, landfills, livestock grazing, and other dispersed sources such as septic systems).*

[69] Napa Valley Subbasin Basin Analysis Report (2016), Section 9.1, pp. 159 - 161

***Goal CON-9****: Control urban and rural storm water runoff and related non-point source pollutants, reducing to acceptable levels pollutant discharges from land-based activities throughout the county.*

***Goal CON-10****: Conserve, enhance and manage water resources on a sustainable basis to attempt to ensure that sufficient amounts of water will be available for the uses allowed by this General Plan, for the natural environment, and for future generations.*

***Goal CON-11****: Prioritize the use of available groundwater for agricultural and rural residential uses rather than for urbanized areas and ensure that land use decisions recognize the long-term availability and value of water resources in Napa County.*

***Goal CON-12****: Proactively collect information about the status of the County's surface and groundwater resources to provide for improved forecasting of future supplies and effective management of the resources in each of the County's watersheds.*

***Goal CON-13****: Promote the development of additional water resources to improve water supply reliability and sustainability in Napa County, including imported water supplies and recycled water projects.*

*Key General Plan Action Items related to the focus of this Basin Analysis Report include:*

***Action Item CON WR-1****: Develop basin-level watershed management plans for each of the three major watersheds in Napa County (Napa River, Putah Creek, and Suisun Creek). Support each basin-level plan with focused sub-basin (drainage-level) or evaluation area-level implementation strategies, specifically adapted and scaled to address identified water resource problems and restoration opportunities. Plan development and implementation shall utilize a flexible watershed approach to manage surface water and groundwater quality and quantity. The watershed planning process should be an iterative, holistic, and collaborative approach, identifying specific drainage areas or watersheds, eliciting stakeholder involvement, and developing management actions supported by sound science that can be effectively implemented. [Implements Policies 42 and 44]*

***Action Item CON WR-4****: Implement a countywide watershed monitoring program to assess the health of the County's watersheds and track the effectiveness of management activities and related restoration efforts. Information from the monitoring program should be used to inform the development of basin-level watershed management plans as well as focused sub-basin (drainage-level) implementation strategies intended to address targeted water resource problems* *and facilitate restoration opportunities. Over time, the monitoring data will be used to develop overall watershed health indicators and as a basis of employing adaptive watershed management planning. [Implements Policies 42, 44, 47, 49, 63, and 64]*

***Action Item CON WR-6****: Establish and disseminate standards for well pump testing and reporting and include as a condition of discretionary projects that well owners provide to the County upon request information regarding the locations, depths, yields, drilling and well construction logs, soil data, water levels and general mineral quality of any new wells. [Implements Policy 52 and 55]*

***Action Item CON WR-7****: The County, in cooperation with local municipalities and districts, shall perform surface water and groundwater resources studies and analyses and work toward the development and implementation of an integrated water resources management plan (IRWMP) that covers the entirety of Napa County and addresses local and state water resource goals, including the identification of surface water protection and restoration projects, establishment of countywide groundwater management objectives and programs for the purpose of meeting those objectives, funding, and implementation. [Implements Policy 42, 44, 61 and 63]*

***Action Item CON WR-8****: The County shall monitor groundwater and interrelated surface water resources, using County-owned monitoring wells and stream and precipitation gauges, data obtained from private property owners on a voluntary basis, data obtained via conditions of approval associated with discretionary projects, data from the State Department of Water Resources, other agencies and organizations. Monitoring data shall be used to determine baseline water quality conditions, track groundwater levels, and identify where problems may exist. Where there is a demonstrated need for additional management actions to address groundwater problems, the County shall work collaboratively with property owners and other stakeholders to prepare a plan for managing groundwater supplies pursuant to State Water Code Sections 10750-10755.4 or other applicable legal authorities. [Implements Policy 57, 63 and 64]*

***Action Item CON WR-9.5****: The County shall work with the SWRCB, DWR, CDPH, CalEPA, and applicable County and City agencies to seek and secure funding sources for the County to develop and expand its groundwater monitoring and assessment and undertake community-based planning efforts aimed at developing necessary management programs and enhancements.*

- *Napa Valley Subbasin Basin Analysis Report, pp. 159 – 161*

**Groundwater Resources Advisory Committee**

"On June 28, 2011, the Napa County Board of Supervisors adopted a resolution to establish a Groundwater Resources Advisory Committee (GRAC) and began an outreach effort for applicants to serve on the GRAC (see excerpt below). On September 20, 2011, the Board of Supervisors appointed 15 residents to the GRAC, and the GRAC held its first organizational meeting on October 27, 2011. The members represented diverse interests, including environmental, agricultural, development, and community interests."[70]

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*The GRAC was created to assist County staff and technical consultants with recommendations regarding:*

- *Synthesis of existing information and identification of critical data needs;*
- *Development and implementation of an ongoing non-regulatory groundwater monitoring program;*
- *Development of revised well pump test protocols and related revisions to the County's groundwater ordinance;*
- *Conceptualization of hydrogeologic conditions in various areas of the County and an assessment of groundwater resources as data become available;*
- *Development of groundwater sustainability objectives that can be achieved through voluntary means and incentives; and*
- *Building community support for these activities and next steps.*

*Napa Valley Subbasin Basin Analysis Report, p. 3*

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Among numerous accomplishments described in the Alternative, the GRAC developed a sustainability goal and sustainability objectives that were reviewed and accepted by the County BOS at a public meeting on April 8, 2014.[71] The sustainability goal and sustainability objectives are presented in Section 7 of the Alternative (see excerpt below).

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*The GRAC concluded that groundwater sustainability is both a goal and a process; most importantly, it is a shared responsibility. Everyone living and working in the county has a stake in protecting groundwater resources, including groundwater supplies, quality, and associated watersheds (GRAC, 2014). The GRAC further found that healthy communities, healthy agriculture and healthy environments exist together and not in isolation. Without sustainable groundwater*

[70] Napa Valley Subbasin Basin Analysis Report (2016), p.3
[71] Napa Valley Subbasin Basin Analysis Report (2016), Appendix A

*resources, the character of the county would be significantly different in terms of its economy, communities, rural character, ecology, housing, and lifestyles.*

*The sustainability goal and groundwater sustainability objectives*[72] *developed by the GRAC included (GRAC, 2014, 2016 BAR Appendix A)*

*GRAC Sustainability Goal: To protect and enhance groundwater quantity and quality for all the people who live and work in Napa County, regardless of the source of their water supply.*

*GRAC Sustainability Objectives:*

*1. Initiate and carry out outreach and education efforts.*

*Develop public outreach programs and materials to make everyone who lives and works in the County aware that the protection of water supplies is a shared responsibility and everyone needs to participate.*

*Through education, enable people to take action.*

*2. Optimize existing water supplies and systems.*

*Support landowners in implementing best sustainable practices.*

*Enhance the water supply system and infrastructure – including but not limited to system efficiencies, reservoir dredging, recycled water, groundwater storage and recharge, conjunctive use – to improve water supply reliability.*

*3. Continue long-term monitoring and evaluation.*

*Collect groundwater and surface water data and maintain a usable database that can provide information about the status of the county's groundwater and surface water resources and help forecast future supplies.*

*Evaluate data using best analytical methods in order to better understand characteristics of the county's groundwater and water resources systems.*

*Share data and results of related analytical efforts while following appropriate confidentiality standards.*

*4. Improve our scientific understanding of groundwater recharge and groundwater-surface water interactions.*

*5. Improve preparedness to address groundwater issues that might emerge.*

[72] These are overarching groundwater sustainability objectives; "measurable objectives", per SGMA requirements, are discussed in Section 7.5.

> *Improve preparedness for responding to long-term trends and evolving issues, such as adverse groundwater trends (including levels and quality), changes in precipitation and temperature patterns, and saltwater intrusion.*
>
> *Improve preparedness for responding to acute crises, such as water supply disruptions and multi-year drought conditions.*
>
> \- *Napa Valley Subbasin Basin Analysis Report, pp. 132 – 133*

**Tracking Groundwater Conditions to Inform Management**

Napa County has maintained an active role in monitoring groundwater conditions in the County since the mid-1960s. The County's initial involvement in groundwater monitoring included data collection at hundreds of wells beginning in 1962 in support of the USGS-led study that provided an early analysis of safe yield for the Napa Valley.[73] As described above, that safe yield analysis and a separate one published in 1991[74], served as the primary objective criteria for groundwater management beginning with the Water Availability Analysis policy adopted in 1991.

Since the initiation of monitoring efforts through the County in 1962, the County BOS has relied on best-available information about groundwater conditions to guide management decisions. Reporting on groundwater conditions is facilitated by the Watershed Information and Conservation Council (see additional information below). The County BOS and stakeholders in Napa County have received updates on groundwater conditions over time through studies conducted in support of groundwater management. These include the studies by Faye (1973) and Montgomery (1991) described previously. Additional synthesis, analysis, and reporting occurred between 2003 and 2005 for the Baseline Data Report prepared in support of the 2008 General Plan Update. The Baseline Data Report includes a chapter on groundwater hydrology that summarizes available information on geologic and groundwater conditions (see Attachment B). Groundwater stakeholders received regular updates on preparation of the Baseline Data Report beginning in 2003 through the WICC.

Following adoption of the 2008 General Plan Update, the County BOS initiated further studies of groundwater conditions. These reports are described in Section 1.1.3 of the Alternative. They include (but are not limited to) the 2011 Groundwater Conditions Report[75], the

[73] Faye, 1973
[74] Montgomery, 1991
[75] LSCE, 2011

2013 Hydrogeologic Conceptualization and Characterization of Conditions Report[76], and annual groundwater conditions reports prepared beginning in 2014.

**Governance and Accountability**

As described above, deliberate groundwater management actions taken by Napa County since 1991 are consistent with the objectives of SGMA and have included setting objective criteria to avoid undesirable results, identified as avoiding overdraft, maintaining historic groundwater level, protecting against water quality degradation, land subsidence, preventing increased surface water flow reductions, and other adverse environmental impacts.

Napa County, under the leadership of the County BOS and key community stakeholders, has been actively tracking, studying and managing groundwater resources for many decades. Under the guidance of its groundwater advisory committees and with public input, the County BOS has taken multiple actions to protect and ensure the sustainability of the County's groundwater. Years before the State developed SGMA policies and regulations, Napa County was already actively working to address groundwater sustainability.

The County BOS is the governing body of Napa County. The County BOS has jurisdiction over land use, roads and municipal services (i.e., groundwater and septic) in the unincorporated areas of the county. The County BOS is both the legislative and the executive authority in Napa County. In some applications, the County BOS also has quasi-judicial authority. In addition, Supervisors serve in other capacities on various boards, commissions or special districts, such as regional and local Councils of Government, the Local Agency Formation Commission, Special Districts, the Air Quality Management District, the Airport Land Use Commission and various Joint Powers Authorities. County Supervisors serving in these various capacities make decisions on local and regional planning and the future land use development of Napa County, which includes prudent management and use of natural resources such as groundwater.

In 2002, by recommendation of the County's Watershed Task Force Oversight Committee, the County BOS created the Watershed Information and Conservation Council (WICC) (then known as the Conservancy and Watershed Information Center). As noted in the Alternative, the WICC was established by the County BOS in 2002 through Resolution No. 02-103 (see Attachment B). Several WICC-related resolutions approved by the County BOS are included with these comments (see Attachment B). These resolutions include the expansion of the WICC Board membership to include representatives from all of the cities in the county and extension of the term of the WICC indefinitely.[77,78]

[76] LSCE. 2013. Hydrogeologic Conceptualization and Characterization of Conditions, prepared for Napa County. January 2013.
[77] Napa County Resolution 05-202
[78] Napa County Resolution 06-82

The WICC is charged with guiding and supporting community efforts to maintain and improve the health of Napa County's watershed lands by coordinating and facilitating partnerships among the individuals, agencies, and organizations involved in improving watershed health and restoration; supporting watershed research activities; and providing watershed information and education. To fulfil its mission, the WICC seeks solutions to watershed issues and concerns, guided by a set of adopted principles that embrace political neutrality, information collection and dissemination, collaboration, cooperation, and funding development. The WICC holds regular public meetings and is comprised of seventeen members of balanced of interests, representing key community leadership and stakeholders. The WICC contains representation from every municipality in Napa County (City of Calistoga, City of St. Helena, Town of Yountville, City of Napa, and City of American Canyon) and a broad at large membership representing environmental, agricultural, development and community interests. As a result, the following agencies, authorities, districts and special districts are represented on the Council: the Napa Sanitation District, the Napa County Flood Control and Water Conservation District, the Napa County Resource Conservation District, the Local Agency Formation Commission, the Napa County Planning Commission, the Natural Resource Conservation Service, the North Bay Watershed Association, Napa County Regional Parks and Open Space District, and until recently the North Bay Water Reuse Authority.

As directed by the County BOS, the WICC actively participates in groundwater research, planning and management activities, ranging from joint meetings with the Napa County Groundwater Resources Advisory Committee (GRAC), review and comment on groundwater studies and plans, participation in groundwater policy development and hearing annual reports on groundwater conditions. In December 2010, the County BOS, committed to participate in the California Statewide Groundwater Elevation Monitoring (CASGEM) program, thereby notifying DWR that Napa County will be the entity responsible for groundwater monitoring pursuant to State requirements. At that time, the County BOS also stated that groundwater monitoring responsibilities and communication of groundwater conditions will ultimately rest with the WICC. Since 2011 the WICC has received presentations and briefings on the County's comprehensive groundwater studies and participated in joint meetings with the County's GRAC. Since 2014, after the work of the GRAC was completed, the WICC has effectively served as the County BOS' advisory committee on groundwater. The WICC has standing groundwater items on its agenda. At these public meetings, the WICC is presented with updates and status reports on the County's groundwater program and SGMA compliance, including development of the Alternative and supporting research and data collection efforts. The WICC and the public provided comments on the Alternative prior to its adoption by the County BOS and submittal to DWR in December of 2016.

The County BOS, together with the role and functions of the WICC effectively serve as a Groundwater Sustainability Agency (GSA) as described in Water Code Section 10723, as it represents a combination of local agencies overlying the groundwater basin that have land use and water regulatory authority.

Through the County's discretionary permit process, the County has the ability to enforce applicable groundwater conditions of approval, require additional monitoring, or require modification of water-using activities up to and including revocation of the use permit. Wells servicing projects subject to a use permit may also be required to participate in the County's groundwater monitoring program, at the discretion of the Director of Public Works. When the Napa County Planning Commission grants approval of a project, the Planning Commission must make a finding that the proposed use would not require an improvement causing significant adverse effects, individually or cumulatively, on an affected groundwater basin. County staff are able to review proposed projects to ensure this finding is met by requiring each project to comply with the WAA and to prove adequate water supplies are available to serve the proposed use without causing significant negative impacts to shared groundwater resources. Through its code compliance program, the County is able to enforce its ordinances including those governing groundwater, zoning, and conservation. The County may also seek inspection warrants from the courts if need be in order to investigate potential violations.

In addition, the County, the GRAC and WICC have taken several of the actions for which SGMA empowers a GSA. For example, SGMA provides a GSA with the authority to investigate and monitor groundwater.[79] The County has been actively studying and requiring monitoring of groundwater since the early 1990s. SGMA provides a GSA with the authority to adopt rules, compliance and enforcement for groundwater limitations. The County has adopted several groundwater ordinances limiting groundwater extractions, requiring reporting of extractions and setting forth consequences for lacking compliance. For these reasons, the County, along with representation of the GRAC and WICC, have provided the functional equivalence of a GSA for more than 10 years prior to the enactment of SGMA.

[79] CA Water Code § 10725.4

## Global Comment Response E - Continuing Efforts to Maintain Sustainable Conditions Consistent with SGMA

The Alternative describes actions that the County may take in the future, consistent with actions taken in the past, to ensure groundwater sustainability, including "changes to local land use controls, well permitting, groundwater metering and usage limits, changes to County ordinances, and direct coordination with other municipal agencies to effectively protect and sustain groundwater and surface water resources" [80] (see Global Comment Response D).

The Staff Reports states, "none of the activities described indicate actions specific to managing for minimum thresholds."[81] The County respectfully disagrees; the Alternative describes Annual SGMA reporting, which includes: "A description of monitoring, data evaluation and other actions in support of continued sustainability, including implementation of projects or management actions since the previous annual report."[82] As needed, the management actions described in the Alternative are consistent with SGMA and strategies employed by the County since the 1990s to maintain sustainability.

The Staff Report summarizes some of the activities and actions included in the Alternative; however, the summary is an incomplete representation of the management measures that have occurred since 1991 or management actions that would be invoked should they be required to ensure continued sustainability (see excerpt below).

> *"Actions may include future changes to local land use controls, well permitting, groundwater metering and usage limits, changes to County ordinances, and direct coordination with other municipal agencies to effectively protect and sustain groundwater and surface water resources. Fortunately, as evident by results of this Report, the Napa Valley Subbasin has been operating within its sustainable yield for more than 20 years and far-reaching management actions are not necessary at this time."*
>
> - *Napa Valley Subbasin Basin Analysis Report (2016), p. 169*

The County's approach to implementing management actions described in the Alternative represents a continuation of successful efforts to manage the Napa Valley Subbasin within its sustainable yield consistent with SGMA, for over two decades. The County has participated in and directed studies analyzing safe yield and sustainable yield since the mid-1960s. The County has considered study findings showing safe yields of approximately 24,000 acre-feet per year in 1973, 22,000 acre-feet per year in 1991, and

[80] Napa Valley Subbasin Basin Analysis Report (2016), p. 169
[81] Staff Report, p. 23
[82] Napa Valley Subbasin Basin Analysis Report (2016), p. 156

sustainable yield between 17,000 and 20,000 acre-feet per year in 2016.[83,84,85] The County has applied its understanding of safe yield and sustainable yield to define undesirable results, including equivalent definitions developed decades before the SGMA effective date. The County has implemented management actions to avoid undesirable results (see Global Response D). While the Alternative finds that groundwater use increased slightly from 1988 to 2015, total water use has decreased over the same period. The Alternative also demonstrates that the Subbasin experienced more than five times as much recharge as outflow due to pumping on an average annual basis from 1988 to 2015. These and other findings support the conclusions of the Alternative that the Subbasin had operated within its sustainable yield for more than 20 years.

The proactive decision by the Napa County BOS to submit the Alternative to DWR in December 2016 has facilitated earlier identification of opportunities for scientific collaboration, data acquisition efforts, and development of analytical tools and technologies that are being implemented much sooner than if the County BOS had waited until 2022 to submit a GSP. Through the development and implementation of the Alternative, and seven years of technical study prior to the Alternative, Napa County continues to implement recommendations that will result in an even more informed Alternative Update in 2022. The County's approach will more effectively ensure continued sustainable groundwater management than had the County waited to submit an initial GSP in 2022. The Alternative describes recommendations made during the seven (7) years prior to the Alternative submittal and the implementation of nearly all of those recommendations by 2016, as well as 10 ongoing recommendations and 13 additional recommendations.

As explained during Napa County's December 4, 2018 call with DWR staff, the WICC was engaged in the SGMA process throughout the development of the Alternative, the preparation of the Northeast Napa Special Study, the 2018 Alternative Amendment, and the 2017 and 2018 Annual Reports. The WICC represents the broad interests of all municipalities, urban, agricultural, and environmental water users, making it the functional equivalent of a GSA. Created in 2002 and comprised of 17 members, the WICC includes elected officials from the County and cities, representatives from the County's various stakeholder communities, including environmental, agricultural, and other community wide interests. Its mission is:

> "To improve the health of the Napa County's watersheds by informing, engaging and fostering relationships within the community."

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[83] Faye, R.E. 1973. Ground-water hydrology of northern Napa Valley California. Water Resources Investigations 13-73, US Geological Survey, Menlo Park, CA, 64 p

[84] James M. Montgomery Consulting Engineers. 1991. *Water Resource Study for the Napa County Region*. Prepared for Napa County Flood Control and Water Conservation District. January 1991. 148 p

[85] Napa Valley Subbasin Basin Analysis Report (2016), Section 6

WICC members represent the entire county and the watersheds including surrounding groundwater basins and subbasins in the county. The WICC is committed to countywide watershed stewardship on behalf of the community and the environment.

Napa County considers its Alternative a functional equivalent to a GSP and a dynamic "living" document that continually informs the County and the public of water resources conditions and actions that need to be implemented to maintain sustainability. As described in the Alternative (Section 9), the County, through the BOS, regulates groundwater usage and well development through its Code of Ordinances, 2008 General Plan Update and corresponding policies, goals and ordinances, and other actions coordinated with the Napa County Planning Commission. The County has and will continue to take actions to maintain groundwater sustainability (see Global Comment Response D).

While waiting for DWR to complete its evaluation of the Alternatives submitted on or before January 1, 2017, Napa County has continued its ongoing implementation of the recommendations in the Alternative, as well as those in previous countywide reports, which began before SGMA. As intended by SGMA, the Napa County BOS has an ongoing commitment to natural resources sustainability on behalf of all the citizens of Napa County and all Napa Valley Subbasin stakeholders.

In September 2017, Napa County completed the Northeast Napa Area: Special Groundwater Study**;** this served as a key supporting document and appendix to the 2018 Alternative Amendment.[86] As explained in the December 17, 2018 letter from the County to DWR, the Amendment did not change the analysis of basin conditions or any other aspects of the Alternative. However, the availability of the Draft Sustainable Management Criteria BMP informed further explanation provided in the Amendment about the interpretation of the sustainability criteria and the definition of undesirable results for the basin.[87] The Amendment was uploaded to the DWR Alternative portal on March 23, 2018.

GSP regulations (Section 355.10(d)(1) Plan Amendments, see excerpt below) specifically allow that an amendment shall be evaluated by DWR as part of the initial review if provided before DWR has completed the initial review. The County again requests, as it did in December 2018, that DWR consider the Amendment when determining whether the Napa Valley Subbasin Alternative satisfies the objectives of SGMA and whether the Alternative is in substantial compliance based on the criteria described in Section 355.4.

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*California Code of Regulations (CCR) Title 23, Section 355.10*

*(a) Any amendment to a Plan shall be evaluated by the Department for consistency with the requirements of the Act and of this Subchapter.*

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[86] Napa Valley Subbasin Alternative Amendment (2018), Appendix A
[87] Napa Valley Subbasin Alternative Amendment (2018), Section 3

*(b) An Agency may amend a Plan at any time, and submit the amended Plan to the Department for evaluation pursuant to the requirements of this Subchapter.*

*(c) The Department shall evaluate the amended portions of the Plan and any new information that is relevant to the amendments or other Plan elements. Portions of the Plan that have not been amended will not be evaluated unless the Department determines the proposed amendment may result in changed conditions to other areas or to other aspects of the Plan.*

*(d) An amendment to a Plan shall be evaluated by the Department as follows:*

*(1) An amended Plan that has been submitted, but not yet approved by the Department, shall be evaluated during the initial evaluation period, in accordance with Sections 355.2 and 355.4.*

*(2) An amended Plan that has been approved by the Department, but determined to be incomplete or inadequate as a result of a periodic assessment pursuant to Section 355.6, shall be evaluated in accordance with Sections 355.2 and 355.4.*

*(3) An amendment to a Plan that has been approved by the Department shall be evaluated in accordance with Section 355.6, except that if the Department does not approve the amendment, the Agency may revise and resubmit another amendment at any time, provided that the status of the Plan remains unchanged.*

## Conclusion

The County appreciates the opportunity to provide this response in the interest of clarifying how the Alternative meets the objectives of SGMA for the Napa Valley Subbasin and the continued sustainable management of groundwater resources. Additional responses to specific comments included in the Staff Report are provided in Attachment A. The attached responses also include descriptions of enhancements to the Alternative to be incorporated as part of the first 5-year Update due by January 1, 2022.

The Alternative includes an analysis of basin conditions that demonstrates that the basin has operated within its sustainable yield over a period of 28 years. The new SGMA sustainability criteria, including the sustainability goal, undesirable results, measurable objectives and minimum thresholds, are defined and presented in the Alternative. These sustainability criteria were considered when assessing whether Subbasin conditions had been sustainable over the 28-year analysis period. As per the intent of the Legislature (Section 10720.1), the County continues to track, analyze, and document basin conditions relative to these sustainability criteria as demonstrated in two SGMA Annual Reports submitted to DWR since 2017 and the 2018 Amendment to the Alternative.

The County BOS approved the Alternative with the understanding that: 1) the basin had already operated within the sustainable yield for at least 10 years, 2) the intent of the Legislature is among other things to provide for the sustainable management of groundwater basins, and 3) the County BOS approved the sustainability goal in the Alternative to "….maintain groundwater sustainability indefinitely without causing undesirable results, including unacceptable economic, environmental, or social consequences". There is no mistaking the County BOS approved the Alternative with the understanding the Napa Valley Subbasin was able to demonstrate it had a history of sustainability and was actively managing to avoid the undesirable results, as defined in the Alternative. The sustainability goal also demonstrates the County's commitment to maintain those conditions and to continue managing the basin to sustainability in the future. The County believes its response to the SGMA requirements, to provide for the sustainable management of the Napa Valley Subbasin in accordance with the Alternative submitted on behalf of stakeholders in the Subbasin, is consistent with the spirit and intent of the Legislature and the objectives of SGMA.

Napa County requests DWR approve the Alternative on the condition that such approval will be revisited at the review of the Alternative update to ensure the Subbasin continues to be actively managed as a functional equivalent to a GSP.

## Supporting Documentation Provided to DWR with this Response

The County is providing copies of the following documentation to provide DWR with additional, requested information about the consistency of the County's management of the Napa Valley Subbasin with the objectives of SGMA for more than two decades before the January 1, 2015 SGMA effective date. Copies of the supporting documentation (listed below in chronological order) are provided in Attachment B.

1. Faye, R.E. 1973. *Ground-water hydrology of northern Napa Valley California*. Water Resources Investigations 13-73, US Geological Survey, Menlo Park, CA, 64 p.

2. James M. Montgomery Consulting Engineers. 1991. *Water Resource Study for the Napa County Region*. Prepared for Napa County Flood Control and Water Conservation District. January 1991. 148 p.

3. Redding, J. R. 1991. Water Availability Analysis Policy. *Public Works Department Report on Water Availability Analysis* [Memorandum] and *Water Availability Analysis* [Staff Report]. Napa, CA: Napa County Department of Conservation, Development, and Planning. February 27, 1991.

4. Napa County Planning Commission. 1991. *Minutes of the Meeting of the Conservation, Development and Planning Commission*, County of Napa. March 6, 1991.

5. Woodbury, M. L. 1991 Memorandum titled *Local Authority to Adopt Regulations for the Protection of Groundwater Resources* [Memorandum]. Napa, CA: Napa County Counsel. March 28, 1991.

6. Bickell, B. 1993. *Report of the Water Advisory Committee* [Memorandum and Report]. Napa, CA: Napa County Department of Public Works. February 4, 1993.

7. County of Napa. 1996. *Napa County Ordinance No. 1117*. Adopted December 3, 1996

8. County of Napa. 1997. *Napa County Ordinance No. 1119*. Adopted January 21, 1997

9. County of Napa. 1997. *Napa County Ordinance No. 1130*. Adopted November 25, 1997

10. Cave T., Johanson K., Redding J., Westermyer, R. 1999. *General Plan Amendment #GPA98-04 and Napa County Code Amendment #98279-ORD* [Staff Report to the Conservation, Development and Planning Commission]. Napa, CA. April 7, 1999.

11. County of Napa. 1999. *Napa County Ordinance No.1162*. Adopted August 3, 1999

12. County of Napa. 2002 - 2016. Napa County Board of Supervisors Resolutions related to the Watershed Information and Conservation Council (10). May 21, 2002 – December 20,2016

13. County of Napa. 2003. *Water Availability Analysis Policy Report*. Napa, CA. August 2003

14. County of Napa. 2003. *Napa County Ordinance No. 1230*. Adopted November 4, 2003

15. County of Napa. 2005. *Napa County Ordinance No. 1254*. Adopted March 8, 2005

16. County of Napa. 2005. *Napa County Baseline Data Report, Chapter 16 Groundwater Hydrology*. Version 1. November 30, 2005

17. Watershed Information Center and Conservancy of Napa County. 2007. *2007 – 2008 Strategic Plan*. June 2007

18. County of Napa. 2007. *Napa County Ordinance No. 1294*. Adopted August 7, 2007

19. County of Napa. 2007. *Water Availability Analysis Policy Report*. Napa, CA. August 2007

20. Watershed Information Center and Conservancy of Napa County. 2015. *2015 Strategic Plan*. January 2015

# Attachment A

## Responses to Technical Comments in the Department of Water Resources Alternative Assessment Staff Report, for the Napa Valley Subbasin, Dated July 17, 2019

(October 11, 2019)

The responses provided in this document focus on those statements in the Department of Water Resources (DWR) Alternative Assessment Staff Report (Staff Report) interpreted by Napa County (County) to represent technical comments on the ability of the Napa Valley Subbasin Alternative[88] (Alternative) to satisfy the objectives of SGMA, which is the focus of the evaluation by DWR.[89] The Staff Report includes other statements interpreted by the County to be observational in nature. The responses in this document address those observational statements as needed, to clarify where the Staff Report misinterprets the Alternative.

The responses include references to information contained in the Alternative, other documents submitted with the Basin Analysis Report as part of the Alternative submittal, and documents referenced in the Alternative submittal but not provided at the time of the initial submittal, as requested by DWR on page 2 of the July 17, 2019 Notification Letter. Substantial effort has been made to clearly identify the document(s) containing information requested by DWR.

Responses also reference the 2018 Napa Valley Subbasin Alternative Amendment (Amendment) provided to DWR on March 23, 2018 during the initial review period consistent with Groundwater Sustainability Plan (GSP) regulations (Section 355.10(d)(1) Plan Amendments), as described in Global Comment Response E.

After the responses, the County has included a section describing enhancements to be incorporated as part of the first 5-year update of the Alternative due by January 1, 2022. The enhancements are proposed in response to comments on the Alternative provided by DWR and in recognition of additional SGMA implementation guidance provided by DWR since submittal of the Alternative in December 2016. The proposed enhancements are consistent with the scope of the 5-year update contents described in the Section 8.6.5 of the Alternative.

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[88] Napa Valley Groundwater Sustainability: A Basin Analysis Report for the Napa Valley Subbasin (2016), including thirteen appended documents and key references described in Table 1-1.

[89] Alternative Assessment Staff Report, p. 5

### DWR Staff Report, Line 21 (page 1 of 28)[90]

"Napa County, as a county government, has the authority to manage water resources, including groundwater, within its jurisdictional boundary. Prior to SGMA, Napa County set conservation goals for water resources as part of its 2008 General Plan and subsequently funded a monitoring program, public outreach, and hydrogeologic studies. As part of these efforts, however, the County did not develop any management or operational criteria for the Napa Valley Subbasin."

### Napa County Response 1

See Global Comment Response D regarding management actions employed by the County since 1991 and the consistency of management actions with SGMA objectives and existing basin management practices.

### DWR Staff Report, Line 39 (page 2 of 28)

"However, the County did not identify quantitative thresholds where the use of groundwater would produce significant and unreasonable effects, and did not manage the Napa Valley Subbasin to any threshold."

### Napa County Response 2

This comment occurs in the same paragraph as the comment beginning on Line 21 and expands on that prior comment with regard to the adequacy of actions taken by Napa County to manage the Napa Valley Subbasin prior to the passage of SGMA. As described in the global comment responses, the Staff Report redefines an "analysis of basin conditions" using standards that do not appear in Water Code Section 10733.6(b)(3) and standards that are inconsistent with Water Code requirements that existed prior to SGMA (See Global Comment Responses A, B, and C). The comment above also overlooks actions by the County to manage groundwater resources in the Napa Valley Subbasin for over two decades prior to the passage of SGMA (see Global Comment Response D).

### DWR Staff Report, Line 49 (page 2 of 28)

"Because the County has not established such thresholds or defined the conditions giving rise to undesirable results, the County can only speculate whether undesirable results have occurred."

### Napa County Response 3

The Napa Valley Subbasin Alternative defines sustainability criteria consistent with the requirements of SGMA, including a sustainability goal, undesirable results, measurable

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[90] References to page numbers related to DWR Staff comments correspond to the DWR Staff Report dated July 17, 2019.

objectives, and minimum thresholds.[91] The Alternative presents those criteria in the context of prior groundwater management goals and actions (see Global Comment Reponses B, C, and D).

## Depletions of Interconnected Surface Water

Quantitative minimum thresholds for depletions of interconnected surface water are defined in Section 7.4.1 of the Alternative (p. 141) utilizing groundwater elevations at 16 wells based on correlations between groundwater elevations and streamflow and in consideration of well construction relative to nearby surface waters. Minimum thresholds are defined in Table 7-3 from the Alternative (see table below). "These thresholds represent the lowest static groundwater elevation to which groundwater levels may reasonably be lowered at the end of a dry season without exacerbating streamflow depletion. These levels are not acceptable on a continuous basis as this would contribute to a worsening of existing conditions."[92] By placing protective thresholds at representative surface water-groundwater sites, groundwater elevations in those wells can be tracked to ensure that groundwater conditions do not cause undesirable results (see Global Comment Response C).

Prior to developing the Alternative, and based on recommendations developed by the GRAC and approved by the Board of Supervisors in April 2014, Napa County revised the Water Availability Analysis (WAA) guidelines to include specific consideration of the potential for streamflow depletion that would result from new or existing wells proposed to supply discretionary land use projects.[93] As described in Global Comment Response D, the WAA has been in use since 1991 to evaluate and avoid significant impacts on water resources through the application of objective water demand criteria consistent with determinations of safe yield documented in prior studies. The updated WAA guidelines incorporate criteria for the avoidance of streamflow depletion impacts based on well type, well production capacity, surface seal thickness, hydrogeologic setting, and distance from surface waters – all of which were analyzed by the County and described in a separate technical memorandum referenced in the Alternative.[94]

**Table 7-3: Minimum groundwater elevation thresholds protective of streamflow depletion (Napa Valley Subbasin Basin Analysis Report, 2016)**

[91] Napa Valley Subbasin Basin Analysis Report (2016), Section 7
[92] Napa Valley Subbasin Basin Analysis Report (2016), p. 139
[93] Napa Valley Subbasin Basin Analysis Report (2016), Appendix I
[94] LSCE. 2013b. *Approach for evaluating the potential effects of groundwater pumping in surface water flows and recommended well siting and construction criteria*. Technical Memorandum prepared for Napa County. in *Napa Valley Subbasin Basin Analysis Report (2016), Table 1-1 Key References*

| Well ID | Minimum Threshold: Minimum Fall Groundwater Elevation (Feet AMSL) |
|---|---|
| NapaCounty-128 | 320 |
| 08N06W10Q001M | 269 |
| 07N05W09Q002M | 127 |
| NapaCounty-133 | 72 |
| 06N04W17A001M | 37 |
| 06N04W27L002M | -2 |
| NapaCounty-214s-swgw1 | 2 |
| NapaCounty-215d-swgw1 | 2 |
| Napa County 216s-swgw2 | 61 |
| Napa County 217d-swgw2 | 61 |
| NapaCounty-218s-swgw3 | 29 |
| NapaCounty-219d-swgw3 | 29 |
| NapaCounty-220s-swgw4 | 75 |
| NapaCounty-221d-swgw4 | 75 |
| NapaCounty-222s-swgw5 | 185 |
| NapaCounty-223d-swgw5 | 164 |

Tables 7.1 - 7.3 from the 2013 Technical Memorandum provide recommended well distances from surface waters based on a streamflow depletion criterion of 0.01 cubic feet per second. The setback distances are applicable both to proposed wells and existing wells for the purposes of the County's review of sources of supply for proposed discretionary land use projects. Table 7.1 considers a typical domestic well with a low production capacity. Table 7.2 considers irrigation wells with a low production capacity, and Table 7.3 considers irrigation wells with a high production capacity. Domestic wells producing less than 10 gpm can be as close as 500 feet from a surface water channel, while relatively lower production capacity irrigation wells (10-30 gpm) and higher are confined to a spacing of at least 1000 feet. With these recommended criteria, the County is able to provide an informed review of proposed land use projects using best available information.

**Table 7.1: Recommended well placement and construction of a low production domestic well (LSCE, 2013b).**

| Well Type | Aquifer Hydraulic Conductivity | Distance from Surface water Channel | | | Surface Seal Depth (feet) | Depth of Uppermost Perforations (feet) |
|---|---|---|---|---|---|---|
| | | 500 feet | 1000 feet | 1500 feet | | |
| Domestic | High | ✓ | ✓ | ✓ | 50 | 100 |
| Domestic | Moderate | ✓ | ✓ | ✓ | 50 | 100 |
| Domestic | Low | ✓ | ✓ | ✓ | 50 | 100 |
| Domestic | Very Low | ✓ | ✓ | ✓ | 50 | 100 |

**Table 7.2: Recommended well placement and construction of a low production irrigation well (LSCE, 2013b).**

| Well Type | Aquifer Hydraulic Conductivity | Distance from Surface water Channel | | | Surface Seal Depth (feet) | Depth of Uppermost Perforations (feet) |
|---|---|---|---|---|---|---|
| | | 500 feet | 1000 feet | 1500 feet | | |
| Irrigation | High | | | ✓ | 50 | 100 |
| Irrigation | Moderate | | | ✓ | 50 | 100 |
| Irrigation | Low | | | ✓ | 50 | 100 |
| Irrigation | Very Low | | ✓ | ✓ | 50 | 100 |

**Table 7.3: Recommended well placement and construction of a high production irrigation well (LSCE, 2013b).**

| Well Type | Aquifer Hydraulic Conductivity | Distance from Surface water Channel | | | Surface Seal Depth (feet) | Depth of Uppermost Perforations (feet) |
|---|---|---|---|---|---|---|
| | | 500 feet | 1000 feet | 1500 feet | | |
| Irrigation | High | | | ✓ | 50 | 100 |
| Irrigation | Moderate | | | ✓ | 50 | 100 |
| Irrigation | Low | | | ✓ | 50 | 100 |
| Irrigation | Very Low | | | ✓ | 50 | 100 |

## Groundwater Quality/Seawater Intrusion

Consistent with other approved Alternatives, the Napa Valley Subbasin Alternative defines quantitative minimum thresholds for water quality degradation using Maximum Contaminant Levels (MCLs) set as drinking water standards by the State Water Resources

Control Board Division of Drinking Water. Section 7.4.2 of the Alternative describes that minimum thresholds for SGMA purposes are “constituents contributed due to activities at the land surface rather than on the presence of naturally occurring constituents.”[95] The MCL for nitrate (as nitrogen) of 10 mg/L is shown as an example constituent at seven representative monitoring sites for groundwater quality.[96] The Alternative also references the MCL for arsenic of 10 µg/L.[97]

**Table 7-4: Nitrate groundwater standards to avoid groundwater degradation (Napa Valley Subbasin Basin Analysis Report, 2016)**

| Well ID | Minimum Threshold: GW Quality Objective[1] (example Nitrate-N mg/l) |
|---|---|
| 06N04W17A001M | 10 |
| 06N04W27L002M | 10 |
| 07N05W09Q002M | 10 |
| 08N06W10Q001M | 10 |
| NapaCounty-128 | 10 |
| NapaCounty-133 | 10 |
| NapaCounty-135 | 10 |

1. The Maximum Contaminant Level (MCL) for Nitrate as Nitrogen is 10 mg/L.

Quantitative minimum thresholds for seawater intrusion are defined in Section 7.4.3 of the Alternative[98] and Section 3.3.2 of the 2018 Alternative Amendment.[99] The representative well with SGMA criteria established for seawater intrusion in the Alternative, shown in Table 7-5, has a long historical record dating to the 1950s with a trend of decreasing TDS concentrations.[100] Of the examples of groundwater quality standards provided in the Alternative and 2018 Alternative Amendment, all are at or below the MCL and Secondary Maximum Contaminant Level (SMCL) standards established under Title 22 of the California Code of Regulations.

95 Napa Valley Subbasin Basin Analysis Report (2016), p. 141
96 Napa Valley Subbasin Basin Analysis Report (2016), p. 142
97 Napa Valley Subbasin Basin Analysis Report (2016), p. 98
98 Napa Valley Subbasin Basin Analysis Report (2016), p. 142
99 Napa Valley Subbasin Alternative Amendment (2018), p. 25
100 Napa Valley Subbasin Basin Analysis Report (2016), Figure 4-18

**Table 7-5: Minimum threshold to avoid seawater intrusion (Napa Valley Subbasin Basin Analysis Report, 2016)**

| Well ID | Minimum Threshold: Maintain TDS at or Below Historically Observed TDS Concentration[1] (mg/L) |
|---|---|
| 5N/4W-15E1 | 450 |

1. Secondary Recommended Maximum Contaminant Level for TDS is 500 mg/L.

**Table 3-5: Minimum threshold of chloride concentration to indicate saltwater intrusion (Napa Valley Subbasin Alternative Amendment, 2018)**

| Well ID | Minimum Threshold: Maintain Chloride Concentrations at or Below Secondary MCL[1] (mg/L) |
|---|---|
| NapaCounty-214s-swgw1 | 500 |

1. Secondary Recommended Maximum Contaminant Level for TDS is 500 mg/L.

County regulations for the protection of groundwater quality are found in Title 13.12 Napa County Code of Ordinances regarding well construction and abandonment standards and water supply protection. These ordinances were enacted in 1999 and thereafter required all wells to perform in a manner protective of groundwater quality. This objective of the ordinance is summarized by Title 13.12.440 (A), “No person shall install or maintain a well in any manner that will result in the pollution or contamination of the ground water, or which allows the entrance of surface waters into the ground water.” In reference to what constitutes groundwater pollution, the County manages to state-designated MCL standards. See Response 19 for more information regarding the County’s groundwater quality policies and coordination with State regulatory programs.

### Planned Enhancement 1

In the first 5-year update of the Alternative, Napa County will clearly state that the minimum thresholds protective of groundwater quality and seawater intrusion are defined by the federal Clean Water Act, State Porter-Cologne Act, and are further regulated by the San Francisco Bay Regional Water Quality Control Board and the California State Water Resources Control Board Division of Drinking Water (DDW).

## Chronic Groundwater Level Declines, Groundwater Storage Reductions, and Land Subsidence

Quantitative minimum thresholds for chronic groundwater level declines, groundwater storage reductions, and land subsidence are defined in Section 7.4.4 of the Alternative. As described in Global Comment Response C, the minimum thresholds set for these three criteria incorporate those established in Section 7.4.1 for depletions of interconnected streamflow (a more sensitive sustainability indicator in the Napa Valley Subbasin.[101] As shown in Table 7-2 of the Alternative, 17 wells are designated as representative monitoring sites with minimum thresholds for both chronic groundwater level declines and groundwater storage reductions, while 7 wells are designated as representative monitoring sites for land subsidence.[102]

In addition to groundwater elevation as an indicator of land subsidence, land surface elevation data reported by the National Geodetic Survey were presented in the Alternative (Section 4.4, p. 65), including land surface elevation data from 1994, 2000, 2007, and 2012. Long-term observations exhibited both positive and negative changes in elevation, relating more to historical error and less precise survey methods. More recent measurements, however, once correlated with groundwater elevation in the area did not suggest that land subsidence has occurred over the 28-year base period (1988 to 2015).

#### Planned Enhancement 2

In the first 5-year update of the Alternative, Napa County will provide a numerical threshold for groundwater storage itself, in addition to the numerical thresholds already established for groundwater levels as a proxy. This standard will be protective of both groundwater levels and streamflow depletion because it will be derived from each of their minimum thresholds.

### DWR Staff Report, Line 51 (page 2 of 28)

“The Department cannot evaluate an alternative that claims to have operated a basin without incurring undesirable results over a period of at least 10 years based on speculation.”

### Napa County Response 4

See Global Comment Responses A and B regarding the requirements of Section 10733.6(b)(3), Sustainability Criteria and Undesirable Results.

### DWR Staff Report, Line 64 (page 2 of 28)

“While it is true that SGMA does not require undesirable results prior to 2015 to be remediated, the presence of undesirable results before 2015 undermines the County’s claim that it has operated the Napa Valley Subbasin without undesirable results. The 2015 exemption does not apply to an alternative based on 10 years of sustainable basin-wide management, as this would render meaningless the requirement that an agency demonstrate 10 years of sustainability.”

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[101] Napa Valley Subbasin Basin Analysis Report (2016), p. 136
[102] Napa Valley Subbasin Basin Analysis Report (2016), p. 140

## Napa County Response 5

See Global Comment Responses B and C regarding avoiding undesirable depletions of interconnected surface waters, specifically the section discussing the absence of undesirable results from 1988 to 2015 and the section on the role of the 2015 baseline.

### DWR Staff Report, Line 70 (page 2 of 28)

"The County also relies on the authority SGMA grants a local agency or GSA to set measurable objectives as supporting the County defining undesirable results and minimum thresholds retroactively, based on past worst-case conditions in the Subbasin. In the judgement of Department staff, the County's approach is inconsistent with both the legislative intent of SGMA as well as the plain meaning of the statute."

## Napa County Response 6

See Global Comment Responses A and B regarding the requirements of Section 10733.6(b)(3), Sustainability Criteria and Undesirable Results.

### DWR Staff Report, Line 82 (page 3 of 28)

"Based on the information presented in the Basin Analysis Report, the Department has no data upon which it can conclude that the Alternative meets the requirement to demonstrate operation within the sustainable yield for at least the last 10 years and, therefore, Department staff recommend that it not be approved."

## Napa County Response 7

See Global Comment Responses A and B regarding the requirements of Section 10733.6(b)(3), Sustainability Criteria and Undesirable Results.

### DWR Staff Report, Line 87 (page 3 of 28)

"Rather, it is a finding that the analysis presented in the Alternative did not confirm the absence of undesirable conditions during the prior 10 years."

## Napa County Response 8

See Global Comment Responses B and C regarding avoiding undesirable depletions of interconnected surface waters, specifically the section discussing the absence of undesirable results from 1988 to 2015.

### DWR Staff Report, Line 132 (page 4 of 28)

"The elements of the cited sections are not all applicable to alternatives. Some provisions apply to GSPs and alternatives alike, to alternatives only prospectively, or do not apply to alternatives at all. Ultimately, the purpose of the evaluation is to determine whether an alternative satisfies the objectives of SGMA. The agency must explain how the elements of an alternative are "functionally equivalent" to the elements of a GSP required by Articles 5 and 7 of the GSP Regulations and are sufficient to demonstrate the ability of an alternative to achieve the objectives of SGMA. The explanation by the agency that elements of an alternative are functionally equivalent to elements of a GSP furthers the objective of demonstrating that an alternative satisfies the objectives of SGMA. Alternatives based on groundwater management plans or historical basin management practices that predate the passage of SGMA or adoption of GSP Regulations, although required to satisfy the objectives of SGMA, are not necessarily expected to conform to the precise format and content of a GSP. The Department's assessment is thus focused on the ability of an alternative to satisfy the objectives of SGMA as demonstrated by information provided by the agency; it is not a determination of the degree to which an alternative matched the specific requirements of the GSP Regulations."

### Napa County Response 9

See Global Comment Responses A and E regarding the requirements of Section 10733.6(b)(3) and the continuing efforts to maintain sustainable conditions consistent with SGMA.

### DWR Staff Report, Line 174 (page 5 of 28)

"The Department's review considers whether there is a reasonable relationship between the information provided and the assumptions and conclusions made by the agency, whether sustainable management criteria and projects and management actions described in an alternative are commensurate with the level of understanding of the basin setting, and whether those projects and management actions are feasible and likely to prevent undesirable results. Staff will recommend that an alternative be approved if staff believe, in light of these factors, that alternative has achieved or is likely to achieve the sustainability goal for the basin."

### Napa County Response 10

See Global Comment Responses D and E regarding management actions and consistency with SGMA, existing basin management practices and the continuing efforts to maintain sustainable conditions consistent with SGMA.

### DWR Staff Report, Line 183 (page 5 of 28)

"An alternative based on a demonstration that the basin has operated within its sustainable yield over a period of at least 10 years may be approved based on information that demonstrates that objective criteria defining operating standards that governed groundwater management for the basin were established and consistently achieved. Even when staff review indicates that an alternative will satisfy the objective of SGMA, the Department may recommend actions to facilitate future evaluation of that alternative and to allow the Department to better evaluate whether an alternative adversely affects adjacent basins."

### Napa County Response 11

See Global Comment Response A regarding the requirements of Water Code Section 10733.6(b)(3). See Global Comment Response B regarding sustainability criteria and undesirable results. See Global Comment Response C specifically the section regarding the absence of undesirable results from 1988 to 2015. See Global Comment Response D regarding management actions employed by the County since 1991 and the consistency of management actions with SGMA objectives and existing basin management practices. See Global Comment Response E regarding the continuing efforts to maintain sustainable conditions consistent with SGMA.

### DWR Staff Report, Line 231 (page 6 of 28)

"Other information provided to or relied upon by the Department have been posted on the Department's website and includes material submitted by the County, public comments, and correspondence. Napa County also submitted an amendment to its Alternative Submittal as part of the 2018 Annual Report, but Department staff did not review this as part of the Alternative evaluation because it was received after the statutory deadline for alternative submissions."

### Napa County Response 12

See Global Comment Response E regarding the continuing efforts to maintain sustainable conditions consistent with SGMA.

### DWR Staff Report, Line 305 (page 8 of 28)

"GSP Regulations require the submitting agency to explain how the elements of an alternative are functionally equivalent to the elements of a GSP as required by Article 5 of the GSP regulations and are sufficient to demonstrate the ability of an alternative to achieve the objectives of SGMA. As stated previously, alternatives based on historical basin management practices that predate the passage of SGMA or adoption of GSP Regulations, although required to satisfy the objectives of SGMA, are not necessarily expected to conform to the precise format and content of a GSP, and the criteria for adequacy of an alternative is whether the Department is able to determine that an alternative satisfies the objectives of SGMA."

## Napa County Response 13

See Global Comment Response A regarding the requirements of Section 107733.6(b)(3) and Global Comment Response E regarding the continuing efforts to maintain sustainable conditions consistent with SGMA.

### DWR Staff Report, Line 329 (page 9 of 28)

"The reference to requirements of the GSP Regulations at the beginning of each section is to provide context regarding the nature of the element discussed but is not meant to define a strict standard applicable to alternatives."

## Napa County Response 14

See Global Comment Response A regarding the requirements of Section 107733.6(b)(3).

### DWR Staff Report, Line 342 (page 9 of 28)

"Through the conservation element of the 2008 Napa County General Plan, Napa County developed six goals related to water resources, which include goals related to groundwater quality and quantity. The General Plan served as the starting point for subsequent County efforts that included a groundwater public outreach project in 2010, the Groundwater Resources Advisory Committee between 2011 and 2014, and development of the Napa County Comprehensive Groundwater Monitoring Program in 2009."

## Napa County Response 15

See Global Comment Response A regarding the requirements of Water Code Section 107733.6(b)(3). See Global Comment Response D regarding management actions employed by the County since 1991 and the consistency of management actions with SGMA objectives and existing basin management practices. See Global Comment Response E regarding continuing efforts to maintain sustainable conditions consistent with SGMA. The March 6, 1991 interim policy report served as the starting point for County efforts regarding groundwater conservation, which required use permit applicants and parcel subdivision applicants to submit a Water Availability Analysis with each application.[103,104] This oversight within the County's jurisdiction

[103] Napa Valley Subbasin Basin Analysis Report (2016), pp. 163 - 164
[104] Napa Valley Subbasin Basin Analysis Report (2016), Appendix I

was refined on August 3, 1999 with the Board of Supervisors approval of Napa County Ordinance No. 1162 (Groundwater Conservation Ordinance).[105]

### DWR Staff Report, Line 430 (page 13 of 28)

"Groundwater elevations in the MST area show declining trends due to several pumping depressions. It is noted that much of the MST area is not within the Napa Valley Subbasin: however, none of the reports distinguish the part of the MST area in the Napa Valley Subbasin from the portion outside of the Subbasin when discussing groundwater elevations."

### Napa County Response 16

The MST groundwater subarea[106] has been a focus of Napa County groundwater management since the 1990s, including through restrictions on groundwater development.[107] The Alternative includes dozens of references to the MST groundwater subarea, which has been delineated by Napa County to support local resources planning and management independent of the mapping of groundwater basins by DWR.[108] The County has also described groundwater conditions, including groundwater level trends and cones of depression, in the MST as part of the following reports submitted with the Alterative:

- *Napa County groundwater conditions and groundwater monitoring recommendations,* prepared for Napa County Department of Public Works, February 2011[109]
- Napa Country comprehensive groundwater monitoring program, 2014 annual report and CASGEM update[110]
- Napa Country comprehensive groundwater monitoring program, 2015 annual report and CASGEM update[111]

The County has also described groundwater conditions, including groundwater level trends and cones of depression, in the MST as part of the following reports prepared and provided to DWR since submittal of the Alterative:

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[105] Napa Valley Subbasin Basin Analysis Report (2016), pp. 161 - 163
[106] The MST groundwater subarea is named for three creeks flowing through it: Milliken Creek, Sarco Creek, and Tulucay Creek. The MST Subarea is characterized by hard-rock and non-alluvial water bearing deposits. The Subarea is located largely outside the Napa Valley Subbasin; see Napa Valley Subbasin Basin Analysis Report (2016) Section 4.1.1.2, Figure 4-7, and Section 9.2.3.

[107] Napa Valley Subbasin Basin Analysis Report (2016), Appendix I
[108] Napa Valley Subbasin Basin Analysis Report (2016), p.19
[109] *Napa Valley Subbasin Basin Analysis Report (2016), Table 1-1 Key References*
[110] *Napa Valley Subbasin Basin Analysis Report (2016), Table 1-1 Key References*
[111] *Napa Valley Subbasin Basin Analysis Report (2016), Table 1-1 Key References*

- *Napa County groundwater sustainability: annual report – water year 2017*. February 2018.
- *Northeast Napa area: special groundwater study*, September 2017
- *Napa County groundwater sustainability: annual report – water year 2018*. March 2019.

The County understands this comment as a reference to groundwater level declines that have occurred in the MST and that have also stabilized since about 2009 in the majority of monitored wells, as described and shown in the *2015 annual report and CASGEM update* and annual reports prepared in subsequent years. While the County has more commonly reported on groundwater level conditions in the MST by referring to northern, central, and southern portions of the MST area, figures depicting the cones of depression in the MST commonly show the Soda Creek Fault that forms the eastern boundary of the Subbasin for approximately 5 miles from near Soda Creek south to First Street near the Napa River in Napa. The *2015 annual report and CASGEM update* and annual reports prepared in subsequent years show the cones of depression in the MST with the MST subarea and Napa Valley Subbasin boundaries for reference (Figures 5-8 and 5-9, see Figure 5-9 below for reference).

### Planned Enhancement 3

In the first five-year update of the Alternative, Napa County will provide a single map depicting groundwater elevations over all regions of the Napa Valley Subbasin, including boundaries for the Northeast Napa Management Area and the MST subarea.

## DWR Staff Report, Line 435 (page 13 of 28)

"However, several wells throughout the Subbasin show declining trends and are explained as being screened below the alluvium in the Sonoma Volcanics. In addition, the Groundwater Conditions Report notes that the northeastern area of the Napa subarea has seen a 10- to 30-foot decline in groundwater levels over the 2000 to 2010 period."

## Napa County Response 17

The Alternative describes that "groundwater level trends in the Napa Valley Subbasin of the Napa-Sonoma Valley Groundwater Basin are stable in the majority of wells. …While many wells have shown at least some degree of response to recent drought conditions [i.e., 2012 – 2015], the water levels observed in recent years are generally higher than groundwater levels in the same wells during the 1976 to 1977 drought."[112] This finding is consistent with evaluations of groundwater levels conducted by DWR that found "No documented groundwater level declines" as part of the basin prioritization completed in 2019 and "long-term water levels in most of the

[112] Napa Valley Subbasin Basin Analysis Report (2016), p.50

county have remained unchanged" as part of the 2014 basin prioritization (see Global Comment Response B).

The Alternative continues, noting observations in four production wells that have experienced declining groundwater levels in successive years,

> *While the majority of wells exhibit stable trends, periods of year-to-year declines in groundwater levels have been observed in a few wells. These wells are located near the Napa Valley margin in the northeastern Napa Subarea (NapaCounty-75 and Napa County-76), southwestern Yountville Subarea (NapaCounty-135) and southeastern St. Helena Subarea (NapaCounty-132). These locations are characterized in part by relatively thin alluvial deposits, which may contribute to more groundwater being withdrawn from the underlying semi-consolidated deposits.*
>
> - *Napa Valley Subbasin Basin Analysis Report (2016), p. 50*

The two wells referenced in the Alternative as located in the northeastern Napa Subarea (NapaCounty-75 and NapaCounty-76) are the same wells referenced in the 2011 Groundwater Conditions Report. As described in the Alternative, alluvial deposits are thinner in the northeastern Napa Subarea east of the Napa River, leading to greater exposure to pre-alluvial and semi-consolidated deposits. As also described in the Alternative, groundwater levels have stabilized in that northeastern Napa Subarea since about 2009. That portion of the Subbasin has been the subject of expanded monitoring effort and focused study since the Alternative was submitted to DWR in 2016.[113]

The other two wells (NapaCounty-132 and NapaCounty-135) are described in the Alternative as being located in areas along margins of the Subbasin previously mapped as having shallow alluvial deposits with more exposure to pre-alluvial, semi-consolidated deposits with different aquifer characteristics and hydraulic properties.[114] Since 2015, water levels in NapaCounty-132 have experienced recovery during wet and normal years consistent with historical conditions.[115,116] As also reported in annual reports submitted to DWR since 2016, water levels in NapaCounty-135 have experienced recovery in recent spring season measurements to levels consistent with historical values. The County has increased the monitoring frequency at both wells to monthly from semi-annual and data continue to be reported to DWR through the CASGEM online system.

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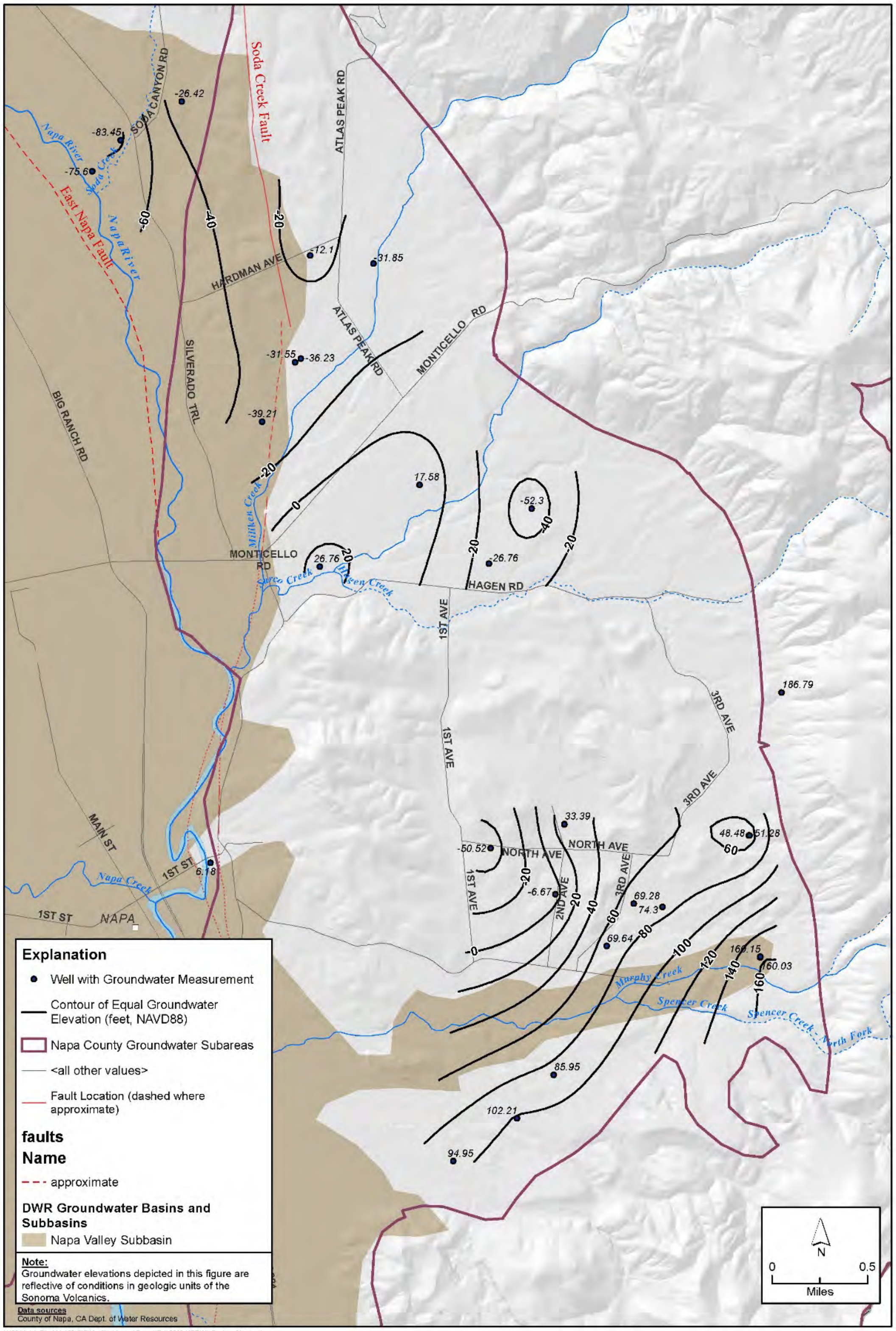
[113] LSCE. 2017. *Northeast Napa area: special groundwater study*, September 2017, included as Appendix A in the Napa Valley Subbasin Alternative Amendment (2018), provided to DWR on March 23, 2018.
[114] Napa Valley Subbasin Basin Analysis Report (2016), pp.49 - 50
[115] Napa County Groundwater Sustainability: Annual Report – Water Year 2017. (February 2018)
[116] Napa County Groundwater Sustainability: Annual Report – Water Year 2018. (March 2019)




X:\2014 Job Files\14-108\GIS\Mapfiles\Annual Report\Fall 2015 MST WL Contour Map.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

**FIGURE 5-9**
**Contours of Equal Groundwater Elevation, Fall 2015**
**MST Subarea, Napa County, CA**

*Napa County Comprehensive Groundwater Monitoring Program*
*2015 Annual Report and CASGEM Update*

### DWR Staff Report, Line 444 (page 13 of 28)

"The Basin Analysis Report states seawater intrusion is not an issue in the Napa Valley Subbasin because common indicators of salinity, such as Total Dissolved Solids (TDS), electrical conductivity (EC), and sodium, are not found in high enough concentrations to indicate sea water has intruded into the Subbasin. The Basin Analysis Report notes that higher concentrations have been observed in areas south of the Napa Valley Subbasin in the Napa River Marshes, Jameson/American Canyon, and Carneros subareas."

## Napa County Response 18

Section 4.3 of the Alternative describes that the seawater/freshwater interface occurs south of the Napa Valley Subbasin. Areas south of the Subbasin, including three County-designated groundwater subareas (Napa River Marshes, Jameson-American Canyon, and Carneros) experience tidal surface water interactions that bring brackish water inland from San Pablo Bay. Historical maximum groundwater quality data are plotted to show that wells that have experienced the highest concentrations of chloride, electrical conductivity, total dissolved solids, and sodium are south of the Subbasin.[117]

### DWR Staff Report, Line 457 (page 13 of 28)

"Napa County did not specifically mention water quality regulatory programs in its Alternative."

## Napa County Response 19

Napa County utilizes the groundwater quality standards defined in the federal Clean Water Act and the California Porter-Cologne Act, which is managed by federal, state, and regional agencies. In California the primary agency overseeing and enforcing drinking water standards is the State Water Resources Control Board Division of Drinking Water. Section 4 of Groundwater Conditions Report (LSCE, 2011a) submitted with the Alternative, describes groundwater quality conditions countywide and references primary and secondary water standards established by the California Environmental Protection Agency and the U.S. EPA.[118] Section 5 of the Groundwater Conditions Report describes Geotracker regulated sites and groundwater quality monitoring programs conducted by DWR, USGS, Department of Public Health, and Napa County.

Published on June 2008, the Napa County General Plan outlined six goals, twenty-eight policies, and ten action items surrounding water resources, all of which are summarized in Section 9 of the Alternative. Napa County implemented conservation regulations in Chapter 18.108 of the Code of Ordinances, with regulations pertaining to water quantity and quality of

[117] Napa Valley Subbasin Basin Analysis Report (2016), Figures 4-58 – 4-61
[118] Napa County Groundwater Conditions and Groundwater Monitoring Recommendations, prepared for Napa County Department of Public Works, (February 2011)

runoff entering water courses, minimizing human modification of natural terrain, and protecting drinking water supplies.

Water quality regulations are under the jurisdiction of various agencies, including the San Francisco Regional Water Quality Control Board, to set numeric thresholds on groundwater, inland surface water, estuaries, and ocean waters. Through the adoption of Water Quality Control Plans, regulations and policies for water quality control are stated to have the force and effect of law to protect water quality, stated in the 17$^{th}$ edition of Water Quality Goals by the State Water Resources Control Board (superseding the April 2011 edition). Of the groundwater constituents listed in the Alternative and 2018 Alternative Amendment, minimum thresholds either meet or are stricter than what the State Water Resources Control Board defines as the parameter thresholds.

The Groundwater Conditions Report provides a comprehensive discussion of countywide groundwater quality conditions based on available data, with 468 pages of water quality summaries, time series plots, and tables for general minerals and trace elements and references to regulatory standards (Alternative Appendices B, C, D, E, F, H, and J). Section 4.1.3.2 of the Amendment summarizes groundwater in the Napa Valley Subbasin as having “good water quality” and stable over recent years (2009-2015) compared to historical data.

The County has evaluated data from a network of 283 groundwater quality monitoring wells to determine whether groundwater quality exceeds the thresholds of state-designated Maximum Contaminant Levels (MCLs), set by the California Environmental Protection Agency. Of these MCLs, many are defined by various government entities, ranging from the U.S. EPA, California Department of Public Health, and California Environmental Protection Agency (standards found in Title 22 of the California Code of Regulations). While it was not explicitly stated in the Amendment that Napa County’s water quality thresholds were to be synonymous with the MCL standards set by Title 22 of the California Code of Regulations, the examples provided were in compliance with prior regulations. In the Amendment, the Secondary Maximum Contaminant Level (SMCL) for total dissolved solids (TDS) was reported as a threshold to avoid seawater intrusion.[119]

The use of state defined standards in an agency’s groundwater sustainability plan or alternative plan is granted under §354.28 (b)(5) of the California Code of Regulations, stating SGMA thresholds can include how “state, federal or local standards relate to the relevant sustainability indicator.” As part of Napa County’s monitoring program, the following are general parameters that are regularly measured at the groundwater quality monitoring sites (Table 4-2, LSCE 2011); chloride, electrical conductivity (EC), nitrate, TDS, alkalinity, hardness, and general minerals including Ca, Mg, Na, K, $SO_4$, $HCO_3$, $NO_3$, and F. Other constituents tested specifically by Napa County include ammonia, arsenic, boron, copper, dissolved oxygen, iron, manganese, nickel, and fecal and total coliform. A total list of monitored groundwater quality parameters is found in Table A1 of the Task 1 Technical Memorandum regarding the Napa

[119] Napa Valley Subbasin Basin Analysis Report (2016), p. 142

County data management system.[120] With regular monitoring, proper action can be taken in the case that any of the tested constituents exhibit consistent and significant exceedances of any of the MCLs or SMCLs.

**Table 4-2: Water Quality MCLs (LSCE 2011 p. 56, p. 57)**

| | **Napa Valley Subbasin Alternative/ 2018 Alternative Amendment (mg/L)** | **California MCL or SMCL (mg/L) (Title 22, & Water Quality Board)** |
|---|---|---|
| Nitrate (as nitrogen) | 10 | 10 |
| Total Dissolved Solids (TDS) | 450 | 500 |
| Chloride | 500 | 500 |
| Arsenic | 0.01 | 0.01 |
| mg/L = milligrams per liter<br>MCL = Maximum Contaminant Level<br>SMCL = Secondary Maximum Contaminant Level | | |

## DWR Staff Report, Line 465 (page 14 of 28)

"The Basin Analysis Report also indicates that historical water quality data is limited but does not explain what limited means."

## Napa County Response 20

Referenced in Section 4.1.3.1 (p. 50) of the Amendment, the Napa County Conditions and Groundwater Monitoring Recommendations (LSCE, 2011a, submitted with the Alternative) report historical groundwater quality monitoring data as typically lacking in Napa County as a whole and more spatially distributed among the subareas than compared to groundwater level data. In the Napa Valley Subbasin, however, groundwater quality monitoring sites are much more abundant (Figure 5.2 of LSCE, 2011a). Dates for historical groundwater quality data range from 1930 to 2010, in which most of the historical groundwater quality data have been collected from 195 wells in the Napa Valley Floor Subbasin out of a total of 368 wells (LSCE, 2011a p. 69). One of the primary objectives listed under the groundwater monitoring program was to expand upon the County-wide monitoring network (currently 283 wells total) and provide infill where needed (Section ES.5.2 LSCE, 2011a). In addition to clarifying the spatial availability of

[120] Task 1, Napa County data management system. Technical Memorandum prepared for Napa County (2010), in in *Napa Valley Subbasin Basin Analysis Report (2016), Table 1-1 Key References*

monitoring wells within Napa County and the Napa Valley Subbasin, wells with less than five years of quality data are designated as having limited data temporally. Table 5.2 and Figure 5.2 of LSCE (2011a), below, detail further the spatial and temporal spread of current and historical groundwater monitoring wells, where a majority of the monitoring wells are located within the Napa Valley Subbasin.

More information regarding the history of groundwater quality monitoring in Napa County can be found in Section 2 of the 2010 Task 1 Technical Memorandum regarding the Napa County data management system. This section outlines each monitoring agency (DWR, California Department of Public Health (DPH), State Water Resources Control Board (SWRCB), and Napa County), each network's period of record, and spatial distribution within the county.

### Planned Enhancement 4

In the first five-year update of the Alternative, Napa County will define clearly what the term "limited" means relative to the spatial and temporal availability of historical water quality data throughout the County and in the Napa Valley Subbasin and its use to describe data both spatially and temporally.

**Table 5.2: Historical and Current Groundwater Quality Monitoring Wells (LSCE 2011a)**

| Summary of Historical and Current Groundwater Quality Monitoring Wells | | | | |
|---|---|---|---|---|
| Subarea | No. Wells with Historical and Current WQ Data (post 2005 and >5 years of data) | No. Wells with Current but Limited WQ Data (post 2005 and <5 years of data | No. Wells with Historical WQ Data (pre-2005 and >5 years of data) | No. Wells with Historical but Limited WQ Data (pre-2005 and <5 years of data) |
| Napa Valley Floor-Calistoga | 4 | 25 | 5 | 4 |
| Napa Valley Floor-MST | 16 | 10 | 4 | 16 |
| Napa Valley Floor-Napa | 3 | 28 | 6 | 5 |
| Napa Valley Floor-St. Helena | 4 | 33 | 2 | 5 |
| Napa Valley Floor-Yountville | 5 | 13 | 4 | 3 |
| Carneros | 3 | 4 | 5 | 1 |
| Jameson/American Canyon | | | 6 | |
| Napa River Marshes | 1 | 26 | 1 | |
| Angwin | 8 | 2 | | |
| Berryessa | | 9 | | 9 |
| Central Interior Valleys | 13 | 26 | | 1 |
| Eastern Mountains | 15 | 10 | | 6 |
| Knoxville | | 5 | | |
| Livermore Ranch | | | | |
| Pope Valley | | 7 | | |
| Southern Interior Valleys | 1 | 2 | | |
| Western Mountains | 6 | 4 | 1 | 1 |
| Total | 79 | 204 | 34 | 51 |

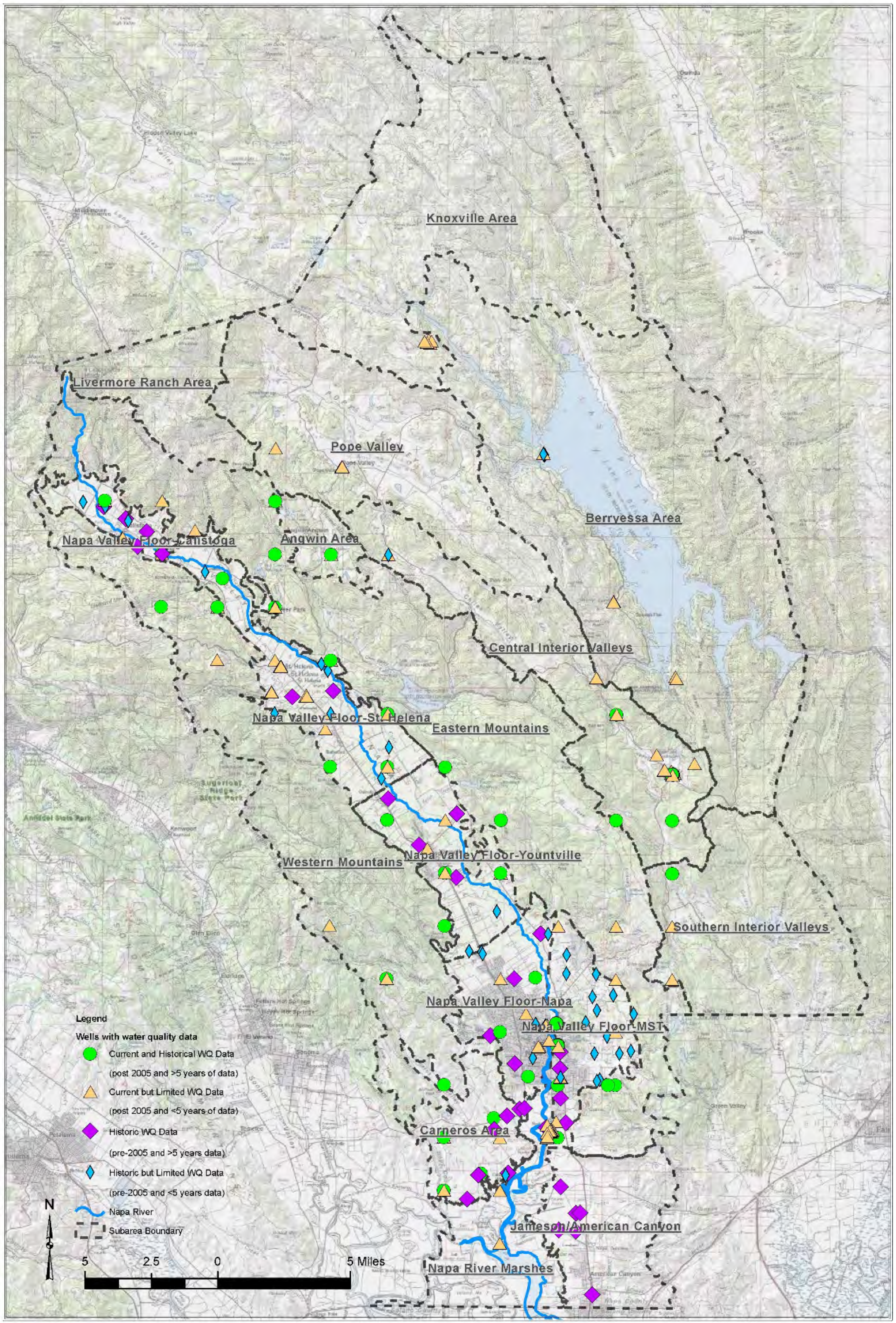



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**Figure 5.2**
**Groundwater Quality Data Availability**

### DWR Staff Report, Line 474 (page 14 of 28)

"The Basin Analysis Report identifies the Napa River as undergoing complex interactions with shallow groundwater in the surficial alluvial deposits. The Basin Analysis Report also mapped known and probable perennial streams in the Napa Valley Subbasin and provided a scatter plot of flow rate by month to illustrate the timing of low- to no-flow periods on the Napa River. However, Napa County does not address depletions of interconnected surface water directly, discussing baseflow instead. A baseflow analysis was also provided to show correlations between baseflow and pumping, and baseflow and precipitation. The County uses groundwater elevation as a proxy for depletions of interconnected surface water and for setting sustainable management criteria."

### Napa County Response 21

See Global Comment Response C regarding avoiding undesirable depletions of interconnected surface water and specifically both sections discussing the suitability of groundwater levels as a proxy metric for streamflow depletion and the absence of undesirable results from 1988 to 2015.

### DWR Staff Report, Line 505 (page 15 of 28)

"However, because a root zone water balance considers only precipitation, surface water runoff, plant evapotranspiration, and soil moisture storage, it does not consider the available storage capacity of the aquifer or account for groundwater pumping or subsurface groundwater outflow, which are generally part of a water budget. As a result, the root zone water balance was updated (emphasis added) and incorporated into the water budget along with estimates of both groundwater pumping and subsurface outflow in the Alternative submittal."

### Napa County Response 22

The Root Zone Model was developed by the County in a process that included public review and revisions by the County throughout its development. Draft Root Zone Model results were presented at public meetings of the Watershed Information & Conservation Council of Napa County (WICC) on September 22, 2016 and November 3, 2016. Public comment was received at each meeting and outside of those meetings[121] The Root Zone Model simulates hydrologic process occurring within the uppermost portion of the Subbasin that defines the root zone accessible by plants roots, including crops and native vegetation.[122] The Root Zone Model reflects surveyed land uses and physical soil properties along with precipitation and evapotranspiration data from Napa Valley to track changes in soil moisture and identify when and where an irrigated crop or landscape requires an application of water and whether the irrigation is sourced from groundwater, surface water, or recycled water.

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[121] Napa Valley Subbasin Basin Analysis Report (2016), Appendix L
[122] Napa Valley Subbasin Basin Analysis Report (2016), Section 6.5

Groundwater demands calculated by the Root Zone Model are one of multiple sources of groundwater pumping information that are inform the overall water budget for the Subbasin.[123] Other sources of groundwater pumping information reflected in the water budget include metered groundwater use reported to the County by municipal groundwater pumpers and population-based estimates of domestic use by self-supplied water users in unincorporated areas of the Subbasin. For self-supplied domestic groundwater users, daily groundwater demand was calculated by applying an average daily per capita demand developed from a study that tracked water use by self-supplied households in Sonoma County as part of a study of 700 households statewide.[124,125]

Regarding outflow from the Subbasin by processes other than evapotranspiration by vegetation, the water budget accounts for all outflows from the Subbasin described in the Hydrogeologic Conceptual Model as: consumptive uses of water by vegetation (Root Zone Model), stormflow and groundwater baseflow leaving the subbasin as discharge into the Napa River, and subsurface groundwater flow to the Napa-Sonoma Lowlands Subbasin.[126] The Subbasin water budget tracks changes in groundwater storage with each monthly time-step. Available aquifer storage capacity was not explicitly simulated in the Subbasin water budget, though the Alternative does include an analysis of total aquifer storage and annual changes in storage.[127] Subsurface outflow is calculated as part of the Subbasin water budget based on the hydraulic gradient at the boundary between the Subbasins and estimates of hydraulic conductivity of aquifer materials in the Quaternary alluvium and Quaternary sedimentary basin deposits depicted in Cross Section G - G' of the Napa Valley Updated Hydrogeologic Conceptualization and Characterization of Conditions Report.[128]

## DWR Staff Report, Line 552 (page 16 of 28)

"Napa County provides in its Basin Analysis Report a sustainability goal for the Napa Valley Subbasin, which it states is in conformance with SGMA and the intent of the Groundwater Resources Advisory Committee and the County Board of Supervisors: "To protect and enhance groundwater quantity and quality for all the people who live and work in Napa County, regardless of the source of their water supply. The County and everyone living and working in the county will integrate stewardship principles and measures in groundwater development, use, and management to protect economic, environmental, and social benefits and maintain groundwater sustainability indefinitely without causing undesirable results, including unacceptable economic, environmental, or social consequences." The sustainability goal is based

[123] Napa Valley Subbasin Basin Analysis Report (2016), Table 6-13
[124] Aquacraft Water Engineering and Management (2011)
[125] Napa Valley Subbasin Basin Analysis Report (2016), Table 6-13
[126] Napa Valley Subbasin Basin Analysis Report (2016), Table 6-10
[127] Napa Valley Subbasin Basin Analysis Report (2016), Section 6.8
[128] Updated Hydrogeologic Conceptualization and Characterization of Conditions. Prepared for Napa County (2013)

on previous work by the Groundwater Resources Advisory Committee, which sought to establish a sustainability goal as part of the Napa County General Plan Update in 2008. The sustainability goal in the General Plan was modified by the County for SGMA."

## Napa County Response 23

See Global Comment Response B regarding the development of the sustainability goal for the Subbasin and the definition of sustainability criteria and undesirable results.

## DWR Staff Report, Line 570 (page 16 of 28)

"Sustainability indicators are defined as any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results. Sustainability indicators thus correspond with the six undesirable results – chronic lowering of groundwater levels indicating a depletion of supply if continued over the planning and implementation horizon, reduction of groundwater storage, seawater intrusion, degraded water quality, including the migration of contaminant plumes that impair water supplies, land subsidence that substantially interferes with surface land uses, and depletions of interconnected surface water that have adverse impacts on beneficial uses of the surface water – but refer to groundwater conditions that are not, in and of themselves, significant and unreasonable. Rather, sustainability indicators refer to the effects caused by changing groundwater conditions that are monitored, and for which criteria in the form of minimum thresholds are established by the agency to define when the effect becomes significant and unreasonable, producing an undesirable result."

## Napa County Response 24

See Global Comment Response B regarding sustainability criteria and undesirable results.

## DWR Staff Report, Line 598 (page 17 of 28)

"However, a submitting agency is not required to establish criteria for an undesirable result when the agency can demonstrate that an undesirable result for that sustainability indicator is not present and is not likely to occur in the basin."

## Napa County Response 25

See Global Comment Responses A and B regarding the requirements of Section 10733.6(b)(3), sustainability criteria and undesirable results.

### DWR Staff Report, Line 606 (page 17 of 28)

"According to the Report, stable groundwater levels over the base period means that no significant and unreasonable effects occurred throughout the Napa Valley Subbasin related to five of the six undesirable results defined by SGMA: chronic lowering of groundwater levels, reduction of groundwater storage, seawater intrusion, degraded water quality, and land subsidence. With regard to the sixth undesirable result, depletions of interconnected surface water that have significant and unreasonable adverse impacts, the Report notes that the historical occurrence of diminished baseflow could be considered an undesirable result, but claims that this possibility is basically immaterial inasmuch as SGMA does not require an alternative to address undesirable results that occurred before, and have not been corrected by, January 1, 2015."

### Napa County Response 26

See Global Comment Responses A and B regarding the requirements of Section 10733.6(b)(3), Sustainability Criteria and Undesirable Results. See Global Comment Responses D regarding the consistency of the County's past management actions with the objectives of SGMA.

### DWR Staff Report, Line 631 (page 18 of 28)

"The Report does not describe any qualitative or quantitative standard for groundwater levels to which the Subbasin had been managed for the "base period" or for any other period and does not describe what groundwater level conditions would cause an undesirable result."

### Napa County Response 27

See Global Comment Responses A, B, and D regarding the requirements of Section 10733.6(b)(3), Sustainability Criteria and Undesirable Results, and the consistency of the County's past management actions with the objectives of SGMA. See also Response 3, above.

Napa County has provided information in Section 7 of the Alternative that elaborates on the criteria by which sustainability indicators will be assessed to determine whether conditions or trends are significant and unreasonable and would constitute an undesirable result consistent with the definition provided by SGMA.

### DWR Staff Report, Line 653 (page 18 of 28)

"The Report does not describe any quantitative standard for groundwater storage to which the Subbasin had been managed for the period of analysis and does not define what would constitute a significant and unreasonable effect for reduction of groundwater storage, or when it would result in an undesirable result for the Subbasin."

## Napa County Response 28

See Global Comment Responses A and B regarding the requirements of Section 10733.6(b)(3), sustainability criteria and undesirable results. See also Response 3, above.

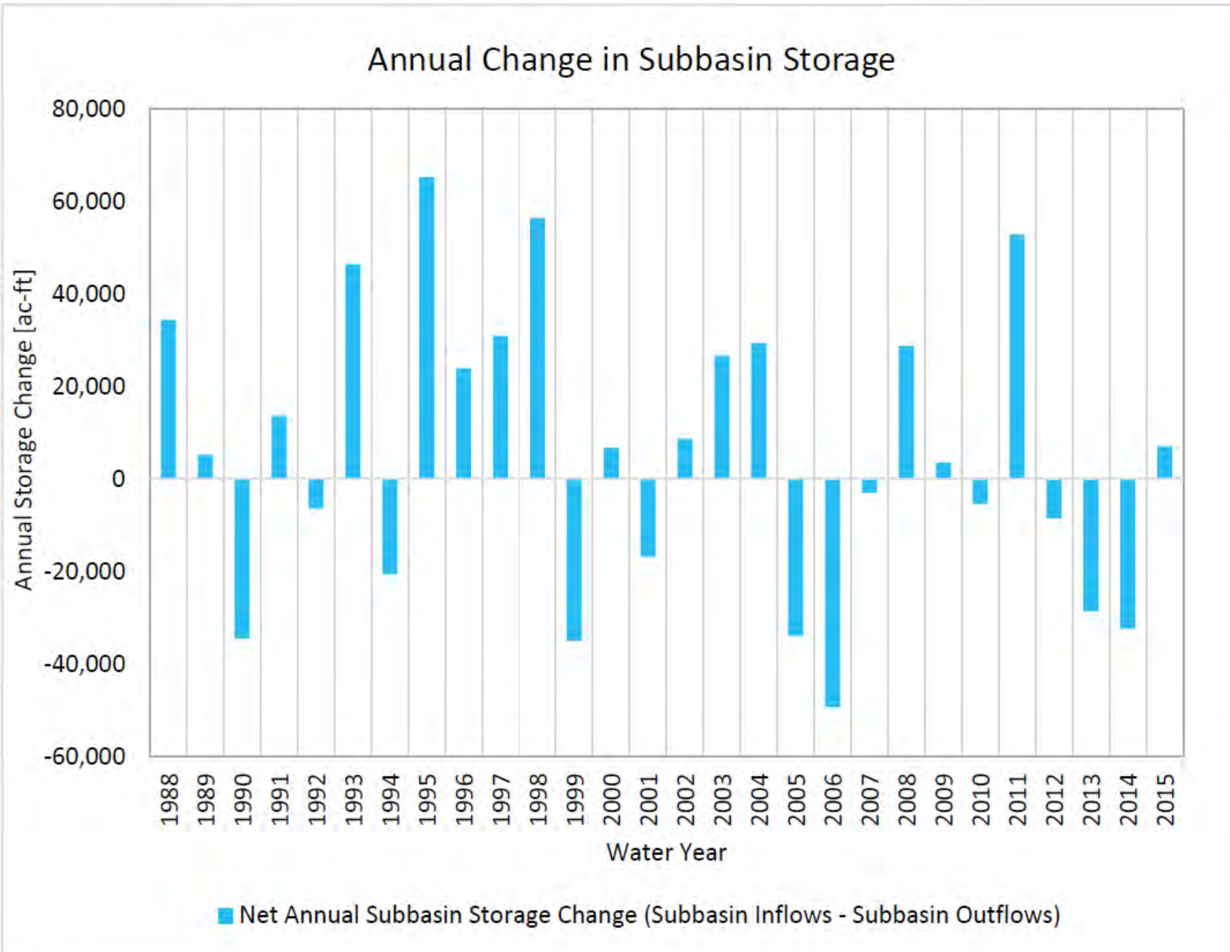
Napa County utilized groundwater elevation as a proxy to establish a minimum threshold for assessing groundwater storage reduction, in which elevation thresholds were set to be protective of storage depletion. Average annual changes in groundwater storage over the 1988 to 2015 base period were found to be positive, indicating overall groundwater pumping in the Napa Valley Subbasin to be below its sustainable yield. Figure 6-24 of the Alternative (p. 117) shows the variable nature of annual changes in groundwater storage, in which the average annual change in storage over the base period is positive. As the undesirable result is designated as chronic lowering of groundwater levels to create significant and unreasonable depletions of water supply, Section 10721 (x)(1) of SGMA clarifies that any overdraft to occur during a period of drought "is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels and storage during a period of drought are offset by increases in groundwater levels or storage during other periods." In response to guidance from DWR, the Draft Best Management Practices – Sustainable Management Criteria, November 2017, the definition of an undesirable result due to reductions of groundwater storage in the Subbasin was clarified as follows:

> *"Reductions in groundwater storage would become significant and unreasonable if groundwater conditions in the Napa Valley Subbasin result in reductions in groundwater storage that exceed the Subbasin sustainable yield, excluding groundwater level declines that may occur during drought conditions unless groundwater storage declines observed during periods of drought result in reduced groundwater storage over a long-term period that is at least 10 years in length, not ending in drought conditions, and including a balance of above average and below average water years."*
>
> \- *Napa Valley Subbasin Alternative Amendment (2018), p.18*

As described in Section 6 of the Alternative, groundwater storage is tracked using groundwater elevations measured throughout the Subbasin, thus the thresholds set using static groundwater elevations are direct indications of groundwater storage in the Subbasin.

As described above in Planned Enhancement 2, in the first 5-year update of the Alternative, Napa County will provide a numerical threshold for groundwater storage itself, in addition to the numerical thresholds already established for groundwater levels as a proxy. This standard will be protective of both groundwater levels and streamflow depletion because it will be derived from each of their minimum thresholds.

**Figure 6-24. Net Annual Subbasin Storage Change, 1988 - 2015**




## DWR Staff Report, Line 693 (page 19 of 28)

"The Report does not describe quantitative standards for degradation of groundwater quality to which the Subbasin had been managed for the period of analysis. The Report states that minimum thresholds developed in 2016 are based on groundwater quality concentrations remaining above water quality objectives described in the Basin Analysis Report, but the County does not describe what the water quality objectives are."

## Napa County Response 29

See Global Comment Responses A and B regarding the requirements of Section 10733.6(b)(3), Sustainability Criteria and Undesirable Results. See also Response 2, above.

An extensive assessment of countywide groundwater quality conditions took place in 2011, in which overall, except for some observations of exceedances due to naturally occurring conditions, groundwater quality was concluded to be sufficient to meet the beneficial uses in the Napa Valley Subbasin. Since the Subbasin is not impacted by widespread or significant water quality degradation nor significant groundwater contaminant plumes, the water quality thresholds defined by the Alternative are equivalent to drinking water standards already determined by federal, state, and regional agencies.

### DWR Staff Report, Line 702 (page 20 of 28)

"The Report notes that minimum thresholds for degraded water quality focus on water quality constituents that are contributed due to activities at the land surface, and not for naturally occurring constituents. The Basin Analysis Report provides minimum thresholds and measurable objectives at seven representative monitoring sites … for nitrate as an "example". The minimum threshold is set at 10 mg/L of nitrate as nitrogen (equivalent to the California MCL for public drinking water) and the measurable objective is 8 mg/L. Except for nitrate, the Report does not specify which other water quality constituents will have minimum thresholds and measurable objectives defined, or make reference to other regulatory programs that are specific to water quality."

### Napa County Response 30

See Napa County Response 3 and 19 for more information regarding the use of state-regulated Maximum Contaminant Levels (MCLs) and Secondary Maximum Contaminant Levels (SMCLs) as minimum thresholds. The County also notes that the use of state-regulated drinking water standards as minimum thresholds for degraded water quality and the description of those minimum thresholds in the Napa Valley Subbasin Alternative is consistent with their use and description in other alternatives approved by DWR.

### DWR Staff Report, Line 721 (page 20 of 28)

"The Basin Analysis Report does not define what would be a significant and unreasonable effect related to land subsidence or what would be an undesirable result for the Subbasin."

### Napa County Response 31

See Global Comment Responses A and B regarding the requirements of Section 10733.6(b)(3), Sustainability Criteria and Undesirable Results. See also Response 2, above.

Section 7.2 (p. 135) of the Alternative and Section 3.1.6 (p. 18) of the 2018 Alternative Amendment state that land subsidence would create significant and unreasonable effects if groundwater conditions in the Napa Valley Subbasin resulted in permanent and inelastic subsidence to a degree that disrupts or causes accelerated damage to important public or private infrastructure, substantially interfering with surface land uses. Based on these defined effects of land subsidence, and available land surface elevation data presented in Section 4.4 from sites located throughout the Subbasin with repeated elevation measurements and in consideration of the stable groundwater levels observed in the Subbasin, Napa County has concluded that over the 28-year base period, there have been no significant and unreasonable effects occurring throughout the Subbasin due to land subsidence. If long-term groundwater level decline is observed within the monitoring network, appropriate action would be taken to look more closely at these impacts and their potential effects on land subsidence.

#### Planned Enhancement 5

In the first five-year update of the Alternative, Napa County will provide a clearer description of the significant and unreasonable effects that would constitute an undesirable result if measurable subsidence was to occur in the Subbasin.

### DWR Staff Report, Line 743 (page 21 of 28)

"The County had not historically established quantitative standards defining when diminished baseflow would cause undesirable results, and claims it is not required to address this potential undesirable result because it occurred prior to January 1, 2015."

### Napa County Response 32

See Global Comment Responses A and B regarding the requirements of Section 10733.6(b)(3), Sustainability Criteria and Undesirable Results. See Global Comment Response C regarding avoiding undesirable depletions of interconnected surface water and specifically both sections discussing the suitability of groundwater levels as a proxy metric for streamflow depletion and the absence of undesirable results from 1988 to 2015.

### DWR Staff Report, Line 751 (page 21 of 28)

"The Report states that those levels would be protective of the Napa River and would prevent additional depletions of surface water that would cause longer durations of low- or no-flow conditions. The report also states that operating to those levels on a continuous basis would not be acceptable as doing so would contribute to a worsening of existing conditions. Measurable objectives for depletion of interconnected surface water were set to the mean fall groundwater levels that occurred historically."

### Napa County Response 33

See Global Comment Response C regarding avoiding undesirable depletions of interconnected surface water and specifically both sections discussing the suitability of groundwater levels as a proxy metric for streamflow depletion and the absence of undesirable results from 1988 to 2015.

## DWR Staff Report, Line 787 (page 22 of 28)

"The monitoring network described for water quality included 81 sites county-wide over the period of 2009 and 2015. The subset of those monitoring sites within the Napa Valley Subbasin were not explicitly provided (e.g., in a tabular format), but the monitoring locations were identified on a map."

## Napa County Response 34

The Napa Valley Floor groundwater quality monitoring network sites are listed in tabular format in Table 5.6 of the 2011 Napa County Groundwater Conditions and Groundwater Monitoring Recommendations Report, also listed as a key reference in Table 1-1 of the Alternative (p. 12). The table summarizes all quality monitoring sites with the well name, subarea location, collecting source, date range, number of measurements, and whether or not well construction data is available for each well.

## DWR Staff Report, Line 802 (page 22 of 28)

"Of the representative monitoring wells used for groundwater levels, storage, and depletions of interconnected surface water, 10 of the wells did not have 10 or more years of data. These 10 wells are the multi-completion wells installed in 2014, specifically for monitoring surface water-groundwater interactions. No information was found in the Basin Analysis Report to demonstrate a significant correlation between groundwater levels and the other sustainability indicators where groundwater levels were used as a proxy."

## Napa County Response 35

See Global Comment Response C regarding avoiding undesirable depletions of interconnected surface water and specifically both sections discussing the suitability of groundwater levels as a proxy metric for streamflow depletion

While DWR staff comment on the relatively short period of record from the 10 dedicated surface water-groundwater monitoring facilities, there are six other representative monitoring wells that were designated for monitoring surface water-groundwater interactions because of their long periods of record (Alternative Table 7-1). Regarding surface water-groundwater interactions, Section 4.2.3 (p. 57) of the Alternative details the relationship between stream baseflow conditions and groundwater levels to the seasonality of hydraulic conditions in the Napa Valley Subbasin. Following the analysis of stream baseflow conditions, investigations from 2014 to 2016 at surface water-groundwater monitoring sites resulted in evidence of streamflow connectivity to surrounding monitoring well sites. Site 1, located in the City of Napa, has shown similar groundwater level elevations at all three monitoring locations on site in relation to streamflow (Alternative Figure 4-42). Though dampened, water level elevations at Sites 3 and 4 reflect cycles in the river channel, ranging from groundwater flow into the river (gaining conditions) to flow coming from the river (losing conditions) (Alternative Figure 4-43 and 4-44).

For Sites 3 and 4, groundwater elevations are above the Napa River stage indicating gaining conditions beginning in the spring and until September. Afterwards, groundwater elevations decline, indicative of losing stream conditions that persist with high magnitude stormwater flows and induce recharge. In contrast, Sites 2 and 5 exhibit losing stream conditions throughout 2015, in which Site 5 was only hydraulically connected to the river in the first half of the year while Site 2 was never connected (Alternative Figure 4-45 and Figure 4-46).

The County also notes that other Alternatives (in the analysis of basin conditions category) that were approved by DWR are not evaluated by DWR in the same manner as occurred for the Napa Valley Subbasin Alternative. One basin with an approved Alternative defined no representative monitoring sites with site-specific criteria associated with any of the six SGMA sustainability indicators. In another basin with an approved Alternative, only two wells are given well-specific minimum thresholds for avoiding surface water depletion, while no other well-specific criteria are established for any other sustainability indicator.

### Planned Enhancement 6

In the first five-year update of the Alternative, Napa County will provide updates on its surface water-groundwater monitoring sites located throughout the county and the ability of those sites to inform the County's management to avoid undesirable depletions of streamflow. Napa County will also provide detailed reasoning why groundwater elevations provide a suitable indicator of groundwater storage and subsidence and will continue utilizing land surface elevation survey data and other land surface elevation datasets that may be provided by DWR through its technical assistance role.

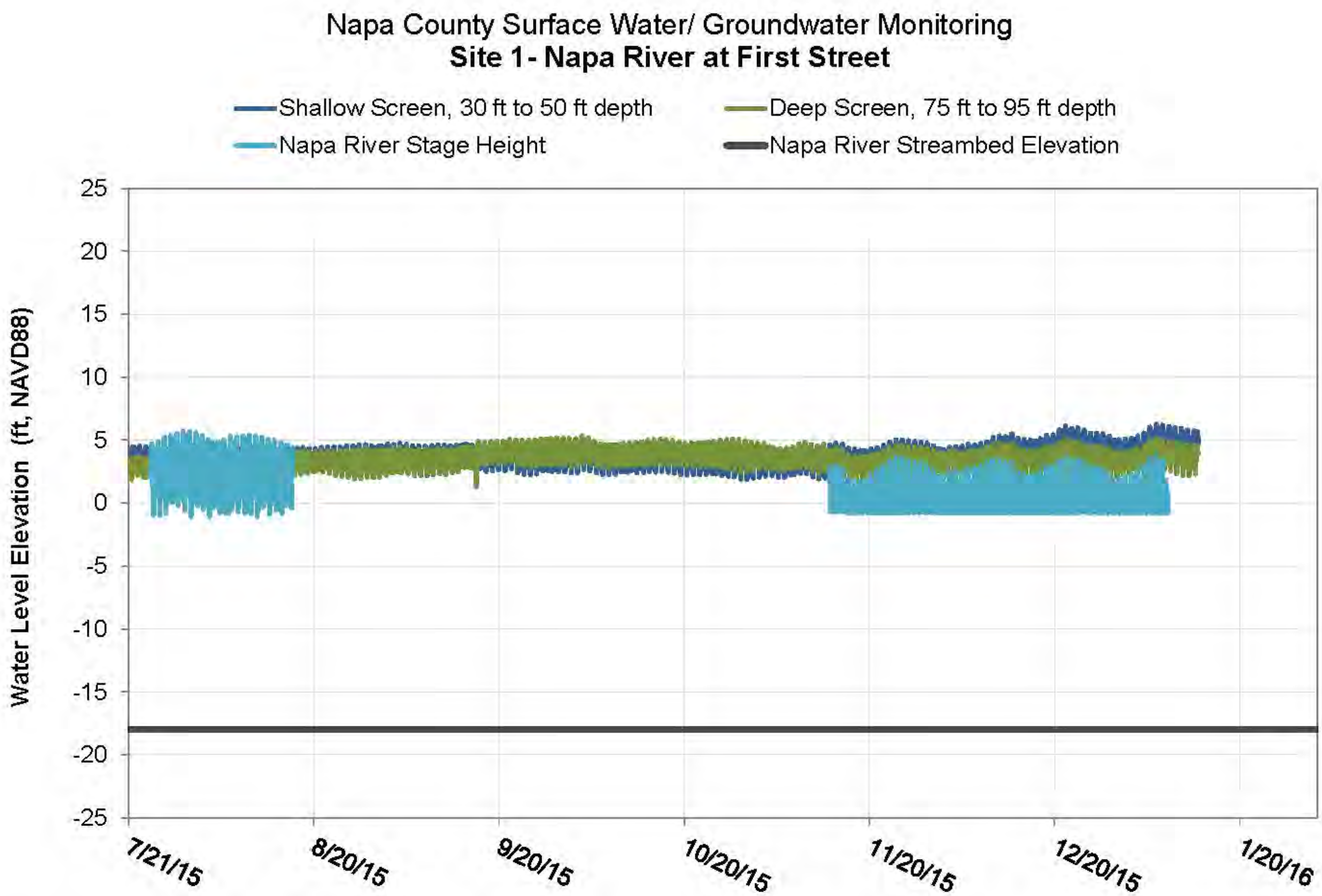



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**Figure 4-42**

**Surface Water-Groundwater Hydrograph**
**Site 1: Napa River at First Street**

*Napa Valley Groundwater Sustainability*
*A Basin Analysis Report for the Napa Valley Subbasin*

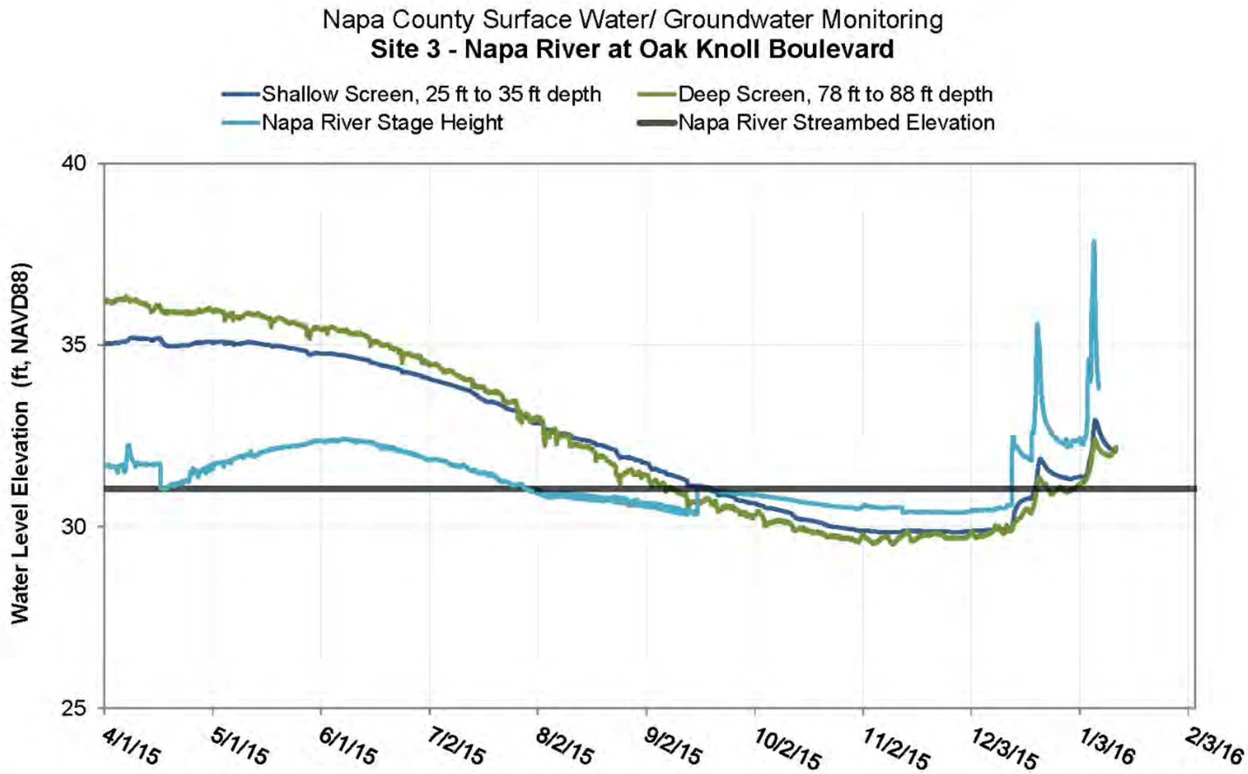


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**Figure 4-43**
**Surface Water-Groundwater Hydrograph**
**Site 3: Napa River at Oak Knoll Avenue**

*Napa Valley Groundwater Sustainability*
*A Basin Analysis Report for the Napa Valley Subbasin*

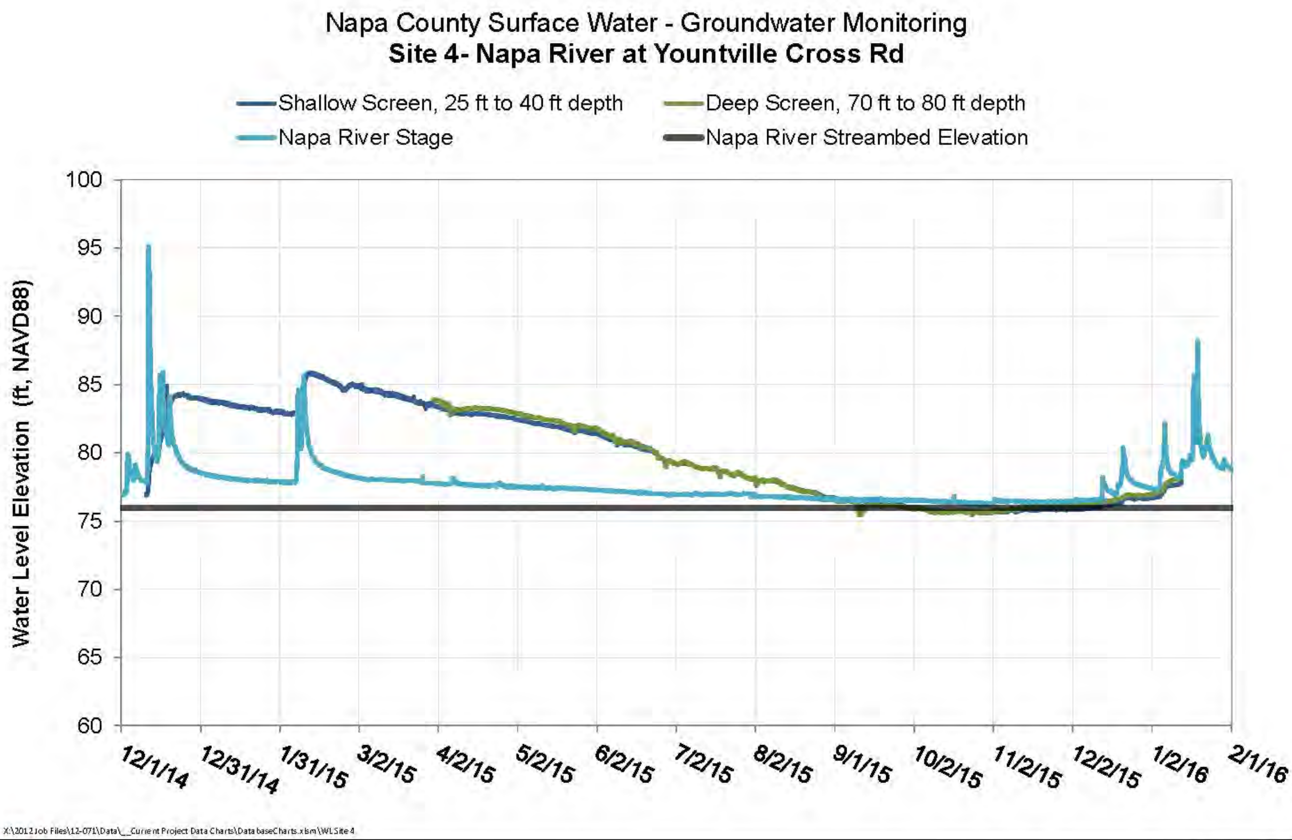


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**Figure 4-44**
**Surface Water-Groundwater Hydrograph**
**Site 4: Napa River at Yountville Cross Road**

*Napa Valley Groundwater Sustainability*
*A Basin Analysis Report for the Napa Valley Subbasin*

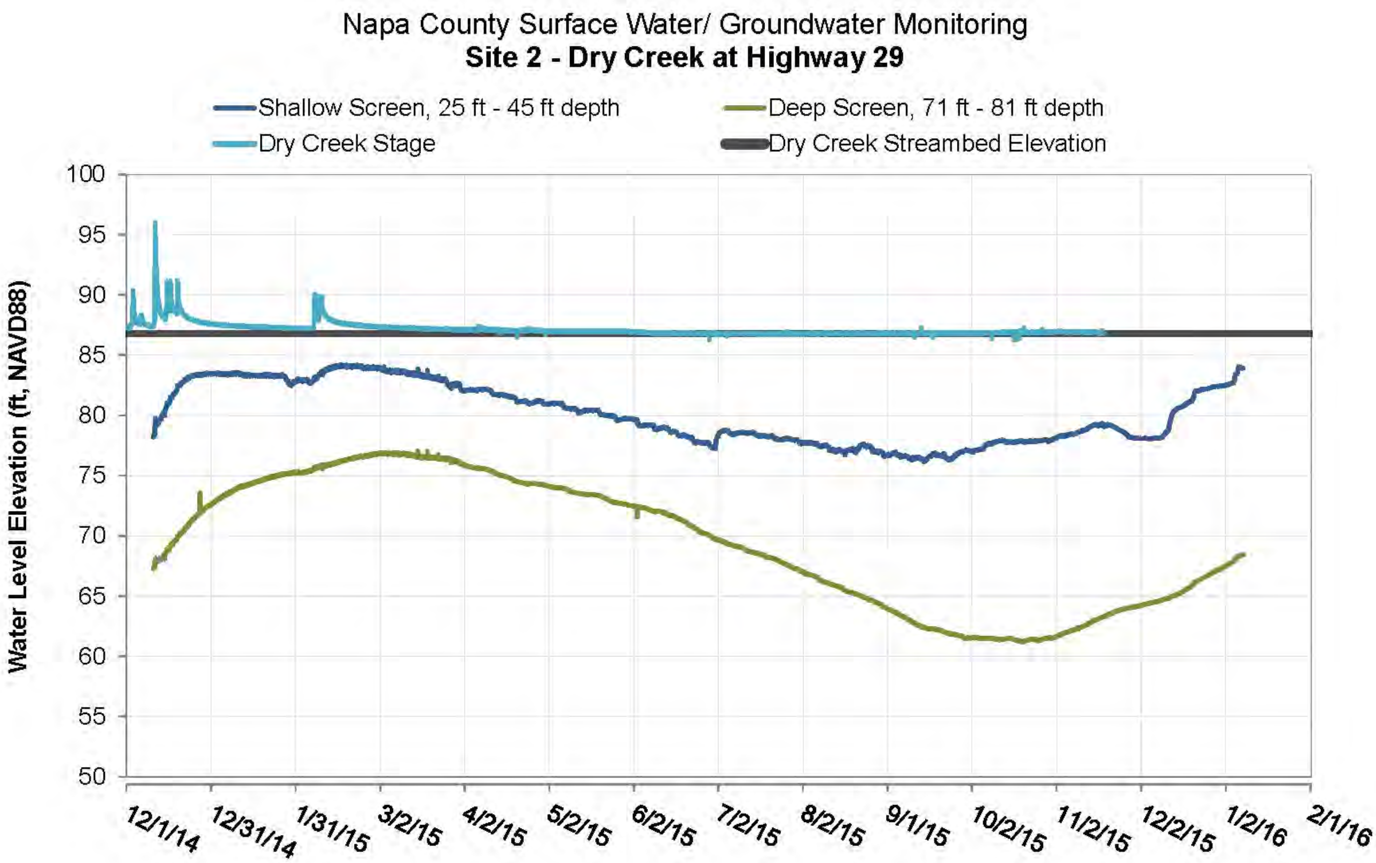


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**Figure 4-45**
**Surface Water-Groundwater Hydrograph**
**Site 2: Dry Creek at Highway 29**

*Napa Valley Groundwater Sustainability*
*A Basin Analysis Report for the Napa Valley Subbasin*

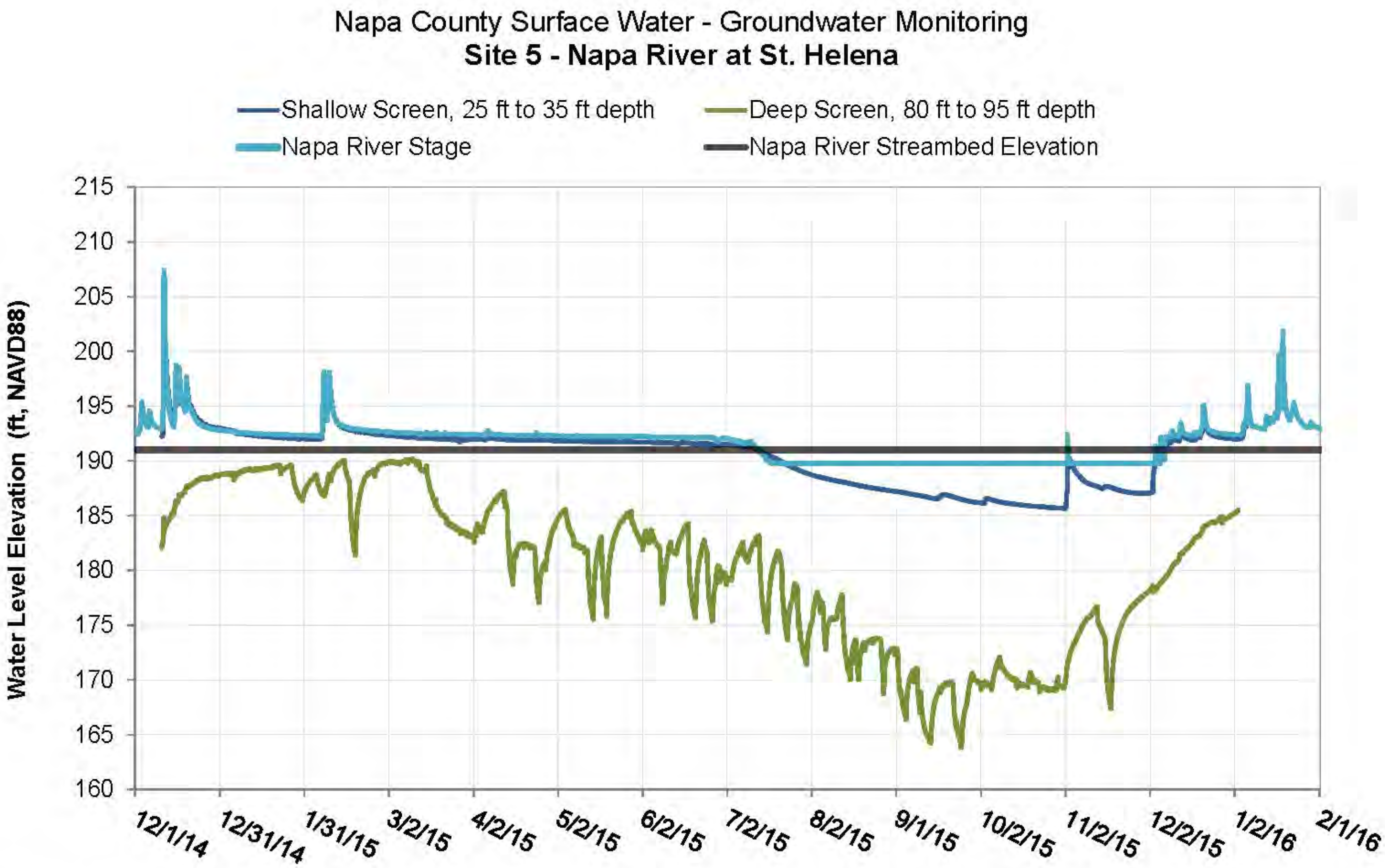


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**Figure 4-46**
**Surface Water-Groundwater Hydrograph**
**Site 5: Napa River at Pope Street**

*Napa Valley Groundwater Sustainability*
*A Basin Analysis Report for the Napa Valley Subbasin*

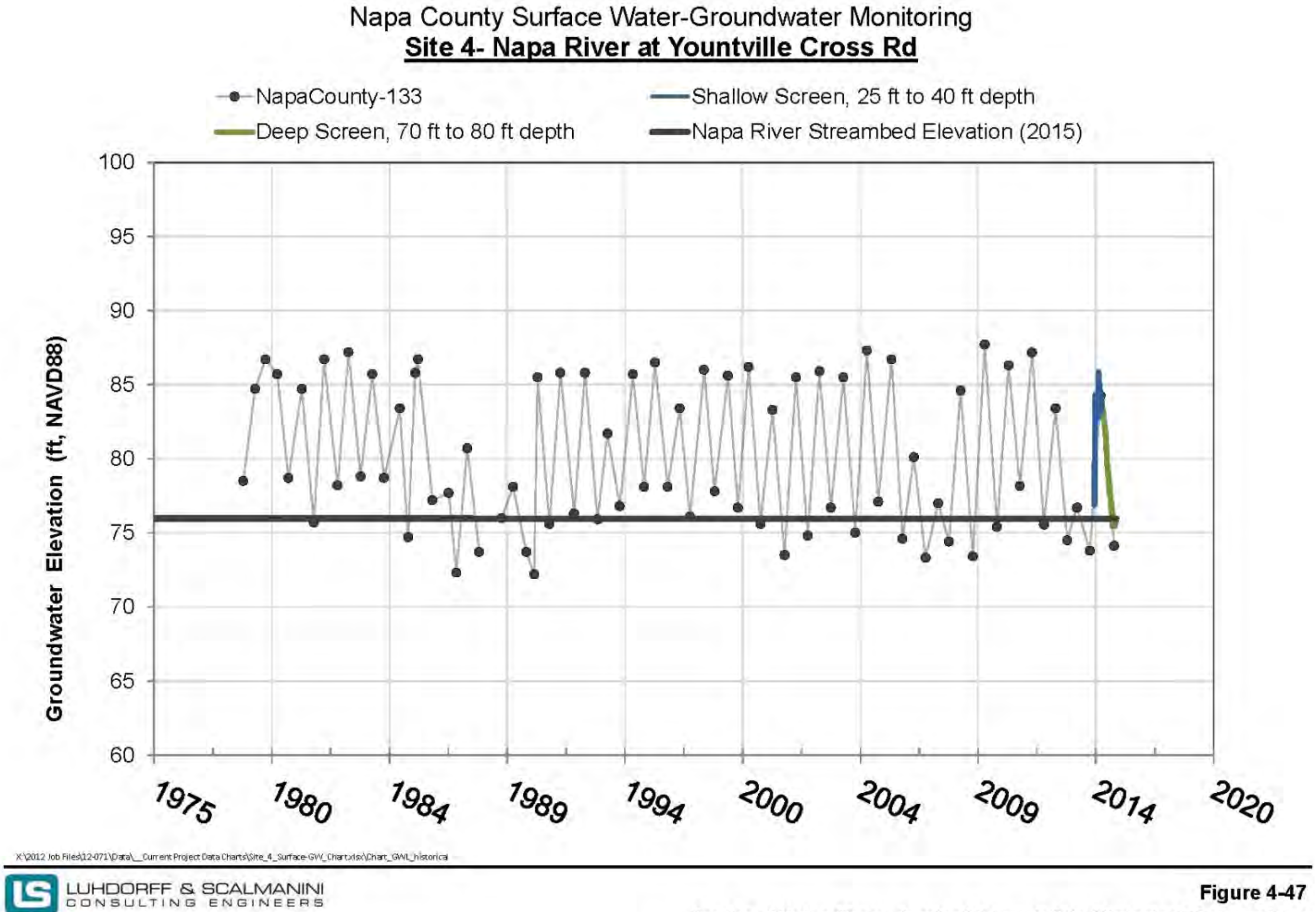



**Figure 4-47**
**Surface Water-Groundwater Network Site Historical Comparison**
**Site 4: Napa River at Yountville Cross Road**
*Napa Valley Groundwater Sustainability*
*A Basin Analysis Report for the Napa Valley Subbasin*

## DWR Staff Report, Line 828 (page 23 of 28)

"Napa County identifies several types of actions including data collection and management, public outreach, and technical studies. However, none of the activities described indicate actions specific to managing for minimum thresholds."

## Napa County Response 36

See Global Comment Response A regarding the requirements of Section 10733.6(b)(3) and Global Comment Response D regarding management actions employed by the County since 1991 and the consistency of management actions with SGMA objectives and existing basin management practices.

### DWR Staff Report, Line 842 (page 23 of 28)

"Based on its evaluation and assessment of the Napa Valley Alternative, as discussed below, Department staff find that the County was not able to demonstrate that the Subbasin has operated within its sustainable yield over a period of at least 10 years as required for an alternative."

### Napa County Response 37

See Global Comment Response A regarding the requirements of Section 10733.6(b)(3) and Global Comment Response E regarding the continuing efforts to maintain sustainable conditions consistent with SGMA.

### DWR Staff Report, Line 851 (page 23 of 28)

"The County shares the responsibility for groundwater resource planning and management between the Department of Public Works and the Department of Planning, Building, and Environmental Services. As described in the Basin Analysis Report, much of the groundwater resource planning for the Napa Valley Subbasin is based on the 2008 County General Plan where six conservation goals were developed for water resources, including groundwater. The County indicates the General Plan served as a starting point for efforts including public outreach, development of a comprehensive monitoring program, and technical investigations related to the hydrogeology of Napa County, including the Napa Valley Subbasin."

### Napa County Response 38

See Global Comment Response D regarding management actions employed by the County since 1991 and the consistency of management actions with SGMA objectives and existing basin management practices.

### DWR Staff Report, Line 877 (page 24 of 28)

"Napa County claims that stable groundwater levels over the 28-year base period indicate that no undesirable results have occurred throughout the Napa Valley Subbasin related to five of the six undesirable results. Department staff do not agree with the County's assumption that if groundwater levels are stable over the base period, significant and unreasonable effects cannot have occurred throughout the Subbasin, and thus the Subbasin cannot have experienced undesirable results. Stable groundwater elevations would provide logical support for an argument that chronic lowering of groundwater levels and significant and unreasonable reduction of groundwater storage had not occurred, and the Department might accept such an inference even if the County failed to explain its reasoning in detail. However, the same cannot be said of all undesirable results. Stable groundwater elevations might be invoked as one element of a claim that seawater intrusion had been blocked, or that groundwater extraction was not causing land subsidence, but the County should explain its reasoning and demonstrate that other variables do not invalidate its theory. However, the County did not consider any variables at all, and provides no evidence and makes no argument based on hydrologic principles as to why the Department should accept its claim."

## Napa County Response 39

See Global Comment Responses A and B regarding the requirements of Section 10733.6(b)(3), Sustainability Criteria and Undesirable Results.

As described in Section 4.3 of the Alternative, the seawater-freshwater interface occurs south of the Napa Valley Subbasin. The extent of the interface is primarily assessed through examining groundwater quality data, including chloride, total dissolved solids (TDS), electrical conductivity (EC), and sodium concentrations. Although elevated chloride concentrations exist in zones south in the Suscol area, suspected causes range from possible leakage from salty Napa River water to the existence of high saline connate water zones deep within the Sonoma Volcanics. The highest historically observed concentrations of the above listed constituents occur in the three subareas south of the Napa Valley Subbasin in the Napa River Marshes, Jameson/American Canyon, and Carneros Subareas. The Alternative recommends additional dedicated monitoring wells from Napa south to San Pablo Bay to fill the data gap that exists relative to the occurrence and hydrogeologic setting of elevated salinity in some wells south of the Napa Valley Subbasin.

Land surface elevation data over the last two decades exhibit less than one foot of elevation change both upwards and downwards, taking place concurrently with stable groundwater elevations. As groundwater head conditions can trigger changes in surface elevation, the Alternative concludes these fluctuations in surface elevation are not caused by changing groundwater levels because the groundwater elevation monitoring in place does not exhibit this.

### Planned Enhancement 7

In the first five-year update of the Alternative, Napa County will provide updates on efforts to add more groundwater monitoring sites near the southern boundary of the Napa Valley Subbasin area and update reference point elevation data for some monitored wells with surveyed values. More information on data gaps identified in the Alternative can be found in Section 4.5.

## DWR Staff Report, Line 900 (page 25 of 28)

"As an initial matter, the fact that the County recognizes that conditions of diminished baseflow could be considered an undesirable result indicates that the County has not defined what constitutes an undesirable result in the Subbasin. Having not defined what an undesirable result related to depletions of interconnected surface water would be, it is unreasonable to expect the Department to accept the County's conclusion that they have not occurred."

**Napa County Response 40**

See Global Comment Response C regarding avoiding undesirable depletions of interconnected surface water.

The County defines what would constitute undesirable results related to depletions of interconnected surface water in Section 7.2 Appendix D of the Alternative. Undesirable results due to depletions of interconnected surface water are outlined to have significant and unreasonable adverse impacts on the beneficial uses of the surface water being impacted. The definition of undesirable results was expanded upon in 2014 in conformance with SGMA requirements and the intent of the GRAC and the County Board of Supervisors, which included consideration of economic, environmental, and social consequences (Alternative Section 7 p. 177).

In addition to the definition expansion in the Alternative, the 2018 Alternative Amendment further refines and details the definition of undesirable results for each sustainability indicator in Section 3.1. In regard to depletions of interconnected surface waters, depletion would become significant and unreasonable if, as a result of groundwater extraction and use in the subbasin:

1. the timing and duration of direct hydraulic connections between groundwater and surface water along the Napa River or its tributaries overlying the Subbasin are reduced relative to the extent of historical conditions or,

2. if the volume of surface water flowing into the groundwater system as a result of groundwater extraction and use in the Subbasin exceeds both flows that have occurred historically and flows that would otherwise occur due to climate change-related shifts in precipitation, temperature, evapotranspiration, and soil moisture in the future.

See Global Response B (Sustainability Criteria and Undesirable Results) and Global Response E regarding the continuing efforts to maintain sustainable conditions consistent with SGMA and the discussion with respect to the 2018 Alternative Amendment.

### DWR Staff Report, Line 912 (page 25 of 28)

"Although SGMA is silent on the issue, the County extrapolates the 2015 baseline for undesirable results to alternatives. The Department agrees with the general principle that the 2015 baseline applies to alternatives but does not believe that it can be applied to the category of alternative selected by the County."

## Napa County Response 41

See Global Response C regarding avoiding undesirable depletions of interconnected surface water, including discussion of the absence of undesirable results from 1988 to 2015 and the role of the 2015 baseline.

### DWR Staff Report, Line 920 (page 25 of 28)

"If the Legislature had intended for an alternative based on 10 years of sustainable yield to avail itself of the 2015 baseline for undesirable results, it would have shortened the period an agency was required to demonstrate sustainable yield from 10 years to two, consistent with the 2017 deadline for submitting alternatives to the Department. At any rate, the 2015 baseline for undesirable results is simply a limitation on what conditions must be addressed; it does not operate as an exoneration of the undesirable result itself. SGMA may not require a basin to reverse the effect of undesirable results to pre-SGMA conditions, but if undesirable results occurred during the 10-year period of the Alternative, that basin cannot demonstrate that it operated within its sustainable yield."

## Napa County Response 42

See Global Comment Response A regarding the requirements of Water Code Section 10733.6(b)(3). See Global Responses B and C regarding sustainability criteria, undesirable results, and avoiding undesirable depletions of interconnected surface water.

### DWR Staff Report, Line 930 (page 25 of 28)

"Regarding the sustainable yield, the Basin Analysis Report does include a range of annual pumping volumes that it terms the sustainable yield for the Subbasin. That quantity is based entirely on the County's estimate of the actual pumping during the period of analysis. However, as noted above, that pumping occurred during a time when "...diminished baseflow could be considered an undesirable result." The quantity of pumping during a period when undesirable results may have been occurring cannot be confirmed to be within the sustainable yield and, if undesirable results were occurring, then that quantity is certainly not within the sustainable yield."

## Napa County Response 43

See Global Comment Response A regarding the requirements of Water Code Section 10733.6(b)(3). See Global Response C regarding avoiding undesirable depletions of interconnected surface water and specifically the subsection discussing the absence of undesirable results from 1988 to 2015.

### DWR Staff Report, Line 951 (page 26 of 28)

"Additionally, the minimum thresholds appear to be set based on not making future conditions worse than historic low conditions (see, e.g., the reference to setting those thresholds with the purpose of "not exacerbating streamflow depletion"), but do not represent criteria for which the Subbasin has been managed for at least 10 years. Groundwater levels selected for minimum thresholds are all based on the lowest recorded fall groundwater levels in the base period. The County appears to rely on the January 1, 2015, provision of SGMA as justification for setting those thresholds but, as noted above, use of that provision is not consistent with the intent of SGMA for alternatives submitted pursuant to Water Code Section 10733.6(b)(3)."

### Napa County Response 44

See Global Comment Response A regarding the requirements of Water Code Section 10733.6(b)(3). See Global Comment Response B regarding sustainability criteria and undesirable results. See Global Response C regarding avoiding undesirable depletions of interconnected surface water, including discussion of the absence of undesirable results from 1988 to 2015 and the role of the 2015 baseline.

### DWR Staff Report, Line 960 (page 26 of 28)

"The Basin Analysis Report did not describe why the groundwater levels selected were a suitable proxy for undesirable results associated with depletions of interconnected surface water. The Report does not discuss depletions of interconnected surface water but, instead, relies on an analysis that only looked at the correlations between groundwater pumping and baseflow and precipitation and baseflow. The analysis concludes that precipitation is more correlated to baseflow than groundwater pumping. Even if this were adequate to demonstrate how groundwater levels could serve as a proxy for interconnected surface waters, baseflow is not the same as depletion. Depletion represents a change in baseflow due to groundwater pumping which can take two primary forms, including 1) water that flows to a well directly from the stream and 2) water that would have flowed to the stream that was intercepted by a well prior to becoming baseflow. So, while precipitation may be more correlated with baseflow, groundwater pumping, by definition, is more correlated with depletion. The question, therefore, becomes one of timing and estimated quantity of depletion and whether that quantity at a particular time is significant and unreasonable."

### Napa County Response 45

See Global Response C regarding avoiding undesirable depletions of interconnected surface water and specifically the subsections discussing the suitability of groundwater levels as a proxy metric from streamflow depletion and the absence of undesirable results from 1988 to 2015.

### DWR Staff Report, Line 983 (page 27 of 28)

"The lack of supporting information related to the establishment of minimum thresholds for degraded water quality has prevented Department staff from being able to determine if the provided threshold is reasonable and supported by best available information."

### Napa County Response 46

See Napa County Responses 3 and 19 for more information regarding the use of state-regulated Maximum Contaminant Levels (MCLs) and Secondary Maximum Contaminant Levels (SMCLs) as minimum thresholds. The County also notes that the use of state-regulated drinking water standards as minimum thresholds for degraded water quality and the description of those minimum thresholds in the Napa Valley Subbasin Alternative is consistent with their use and description in other alternatives approved by DWR.

### DWR Staff Report, Line 987 (page 27 of 28)

"First, Napa County mentions maintaining concentrations above water quality objectives. These water quality objectives are never defined despite being mentioned several times in the text and associated appendices. The Groundwater Conditions Report and the Groundwater Monitoring Plan both describe groundwater quality monitoring objectives. However, the monitoring objectives do not relate to objectives or criteria that may be used to set minimum thresholds. As a result, the water quality objectives mentioned for minimum thresholds are unknown and cannot be verified."

### Napa County Response 47

See Napa County Response 3 and 19 for more information regarding the use of state-regulated Maximum Contaminant Levels (MCLs) and Secondary Maximum Contaminant Levels (SMCLs) as minimum thresholds. The County also notes that the use of state-regulated drinking water standards as minimum thresholds for degraded water quality and the description of those minimum thresholds in the Napa Valley Subbasin Alternative is consistent with their use and description in other alternatives approved by DWR.

### DWR Staff Report, Line 1001 (page 27 of 28)

"Justification for the selection of representative monitoring sites could not be found. While a GSP may allow a monitoring network to be improved over time to account for significant data gaps (i.e. not representative), an analysis of basin conditions needs to have sufficient monitoring based on the understanding of the basin to demonstrate basin-wide management within the sustainable yield. Thus, representative monitoring also needs to be sufficient to demonstrate that the basin is being operated to the established metrics for tracking sustainability. If a monitoring network is not representative of differing conditions across the basin, then it is not able to demonstrate the basin is being operated sustainably. The Basin Analysis Report provides hydrographs for 18 representative wells. Of those wells, seven appear to be same as the representative monitoring sites for minimum thresholds using groundwater levels. Based on the trends in the provided hydrographs, the subset used for minimum thresholds exhibit different trends than some of the other nearby wells. Some of these trends are discussed in the Basin Analysis Report such as a NapaCounty-132, which had a nearby vineyard replanting in 2007. However, this discussion does not explain why that well is not used for monitoring sustainable management criteria."

## Napa County Response 48

The Staff Report misinterprets the number of representative wells where groundwater elevations are established as sustainability criteria. Table 7-2 shows each of the eighteen representative wells described in the Alternative and shows which sustainability criteria apply at each well. A total of 17 wells have groundwater elevation criteria established in the Alternative. Justification for the selection of representative monitoring well sites is described in Section 7.3 and Table 7-1 of the Alternative. The basis for selection of each well is summarized in Table 7-1 and includes the availability of construction information or construction targeted to specific aquifer zones, distribution of wells throughout the Subbasin and the period of record.

The County also notes that other Alternatives (in the analysis of basin conditions category) that were approved by DWR are not evaluated by DWR in the same manner as occurred for the Napa Valley Subbasin Alternative. One basin with an approved Alternative defined no representative monitoring sites with site-specific criteria associated with any of the six SGMA sustainability indicators. In another basin with an approved Alternative, only two wells are given well-specific minimum thresholds for avoiding surface water depletion, while no other well-specific criteria are established for any other sustainability indicator.

See Napa County Response 17 for discussion of groundwater trends observed in a few wells including NapaCounty-132, which extends across multiple water bearing formations.

## DWR Staff Report, Line 1029 (page 28 of 28)

"Minimum thresholds for sustainability indicators do not appear to include the MST area and no representative monitoring includes the MST area. The monitoring network section provides a description of groundwater monitoring for the entire county in 2015."

## Napa County Response 49

As part of the 2018 Alternative Amendment, prepared in response to findings in the Special Study described in Section 7.6 of the Alternative and the Draft Sustainable Management Criteria BMP, two wells in the MST subarea were designated as additional representative wells with sustainability criteria: NapaCounty-122 and NapaCounty-229.[129] (see Figures 7-1 from the Alternative and Figure 3-6 from the 2018 Alternative Amendment, below)

See Global Response E regarding the continuing efforts to maintain sustainable conditions consistent with SGMA and the discussion of the 2018 Alternative Amendment.

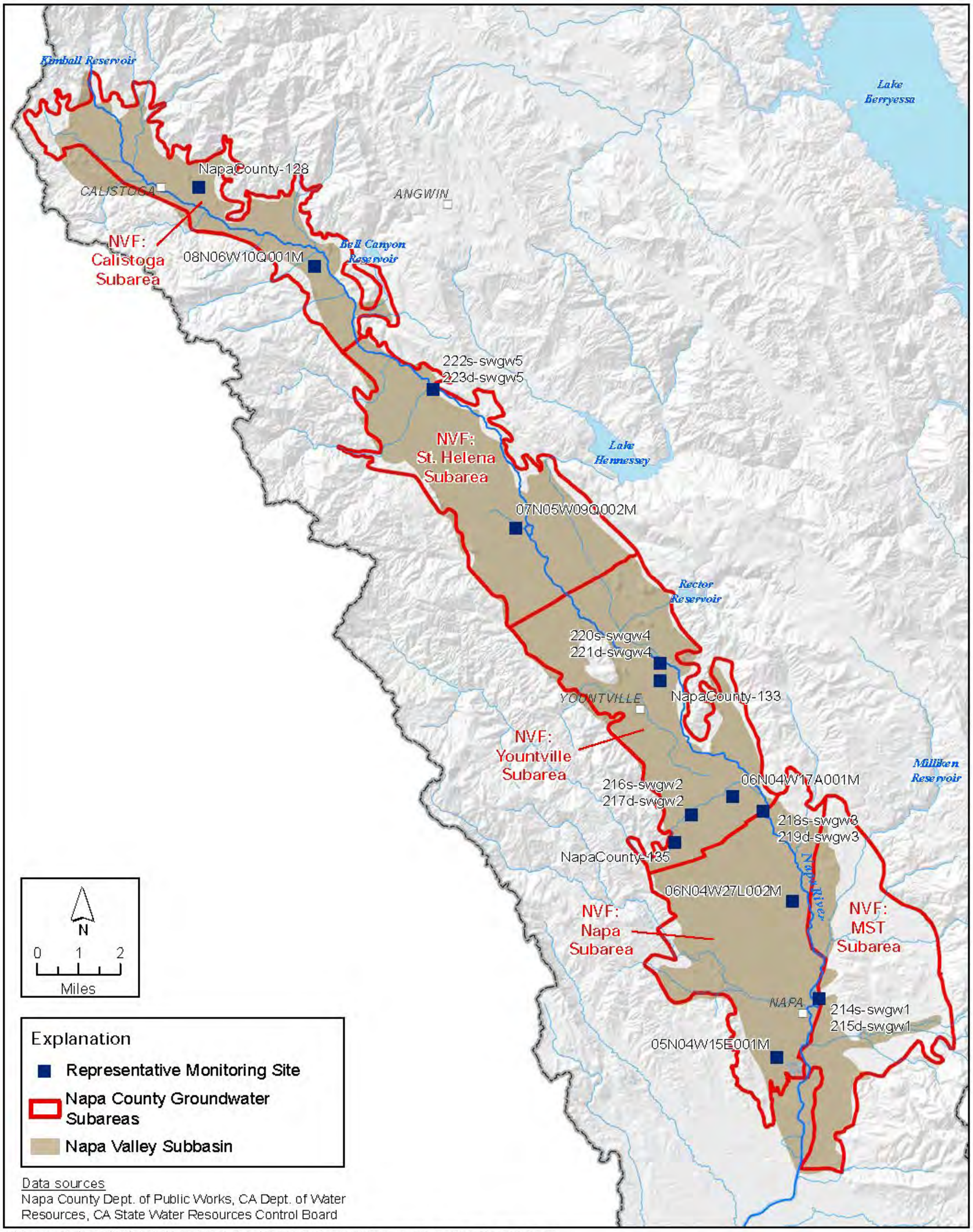
### DWR Staff Report, Line 1035 (page 28 of 28)

"The MST area does not align well with the boundaries of the Subbasin. Because of this lack of alignment, it is unclear which wells in the MST area are within the Napa Valley Subbasin and which wells are not. Two monitoring wells in the MST area are used as representative monitoring wells for plotting hydrographs and occur within the Napa Valley Subbasin. However, neither of the wells are used to set minimum thresholds despite showing declining water levels and different trends from the other areas of the Subbasin. The Basin Analysis Report does indicate there are efforts to further investigate the MST area; however, these efforts were not completed by the statutory deadline for submitting an alternative to the Department."

### Napa County Response 50

See Napa County Response 49. See Global Response E regarding the continuing efforts to maintain sustainable conditions consistent with SGMA and the discussion of the 2018 Alternative Amendment.

[129] Napa Valley Subbasin Alternative Amendment, Sections 3.2, 3.3, and 3.4, including Tables 3-1 and 3-2 and Figure 3-6




X:\2014 Job Files\14-108\GIS\Mapfiles\Basin Analysis Report\Figure 7-1 NV Subbasin Representative Monitoring Sites_revised.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

FIGURE 7-1
Napa Valley Subbasin
Representative Monitoring Sites

*Napa Valley Groundwater Sustainability: A Basin Analysis Report for the Napa Valley Subbasin*

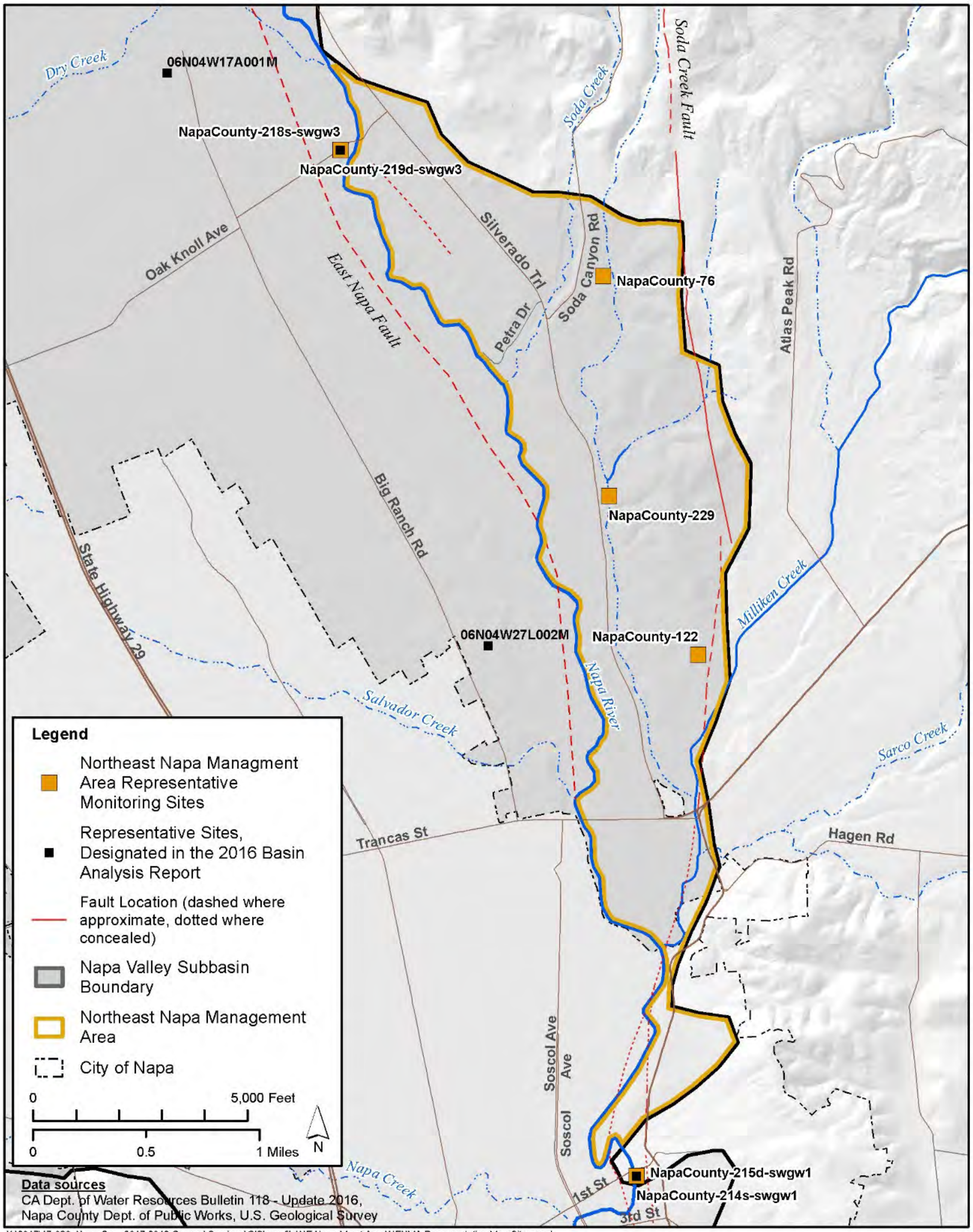



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**FIGURE 3-6**

**Northeast Napa Management Area: Representative Monitoring Sites**

*Napa Valley Groundwater Sustainability*
*Northeast Napa Management Area: An Amendment to the 2016 Basin Analysis Report for the Napa Valley Subbasin*

## Napa Valley Subbasin Alternative 5-year Update Planned Enhancements in Response to DWR Comments

The following section describes content to be incorporated as part of the 5-year update of the Napa Valley Subbasin Alternative in response to comments on the Alternative provided by DWR and in recognition of additional SGMA implementation guidance provided by DWR since submittal of the Alternative in December 2016. These enhancements are consistent with the scope of the 5-year update contents described in the Alternative Section 8.6.5 (see table below).

| |
|---|
| Planned Enhancement 1<br><br>In the first 5-year update of the Alternative, Napa County will clearly state that the minimum thresholds protective of groundwater quality and seawater intrusion are defined by the federal Clean Water Act, State Porter-Cologne Act, and are further regulated by the San Francisco Bay Regional Water Quality Control Board and the California State Water Resources Control Board Division of Drinking Water (DDW). |
| Planned Enhancement 2<br><br>In the first 5-year update of the Alternative, Napa County will provide a numerical threshold for groundwater storage itself, in addition to the numerical thresholds already established for groundwater levels as a proxy. This standard will be protective of both groundwater levels and streamflow depletion because it will be derived from each of their minimum thresholds. |
| Planned Enhancement 3<br><br>In the first five-year update of the Alternative, Napa County will provide a single map depicting groundwater elevations over all regions of the Napa Valley Subbasin, including boundaries for the Northeast Napa Management Area and the MST subarea. |
| Planned Enhancement 4<br><br>In the first five-year update of the Alternative, Napa County will define clearly what the term “limited” means relative to the spatial and temporal availability of historical water quality data throughout the County and in the Napa Valley Subbasin and its use to describe data both spatially and temporally. |

| |
|---|
| **Planned Enhancement 5**<br>In the first five-year update of the Alternative, Napa County will provide a clearer description of the significant and unreasonable effects that would constitute an undesirable result if measurable subsidence was to occur in the Subbasin. |
| **Planned Enhancement 6**<br>In the first five-year update of the Alternative, Napa County will provide updates on its surface water-groundwater monitoring sites located throughout the county and the ability of those sites to inform the County's management to avoid undesirable depletions of streamflow. Napa County will also provide detailed reasoning why groundwater elevations provide a suitable indicator of groundwater storage and subsidence and will continue utilizing land surface elevation survey data and other land surface elevation datasets that may be provided by DWR through its technical assistance role. |
| **Planned Enhancement 7**<br>In the first five-year update of the Alternative, Napa County will provide updates on efforts to add more groundwater monitoring sites near the southern boundary of the Napa Valley Subbasin area and update reference point elevation data for some monitored wells with surveyed values. More information on data gaps identified in the Alternative can be found in Section 4.5. |

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# Attachment B

## Supporting Documentation Provided in Response to the Department of Water Resources Alternative Assessment Staff Report for the Napa Valley Subbasin, Dated July 17, 2019

(October 11, 2019)

Napa County is providing copies of the following documentation to provide DWR with additional, requested information about the consistency of the County's management of the Napa Valley Subbasin with the objectives of SGMA for more than two decades before the January 1, 2015 SGMA effective date.


1. Faye, R.E. 1973. *Ground-water hydrology of northern Napa Valley California*. Water Resources Investigations 13-73, US Geological Survey, Menlo Park, CA, 64 p.

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1. **Faye, R.E. 1973. *Ground-water hydrology of northern Napa Valley California*. Water Resources Investigations 13-73, US Geological Survey, Menlo Park, CA, 64 p.**

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# UND-WATER HYDROLOGY of NORTHERN NAPA VALLEY CALIFORNIA

## U.S. GEOLOGICAL SURVEY

WATER-RESOURCES INVESTIGATIONS

13-73

PREPARED IN COOPERATION WITH THE
NAPA COUNTY FLOOD CONTROL AND
WATER CONSERVATION DISTRICT

# GROUND-WATER HYDROLOGY OF NORTHERN NAPA VALLEY

# CALIFORNIA

By Robert E. Faye

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations 13-73

Prepared in cooperation with the

Napa County Flood Control and Water Conservation District



November 1973

UNITED STATES DEPARTMENT OF THE INTERIOR

Rogers C. B. Morton, Secretary

GEOLOGICAL SURVEY

Vincent E. McKelvey, Director

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Menlo Park, Calif. 94025

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# GROUND-WATER HYDROLOGY OF NORTHERN NAPA VALLEY, CALIFORNIA

By Robert E. Faye

## ABSTRACT

The alluvium of northern Napa Valley is the principal aquifer of the area and is capable of yielding as much as 3,000 gallons per minute to wells. Generally the larger-yielding wells are along the Napa River where the alluvium is thickest and most permeable. Recharge to the alluvium is chiefly by percolation from streams and infiltration of precipitation. Discharge is chiefly flow to the Napa River, evapotranspiration, and pumpage from wells. Both recharge to, and discharge from, the alluvial aquifer are sensitively influenced by rainfall. About 190,000 acre-feet of water is presently (1972) stored in the alluvium of northern Napa Valley. Future annual water use in the project area will probably vary between 12,000 and 35,000 acre-feet and, for most purposes, can be supplied by the alluvial aquifer even during extended periods of limited rainfall. Generally low transmissivities in the alluvium, however, limit the opportunity for obtaining sustained, large yields from wells in much of the valley and require that large-scale development and operation of wells in much of the area be planned and synchronized.

Sustained drought conditions in the Napa Valley accompanied by expected increases in the use of ground water will probably cause significant reductions in the base flow of the Napa River and cause many shallow wells in the area to dry up.

Sodium chloride ground water occurs near Calistoga and in the vicinity of Oakville and in some places is not suitable for irrigation. Model studies indicate that limited migration of sodium chloride water into intensively pumped parts of the aquifer probably will not be a serious problem.

# INTRODUCTION

## Location and Extent of Project Area

The project area is within Napa Valley in the central Coast Ranges of California about 40 miles northeast of San Francisco (fig. 1). Comprising the northern part of Napa Valley, the project area extends from the vicinity of Oak Knoll Avenue, north of the city of Napa, to the northern end of the valley, north and west of the city of Calistoga. The area is a distinct topographic basin consisting of about 60 square miles of valley floor surrounded on three sides by foothills and mountain ranges.

## Purpose and Scope

The purpose of this study was to assess the occurrence, availability and quality of ground water in the northern part of Napa Valley.

This report summarizes the geology and water-bearing characteristics of geologic formations; discusses the spatial and hydrologic parameters of water-bearing units with special emphasis on the alluvial aquifer; provides a qualitative and quantitative hydrologic assessment of the alluvial aquifer; discusses the quality of ground water with respect to occurrence, chemical composition, and use; and evaluates the quality of base flow and seasonal runoff in the Napa River.

The qualitative and quantitative hydrologic assessment of the alluvial aquifer includes a determination of: (1) The spatial distribution of thickness and hydraulic conductivity in the alluvial aquifer; (2) the quantity of water presently stored in the alluvial aquifer; (3) quantities of recharge to, and discharge from, the alluvial aquifer under given climatologic conditions; (4) recent quantities of pumpage from the alluvial aquifer; and (5) the response of water levels in the alluvial aquifer to specified pumping and recharge conditions.

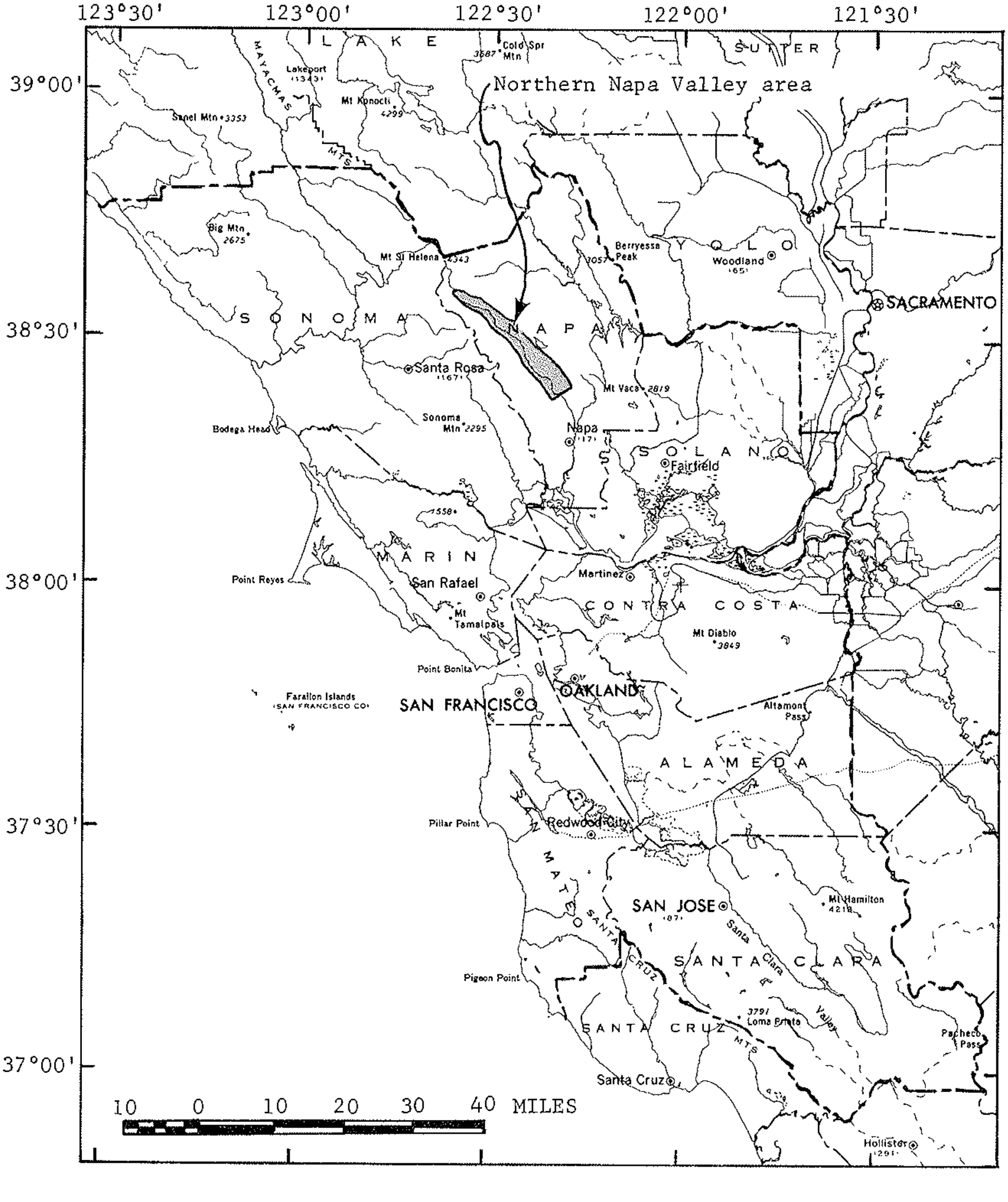


FIGURE 1.--LOCATION MAP OF PROJECT AREA.

The assessment of ground-water quality includes: (1) A chemical classification of ground water; (2) a determination of the occurrence of ground water containing high concentrations of boron and other undesirable constituents; (3) a determination of the redistribution of ground water of poor quality in the alluvial aquifer under specified recharge and pumping conditions; and (4) an evaluation of ground-water quality with respect to the use of ground water as an irrigation and domestic water supply.

The scope of this study included: (1) An evaluation of geologic and hydrologic data for the Napa Valley area; (2) the development of a transient-state mathematical model that adequately simulated the ground-water hydrology of the alluvial aquifer; and (3) a model analysis to evaluate the response of water levels in the alluvial aquifer to critical climatologic and pumping stresses.

## Previous Work

The earliest known hydrologic work in the Napa Valley was an unpublished U.S. Geological Survey inventory of "deep" wells in 1895. Waring (1915) cataloged the various hot springs and "health resorts" located in the project area in the early 1900's. More comprehensive water-resources studies were completed by Bryan (1932) and Kunkel and Upson (1960). Interest in increased utilization of ground water for irrigation and frost protection resulted in ground-water investigations by the U.S. Bureau of Reclamation (1966) and the Napa County Flood Control and Water Conservation District (1972).

Early geologic work was done by Osmont (1905) and Dickerson (1922). Mapping of the volcanic rocks, older consolidated sedimentary rocks, and younger unconsolidated deposits was completed by Weaver (1949), Kunkel and Upson (1960), and Koenig (1961, 1963). Crutchfield (1953) and Johnston (1948) prepared detailed geologic maps of areas in the Calistoga quadrangle.

A soil survey and review of the contemporary agricultural industry in Napa County was issued by Carpenter and Cosby (1938). As of 1972, the U.S. Soil Conservation Service was preparing a comprehensive report on the soils of Napa County.

## Well-Numbering System

The well-numbering system used by the Geological Survey in Napa Valley shows the location of wells and springs according to the rectangular system for the subdivision of public land. For example, in the number 9N/7W-26R2, which was assigned to a well located near Calistoga (fig. 3), the part of the number preceding the slash indicates the township (T. 9 N.,); the number between the slash and the hyphen indicates the range (R. 7 W.); the digits between the hyphen and the letter indicate the section (sec. 26); and the letter following the section number indicates the 40-acre subdivision of the section, as shown in figure 2. Within each 40-acre tract the wells are numbered serially, as indicated by the final digit of the number. Thus, well 9N/7W-26R2 is the second well to be listed in the SE¼SE¼ sec. 26. The letter X after the section number indicates the site was located only to the section.

## Definitions of Hydrologic Terms

*Aquifer*: An aquifer is a formation, group of formations, or a part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

*Artesian*: Synonymous with confined.

*Base flow*: Sustained or fair weather runoff composed largely of ground-water effluent.

*Cone of depression*: A three-dimensional conical depression that develops around a pumping well, the outer boundary of which, defines the area of influence of the well.

*Confined water*: Ground water that is under sufficient pressure to rise above the level at which it is encountered by a well, but which does not necessarily rise to or above land surface.

*Evapotranspiration*: The total water removed from an area by transpiration and by evaporation from soil, snow, and water surfaces.

*Gaining stream*: A gaining stream is a stream, or reach of a stream, whose flow is being increased by inflow of ground water.

*Hydraulic conductivity*: A measure of an aquifer's capacity to transmit water, expressed in feet per day (fpd) or feet per second (fps).

*Losing stream*: A losing stream is a stream, or reach of a stream, that is losing water to the ground-water reservoir.

*pH*: The negative logarithm of the hydrogen ion concentration. A neutral water has a pH of 7; an alkaline water a pH greater than 7; and an acid water a pH less than 7.

*Permeability*: Synonymous with hydraulic conductivity.

*Potentiometric*: A surface that represents the static head of water in an aquifer.

*Specific capacity*: The discharge of a well expressed as rate of yield per unit of drawdown, generally gallons per minute per foot of drawdown (gpm/ft).

*Specific yield*: The specific yield of a rock or soil, with respect to water, is the ratio of (1) the volume of water which, after being saturated, it will yield by gravity to (2) its own volume.

*Transmissivity*: Transmissivity is the rate of flow in feet squared per second ($ft^2/s$) at prevailing water temperature, through a 1-foot wide vertical strip of aquifer extending the full saturated height of the aquifer under a unit hydraulic gradient.

*Water table*: The water table is that surface in an unconfined water body at which the pressure is atmospheric. It is defined by the levels at which water stands in wells that penetrate the water body just far enough to hold standing water. In wells penetrating to greater depths, the water level will stand above or below the water table if an upward or downward component of ground-water flow exists.

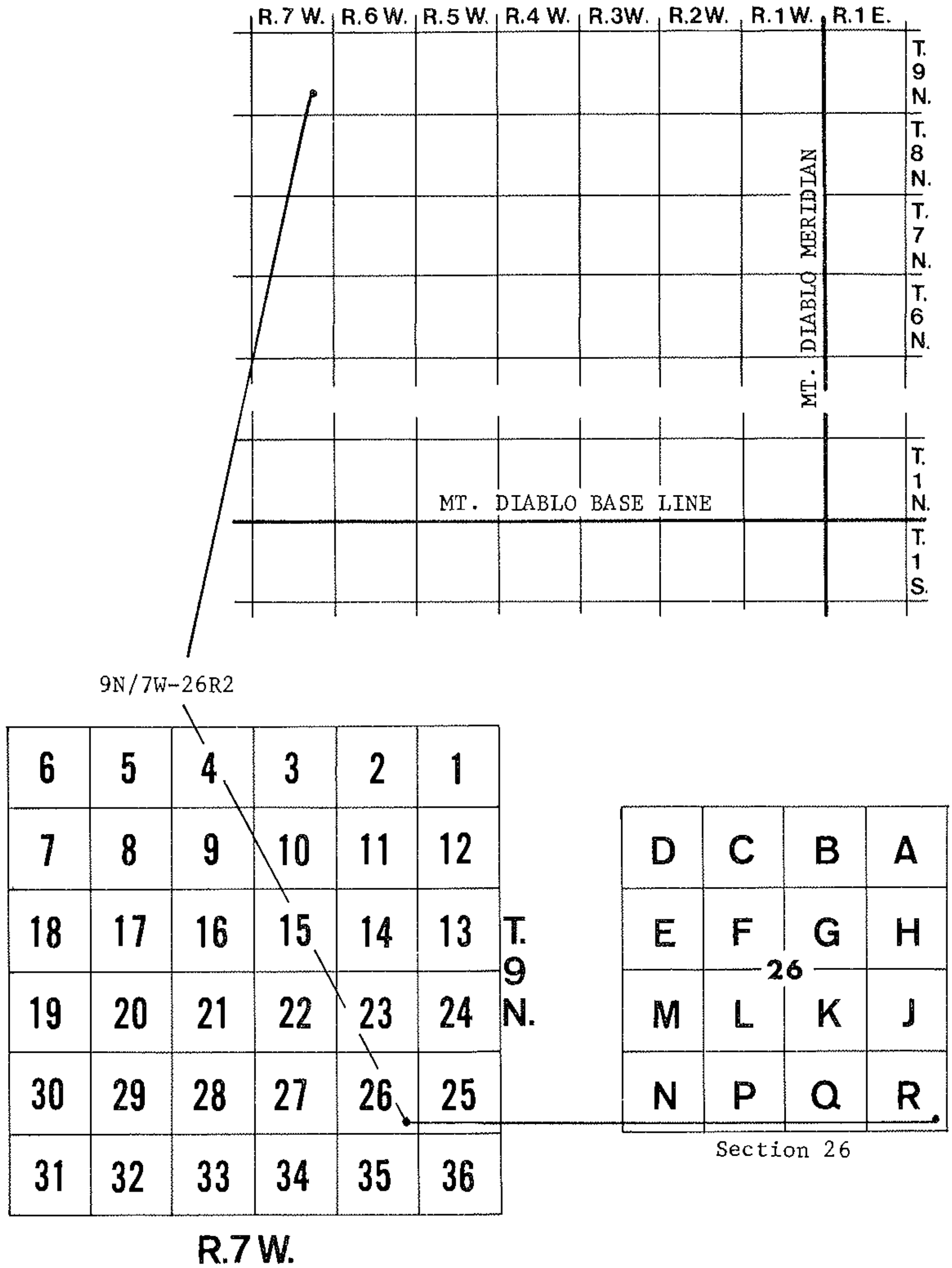


FIGURE 2.--WELL-NUMBERING SYSTEM.

## Acknowledgments

Appreciation and thanks are due the residents of Napa Valley who provided access to their property and aided in the collection of data upon which much of this report is based.

The following personnel and agencies of Federal, State, and local governments aided in this investigation by providing information and assistance: Joseph V. Reynolds and Herbert J. Knierim, Napa County Flood Control and Water Conservation District; Gilbert Lambert and Albert J. McDowell, U.S. Soil Conservation Service; Robert E. Trefzger, U.S. Bureau of Reclamation; Robert S. Ford, California Department of Water Resources; James Lider, Napa County Agricultural Extension Service; James E. Page, Napa County Department of Public Health; Richard A. Campbell, city of Napa.

# GEOGRAPHY

## Topography

Napa Valley is a distinct topographic basin consisting of a central valley floor with bordering foothills and mountains. Situated within the north-central Coast Ranges, the basin is oriented generally to the northwest, parallel to the California coastline (fig. 1). The northern part of the Napa Valley--about 24 miles of alluvial plain along the Napa River--is of major interest in this investigation. Mountain ranges surround the valley on three sides and include the Mayacmas Mountains to the north and unnamed sections of the Coast Ranges to the east and west. The bordering mountains are, for the most part, steep and brush covered. Peaks in the surrounding mountain ranges have elevations ranging from less than 1,000 feet to more than 4,000 feet. The southern border of the project area was arbitrarily placed across the Napa Valley in the vicinity of Oak Knoll Avenue (fig. 3).

The approximately 60 square miles of alluvial plain in the project area slope gently from the periphery of the valley toward the Napa River. The plain is less than a mile wide at the northern end of the valley, but gradually broadens to a width of about 3½ miles in the vicinity of Oak Knoll Avenue. The elevation of the valley floor drops from 343 feet at Calistoga to about 50 feet near the Napa River at Oak Knoll Avenue.

The basin is drained by the Napa River and its principal tributaries; Conn, Dry, Sulphur, Rector, and Mill Creeks. The Napa River is incised within steep banks of alluvium, as are the lower parts of the principal tributaries. The tributary streams are, with few exceptions, intermittent under most climatological and water-use conditions. The Napa River is perennial except during years of less than normal rainfall. At present (1972) a significant part of the low flow of the Napa River is water discharged from municipal sewage-treatment plants at Calistoga and St. Helena. Controlled releases of water are made to downstream users from Lake Hennessey on Conn Creek.

## Climate

The climate in Napa Valley is characterized by warm, dry summers and cool, moist winters. Most of the annual precipitation occurs as rain that falls during the winter and early spring months. The distribution of this precipitation is dependent upon the topography and the prevailing winds. Precipitation generally increases with increases in topographic elevation. Most of the rain comes with southwesterly winds and falls in a zone of high rainfall extending south to north along the slopes of the bordering western mountains. A less pronounced zone of high rainfall extends similarly along the slopes of the eastern mountains, but the precipitation is not as great there due to the generally lower elevations. The area of highest rainfall occurs at the northern end of the valley where the eastern and western rainfall zones join and are influenced by rain-bearing winds coming through wind gaps in the vicinity of Calistoga.

Rainfall data are available from U.S. Weather Bureau Climatological Data for California and from Kunkel and Upson (1960). For purposes of this report the rainfall record at St. Helena is considered most representative of annual precipitation throughout the project area, and references to rainfall or precipitation amounts refer to this record. The mean annual precipitation at St. Helena over the period of record 1906-70 is 33.5 inches. The standard deviation is 11.3 inches and the skew coefficient is 0.49. The median annual precipitation at St. Helena was 30.6 inches, or very near to the mean value. The small difference between mean and median values and the correspondingly small skew coefficient indicate that a frequency distribution of the annual rainfall at St. Helena will be generally symmetrical about the mean. Thus, for purposes of this report, rainfall is assumed to be normally distributed.

Table 1 shows the probability of exceeding, in any water year, the given amount of rainfall at St. Helena along with the probability that this rainfall will be exceeded for 2 years, consecutively. These probabilities are based on the assumption that values of annual rainfall at St. Helena are normally distributed, mutually exclusive, and independent.

TABLE 1.--*Probability that given amounts of annual rainfall at St. Helena will be exceeded in 1 and 2 water years, consecutively*

| Annual rainfall at St. Helena (inches) | Probability that annual rainfall at St. Helena will be exceeded in any water year (percent) | Probability that annual rainfall at St. Helena will be exceeded in 2 consecutive water years (percent) |
|---|---|---|
| 10 | 98 | 96 |
| 15 | 95 | 90 |
| 20 | 88 | 77 |
| 25 | 77 | 59 |
| 30 | 62 | 38 |
| 35 | 45 | 20 |
| 40 | 28 | 8 |
| 45 | 15 | 2 |
| 50 | 7 | .5 |
| 55 | 2 | .0 |
| 60 | 1 | .0 |

Variations in annual rainfall for a single station within the project area can be very large. For example, only 12 inches of precipitation was recorded at St. Helena during the 1924 water year, whereas 59 inches was recorded during the 1914 water year.

Significant temperature variations also occur in the project area, largely as a result of the uneven topography. The lower valley troughs and the higher elevations of the surrounding mountains are generally cooler in the summer, and have the lower winter temperatures. The foothills and the alluvial plain are generally warmer, having a frost-free season at least a month longer than the colder zones. The less extreme temperatures in these areas result partly from the thermal insulating properties of night and morning fog blown in from San Pablo Bay. This fog, common during all seasons of the year, decreases the amount of heat received from the sun in summer and decreases radiation from the earth in winter. The mean annual temperature of the project area is about 60°F (15.5°C); there is a seasonal variation about this mean of approximately ±30 degrees. Temperature extremes of 115°F (46°C) and 10°F (-12.0°C) have been recorded at St. Helena.

During the winter months, temperatures below freezing (32°F or 0°C) occur infrequently. The average frost-free season in the valley proper spans 250 days from March 18 to November 22. This time period varies considerably, however, from year to year and from place to place within the valley. For example, frost has occurred at Napa as late as May 26 and as early as October 12. The period from March 15 to May 15 is especially critical to the grape industry because a frost at this time of year seriously reduces crop yields. Statistical information concerning the severity, distribution, and occurrence of frost periods is available from the Napa County Flood Control and Water Conservation District (1972).

## GEOLOGY

The geologic formations in the project area were mapped by Weaver (1949), Taliaferro (1951), Kunkel and Upson (1960), and Koenig (1961, 1963). A brief description of the geologic formations, their history, their relation to one another, and their water-bearing properties is considered sufficient for purposes of this report. More detailed information may be obtained in the references cited above.

The floor of the Napa Valley consists of a relatively thin cover of alluvium of Quaternary age overlying a thick section of Sonoma Volcanics of Pliocene age, consolidated sedimentary rocks of Cretaceous age, sedimentary and metamorphic rocks of the Franciscan Formation, and ultrabasic plutonic rocks and serpentine of Jurassic age. As shown in figure 3, the Sonoma Volcanics and the older sedimentary, metamorphic, and ultrabasic rocks crop out in Napa Valley and constitute the bedrock in the project area.

## Geologic History

The geologic activities that have had the most direct bearing on the hydrologic system of present-day Napa Valley began during the Miocene epoch. In early and middle Miocene time, the area now known as Napa Valley was part of a structural depression occupied by the Miocene sea. During that time, severe erosion from land masses which bordered the sea caused thousands of feet of sediment to be deposited in the depression.

During late Miocene and early Pliocene time, a general uplift occurred and the Miocene sea regressed. The Napa Valley area probably was above sea level during most of early Pliocene time and was modified by crustal movements, volcanic activity, and erosion. Large areas of the uplifted marine deposits were blanketed by pumice and volcanic ash or covered by flows of basalt, andesite, and rhyolite. In quiet periods between the volcanic episodes, stream valleys and topographic depressions were partly filled with deposits of gravel, sand, and clay, and diatomaceous deposits were formed in fresh or brackish-water lakes. In middle and late Pliocene time, volcanic activity increased and large areas were covered by pumice, welded tuff, and flows of primarily rhyolitic composition.

In early Pleistocene time the region was again uplifted and subjected to extensive erosion. During this time several oscillations of the sea level, accompanied by crustal movements, placed the land surface alternately above and below water. With each of these oscillations, the hydraulic gradients of streams draining the Napa Valley area were altered and readjusted. Stream channels shifted, gradients were changed, and sediments were deposited and eroded at varying rates. Hence, local deposits of early Quaternary age in Napa Valley are highly variable with respect to their lithology, thickness, and hydrologic properties. In middle Pleistocene time a general downwarping of the Napa Valley and surrounding areas forced the streams draining the basin to make further adjustments.

The general topographic form of the present-day Napa Valley area is the result of erosion and deposition that has taken place since the middle Pleistocene downwarping and the last great sea-level rise that occurred following the end of the last Ice Age.

## Geologic Units and Their Water-Bearing Properties

For this report, the geologic units of the Napa Valley area have been divided into ultrabasic rocks of Jurassic age; the Franciscan Formation and its metamorphic equivalents of Jurassic and Cretaceous ages; consolidated sedimentary rocks of Cretaceous age; Sonoma Volcanics of Pliocene age; and alluvium of Quaternary age. Figure 3 shows the areal distribution and relative ages of the geologic units.

## Ultrabasic Rocks

The ultrabasic rocks of Jurassic age include serpentine, peridotite, dunite, pyroxenite, and minor amounts of silica-carbonate rock derived from alteration of serpentine. The rocks occur as lenses, sheets, and irregularly-shaped masses within, or along, the boundaries of Jurassic equivalents of the Franciscan Formation. The serpentine masses probably were formed by alteration of original igneous intrusive material. Chemical analyses of the serpentinized intrusions (Bailey, Irwin, and Jones, 1964) indicate that the rock is composed of almost equal parts of silica and magnesium with residual amounts of other rock-forming minerals. These rocks are poorly permeable and not important as a source of water supply.

## Franciscan Formation

The Franciscan Formation of Jurassic and Cretaceous ages is a heterogeneous assemblage of graywacke, altered volcanic rocks and associated metamorphic rocks, shale, chert, limestone, and conglomerate. In the Napa Valley area, the Franciscan Formation is chiefly consolidated graywacke and shale with minor amounts of greenstone, chert, and conglomerate. All of the units have been more or less metamorphosed and altered by pronounced changes in the physical and chemical environment in which the rocks originated.

Chemical analyses of the sandstone and shale of the Franciscan Formation (Bailey, Irwin, and Jones, 1964) indicate that silica and aluminum are the dominant constituents, followed by iron, magnesium, and calcium, respectively.

Except where fractured or deeply weathered, the Franciscan Formation is poorly permeable. Wells penetrating the rocks may yield enough water for minimum domestic or stock requirements but the water may be of poor quality for domestic uses.

## Consolidated Sedimentary Rocks of Cretaceous Age

The consolidated sedimentary rocks of Cretaceous age are chiefly mudstone and siltstone with minor beds of thin-bedded sandstone. The rocks are well consolidated and poorly permeable. Where penetrated by wells, they yield small quantities of water that may be sufficient for minimum domestic or stock requirements but the water may be too mineralized for human consumption.

## Yield of Wells Tapping the Consolidated Sedimentary Rocks of Cretaceous Age, the Franciscan Formation, and the Ultrabasic Rocks

Logs of wells and pump-test information supplied by drillers, pump companies, and land owners indicate that the consolidated sedimentary rocks of Cretaceous age, rocks of the Franciscan Formation, and the ultrabasic rocks generally yield small quantities of water to wells. However, significantly larger quantities of water may be obtained from highly fractured or deeply weathered zones. Well-test information from 36 wells drilled into these rocks show an average yield of 19 gpm (gallons per minute) with most wells yielding 10 gpm or less. Most of the well tests for which both yield and drawdown information are available show a specific capacity less than or equal to 0.1 gallon per minute per foot of drawdown.

## Sonoma Volcanics

The Sonoma Volcanics constitute a thick and highly variable series of volcanic rocks including andesite, basalt, and minor rhyolite flows with interbedded and discontinuous layers of tuff, tuff breccia, agglomerate and scoria. Redeposited tuff and pumice, diatomite, diatomaceous mud, silt, sand, and gravel, and a prominent body of rhyolite flows and tuff with some obsidian and perlitic glass are also included in this group of rocks.

Redeposited, water-laid pyroclastic materials, diatomite, silt, sand, and gravel are exposed in roadcuts along the Silverado Trail east and southeast of St. Helena. In the vicinity of Calistoga, prominent bodies of rhyolite and rhyolitic tuff have been altered by hydrothermal processes to a hard, dense, fine-grained rock. Thin-section and X-ray diffraction analyses indicate that the altered rhyolitic rocks now consist mostly of quartz and kaolinitic and montmorillonitic clays.

Well-test information from 140 wells tapping the Sonoma Volcanics show an average yield of 32 gpm and an average specific capacity of 0.6 gallon per minute per foot of drawdown.

## Alluvium

In this report, deposits described as alluvium or as the alluvial aquifer, include the older alluvium, terrace deposits, older alluvial-fan deposits, and younger alluvium as mapped and described by Kunkel and Upson (1960).

The alluvium underlies and forms the floor of Napa Valley and consists mostly of lenticular, unconsolidated, poorly sorted, and imperfectly bedded deposits of gravel, sand, silt, and clay. Individual lenses of gravel, sand, and clay generally are not more than 10 feet thick but may extend laterally over large areas.

The floor of the Napa Valley is formed mainly by the flood plains and channels of the Napa River and its tributaries. Mechanical analyses by Carpenter and Cosby (1938) show that flood-plain materials consist mostly of silt and clay with a small percentage of gravel and sand. Channel deposits were shown to consist mostly of sand and gravel.

The yield of wells tapping the alluvium ranges from about 50 gpm to about 3,000 gpm depending on the number and thickness of gravel and sand lenses penetrated at the particular well. Well-test information supplied by drillers, pump companies, and land owners for 100 wells perforated in the alluvium indicate that this unit is by far the best aquifer in the project area. The average yield of these 100 wells is about 220 gpm and the average specific capacity is about 10 gallons per minute per foot of drawdown.

## Geothermal Activity

Geothermal activity, in the form of "geyser" wells, hot springs, and wells that discharge warm to hot water, occurs at several places in the project area. Ground water associated with geothermal activity is termed "hydrothermal" because the water temperature is unusually high. A standard definition (White, 1957) is used in this report and states that water at a temperature of 5°C or more above the mean annual temperature of the surrounding environment is considered hydrothermal. Thus, for the project area, a well or spring containing water at a temperature equal to, or greater than, 20.5°C (69°F) is said to yield hydrothermal water.

The most notable occurrence of hydrothermal water in the project area is in the vicinity of Calistoga. Kunkel and Upson (1960) reported that several wells in sec. 26, T. 9 N., R. 7 W. periodically discharged hot water and steam in the manner of a geyser. Health resorts featuring hot springs and hot mineralized water have been developed near wells 9N/6W-21M3 and 9N/7W-26R1, 2, (fig. 3). Most wells in the Calistoga area that contain hydrothermal water penetrate confined or semiconfined aquifers and many of these wells flow at the land surface. Drillers' logs indicate that "cool" water occurs at shallow depth throughout most of the Calistoga area; however, at depths ranging from 50 to 100 feet below land surface drillers generally encounter confined, hydrothermal water. Water temperatures in the deeper wells are reported to range from 29.5°C (85°F) to 120°C (248°F). Hydrothermal water and artesian conditions also occur in wells south and east of Calistoga in T. 8 N., R. 6 W., secs. 3, 4, 9, and 25 and in the Rutherford-Oakville area in T. 7 N., R. 5 W., secs. 3, 14, 15, 25, and 26.

Figure 3 shows the location of wells that yield hydrothermal ground water. Table 4 shows chemical analyses of water samples taken from wells that yield hydrothermal water.

# GROUND-WATER HYDROLOGY

## Ultrabasic Rocks, Franciscan Formation, and Sedimentary Rocks of Cretaceous Age

The ultrabasic rocks, Franciscan Formation, and the sedimentary Cretaceous rocks are saturated below the water table, but yield very little water to wells. This restricted ability to yield water to wells results from a very low average hydraulic conductivity which, for these rocks, is probably on the order of $10^{-4}$ fpd (feet per day) or less. Ground-water flow patterns in these units generally conform to the topographic slopes except where interrupted by faults or other barriers that impede ground-water movement. The few well records available indicate that confined conditions occur locally within this group of rocks.

## Sonoma Volcanics

The tuff breccia, scoriaceous material, and sedimentary deposits that compose a relatively small part of the Sonoma Volcanics generally are more permeable than the older ultrabasic, Franciscan, and sedimentary Cretaceous rocks and yield, on the average, greater quantities of water to wells. The hydraulic conductivity of the breccia, scoria, and sedimentary deposits is probably on the order of $10^{-2}$ to $10^{-3}$ fpd. Other units of the Sonoma Volcanics, most notably the andesitic, basaltic, and rhyolitic flow rocks and the hydrothermally altered material, yield little water to wells and probably have a hydraulic conductivity on the order of $10^{-4}$ fpd or less.

Water in the Sonoma Volcanics commonly is confined, though few wells penetrating this unit actually flow at land surface. Of the wells that do flow, most are located in the Calistoga area and the majority of these discharge hydrothermal water (fig. 3, table 4). Density differences between the hydrothermal water and the cooler ground water are caused by high subsurface temperatures and pressures and probably contribute to the upward movement of hydrothermal water and to the potentiometric heads observed at flowing, hot-water wells and "geyser" wells in the Calistoga area. On the other hand, the relation of depth to the occurrence of confined, hydrothermal water in wells in the Calistoga area (p. 15) suggests that the occurrence of hydrothermal water may be associated with a confining zone.[1] The fact that flowing wells, discharging hydrothermal water, occur in the project area is probably due to the combined influence of a local confining zone and the geothermally induced density differences of ground water.

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[1] A possible mechanism for the development of such a confining zone in hot-water dominated, hydrothermal systems is described on page 53.

Intermittently flowing wells in the Sonoma Volcanics that do not discharge hydrothermal water are located in sec. 16, T. 7 N., R. 5 W. and in secs. 6 and 7, T. 8 N., R. 6 W.

## Alluvium

### Spatial and Hydrologic Properties

The alluvium is by far the best aquifer in the project area and is locally capable of providing water to wells at rates of more than 3,000 gpm. The average hydraulic conductivity of the alluvium, as determined from drillers' logs and from specific-capacity data ranges from 10 to more than 100 fpd, depending on the percentage of sand and gravel in the alluvial deposits. The distribution of sand and gravel is irregular and variable but, as indicated in figure 4, the average values of hydraulic conductivity follow a general pattern; increasing from north to south and from the peripheries of the valley toward the Napa River. Thus, along any section that crosses the valley, the average hydraulic conductivity near the Napa River is virtually always the highest, and ranges from approximately 40 fpd near Calistoga to more than 110 fpd near Oak Knoll Avenue.

Except for small localized areas of semiconfinement, water in the alluvium is unconfined and moves under a natural hydraulic gradient that conforms in a general way to the surface topography. However, wells in the alluvium ranging in depth from 10 to 56 feet flow continuously or seasonally in secs. 22, 23, and 26, T. 7 N., R. 5 W. Most of these wells contain confined, hydrothermal water similar to wells in the Calistoga area, and the high potentiometric heads are probably the result of geothermally related phenomena such as described on page 16.

The thickness of the alluvium increases progressively from north to south, and from the periphery of the valley toward the Napa River. Figure 5 shows that the thicker sections of alluvial materials are beneath the Napa River and its major tributaries. The alluvium nearly everywhere thins toward the edges of the valley, except in the area immediately east and southeast of St. Helena. Here the thicker sections of alluvium occur at the eastern edge of the valley and abut directly against redeposited material of the Sonoma Volcanics. Also, a thick section of alluvium abuts the Sonoma Volcanics that form the Yountville Hills.

Kunkel and Upson (1960, table 8) used specific-yield values that ranged from 5 to 8 percent to estimate the volume of water in the alluvial aquifer. Because most of the values were in the 6-percent range in the areas of concern to this report, that value was used in conjunction with historical water-level data and estimated aquifer thicknesses (fig. 5) to determine that, as of 1972, the available quantity of water in the alluvial aquifer of northern Napa Valley was about 190,000 acre-feet.

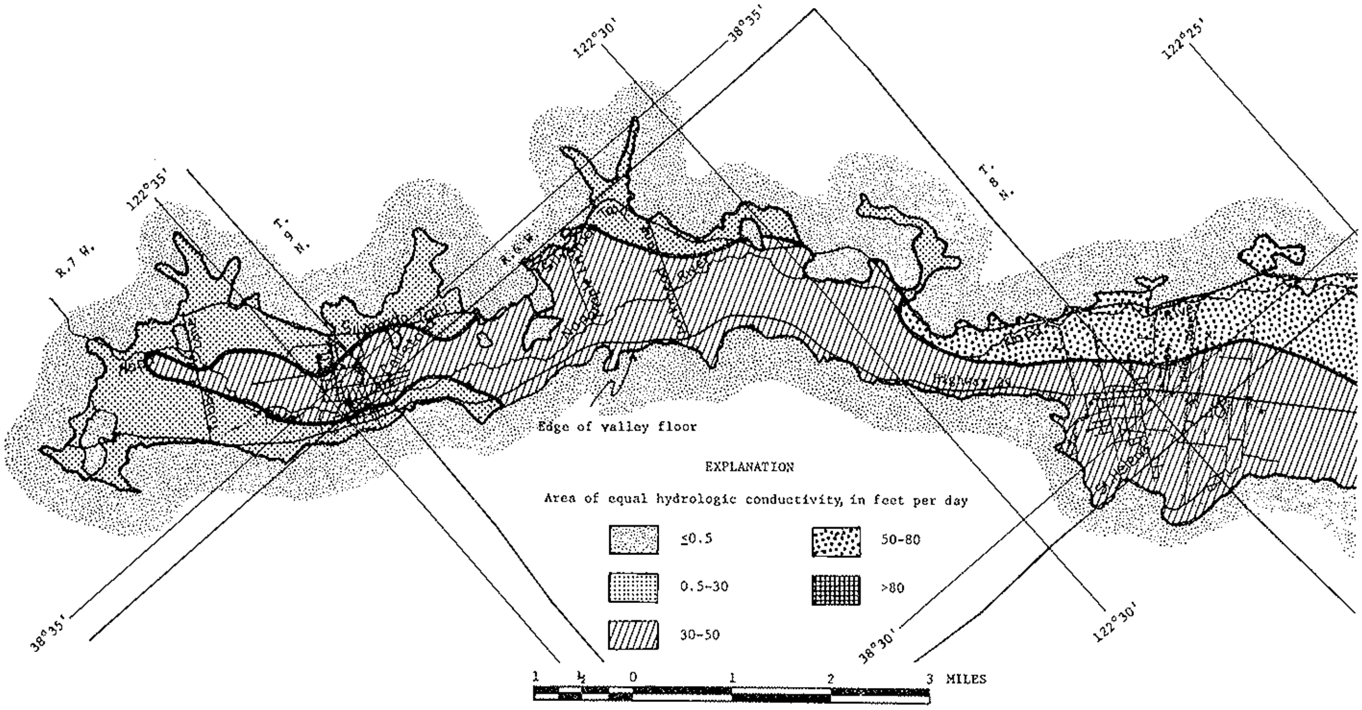
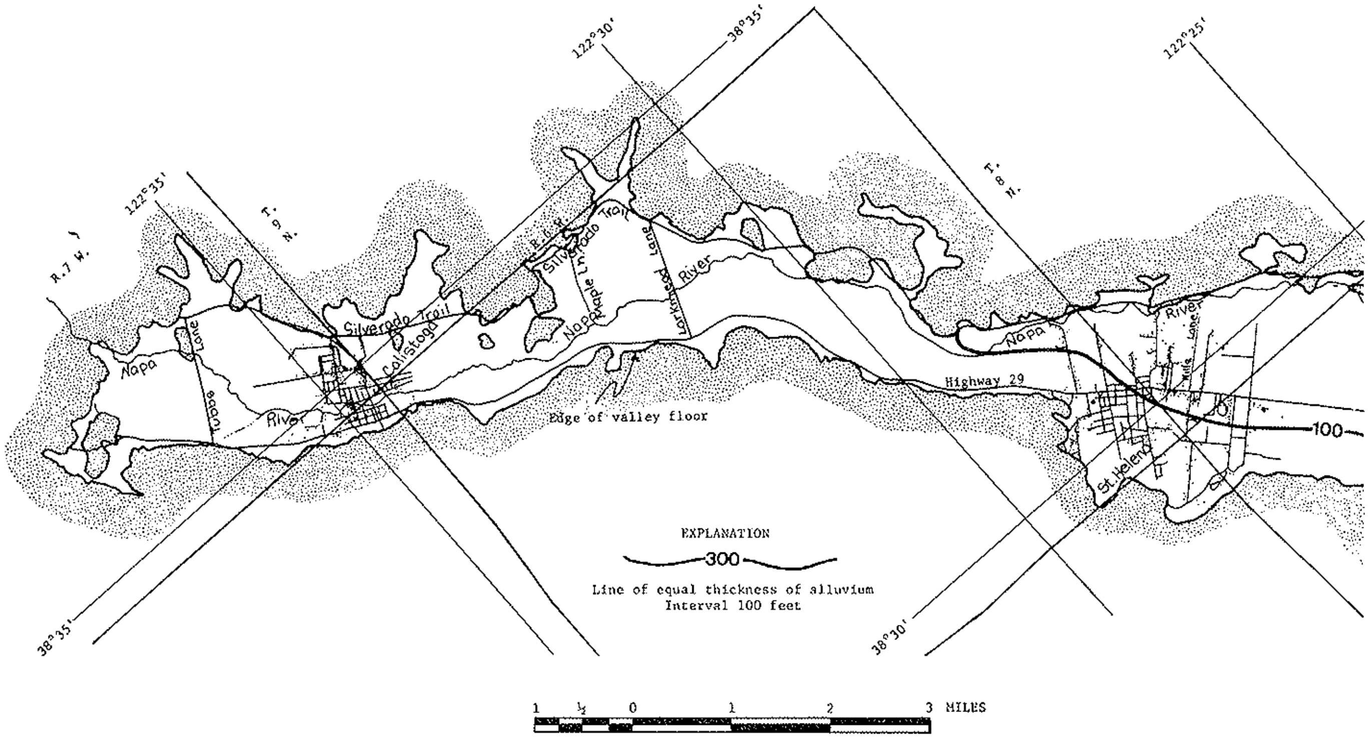



FIGURE 4.--HYDRAULIC CONDUCTIVITY OF THE ALLUVIUM IN NORTHERN NAPA VALLEY.




Base from U.S. Geological Survey 15' topographic series:
Calistoga, 1959, St. Helena, 1960; Sonoma, 1951; and
Santa Rosa, 1954

FIGURE 5.--THICKNESS OF ALLUVIUM IN NORTHERN NAPA VALLEY.

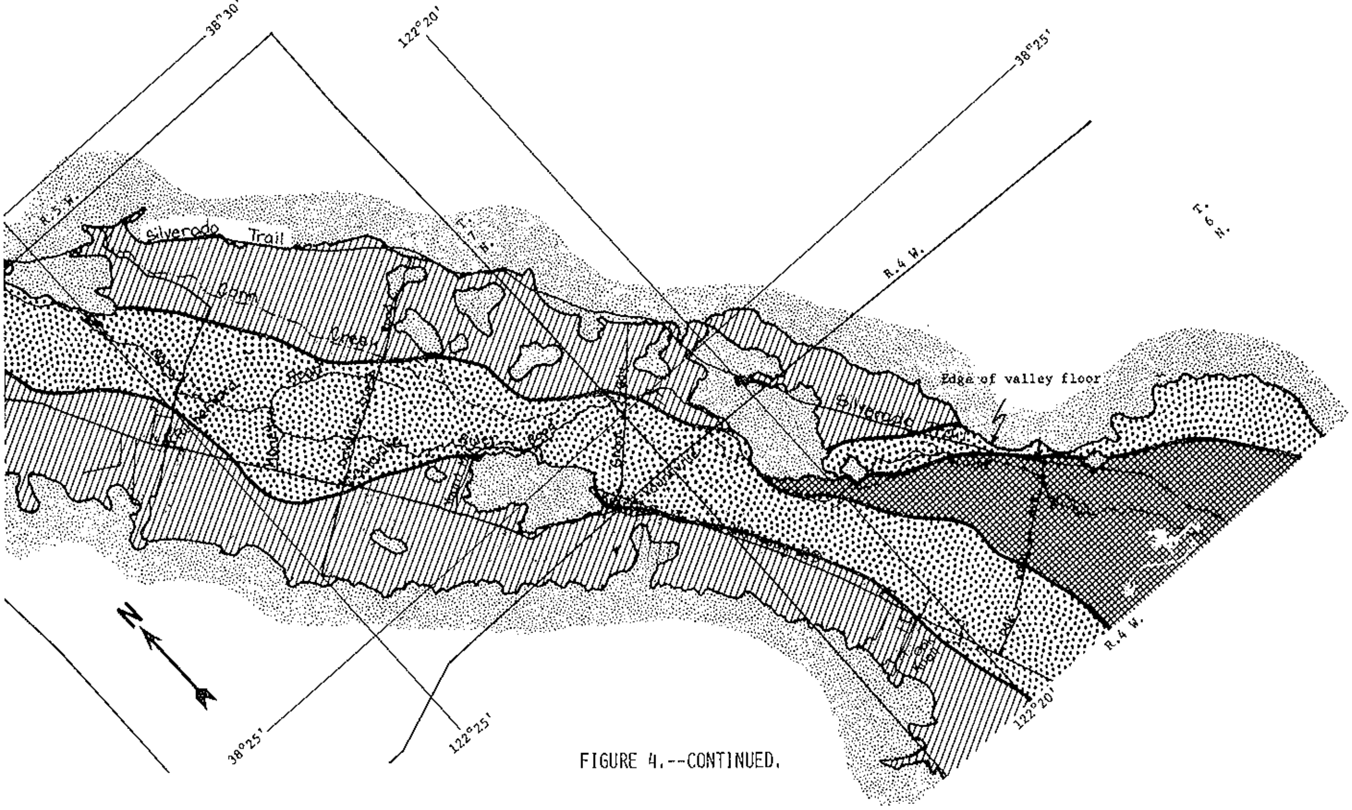



FIGURE 4.--CONTINUED.

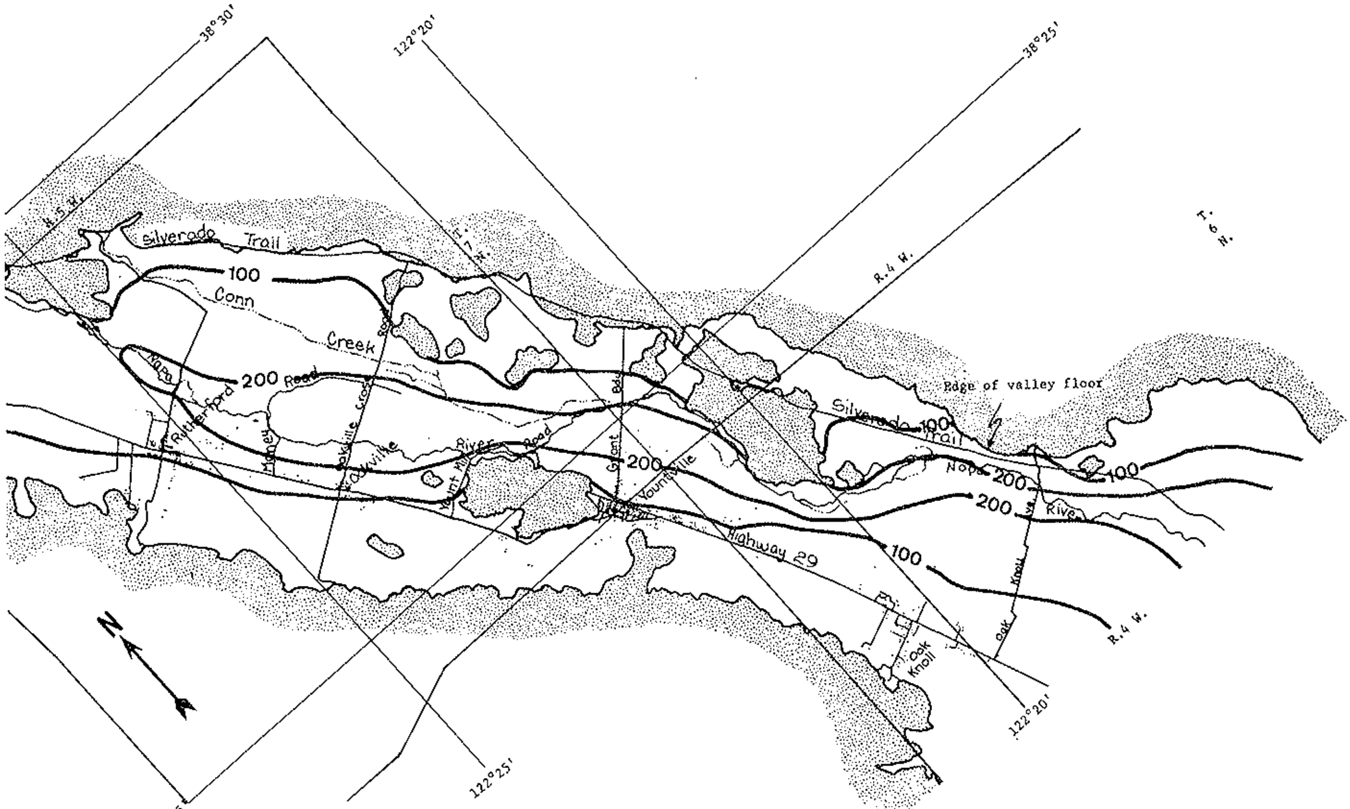



FIGURE 5.--CONTINUED.

## Recharge and Discharge

Recharge to the alluvium occurs by infiltration of rain, percolation from streams, and subsurface inflow from older rocks. Discharge from the alluvium occurs by evapotranspiration, ground-water flow to the Napa River, pumping from wells, and subsurface outflow across the southern boundary of the project area.

At the present time (1972), the Napa River is a gaining stream and contributes little recharge to the water table. Even during years of limited rainfall, when the river flows intermittently, water is discharged from the aquifer in those reaches where the river is flowing and water recharges the alluvium in reaches where the river channel is dry; thus, net recharge to the alluvial aquifer is negligible.

Subsurface outflow occurs across the southern boundary of the project area as underflow in the alluvial deposits beneath and directly adjacent to the Napa River and is considered to be relatively constant over time. Using Darcy's law, known values of the hydraulic gradient, and estimated values of hydraulic conductivity, the subsurface discharge is calculated to be between 1 and 2 cfs (cubic feet per second). Subsurface inflow along the periphery of the valley is insignificant except in the area east and southeast of St. Helena. Here, relatively permeable redeposited volcanic materials abut thick sections of alluvium and provide an estimated constant inflow to the alluvial aquifer of 0.50 cfs.

## Fluctuation of Water Levels and Streamflows and the Response of Water Table and Streamflows to Annual Rainfall

Historically, ground-water levels and streamflows in the Napa Valley have varied considerably from season to season and from year to year and have been most critically influenced by winter and early spring precipitation. Seasonal fluctuations of the water table and seasonal changes in streamflows are relatively large because of large seasonal variations in rainfall. Consequently, streamflows and ground-water levels are highest in the spring, decline progressively through the summer and autumn, and are lowest before the onset of winter rains.

Fluctuations of the water table and total streamflows from water year to water year are also directly dependent upon rainfall. During most water years, rainfall is sufficient to meet soil-moisture requirements and to replace ground water lost by pumping and by natural discharge. During years of limited rainfall, however, soil-moisture requirements are not met, some depletion from ground-water storage occurs, and surface runoff and ground-water discharge to the Napa River are reduced. Several consecutive dry years in succession would aggravate the problem of decreased streamflows to a degree commensurate with the length and severity of the drought and the amount of ground-water pumping. During years when rainfall is significantly below average, there may be no flow in the Napa River during most of the summer and autumn months. If significant storage depletion occurs as the result of pumping during a dry period and if the water is replaced as a result of recharge during a subsequent wet period, the total discharge of the Napa River at Oak Knoll Avenue during the wet period will be reduced by the amount of storage gained after flow begins.

Water-level data indicate that during the last 42 years (1929-70) seasonal and annual water-table fluctuations caused by periods of below average rainfall and pumping from wells have not exceeded 30 feet.

Water-table response to annual rainfall is a reflection of the annual recharge to the aquifer and indicates the ability of the aquifer to receive further recharge. The three curves in figure 6 show annual water-table recovery in three observation wells in the alluvium plotted against total annual rainfall for the same year. The graphs show that annual recharge to the water table is sensitively controlled by total annual rainfall up to a threshold value of 35 to 40 inches at St. Helena. Beyond this amount, significant increases in rainfall do not cause a corresponding recovery of water levels, and the excess rainfall becomes rejected recharge. Consequently, the threshold value of 35 to 40 inches indicates the average annual rainfall required at St. Helena to meet soil-moisture requirements and to replace ground-water storage previously depleted as a result of pumping and natural aquifer discharge.

Several wells some distance from the Napa River and the three wells for which the general response curves (fig. 6) were calculated, indicate that long-term rainfall trends rather than annual rainfall may influence water-table response for a particular water year. For example, several consecutive years of rainfall well below the threshold value, followed by a year of rainfall well above the threshold value, can produce a water-table response for the last year considerably above that indicated by the general response curve. Similarly, several consecutive years of rainfall above the threshold value can produce a water-table response for the last such year considerably below that indicated by the response curve. Such extreme variations in precipitation and recharge have influenced water-table response through the years. However, repetition of precipitation-recharge conditions has also occurred, and the response data generated from these events, coupled with long-term rainfall and water-level records, were used to damp the influence of extreme climatologic variations on the water-table response curves. Thus, the curves do define valid relations and become a useful aid in estimating precipitation-recharge relations.

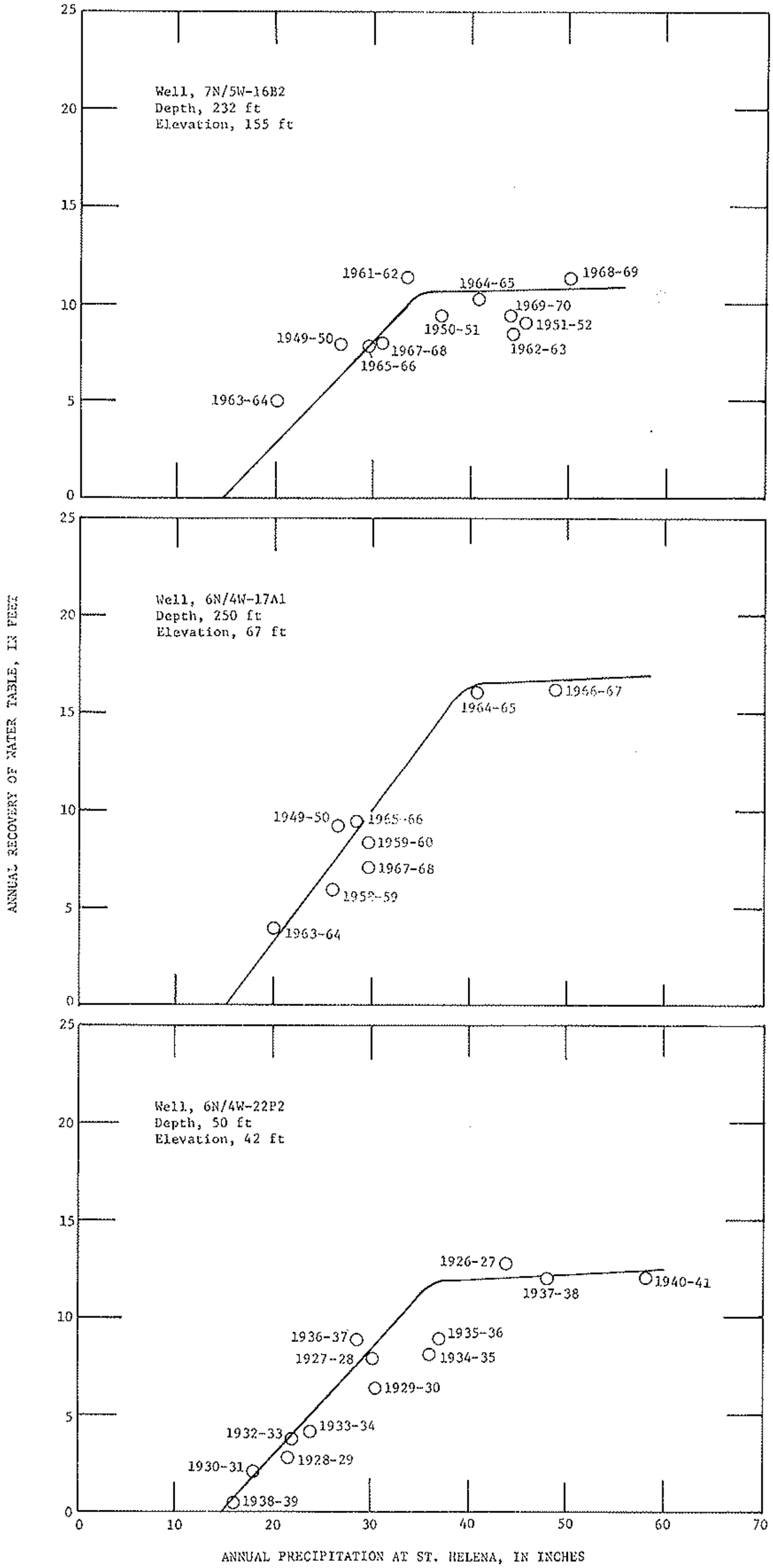



FIGURE 6.--WATER-TABLE RESPONSE CURVES.

Only three response curves are shown in figure 6 because sufficient long-term water-level data were not available for other observation wells. However, comprehensive water-level data for short periods of record from Bryan (1932) and Kunkel and Upson (1960) indicate that the magnitude of water-table response to annual rainfall generally is the same in most parts of the alluvial aquifer. Thus, the "threshold" values shown in figure 6 can be extrapolated to most of the project area. The exception to this rule is in the narrow part of the alluvium north of St. Helena, near Barro, where aquifer geometry and the requirements of flow continuity maintain high ground-water levels and dampen response to rainfall.

Total annual stream discharge from the project area is also directly dependent upon annual rainfall. This relation is indicated by the curves in figure 7 where the total annual streamflow for Conn Creek, Dry Creek, and the Napa River is plotted against total annual rainfall at St. Helena. These curves indicate that the annual discharge of tributary streams decreases with decreasing rainfall and becomes negligible when annual rainfall at St. Helena is 20 inches or less.

## Relation of Annual Recharge to Annual Rainfall

Subsurface inflow was discussed previously (p. 20) and is considered to be nearly constant over time. Recharge to the alluvial aquifer from rainfall and streamflow, on the other hand, is not independent of annual precipitation; in fact, recharge amounts vary considerably when annual rainfall is less than the threshold value (fig. 6).

For example, net annual recharge[1] to the alluvial aquifer from percolation of rain is estimated to be 3 inches per unit area during water years when the threshold value of rainfall is equalled or exceeded. This recharge is progressively reduced when rainfall departs negatively from the threshold value, and it probably becomes virtually zero during water years when total rainfall at St. Helena is less than 12 inches.

Net recharge from streamflow is similarly dependent on annual rainfall. Most of this recharge is derived from streams tributary to the Napa River and occurs near the valley margins where the tributary flows leave the older, impermeable rocks and pass over permeable channel deposits in the alluvium. Net annual recharge from streamflows is at a maximum when annual rainfall equals or exceeds the threshold value, becomes progressively less when rainfall is less than the threshold value, and for most years probably is negligible when annual rainfall at St. Helena is 20 inches or less.

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[1]Net recharge to the alluvium is defined as the total amount of water recharged to the water table minus the losses from the water table attributed to evapotranspiration.

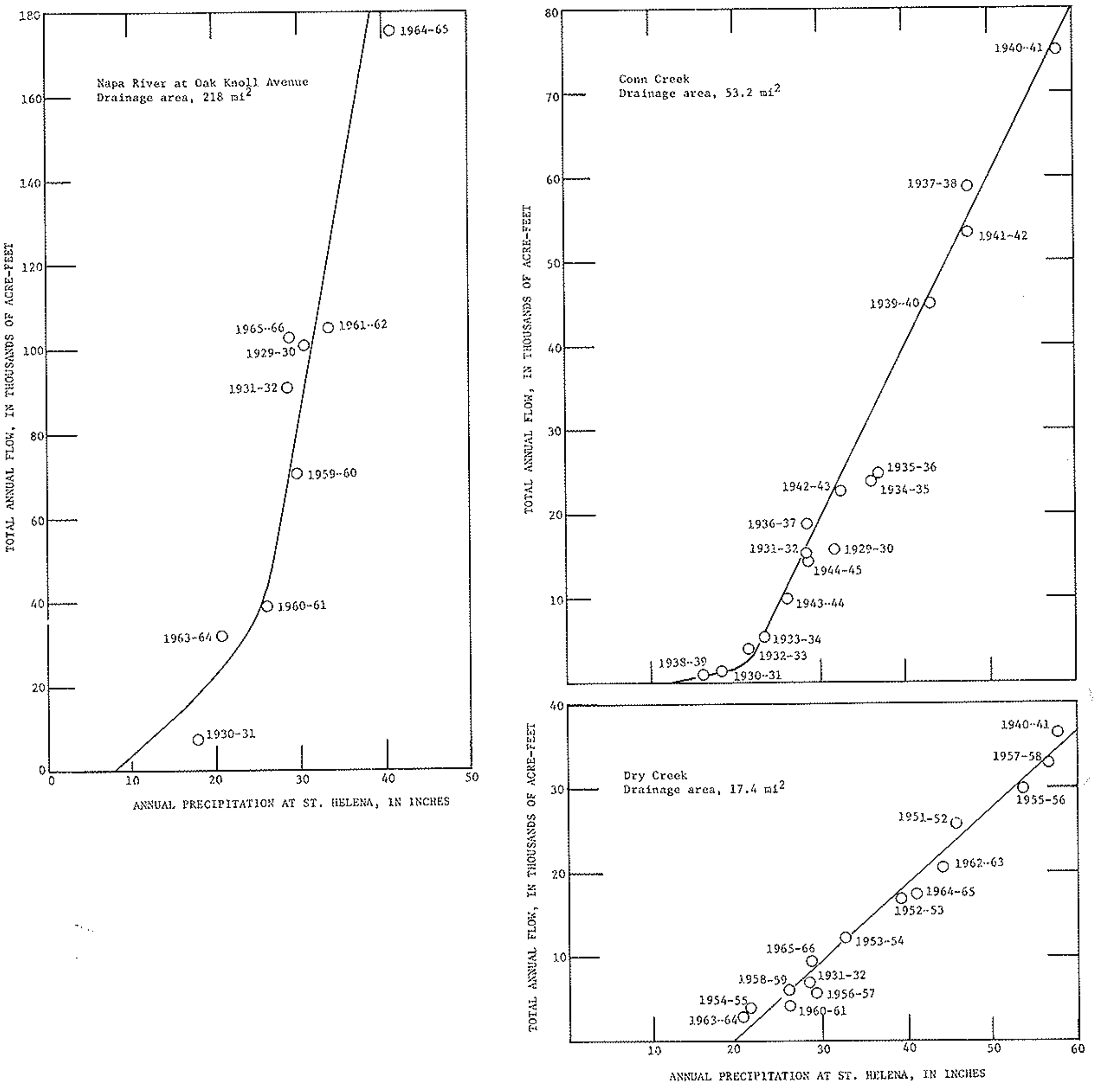



FIGURE 7.--STREAMFLOW RESPONSE CURVES.

## Ground-Water Pumpage

Faye (1972) calculated the annual agricultural use of ground water in the project area from power records for the years 1964-70 (table 2). Domestic use of ground water in the project area for the same period is estimated to have been 300 acre-feet per year. Annual agricultural pumpage for the 1964-67 period (table 2) varied inversely with the rainfall at St. Helena After 1967, however, annual pumpage increased significantly and no longer varied in a way sensitive to rainfall. The 1967-70 period coincides with the increasing use of ground water to provide frost protection for vineyards. Thus, future ground-water withdrawals probably will reflect the length and severity of spring frosts and the amount of acreage devoted to vineyards.

TABLE 2.--*Calculated agricultural pumpage from the alluvial aquifer in northern Napa Valley for water years 1964-70 (Faye, 1972)*

| Water year | Pumpage (acre-feet per year) |
|---|---|
| 1964 | 4,500 |
| 1965 | 4,050 |
| 1966 | 4,650 |
| 1967 | 3,300 |
| 1968 | 5,150 |
| 1969 | 5,600 |
| 1970 | 5,700 |

## Definition of Steady-State and Transient-State Conditions in the Alluvial Aquifer

The flattening of the water-table response curves in figure 6 indicates that the distribution of ground-water levels in the alluvial aquifer is about the same during those water years when rainfall equals or exceeds the threshold value. A statistical evaluation (table 1) of the rainfall record at St. Helena indicates that the threshold value of rainfall has a recurrence interval of less than 3 years. On the average, then, approximately the same distribution of water-table elevations, and, by inference, the same quantities of aquifer recharge and discharge, occur throughout the alluvial aquifer every 3 years. Thus, for purposes of this study, steady-state conditions are said to occur in the alluvial aquifer during those years when rainfall equals or exceeds the threshold value (p. 21). The quantities of water recharged to, and discharged from, the alluvial aquifer during those years and the spring water-table surface that develops as a result of that recharge and discharge are said to define those steady-state conditions.

The fact that long term, water-table elevations in the alluvial aquifer are generally static indicates that very little storage depletion or storage accumulation has occurred with time. Thus, in order to satisfy continuity, net discharge[2] from the alluvial aquifer must equal net recharge when steady-state conditions prevail.

Rainfall and water-level records indicate that steady-state conditions occurred in the alluvial aquifer during the 1963 water year. Using unpublished water-level data and estimated quantities of recharge and discharge, a water-level contour map for the spring of 1963 (fig. 8) was prepared and a ground-water budget (table 3) was computed. The ground-water budget and the water-level contour map are considered representative of the water body in the alluvial aquifer during most of the 1929-70 period.

Separation of the streamflow hydrograph into quantities of base flow and surface runoff for the Napa River at Oak Knoll Avenue indicates that the average ground-water discharge to the Napa River and subsequently out of the project area, during the 1963 water year was 18.0 cfs. Net pumpage of ground water during that water year was estimated to have been 4.0 cfs, after allowing for an estimated 10 percent irrigation return flow. Subsurface outflow across the southern boundary of the project area was estimated to be 1.5 cfs (p. 20). Thus, the total average net discharge from the alluvial aquifer for 1963 water year is computed to have been 23.5 cfs, and is considered to be the steady-state discharge from the project area.

Net recharge from direct rainfall penetration is estimated to be 3 inches per unit area during periods when the total rainfall at St. Helena equals or exceeds the threshold value. Rainfall thus contributes about 12.5 cfs of net recharge to the alluvium under steady-state conditions. Nearly all the remaining 11.0 cfs of net recharge required to maintain steady-state ground-water conditions is contributed by tributary streams along the periphery of the valley.

$\frac{3''}{30''}$ – 10% recharge

[2]Net discharge is defined as all water discharged from the saturated zone except evapotranspiration.

Even though steady-state conditions generally have prevailed in the project area during the past 40 years, the rainfall record indicates that dry periods have occurred during which the annual rainfall was less than the threshold value for several consecutive years. During these periods, steady-state conditions did not prevail in the alluvial aquifer, some storage depletion occurred, and in extreme cases--most notably during the 1930 and 1931 water years--the Napa River did not flow for a considerable period of time. At the end of such periods, the water-level contours were generally 20 to 30 feet below steady-state levels. For this study, whenever rainfall at St. Helena is significantly below the threshold value for several consecutive water years, ground-water conditions are defined as undergoing change and a transient-state situation is said to prevail. Water-level contours in, and quantities of recharge to and discharge from the alluvial aquifer under transient-state conditions are defined as transient-state parameters.

Bryan (1932) reported water-level records and streamflow hydrographs for 1929-32 water years, during which a total of 77.1 inches of rainfall was measured at St. Helena. Transient-state conditions prevailed throughout that period, most notably from the spring of 1930 through the summer of 1931. Water-level contours at the beginning and end of this period are shown in figures 9 and 10. Figure 9 shows that in the spring of 1930, water levels were 5 to 10 feet below steady-state water levels (fig. 8). Figure 10 shows that in June of 1931, water levels were generally 15 to 25 feet below steady-state levels (fig. 8).

The period April 1930 to June 1931 is considered most representative of transient-state conditions as defined in this report, and will henceforth be referred to as the transient period. Separation of streamflow hydrographs for base flow and surface runoff indicates that from April 1930 to June 1931, the base flow of the Napa River averaged 10.5 cfs. No flow was recorded in the Napa River at Oak Knoll Avenue from June 5 to November 26, 1931. The total ground-water withdrawal from the alluvial aquifer during the transient period was estimated to be 3,700 acre-feet. This amount was about 200 acre-feet more than the annual average withdrawal rate of 3,000 acre-feet reported by Faye (1972) as representative of this period. The difference reflects an estimated increase in the use of ground water to supplement deficient rainfall. Bryan (1932) indicated that during the transient period approximately 1,100 acre-feet of base flow was diverted from the Napa River and from Conn Creek for irrigation purposes upstream from Oak Knoll Avenue. Thus, the total net discharge from the alluvial aquifer during the transient period was estimated to have been 18.0 cfs, after allowing for an estimated 10 percent irrigation return flow and assuming that subsurface discharge across the southern boundary of the project area remained unchanged at 1.5 cfs.

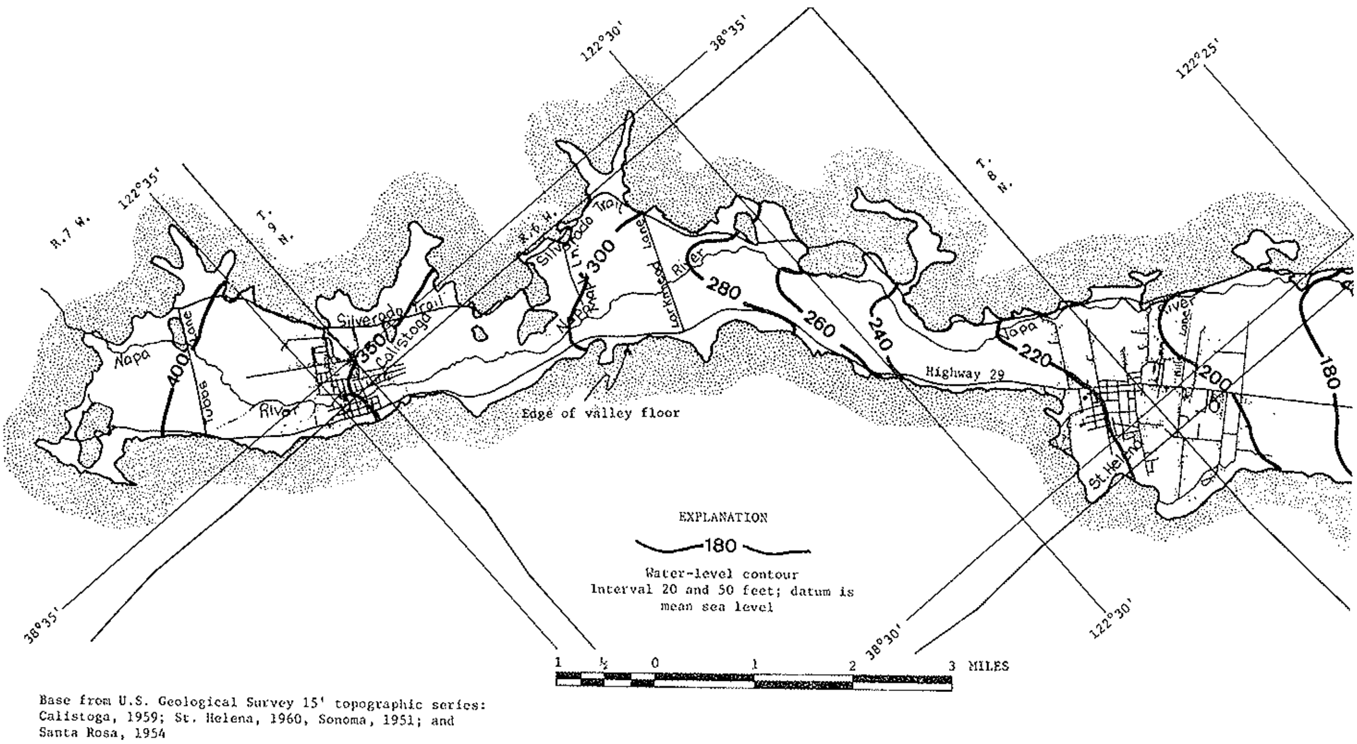



FIGURE 8.--WATER-LEVEL CONTOURS IN NORTHERN NAPA VALLEY, SPRING 1963.

Recharge to the alluvial aquifer in the transient period occurred during seasonal rains of the 1931 water year when approximately 18 inches of precipitation was measured at St. Helena. Relating this annual precipitation to the water-table response curves in figure 6, indicates that total recharge to the water table for the 1931 water year was 11 to 16 percent of the steady-state value. Considering that evapotranspiration from an unusually low water table was minimal, the net recharge to the alluvial aquifer during the transient period was estimated to be 14.5 percent of the steady-state recharge, or 3.6 cfs. Net recharge to the water table from streams tributary to the Napa River is estimated to be zero when annual rainfall at St. Helena is 20 inches or less. Thus, the total net recharge during the transient period was estimated to consist of 0.5 cfs of subsurface inflow and 3.1 cfs of direct infiltration of rainfall. Table 3 summarizes the steady-state and transient-state water budgets for the alluvial aquifer.

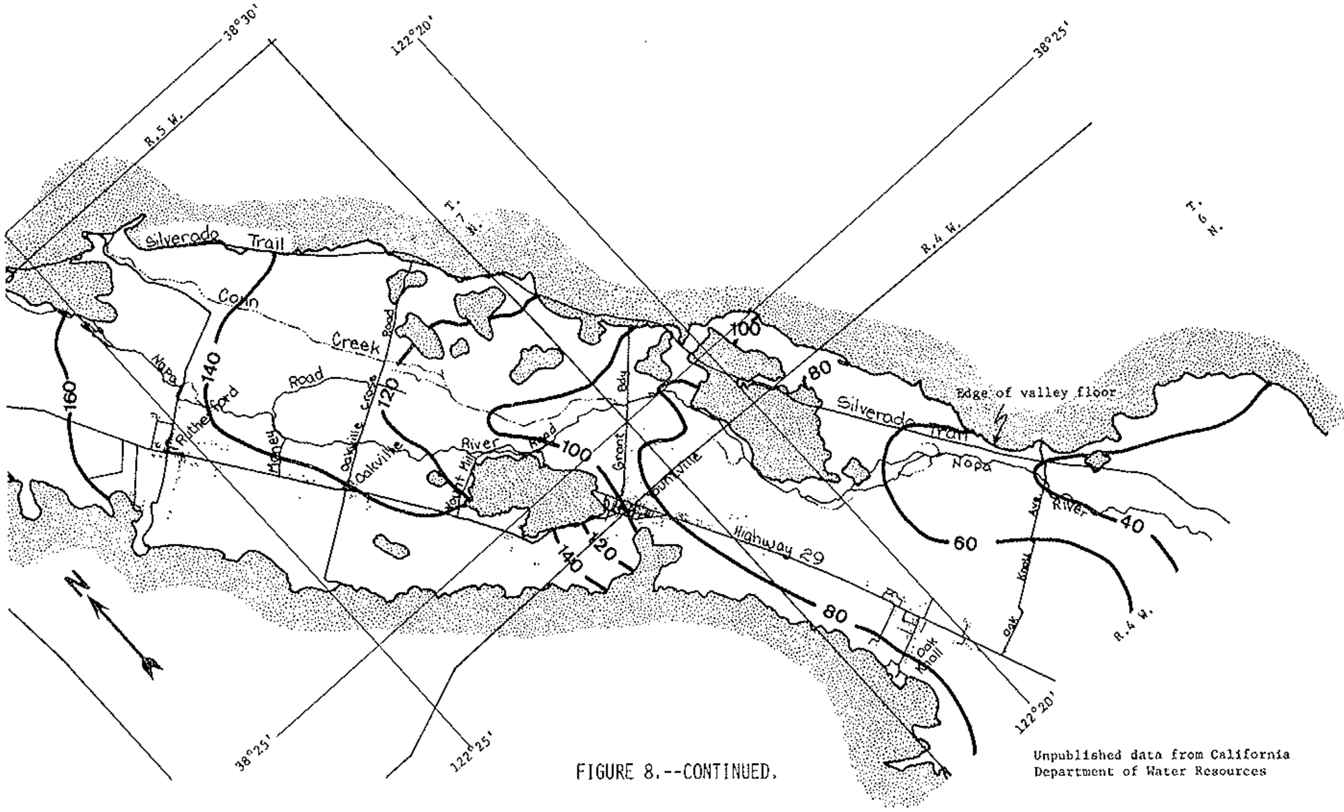



FIGURE 8.--CONTINUED.

TABLE 3.--*Water budgets for steady-state and transient-state conditions in the alluvial aquifer of northern Napa Valley*

| Steady-state conditions | | | | Transient-state conditions | | | |
|---|---|---|---|---|---|---|---|
| Discharge (cfs) | | Recharge (cfs) | | Discharge (cfs) | | Recharge (cfs) | |
| Base flow in Napa River | 18.0 | Rainfall | 12.5 | Base flow in Napa River | 10.5 | Rainfall | 3.1 |
| Net pumpage | 4.0 | Tributary streams | 10.5 | Net pumpage | 6.0 | Tributary streams | 0 |
| Subsurface outflow | 1.5 | Subsurface inflow | .5 | Subsurface outflow | 1.5 | Subsurface inflow | .5 |
| Total | 23.5 | | 23.5 | | 18.0 | | 3.6 |

Gross change in storage = 0 cfs

Gross change in storage = 14.4 cfs

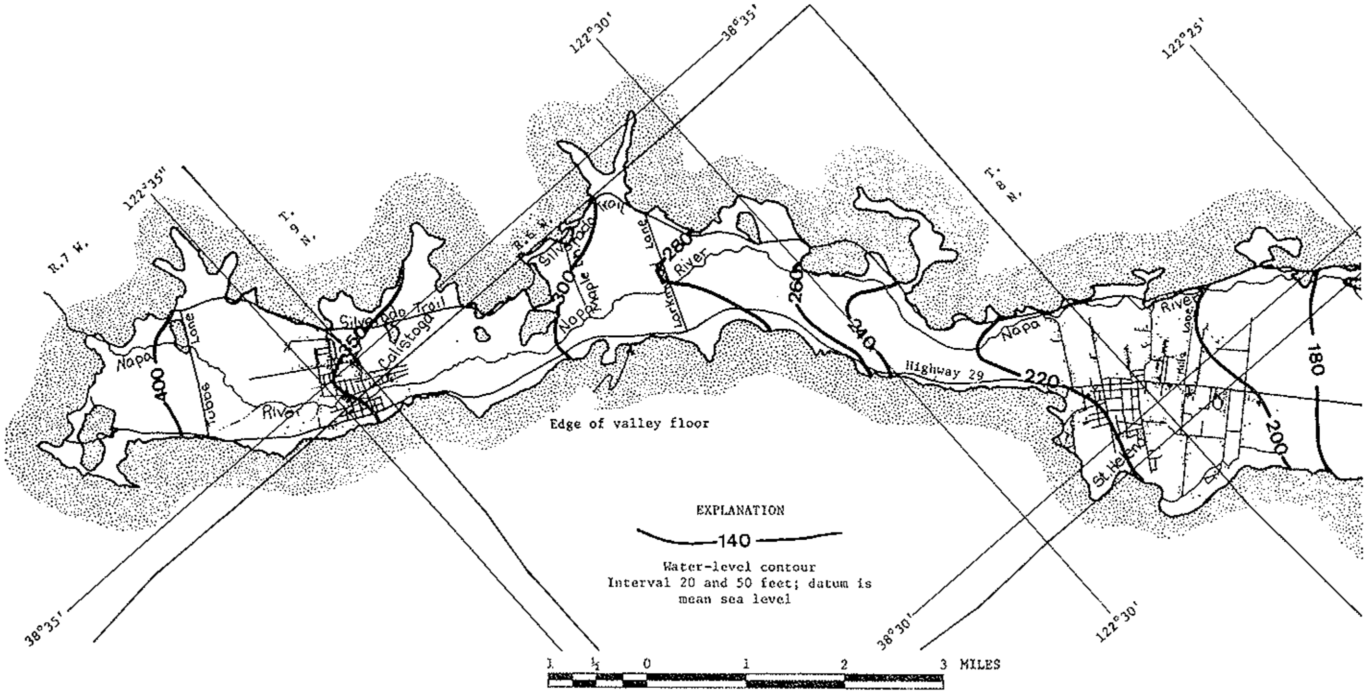
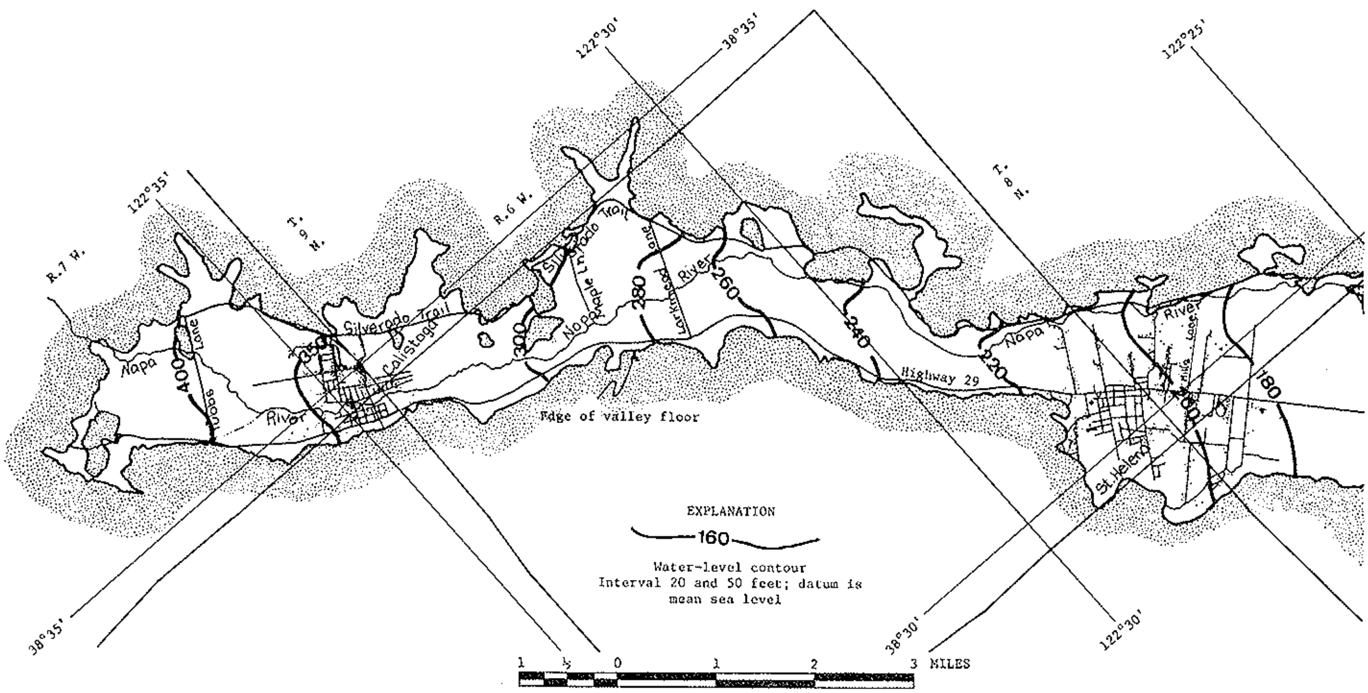



FIGURE 9.--WATER-LEVEL CONTOURS IN NORTHERN NAPA VALLEY, SPRING 1930.




Base from U.S. Geological Survey 15' topographic series:
Calistoga, 1959; St. Helena, 1960, Sonoma, 1951; and
Santa Rosa, 1954

FIGURE 10.--WATER-LEVEL CONTOURS IN NORTHERN NAPA VALLEY FOR JUNE 1931.

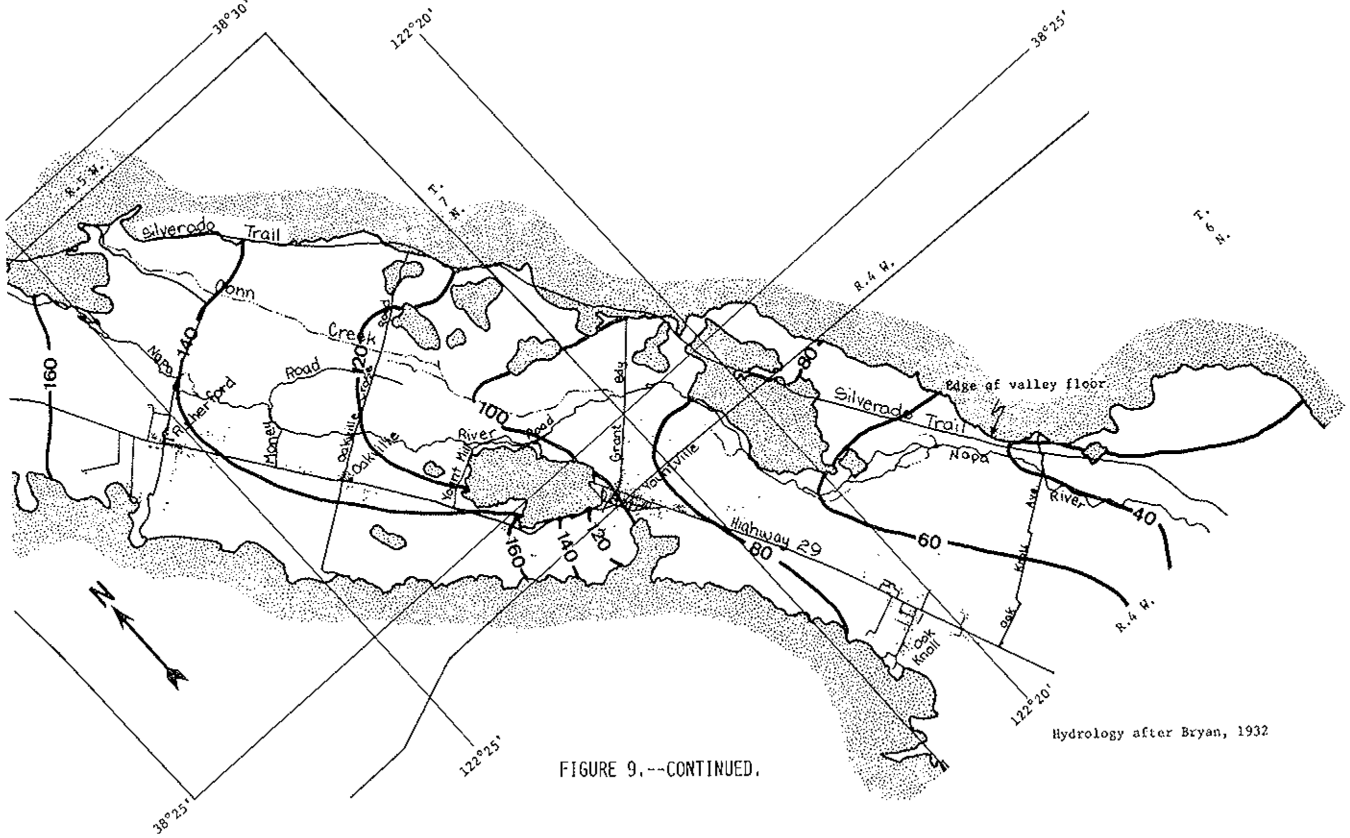



FIGURE 9.--CONTINUED.

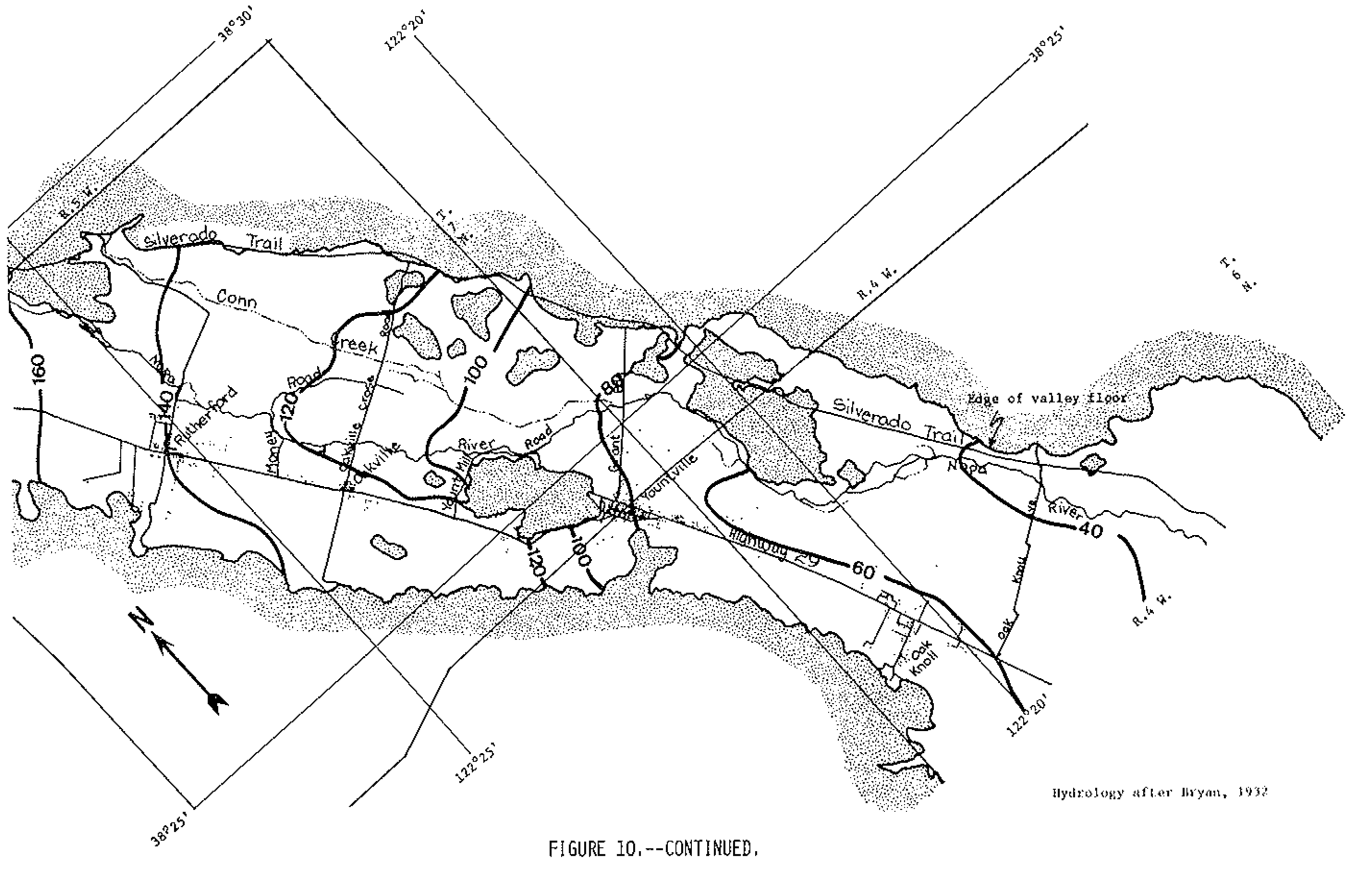



FIGURE 10.--CONTINUED.

## MATHEMATICAL SIMULATION OF THE ALLUVIAL AQUIFER

### Discussion of the Mathematical Model

The linear mathematical model used in this study is an expression of two-dimensional flow through porous media in the form of a computer program designed to simulate the response of an unconfined aquifer to constant rates of recharge or discharge. A detailed discussion of model theory and the analytical approach to model development is given in Pinder and Bredehoeft (1968).

A mathematical model, such as the one mentioned above, is an idealized representation of a ground-water system and is designed to describe, in concise quantitative terms, the response of the aquifer system to various conditions of stress. Such a quantitative response is necessary for even a general understanding of the complex hydrologic relations that occur in an aquifer system and it facilitates a description of the combined influences that climate, geology, hydrology, and man have on a ground-water basin.

Hydrologic relations are seldom simple and, generally, cannot be exactly described. Model simulation, therefore, requires assumptions and approximations that simplify conditions in the so-called "real world." Models are only as accurate as the assumptions used in their construction, and these assumptions should be kept in mind when model results are evaluated. The simplifying assumptions used in the model designed for this study are:

1. The alluvial aquifer is the only significant source of ground water;

2. Ground water occurs under water-table (unconfined) conditions;

3. The hydraulic head in the aquifer and the thickness, hydraulic conductivity, and specific yield of deposits are areally distributed and sufficiently uniform that each of these parameters can be represented by an average value per unit area;

4. Values for specific yield do not change with time;

5. Within the alluvial aquifer, vertical flow components are negligible compared with horizontal flow components; and

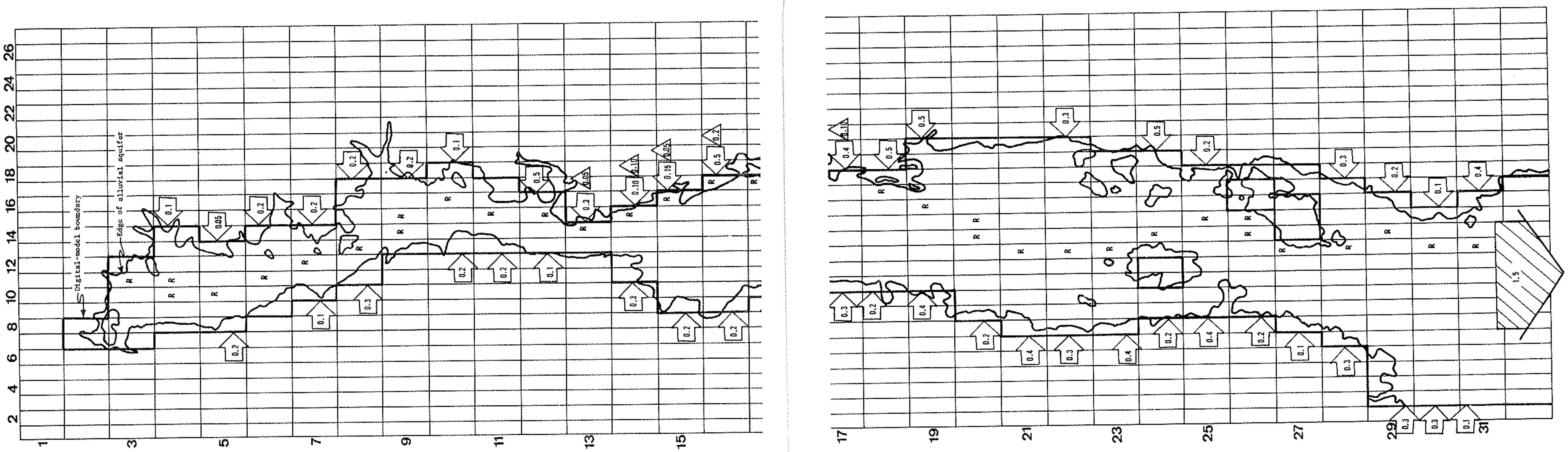
6. Recharge and discharge occur at constant rates over specified periods of time.

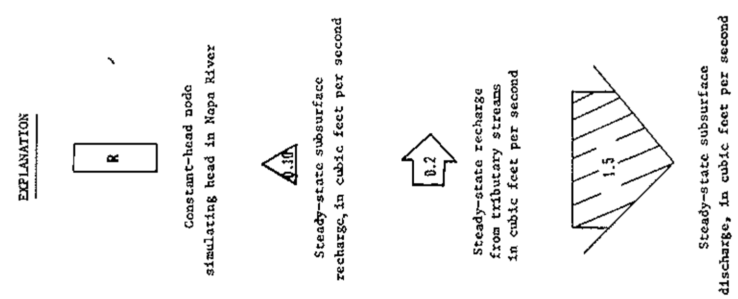
Before the model can be used to predict future ground-water levels, the model parameters used to describe the alluvial aquifer must be verified and checked against known geologic and hydrologic data. When the model-generated water levels for a particular set of conditions approximate the historic water levels within some predetermined limit of accuracy, the model is considered verified and ready for use in predicting future ground-water levels under various patterns and rates of pumping.

For this study, a uniform rectangular grid network of 35 rows and 27 columns was superposed on a plan view of the alluvial aquifer. Each unit area, or node, represents 6,750,000 square feet or nearly 155 acres. Model-control points were designated at the center of each node. A model boundary was then placed on the grid by tracing along the individual rectangular areas, or nodes, where they approximated the alluvial contact described in figure 3. The grid network, model boundary, alluvial contact, and other elements used in the model analysis are shown in figure 11. All hydrologic parameters communicated to, or computed by, the model were referred to the various nodes in units of feet and seconds. An individual node is designated by the number of the row and column. For example, the tenth node of the fifth row is designated (5-10).

At each node the following information was recorded:

1. The size of the grid interval, 1,500 x 4,500 feet;
2. Initial hydraulic-head values in the alluvial aquifer, in feet;
3. Elevation of the base of the alluvial aquifer, in feet;
4. Hydraulic-conductivity values for the alluvial aquifer, in feet per second;
5. Specific-yield values for the alluvial aquifer;
6. Recharge or discharge rates, in cubic feet per second, at each node designated as a recharge or discharge point. Negative values indicate a recharge point.



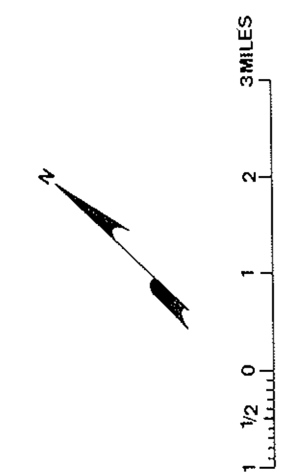




FIGURE 11.--MAP SHOWING DIGITAL-MODEL GRID NETWORK, CONSTANT-HEAD NODES, AND LOCATION AND QUANTITIES OF STEADY-STATE RECHARGE AND DISCHARGE FOR THE ALLUVIAL AQUIFER.

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## Simulation of Steady-State and Transient-State Conditions in the Alluvial Aquifer

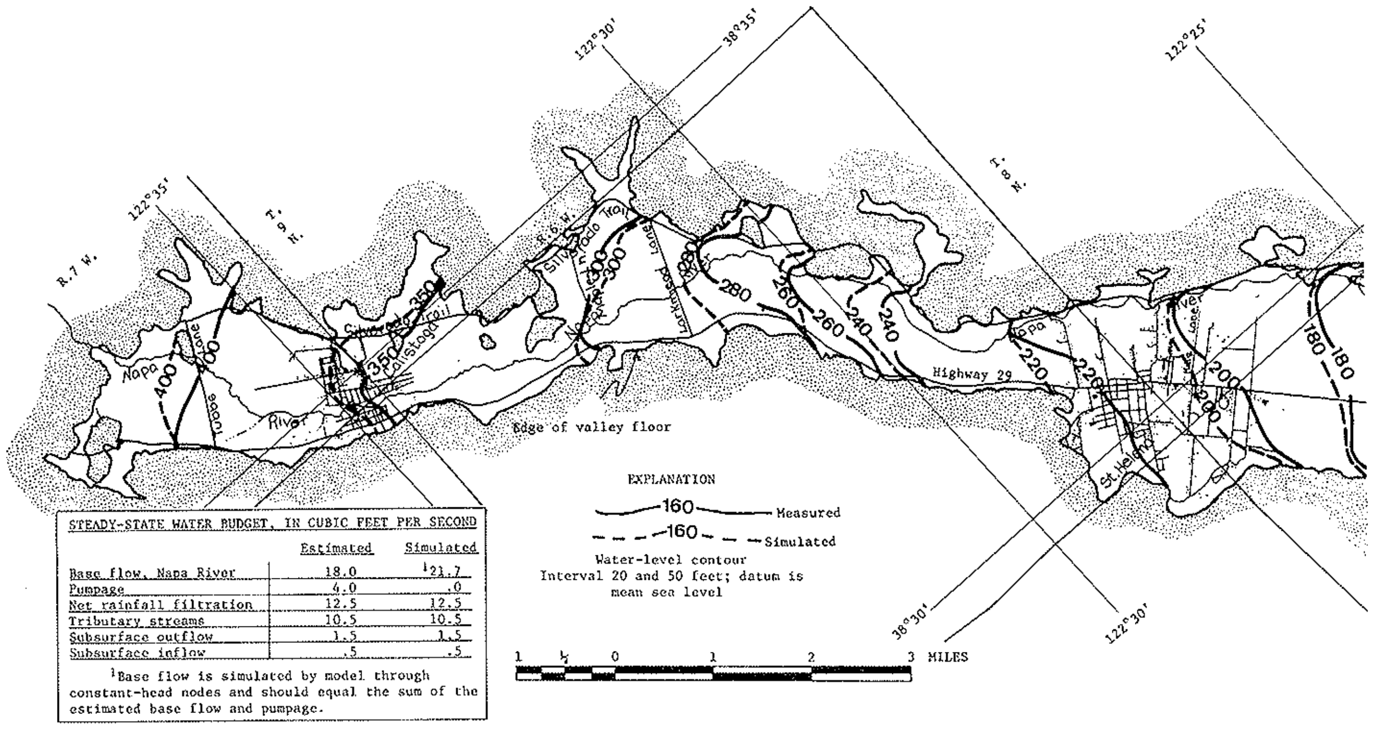
For this study, steady-state and transient-state conditions in the alluvial aquifer were simulated using the Pinder-Bredehoeft digital model and the assumptions discussed earlier. Net recharge to the model aquifer was simulated by postulating recharge wells at appropriate nodes; a constant rate of vertical recharge was postulated at every node in order to simulate infiltration of rainfall to the water table. Data for pumping rates at individual wells were unavailable. Consequently, total net discharge from the aquifer under both steady-state and transient-state conditions was assumed to have occurred as flow to the Napa River and subsurface flow out of the area. The Napa River was simulated by using constant heads at appropriate nodes that act as points of discharge from or recharge to, the aquifer, depending on the water-table elevations at adjacent nodes. Net quantities of water entering or leaving constant-head nodes were calculated by the model and were not specified by the model operator.

The model was calibrated by matching computed water-level contours and aquifer-discharge data with measured water levels and estimated aquifer-discharge data. Proper calibration of the model aquifer required adequate simulation of both steady-state and transient-state conditions; utilizing, in each case, the same nodal distribution of constant-head nodes, hydraulic conductivity, aquifer thickness, and specific yield.

Steady-state conditions were simulated using the steady-state water-level contours (fig. 8) and the recharge and discharge data given in table 3. Figure 11 shows the nodal distribution and quantities of steady-state peripheral recharge from tributary streams, subsurface discharge, and the distribution of the constant-head nodes simulating the Napa River. Approximately 3 inches of water per unit area was recharged to the model at an average rate in order to simulate net infiltration of rainfall to the water table. Quantities of peripheral recharge from tributary streams were distributed at appropriate nodes (fig. 11) according to the size, number, and location of tributary streams entering the valley. Subsurface recharge from redeposited materials in the Sonoma Volcanics totals 0.5 cfs and was distributed at nodes 13-14, 14-15, 15-16, 16-17, and 17-17 (fig. 13). Subsurface discharge across the southern boundary of the project area was estimated at 1.5 cfs and was distributed at nodes 31-7, 31-8, 31-9, 31-10, 31-11, 31-12, and 31-13. Other steady-state discharge was simulated as aquifer discharge to the Napa River and was calculated by the model as flow to constant-head nodes. The model aquifer was operated under simulated steady-state conditions for a period of time corresponding to a real time difference of 35 years. At the end of that time, water-table elevations were calculated by the model at each appropriate node and compared to historical data. Figure 12 shows the simulated steady-state water-level contours, contours constructed from historical water-level data, and estimated and simulated water budgets for the steady-state condition.

Transient-state conditions brought about by large variations in rainfall and runoff were simulated using the initial water-level contours shown in figure 9 and the transient-state recharge and discharge data given in table 3. Approximately 0.75 inch of water per year per unit area was recharged to the model in order to simulate net infiltration of rainfall to the water table. No peripheral recharge from tributary streams was provided for; however, subsurface recharge from redeposited materials in the Sonoma Volcanics totals 0.5 cfs and was distributed at nodes 13-14, 14-15, 15-16, 16-17, and 17-17. Subsurface discharge across the southern boundary of the project area was maintained at 1.5 cfs and distributed at nodes 31-7, 31-8, 31-9, 31-10, 31-11, 31-12, and 31-13. Other transient-state discharge was simulated as aquifer discharge to the Napa River and was calculated by the model as flow to constant-head nodes. The model aquifer was operated under simulated transient-state conditions for a simulation period corresponding to the 14-month dry period from April 1930 to June 1931. At the end of this period, water-table elevations were calculated by the model at each appropriate node and compared to historical data. Figure 13 shows simulated water-level contours and contours constructed from historical data for June 1931 and compares the estimated and simulated transient-state water budgets. The differences between the calculated and simulated values of aquifer discharge and gross storage change in the alluvial aquifer for the transient period were considered to be within acceptable limits of error.

The aquifer response under both transient and steady-state conditions was simulated by the model using the same nodal distributions of hydraulic conductivity, aquifer thickness, and specific yield. Successive simulations of transient conditions for time periods of 31, 78, 148, 254, and 412 days, indicated a progressive water-table decline throughout most of the model aquifer. This water-table decline was accompanied by a progressive decrease in model-aquifer discharge to constant-head nodes at the Napa River. Similar declines in the water table and in aquifer discharge to the Napa River were described as representative of the alluvial aquifer's response to transient conditions (p. 21). At the end of the transient period, flow directions at approximately one-third of the constant-head nodes had reversed; indicating, in effect, that dry reaches had occurred along the Napa River. Such transient response from the model aquifer and the properly simulated water-level contours and water budgets (figs. 12 and 13) indicated that the model aquifer was properly calibrated and is sufficiently accurate to be used as a tool to predict future ground-water levels. The above statement should be qualified with respect to response of the constant-head nodes when simulating short-term, transient conditions of less than a year. Reliable short-term simulations require a much more sensitive response to model-aquifer conditions at the constant-head nodes than can now be achieved. It was not within the scope of this project to provide a model of such sensitivity, nor would it have been possible to do so within the limitations of time and money alloted. However, future efforts to provide refinements of the model should include attempts to simulate more accurately the alluvial aquifer's response to rapidly changing flow conditions in the Napa River.




STEADY-STATE WATER BUDGET, IN CUBIC FEET PER SECOND

| | Estimated | Simulated |
|---|---|---|
| Base flow, Napa River | 18.0 | [1]21.7 |
| Pumpage | 4.0 | .0 |
| Net rainfall filtration | 12.5 | 12.5 |
| Tributary streams | 10.5 | 10.5 |
| Subsurface outflow | 1.5 | 1.5 |
| Subsurface inflow | .5 | .5 |

[1]Base flow is simulated by model through constant-head nodes and should equal the sum of the estimated base flow and pumpage.

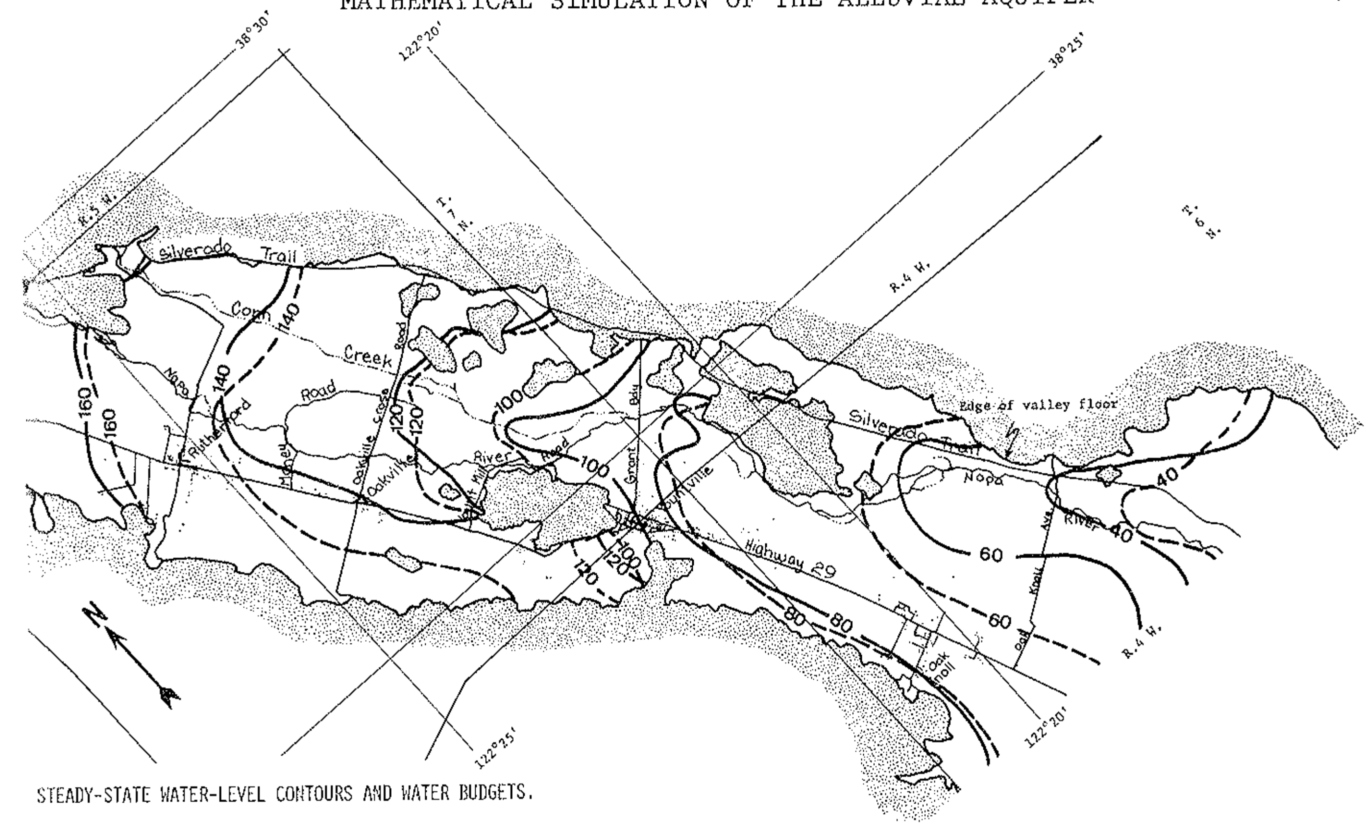
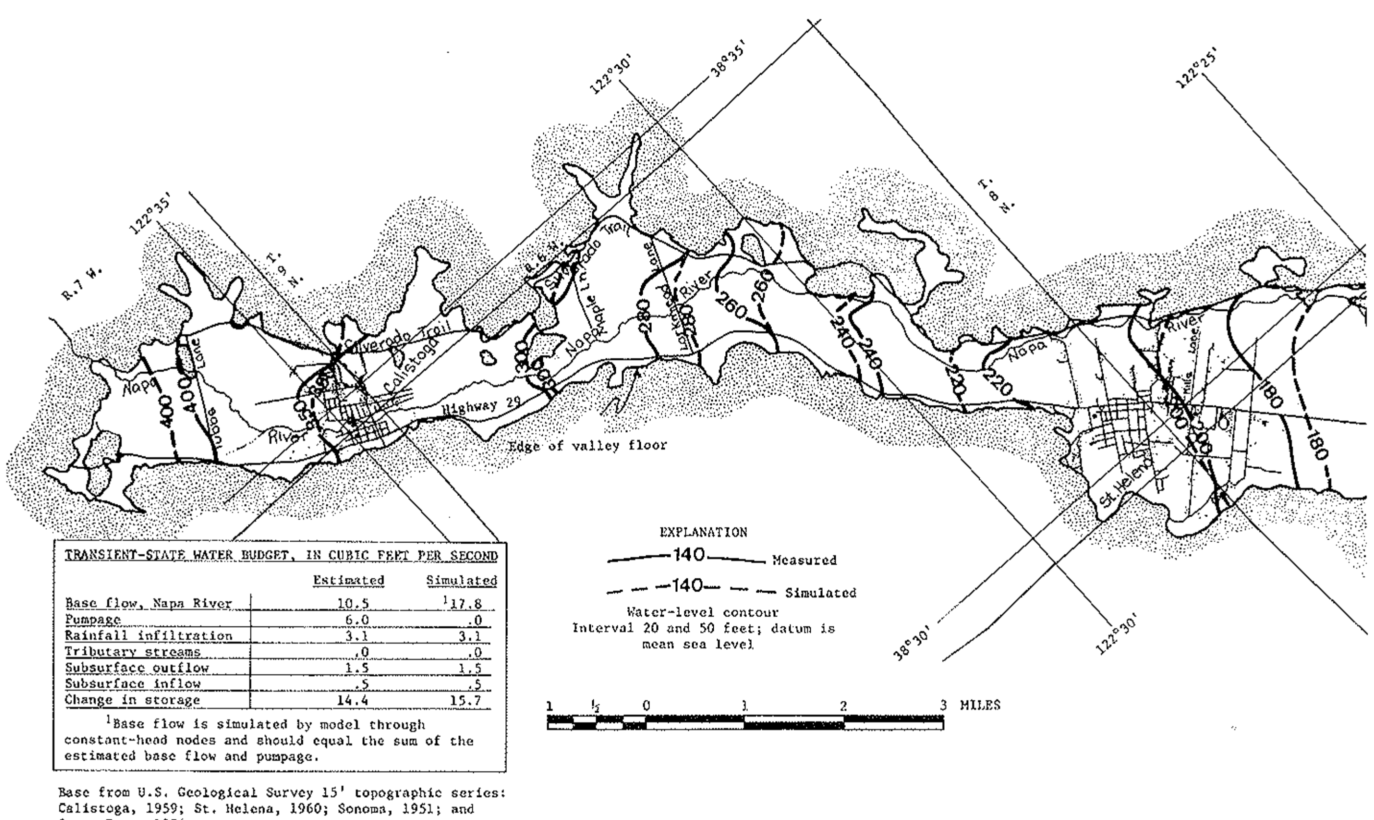



FIGURE 12.--COMPARISON OF MEASURED AND SIMULATED STEADY-STATE WATER-LEVEL CONTOURS AND WATER BUDGETS.




TRANSIENT-STATE WATER BUDGET, IN CUBIC FEET PER SECOND

| | Estimated | Simulated |
|---|---|---|
| Base flow, Napa River | 10.5 | [1]17.8 |
| Pumpage | 6.0 | .0 |
| Rainfall infiltration | 3.1 | 3.1 |
| Tributary streams | .0 | .0 |
| Subsurface outflow | 1.5 | 1.5 |
| Subsurface inflow | .5 | .5 |
| Change in storage | 14.4 | 15.7 |

[1]Base flow is simulated by model through constant-head nodes and should equal the sum of the estimated base flow and pumpage.

Base from U.S. Geological Survey 15' topographic series: Calistoga, 1959; St. Helena, 1960; Sonoma, 1951; and Santa Rosa, 1954

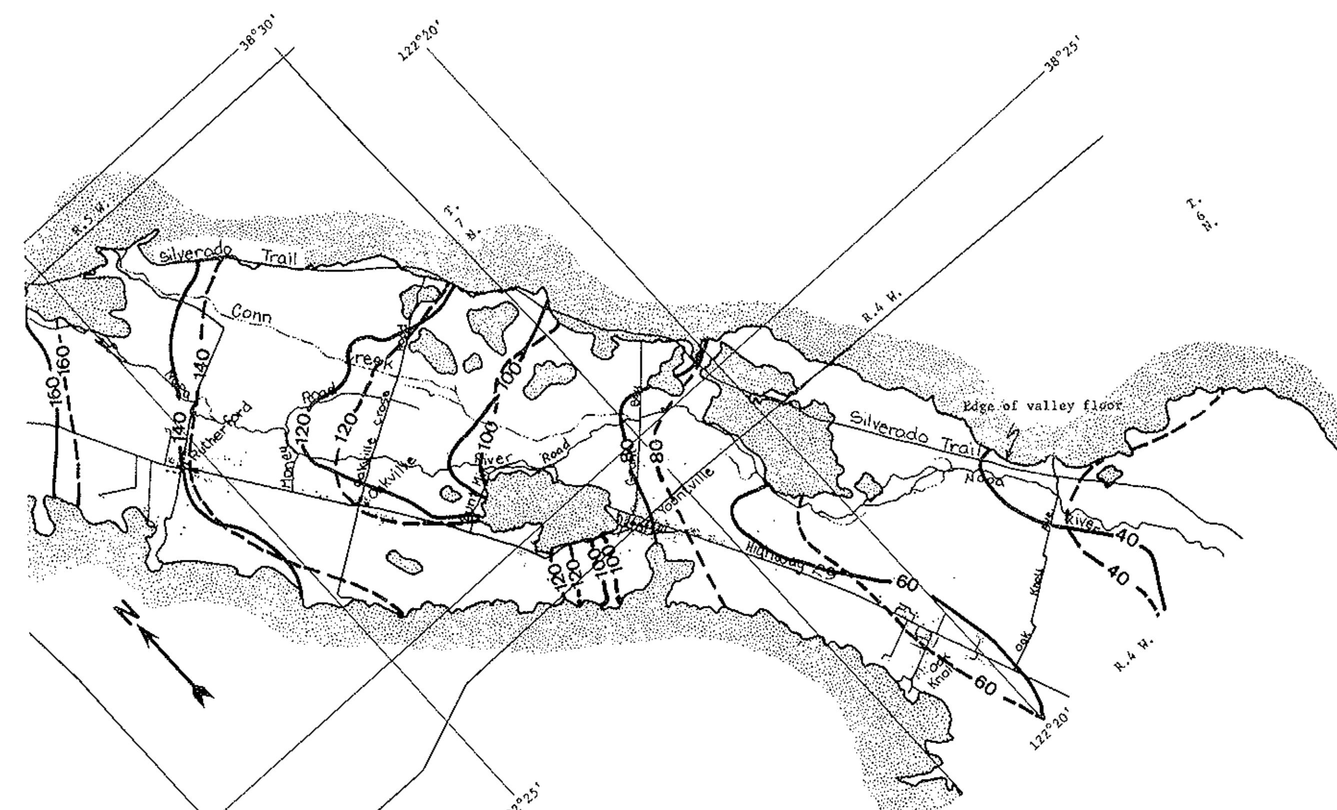



FIGURE 13.--COMPARISON OF SIMULATED AND MEASURED WATER-LEVEL CONTOURS FOR JUNE 1931 AND APPLIED AND SIMULATED TRANSIENT-STATE WATER BUDGETS.

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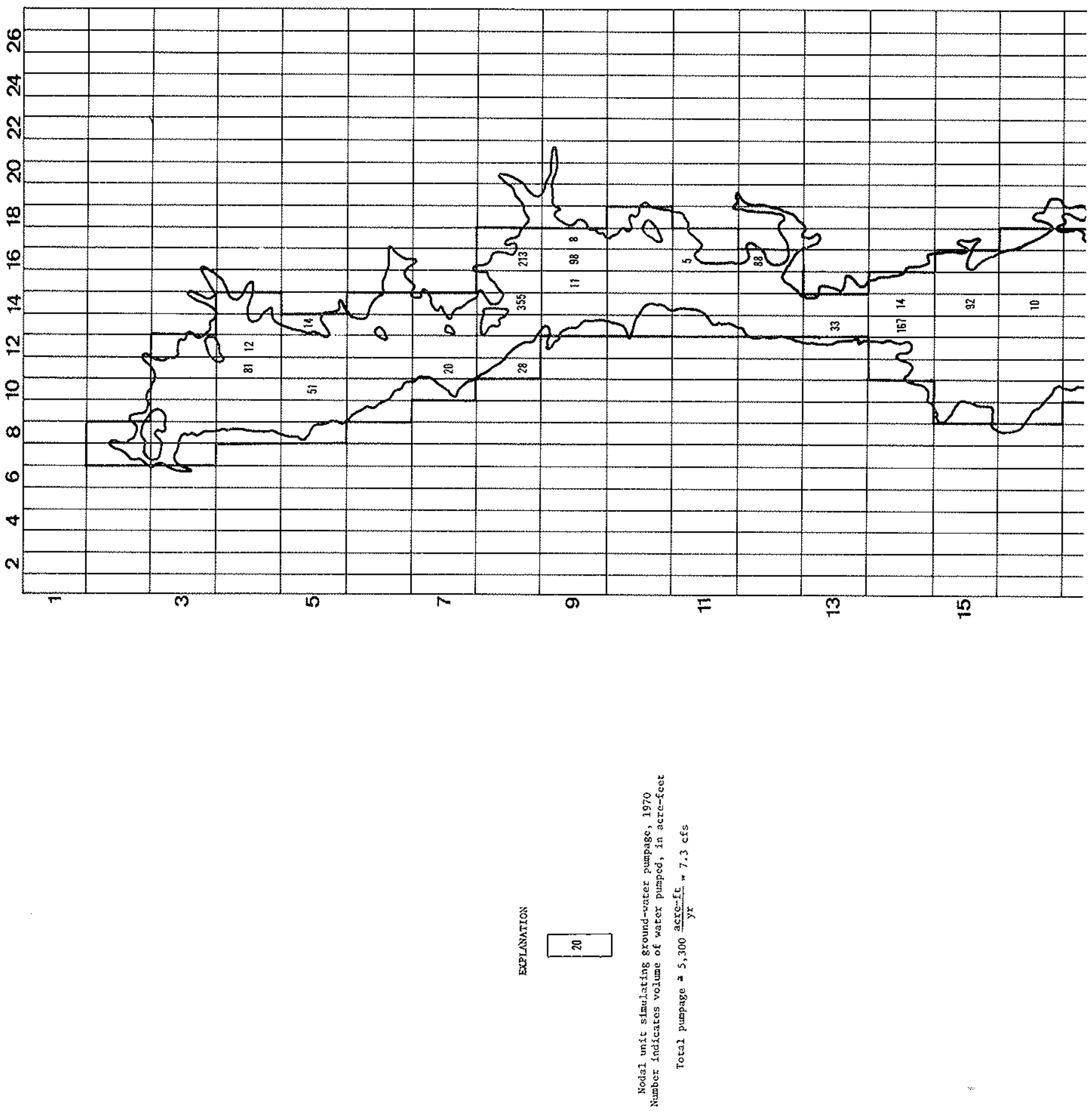


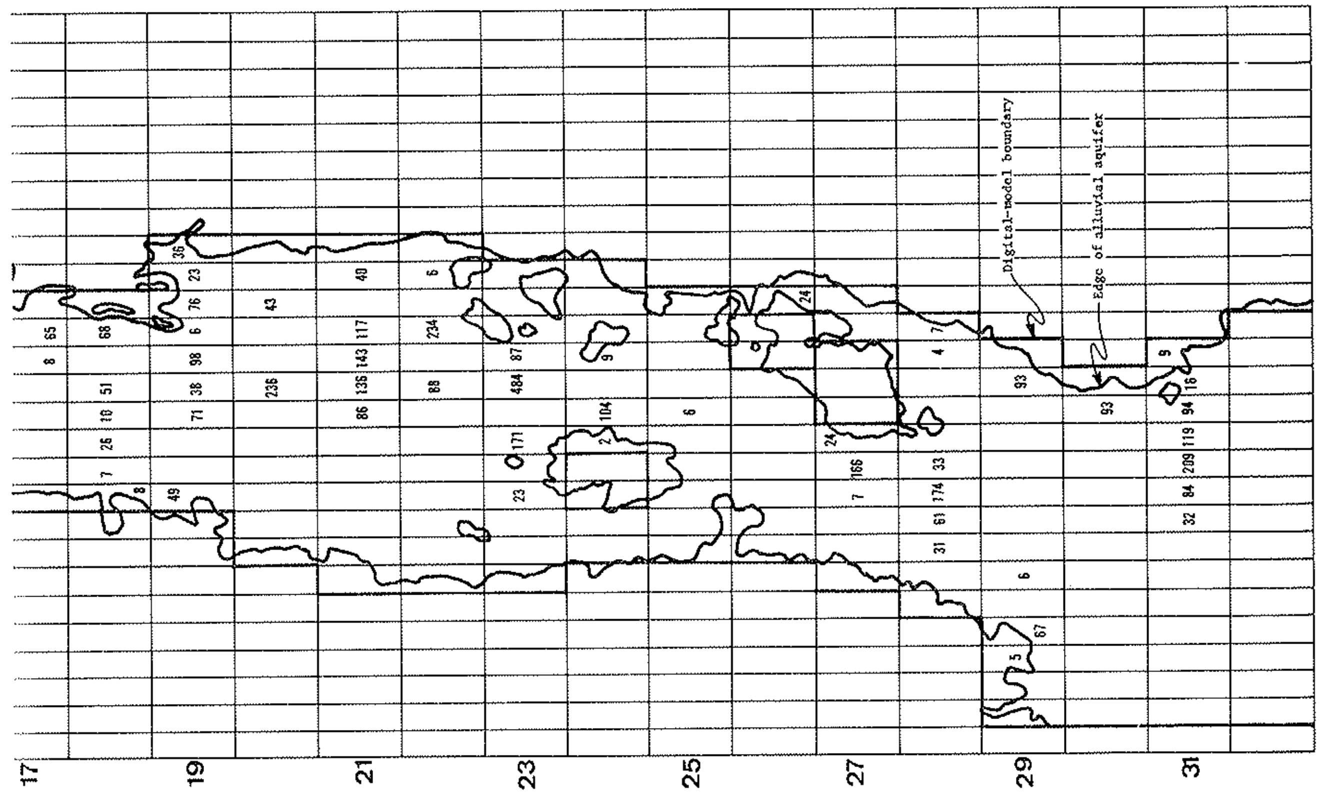


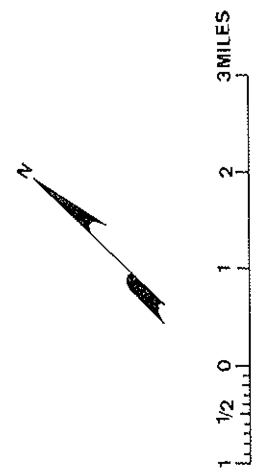


FIGURE 14.--NET GROUND-WATER PUMPAGE FROM ALLUVIAL AQUIFER IN NORTHERN NAPA VALLEY, 1970.

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## SIMULATION OF CRITICAL DROUGHT CONDITIONS IN THE PROJECT AREA

The Napa County Flood Control and Water Conservation District (1970) estimated that by the year 2020 the annual use of ground water in the project area could range from 12,000 to 35,000 acre-feet. The ability of the alluvial aquifer to provide such large withdrawals, without imposing serious limitations on well users, depends for the most part on the amount of net recharge available every year. During water years when precipitation is equal to or above the threshold value, net recharge to the aquifer is expected to be sufficient to replace the storage depleted during the previous season(s). On the other hand, if several consecutive years occur, during which precipitation is significantly less than the threshold value; the net aquifer recharge will be small or entirely lacking and drought conditions may result. The effect of such drought conditions, measured in terms of their impact on ground-water users, will depend on the distribution of pumping centers in the project area; the rate and timing of pumping from large capacity wells; and the length and severity of the drought. The most critical situation will develop when large quantities of water are pumped from the alluvial aquifer during a year or series of years, when net aquifer recharge is practically zero. For this study, a period of critical drought is said to occur when large-scale ground-water pumpage takes place after a water year or series of water years when recharge to the alluvial aquifer is negligible. Table 1 indicates that the probability of occurrence of critical drought conditions is about 3 percent annually and only 0.09 percent for the occurrence of two such years in sequence.

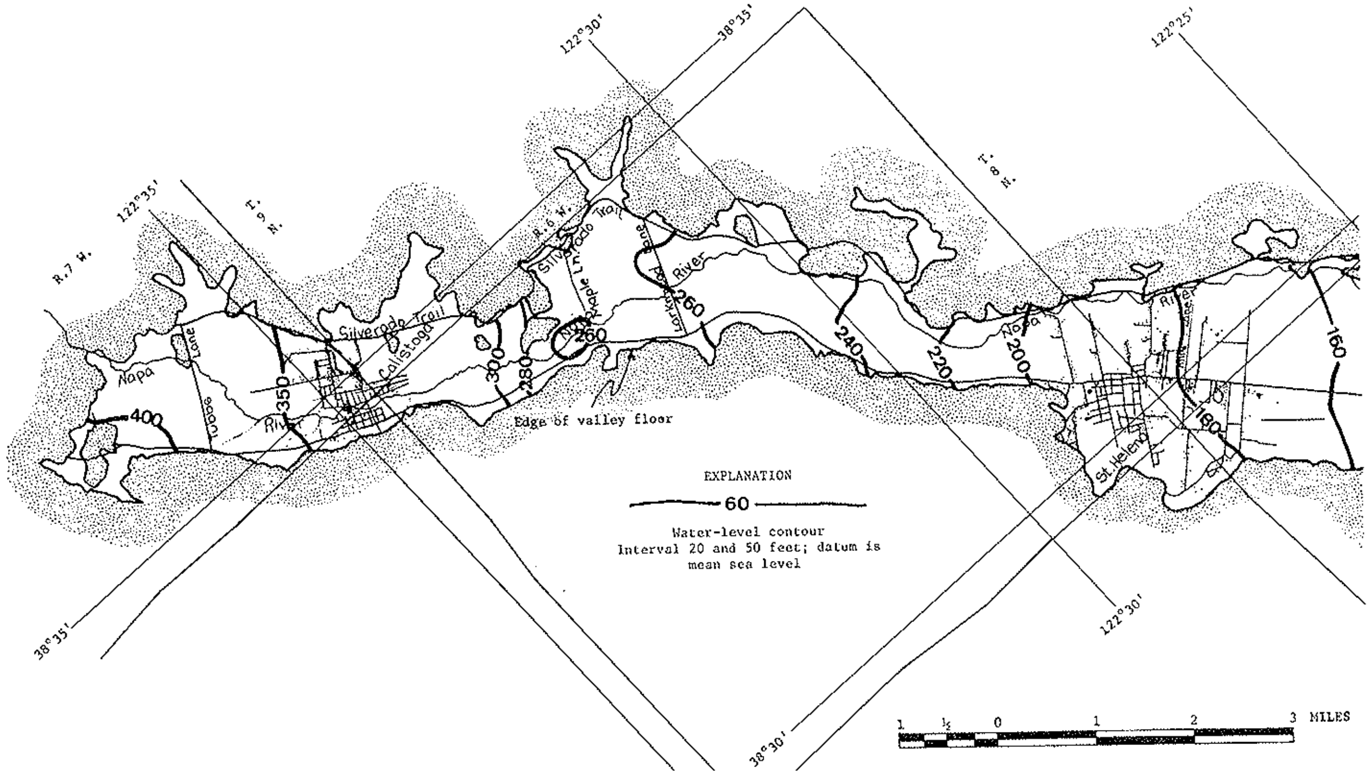
The response of the alluvial aquifer to critical drought conditions for periods of 1 and 2 years was simulated by the aquifer model. Initial conditions were taken to be the same as those simulated for June 1931; that is, no flow in the Napa River and no simulated net recharge occurring from tributary streams or from precipitation. Subsurface recharge and discharge were simulated using the same values as used for the steady-state and transient-state conditions described above. Withdrawal rates from the alluvial aquifer were estimated using data from Faye (1972), the 1970 distribution of irrigation wells, assumed total lifts and pumping times, and the design capacity of pumps in the project area during the 1970 water year. Figure 14 shows the calculated net pumpage from the alluvial aquifer during the 1970 water year. This pumpage represents total calculated pumpage (5,900 acre-feet) less an estimated 10 percent irrigation return flow. In order to simulate future ground-water conditions the 1970 nodal distribution of pumping was maintained, but pumping rates were doubled and quadrupled. Critical drought conditions were then simulated for 2 years using twice the 1970 rate of pumping and for 1 and for 2 years using 4 times the 1970 rate of pumping. The results of these simulations are shown in figures 15, 16, and 17. These figures show the probable distribution of water-level contours in the alluvial aquifer after a simulation of what probably are the most adverse conditions to which the aquifer will ever have to respond.

Simulation of twice the 1970 pumpage for 2 years (fig. 15) and quadruple the 1970 pumpage for 1 year (fig. 16) indicated little depletion of the aquifer. A significant pumping depression did develop just north of Maple Lane in the center of the valley. South of St. Helena, many wells 30 feet or less in depth would be dry under these drought conditions and pumping lifts at deeper wells would be increased.

Figure 17 indicates that significant declines in the water table would occur after 2 years of critical drought conditions with quadruple the 1970 pumping rates. The pumping depression near Maple Lane would expand and another depression would probably develop directly east of it. In the center of the valley, between Rutherford and Oakville, much of the upper 50 to 70 feet of the alluvial aquifer would be dewatered and a cone of depression would extend northward toward the periphery of the valley. Also, dewatering of the upper part of the alluvial aquifer would occur between Yountville and Oak Knoll Avenue. In the vicnity of Oak Knoll Avenue, large simulated withdrawals made between Highway 29 and the Napa River would cause a cone of depression to extend westward toward the periphery of the valley. South of St. Helena, relatively shallow wells having depths of 60 feet or less would be dry under such conditions.

It should be emphasized that the critical drought conditions described above are statistically rare events, and even if pumpage should increase to the projected values, the amount of water stored in the alluvial aquifer would be sufficient for most of the projected needs. During most water years, some recharge to the aquifer will almost certainly take place accordingly to the recharge mechanisms described previously. If significant storage depletion occurs and if the water table drops below the bed of the Napa River, the river will become a major source of recharge to the alluvial aquifer and flow in the Napa River will be reduced accordingly.

It should also be emphasized that in years following critical dry periods, normal rainfall and runoff would cause substantial water-level recovery and steady-state water-level conditions would probably reoccur. Thus, no long-term aquifer depletion should develop in the alluvium under the water-use conditions expected during the 1970-2020 period. If optimum plans for using the alluvial aquifer could be developed so that costs were minimized, significant economic benefits could accrue to the water users in future years.



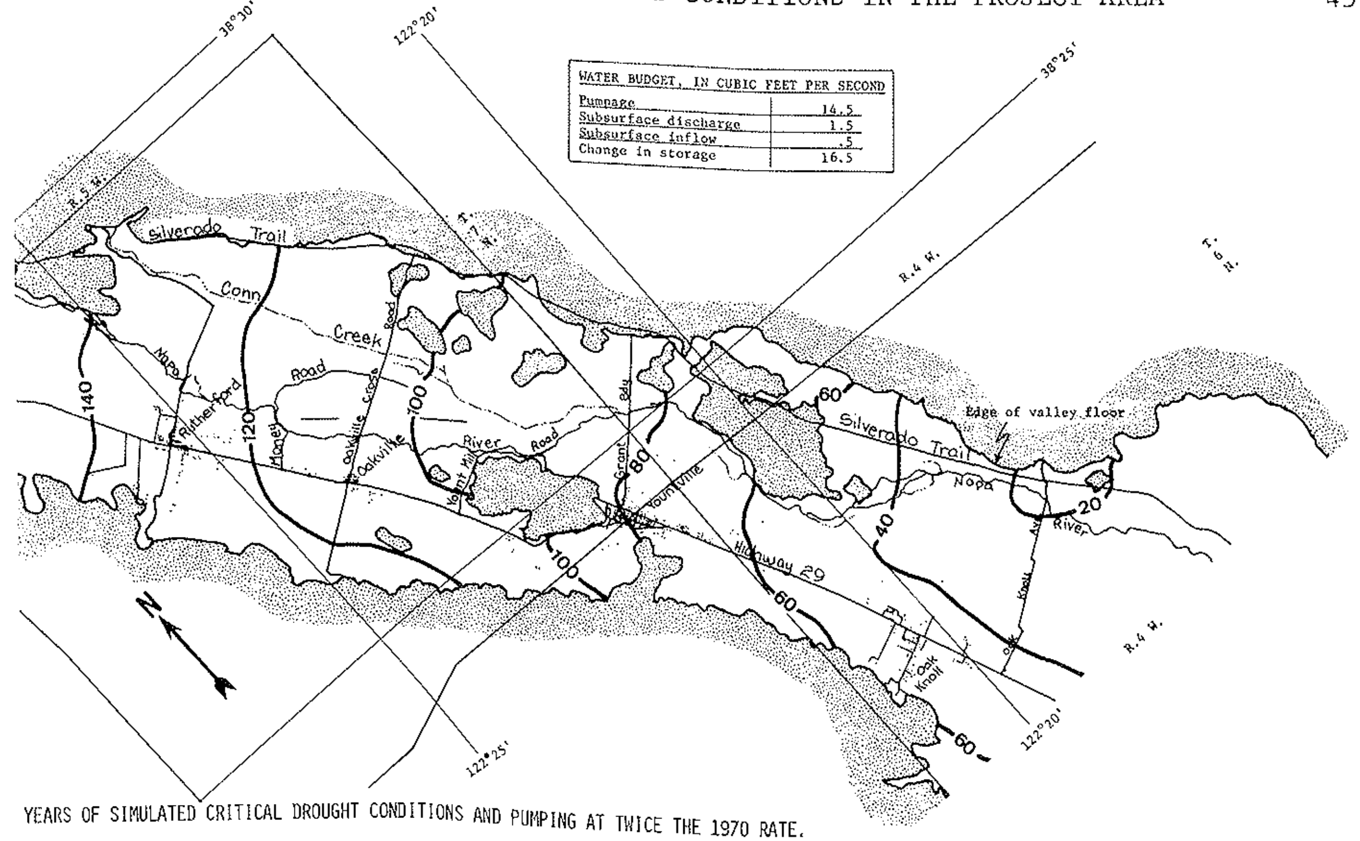
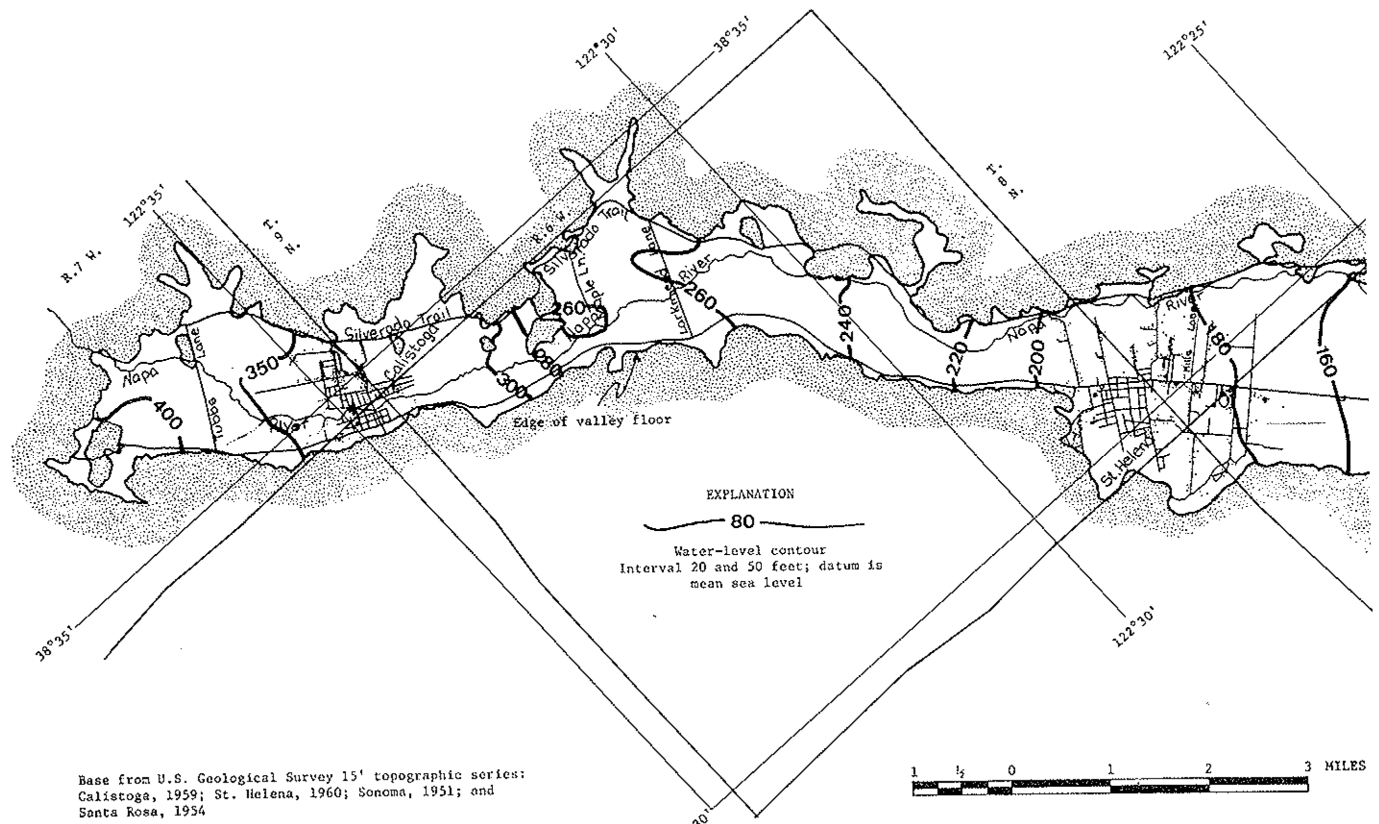




FIGURE 15.--WATER-LEVEL CONTOURS IN NORTHERN NAPA VALLEY AFTER TWO CONTINUOUS YEARS OF SIMULATED CRITICAL DROUGHT CONDITIONS AND PUMPING AT TWICE THE 1970 RATE.



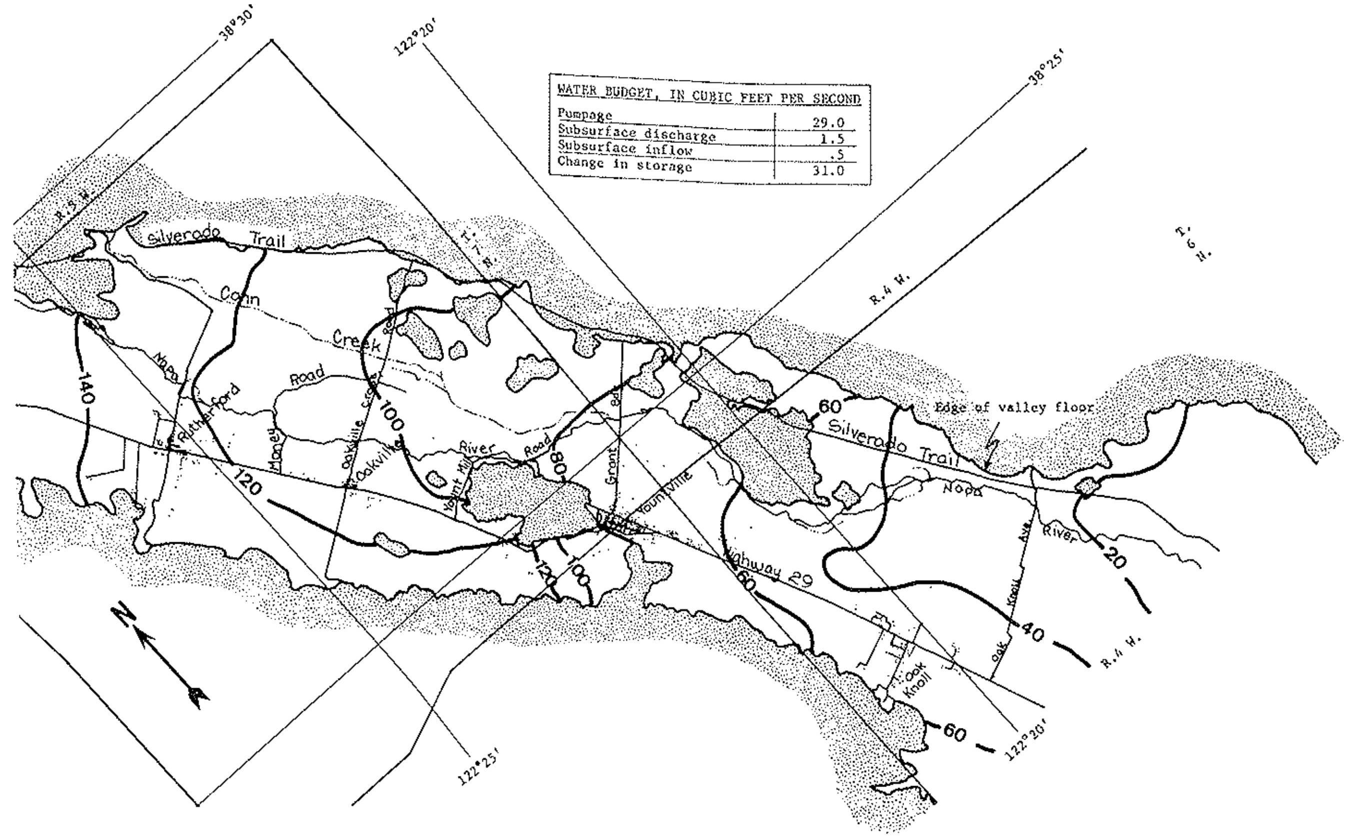




FIGURE 16.--WATER-LEVEL CONTOURS IN NORTHERN NAPA VALLEY AFTER 1 YEAR OF SIMULATED CRITICAL DROUGHT CONDITIONS AND PUMPING AT QUADRUPLE THE 1970 RATE.

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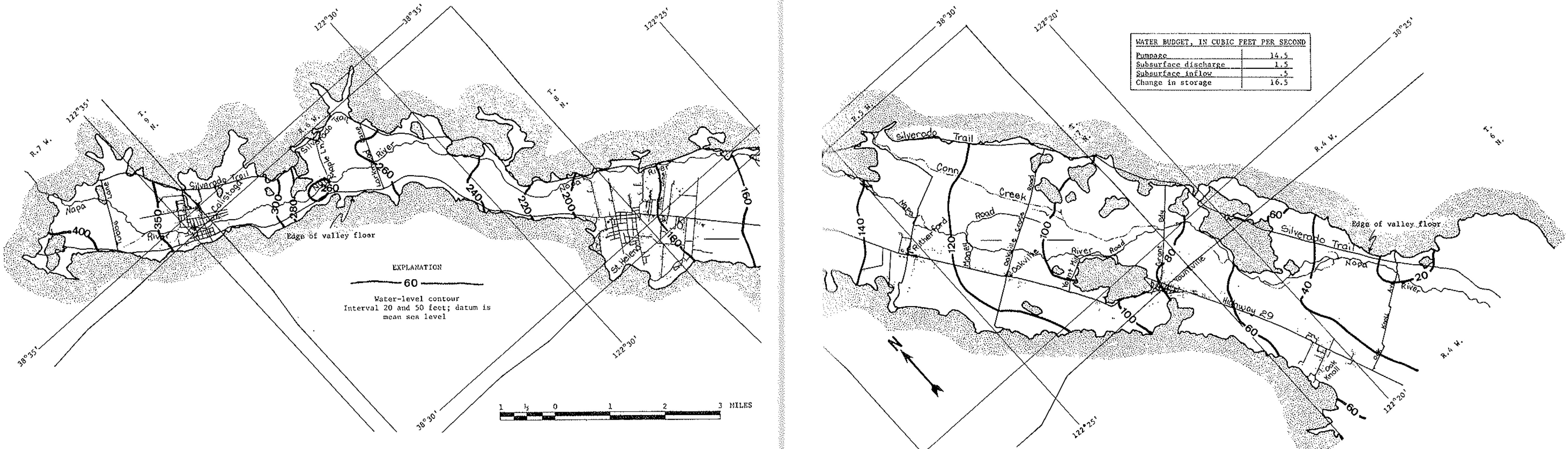


FIGURE 15.--WATER-LEVEL CONTOURS IN NORTHERN NAPA VALLEY AFTER TWO CONTINUOUS YEARS OF SIMULATED CRITICAL DROUGHT CONDITIONS AND PUMPING AT TWICE THE 1970 RATE.

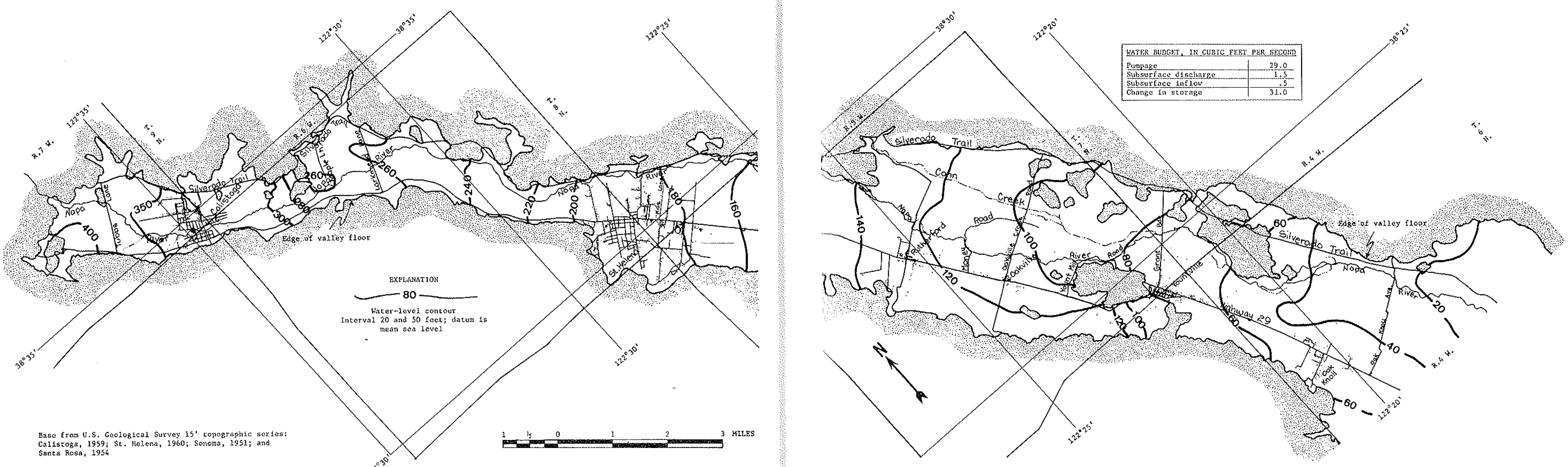


FIGURE 16.--WATER-LEVEL CONTOURS IN NORTHERN NAPA VALLEY AFTER 1 YEAR OF SIMULATED CRITICAL DROUGHT CONDITIONS AND PUMPING AT QUADRUPLE THE 1970 RATE.

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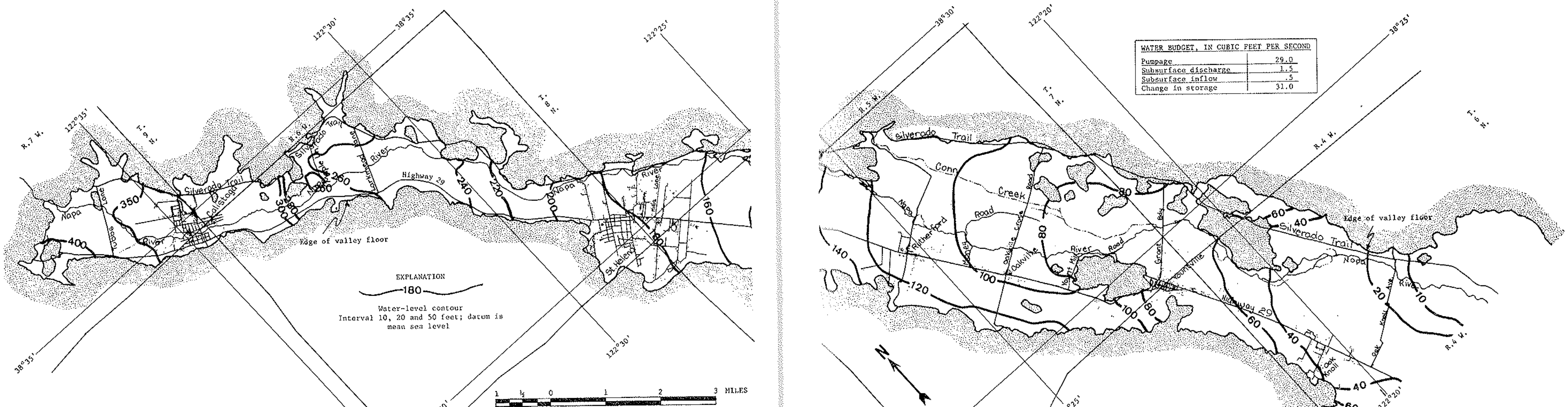


Base from U.S. Geological Survey 15' topographic series: Calistoga, 1959; St. Helena, 1960; Sonoma, 1951; and Santa Rosa, 1954

FIGURE 17.--WATER-LEVEL CONTOURS IN NORTHERN NAPA VALLEY AFTER TWO CONTINUOUS YEARS OF SIMULATED CRITICAL DROUGHT CONDITIONS AND PUMPING AT QUADRUPLE THE 1970 RATE.

## GROUND-WATER QUALITY

Water-quality criteria are based on the type and amount of dissolved solids (mineral and organic matter) in water and on the intended use of the water. Dissolved matter in water is mostly in the form of electrically charged particles called ions whose concentrations are measured in milligrams per liter (mg/l) or milliequivalents per liter (meq/l). Positively charged ions are called cations; negatively charged ions are called anions. Among the more important factors that influence the quality of water for irrigation are the dissolved-solids concentrations, the ratio of sodium to other positively charged ions, the concentration of bicarbonate ions, and the boron concentration. Domestic water users are generally concerned with the hardness of water and the concentrations of such potentially harmful or distasteful constituents as chloride, nitrate, sulfate, fluoride, iron, and sodium.

Because application of mineralized water to land having inadequate drainage may create an adverse nutritional or toxic response in crops (salinity hazard), the dissolved solids of a water should be known before it is used for irrigation. The electrical conductivity or specific conductance of water is commonly used as an indicator of total dissolved solids.

A high percentage of sodium in irrigation water may influence the soil texture by ion exchange and create a sodium hazard. In this process, sodium replaces calcium and magnesium in the soil complex. The sodium-bearing soil particles may cause the soil to deflocculate and become almost impermeable. A decrease in the relative permeability would also increase drainage problems and could result in the formation of a saline topsoil, creating a potential for salinity hazard.

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Large concentrations of carbonate or bicarbonate ions in irrigation water increase the potential for sodium hazard. When a soil-water solution becomes increasingly concentrated, water containing high concentrations of carbonate and bicarbonate ions tends to precipitate calcium and magnesium as carbonates. With the progressive removal of calcium and magnesium from the soil solution, the relative proportion of sodium is increased and the potential for sodium hazard is increased proportionately.

Boron is essential to the normal growth of all plants, but the quantity required is very small. Also, the amount of boron that can be tolerated by one plant may be toxic to more sensitive plants. Boron hazard from irrigation water is based on the concentration of boron in the water and the kinds of plants to which the water is applied. Water having a boron concentration of 0.5 mg/l or less is generally safe to use on all types of crops (Wilcox, 1955).

High concentrations of iron in irrigation water may cause the formation of objectionable scale and bacteria growths in wells and pipe lines and iron precipitates tend to coat soil particles and deflocculate the soil during cyclical applications of irrigation water.

The U.S. Department of Agriculture has developed several methods to evaluate the salinity, sodium, and bicarbonate hazard of irrigation water (Wilcox, 1955). Bicarbonate hazard is evaluated by calculating the residual sodium carbonate (RSC) which is defined as:

$$RSC = (CO_3^{=} + HCO_3^{-}) - (Ca^{++} + Mg^{++})$$

in which the ionic concentrations are expressed in milliequivalents per liter (meq/l). Generally water containing an RSC of 1.25 meq/l or less is safe for irrigation purposes. Salinity and sodium hazards are evaluated using specific conductance (that is, total dissolved solids) and the sodium adsorption ratio (SAR). SAR is based on the absolute and relative concentrations of positively charged major ions in water such that:

$$SAR = \frac{Na^{+}}{\sqrt{\frac{Ca^{++} + Mg^{++}}{2}}}$$

where the concentrations are expressed in milliequivalents per liter.

The drinking-water standards of the U.S. Public Health Service (1962) are generally used to evaluate the chemical quality of domestic-water supplies. Recommended upper limits for some of the more common constituents, in milligrams per liter, are listed below.

| Constituent | Recommended upper limit (mg/1) |
|---|---|
| Nitrate ($NO_3^-$) | 45 |
| Chloride ($Cl^-$) | 250 |
| Sulfate ($SO_4^{=}$) | 250 |
| Total dissolved solids | 500 |

The Environmental Protection Agency (1971) has recommended that the upper limit of concentration for sodium in drinking water supplies be placed at 270 mg/1.

Excessive hardness of a domestic water supply generally is caused by high concentrations of calcium and magnesium ions in solution. Hardness usually is reported as total hardness as $CaCO_3$ (calcium carbonate) wherein the concentrations of hardness-producing ions are converted to equivalent weights of $CaCO_3$. Water with a total hardness of more than 120 mg/1 as $CaCO_3$ is considered hard (Hem, 1970) and may have objectionable scale-forming and soap-consuming properties. Alkaline water containing calcium and carbonate ions in solution also tends to deposit $CaCO_3$ in pipes and tanks.

High concentrations of iron in domestic water supplies may stain glassware, porcelain, and laundered clothes and may impart an unpleasant inky or astringent taste to the drinking water.

## Chemical Classification of Ground Water in the Project Area

Four chemically distinct types of ground water occur in the project area. These water types have been identified by comparing relative concentrations of representative chemical constituents in a water and are listed below according to their frequency of occurrence in the project area.

Mixed cation bicarbonate water
Sodium chloride water
Magnesium bicarbonate water
Sodium bicarbonate water

The chemical analyses of ground water from 59 sampling sites in the project area are given in table 4. Figure 3 shows the location of sampling sites, summarizes the chemical characteristics of ground water in different parts of the project area, and indicates places where hydrothermal water has been found.

TABLE 4.--*Chemical analyses of ground water in the northern part of Napa Valley*

Well locations explained in text, page 5.

Geologic units: Qal, alluvium; Tsv, Sonoma Volcanics, undivided; Ku, sedimentary Cretaceous rocks, undivided; KJf, Franciscan Formation; Jsp, Ultrabasic rocks.

SAR; sodium-adsorption ratio, $Na^{+}/\sqrt{(Ca^{++}+Mg^{++})/2}$, where the ionic concentrations are expressed in meq/l; symbol <, less than value shown.

RSC; residual sodium carbonate, $(CO_3^{=}+HCO_3^{-}) - (Ca^{++}+Mg^{++})$, where the ionic concentrations are expressed in meq/l; symbol <, less than value shown.

Tr, trace

Values for dissolved solids indicate residue on evaporation at 180°C, except those preceded by the letter "a" which have been calculated (sum of determined constituents).

Values for nitrate preceded by the letter "b" were reported as the sum of nitrate and nitrite.

Other constituents expressed in mg/l, in remarks column as follows: Al, aluminum; Li, lithium; $PO_4$, phosphate, total; N, nitrogen, total; Mn, manganese; As, arsenic.

Water temperature; degrees Celsius (°C) to degrees Fahrenheit (°F), F = 9/5 (°C) + 32.

| Well number | Geologic unit | Depth of well (feet) | Date sampled | Water temperature (°C) | Concentration, in milligrams per liter (mg/l): Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Carbonate ($CO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | Hardness as $CaCO_3$ | SAR | RSC | Specific conductance (micromhos at 25°C) | pH | Other constituents and remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *MIXED CATION BICARBONATE WATER* | | | | | | | | | | | | | | | | | | | | | | | | |
| [c]6N/4W-2N1 | Tsv | | 1915 | 19.5 | 14 | 67 | 61 | 124 | 143 | Tr | | 608 | 8.8 | 49 | | | | | 663 | 2.5 | 7 | | | Spring; Al, 6.7; Li, Tr |
| 6N/4W-17A1 | Qal | 250 | 8/27/58 | 16.5 | 25 | 15 | 29 | 18 | 19 | 2 | 167 | | 35 | 5.9 | 0.1 | 6.2 | 0.0 | 222 | 146 | <1.0 | <1.0 | 363 | 7.9 | |
| 6N/4W-19J2 | Qal | | 8/1/63 | | 24 | | 18 | 12 | 11 | .7 | 58 | | 12 | 12 | .1 | 50 | .28 | 170 | 95 | <1.0 | <1.0 | 248 | 6.7 | |
| 6N/4W-20L3 | Qal | 50 | 8/1/63 | | 24 | | 22 | 14 | 13 | .5 | 92 | | 18 | 9.9 | .2 | 49 | .32 | 187 | 40 | <1.0 | <1.0 | 300 | 7.0 | $PO_4$, 0.03 |
| 7N/4W-30L1 | Qal | 171 | 4/19/61 | | 29 | .09 | 7.8 | 6.0 | 7.7 | 2.5 | 58 | | 2.0 | 9.1 | .1 | .2 | .0 | 92 | 44 | <1.0 | <1.0 | 136 | 7.8 | Iron precipitate |
| 7N/4W-19E1 | Qal, Tsv | 210 | 3/16/59 | | | | 15 | 15 | 16 | | 153 | .0 | .0 | 7.0 | | Tr | 2.5 | | 99 | <1.0 | <1.0 | 250 | 7.3 | Water has slight yellow color |
| 7N/5W-4A1 | Qal, Tsv | 244 | 8/5/71 | 20.0 | 100 | 3.8 | 16 | 6.6 | 18 | 4.0 | 95 | .0 | 6.8 | 13 | .0 | b.06 | .0 | 215 | 67 | <1.0 | <1.0 | 195 | 7.4 | |
| 7N/5W-5X | Qal | 90 | 3/1/54 | | | | 25 | 20 | 15 | | 180 | .0 | .2 | 10 | | | .1 | | | <1.0 | <1.0 | 310 | 7.4 | |
| 7N/5W-9J1 | Qal, Tsv | 459 | 7/20/71 | 21.0 | 53 | .0 | 25 | 18 | 36 | 3.8 | 252 | .0 | 17 | 8.0 | .1 | b.06 | .2 | 286 | 140 | 1.3 | 1.4 | 411 | 7.8 | |
| 7N/5W-13N1 | Tsv | 147 | 7/20/71 | 20.0 | 94 | .0 | 21 | 12 | 11 | 1.5 | 160 | .0 | 2.0 | 6.7 | .0 | b.9 | .0 | 228 | 100 | <1.0 | <1.0 | 250 | 7.2 | |
| 7N/5W-20B1 | KJf, Jsp | 181 | 10/9/70 | | | | 44 | 36 | 23 | | 340 | | | 10 | | .0 | .22 | | | <1.0 | <1.0 | 620 | 7.3 | |
| 7N/5W-23C1 | Qal, Tsv | 390 | 8/2/71 | | 52 | .0 | 21 | 25 | 33 | 2.3 | 276 | .0 | 13 | 9.8 | .0 | b.06 | .0 | 292 | 160 | 1.2 | 1.4 | 424 | 7.9 | |
| [c]7N/5W-26E1 | Qal | 66 | 3/16/51 | 29.5 | 131 | .0 | 27 | 15 | 37 | 8.2 | 212 | | 13 | 19 | .3 | .1 | .78 | 355 | 129 | 1.2 | <1.0 | 397 | 7.3 | Flows |
| [c]7N/5W-26E2 | Qal | 79 | 4/28/52 | | | | 30 | 15 | 40 | | 220 | | 10 | 30 | | | .6 | | 137 | 1.5 | <1.0 | 410 | 7.4 | Yellow residue |
| 7N/5W-26M2 | Qal, Tsv | 215 | 6/18/53 | | | | 25 | 20 | 25 | | 175 | .0 | 20 | 20 | | | .0 | | 144 | <1.0 | <1.0 | 340 | 7.6 | |
| 7N/5W-34H1 | Qal, Tsv | 200 | 8/3/71 | 16.0 | 87 | .2 | 23 | 16 | 16 | 2.3 | 175 | .0 | 13 | 4.4 | .1 | b.06 | .0 | 248 | 120 | <1.0 | <1.0 | 286 | 7.4 | |
| 7N/5W-36M1 | Tsv | 104 | 8/27/58 | 20.5 | 96 | .0 | 17 | 13 | 15 | 3.5 | 143 | .0 | 7.4 | 6.2 | .2 | .5 | .0 | [a]230 | 96 | <1.0 | <1.0 | 265 | 8.1 | |
| 8N/5W-26M1 | Tsv | 340 | 7/10/72 | | 93 | .0 | 7.2 | 8.1 | 10 | 4.4 | 79 | .0 | 3.8 | 8.9 | .1 | b6.7 | .0 | 181 | 51 | <1.0 | <1.0 | 157 | 7.4 | |
| 8N/6W-4Q2 | Qal, Tsv | 232 | 9/29/55 | | | | 10 | 5 | 10 | | | 65 | .0 | 10 | | | .0 | | 46 | <1.0 | <1.0 | 130 | 7.3 | |
| 8N/6W-15A2 | Qal | 125 | 3/19/51 | | 53 | .0 | 20 | 10 | 10 | 3.4 | 112 | .0 | 12 | 7 | .2 | 1.4 | .0 | [a]170 | 91 | <1.0 | <1.0 | 211 | 7.4 | |
| 8N/6W-23B2 | Qal | 168 | 12/6/55 | | | | 10 | 5 | 20 | | 110 | .0 | .0 | 10 | | | .11 | | 46 | <1.0 | <1.0 | 160 | 7.2 | |
| 8N/6W-25B3 | Qal, Tsv | 325 | 5/28/54 | | | | 15 | 15 | 15 | | 130 | .0 | .0 | 15 | | | .0 | | 100 | <1.0 | <1.0 | 200 | 7.2 | |
| 9N/6W-31Q1 | Qal | 51 | 8/27/58 | | 38 | .0 | 8.9 | 3.9 | 8.3 | .6 | 54 | .0 | 7.4 | 3.9 | .0 | .2 | .0 | [a]98 | 38 | <1.0 | <1.0 | 118 | 7.4 | |
| 9N/7W-26M2 | Qal, Tsv | 140 | 7/10/72 | | 36 | .0 | 14 | 14 | 7.5 | .2 | 95 | .0 | 19 | 6.6 | .0 | b14 | .0 | 158 | 93 | <1.0 | <1.0 | 222 | 7.7 | |
| [c]9N/7W-26P1 | Qal, Tsv | 470 | 3/27/52 | | 30 | | 15 | 18 | 37 | 2.3 | 166 | 6.0 | 7.7 | 28 | .1 | 2.8 | 1.5 | | 111 | 1.6 | <1.0 | 372 | 8.3 | |
| 9N/7W-27F1 | Qal, Tsv | 122 | 8/31/50 | | | | 15 | 5 | 15 | | 75 | | 15 | 10 | | | .0 | [a]98 | 58 | <1.0 | <1.0 | 100 | 7.2 | |
| [c]9N/7W-36F1 | Qal | 31 | 4/8/57 | | | | 20 | 10 | 30 | | 135 | .0 | .0 | 20 | | | .3 | | 92 | 1.3 | <1.0 | 290 | 6.8 | Yellow color |
| *SODIUM CHLORIDE WATER* | | | | | | | | | | | | | | | | | | | | | | | | |
| 7N/5W-22G1 | Qal | 56 | 9/15/50 | | | | 35 | 30 | 190 | | 285 | | .0 | 270 | | | 14.0 | 668 | 212 | 5.7 | <1.0 | 1,300 | 7.4 | Flows in winter months |
| 7N/5W-22G2 | Qal | 40 | 5/18/51 | | | | 40 | 40 | 190 | | 290 | | .0 | 300 | | | 14.5 | 730 | 255 | 5.0 | <1.0 | 1,300 | 7.5 | |
| 7N/6W-2D1 | KJf | | 5/11/65 | 32.0 | 46 | | 4.6 | .6 | 232 | 3.0 | 120 | 64 | 12 | 224 | 5.7 | 1.3 | 32 | 698 | 14 | 56 | 3.8 | 1,110 | 8.8 | Spring |
| 8N/6W-4F1 | Qal, Tsv | 207 | -- | 82.0 | 111 | | .8 | 36 | 176 | | | 90.4 | 2.2 | 270 | | | | [a]690 | 154 | | | | | "Geyser" well |
| 8N/6W-5Q2 | Qal, Tsv | 305 | 8/5/71 | 20.0 | 65 | .88 | 14 | 4.7 | 32 | 3.7 | 63 | .0 | 17 | 50 | .2 | b.06 | 1.6 | 220 | 54 | 1.9 | <1.0 | 295 | 7.1 | |
| 8N/6W-9D1 | Qal, Tsv | 165 | 2/19/51 | | | | 35 | 5 | 85 | | 110 | 10 | 55 | 95 | | | 3.2 | [a]340 | 106 | 3.6 | <1.0 | 690 | | |
| 9N/6W-31M3 | Qal, Tsv | | 4/17/70 | 98.0 | 134 | .0 | 4.0 | .0 | 180 | 10 | 122 | 3 | 18 | 211 | 11.4 | | 10 | | 10 | 23.6 | 1.8 | 995 | 8.7 | |
| 9N/7W-25N1 | Qal, Tsv | 149 | 8/27/58 | 29.5 | 66 | .17 | 12 | 5.6 | 166 | 9.8 | 201 | .0 | .0 | 173 | 6.2 | 1.2 | 12 | 551 | 53 | 10 | 2.2 | 901 | 7.7 | |
| 9N/7W-26G1 | Qal, Tsv | 305 | 12/3/52 | 31.5 | | | 25 | 5 | 170 | | 210 | | .0 | 220 | | | 11.6 | | 93 | 8.0 | 1.7 | 1,420 | 7.7 | Flows |
| 9N/7W-26K2 | Qal, Tsv | 60 | 4/25/51 | | | | 5 | 5 | 220 | | 170 | | .0 | 190 | | | 7.0 | | 36 | 19.2 | 2.3 | 900 | 8.0 | Yellow residue |
| 9N/7W-26K3 | Qal, Tsv | 150 | 6/30/55 | | | | .0 | .0 | 190 | | 145 | | .0 | 195 | | | 9.9 | | 0 | High | 2.4 | 900 | 7.6 | |
| 9N/7W-26K4 | Qal, Tsv | 75 | 6/30/55 | | | | .0 | .0 | 185 | | 140 | Tr | 5 | 195 | | | 10.0 | | 0 | High | 2.3 | 900 | 7.9 | Flows |
| 9N/7W-26R1 | Qal | 18 | 11/16/48 | | | | 35 | 5 | 105 | | 190 | | 10 | 115 | | | 4.6 | [a]370 | 108 | 4.5 | 1.0 | 800 | 7.3 | |
| 9N/7W-26R2 | Qal, Tsv | 207 | 1/10/48 | 43.5 | | | 15 | | 170 | | 165 | | | 190 | | | 10.6 | [a]470 | | | | 926 | | |
| 9N/7W-35R1 | Qal, Tsv | 312 | | | | | .6 | .4 | 100 | | 170 | | | 95 | | | 4.2 | | | 6.1 | 1.8 | 550 | 7.4 | |
| 9N/7W-36D2 | Qal, Tsv | 165 | 2/4/58 | | | | 10 | 5 | 160 | | 180 | .0 | | 165 | | Tr | | | 46 | 12.6 | 1.8 | 996 | 7.6 | Warm |
| *MAGNESIUM BICARBONATE WATER* | | | | | | | | | | | | | | | | | | | | | | | | |
| 6N/4W-6P1 | Qal | 120 | 7/10/69 | 16.5 | | | 18 | 26 | 15 | 1.0 | 137 | .0 | 40 | 12 | | 19 | .0 | 243 | 153 | <1.0 | <1.0 | 361 | 7.9 | |
| 6N/4W-7X | Qal | 100 | 12/15/55 | | | | 30 | 35 | 25 | | 260 | .0 | 40 | 20 | | | .3 | | 220 | <1.0 | <1.0 | 510 | 7.0 | |
| 7N/5W-5A1 | Qal | 38 | 9/29/59 | | 27 | | 18 | 46 | 17 | 3.9 | 235 | .0 | 51 | 16 | .2 | 4.6 | .5 | | 233 | <1.0 | 01.0 | 512 | 8.0 | |
| 7N/5W-10M1 | Qal, Tsv | 590 | 8/3/71 | 15.5 | 39 | .2 | | 29 | 14 | 1.7 | 224 | .0 | 18 | 7.1 | .1 | b16 | .2 | 259 | 180 | <1.0 | <1.0 | 395 | 7.5 | |
| 7N/5W-20J1 | Jsp | | 10/12/48 | | | | 70 | 90 | 35 | | 530 | | 140 | 15 | | | .4 | | | | | 1,010 | 7.1 | Spring |
| [c]7N/5W-22K1 | Qal | 15 | 3/9/55 | | | | 35 | 55 | 45 | | 245 | .0 | 20 | 100 | | | 2.9 | | 315 | 1.1 | <1.0 | 840 | 6.8 | |
| 7N/5W-23D2 | Qal | 139 | 2/1/51 | | 47 | .10 | 21 | 30 | 20 | 3.0 | 241 | .0 | 13 | 8.0 | .0 | 1.5 | .21 | [a]260 | 176 | <1.0 | <1.0 | 399 | 7.5 | Flows in spring of the year |
| 8N/6W-9F1 | Qal | 105 | 1951 | | | | 20 | 20 | 15 | | 135 | | 10 | 30 | | | | [a]160 | 113 | <1.0 | <1.0 | 310 | 6.7 | |
| *SODIUM BICARBONATE WATER* | | | | | | | | | | | | | | | | | | | | | | | | |
| 6N/4W-4D1 | Tsv, Ku | 515 | 7/20/71 | | 30 | .0 | 40 | 8.4 | 110 | .5 | 242 | .0 | 130 | 11 | .6 | b.06 | .0 | 450 | 130 | 4.1 | 1.4 | 637 | 7.8 | |
| 6N/4W-15Q1 | Qal, Tsv | 303 | 9/29/59 | 19.0 | 45 | | 10 | 5.6 | 35 | 4.0 | 133 | .0 | 2.1 | 8.4 | .3 | 9.1 | .2 | 185 | 48 | 13 | 1.2 | 254 | 8.1 | |
| 8N/5W-27N1 | Jsp | | 8/21/59 | | | | | | 644 | | | | | | | | 3.5 | | | 23 | | 3,040 | | |
| 8N/5W-32C1 | Tsv | 132 | 3/8/63 | | 100 | | 14 | 13 | 57 | 7.0 | 248 | .0 | .0 | 13 | .4 | 2.5 | .64 | 347 | 89 | 2.6 | 2.3 | 422 | 7.8 | N, 0.56 |
| 8N/6W-7F1 | Tsv | 245 | 8/5/71 | 25.0 | 91 | 5.1 | 7.0 | 2.2 | 23 | 4.6 | 84 | .0 | 13 | 3.8 | .0 | b.06 | .0 | 191 | 27 | 1.9 | <1.0 | 160 | 7.3 | |
| 8N/6W-13K1 | Tsv | | 5/11/65 | | | | 3.8 | 1.3 | 7.5 | 2.8 | 26 | | 4 | 5 | .1 | 2.4 | .0 | 97 | 15 | <1.0 | <1.0 | 80 | 6.1 | Spring; $PO_4$, 0.25; As, Tr; Li, 0.03; Mn, 0.45 |
| 8N/6W-15H1 | Qal, Tsv | | 3/19/51 | | 59 | .8 | 13 | 8.4 | 39 | 6.6 | 180 | | 4.1 | 5.8 | .1 | .0 | .1 | [a]230 | 67 | 2.1 | 1.6 | | 7.3 | |
| 8N/6W-35R3 | KJf | | 7/20/71 | | 13 | .6 | 44 | 13 | 150 | 3.4 | 450 | .0 | 130 | 6.7 | .1 | b.2 | .55 | 583 | 160 | 5.1 | 4.2 | 895 | 7.8 | |

c. Probably mixed with sodium chloride water.

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## Mixed Cation Bicarbonate Water

Mixed cation bicarbonate water is characterized by relatively high concentrations of calcium, magnesium, and bicarbonate ions, and commonly contains anomalous concentrations of sodium. This water is generally alkaline with pH values ranging from near 7.0 to as high as 8.3. The specific conductance is low, ranging from less than 100 micromhos to more than 400 micromhos at 25°C (77°F).

Mixed cation bicarbonate water occurs throughout the Napa Valley area and is generally associated with sediments and detrital material from granitic and volcanic sources. In the project area, the water is common to the alluvial aquifer and to several areas of the Sonoma Volcanics (fig. 3 and table 4).

This water is generally suitable for irrigation and domestic uses. SAR and RSC values (table 4) are characteristically low, and the water is generally classified as soft to moderately hard; total hardness as $CaCO_3$ is generally less than 150 mg/l. High concentrations of iron noted in several analyses may limit the use of the water as an irrigation and domestic water supply.

## Sodium Chloride Water

In the project area sodium chloride water generally is associated with geothermal activity and contains relatively high concentrations of sodium, chloride, bicarbonate, boron, silica, and sulfate ions. Anomalous concentrations of nitrate were noted in several samples. The sodium chloride water is generally alkaline with pH values ranging from near 7.0 to as much as 8.7. The specific conductance ranges from less than 300 micromhos to more than 1,400 micromhos at 25°C (77°F).

White (1957) and White, Muffler, and Truesdell (1971) describe a process whereby sodium chloride water originates from a hot-water dominated hydrothermal system of volcanic origin. A similar process may account for the occurrence of sodium chloride water in the northern part of Napa Valley. According to White (1957), deep-percolating meteoric water and possibly water of other origins become involved in a hydrothermal system of high terrestrial heat flow associated with a deep magmatic heat source. This water is heated to steam containing alkali halides in solution; is subsequently circulated within the hydrothermal, ground-water system; and, upon condensation at or near the surface of the earth, yields the characteristic sodium chloride water.

Sodium chloride water in the project area is generally hydrothermal and occurs most commonly in the Calistoga area (p. 15). Figure 3 shows that sodium chloride water also occurs along Maple Lane south of Calistoga, in Sulphur Canyon west of St. Helena, and in the vicinity of Oakville. Water of mixed type was found at Napa Soda Springs, in several wells south of Oakville, and in wells 9N/7W-26P1 and 9N/7W-36F in the Calistoga area (table 4).

The occurrence of sodium chloride water may be associated with faults. Barnes (1970) describes water containing high concentrations of sodium, chloride, bicarbonate, and boron ions that issues from springs along known or inferred fault zones in the western Coast Ranges of North America. In northern Napa Valley, a chemical analysis of water from Napa Soda Springs (6N/4W-2N1, fig. 3, and table 4) indicates the occurrence of sodium chloride water. The springs issue from orifices along the inferred strike of the Soda Creek fault. Sterns, Sterns, and Waring (1937) also implied an association between faults and the occurrence of hot springs in the Calistoga area. As more water-quality and geologic data for the Napa Valley area become available, the association between sodium chloride water and faults may become more apparent.

In the project area, sodium chloride water is marginally suited for irrigation purposes. Boron concentrations and SAR values are characteristically high, RSC values are commonly above 1.25 meq/l (table 4), and relatively high iron concentrations were noted in several analyses. Domestic use of sodium chloride water is practical in some instances even though concentrations of some constituents exceed the upper limits recommended by the U.S. Public Health Service (1962). Hardness generally is less than 150 mg/l as $CaCO_3$.

Water from well 9N/6W-31M3 (table 4) was given the most complete analysis of any sodium chloride water from the project area. Of particular interest is the temperature and the concentration of silica ($SiO_2$) in the water from this well and from well 8N/6W-4F1 (table 4).

Fournier and Rowe (1966), using curves that relate silica solubilities in water to temperature, have developed a method to estimate ground-water temperatures using the silica content of hot water discharging at land surface. This procedure suggests an underground temperature of at least 138°C (280°F) at well 9N/6W-31M3 and 130°C (266°F) at well 8N/6W-4F1.

A general dependence on depth to the occurrence of flowing wells and the possibility of general confinement in the Calistoga area has been previously mentioned (p. 15). Flowing wells in the Calistoga area are with few exceptions, hydrothermal and yield sodium chloride water. Noting the relation of silica solubility to water temperature (Fournier and Rowe, 1966) it is possible that hot sodium chloride water, rising from depth, mixes with downward-percolating cooler water causing the precipitation of silica and the subsequent cementation of material at the mixing interface. White, Muffler, and Truesdell (1971) indicate that such "self-sealing" phenomena are common in hot-water dominated hydrothermal systems with temperatures in excess of 150°C (302°F). Such activity, taking place over an area of several square miles, could produce a zone of relatively impermeable material that would confine sodium chloride water under a potentiometric head.

## Magnesium Bicarbonate Water

Magnesium bicarbonate water is characterized by relatively high concentrations of magnesium and bicarbonate ions and lesser concentrations of calcium ions. This water is generally alkaline with pH values ranging from near 7.0 to 8.2. The specific conductance generally is high, ranging from about 300 micromhos to more than 1,000 micromhos at 25°C (77°F).

Magnesium bicarbonate water is generally of good quality for both irrigation and domestic purposes. SAR and RSC values (table 4) are low. In several analyses, however, boron concentrations were above recommended limits for boron-sensitive plants. Hardness ranges from about 100 mg/l to more than 500 mg/l as $CaCO_3$.

Barnes and O'Neil (1969) associated magnesium bicarbonate water in the Coast Ranges with serpentine and ultrabasic intrusive rocks. Water from a spring (7N/5W-20J1, fig. 3, and table 4) near the Bella Oaks Mine may represent this association. Also, as noted earlier (p. 13), chemical analyses of ultrabasic rocks show high concentrations of magnesium. Thus, these rocks are identified as a possible source of magnesium in ground water in the Napa Valley area. The occurrence of magnesium bicarbonate water within the alluvial aquifer probably is indicative of the infiltration of streamflow that originated as runoff from ultrabasic rocks.

## Sodium Bicarbonate Water

Sodium bicarbonate water contains relatively high concentrations of sodium and bicarbonate ions. In Napa Valley several analyses also showed high concentrations of sulfate. This water is characteristically alkaline and pH values range from 7.3 to 8.1. The specific conductance ranges from less than 100 micromhos to more than 3,000 micromhos at 25°C (table 4).

In most places, sodium bicarbonate water is only marginally suited for domestic and irrigation purposes. SAR and RSC values are commonly greater than 2, boron concentrations are commonly too high for boron-sensitive plants, and relatively high iron concentrations may cause objectionable scales and stains on plumbing and other fixtures. Hardness is generally less than 100 mg/l as $CaCO_3$. Sodium concentrations may be above the limits (270 mg/l) recommended by the Environmental Protection Agency (1971) for public water supplies.

The source of sodium bicarbonate water is not well known, but available data suggest an association with the Franciscan Formation and the consolidated sedimentary rocks.

## Occurrence and Classification of Sodium Chloride and Sodium Bicarbonate Water

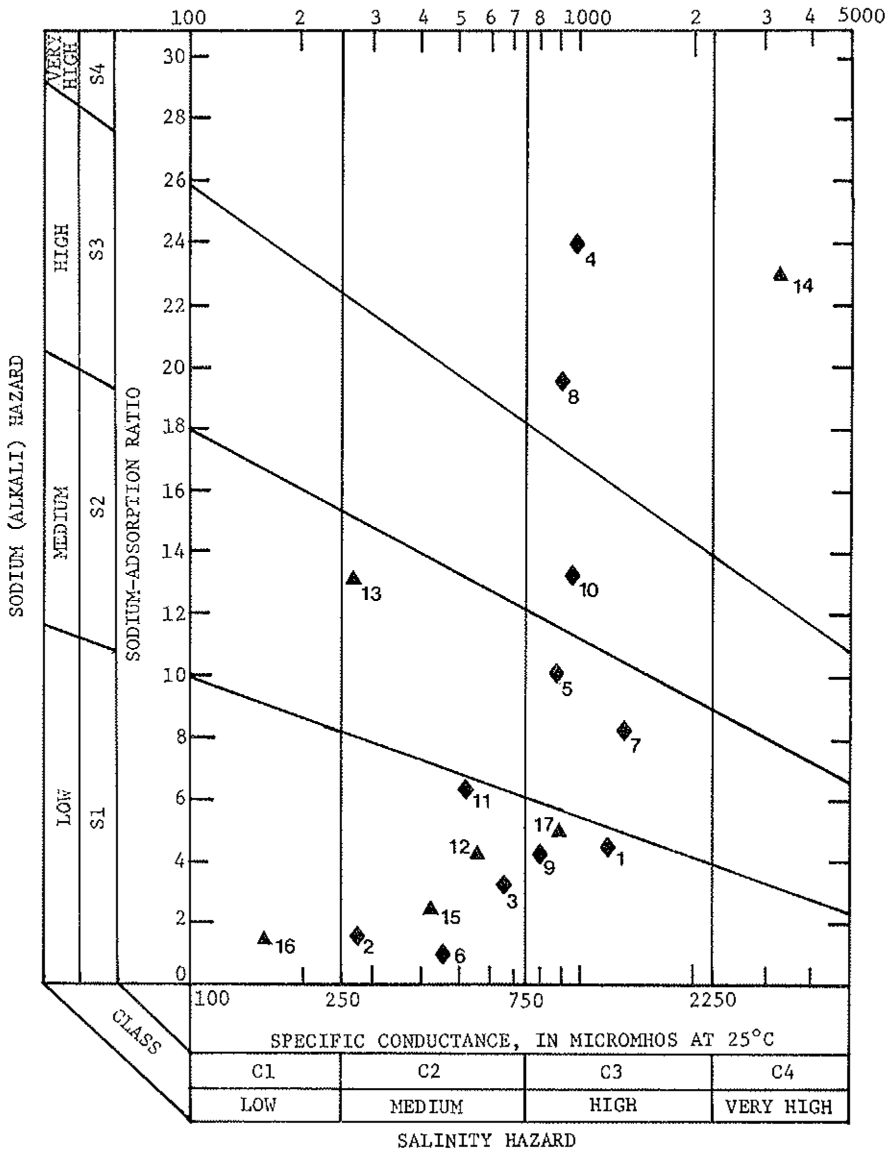
Sodium chloride water and sodium bicarbonate water are the most troublesome mineralized ground waters in the project area. As shown in figure 3, sodium chloride water occurs in the Calistoga area and in the vicinity of Oakville. In the Calistoga area, most wells containing sodium chloride water are located along the topographic axis of the valley from Bennet Lane to Maple Lane. In the vicinity of Oakville, sodium chloride water occurs in the area from Money Road to Yount Mill Road, generally between Highway 29 and the Napa River. Water-temperature records (fig. 3 and table 4) suggest that sodium chloride water may occur in wells located in secs. 3, 15, 25, and 26, T. 7 N., R. 5 W., and in secs. 3 and 25, T. 8 N., R. 6 W.

Sodium bicarbonate water occurs less frequently in the project area than does sodium chloride water and commonly occurs along the periphery of the valley or in the foothills. Wells yielding sodium bicarbonate water are located in secs. 4 and 5, T. 8 N., R. 4 W., in secs. 27 and 32, T. 8 N., R. 5 W., and in secs. 7, 13, 15, and 35, T. 8 N., R. 6 W.

Sodium chloride and sodium bicarbonate water from selected wells were plotted on a diagram (fig. 18) widely used for evaluating water for irrigation. The diagram shows that the sodium chloride water has a medium to high salinity hazard and a low to medium sodium hazard. The sodium bicarbonate water has a low to very high salinity hazard and a low to very high sodium hazard.

## Migration of Sodium Chloride Water During Critical Drought Conditions

Sodium chloride water has been identified as the most troublesome and potentially the most harmful type of ground water in the project area. Water-quality data indicate the distribution of sodium chloride water is presently stable. However, critical drought conditions may cause a migration of sodium chloride water into areas of the alluvial aquifer where it does not presently occur. Such a migration would depend, for the most part, on a major change in hydraulic gradients that direct the movement of water in the alluvial aquifer.




EXPLANATION

▲ Sodium bicarbonate water

◆ Sodium chloride water

| Number | Location |
|---|---|
| 1 | 7N/5W-22G1 |
| 2 | 8N/6W-5Q2 |
| 3 | 8N/6W-9D1 |
| 4 | 9N/6W-31M3 |
| 5 | 9N/7W-25N1 |
| 6 | 9N/7W-25N2 |
| 7 | 9N/7W-26G1 |
| 8 | 9N/7W-26K2 |
| 9 | 9N/7W-26R1 |
| 10 | 9N/7W-35R1 |
| 11 | 9N/7W-36D2 |
| 12 | 6N/4W-4D1 |
| 13 | 6N/4W-15Q1 |
| 14 | 8N/5W-27N1 |
| 15 | 8N/5W-32C1 |
| 16 | 8N/6W-7F1 |
| 17 | 8N/6W-35R3 |

FIGURE 18.--CLASSIFICATION OF SODIUM CHLORIDE AND SODIUM BICARBONATE WATER FOR IRRIGATION. MODIFIED AFTER WILCOX (1955).

Simulation of critical drought conditions in the alluvial aquifer has been discussed in a previous section (p. 42). A comparison of figures 8, 15, 16, and 17 suggests that hydraulic gradients and the direction of ground-water movement probably will not change sufficiently to cause a significant migration of sodium chloride water until critical drought conditions occur and pumping from wells is about four times the volume pumped in 1970. Figure 17 shows simulated water-level contours for northern Napa Valley after 2 years of such conditions. The contours indicate a significant redistribution of hydraulic gradients, and suggest that a major depression caused by excessive pumping in the central part of the valley might extend westward toward Oakville and cause sodium chloride water to migrate toward postulated pumping centers. Because the effects of dispersion and dilution could not be determined, the extent of such a migration or the influences on the ultimate concentrations of sodium and chloride ions in the ground water could not be predicted. On the other hand, migration of undesirable chemical constituents to developed parts of the alluvial aquifer can generally be monitored in the field, and it is recommended that such a monitoring program be estabblished in the near future.

Although the potential for widespread migration of sodium chloride water is small, local problems of this nature can be expected as ground-water development increases. Development of ground water in the Oakville area may be most affected by intrusion of sodium chloride water into local cones of depression.

## Evaluation of Quality of Base Flow and Seasonal Runoff in the Napa River

Although the Napa River at the present time is a gaining stream, large annual ground-water withdrawals could significantly alter this condition. For example, if significant storage depletion occurs in the alluvial aquifer during the summer and autumn, recharge from the Napa River will increase during the early part of the rainy season. At the same time, the lowered water levels in the alluvial aquifer may cause base flow to be depleted and no-flow conditions may become common in the Napa River during the later part of the water year. Such a situation would increase the opportunity for inducing recharge from the sewage effluent presently (1972) being discharged to the Napa River by the cities of Calistoga and St. Helena.

In order to evaluate the chemical quality of base flow in the Napa River and to estimate the qualitative impact of water recharged from the Napa River to the alluvial aquifer, two water-quality reconnaissances of the Napa River were made in July and December 1971 at the sampling sites listed below.

| Sampling site | Station number | Station name | Local name |
|---|---|---|---|
| 1 | 11-4580 | Napa River near Napa | Bridge at Oak Knoll Avenue |
| 2 | | | Bridge at Grant Boundary Lane |
| 3 | 11-4560 | Napa River near St. Helena | Bridge at Zinfandel Avenue |
| 4 | | | Bridge at Lodi Lane |
| 5 | | | Pine Street, Calistoga |

The July 1971 data (tables 5 and 6 and fig. 19[3]) are considered indicative of the quality of base flow. The December 1971 data (tables 5 and 6) are indicative of the quality of water most likely to be recharged to the alluvial aquifer by the Napa River after the first significant seasonal rains. These data indicate water of good mineral quality, but high coliform bacteria counts and relatively high concentrations of organic carbon and other nutrients suggest contamination from sewage and fertilizers.

[3]In figure 19, the rapid rise in water temperature during the late morning of July 27 is probably due to the dissipation of early morning fog and a subsequent sharp rise in air temperature.

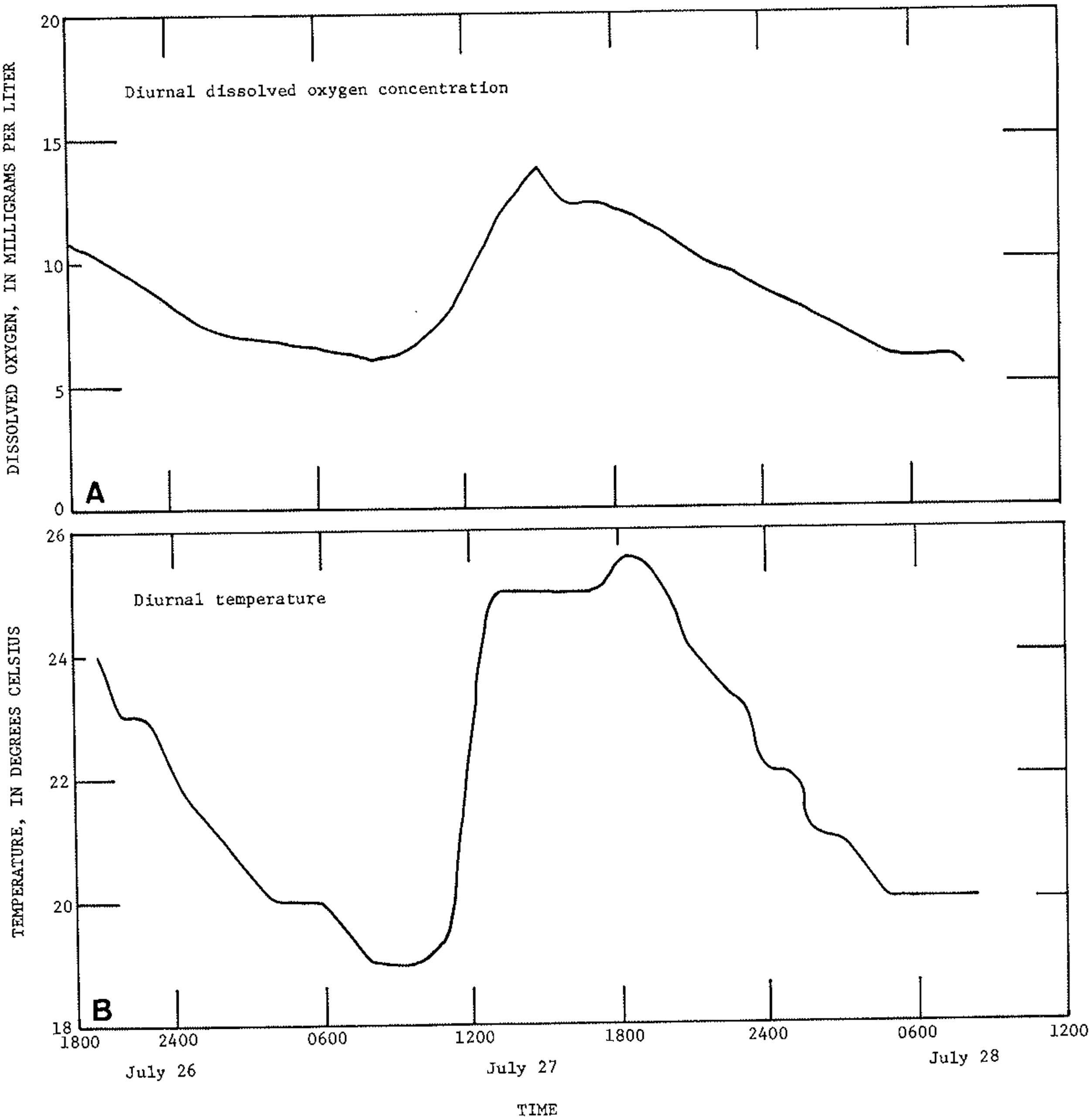



FIGURE 19.--CONTINUOUS DIURNAL DISSOLVED OXYGEN CONCENTRATION AND TEMPERATURE OF WATER IN THE NAPA RIVER AT OAK KNOLL AVENUE, JULY 26-28, 1971.

TABLE 5.--*Chemical analyses of water from the Napa River*

[Sampling sites shown in fig. 3 and explained on p. 58, discharge in cubic feet per second (cfs), computed from stage record at time sample collected]
Nitrate, reported as the sum of nitrate and nitrite.
Dissolved solids, reported as the residue on evaporation at 180°C.

| Sampling site and number | Date and time of collection: Date | Time (hours) | Discharge (cfs) | Water temperature (°C) | Concentration, in milligrams per liter (mg/l): Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Carbonate ($CO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate as N | Boron (B) | Dissolved solids | Hardness as $CaCO_3$ | Noncarbonate hardness as $CaCO_3$ | Total alkalinity as $CaCO_3$ | Percent sodium | Specific conductance (micromhos at 25°C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Bridge at Oak Knoll Ave. | 7-27-71 | 1100 | 2.4 | 19.0 | 30 | 0.02 | 27 | 22 | 21 | 2.9 | 198 | 0.0 | 27 | 16 | 0.1 | 0.76 | 0.32 | 247 | 160 | 0.0 | 162 | 22 | 389 | 7.7 |
| 2 Bridge at Grant Boundary Lane | 7-27-71 | 0925 | | 20.0 | 29 | 0.03 | 32 | 24 | 19 | 2.8 | 228 | 0.0 | 21 | 11 | 0.1 | 0.44 | 0.39 | 253 | 180 | 0.0 | 187 | 19 | 409 | 7.7 |
| 3 Bridge at Zinfandel Ave. | 7-27-71 | 1120 | 2.0 | 22.0 | 27 | 0.07 | 32 | 15 | 17 | 2.7 | 185 | 0.0 | 16 | 11 | 0.1 | 0.63 | 0.37 | 215 | 140 | 0.0 | 152 | 20 | 336 | 7.6 |
| 4 Bridge at Lodi Lane | 7-27-71 | 1330 | | 24.5 | 47 | 0.07 | 11 | 5 | 21 | 3.3 | 96 | 0.0 | 9.3 | 12 | 0.3 | 0.03 | 0.31 | 157 | 48 | 0.0 | 79 | 47 | 195 | 7.7 |
| 5 Pine St., Calistoga | 7-27-71 | 1435 | | 23.0 | 49 | 0.04 | 17 | 8.4 | 36 | 4.1 | 142 | 0.0 | 23 | 14 | 0.5 | 0.03 | 1.2 | 223 | 77 | 0.0 | 116 | 49 | 311 | 7.6 |
| 1 Bridge at Oak Knoll Ave. | 12-27-71 | 1500 | 670 | 7.0 | 22 | 0.16 | 8.6 | 5.9 | 10 | 3.0 | 51 | 0.0 | 14 | 9.8 | 0.4 | 1.4 | 0.15 | 106 | 46 | 4 | 42 | 31 | 134 | 7.1 |
| 3 Bridge at Zinfandel Ave. | 12-27-71 | 1330 | 341 | 7.0 | 25 | 0.11 | 9.5 | 4.1 | 6.4 | 5.9 | 44 | 0.0 | 11 | 9.1 | 0.3 | 1.3 | 0.18 | 99 | 41 | 5 | 36 | 22 | 128 | 7.1 |

TABLE 6.--*Nutrient, organic, and biological constituents in water from the Napa River*

[Sampling sites shown in fig. 3 and explained on p. 58, discharge in cubic feet per second (cfs), computed from stage record at time sample collected]

| Sampling site and number | Date and time of collection: Date | Time (hours) | Discharge (cfs) | Water temperature (°C) | Concentration, in milligrams per liter (mg/l): Dissolved oxygen (DO) | Organic carbon (TOC) | Nitrogen, total as N | Nitrogen, total Kjeldahl, as N | Ammonia ($NH_4$) as N | Phosphorus, total as P | Phosphate, ortho as P | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Bridge at Oak Knoll Ave. | 7-27-71 | 1100 | 2.4 | 19.0 | - | 6.5 | 1.1 | 0.38 | 0.27 | 0.45 | 0.40 | Water turbid; large quantities of algae in stream channels; fingerlings and large fish noted; no odor |
| 2 Bridge at Grant Boundary Lane | 7-27-71 | 0925 | | 20.0 | 7.4 | | 0.85 | 0.41 | 0.27 | 0.09 | 0.08 | Large quantities of yellow-green algae in stream channel; cattle near stream; no odor |
| 3 Bridge at Zinfandel Ave. | 7-21-71 | 1120 | 2.0 | 22.0 | 8.6 | 5.0 | 1.0 | 0.40 | 0.27 | 0.08 | 0.06 | Large fish and fingerlings noted. No odor. [1]Total coli, 510 colonies per 100 ml. |
| 4 Bridge at Lodi Lane | 7-27-71 | 1330 | | 24.5 | 8.6 | 4.0 | 0.31 | 0.28 | 0.21 | 0.17 | 0.15 | Considerable algae growth in stream channel; no odor |
| 5 Pine St., Calistoga | 7-27-71 | 1435 | | 23.0 | 6.8 | 5.5 | 0.30 | 0.27 | 0.21 | 0.20 | 0.15 | Water clear; no algae; many aquatic insects and snails |
| 1 Bridge at Oak Knoll Ave. | 12-27-71 | 1500 | 670 | 7.0 | - | 10 | 2.6 | 1.2 | 0.11 | 0.34 | 0.08 | [2]Total coli, 22,500 MPN per 100 ml; [2]fecal coli, 4,600 MPN per 100 ml |
| 3 Bridge at Zinfandel | 12-27-71 | 1330 | 341 | 7.0 | - | 5.5 | 2.1 | 0.75 | 0.11 | 0.31 | 0.28 | [2]Total coli, 11,000 MPN per 100 ml; [2]fecal coli, 4,600 MPN per 100 ml |

[1]Membrane-filter technique.
[2]Multitube-fermentation technique.

## SUMMARY AND CONCLUSIONS

The alluvium is the principal aquifer in the project area and is capable of yielding large quantities of water to wells. The largest yielding wells generally are located along the Napa River and its major tributaries where the aquifer is thickest and most permeable. The total quantity of ground water stored in the alluvial aquifer at the present time (1972) is estimated to be 190,000 acre-feet.

Recharge to the alluvial aquifer occurs chiefly from infiltration of precipitation and percolation from streams tributary to the Napa River. Discharge occurs chiefly by direct discharge to the Napa River, by evapotranspiration, and by pumping from wells. Historically, water levels and stream discharges have been strongly influenced by precipitation. Annual precipitation generally has been sufficient to meet natural and artificial demands placed on the aquifer, and water levels have not changed significantly over time. During periods of limited precipitation, however, water levels have declined and stream discharges have been reduced significantly.

In order to meet increasing demands for agricultural water, users have increased ground-water pumpage since 1967. Projected future ground-water use is estimated to be as much as 35,000 acre-feet per year. Such large annual withdrawals, during critical drought periods, could result in significant aquifer depletion and restrict the availability of ground water to many users. A digital-computer model of the alluvial aquifer simulated critical drought conditions and indicated that (1) ground-water levels should not decline significantly until ground-water pumpage exceeds 24,000 acre-feet per year; (2) after two consecutive years of little or no natural recharge, ground-water withdrawals in excess of 24,000 acre-feet per year could cause significant declines in water levels and significantly redistribute the hydraulic gradients in the valley between Zinfandel Lane and Oak Knoll Avenue; and (3) the alluvial aquifer and the stream system can provide water sufficient to meet most projected ground-water requirements, even under protracted, adverse climatological conditions.

Because of generally low transmissivities in the alluvium, many widely-spaced wells may be required to obtain large rates of withdrawal. The development and operation of large-capacity wells should be managed with respect to placement and coordination of pumping rates and schedules so as to afford the greatest efficiency of operation. Optimum placement and operation of these wells probably cannot be achieved until a ground-water basin management model is developed and coupled to a refined model of the hydrologic system.

The following types of ground water occur in the projected area:

a. Mixed cation bicarbonate water
b. Sodium chloride water
c. Magnesium bicarbonate water
d. Sodium bicarbonate water

Although excessive hardness is common, the quality of most of the ground water is adequate for domestic and stock use. Sodium chloride water is generally unsuitable for irrigation purposes because of high boron concentrations and relatively high SAR values.

The potential for the migration of sodium chloride water under normal conditions of use is slight, but migration could increase locally in the Oakville area, especially during critical drought conditions.

If water levels decline enough to make the Napa River a major source of recharge to the alluvial aquifer, serious biologic and nutrient contamination of the ground water could occur if present (1972) water-quality conditions in the Napa River are maintained.

## RECOMMENDATIONS FOR FUTURE WORK

In order to properly manage the water resources in the project area, the following should be considered:

1. The digital model should be refined to include a simulated Napa River that is responsive to withdrawals from the alluvial aquifer under all transient-state conditions.

2. The observation-well network presently operated by the Napa County Agricultural Extension Service should be modified and expanded to include more wells screened in the alluvial aquifer. Efforts should be made to obtain detailed records for existing observation wells, and for new wells that may be added to the network.

3. Pumpage should be compiled annually to provide realistic data for use in refining the digital model and monitoring the potential for critical drought conditions.

4. Hydrologic data from local, State, and Federal agencies should be collected and organized for use in future studies.

5. Wells to monitor the possible migration of sodium chloride water toward pumping centers in the Oakville area should be located and maintained for future sampling. Migrating sodium chloride water can be detected by measuring temperature, chloride, and the specific conductance of the water from wells.

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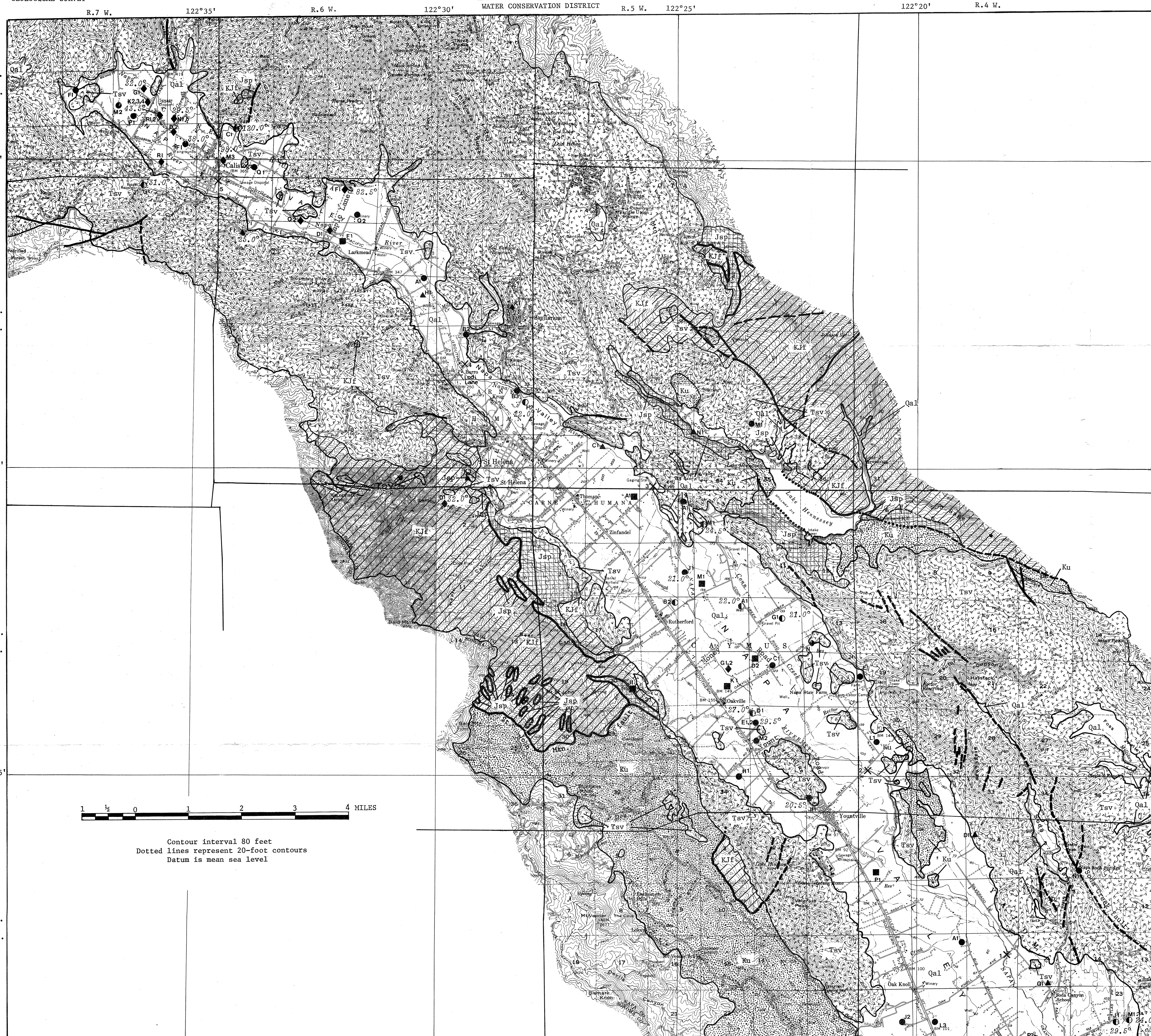
NAPA COUNTY FLOOD CONTROL AND
WATER CONSERVATION DISTRICT






Base from U.S. Geological Survey 15' topographic series; Calistoga, 1959; St. Helena, 1960; Sonoma, 1951; and Santa Rosa, 1954

Geology modified after Koenig, 1963 and Kunkel and Upson, 1960

GEOLOGIC MAP AND CHEMICAL CLASSIFICATION OF GROUND WATER, NORTHERN NAPA VALLEY, CALIFORNIA.

## EXPLANATION

**QUATERNARY** — Pleistocene and Holocene

Qal

Alluvium

Unconsolidated clay, silt, sand, and gravel. Underlies the alluvial plain in Napa Valley. Yields large to medium quantities of water to wells

**TERTIARY** — Pliocene

Tsv

Sonoma Volcanics, undifferentiated

Mainly tuff, pumice, scoria, tuff breccia, agglomerate and flows of andesite and basalt. In the vicinity of St. Helena and Calistoga banded rhyolitic flows, welded rhyolitic tuff, hydrothermally altered volcanic rocks and, in places, a basal layer of perlitic obsidian occur. Along the east side of the valley between Yountville and St. Helena, fine-grained massive beds of diatomite and diatomaceous tuff, lenses of sand, and beds of gravel are interbedded with the volcanics. The scoriacious units and pumice layers commonly yield water freely to wells. The diatomaceous beds, sand lenses, and gravel beds yield small quantities of water to wells. Except where highly fractured, other rocks yield little or no water to wells

**CRETACEOUS** — Lower Cretaceous

Ku

Consolidated sedimentary rocks, undifferentiated

Mudstone and siltstone with minor beds of thin-bedded sandstone. Generally non-water-bearing; locally yield small quantities of water from fractures and weathered zones

**JURASSIC AND CRETACEOUS** — Upper Jurassic and Lower Cretaceous

KJf

Franciscan Formation

Shale and sandstone that contain masses of chert, greenstone, and serpentine, and related metamorphic rocks. Generally non-water-bearing; locally yields small quantities of water from fractures and from deeply weathered zones

Jurassic

Jsp

Ultrabasic rocks

Lenses, sheets, and irregularly shaped masses of serpentine, dunite, peridotite, and pyroxenite, and minor amounts of silica carbonate rock derived from alteration of serpentine. Generally non-water-bearing; locally yield small to moderate quantities of water from shear zones in serpentine

Fault
Dashed where approximately located; dotted where concealed

Contact between geologic units

◐ A1
Water well that yields hydrothermal water
Number (20.5°) indicates water temperature, °C

● B3
Water well that yields mixed cation bicarbonate water

Water is associated with alluvial deposits and detrital material; occurs throughout Napa Valley; low SAR and RSC values and low to moderate hardness; excellent quality for most domestic and agricultural purposes

◆ D1
Water well that yields sodium chloride water

Water is associated with a hot-water-dominated thermal system of volcanic origin; occurs in the vicinity of Calistoga and Oakville; has moderate to high SAR and RSC values and boron content; low to moderate hardness; generally unsuitable for irrigation purposes; adequate for most domestic purposes

■ G3
Water well that yields magnesium bicarbonate water

Water is associated with serpentine and ultrabasic rocks; low SAR and RSC values; moderate to high hardness; generally suitable for agricultural and domestic uses

▲ C1
Water well that yields sodium bicarbonate water

Water is associated with Franciscan Formation and Cretaceous sedimentary rocks; moderate to high SAR and RSC values; low to moderate hardness; low to moderate boron concentrations; marginally adequate for domestic and most agricultural purposes

✕ 1
Water-quality sampling site on Napa River. Number refers to the sampling site in tables 5 and 6

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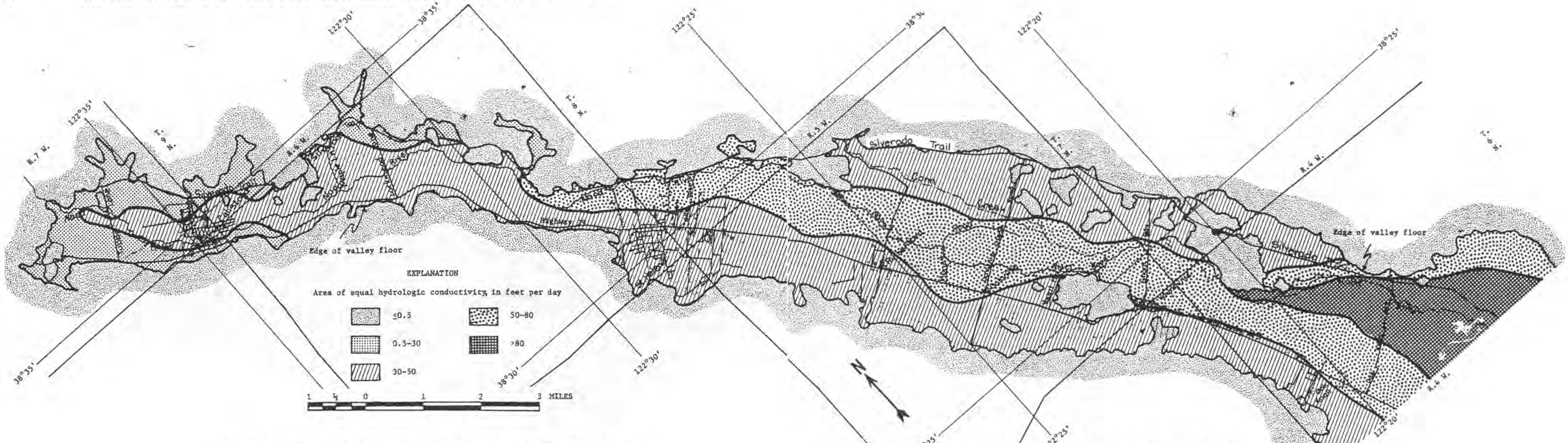
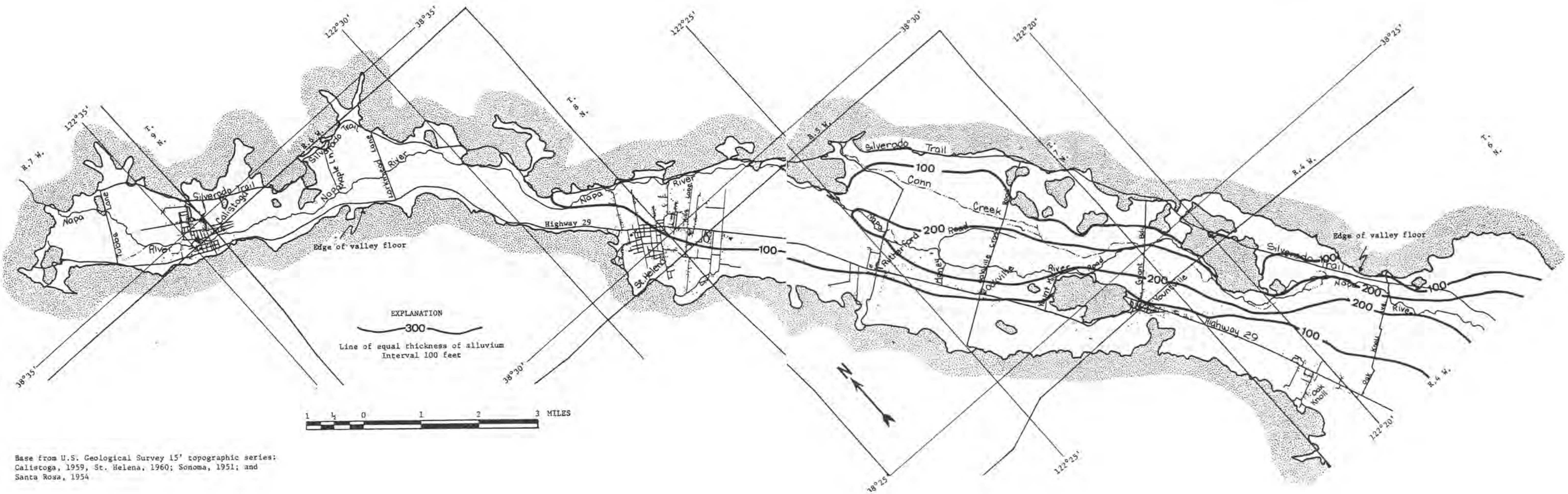



FIGURE 4.--HYDRAULIC CONDUCTIVITY OF THE ALLUVIUM IN NORTHERN NAPA VALLEY.

FIGURE 4.--CONTINUED.




Base from U.S. Geological Survey 15' topographic series:
Calistoga, 1959, St. Helena, 1960; Sonoma, 1951; and
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2. **James M. Montgomery Consulting Engineers. 1991. Water Resource Study for the Napa County Region. Prepared for Napa County Flood Control and Water Conservation District. January 1991. 148 p.**

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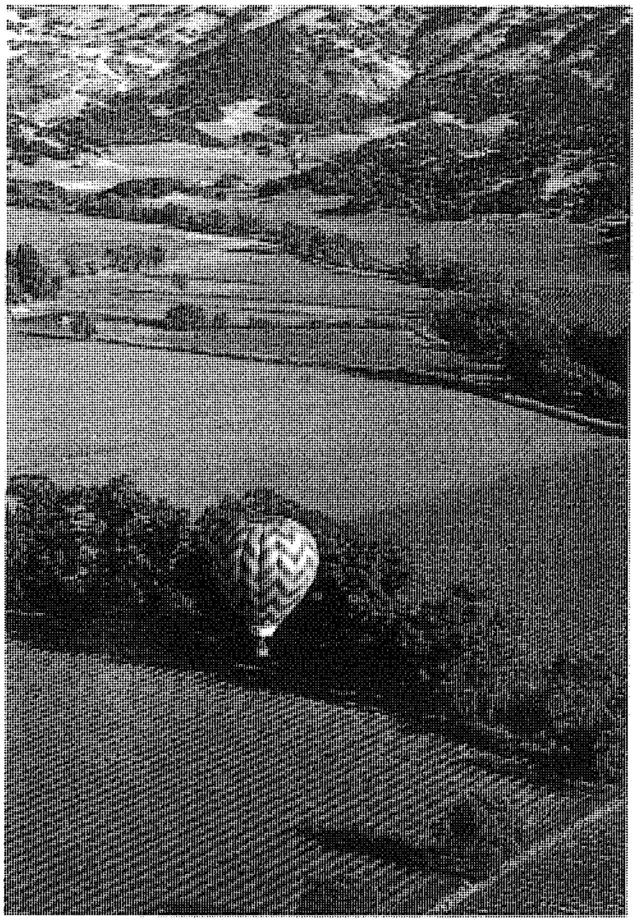

# Napa County Flood Control and Water Conservation District

## *Water Resource Study for the Napa County Region*

January 1991

JMM James M. Montgomery
Consulting Engineers Inc.

Napa County Flood Control and Water Conservation District
WATER RESOURCE STUDY FOR THE NAPA COUNTY REGION

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**Napa County Flood Control and Water Conservation District**
**WATER RESOURCE STUDY FOR THE NAPA COUNTY REGION**

# STUDY SUMMARY

## STUDY OBJECTIVE

Provide an in-depth review of the water need/supply relationship for the County's five major municipal areas - American Canyon, City of Napa, Yountville, St. Helena, and Calistoga; rural areas; and agriculture. Based on this review, recommend a program for balancing water needs and supply.

## STUDY SCOPE OF WORK

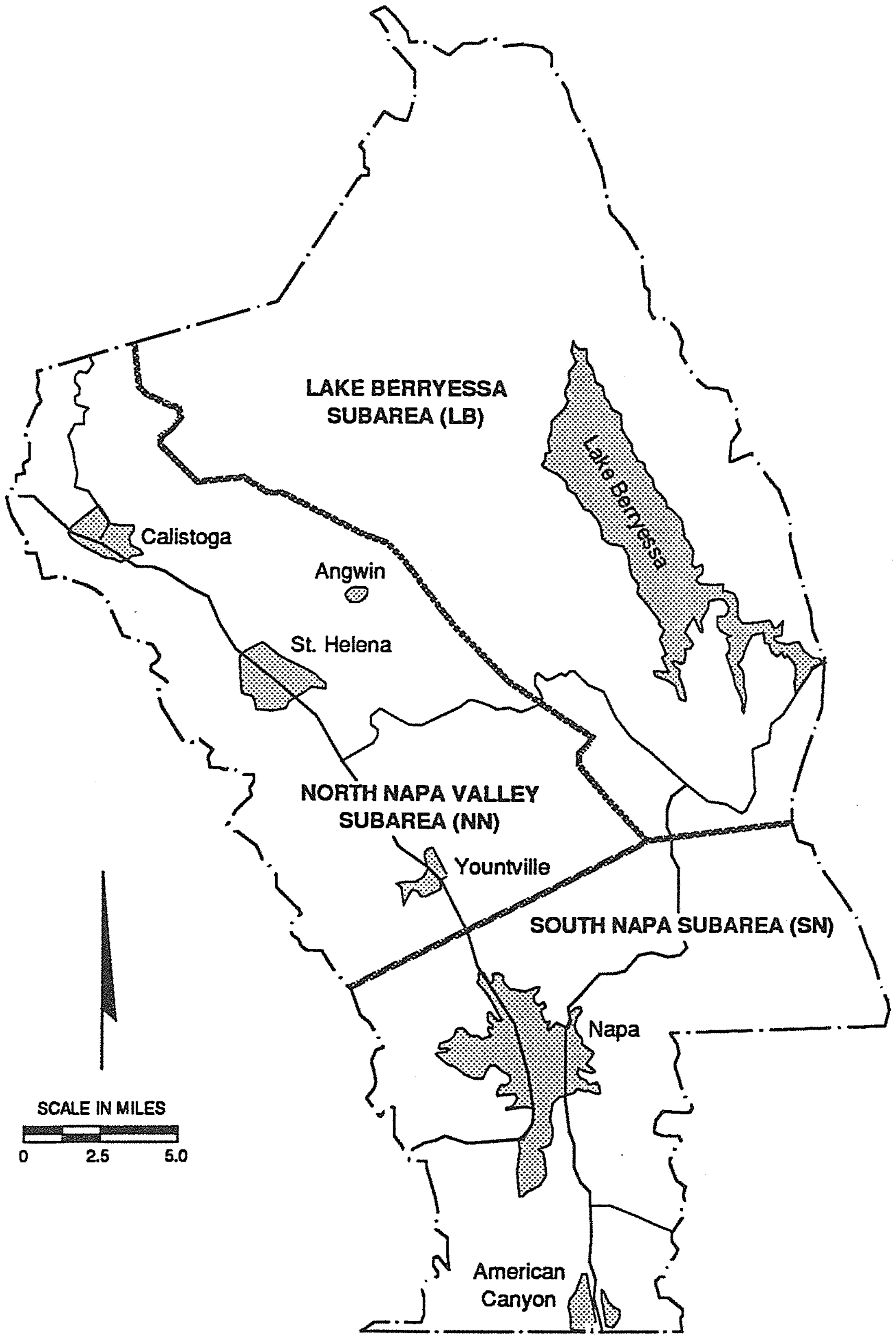
The scope of work contained in Agreement No. 2893-Contract for Engineering Services for Napa County Water Resources Study, approved by the County Board of Supervisors on February 27, 1990, can be summarized as follows:

- Analyze and characterize existing (1989) water use by principal user categories.
- Estimate future water needs to the year 2020 in five-year increments.
- Summarize water quality requirements of users and quality of supplies.
- Analyze the availability of existing water supplies, including groundwater, river diversion, local reservoirs, imported water, and reclamation.
- Discuss the water need/supply relationship and recommend a program for balancing water needs and supplies.

## WATER NEEDS

Water use in Napa County primarily satisfies agricultural and municipal needs, with a small percentage of use by industry and rural areas. To facilitate balancing water needs and supplies, existing water use and future needs were established at several levels - by user; by subarea; and County-wide. Users include the five major municipal areas, rural (Angwin and remainder), and agricultural (vineyards and other). Three subareas were defined - North Napa Valley (NN); South Napa (SN); and Lake Berryessa (LB). The subareas and user groups are shown in Figure S-1, along with the water needs methodology.

An extensive data collection effort was undertaken in association with members of an Advisory Committee. The effort consisted of a review of general plans, master water supply plans, water management plans, and previous investigations; a review of agricultural water and land use practices; acquisition of historical water production and metered water sales




NAPA COUNTY MUNICIPALITIES AND SUBAREAS

**RECENT HISTORICAL USE (1985-89)**

HOW MUCH PER YEAR?
- Municipalities
  - Production Records for:
    - American Canyon CWD
    - City of Napa
    - Town of Yountville
    - City of St. Helena
    - City of Calistoga
- Rural
  - Angwin Area: Production Records
  - Remainder: Estimate based on population x per capita use
- Agricultural
  - Vineyards
    - Irrigation requirements = 1987 DWR acreage x applied water based on region (Ac-Ft/Ac/Yr)
      - South Napa Subarea = 0.4
      - North Napa Valley Subarea = 0.5
      - Lake Berryessa Subarea = 0.6
    - Frost Protection = DWR acreage x 0.33 Ac-Ft/Ac/Yr
    - Heat Protection = DWR acreage x 0.17 Ac-Ft/Ac/Yr
  - Other Agriculture
    - Pasture - 4.0 Ac-Ft/Ac/Yr
    - Deciduous - 2.0 Ac-Ft/Ac/Yr
    - Truck Crops - 2.4 Ac-Ft/Ac/Yr
    - Grain - 1.2 Ac-Ft/Ac/Yr

**UNIT WATER USE**

CHARACTERISTICS?
- Variation in Use
- Unit Use
  - Per Capita
  - Per Acre
- Extent of Conservation

WILL CURRENT CHARACTERISTICS CONTINUE?
- Greater Density
- More Conservation
- Change in Industry
- Change in Crops
- System Improvements

**FUTURE WATER NEED**

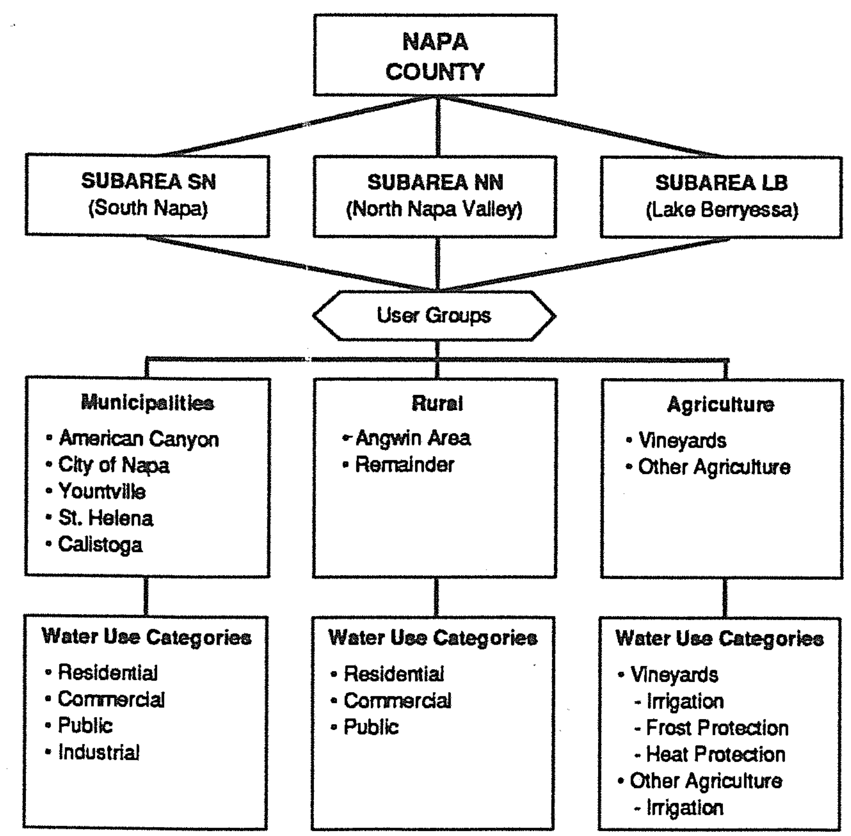
How do local and regional planning entities envision future distribution of population and land use within Napa County?
- Reflection of Policies
- Regional Economy
- Land Capabilities

Municipalities
- Residential/Commercial/Public
  To year 2005, ABAG population projections x per capita use.
  To year 2020, California Department of Finance population projections x per capita use.
- Industrial
  General/Specific Land Use Plans for years 2000/10. Acreage of water use category x unit use (Ac-Ft/Ac/Yr)

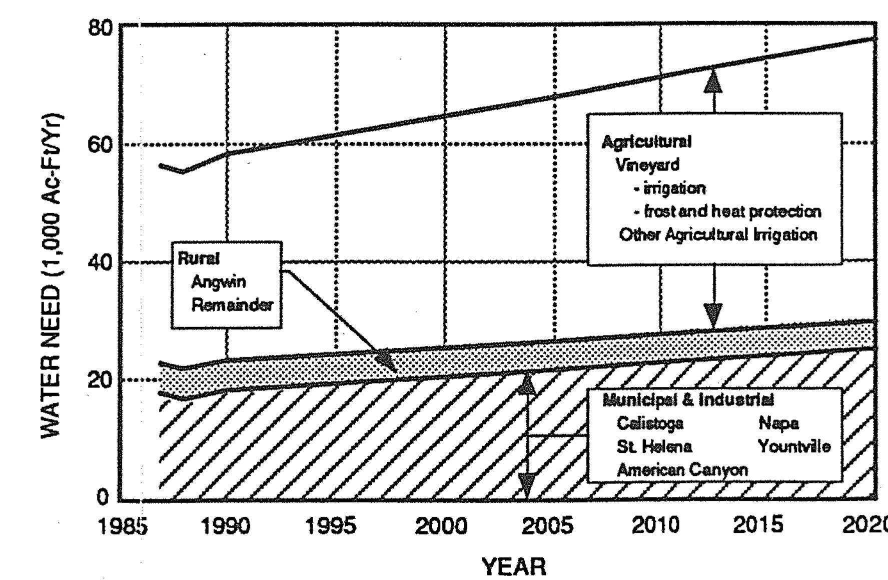
Rural
To year 2005, ABAG population projections x estimated per capita use.
To year 2020, California Department of Finance population projections x estimated per capita use.

Agriculture
- Vineyards:
  In year 2020, 53,000 Ac (based on Agricultural Resource acreage of County General Plan) x applied water requirement for irrigation and frost and heat protection.
- Other Agriculture: Constant water demand.

WATER USE CALCULATIONS




WATER USER CLASSIFICATIONS




NAPA COUNTY WATER NEEDS

## OVERVIEW OF WATER NEEDS METHODOLOGY

FIGURE S-1

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records; collection of historical and projected population data; acquisition of land use maps and data; and consultation with the County Agricultural Commissioner's Office, the U.C. Davis Cooperative Extension, the Farm Bureau, and the Napa County Planning Department. The type of data available was a key factor in establishing the water need methodology.

Future municipal and industrial water needs were based on per capita water consumption factors obtained from 1985-89 water production and sales data applied to population projections made by Napa County, the Association of Bay Area Governments (ABAG), and the California Department of Finance (CDOF). The industrial use component of the per capita factor was reviewed and separated where required to insure that the per capita estimate would be representative of future water use. The adopted per capita factors were also reviewed for extent of in-place conservation and impact of recent drought conditions. The seasonal variation of municipal and industrial water use was also established from the 1985-89 production data. The variation was required to perform operational runs for reservoir yield analyses.

Future rural water needs were based on an estimate of per capita use and population projections. Per capita use was obtained from Howell Mountain Mutual Water Company data and generally-available information for similar rural areas in northern California. The adopted values were 135 and 150 gallons per capita per day for the Angwin area and remainder of Napa County, respectively.

Since records of well pumping and stream diversion are not maintained for public use, an alternative "water duty" approach was utilized to estimate agricultural water needs. Agricultural water use practices have a unique requirement for vineyards, supplemental to vineyard irrigation, from the threat of severe frost and heat conditions. In this study, individual average annual water consumption factors were determined for frost and heat protection, 0.33 and 0.17 Acre-Feet per Acre per Year, respectively. These factors were then added to the irrigation-applied water requirement which varied from 0.4 to 0.6 Acre-Feet per Acre per Year depending upon location (climate), being highest in the warmer Lake Berryessa Subarea. Factors were also established for other irrigated use such as pasture, grain, deciduous, and truck crops. The future agricultural water need was obtained by applying the "water duty" to the acreage by specific crop.

Because of the uncertainty involved in making any projection of future water needs which are based on population and land use, a baseline water need projection and alternative demand scenarios were developed. These scenarios are based on per capita use factors, water duties, population, and land acreage shown in Table S-1. Key scenario conditions are summarized below.

# TABLE S-1

## NAPA COUNTY WATER NEEDS SCENARIO CHARACTERISTICS

| Characteristics | Baseline Projection | Alternative Scenario 1 | Alternative Scenario 2 |
|---|---|---|---|
| PER CAPITA (gpcd) | | | |
| Calistoga | 151 | 136 | 151 |
| St. Helena | 233 | 209 | 233 |
| Yountville | 223 | 201 | 223 |
| Napa | 179 | 161 | 179 |
| American Canyon | 164 | 148 | 164 |
| Angwin | 135 | 135 | 135 |
| Remainder | 150 | 150 | 150 |
| VINEYARD WATER REQUIREMENTS (ac-ft/ac/yr) (1) | | | |
| Frost Protection | 0.33 | (2) | 0.33 |
| Heat Protection | 0.17 | (2) | 0.17 |
| IRRIGATED VINEYARD LAND USE ACREAGE (1) | | | |
| South Napa Subarea | | | |
| 1990 | 8121 | 8121 | 8121 |
| 2005 | 10581 | 10581 | 13041 |
| 2020 | 13041 | 13041 | 13041 |
| Napa Valley Subarea | | | |
| 1990 | 22181 | 22181 | 22181 |
| 2005 | 26883 | 26883 | 26883 |
| 2020 | 31586 | 31586 | 31586 |
| Lake Berryessa Subarea | | | |
| 1990 | 2236 | 2236 | 2236 |
| 2005 | 3443 | 2236 | 5611 |
| 2020 | 4650 | 2236 | 8986 |
| POPULATION | | | |
| Napa County | | | |
| 1990 | 108900 | 108900 | 108900 |
| 2005 | 127350 | 127350 | 138900 |
| 2020 | 147500 | 147500 | 169900 |

(1) For Alternate Scenarios 1 and 2, the Other Irrigated Agriculture water requirements and land use acreage are the same as the Baseline Projection (see Table 3-2 and Figure 3-3). Vineyard irrigation requirements, also not shown, are not changed for the analysis of Alternative Scenarios 1 and 2 (see Table 3-2).

(2) Conversion from sprinkler systems to wind machines is assumed to occur linearly at a rate such that in the year 2020 sprinkler systems for frost and heat protection are used on 50 percent of the vineyard lands in the North Napa Valley and Lake Berryessa Subareas, with the remaining lands in these subareas utilizing wind machines and other alternatives.

- **Baseline Projection**

  - Per capita use for municipal areas based on the average consumption during the 1985-89 period. The per capita factor for this period of predominantly dry years reflects a conservation - oriented attitude (inherent conservation) deemed to be representative of future use.

  - Population projections from ABAG and CDOF.

  - "Water Duties" for crop irrigation and protection as discussed above.

  - Irrigated crop acreage from Napa County 1989-2005 General Plan Land Use Map, with area dedicated to Agricultural Resource fully developed as vineyards by year 2020 for South Napa and North Napa Valley Subareas, and 50 percent developed in the Lake Berryessa Subarea due to restricted water availability. Frost and heat protection not required for 50 percent of future vineyard lands in the North Napa Valley and Lake Berryessa Subareas due to hillside location.

- **Alternative Scenario 1**

  - Per capita use factors reduced by 10 percent from potential additional water conservation in the incorporated communities and American Canyon.

  - No further growth in current vineyard acreage in the Lake Berryessa Subarea due to limited water availability.

  - Wind machines will replace sprinkler systems for frost and heat protection in 50 percent of vineyards in the North Napa Valley and Lake Berryessa Subareas by year 2020.

- **Alternative Scenario 2**

  - A greater projected population than the ABAG and CDOF estimates based on the 1980-2000 growth rates used in the Napa County General Plan, assuming that the growth rates remain in effect until year 2020.

  - Due to potential rapid development of Carneros vineyards, the acreage designated as Agricultural Resource in the South Napa Subarea is assumed to be fully developed by year 2005, instead of year 2020.

The resultant total County water needs for these scenarios are shown in Figure S-2.

## WATER QUALITY

User water quality requirements for municipalities (drinking water), industries, and vineyard irrigation, and quality of sources (local reservoirs, North Bay Aqueduct, Lake Berryessa, Napa River, and four groundwater basins) were summarized. Source quality issues were discussed based on a comparison of source quality parameters with user requirements. The parameters of concern are summarized below by user:

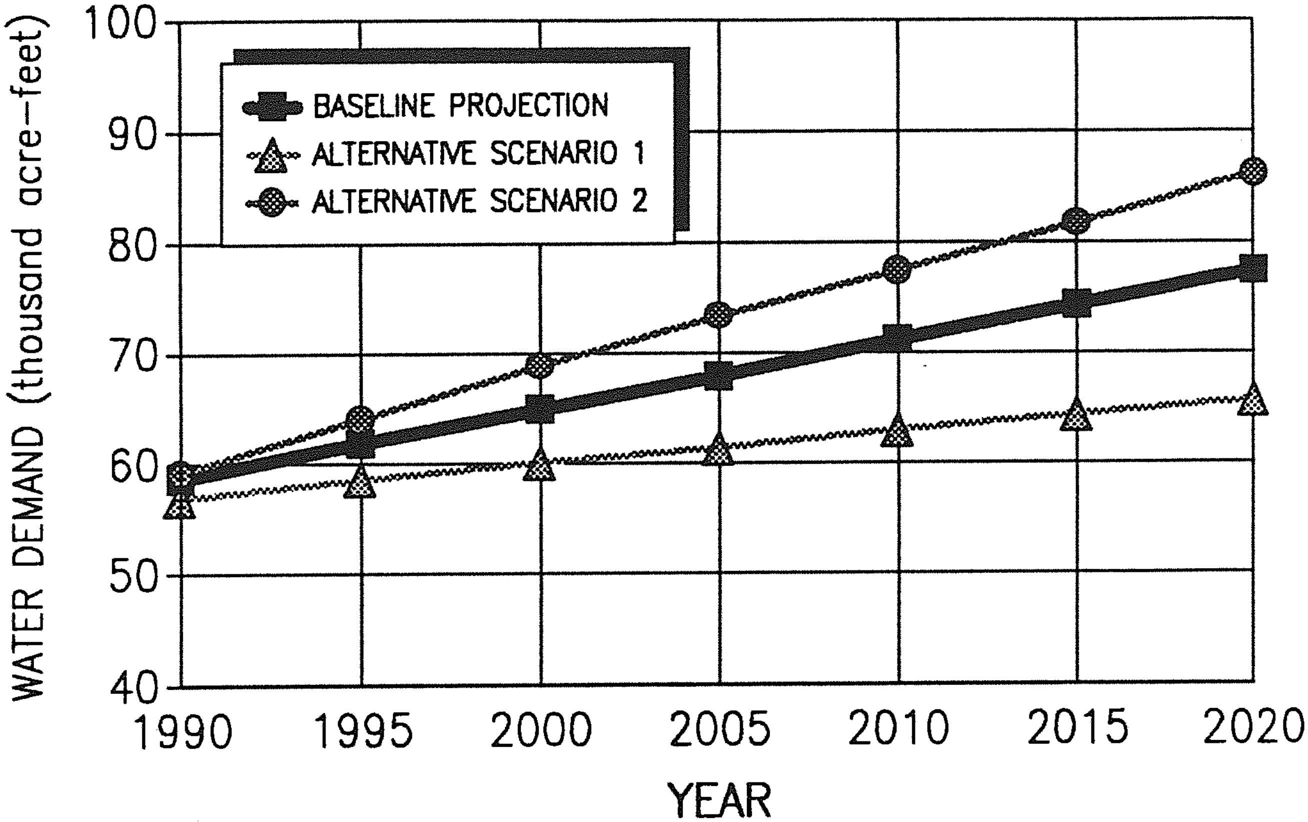
| | User | | |
|---|---|---|---|
| **Water Quality Parameter** | **Municipal** | **Industrial** | **Agricultural** |
| Turbidity | X | | |
| Color | | | |
| Odor | X | | |
| Iron and Manganese | X | | |
| Hardness | | X | |
| Nitrates | X | | X |
| Total Dissolved Solids | | X | X |
| Sodium | X | | X |
| Chlorides | | | X |
| Boron | | | X |

## EXISTING WATER SUPPLIES

Napa County's agriculture, municipalities, and rural areas satisfy their current water needs from five supplies:

- Groundwater
- River Diversion
- Reservoirs
- Imported Water
- Reclamation

The quantity, its buildup (if any) with time, and availability (reliability) of these supplies were analyzed, with a focus of effort on estimating the safe yield of the main Napa (North Napa Valley) groundwater basin and the yield-frequency relationship for the five major municipal water supply reservoirs - Milliken, Rector, Hennessey, Bell Canyon, and Kimball. In the case of groundwater, where three additional basins were also reviewed (Milliken-Sarco-Tulucay, Carneros, and Lake Berryessa), the safe yield represents a long-range amount




**TOTAL PROJECTED WATER NEEDS OF THE BASELINE PROJECTION AND ALTERNATIVE DEMAND SCENARIOS - NAPA COUNTY, CALIFORNIA**

FIGURE S-2

of well pumpage that can be sustained by recharge, avoiding economic hardship (deep pumping) and water quality degradation. In the case of river diversion, the variation in flow from year to year and seasonally for the Napa River were related to the timing of water need for vineyard irrigation and frost and heat protection. For the major local reservoirs, the variation of inflow from their respective watersheds and variation of consumption played key roles in arriving at a yield-frequency relationship. For Lake Berryessa, the water rights and Napa-Solano negotiations were reviewed. For the North Bay Aqueduct (imported) water supply, contract buildup and potential drought cutbacks were summarized. And for reclamation, the plans by the Napa Sanitation District were reviewed.

The yield of existing water supplies resulting from the above analyses and reviews are as summarized in Table S-2.

## BALANCING WATER NEEDS AND SUPPLIES

The study estimated the likely range of future water needs through development of a baseline projection and low- and high-demand alternative scenarios, and the availability of individual existing supplies - groundwater, river diversion, reservoirs, imported water, and reclamation. The relationship between year 1990 and 2020 water need and existing supplies was established by user, subarea, and for the County using the baseline water need projection and the following assumptions regarding supplies:

- **Groundwater.** Safe yield extraction rate.

- **River Diversion.** Napa River above Oak Knoll Ave - 10,000 Ac-Ft/Yr. Others - estimated.

- **Reservoirs.** Rector and Hennessey at firm yield (100 percent frequency) rate; Milliken, Bell Canyon, and Kimball at 80 percent frequency yield. Lake Berryessa-1,500 Ac-Ft/Yr based on existing agreement for lakeside use.

- **Imported Water.** North Bay Aqueduct maximum contract entitlement of 6,475 Ac-Ft/Yr in 1990 to 13,695 Ac-Ft/Yr in 2020, with the latter based on a reduced entitlement at 55 percent of the ultimate amount (State delivery capability with existing facilities).

- **Reclamation.** Current reclamation capacity of 200, 314, and 1,622 Ac-Ft/Yr for Calistoga, Yountville, and Napa Sanitation District, respectively.

From a review of the water need/supply relationship for Napa County water users, its three subareas, and the County as a whole, as shown in Table S-3 and Figure S-3, the following observations can be made:

TABLE S-2

YIELD OF EXISTING WATER SUPPLIES

| Source | Safe or Firm Yield (Ac-Ft/Yr) | Based on Record Period |
|---|---|---|
| __Groundwater__ | | |
| North Napa Valley Basin | 22,500 | 1962-89 |
| Milliken-Sarco-Tulucay Basin | <5,400 | --- |
| Lake Berryessa Basin | < 400 | --- |
| Carneros Area Basin | < 300 | --- |
| **Total Groundwater** | **28,600 max** | **---** |
| __River Diversion__ | | |
| Napa River above Oak Knoll | 10,000 | 1960-88 |
| __Reservoirs__ | | |
| **Major Municipal** | | |
| Milliken | 400 | 1940-89 |
| Rector | 1,200 | 1940-89 |
| Lake Hennessey | 5,000 | 1940-89 |
| Bell Canyon | 480 | 1940-89 |
| Kimball | 110 | 1949-89 |
| Subtotal Reservoirs | 7,190 | |
| **Lake Berryessa** | 1,500 | --- |
| __Imported Water (North Bay Aqueduct)__ | | |
| Maximum - 1990 | 6,745 | --- |
| - 2020 | 24,900 | --- |
| Minimum - 1990 | 5,060 | --- |
| - 2020 | 13,695 | --- |
| __Reclamation__ | | |
| Minimum | 3,103 | --- |
| Maximum | 5,943 | --- |

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# TABLE S-3
# NAPA COUNTY WATER NEED/SUPPLY RELATIONSHIP

| | Baseline Water Need (Ac-Ft/Yr) | | | | | | | Safe/Firm Yield from Existing Water Supplies | | | | | | | | | | | Supply-Need (Ac-Ft/Yr) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ground-Water | River Diversion | | Reservoirs | | | Imported (NBA) | | Recla-mation | Total | | | |
| Water User | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | | Napa | Others | Muni-cipal | Berryessa | Misc. | 1990 | 2020 | | 1990 | 2020 | 1990 | 2020 |
| **North Napa Valley (NN) Subarea** | | | | | | | | | | | | | | | | | | | | |
| Muncipal & Industrial (M&I) Calistoga | 990 | 1060 | 1190 | 1340 | 1405 | 1460 | 1515 | 75 | 0 | 0 | 400 | NA | 0 | 272 | 275 | 200 | 947 | 950 | -43 | -565 |
| St. Helena | 1935 | 2195 | 2275 | 2380 | 2495 | 2595 | 2690 | 0 | 0 | 0 | 1200 | NA | 0 | 0 | 0 | 0 | 1100 | 1200 | -835 | -1490 |
| Yountville | 450 | 490 | 515 | 540 | 570 | 595 | 625 | 0 | 0 | 0 | 325 | NA | 0 | 272 | 275 | 0 | 597 | 600 | 147 | -25 |
| Subtotal M&I | 3375 | 3745 | 3980 | 4260 | 4470 | 4650 | 4830 | 75 | 0 | 0 | 1925 | 0 | 0 | 544 | 550 | 200 | 2744 | 2747 | -631 | -2083 |
| | | | | | | | | | | | | | | | | | | | | |
| Rural(1) | 2438 | 2506 | 2623 | 2745 | 2882 | 2996 | 3111 | * | * | * | 875 | NA | * | NA | NA | 0 | — | — | — | — |
| | | | | | | | | 22500* | 10,000* | | | | | | | | 35175 | 35175 | 9762 | 2034 |
| Agricultural-Vineyard | 22181 | 23356 | 24532 | 25708 | 26883 | 28059 | 29235 | | | | | | | | | | | | | |
| Agricultural-Other | 797 | 797 | 797 | 797 | 797 | 797 | 797 | | | | | | | | | | | | | |
| Agricultural-Total | 22978 | 24153 | 25329 | 26505 | 27680 | 28856 | 30032 | * | * | * | 1500** | NA | * | NA | NA | 300 | — | — | — | — |
| **Total for Subarea NN** | 28791 | 30404 | 31932 | 33510 | 35032 | 36502 | 37973 | 22575 | 10000 | 0 | 4300 | 0 | 0 | 544 | 550 | 500 | 37919 | 37922 | 9128 | -51 |
| **South Napa (SN) Subarea** | | | | | | | | | | | | | | | | | | | | |
| Municipal & Industrial (M&I) City of Napa | 13825 | 14675 | 15305 | 15685 | 16625 | 17410 | 18195 | 0 | 0 | 0 | 6150 | NA | NA | 4000 | 10285 | 0 | 10150 | 16435 | -3675 | -1760 |
| American Canyon | 1591 | 1721 | 1846 | 2031 | 2136 | 2226 | 2316 | 0 | 0 | 0 | NA | NA | NA | 2200 | 2860 | 0 | 2200 | 2860 | 609 | 544 |
| Subtotal M&I | 15416 | 16396 | 17151 | 17716 | 18761 | 19636 | 20511 | 0 | 0 | 0 | 6150 | 0 | 0 | 6200 | 13145 | 0 | 12350 | 19295 | -3066 | -1216 |
| | | | | | | | | | | | | | | | | | | | | |
| Rural | 1705 | 1732 | 1811 | 1903 | 2017 | 2112 | 2207 | * | * | * | NA | NA | * | NA | NA | 0 | — | — | — | — |
| | | | | | | | | 5700* | 1000** | 500** | | | 500** | | | | 9300 | 9300 | 841 | -1629 |
| Arigcultural-Vineyard | 3248 | 3576 | 3904 | 4232 | 4560 | 4888 | 5216 | | | | | | | | | | | | | |
| Agricultural-Other | 3506 | 3506 | 3506 | 3506 | 3506 | 3506 | 3506 | | | | | | | | | | | | | |
| Agricultural-Total | 6754 | 7082 | 7410 | 7738 | 8066 | 8394 | 8722 | * | * | * | NA | NA | * | NA | NA | 1600 | — | — | — | — |
| **Total for Subarea SN** | 23875 | 25210 | 26372 | 27357 | 28844 | 30142 | 31440 | 5700 | 1000 | 500 | 6150 | 0 | 500 | 6200 | 13145 | 1600 | 21650 | 28595 | -2225 | -2845 |
| **Lake Berryessa (LB) Subarea** | | | | | | | | | | | | | | | | | | | | |
| Municipal & Industrial (M&I) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| | | | | | | | | | | | | | | | | | | | | |
| Rural | 95 | 96 | 101 | 106 | 112 | 117 | 123 | * | NA | * | NA | * | * | NA | NA | 0 | — | — | — | — |
| | | | | | | | | 400* | | 100* | | 1500* | 250* | | | | 2250 | 2250 | -3664 | -5744 |
| Agricultural-Vineyard | 2460 | 2802 | 3144 | 3486 | 3828 | 4170 | 4512 | | | | | | | | | | | | | |
| Agricultural-Other | 3359 | 3359 | 3359 | 3359 | 3359 | 3359 | 3359 | | | | | | | | | | | | | |
| Agricultural-Total | 5819 | 6161 | 6503 | 6845 | 7187 | 7529 | 7871 | * | NA | * | NA | 0 | * | NA | NA | 0 | — | — | — | — |
| **Total for Subarea LB** | 5914 | 6257 | 6604 | 6951 | 7299 | 7646 | 7994 | 400 | 0 | 100 | 0 | 1500 | 250 | 0 | 0 | 0 | 2250 | 2250 | -3664 | -5744 |
| | | | | | | | | | | | | | | | | | | | | |
| **Total All Subareas** | 58580 | 61871 | 64908 | 67818 | 71175 | 74290 | 77407 | 28675 | 11000 | 600 | 10450 | 1500 | 750 | 6744 | 13695 | 2100 | 61819 | 68770 | 3239 | -8637 |

NOTES: * Supply available to rural and agricultural, combined - ** Assumed (no detailed information available) - NA - Not available to user - (1) Includes Veterans Home at Yountville.

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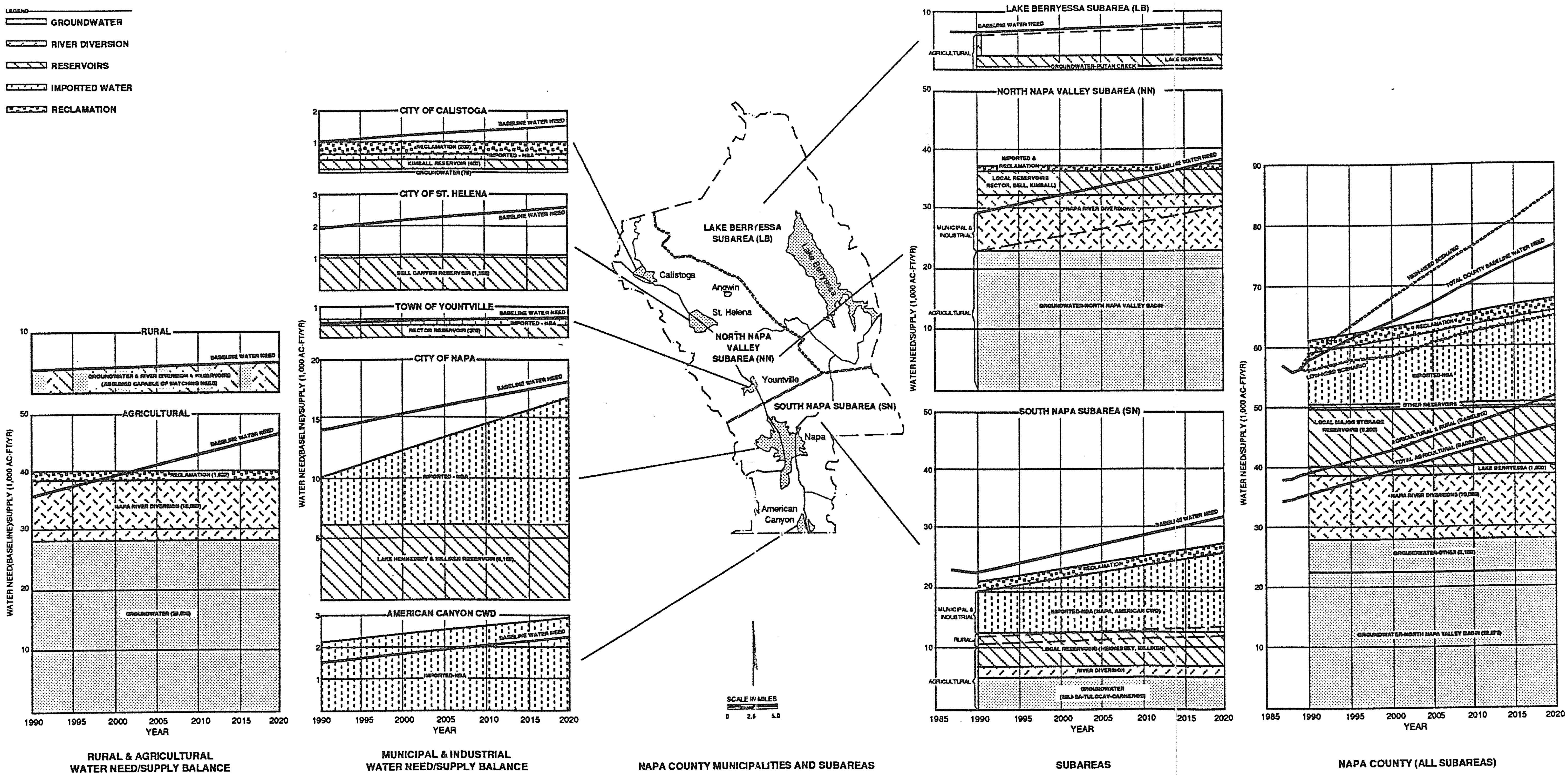


**WATER NEED/ SUPPLY RELATIONSHIPS**

FIGURE S-3

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| User Group | Adequacy of Existing Supplies 1990 | 2020 |
|---|---|---|
| **Individual User:** | | |
| **Municipal and Industrial** | | |
| City of Calistoga | Barely Adequate | Inadequate |
| City of St. Helena | Inadequate | Inadequate |
| Town of Yountville | Adequate | Barely Adequate |
| City of Napa | Inadequate | Inadequate |
| American Canyon CWD | Adequate | Adequate |
| **Rural** | Probably Adequate | Probably Adequate |
| **Agricultural** | Adequate | Inadequate |
| **Subareas:** | | |
| Lake Berryessa (LB) | Adequate* | Inadequate |
| North Napa Valley (NN) | Adequate | Inadequate |
| South Napa (SN) | Inadequate | Inadequate |
| **Napa County:** | Adequate | Inadequate |

* Due to the SWRCB depletion reservation for the Putah Creek area, the right to develop any water supply has been available.

Certain water management issues were addressed in balancing the County's water needs and supplies, as summarized below:

- What is a realistic short-term drought-period cutback in the future water need?
- Can groundwater serve as a potential alternate supply to municipalities, especially during drought periods?
- Have river diversions been maximized through the development of storage?
- Are local municipal reservoirs developed such as to derive the maximum yield from tributary watersheds?
- What supply should be anticipated from Lake Berryessa and who would it serve?

- What can be done about firming up the North Bay Aqueduct supply?
- Can any additional in-County water transfers be implemented?
- What supplemental water supplies might be considered?

Incremental water supplies available from these water management measures are summarized in Table S-4.

## WATER MANAGEMENT PLAN

Based upon the water need/supply balance (surplus or deficit for 1990 and 2020,) as shown in Table S-3, and the incremental supply available from alternative water management measures, as shown in Table S-4, it is recommended that the Napa County Water Management Plan consist of the following elements (See summary in Figure S-4):

- Public Information Element. Develop, maintain, and distribute information to County water users regarding:

    - the source of the County's water supplies.
    - current hydrologic conditions in the County and those pertinent to its imported supply.
    - status of State's efforts to meet its North Bay Aqueduct contract entitlements.
    - status of municipal, industrial, and agricultural water conservation efforts.
    - status of wastewater reclamation efforts.

    Consideration should be given to establishing a water deficiency (drought) index that would trigger certain actions to restrain water use and preserve or enhance supplies through transfers or short-term supplemental supplies.

- Water Need Element. At five-year intervals, update the County-wide water needs analysis to track the baseline water use. In addition, encourage discussion on optimum beneficial use; compliance by municipalities with the conservation commitments contained in their urban water management plans and introduction of incentives for water conservation; the use of advanced water-saving vineyard development and irrigation methods; and facilitate increased wastewater reclamation by identifying potential users.

## TABLE S-4
## INCREMENTAL SUPPLY FROM WATER MANAGEMENT MEASURES

| Water Management Measure | Incremental Supply (Ac-Ft/Yr) 1990 | 2020 |
|---|---|---|
| Drought-Period Water Use Cutback (25%) | | |
| Calistoga | 248 | 379 |
| St. Helena | 484 | 672 |
| Yountville | 112 | 156 |
| City of Napa | 3,456 | 4,549 |
| American Canyon | 398 | 579 |
| Rural (Total) | 947 | 1,245 |
| Agricultural (Total) | 8,888 | 11,656 |
| Total | 14,533 | 19,236 |
| Groundwater as Municipal Supply | | |
| Calistoga | --- | --- |
| St. Helena | --- | --- |
| Yountville | --- | --- |
| City of Napa | --- | --- |
| American Canyon | Not Available | |
| Total | 9,776 | 2,048 |
| Maximizing River Diversions | | |
| Napa River above Oak Knoll Avenue | --- | |
| Other Streams | --- | |
| Total | 5,000 | |
| Maximizing Municipal Reservoir Yield | | |
| Milliken (20-ft dam height increase) | 600 | |
| Rector | Minimal | |
| Lake Hennessey (15-ft dam height increase) | 1,500 | |
| Bell Canyon (20-ft dam height increase) | 700 | |
| Kimball (40-ft dam height increase) | 500 | |
| Total | 3,300 | |
| Lake Berryessa Supply | Indeterminate | |
| Firming Up North Bay Aqueduct Supply (45%) | | |
| Calistoga | 0 | 225 |
| Yountville | 0 | 225 |
| City of Napa | 0 | 8,415 |
| American Canyon | 0 | 2,340 |
| Total | 0 | 11,205 |

## TABLE S-4
## INCREMENTAL SUPPLY FROM WATER MANAGEMENT MEASURES (CONTINUED)

| Water Management Measure | Incremental Supply (Ac-Ft/Yr) 1990 | 2020 |
|---|---|---|
| In-County Water Transfers | | |
| American Canyon NBA Entitlement | 610 | 546 |
| North Napa Valley Groundwater | 9,776 | 2,048 |
| Total | 10,386 | 2,594 |
| Additional Wastewater Reclamation | | |
| Napa Sanitation District | 4,321 | |
| Calistoga | 200 | |
| St. Helena | 500 | |
| Yountville | 100 | |
| Total | 5,121 | |
| New Supplemental Water Supplies | | |
| Local Storage Reservoirs | | |
| Napa River, Off-stream | 10,000 | |
| Others | 1,000 | |
| Imported | | |
| Central Valley Project | 10,000 | |
| Total | 21,000 | |

## PUBLIC INFORMATION ELEMENT

Develop, maintain, and distribute information regarding the water resources of Napa County:

- ☐ Supplies - groundwater, river diversion, local reservoir storage, imported water, wastewater reclamation.
- ☐ Current Hydrologic Conditions - Drought Index
- ☐ Status of North Bay Aqueduct Entitlements
- ☐ Status of Water Conservation Efforts
- ☐ Status of Wastewater Reclamation Efforts

## WATER NEED ELEMENT

Update County-wide water needs analysis periodically and encourage the continuation of existing and implementation of additional water conservation measures.

- ☐ At five-year intervals update baseline water needs estimate and alternative demand scenarios.
- ☐ Analyze optimum beneficial use of stored, imported, and groundwater.
- ☐ Encourage compliance with State-mandated urban water management plan commitments on water conservation.
- ☐ Encourage implementation of incentives to promote conservation with a focus on urban turf and landscaping.
- ☐ Encourage agriculture to use advanced vineyard layout and water-saving methods such as moisture tracking and drip irrigation.

## WATER SUPPLY ELEMENT

Take the lead role in making arrangements and pursuing opportunities in resolving the County's near-term and long-term water need-supply imbalances

### NEAR TERM ACTIONS (Next Five Years)

- ☐ Develop an automatic drought action triggering mechanism (drought index) that would signal a staged program to restrain water use and enhance supplies.
- ☐ Inventory wells or well sites which could be used to supplement municipal water supplies during droughts.
- ☐ Inventory non-municipal water storage capacity along the Napa River to establish diversion capability. Review and summarize existing Napa River diversion water rights.
- ☐ Confirm potential transfers among North Bay Aqueduct contractors within the County.
- ☐ Negotiate multi-year agreement with water surplus-agency to supplement NorthBay Aqueduct entitlement through 1995.
- ☐ Summarize and update the cost of potential existing municipal reservoir enlargements previously studied.

### LONG-TERM ACTIONS

- ☐ Sponsor additional investigation of County's smaller groundwater basins to refine yield estimate.
- ☐ Track exploration of new wells by municipalities and wineries.
- ☐ Insure that County use permits demonstrate the adequacy of water supply and retain drainage on site to encourage groundwater recharge.
- ☐ Negotiate with Solano County to resolve Lake Berryessa water allocation.
- ☐ Serve as lead agency in firming up the North Bay Aqueduct supply through a long-term contract with surplus water-agency and extension of supplemental Central Valley Project water into Napa County. Review North Bay Aqueduct conveyance capacity and feasibility of additional terminal storage.
- ☐ Encourage the implementation of wastewater reclamation by the Napa Sanitation District for turf irrigation in the south-Napa and American Canyon area.
- ☐ Review offstream storage potential if unused Napa River flows are available.
- ☐ Investigate the advantages of conversion of the Flood Control and Water Conservation District into a County Water Agency.

NAPA COUNTY
WATER MANAGEMENT PLAN

FIGURE S-4

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- Water Supply Element. Based on the Water Resource Study, the following guidelines are offered to the District in resolving near-term and short-term imbalances between County water needs and supplies:

  - Water conservation has a very significant impact on getting through drought periods.

  - Adequate groundwater reserve is available in the North Napa Valley Basin for short-term municipal use during drought periods.

  - Off-stream storage is the key to Napa River diversion capability. The total current storage capacity is not well documented.

  - Some opportunities exist for near-term transfers of water among the County's North Bay Aqueduct contractors.

  - Near-term, multi-year arrangements for water are needed to supplement the County's current North Bay Aqueduct entitlements.

  - There are opportunities at Kimball, Bell Canyon, and Milliken to enhance the existing water supply by dam enlargement, although such enlargements would be very costly.

  As far as future activities with regard to water supply, it is recommended that the District consider the following:

  - refine the safe yield estimates of the smaller groundwater basins (Milliken-Sarco-Tulucay, Pipe/Capell Valleys, and the Carneros area.

  - track exploration for new wells by municipalities and wineries.

  - undertake an inventory of non-municipal storage facilities with special emphasis on Napa River diverters, using a follow-up on the winery questionnaire conducted during the current study. Summarize riparian and appropriative river water rights. Review offstream storage potential if unused Napa River flows are available.

  - for County development use permits, insure that drainage is retained on site to encourage groundwater recharge, and that adequacy of the water supply is fully demonstrated.

- negotiate with Solano County for allocation of the Lake Berryessa water rights considering the needs and supplies of the Lake Berryessa Subarea as discussed in this study.

- serve as the lead agency in firming up the North Bay Aqueduct supply so that full entitlement will be available.

- encourage the implementation of Napa Sanitation/American Canyon Water District's reclamation plans at the joint Soscol Wastewater Plant.

- investigate the advantages of conversion of the District into a county water agency as water supply consumes an ever-increasing share of the District's activities.

# SECTION 1

## STUDY OBJECTIVE AND SCOPE

As the existing water supplies of Napa County reach full utilization, and the water needs of the County's municipalities and agriculture continue to go up, formulating practical solutions to the water needs - supply balance is best achieved by a regional, County-wide review of longer-range water needs and alternative water management strategies. Napa County Flood Control and Water Conservation District (County) has evolved as the sponsor of the study since it is the prime regional contractor for supplemental water from the State via the North Bay Aqueduct. Further, the County is the negotiating agency for Solano Project (Lake Berryessa) water, and is the logical requestor of potential uncommitted Central Valley Project (CVP) from the Bureau of Reclamation.

Specifically, the objective of this study is to provide an in-depth review and future projection of water demands and supplies for all of Napa County, with incremental 5-year projections between the years 1990 and 2020 for municipal, industrial, and agricultural users. Although numerous studies have been conducted over the years on various aspects of water needs and supplies, the last comprehensive, County-wide assessment was conducted nearly 30 years ago.

The scope of work of Agreement #2893 - Contract for Engineering Services for Napa County Water Resources Study, approved by the County Board of Supervisors on February 27, 1990, consists of the following series of tasks:

| Task | Description |
|---|---|
| 1 | Summarize Existing Water Use |
| 2 | Characterize Existing Water Use |
| 3 | Estimate Water Needs to Year 2020 |
| 4 | Summarize Existing County Water Supplies |
| 5 | Analyze Demand - Supply Relationship |
| 7 | Discuss Plans for Supplemental Water Sources |
| 8 | Recommend a Program for Balancing Water Needs and Supply |
| 9 | Meetings and Reports |

Section 1

Study Objective and Scope

| Report Section | Title | Task Covered |
| --- | --- | --- |
| 2 | Description of Study Area | ---- |
| 3 | Water Needs | 1,2,3,4 |
| 4 | Existing Water Supplies | 5 |
| 5 | Water Quality | 4,5 |
| 6 | Balancing Water Needs and Supplies | 6,7,8 |

In order to coordinate the study work with the County's primary water users, an Advisory Committee was formed, consisting of the following:

- City of Calistoga
- American Canyon County Water District
- City of Napa
- City of St. Helena
- Town of Yountville
- County of Napa
- Farm Bureau
- Vintners Association
- United Napa Valley Associates/Sierra Club

The input of Advisory Committee members is hereby acknowledged.

# SECTION 2

## DESCRIPTION OF STUDY AREA

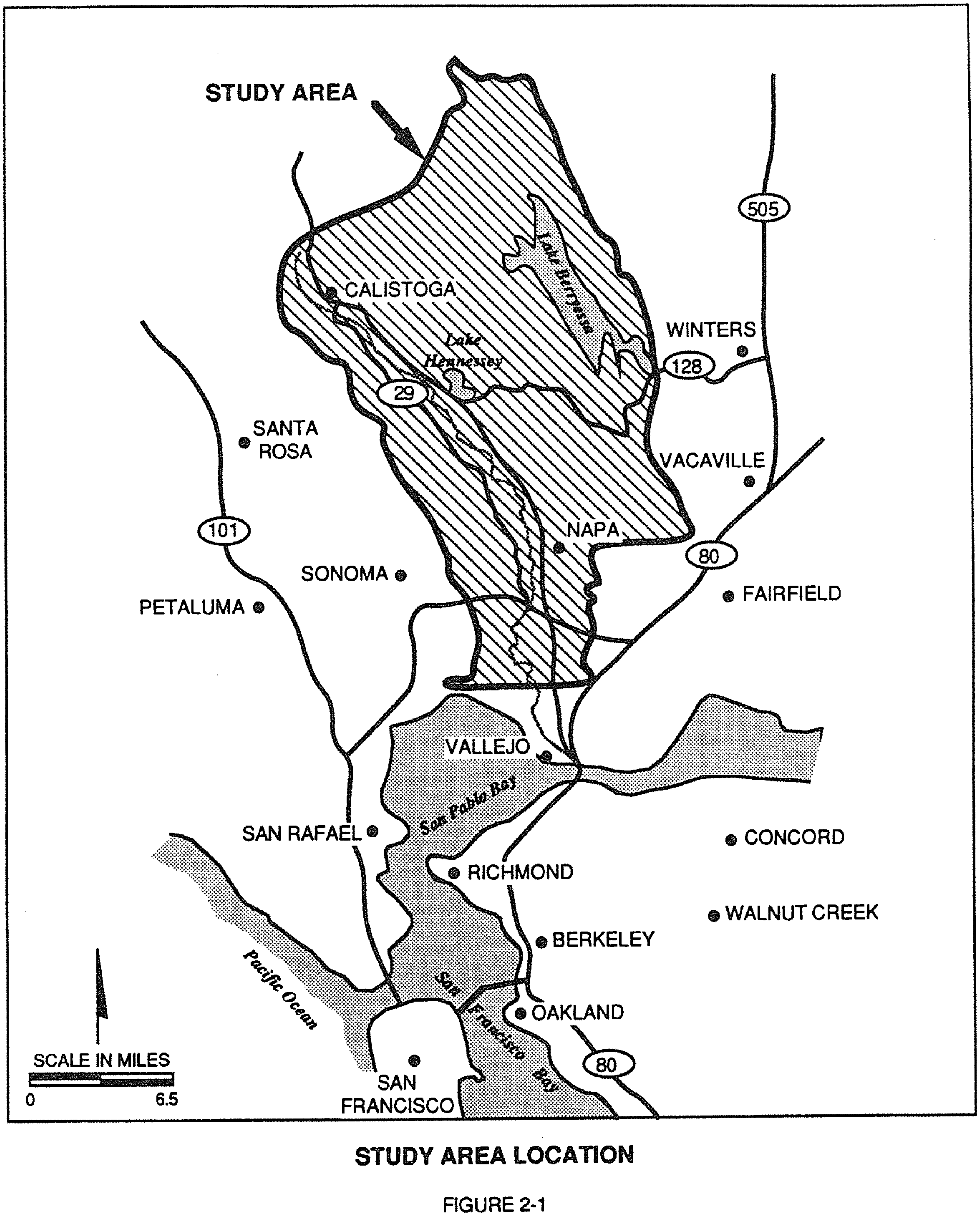
Napa Valley, the key, most well-known portion of Napa County, extends about 35 miles in a gentle northwesterly arc from the shores of San Pablo Bay to the hills above Calistoga, culminating in 4,000 foot-high Mount St. Helena. At the foot of the valley lies the City of Napa; to the southwest, the Carneros region; and to the southeast, the American Canyon area. The valley is surrounded on both sides by mountains, with the Mayacamas on the west side separating Napa from Sonoma County. Beyond the eastside hills lie a series of smaller valleys from Pope Valley in the north to Wooden Valley in the south. Further east lies the large man-made reservoir, Lake Berryessa. (See Figure 2-1 for study area location.)

Napa County is now recognized world-wide for its premium wines and as a popular tour goal based on its scenic vineyards and wineries. It is the Napa Valley floor, between Highway 29 and the Silverado Trail, that dominates as vineyard area, with, however, more and more hillside plantings in recent years. Napa Valley's towns of Napa, Yountville, Oakville, Rutherford, St. Helena, and Calistoga are well known as a result of the valley's wine reputation, with the latter town further recognized as a health resort with natural hot-water geysers, mineral springs and mineralized mud baths. The climate of the valley varies from the cooler, Bay-influenced southern portion such as the Carneros area, to the hotter northern end at Calistoga. The valleys to the east and Lake Berryessa are still hotter. At the southeast end of the County lies the unincorporated community of American Canyon, located adjacent to the City of Vallejo on the border of Napa and Solano Counties.

The County has long recognized the importance of maintaining vineyard land, creating in 1968 the agricultural preserve designation. It is the proper balance between requirements for resource preservation and urban development needs of the County that has occupied many general plan formulations and updates. With 1.5 million County visitors a year and approximately 240 wineries in business or in the approval state, concern about traffic and water recently resulted in new County regulations imposing strict limits on the size and scope of winery expansions and public events. At the southern end of the County, 3,000 acres have been set aside for commercial development including manufacturing, distribution warehouses and office space. Recent announcements indicate a growing commercial and industrial zone. The County and its towns are generally governed by population growth goals, with the greatest urbanization currently taking place in the American Canyon area due to its proximity to Highway 80, the booming city of Vallejo and the recently-relocated Marine World.

For purposes of this study, Napa County has been divided into three subareas:

- North Napa Valley (NN)
- South Napa (SN)
- Lake Berryessa (LB)




**STUDY AREA LOCATION**

FIGURE 2-1

These subareas were established to facilitate development of the water need and supply balance. For example, the NN Subarea, covering the main Napa Valley north of Oak Knoll Avenue, just outside of the City of Napa, was used by the U.S. Geological Survey in its 1973 groundwater model. The subarea's groundwater basin and the Napa River, which is the main stream within the area, provide a dominant water supply for subarea agriculture. In the case of the Lake Berryessa Subarea, the lake's watershed is the basis of water right reservations associated with construction of Lake Berryessa.

Within each subarea, water needs by user group (agriculture, municipal and industrial, and rural) and appropriate supplies will be brought into balance, to the greatest extent possible, before inter-subarea water transfers are considered.

# SECTION 3

# WATER NEEDS

Water use in Napa County primarily satisfies agricultural and municipal needs, with a small percentage of use by industry and rural areas. The purpose of this section is to present existing water use (1989) and projections of future water needs to the year 2020 for Napa County. The uses are separated into four primary categories:

- Municipal and Industrial
- Rural
- Vineyard
- Other Irrigated Agriculture

Municipal and industrial users rely primarily on local reservoirs and the North Bay Aqueduct, with a small percentage of supply coming from groundwater. Groundwater pumping and diversions from the Napa River and its tributaries, as well as numerous streams and creeks in the Lake Berryessa watershed, supply water to the other three user categories.

The remainder of this section is organized as follows:

- **Data Collection.** This section discusses the data collection effort conducted for the water needs analysis.

- **Methodology.** This section provides a description of how existing water use and future water needs are estimated for this report.

- **Analysis of Existing (1989) Water Use.** This section presents the existing water needs (1989) for the four major water use categories. The characteristics of water use are also presented for each group; this provides the basis for projecting future water needs, and conducting operations studies of supply sources

- **Future Water Needs.** This section presents estimates of water needs projected to the year 2020. Projections are made in five-year increments according to the water user groups mentioned above. In addition, alternative scenarios are considered which provide a range of likely water needs, accounting for potential variations in the adopted water use characteristics, population growth, and land use development.

## DATA COLLECTION

An extensive effort was made to collect data pertaining to water use practices and requirements, population projections, and existing and future land use plans, all of which are desirable for a water needs evaluation. The data collection effort consisted of: a review of general plans, master water supply plans, water management plans, and previous investigations; a review of agricultural water and land use practices; acquisition of historical water production records and metered water sales records; collection of historical and projected population data; acquisition of land use maps and data; and consultation with the Agricultural Commissioner's Office, the U.C Davis Cooperative Extension, the Farm Bureau, the Napa County Planning Department and the Advisory Committee, a panel consisting of experts in the areas of water and land use in Napa County.

As is common with these types of studies, the available data is not as complete as would be desired and it is not always in a consistent format. From inspection of the database, the following observations were made:

- Historical water production data for the City of Calistoga, the City of St. Helena, the City of Napa, the Town of Yountville, and American Canyon area are available. Recent data for the community of Angwin is not readily available;

- Metered water sales records are not readily available for the entire historical period 1985 through 1989, nor for all the communities; this is a reflection of the water rate structure of the communities;

- Industrial water use supplied by municipal sources is available for some communities, however historical information is limited and the format is not consistent from area to area. Production of water from private sources for industrial uses is not readily available; some information is reported in investigations conducted by the California Department of Water Resources (DWR);

- Very limited data is available for water use by customers served by small water purveyors or water use by rural users on private wells for the historical period 1985 through 1989;

- No measurements of groundwater pumping or surface water diversions for crop irrigation are readily available for the historical period 1985 through 1989;

- Historical and projected population data is available for Napa County from the California Department of Finance (CDOF) for 1985 through 2020. The Association of Bay Area Governments (ABAG) publishes population projections for Napa County, the incorporated areas, and the American Canyon area for 1985 through 2005;

- Existing land use maps/data (1989) for Napa County and for the communities have not been compiled recently. General Plan land use maps are available;

- Detailed land use maps and land use acreage are available from DWR Land Use Study #88-62. This study, completed in 1988, delineates existing land use (1987) for Napa County on U.S. Geological Survey (USGS) quadrangles; land use is divided into 26 groups -- ten agricultural classifications, six native classifications, six urban classifications, and four recreational classifications. Corresponding acreage for each quadrangle and classifications are also available.

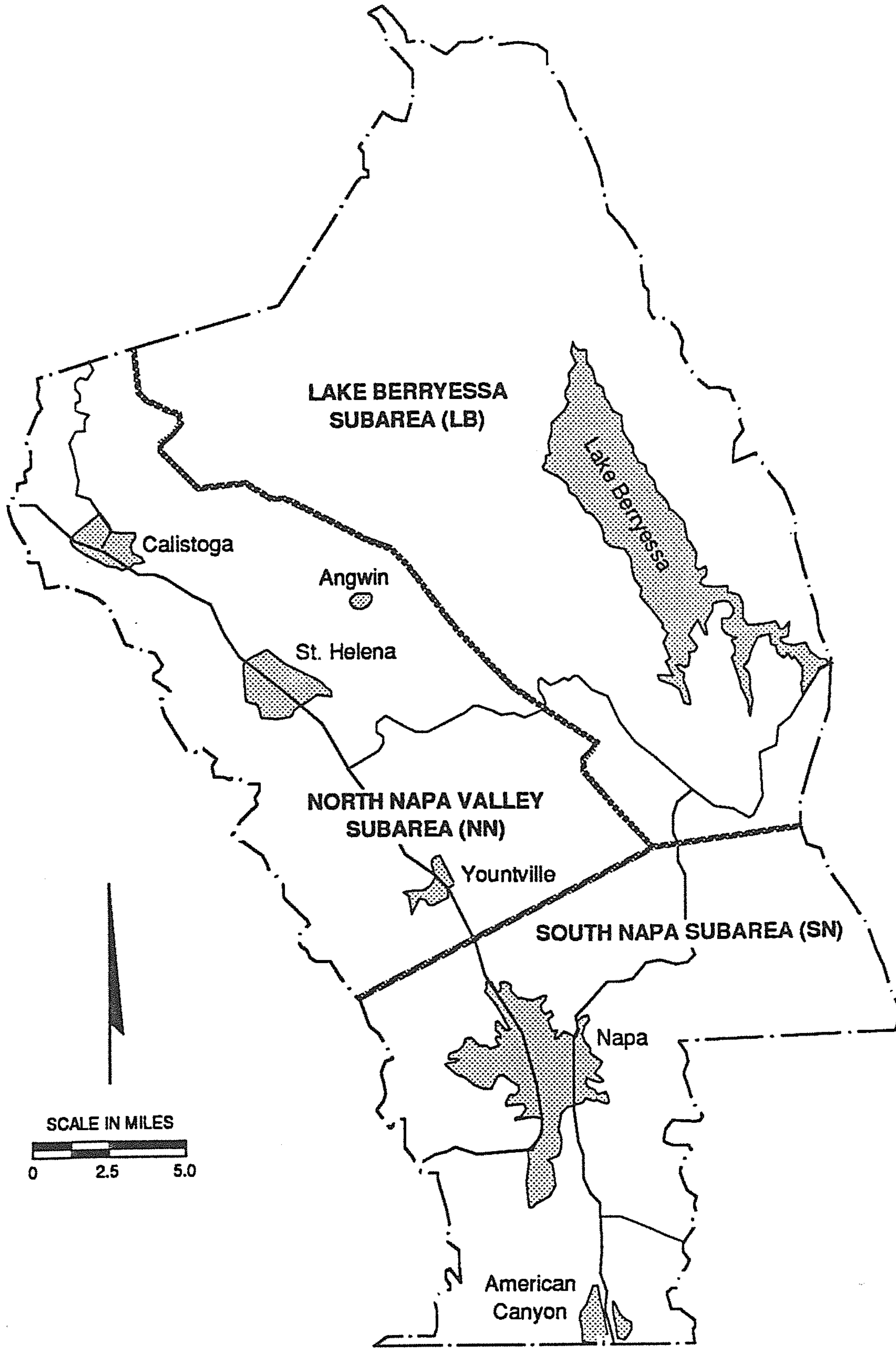
## METHODOLOGY

To determine existing and future water needs in Napa County, unit water consumption was analyzed or developed by user group, as discussed below. See Figure 3-1 for an overview of the water needs methodology.

### Municipal and Industrial Water Needs Analysis

Municipal and industrial water use for 1989 were determined from an analysis of water production records and metered water sales data maintained by the water service agencies serving communities discussed above.

The most common approach for estimating future water needs of the municipal and industrial sector is the per capita consumption factor. The per capita method is ideal for areas that do not expect dramatic changes in the current composition of the city and its water use characteristics. The data required for this method is the annual water consumed for a service area and the corresponding number of customers served. In this study, water production records for a city, together with historical population data, provided the information necessary to estimate an average annual per capita use for the city. (This assumes the geographic delineation of the water service agency boundary is coincident with the geographic area used for the population estimate). The per capita consumption factor is then used with projected future population data to estimate the corresponding future water need.




NAPA COUNTY MUNICIPALITIES AND SUBAREAS

**RECENT HISTORICAL USE (1985-89)**

HOW MUCH PER YEAR?
- Municipalities
  Production Records for:
  - American Canyon CWD
  - City of Napa
  - Town of Yountville
  - City of St. Helena
  - City of Calistoga
- Rural
  - Angwin Area: Production Records
  - Remainder: Estimate based on population x per capita use
- Agricultural
  - Vineyards
    - Irrigation requirements = 1987 DWR acreage x applied water based on region (Ac-Ft/Ac/Yr)
      - South Napa Subarea = 0.4
      - North Napa Valley Subarea = 0.5
      - Lake Berryessa Subarea = 0.6
    - Frost Protection = DWR acreage x 0.33 Ac-Ft/Ac/Yr
    - Heat Protection = DWR acreage x 0.17 Ac-Ft/Ac/Yr
  - Other Agriculture
      - Pasture - 4.0 Ac-Ft/Ac/Yr
      - Deciduous - 2.0 Ac-Ft/Ac/Yr
      - Truck Crops - 2.4 Ac-Ft/Ac/Yr
      - Grain - 1.2 Ac-Ft/Ac/Yr

**UNIT WATER USE**

CHARACTERISTICS?
- Variation in Use
- Unit Use
  - Per Capita
  - Per Acre
- Extent of Conservation

WILL CURRENT CHARACTERISTICS CONTINUE?
- Greater Density
- More Conservation
- Change in Industry
- Change in Crops
- System Improvements

**FUTURE WATER NEED**

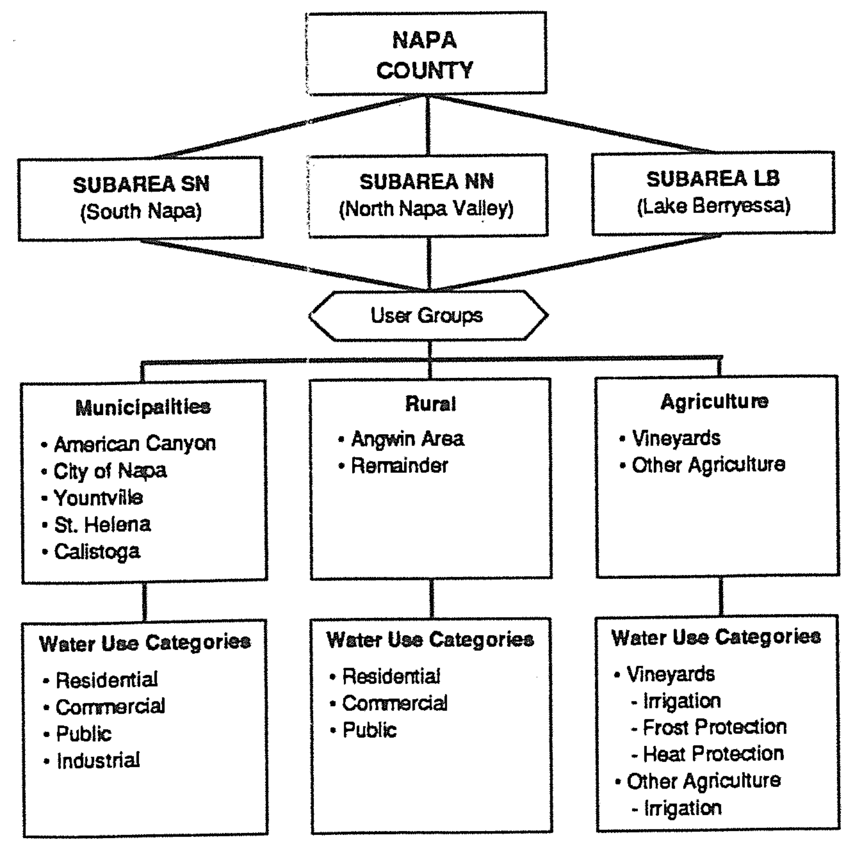
How do local and regional planning entities envision future distribution of population and land use within Napa County?
- Reflection of Policies
- Regional Economy
- Land Capabilities

Municipalities
- Residential/Commercial/Public
  To year 2005, ABAG population projections x per capita use.
  To year 2020, California Department of Finance population projections x per capita use.
- Industrial
  General/Specific Land Use Plans for years 2000/10. Acreage of water use category x unit use (Ac-Ft/Ac/Yr)

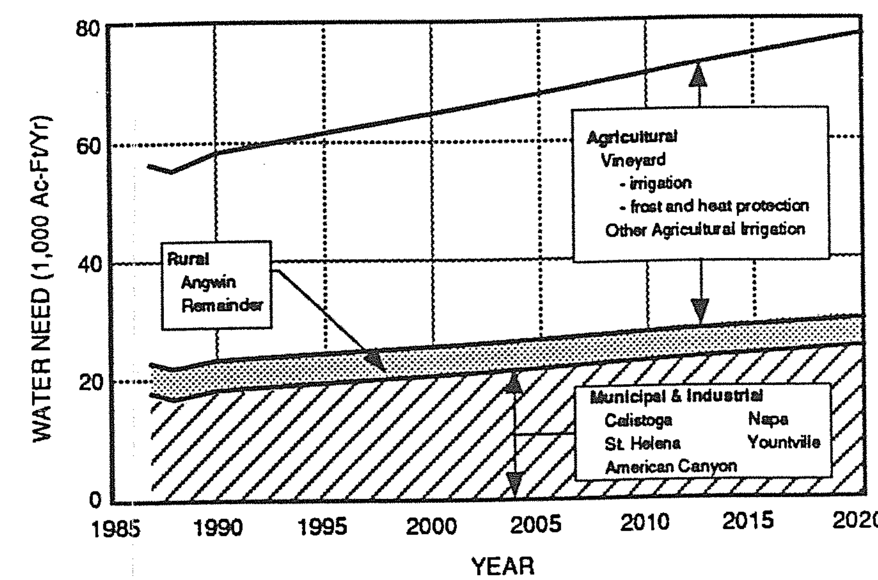
Rural
To year 2005, ABAG population projections x estimated per capita use.
To year 2020, California Department of Finance population projections x estimated per capita use.

Agriculture
- Vineyards:
  In year 2020, 53,000 Ac (based on Agricultural Resource acreage of County General Plan) x applied water requirement for irrigation and frost and heat protection.
- Other Agriculture: Constant water demand.

WATER USE CALCULATIONS




WATER USER CLASSIFICATIONS




NAPA COUNTY WATER NEEDS

## OVERVIEW OF WATER NEEDS METHODOLOGY

FIGURE 3-1

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## Section 3

## Water Needs

In order for the unit consumption approach to yield valid estimates of future water needs, existing and probable future water use practices must be reviewed. The review considered the current effectiveness of water conservation practices of the municipal and industrial groups, and the likelihood of additional conservation driven by governmental regulation, economics, or technical advancements. The water management plans, mandated by the State, cover a community's goals as far as conservation is concerned. In addition, adjustments were made to the per capita estimates to account for: recent hydrologic conditions; anticipated changes in population density; commercial development; large industrial uses, and tourism.

The characteristics of municipal use in Napa County, consisting of residential, commercial, and public water needs, are not expected to change dramatically over the planning horizon. However, the industrial use component can vary dramatically as a result of the unique water requirements of certain kinds of industrial processes. To guarantee the accurate representation of future water use characteristics, the per capita method was enhanced to accommodate this possibility. The industrial component was separated from the total municipal and industrial water needs prior to calculating the per capita consumption factor.

Future industrial water needs were estimated in one of two ways, based on data availability. If metered water sales records were available, together with corresponding existing land use maps, a water duty for the industrial portion was determined. (A water duty represents the amount of water required per unit area occupied by a particular land use category, expressed in units of acre-feet per acre per year). Estimates of future industrial water needs were then determined by applying the water duty to future land use acreage reserved for industrial development, as stated in the general plans. Alternatively, relying on previous investigations and/or recommendations from Advisory Committee panelists, industrial water use was expressed as a percentage of the total water use. Water needs in the future were then assumed to reflect this same percentage. Any error induced from the special treatment of this industrial factor was presumed to be small since industrial use in Napa County is a relatively small component of the total water needs.

### Rural Water Needs Analysis

Existing water use of the rural population can also be determined from a compilation of water production records. However, such records of rural water use are not regularly maintained on a public level. Hence, an estimate of per capita water consumption was used together with historical population data.

A large component of the rural population is made up of individuals associated with wineries situated primarily throughout the Napa Valley. This industry has a water use component consisting of needs for domestic purposes, bottle washing, tourism, and other incidental uses for processing of wine. A survey revealed that winery operations required relatively little water, with domestic needs requiring the largest percentage. This domestic need was already accounted for in the rural per capita estimate. From the survey, the remaining uses were averaged over the rural population and an additional per capita component included with the overall rural per capita estimate.

The same per capita estimate was used with projected population data to determine future water needs of the rural population. No adjustments were made to the per capita use estimate for calculating future water needs. This assumes that water use characteristics of the rural population will remain constant over the planning horizon.

### Agricultural Water Needs Analysis

Generally, irrigation for agricultural purposes is met by pumpage of groundwater, surface water diversions from local streams and creeks, and to a lesser extent water service agencies. Typically, records of agricultural water consumption are not maintained and/or are not easily obtained. The most common approach used to estimate existing agricultural water needs makes use of an applied water requirement factor, expressed in units of acre-feet of water required annually per acre of crop for a particular crop type. The annual water requirement is based on the amount of water needed to meet the evapotranspirative needs of the crop as well as losses incurred in conveyance systems.

Agricultural water use practices in Napa County have a unique requirement for vineyards posed by the threat of severe frost and heat conditions. Water is commonly sprayed over the vineyard to protect the vines from potential damage. If adequate protection against these two factors is not provided, significant economic loss can be incurred. Numerous studies conducted in the past have estimated the seasonal and annual water needs required for frost and heat protection. However, determining an annual average water application for these purposes has been difficult because of the unpredictability due to erratic climatic conditions. In this study, individual average annual water consumption factors were determined for frost and heat respectively based on previous studies. These factors were then added to the irrigation-applied water requirement.

The applied water requirement determined for a particular crop was used, together with crop acreage determined from existing detailed land use maps prepared by DWR, to estimate the existing water needs of a particular crop.

To calculate future irrigated crop water needs, the growth patterns of the different crop types were evaluated, as well as future irrigation practices that may alter the water consumption factor. Crop development depends on the Napa County general plan land use element, economics, land availability, and water availability. The applied water requirement for each crop was evaluated and adjusted according to potential changes in irrigation practice and irrigation efficiency. Water demand projections were calculated by applying this adjusted applied water requirement to the projected future crop acreage as designated in the Napa County General Plan.

### Alternative Scenarios

In addition to the above estimates, alternative scenarios were developed to consider the possibility of changes in projected populations, land use development, and to account for changes in general water use characteristics.

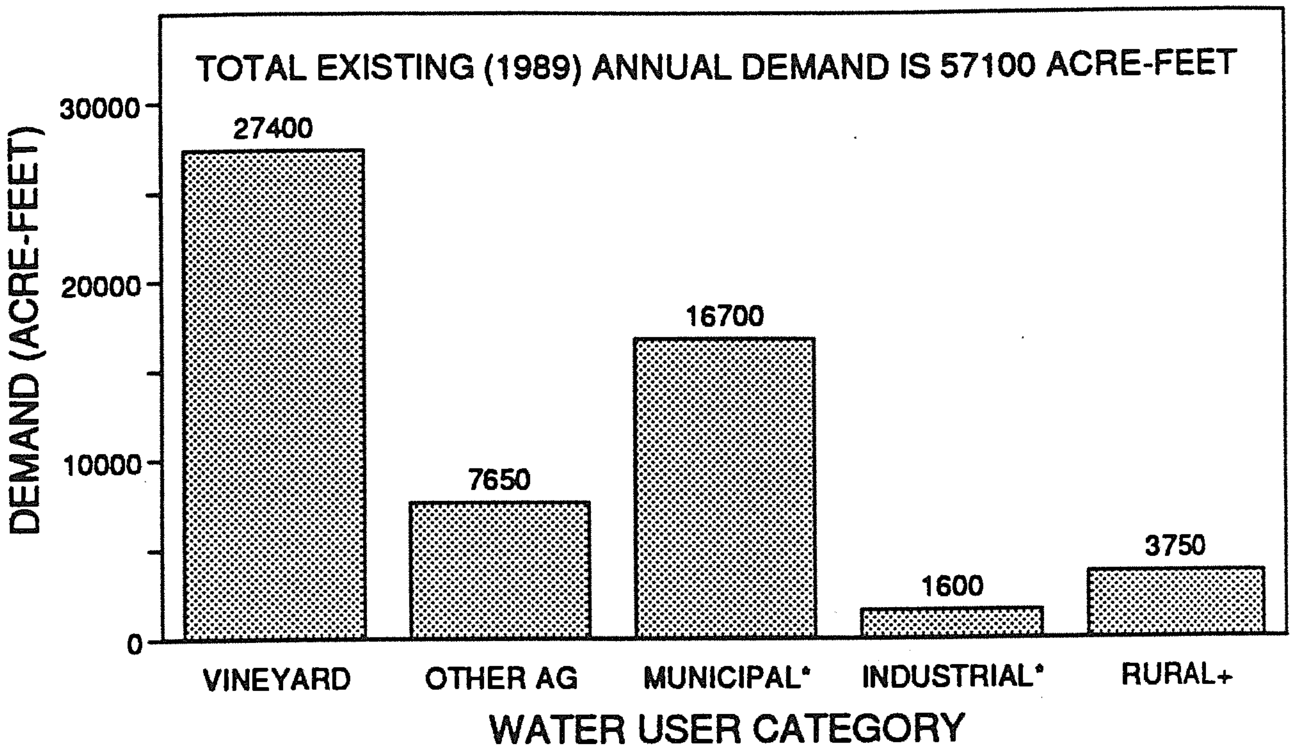
## ANALYSIS OF EXISTING (1989) WATER USE

As discussed previously, water use in Napa County has been separated into four categories: Municipal and Industrial; Rural; Vineyard; and Other Irrigated Agriculture. The total current (1989) water use for Napa County is 57,100 acre-feet. The distribution of this total by water use category is shown in Figure 3-2.

### Municipal and Industrial Water Demand

The focus of municipal and industrial use is in the urban areas of Calistoga, St. Helena, Yountville, Napa, American Canyon, and Angwin. The residents of these areas make up 81 percent of the total population in Napa County, and are located in the North Napa Valley and South Napa Subareas. Each of these communities, with the exception of Angwin, is served by a single water service agency. The Angwin area receives its water primarily from the Howell Mountain Mutual Water Company, Pacific Union College, and St. Helena Hospital. The water agency boundaries generally coincide with the urban limit lines defined in the general plans, although in some cases a small number of residential and industrial customers exist outside the service area boundaries.

**Existing Municipal and Industrial Water Use.** Existing municipal and industrial water use was determined using water production records from the individual water service agencies. Additional metered water sales records were available for some cities, though the use of this data is limited since records are incomplete. However, this additional information serves to check and validate the water production data. Each community, as mentioned previously, is treated individually, accounting for the variations in water use practices of the distinctive communities. The total current (1989) combined municipal and industrial use is 18,300 acre-feet (Figure 3-2).




* Includes the cities of Calistoga, St.Helena, and Napa, the Town of Yountville (including the group quarters), and American Canyon.
+ Includes the rural population, the Angwin area, and winery usage.

**EXISTING (1989) WATER USE**
**NAPA COUNTY, CALIFORNIA**

FIGURE 3-2

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## Section 3

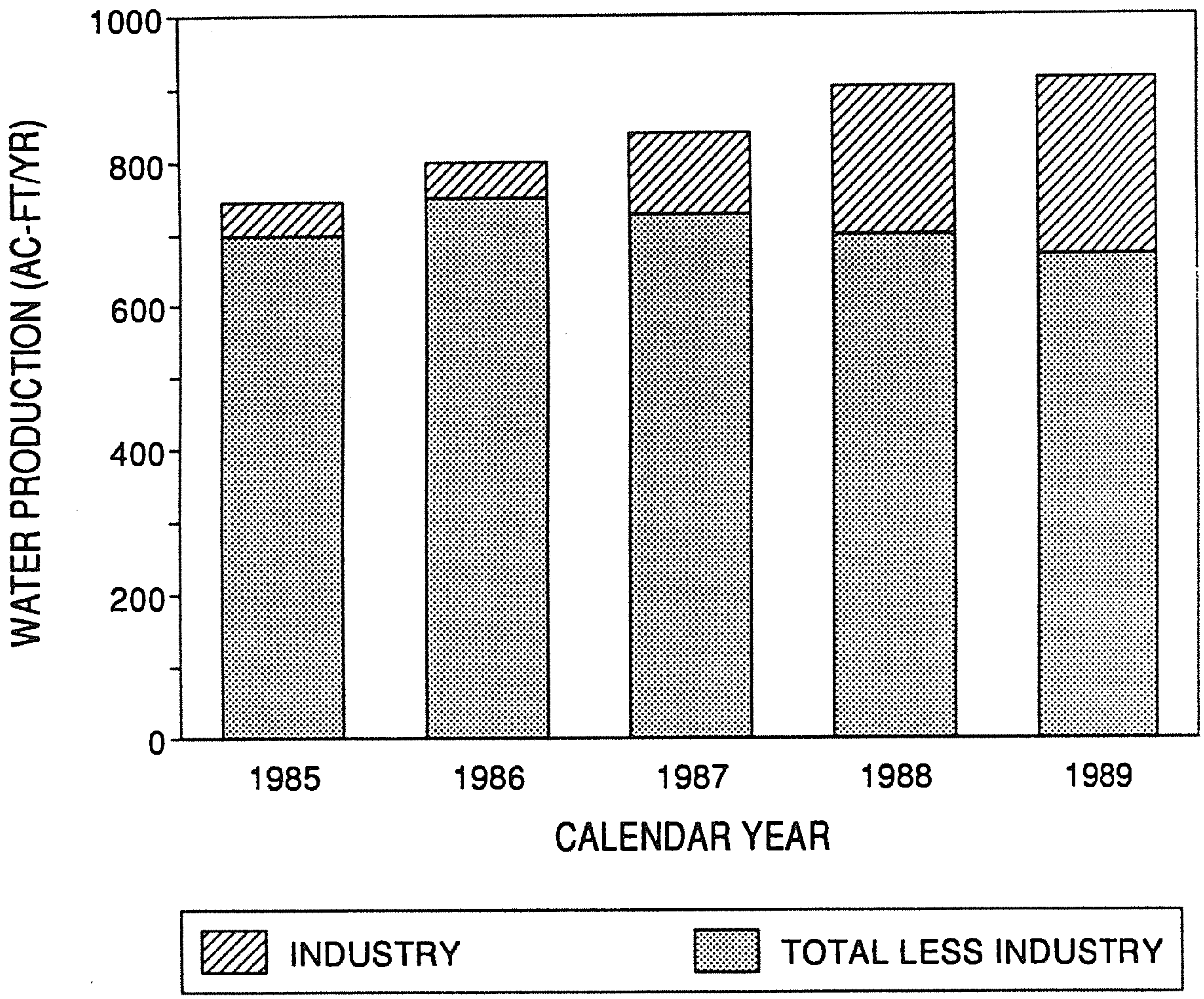
## Water Needs

The City of Calistoga, located in the extreme north end of Napa Valley, provides water for residential, commercial, industrial, and public uses within its city limits. The city's water needs are supplied from Kimball Reservoir, the North Bay Aqueduct, and the Fiege well field. The most significant industrial use is for Calistoga bottling works, responsible for producing sparkling mineral water. In recent years this industry has grown tremendously, as is reflected in Figure 3-3 which depicts historical total water production, with industrial use segregated from the total use, and the remainder consisting of residential, commercial, and public uses. The industrial use was determined from 1989 metered water sales records. For 1985 through 1988, industrial water use was estimated from previous work (Heuser, 1989).

The City of St. Helena, located south of Calistoga, near the center of Napa Valley, is served by the Water Enterprise of St. Helena. Water is supplied by Bell Canyon Reservoir, and in recent years, additional water, as needed, has been imported from outside sources according to temporary short term contracts. Currently, groundwater does not provide any supply, though investigation of wells located within the service area are ongoing. The Water Enterprise sells approximately 79 percent of its water within the St. Helena city limits, with the remainder being distributed to residential and commercial use, as well as wineries for wine production outside the service area (Hanson, 1987). In addition, restaurants and overnight accommodations for tourists represent a significant water use. Recent historical use, according to water production records collected from the Louis Stralla Water Treatment Plant, are presented in Figure 3-4. Industrial use was 440 acre-feet in 1987 (Hanson, 1987). The use was assumed to be an average use and was separated from the remaining years as well.

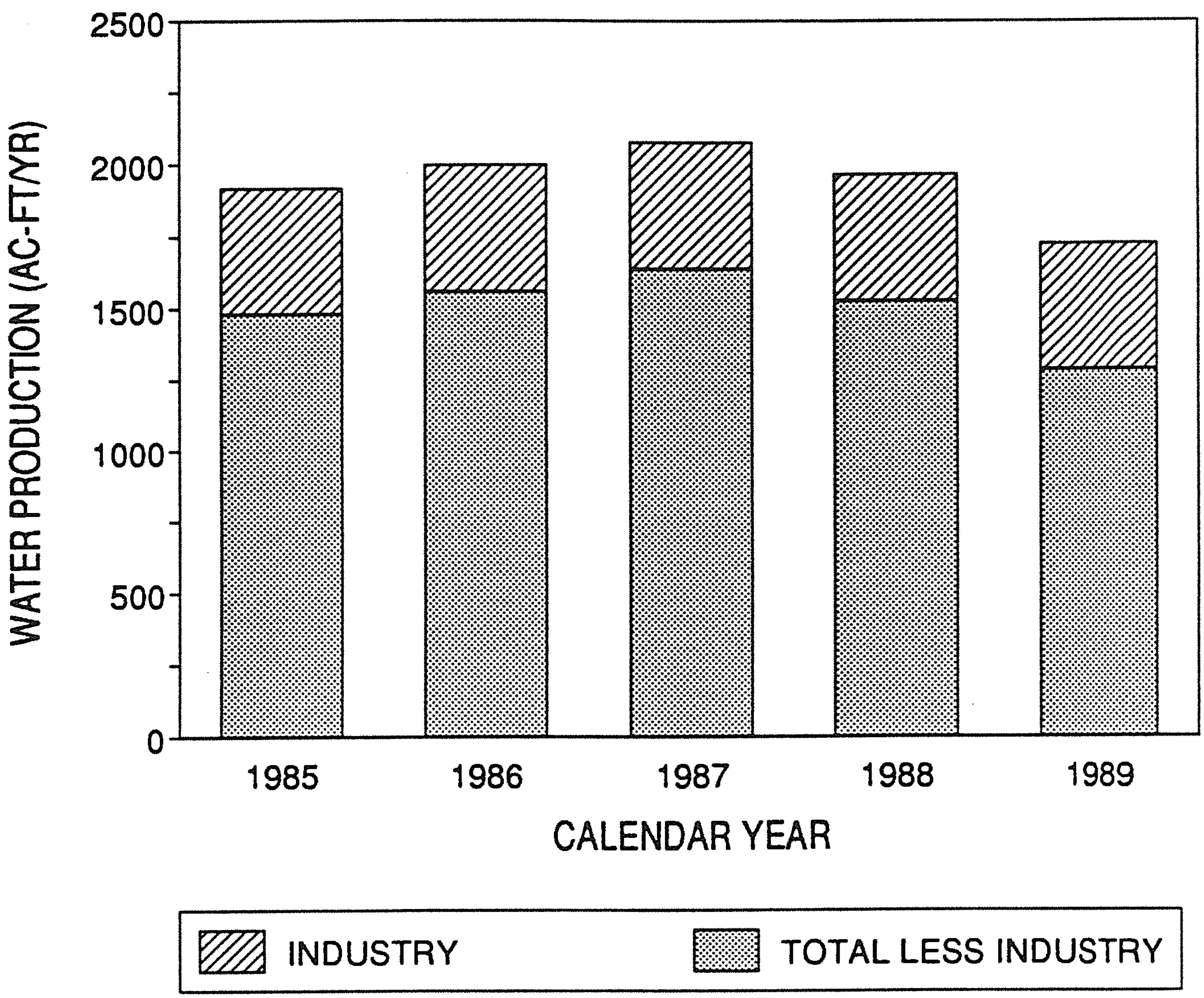
Another residential community within Napa Valley, located north of the City of Napa, is the Town of Yountville. The water service area serving Yountville includes residents in the town limits and excludes those people living in the California Veterans Home. The water supply comes from two sources, the North Bay Aqueduct and Rector Reservoir, through contractual agreements with DWR and the California Department of Veteran Affairs, respectively. The water use in Yountville is dominated by residential and commercial needs; no industrial uses are reported. However, like St. Helena, restaurants and overnight accommodations for tourists represent a significant water use. Water production records for the Yountville water service area are presented in Figure 3-5.

The largest community of Napa County, the City of Napa, is located near the southern-most end of Napa Valley. With a population of approximately 64,500 in 1989, the City of Napa is home to over 60 percent of the total Napa County population. Water needs are currently met by three primary supplies: Lake Hennessey, Milliken Reservoir, and the North Bay Aqueduct. With the exception of two large industrial operations (Napa Pipe and Syar Rock),



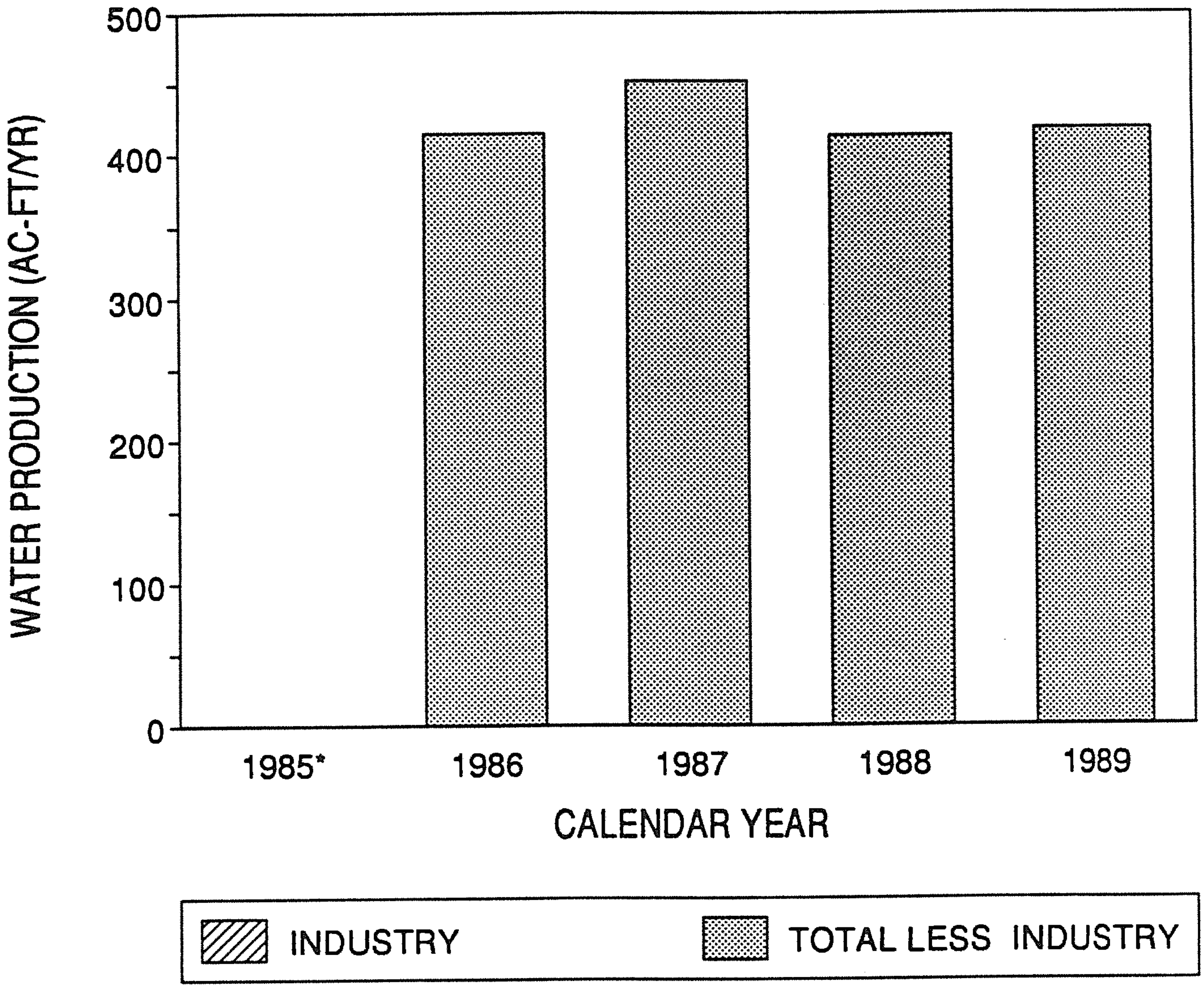

**HISTORICAL WATER PRODUCTION FOR THE CITY OF CALISTOGA, NAPA COUNTY, CALIFORNIA**

FIGURE 3-3




**HISTORICAL WATER PRODUCTION FOR THE CITY OF ST. HELENA, NAPA COUNTY, CALIFORNIA**

FIGURE 3-4




* Water Production data not available for 1985

**HISTORICAL WATER PRODUCTION FOR THE TOWN OF YOUNTVILLE, NAPA COUNTY, CALIFORNIA**

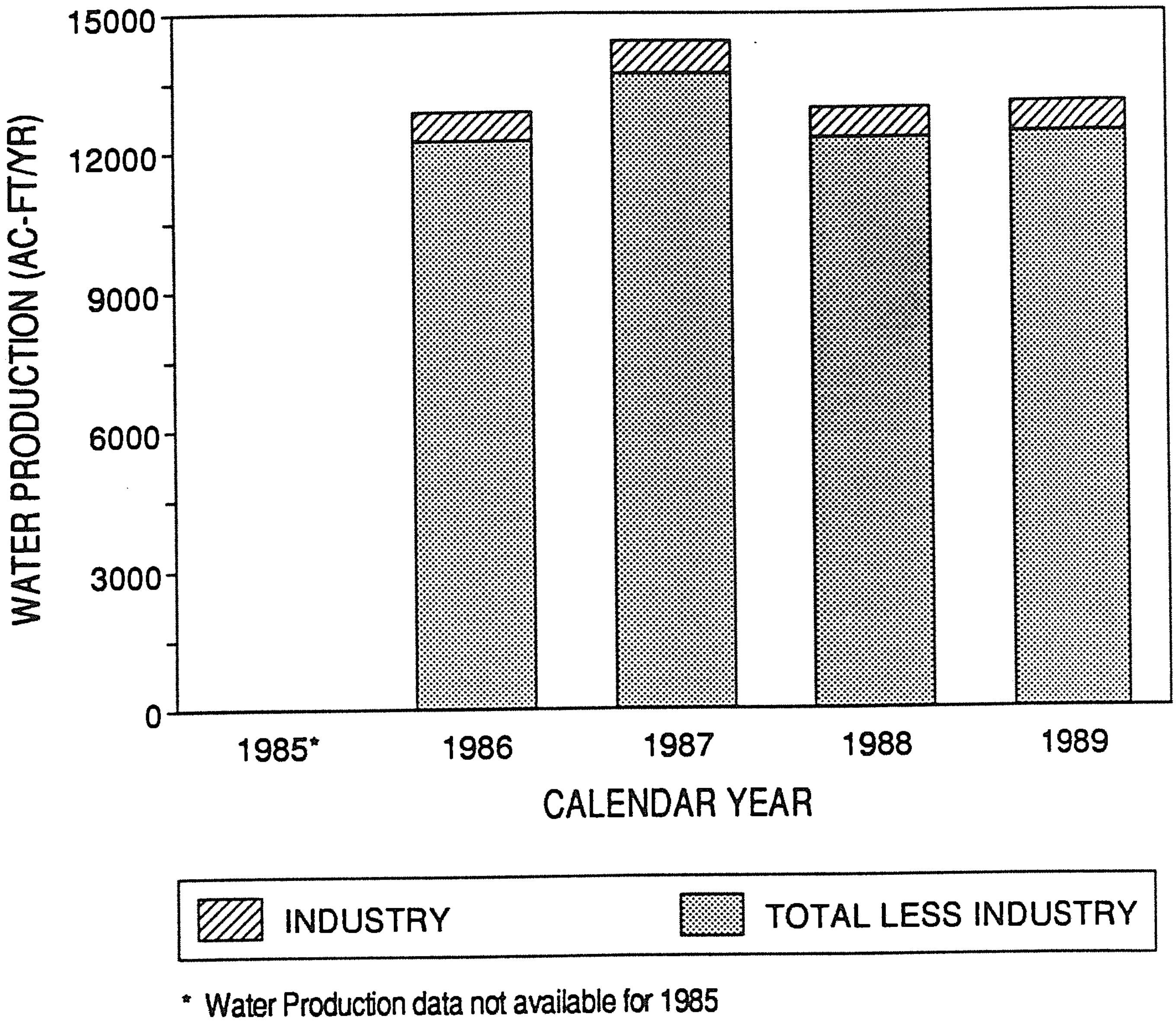
FIGURE 3-5

industrial activity is limited to small operations. The City sells surplus water to agricultural customers, primarily vineyards, when the municipal and industrial requirements have been met. This service is provided on a contract basis and is interruptible. The combined recent historical water production records of the three water treatment plants (Hennessey, Milliken, and Jameson) supporting the City of Napa are shown in Figure 3-6. The segregation of industrial use from the total use was based on an estimate that five percent of the total use was for industrial needs. Data from metered water sales records were used to derive this estimate. Industrial use could not be directly extracted from the records due to the water rate structure used by the city of Napa. Consultation with the Advisory Committee enabled the five percent estimate to be determined (City of Napa, 1990).

The American Canyon County Water District (ACCWD) serves a rapidly developing unincorporated community referred to as American Canyon, located in the southern end of Napa County. The Local Area Formation Committee (LAFCOM) has identified a boundary for the area congruent with the ACCWD service area. The service district receives its water supply principally from the State Water Project via the North Bay Aqueduct with minor supplemental supplies from the City of Vallejo and a connection to the City of Napa distribution system. The area is predominantly residential. The steady upward trend of water production, as shown in Figure 3-7, is an indication of recent growth. Figure 3-7 reflects the initiation of a 5-year contract serving an agricultural interest, which, for purposes of this study, was treated as an industrial demand (assumed constant for 1987 through 1989) and separated from the municipal demand. No other industrial uses were reported.

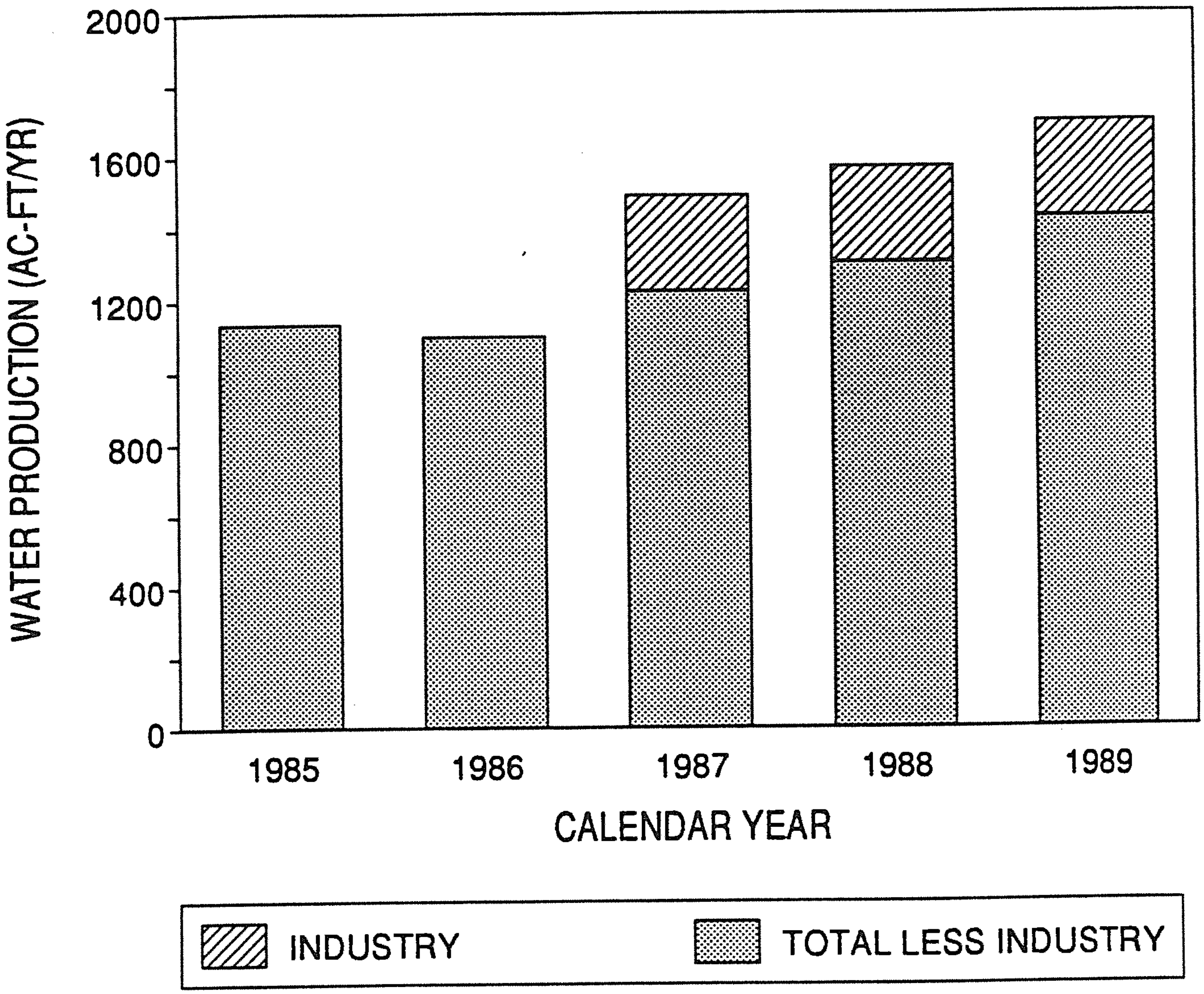
Recent water production data for the Angwin area was not readily available. Instead, estimates of per capita consumption and population were used to determine existing water use. The per capita estimate was taken from a previous investigation conducted for the Howell Mountain Mutual Water Company (Winzler & Kelly, 1985).

**Characteristics of Municipal and Industrial Water Use.** For projections to be made of future municipal and industrial water needs, an analysis of the existing water use was conducted, deriving unit consumption factors for each municipality. The historical water production data for each water service agency, together with historical population data obtained from the CDOF and the ABAG, was used to obtain annual per capita consumption in units of gallons per capita per day. The recent drought conditions have affected water use practices in Napa County. To evaluate this impact, data was collected for the period 1985 through 1989. The per capita method is sensitive to large non-residential water use components that have a tendency to fluctuate. For this reason it is important to address any sizable current use that may change dramatically and separate it from the data. The potential for industrial water demands to change independently of population, for example, is accounted for in this case. With the industrial component removed, the per capita method




**HISTORICAL WATER PRODUCTION FOR THE CITY OF NAPA, NAPA COUNTY, CALIFORNIA**

FIGURE 3-6




**HISTORICAL WATER PRODUCTION FOR THE AMERICAN CANYON COUNTY WATER DISTRICT, NAPA COUNTY, CALIFORNIA**

FIGURE 3-7

is ideal for projecting future water needs of municipalities in Napa County, since water use characteristics of the various cities are expected to remain relatively constant over the planning horizon. The characteristics of recent water use patterns for municipal needs were determined for each of the Napa County communities. These characteristics, expressed as annual per capita water consumption factors, are given in Table 3-1.

Calistoga water production data was adjusted for the recent trend of increased water demand for the bottling works industry. This industrial water use was reflected in metered water sales records for 1989. Per capita use was calculated after this industrial use was removed.

St. Helena also serves a share of its water to nearby wineries during production phases. Based on a recent study, it was assumed that the 1987 industrial use would remain constant over the planning horizon (Hanson, 1987). This community's per capita use is the largest of the group. Two reasons account for this: (1) Tourism is a major component of this area. St. Helena showed the second largest percentage increase in the number of lodging rooms during the 1980 decade (Napa County Conservation, Development and Planning Department, 1990); and (2) delivery system losses are reported as high as 20 to 30 percent (Hanson, 1987). Because the analysis relies on water production data, these losses comprise part of the per capita estimate.

The industrial sector of Yountville is assumed insignificant (Yountville Water Management Plan, 1986), and no adjustment accounting for industrial use was made to the water production data. Like St. Helena, this community also portrayed a high per capita water use estimate relative to the other municipalities. This is primarily due to the large tourist activity in the area, which showed the greatest increase in Napa County during the 1980 decade (Napa County Conservation, Development and Planning Department, 1990).

In the City of Napa, industrial use has historically been a small component of total water needs. It was difficult to separate the industrial water needs due to the water rate structure since industrial contracts were not always distinguished from residential and commercial contracts. A review of data available, reinforced by recommendations from Advisory Committee panelists, resulted in an assumption of a five percent industrial water use. Future land use plans indicate that the composition of the city of Napa's water use characteristics will not change significantly over the planning horizon (City of Napa, 1990).

American Canyon also supports little industry, however in 1987 the service district initiated a single contract for delivering water for vineyard irrigation to the Chardonnay Golf Club (ACCWD, 1990). This use was placed in the industrial use category and, as stated previously, was assumed constant for the years 1987 through 1989.

## TABLE 3-1

## CHARACTERISTICS OF CURRENT WATER USE

| CALENDAR YEAR | CALISTOGA gpcd | NAPA gpcd | ST. HELENA gpcd | YOUNTVILLE gpcd | ACCWD gpcd | ANGWIN gpcd | REMAINDER gpcd |
|---|---|---|---|---|---|---|---|
| 1985 | 154 | N/A | 230 | N/A | 158 | N/A | |
| 1986 | 163 | 177 | 242 | 226 | 150 | N/A | |
| 1987 | 155 | 195 | 254 | 240 | 163 | N/A | |
| 1988 | 146 | 173 | 237 | 215 | 169 | N/A | |
| 1989 | 139 | 172 | 200 | 213 | 181 | N/A | |
| AVERAGE | 151 | 179 | 233 | 223 | 164 | 135 | 150 |

**NOTES:**

gpcd = gallons per capita per day
N/A = Not available

CALISTOGA: Production data was adjusted for industrial use. This was necessary due to the rapid growth of "bottling works" which significantly increased overall water use. The resulting per capita estimates reflects a conservation-minded community. Industrial demands were handled by the "Water Duty" approach. A water duty was calculated using existing land use data; this was then applied to future land use acreage provided in the general plan.

ST. HELENA: St. Helena serves a large portion of its water to the wineries during production phases. Based on previous studies (Master Water Plan of 1987 - Hanson) it was assumed that the industrial use of 1987 represented an average annual use. To calculate per capita, this industrial component was separated from the production data; for future projections it was then added back (assuming no future demand increase in this use category).

NAPA: Production data was also adjusted for industrial use in Napa. However, because of limited data it was assumed that five percent of the production data went to industry (based on fiscal year sales data). Industrial use was assumed to make up five percent of future demands as well.

YOUNTVILLE: It was assumed that industry was an insignificant portion of Yountville's annual production. The only adjustment necessary was the separation of the "Group Quarters" population from the rest of the town. Per capita was calculated using the estimates of Town population. A per capita of 50 gpcd was assumed for the Group Quarters indoor use; water duty of 1.5 Ac-Ft/Ac/Yr was applied to 150 acres used by the Veteran's Home (DWR 1987 land use).

ACCWD (AMERICAN CANYON COUNTY WATER DISTRICT): American Canyon also supports little industry, and therefore was not adjusted accordingly. However, in 1986-1987 ACCWD began supplying Chardonnay Golf Course with irrigation water. An estimate of 266 Ac-Ft was then removed from years 1987-1989. Per capita use was then calculated, and the irrigation was carried along as a separate component for future demand calculations.

ANGWIN: Data was not available for the Angwin area, with the exception of a report performed by Winzler and Kelly in 1985 for Howell Mountain Mutual Water Company. A per capita estimate of 135 gpcd was taken from here (119 gpcd for residential use; 12 percent of total use for commercial - 16 gpcd).

REMAINDER (rural): Assumed the per capita use of the rural population of Napa County was 150 gpcd.

As is apparent in Table 3-1, the dry conditions that have prevailed in recent years are partly responsible for the downward trend in the annual per capita use. To evaluate the significance of this on the average per capita use estimate, an average of the period spanning 1985 through 1987 was considered. The net impact is less than a 5 percent increase in future water demands. This is not enough evidence to warrant an adjustment to the per capita use estimates. On the contrary, state wide trends indicate that future per capita use estimates will decline as a result of increased water conservation. This slightly lower per capita estimate inherently reflects this attitude. The primary reasons for historical differences in the individual per capita use estimates was due to large tourism components associated with St. Helena and Yountville relative to the other communities. Calistoga, on the other hand, tends to be lower than the other communities due to a large percentage of trailer parks, which generally have a low per capita use (STA Planning, Inc., 1989). The Napa County General Plan calls for urban development to be restricted to those areas within the urban limit lines. In addition, there are currently no future plans for extending urban limit lines associated with any of the incorporated areas. Thus, the composition of the water user categories should remain relatively constant over the planning horizon warranting the use of the per capita estimate. The average per capita use estimate derived from historical use during the 1985 to 1989 period has been used as the basis for projecting future municipal and industrial water needs.

Production data for the period 1985-89 was reviewed for the five municipal entities to establish the seasonal variation of use. This variation is required for the yield analysis of local reservoirs (See Table 5-5).

## Rural Water Use

The rural community represents approximately 19 percent of the total Napa County population, and relies primarily on private wells and small water purveyors for their water supply.

The primary water use is for domestic purposes. However, it is possible that some incidental use occurs as a result of commercial, industrial, and agricultural needs. For purposes of this study it was assumed that a per capita consumption factor would be used to account for these rural water needs. A review of previous investigations indicated an annual per capita use of 150 gallons per capita per day has been calculated in the past (Engineering-Science, Inc., 1971). Using historical population data, the total existing water use for 1989 was calculated (see Figure 3-2). The estimated water use supports an earlier assumption that the rural water use category represented only a small percentage of the total water needs of Napa County -- approximately 6 percent. This reinforces the idea that the same per capita estimate can be used for projecting the future water needs of this category, with little chance of significant error based on these estimates.

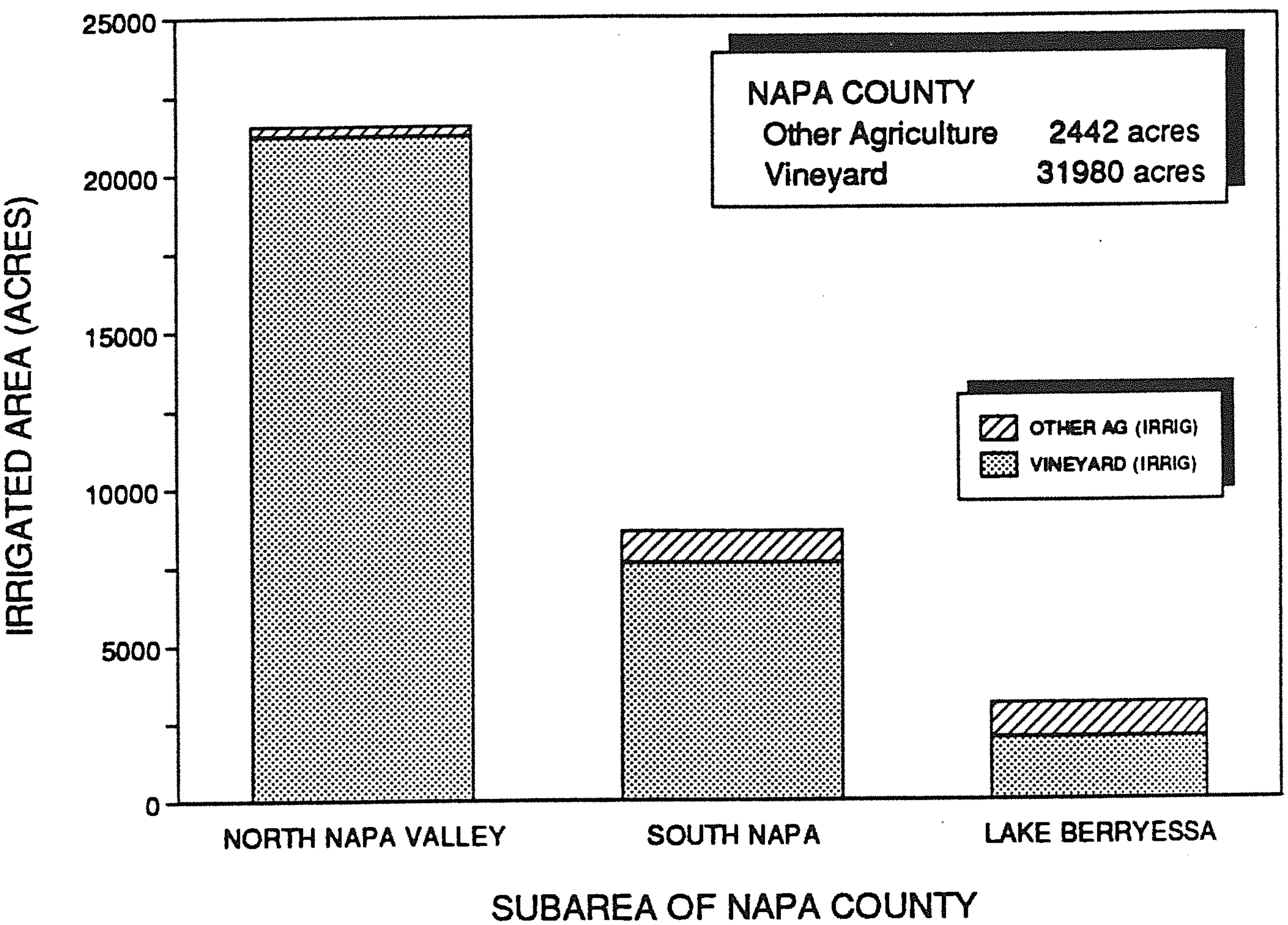
## Agricultural Water Use

The largest component of existing water use is the agricultural base of Napa County. The primary crop grown is wine grapes, which account for 92 percent of the irrigated agriculture (1989). Other irrigated crops consist of pasture, grain, deciduous, and truck crops. The irrigated agricultural land use acreage distribution by subarea is shown in Figure 3-8. Crops are irrigated using both groundwater and diversions of Napa River water and its tributaries, as well as a number of small streams and creeks in the Lake Berryessa watershed. A very small percentage of crop water requirements are met by municipal water agencies, on an as-available basis.

Agricultural water use in Napa County is largely devoted to vineyards covering the Napa Valley floor, and increasingly the hillsides, as well as the Carneros area, Jameson and American Canyons, and Chiles and Pope Valley. The annual current water requirements for vineyard is composed of water for irrigation, protection of the vines from spring frost damage, and protection of maturing grapes from heat damage during extremely hot summer temperatures. Several references have addressed vineyard development in Napa County and its water requirements. The key sources of information used in this study included: the Napa County Department of Agriculture, DWR, and the University of California Cooperative Extension Service.

**Existing Land Use.** A breakdown of crop patterns is the first step in developing estimates of existing and future agricultural water needs. Agricultural land use practices in Napa County were analyzed to identify crop-mix and crop acreage. Significant detail of Napa County agricultural development was made available from a DWR land use survey conducted in 1987 (DWR Land Use Study #88-62). DWR conducts such surveys for California counties approximately every seven years. The maps and data are developed from aerial photographs, supported by frequent spot field checks for accuracy. The survey separates land use into agricultural, native, urban, and recreational classes, with further division within each class. The agricultural class includes ten subclasses, of which Napa County has five:

- Vineyard
- Pasture
- Grain
- Deciduous
- Truck Crops




**EXISTING (1989) SUBAREA IRRIGATED AGRICULTURE**
**NAPA COUNTY, CALIFORNIA**

FIGURE 3-8

## Section 3

## Water Needs

Because of the dominant presence of vineyards in Napa County, pasture, grain, deciduous, and truck crops were assigned to one group, previously identified as Other Irrigated Agriculture. The land use survey also identifies whether the crop is irrigated or not. By identifying the irrigated acreage for each crop, water requirements can be estimated based on water use characteristics shown in Table 3-2.

As of 1987, the North Napa Valley Subarea contained nearly 70 percent of all developed vineyard land in Napa County (or 21,240 acres). Development is concentrated on the Napa Valley floor, with additional vineyards recently spreading to the hillsides and smaller upper elevation areas such as Chiles and Foss Valleys. Other irrigated agriculture is relatively small, occupying less than 2 percent of the developed irrigated agricultural land in this subarea (or 320 acres).

The eastern portion of Napa County, designated as the Lake Berryessa Subarea, supports a mixture of vineyard and other irrigated agriculture. Existing vineyards are currently limited primarily to Pope and Capell Valley, totaling 1995 acres in 1987. Other irrigated agriculture is approximately 1115 acres.

In the South Napa Subarea rapid vineyard development has occurred in the Carneros Valley, with additional vineyards spread thinly among the Jameson and American Canyon areas, and Wooden and Gordon Valleys. Total lands occupied by vineyards in 1987 was 7630 acres, with 1010 acres devoted to other irrigated agriculture.

**Characteristics of Vineyard Water Requirements.** In general, irrigated agricultural land requires enough applied water to satisfy the consumptive use requirements not met by precipitation (the consumptive use of a crop is the amount of water required to satisfy the evapotranspirative demands of the crop including evaporation loss from crop foliage and adjacent soils). Annual water requirements for vineyards are unique, however, and consist of three distinctive water use components: (1) irrigation; (2) frost protection; and (3) heat protection. A summary of these applied water demands for each particular crop is given in Table 3-2.

Vineyard irrigation varies geographically and annually depending on climatic conditions. The water requirements for irrigation are commonly expressed in units of acre-feet per acre. Based on a review of previous investigations and consultation with Advisory Committee panel members, an applied water requirement for each subarea was estimated (see Table 3-2). It was assumed that this water requirement was constant over a given subregion.

During the 1970s, not all vineyards were irrigated, depending mostly on grower preference (Metcalf and Eddy, 1973). However, the increased demand for higher yielding vineyards

# TABLE 3-2

## UNIT WATER REQUIREMENTS BY CROP CATEGORY

| Crop Category | Average Annual Crop Water Demand (Ac-Ft/Ac/Yr) North Napa Valley[1] | South Napa[1] | Lake Berryessa[1] | Crops Included[2] |
|---|---|---|---|---|
| Vineyard[3] | | | | Black and White grapes |
| Irrigation | 0.50 | 0.40 | 0.60 | |
| Frost Protection | 0.33 | 0.33 | 0.33 | |
| Heat Protection | 0.17 | 0.17 | 0.17 | |
| Total | 1.00 | 0.90 | 1.10 | |
| Pasture | | | | |
| Irrigation | 4.00 | 4.00 | 4.00 | Alfalfa, Mixed Pasture, Irrigated Native Pasture |
| Grain | | | | |
| Irrigation | 1.70 | 1.70 | 1.70 | Oats, Wheat, Barley |
| Deciduous | | | | |
| Irrigation | 2.00 | 2.00 | 2.00 | Apples, Apricots, Bushberries Citrus, Prunes, Nut Crops |
| Truck Crops | | | | |
| Irrigation | 1.70 | 1.70 | 1.70 | Flowers and Nursery |

(1) Other than Vineyards, the Average Annual Crop Water Demand was assumed constant for each subarea.

(2) Incidental crops not included are Subtropical Fruits and Field Crops - irrigated acreage was insignificant.

(3) Average Annual Crop Water demand is assumed to be the same for Black and White grapes.

coupled with improved irrigation technology has resulted in a majority of vineyards utilizing irrigation water. For purposes of this study, irrigated vineyards acreage was based on irrigated vineyard lands identified by the DWR Land Use Study #88-62.

Between March 15 and May 15, potential frost conditions in the low-lying valleys threaten vineyard development. To combat this problem, sprinkler systems have been installed, and to a lesser extent other systems such as wind machines are also used. Sprinkler systems accomplish the task by coating the leaves, shoots, and clusters with a thin layer of ice which holds the enclosed area at 32°F, as the surrounding temperature continues to drop. A review of previous investigations indicated that water requirements for frost protection varied dramatically from year to year. A rate of 55 gpm per acre has been reported (Metcalf and Eddy, 1973). There is no general agreement of the average number of hours of frost protection required per year. Based on consultation with Advisory Committee members, an agreement of an average 32 hours per year was reached. This translates to approximately .33 acre-feet per acre required annually for frost protection. It was also assumed that frost protection was only a requirement in the low lying-valleys of the North Napa Valley and Lake Berryessa Subareas; the South Napa Subareas proximity to coastal climatic conditions prevents frost from occurring in this region.

The need of water for heat protection occurs primarily in August, to prevent damage to maturing crops for high summer temperatures. The purpose of the water, also commonly applied by sprinkler systems, is to create a cooling action by its evaporative processes. For purposes of this study it was assumed that previous estimates of .17 acre-feet per acre was required on an annual basis. And like frost protection, heat protection was assumed only to be required in the North Napa Valley and Lake Berryessa Subareas.

The three components of water requirements for vineyards in Napa County are based on average annual estimates. The sum of these components represents the total annual water requirement per acre of vineyard, as presented by subarea in Table 3-2. These estimates of water consumption were based on existing (1989) irrigation practices. Currently irrigation is accomplished with sprinkler or drip systems. Trends indicate that conversion to the drip system is occurring throughout Napa County (Farm Bureau, 1990). However, differences in water requirements for sprinkler systems and of drip systems are marginal. Since no significant changes in irrigation practices were foreseen, the total applied water consumption factor was assumed to apply to future conditions.

**Characteristics of Other Irrigated Agriculture.** Water requirements for the other irrigated agricultural lands consist only of irrigation water used to satisfy the needs of crop consumptive use. Each of the crop classes in this category (pasture, grain, deciduous, and truck crops) has an irrigation-applied water requirement published by DWR (DWR Bulletins

113-3 and 113-4). These factors are presented in Table 3-2, and are assumed to be constant for all of Napa County. Like vineyard irrigation practices, no significant changes in water use practices are expected that would warrant an adjustment to future irrigation water consumption factors.

**Existing Agricultural Water Use.** The annual water use of a crop can be determined by multiplying the unit water requirement by the irrigated acreage of that crop. A rate of 1.25 acre-feet per acre per year has been previously developed for vineyard crops, and most recently used in the District's 1988 application for supplemental Central Valley Project (CVP) water. Our analysis indicates a net annual average vineyard water requirement of 1.0 acre-feet per acre for North Napa Valley Subarea, and 1.1 acre-feet per acre for Lake Berryessa Subarea, and .9 acre-feet per acre for South Napa Subarea. Applying the factors shown in Table 3-2 to the acreage shown in Figure 3-3 results in a total vineyard requirement of 27,400 acre-feet in 1989 and 7,650 acre-feet for Other Irrigated Agriculture (see Figure 3-2).

## FUTURE WATER NEEDS

Water needs to the year 2020 have been determined for Napa County and three subareas: North Napa Valley, South Napa, and Lake Berryessa. The conditions and assumptions relative to future land use and population growth were reviewed in Advisory Committee meetings held throughout the study. The future water need projection made under these conditions and assumptions is referred to as the Baseline Projection. Because of the uncertainty involved in making any projection, alternatives to the Baseline Projection were also developed and are called Alternative Scenario 1 and Alternative Scenario 2. The purpose of these alternatives is to provide a range of likely future water needs, accounting for the possibility of variations in water use characteristics, population growth, and land use development.

The year 2020 was requested by the County as the planning horizon for this study. The 30-year period, from 1990 to 2020, represents a reasonable period for planning and implementing any measures to bring the County's water needs and supplies into balance.

ABAG and CDOF population projections and the Napa County General Plan, along with the community General Plans, were used to establish the population and acreage of specific land use categories to the year 2020. The demand at year 2020 and at five year increments from 1990 were established through application of the unit consumption factors for municipal, industrial, and rural water needs, and the unit water requirement for agriculture.

## Section 3

## Water Needs

The conditions underlying the baseline projection and the two alternative scenarios are summarized below. Refer to Table 3-3 for a summary of the characteristics.

### Conditions of Baseline Projection

The conditions agreed upon for projecting water needs for Napa County to the year 2020 are described for each water use category below.

**Municipal/Industrial and Rural Water Needs.** Municipal/industrial and rural water needs were calculated using per capita use estimates (gallons per capita per day) and projected population data. Estimates of per capita use were developed from an analysis of production and population data collected for the historical period 1985 to 1989. Population projections were obtained from ABAG and the CDOF (see Figure 3-9). The following conditions are a result of deliberations carried out with the Advisory Committee panel:

- Characteristics of current water use estimates (i.e. per capita estimates based on an average of the calculated annual per capita use for the historical period 1985 through 1989) were assumed to represent characteristics of future water use conditions.

- The proportionate use of the municipal components (residential, commercial, and public) remains unchanged for the duration of the study period.

- The production data collected for each municipality represents all contracted use (i.e. no major unmetered uses or illegal uses). (It is noted that other uses not metered include fire protection, miscellaneous city use, and system losses).

- Projected population estimates (based primarily on sphere of influence boundaries designated by LAFCOM) are consistent with populations served according to municipal water district boundaries.

**Irrigated Agricultural Water Needs.** Irrigated agricultural water needs were calculated using irrigation-applied water requirements (acre-feet per acre) and land use acreage for each crop type. Estimates of irrigation-applied water requirements were based on a thorough review of previous investigations focusing on crop water use in the region and recommendations from Advisory Committee members. Existing irrigated crop acreage was determined from a DWR land use survey conducted for Napa County in 1987 (DWR Land Use Study #88-62). Future irrigated crop acreage was determined from the Napa County 1989-2005 General Plan Land Use Map. Figure 3-10 depicts future acreage for vineyard

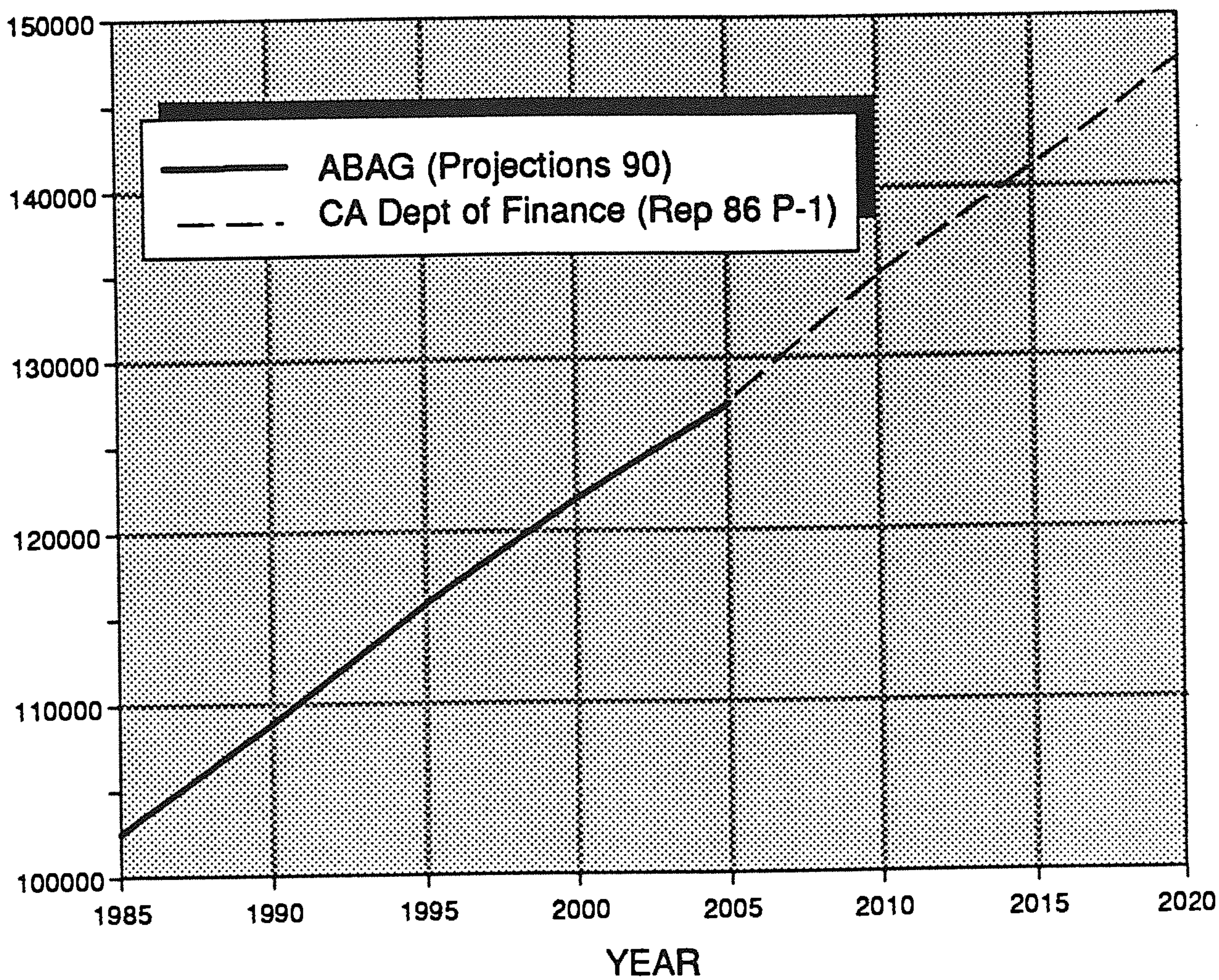
## TABLE 3-3

## NAPA COUNTY WATER NEEDS SCENARIO CHARACTERISTICS

| Characteristics | Baseline Projection | Alternative Scenario 1 | Alternative Scenario 2 |
|---|---|---|---|
| PER CAPITA (gpcd) | | | |
| Calistoga | 151 | 136 | 151 |
| St. Helena | 233 | 209 | 233 |
| Yountville | 223 | 201 | 223 |
| Napa | 179 | 161 | 179 |
| American Canyon | 164 | 148 | 164 |
| Angwin | 135 | 135 | 135 |
| Remainder | 150 | 150 | 150 |
| VINEYARD WATER REQUIREMENTS (ac-ft/ac/yr) (1) | | | |
| Frost Protection | 0.33 | (2) | 0.33 |
| Heat Protection | 0.17 | (2) | 0.17 |
| IRRIGATED VINEYARD LAND USE ACREAGE (1) | | | |
| South Napa Subarea | | | |
| 1990 | 8121 | 8121 | 8121 |
| 2005 | 10581 | 10581 | 13041 |
| 2020 | 13041 | 13041 | 13041 |
| Napa Valley Subarea | | | |
| 1990 | 22181 | 22181 | 22181 |
| 2005 | 26883 | 26883 | 26883 |
| 2020 | 31586 | 31586 | 31586 |
| Lake Berryessa Subarea | | | |
| 1990 | 2236 | 2236 | 2236 |
| 2005 | 3443 | 2236 | 5611 |
| 2020 | 4650 | 2236 | 8986 |
| POPULATION | | | |
| Napa County | | | |
| 1990 | 108900 | 108900 | 108900 |
| 2005 | 127350 | 127350 | 138900 |
| 2020 | 147500 | 147500 | 169900 |

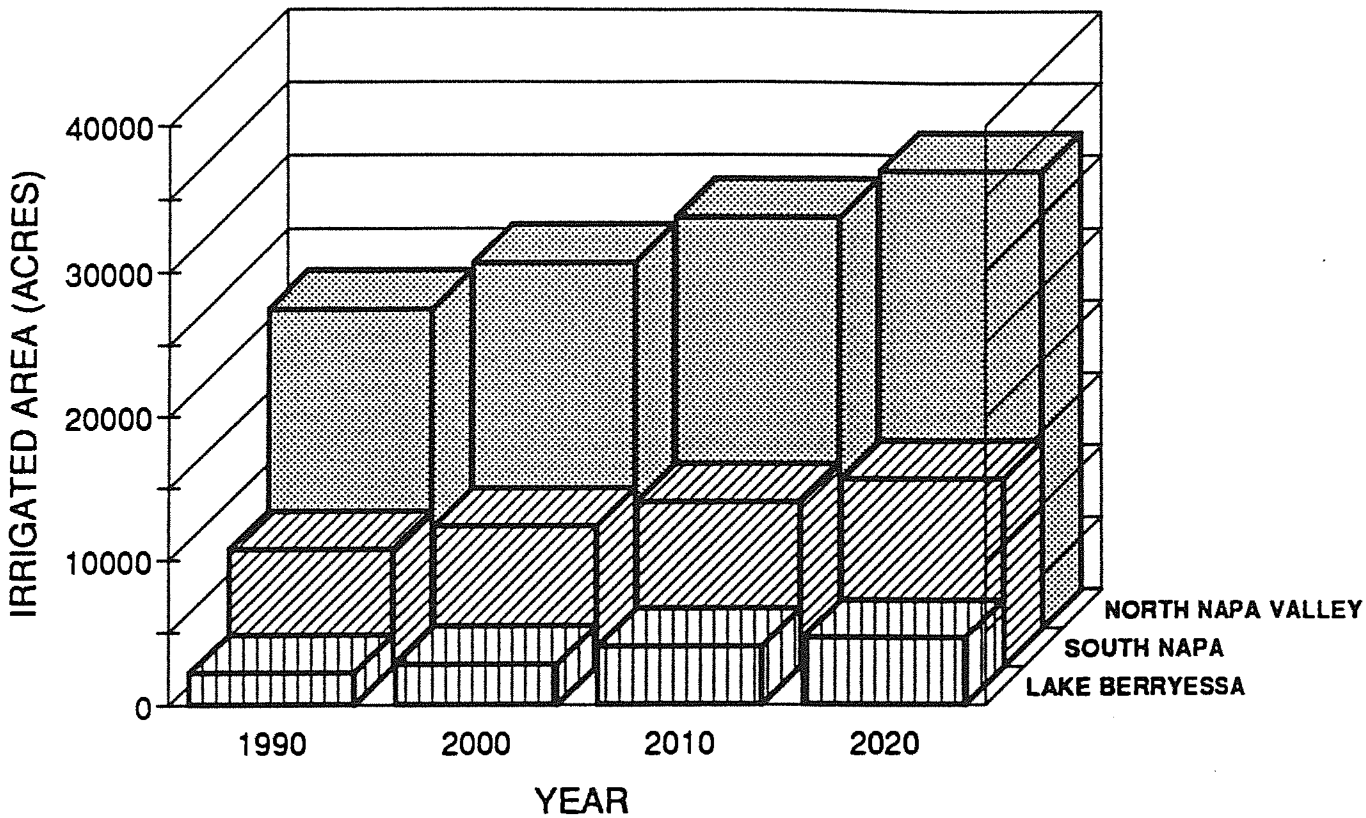
(1) For Alternate Scenarios 1 and 2, the Other Irrigated Agriculture water requirements and land use acreage are the same as the Baseline Projection (see Table 3-2 and Figure 3-3). Vineyard irrigation requirements, also not shown, are not changed for the analysis of Alternative Scenarios 1 and 2 (see Table 3-2).

(2) Conversion from sprinkler systems to wind machines is assumed to occur linearly at a rate such that in the year 2020 sprinkler systems for frost and heat protection are used on 50 percent of the vineyard lands in the North Napa Valley and Lake Berryessa Subareas, with the remaining lands in these subareas utilizing wind machines and other alternatives.




**HISTORICAL AND PROJECTED POPULATION, NAPA COUNTY, CALIFORNIA**

FIGURE 3-9




**PROJECTED IRRIGATED VINEYARD ACREAGE BY SUBAREA, NAPA COUNTY, CALIFORNIA**

FIGURE 3-10

lands by subarea. For purposes of this study, it is assumed that the area dedicated to Agricultural Resource would be fully developed as vineyards by 2020 for the South Napa and North Napa Valley, and 50 percent developed in the Lake Berryessa Subarea (special treatment in the Lake Berryessa subarea is a result of restrictions in water availability and recommendations by the Advisory Committee). Vineyard land development was assumed to occur at a linear rate from 1987 to 2020. Acreage devoted to other irrigated crops is assumed to remain constant in each subarea for the duration of the planning period. Irrigated vineyard area, as designated by the DWR 1987 Napa County Land Use Study (Study #88-62), represents lands requiring frost and heat protection (North Napa Valley and Lake Berryessa Subareas only), as well as irrigation. The irrigation-applied water requirement for vineyards is the same over a given subarea. The irrigation-applied water requirement for Other Irrigated Agriculture is the same over the entire county for a given crop type.

**Frost and Heat Protection Water Needs.** Frost and heat protection of vineyards, assumed to be required in the North Napa Valley and Lake Berryessa Subareas only, is most commonly accomplished with the use of sprinkler systems or wind machines. Application rates for sprinkler systems are based on a thorough review of previous investigations and recommendations from Advisory Committee members. A review of existing vineyard land use indicated that much of the future vineyard development in these subareas will occur on hillsides, regions generally requiring little or no protection from frost and heat. It was assumed that 50 percent of the future land developed as vineyards in the North Napa Valley and Lake Berryessa Subareas will not require frost and heat protection. This is based on a comparison of DWR land use survey maps (DWR, 1987) together with USGS topographic maps and soil classifications identified in the Napa County Soil Survey (Soil Conservation Service, 1977).

## Conditions of Alternative Scenario 1

Alternative Scenario 1 incorporated potential changes in water use patterns due to conservation activities and reduction in land use development. The departure from the conditions stated in the Baseline Projection for each water use category is described below.

**Municipal/Industrial and Rural Water Need.** The communities of Calistoga, Yountville, Napa, and American Canyon have developed water management plans in an attempt to improve overall water conservation. Given full implementation of these plans, water savings in the municipal and industrial sectors are estimated in the range of five to fifteen percent. Since it is not known to what extent these plans have been executed, it was assumed that the per capita estimate for the municipal/industrial water use categories is reduced by ten percent for the incorporated communities and American Canyon. The water demands were then calculated using the population projections from the Baseline Projection. This reduction does not apply to any of the rural communities in Napa County (refer to Table 3-3). It should be noted that the ten percent reduction in water use is in addition to the five percent reduction inherent in the per capita estimates previously discussed. It was assumed that no reductions in the rural and industrial categories would occur from conservation; because of their relatively small magnitude, any change would be minimal.

**Irrigated Agricultural Water Needs.** Most vineyard development in the Lake Berryessa Subarea is expected to occur in Pope Valley (Napa County General Plan, November 1986). However, because of extremely limited water rights in this subarea, water needed to support this growth may not be available. Therefore, it was assumed that the estimated vineyard acreage for 1990 in the Lake Berryessa Subarea will remain unchanged for the duration of the study period. The South Napa and North Napa Valley Subareas follow the conditions stated in the Baseline Projection (refer to Table 3-3).

**Frost and Heat Protection Water Needs.** From numerous discussions with experts involved in the Napa Valley wine industry, a recent trend of conversions from sprinkler systems to wind machines for frost and heat protection has been observed. One key factor contributing to this change is water availability. In regions where frost and heat protection are required (primarily the valley areas of the North Napa Valley and Lake Berryessa Subareas) as much as one-half of the total annual vineyard water requirement may be used for this purpose alone. To evaluate this potential change in agricultural water use characteristics, it was assumed the conversion will occur at a rate such that in the year 2020 sprinkler systems for frost and heat protection are used on 50 percent of the vineyard lands in the North Napa Valley and Lake Berryessa Subareas, with the remaining vineyard lands in these subareas utilizing wind machines.

### Conditions of Alternative Scenario 2

Alternative Scenario 2 was developed to focus on the possibility of increased population growth and land use development from those rates stated previously for the Baseline Projection. The departure from the Baseline Conditions for each water use category is described below.

**Municipal/Industrial and Rural Water Needs.** As part of the planning process, the Napa County General Plan has reported estimates of projected population growth through the year 2000. There is some discrepancy between these projections and those developed by ABAG and the CDOF, the General Plan estimating a greater projected population. Hence, as a part of this scenario, the 1980-2000 growth rates used in the General Plan were used to calculate the population projections (it was assumed that these growth rates remain in effect through

2020). The water demands were then calculated using the per capita estimates from the Baseline Projection (refer to Table 3-3).

**Irrigated Agricultural Water Needs.** Based on discussions with experts in the Napa Valley wine industry, it is possible that the Carneros area will grow at a faster pace than any other region in Napa County. Several reasons support this observation, including: less expensive land; abundance of good quality land; and frost and heat protection are not usually required. Therefore, acreage designated as Agricultural Resource in the South Napa Subarea is assumed to be fully developed as vineyards by 2005, with vineyard land development occurring at a linear rate from 1987 to 2005. It was also assumed that the entire area in the Lake Berryessa Subarea designated as Agricultural Resource by the Napa County General Plan would be fully developed as vineyards by the year 2020. Vineyard development in the North Napa Valley Subarea followed the conditions previously stated in the Baseline Projection (refer to Table 3-3).

**Frost and Heat Protection Water Needs.** Frost and heat protection water needs follow the conditions stated in the Baseline Projection.

### Baseline Projection Water Needs

The municipal, industrial, and rural projected water needs are presented for each community in Table 3-4. As stated earlier, the municipal and rural projections are based on derived average annual per capita estimates and projected population data. The industrial component was separated and treated independently (refer to Table 3-1 for further explanation of projected industrial water needs).

The annual projected water needs by water user category are presented in Table 3-5. Projected water needs were grouped by each subarea and totaled for Napa County. Figures 3-11 through 3-14 depict the projected water needs graphically. From the figures it is apparent that the South Napa Subarea contains the majority of the municipal and industrial water use (which accounts for approximately 65 percent of the total water use in this subarea). On the contrary, water use in the North Napa Valley and Lake Berryessa Subareas is dominated by agricultural requirements.

As can be seen in Figure 3-14, the change in composition of future water uses is relatively small from existing conditions. Currently municipal and industrial water uses are approximately 32 percent of total, rural seven percent, and agricultural requirements accounting for the remaining 61 percent. Future conditions indicate that municipal and industrial use will require approximately 34 percent, rural six percent, and agricultural 60 percent of the total water needs for Napa County in the year 2020.

## TABLE 3-4

## MUNICIPAL AND INDUSTRIAL WATER NEEDS
## NAPA COUNTY, CALIFORNIA

| AREA OF USE | 1989 | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 |
|---|---|---|---|---|---|---|---|---|
| CALISTOGA | | | | | | | | |
| Municipal | 670 | 745 | 810 | 930 | 1070 | 1130 | 1185 | 1240 |
| Industrial | 245 | 245 | 250 | 260 | 270 | 275 | 275 | 275 |
| ST. HELENA | | | | | | | | |
| Municipal | 1285 | 1495 | 1755 | 1835 | 1940 | 2055 | 2155 | 2250 |
| Industrial | 440 | 440 | 440 | 440 | 440 | 440 | 440 | 440 |
| YOUNTVILLE-TOWN | | | | | | | | |
| Municipal (1) | 420 | 450 | 490 | 515 | 540 | 570 | 595 | 625 |
| Industrial | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| YOUNTVILLE-V.H. | | | | | | | | |
| Municipal (1) | 450 | 450 | 450 | 455 | 460 | 460 | 460 | 460 |
| Industrial | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NAPA | | | | | | | | |
| Municipal | 12405 | 13135 | 13940 | 14540 | 14900 | 15795 | 16540 | 17285 |
| Industrial | 655 | 690 | 735 | 765 | 785 | 830 | 870 | 910 |
| AMERICAN CANYON | | | | | | | | |
| Municipal | 1430 | 1325 | 1455 | 1580 | 1765 | 1870 | 1960 | 2050 |
| Industrial | 266 | 266 | 266 | 266 | 266 | 266 | 266 | 266 |
| ANGWIN AREA | | | | | | | | |
| Munipical | 620 | 630 | 675 | 725 | 770 | 815 | 855 | 895 |
| Industrial | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RURAL (2) | | | | | | | | |
| Municipal | 3150 | 3155 | 3205 | 3355 | 3525 | 3735 | 3910 | 4090 |
| Industrial | --- | --- | --- | --- | --- | --- | --- | --- |

(1) Yountville was separated into two components:
Town - water use within the Town Limits
V.H. - Water use by the Veterans Home
(2) Includes rural population and winery use.

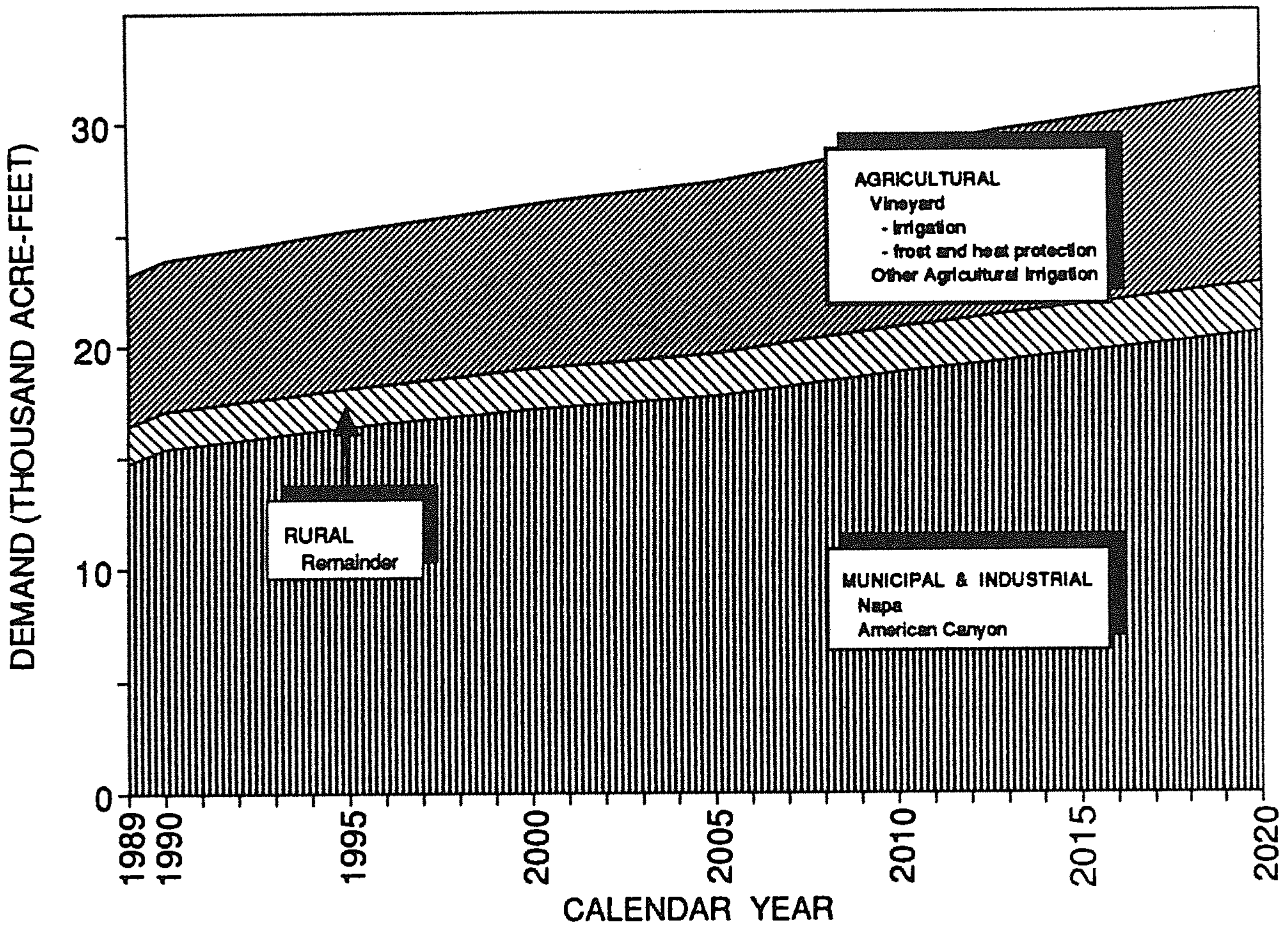
## TABLE 3-5

## ANNUAL PROJECTED WATER NEEDS BY WATER USER CATEGORY NAPA COUNTY, CALIFORNIA

| WATER USE CATEGORY | 1989 | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 |
|---|---|---|---|---|---|---|---|---|
| NORTH NAPA VALLEY SUBAREA | | | | | | | | |
| Municipal[1] | 2825 | 3140 | 3505 | 3735 | 4010 | 4215 | 4395 | 4575 |
| Industrial | 685 | 685 | 690 | 700 | 710 | 715 | 715 | 715 |
| Rural | 1976 | 1988 | 2056 | 2168 | 2285 | 2422 | 2536 | 2651 |
| Vineyard | 21867 | 22181 | 23356 | 24532 | 25708 | 26883 | 28059 | 29235 |
| Other Irrigated Agriculture | 797 | 797 | 797 | 797 | 797 | 797 | 797 | 797 |
| Subtotal | 28150 | 28791 | 30404 | 31932 | 33510 | 35032 | 36502 | 37973 |
| SOUTH NAPA SUBAREA | | | | | | | | |
| Municipal | 13835 | 14460 | 15395 | 16120 | 16665 | 17665 | 18500 | 19335 |
| Industrial | 921 | 956 | 1001 | 1031 | 1051 | 1096 | 1136 | 1176 |
| Rural | 1702 | 1705 | 1732 | 1811 | 1903 | 2017 | 2112 | 2207 |
| Vineyard | 3183 | 3248 | 3576 | 3904 | 4232 | 4560 | 4888 | 5216 |
| Other Irrigated Agriculture | 3506 | 3506 | 3506 | 3506 | 3506 | 3506 | 3506 | 3506 |
| Subtotal | 23147 | 23875 | 25210 | 26372 | 27357 | 28844 | 30142 | 31440 |
| LAKE BERRYESSA SUBAREA | | | | | | | | |
| Municipal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Industrial | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rural | 95 | 95 | 96 | 101 | 106 | 112 | 117 | 123 |
| Vineyard | 2372 | 2460 | 2802 | 3144 | 3486 | 3828 | 4170 | 4512 |
| Other Irrigated Agriculture | 3359 | 3359 | 3359 | 3359 | 3359 | 3359 | 3359 | 3359 |
| Subtotal | 5826 | 5914 | 6257 | 6604 | 6951 | 7299 | 7646 | 7994 |
| NAPA COUNTY | | | | | | | | |
| Municipal | 16660 | 17600 | 18900 | 19855 | 20675 | 21880 | 22895 | 23910 |
| Industrial | 1606 | 1641 | 1691 | 1731 | 1761 | 1811 | 1851 | 1891 |
| Rural | 3773 | 3788 | 3884 | 4080 | 4294 | 4551 | 4765 | 4981 |
| Vineyard | 27422 | 27889 | 29734 | 31580 | 33426 | 35271 | 37117 | 38963 |
| Other Irrigated Agriculture | 7662 | 7662 | 7662 | 7662 | 7662 | 7662 | 7662 | 7662 |
| Subtotal | 57123 | 58580 | 61871 | 64908 | 67818 | 71175 | 74290 | 77407 |

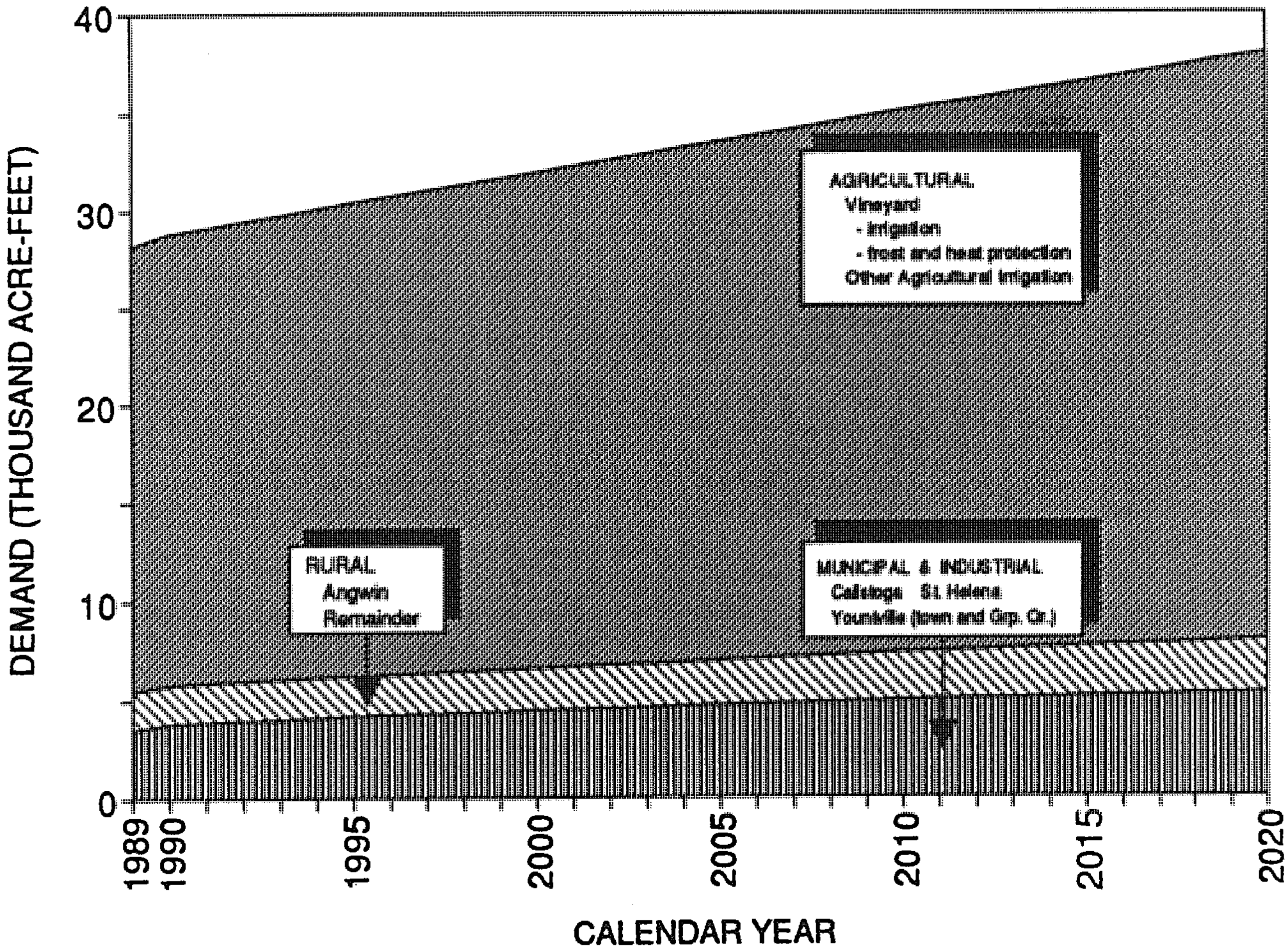
Notes:

1) Includes Veterans Home at Yountville




**PROJECTED WATER NEEDS - SOUTH NAPA SUBAREA, NAPA COUNTY, CALIFORNIA**

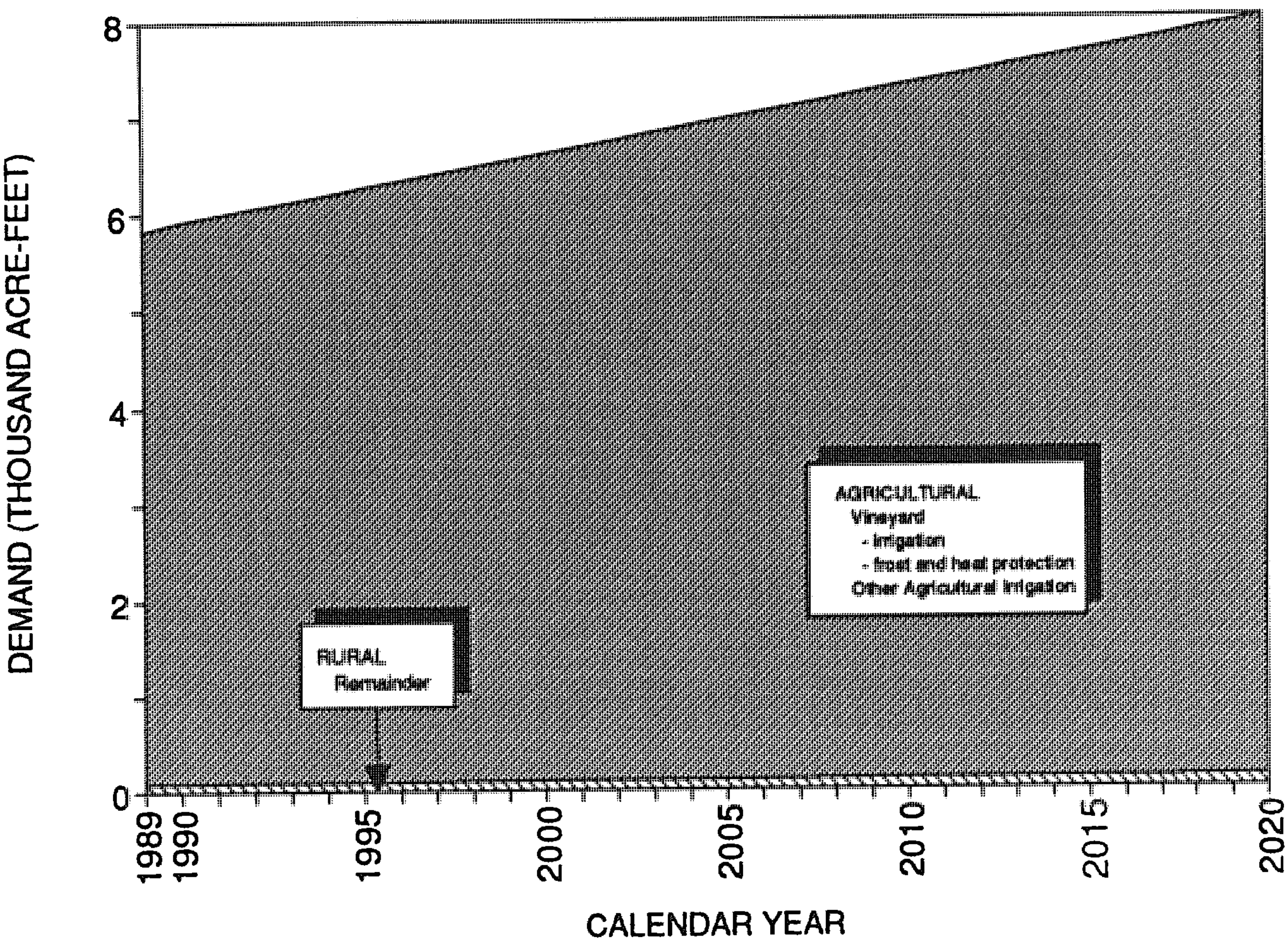
FIGURE 3-11




**PROJECTED WATER NEEDS - NORTH NAPA SUBAREA, NAPA COUNTY, CALIFORNIA**

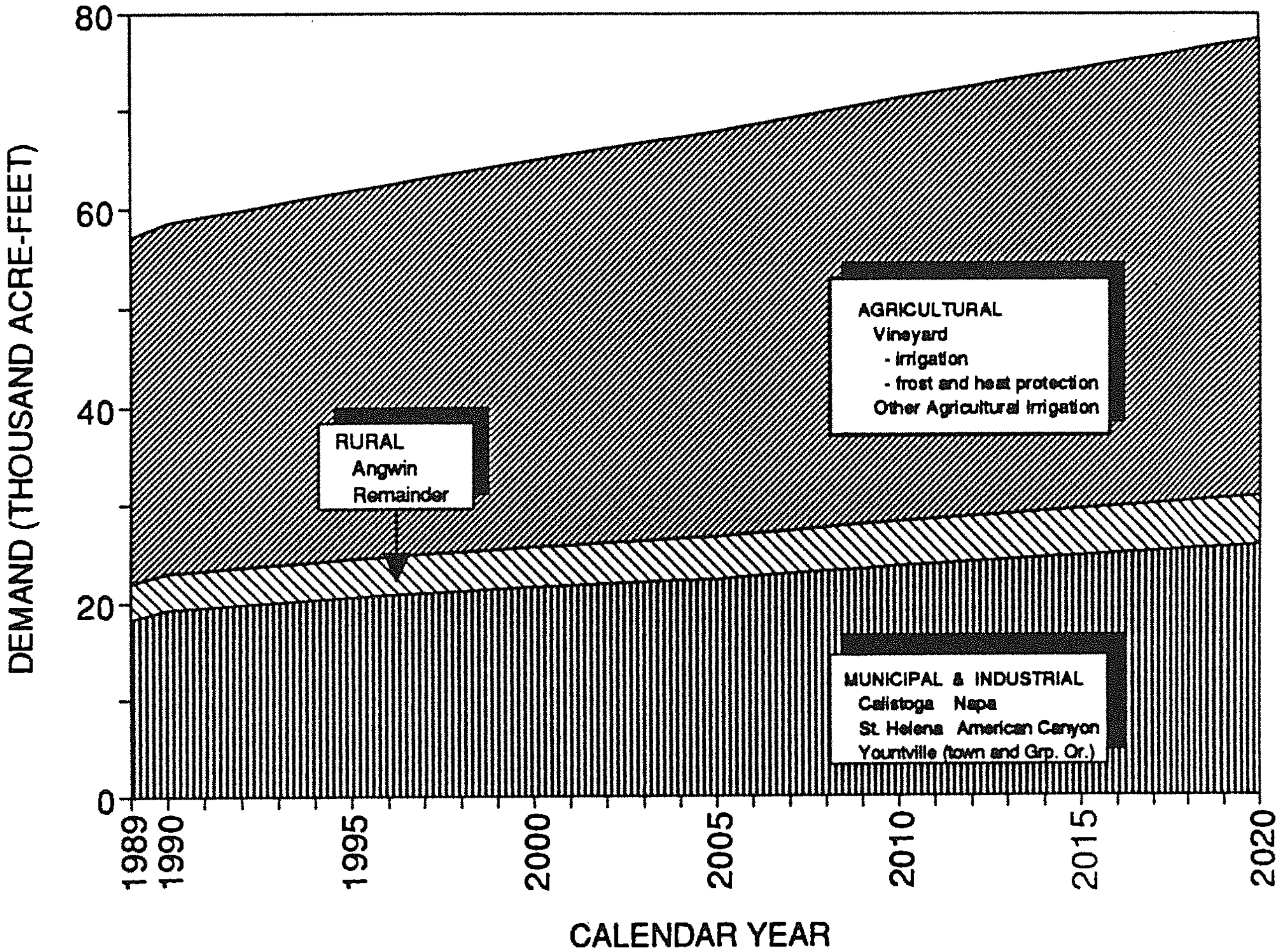
FIGURE 3-12

JMM




**PROJECTED WATER NEEDS - LAKE BERRYESSA SUBAREA, NAPA COUNTY, CALIFORNIA**

FIGURE 3-13



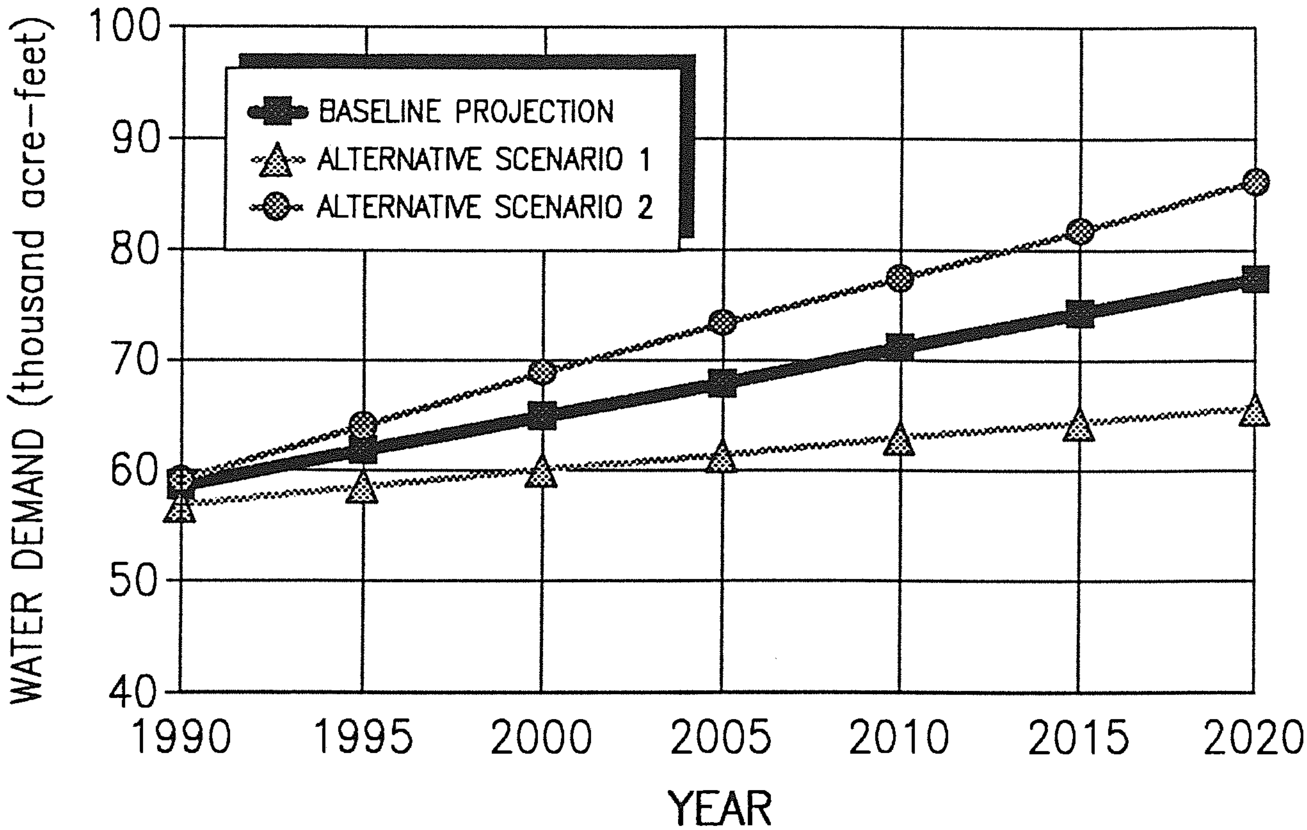

**PROJECTED WATER NEEDS - NAPA COUNTY, CALIFORNIA**

FIGURE 3-14

## Alternative Scenario Water Needs

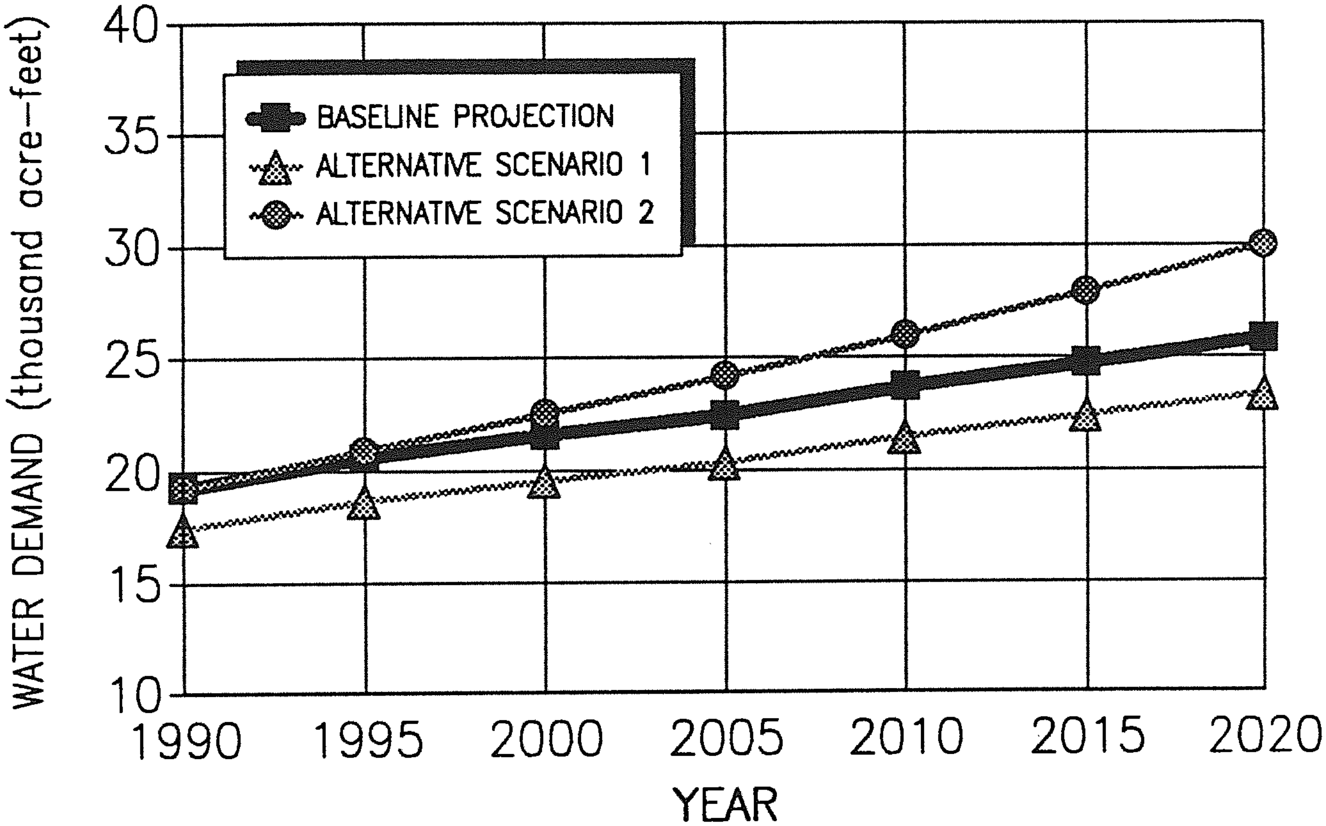
The impacts of potential changes in future water use characteristics, population projections, and land use development, from those used in the Baseline Projection, are reflected in Figures 3-15 through 3-17. Alternative Scenario 1 would result in a reduction of approximately fifteen percent in total water needs for Napa County by the year 2020. This is due primarily to the changes in vineyard water use practices, and to a lesser extent the increased water conservation effort by municipalities.

Alternative Scenario 2 shows a potential for an increase of projected water needs from the Baseline Projection of approximately 11 percent. This increase is due to the accelerated population growth (see Figure 3-16) and the additional land use development (see Figure 3-17).



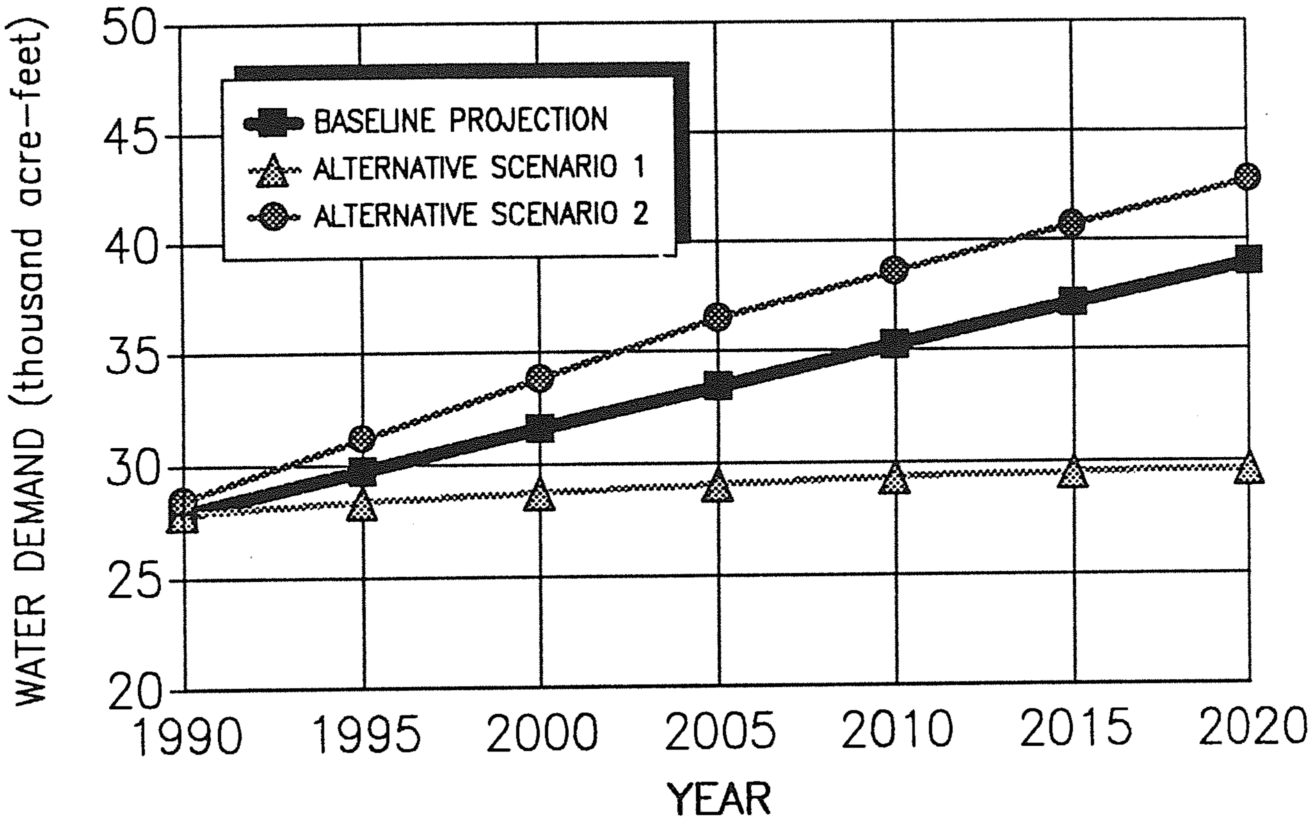

**TOTAL PROJECTED WATER NEEDS OF THE BASELINE PROJECTION AND ALTERNATIVE DEMAND SCENARIOS - NAPA COUNTY, CALIFORNIA**

FIGURE 3-15




**MUNICIPAL AND INDUSTRIAL PROJECTED WATER NEEDS OF THE BASELINE PROJECTION AND ALTERNATIVE DEMAND SCENARIOS - NAPA COUNTY, CALIFORNIA**

FIGURE 3-16




**VINEYARD PROJECTED WATER NEEDS OF THE BASELINE PROJECTION AND ALTERNATIVE DEMAND SCENARIOS - NAPA COUNTY, CALIFORNIA**

FIGURE 3-17

# SECTION 4

# WATER QUALITY

This section discusses the quality of surface and groundwaters of Napa County. Data sources are described first. Standards for drinking water and requirements for industrial and agricultural water uses of Napa County are summarized next. This is followed by a review of the historical and existing quality of surface and groundwaters of Napa County. The review is limited to inorganic and physical parameters exceeding the drinking water standards, and requirements for industrial and agricultural supply.

## DATA SOURCES

Water quality data were obtained from the California Department of Health Services (DOHS), California Department of Water Resources (DWR), and published reports. Available data for different source waters varied considerably. Where data for source water was limited or unavailable, raw water quality measurements at the treatment plants were used.

The quality of Bell Canyon Reservoir water is described using six raw and six treated water samples collected between September 1974 and May 1990. Rector Reservoir water quality is based on three raw and five treated water samples obtained between January 1986 and July 1987. Kimball Reservoir water quality is based on two raw and ten treated water samples measured between May 1982 and March 1990. The quality of Lake Hennessey and Milliken Reservoir waters were characterized from average monthly raw and treated samples measured at the respective treatment plants. At the Hennessey Water Treatment Plant, seventy five monthly measurements of average values were recorded between January 1983 and July 1990, and at the Milliken Water Treatment Plant, during the same period, forty monthly measurements were recorded. Between December 1985 and May 1986, the Milliken plant was not in service.

The quality of North Bay Aqueduct water was obtained from average monthly raw and treated samples measured at the Jameson Water Treatment Plant. Sixty three monthly measurements were recorded between November 1983 and July 1990.

Lake Berryessa water quality was described from Putah Creek measurements recorded at Winters, Yolo County, by DWR between 1985 and 1987.

Water quality data for the Napa River was obtained from DWR, consisting of 216 measurements made at St. Helena between December 1951 and April 1989.

Napa County groundwater quality data was obtained from USGS and DWR reports. Much of the available information on Northern Napa, Milliken-Sarco-Tulucay, Carneros and Putah Creek groundwaters was collected between January 1948 and July 1972.

## USER QUALITY REQUIREMENTS

Water quality requirements, in general, depend upon the potential beneficial use of water. Napa County's current water demand (1989) generated by municipal, industrial and agricultural uses is estimated to be 57,100 Ac-Ft/Yr. Other beneficial uses of Napa County surface waters include recreation, fish spawning and warm fresh water habitat as well as migration route and temporary environment for anadromous fish species. In this report, however, only water quality issues related to municipa, industrial and agricultural uses are described. Municipal demand constitutes about 29 percent of the total water demand; industrial demand about 3 percent; and agriculture about 61 percent. Surface water, including from the local reservoirs and imported water, supplies more than 95 percent of the total municipal and industrial demand. Surface water from the local reservoirs and Napa River also supplies about 40 percent of the total agricultural demand. Groundwater supplies less than 5 percent of the municipal and industrial demand and about 60 percent of the agricultural demand.

### Quality Requirements for Municipal Supply

Table 4-1 lists the primary and secondary water quality standards for inorganic and physical parameters in drinking water supplies established by DOHS. Primary standards have been established as Maximum Contaminant Levels (MCLs) for parameters that are known to adversely affect human health and are enforceable by law. Secondary standards are set as recommended concentration limits for some parameters and are based mainly on aesthetic considerations.

Primary drinking water quality standards have been exceeded for turbidity in raw waters of all local reservoirs as well as the North Bay Aqueduct, and for nitrates in the Napa River and groundwaters of the Northern Napa, and Carneros basins. Secondary drinking water quality standards have been exceeded for color, odor, iron, and manganese in various surface and groundwater sources.

### Quality Requirements for Industrial Supply

Quality requirements for industrial water vary over a wide range depending on the type of industry and the industrial process or equipment installed in a particular facility. Because the variance is so great it is unlikely that most domestic supplies will be of the proper quality without further treatment. Drinking water standards would apply to the wine-making industry. Table 4-2 lists values for selective water quality parameters that may be of relevance to other Napa County industries.

TABLE 4-1

CALIFORNIA DRINKING WATER QUALITY STANDARDS

| | | California Title 22 | |
|---|---|---|---|
| Parameter | Unit | Primary MCL(1) | Secondary (2) |
| **Physical/Aesthetic** | | | |
| Color | unit | - | 15 |
| Corrosivity | - | - | relatively low |
| Odor | TON | - | 3 |
| pH | unit | - | - |
| Specific Conductance | μmho/cm | - | 900 |
| Turbidity | TU | 1 | - |
| Total Dissolved Solids | mg/l | - | 500 |
| **Inorganic Chemicals** | | | |
| Aluminium | mg/l | 1 | - |
| Arsenic | mg/l | 0.05 | - |
| Barium | mg/l | - | - |
| Cadmium | mg/l | 0.01 | - |
| Chlorides | mg/l | - | 250 |
| Chromium (total) | mg/l | 0.05 | - |
| Copper | mg/l | - | 1 |
| Fluoride | mg/l | 1.4-2.4(3) | - |
| Iron | mg/l | - | 0.03 |
| Lead | mg/l | 0.05 | - |
| Manganese | mg/l | - | 0.05 |
| Mercury | mg/l | 0.002 | - |
| Nitrate (as NO3) | mg/l | 45 | - |
| Selenium | mg/l | 0.01 | - |
| Silver | mg/l | 0.05 | - |
| Zinc | mg/l | - | 5 |

Note: (1) Standards are enforceable
(2) Standards are recommended
(3) Temperature dependent

TABLE 4-2

SUMMARY OF INDUSTRIAL WATER QUALITY PREFERENCE

| Parameter | Preferred Value |
|---|---|
| Chlorides (mg/l) | 200 |
| Color (color units) | 25 |
| Iron (mg/l) | 0.3 |
| Bicarbonate (mg/l) | 480 |
| Manganese (mg/l) | 1 |
| Nitrate (mg/l) | 8 |
| Total Dissolved Solids (mg/l) | 150 |
| Total Hardness (mg/l) | 120 |

* Interpreted from California Department of Water Resources (1989: 8)

In addition to the parameters that exceed the drinking water standards, total dissolved solids and total hardness values in various surface and groundwaters exceed the preferred industrial water quality levels.

## Quality Requirements for Agricultural Supply

Water quality constraints for agriculture are generally less stringent than those for municipal supply, and as such, agricultural water quality requirements, rather than standards, have been established for irrigation. Since Napa County agriculture is dominated by grape growing, only the water quality requirements for irrigation of vineyards are discussed. Table 4-3 lists the water quality requirement for irrigation for vineyards. The suitability of water for irrigation depends upon the effects of chemical constituents in the water on the plants and the soil. Permissible salt concentrations for irrigation water depend on the salinity tolerance of the plant, soil types, climatic conditions, and irrigation practices.

Potential water quality constraints for agricultural supply in Napa County include high levels of dissolved solids, boron, nitrate, sodium, and chloride.

## SOURCE QUALITY ISSUES

Table 4-4 lists the concentration range for parameters that have exceeded the drinking, industrial or agricultural water quality requirements in the local reservoirs of Napa County and the North Bay Aqueduct. Raw water quality data for local reservoirs including Hennessey, Milliken, Rector, Bell Canyon, and Kimball, and for the North Bay Aqueduct, indicate that the following parameters have exceeded drinking water quality standards at different times: turbidity, color, odor, iron and manganese. In some of these sources even the industrial preference levels for total dissolved solids and total hardness have been exceeded.

Table 4-5 lists the concentration range for parameters that have exceeded the drinking, industrial or agricultural water quality requirements in Lake Berryessa, Napa River and four groundwater basins in Napa County. The constituents listed in Tables 4-4 and 4-5 are elaborated below with regard to each surface and groundwater source.

### Turbidity

Turbidity is attributed to suspended and colloidal material such as microorganisms, organic debris, silica or other mineral substances, clay or silt. Turbidity reduces the clarity of the water and diminishes the penetration of light. It is commonly analyzed

TABLE 4-3

WATER QUALITY REQUIREMENTS FOR IRRIGATION OF VINEYARDS

| Parameter | Value | | |
| --- | --- | --- | --- |
| | No problems | Increasing problems | Usually unsatisfactory |
| Total Dissolved Solids (mg/l) | 0 - 500 | 500 - 2000 | 2000+ |
| Sodium (mg/l) | 0 - 69 | 69 - 184 | 184+ |
| Sodium Adsorption Ratio | 0 - 6 | 6 - 9 | 9+ |
| Chlorides (mg/l) | 0 - 106 | 106 - 284 | 284+ |
| Bicarbonate (mg/l) | 0 - 76 | 76 - 152 | 152+ |
| Boron (mg/l) | 0 - 1 | 1 - 3 | 3+ |
| Nitrate-Nitrogen (mg/l) | 0 - 5 | 5 - 30 | 30+ |
| Biochemical Oxygen Demand (mg/l) | 0 - 10 | 10 - 20 | 20+ |
| pH | 6.5 - 8.4 | | |
| Coliform, Most Probable Number | 2.2* | | |

* For sprinkler irrigation of produce.

Source: University of California, Agriculture Extension Service

## Table 4-4

### Water Quality* in Local Reservoirs and North Bay Aqueduct

| Source | Hennessey | Milliken | Kimball | Rector | Bell Canyon | NBA |
|---|---|---|---|---|---|---|
| **Parameter** | | | | | | |
| Turbidity (TU) | 3 - 26 | 2.3 - 18 | 8 - 11 | 0.5 - 8 | 1.6 - 2.5 | 2 - 68 |
| Color (color unit) | 0 - 100 | 2.5 - >70 | 20 - 35 | 35 - 50 | 1 - 30 | 2 - 77 |
| Odor (TON) | 2 - 4 | <3** | 3 - 6 | <3** | 1 - 8 | <3 - 8 |
| Iron (mg/l) | 0 - 0.49 | 0.05 - 1.63 | <0.1 - 0.83 | 0.09 - 0.65 | 0.1 - 0.61 | <0.3** |
| Manganese (mg/l) | 0.01 - 1.2 | 0.01 - 0.15 | 0.01 - 0.055 | <0.05** | <0.05** | 0.01 - 0.63 |
| Hardness (mg/l) | 100 - 147 | <120** | 83 - 150 | 37 - 42 | 21 - 125 | 90 -186 |
| Total Dissolved Solids (mg/l) | <150 - 180 | <150** | 100 - 180 | 46 - 150 | 61 - 220 | <150 -283 |

* Only concentration ranges of parameters exceeding beneficial use requirements are listed

** All records below stated value

## Table 4-5

### Water Quality* in Lake Berryessa, Napa River and Napa County Groundwater

| Source | | | Groundwater Basins | | | |
|---|---|---|---|---|---|---|
| | Lake Berryessa | Napa River | Northern Napa | Milliken-Sarco Tulocay | Carneros | Putah Creek |
| **Parameter** | | | | | | |
| Iron (mg/l) | - | - | 0 - 5.1 | 0 - 67 | - | - |
| Hardness (mg/l) | 139 - 178 | 33 - 182 | 0 - 315 | - | - | - |
| Nitrates (mg/l) | - | 0.44 - 53 | 0.06 - 50 | - | >45 | - |
| Total Dissolved Solids (mg/l) | 170 - 262 | <150 | 98 - 1000 | 500 - >1000 | 500 - >2000 | >2000 |
| Sodium (mg/l) | 8 - 23 | 4 - 36 | 7.7 - 644 | - | - | - |
| Chloride (mg/l) | 4 - 20 | 4 - 45 | 50 - 300 | - | - | - |
| Boron (mg/l) | 0.1 - 0.3 | 0.05 - 1.9 | 4.2 - 32 | >1 | - | 1 - 10 |
| Sodium Adsorption Ratio | - | 0.4 - 1.3 | 1 - 56 | - | - | 23.6 |

* Only concentration ranges of parameters exceeding beneficial use requirements are listed

\- Records not available

by measuring the amount of light scattered by particulate matter, higher turbidity readings, measured as turbidity units (TU), indicate an increase in particulate matter and light scattering, and a corresponding decrease in clarity.

High turbidity levels in drinking water pose a potential health risk and are aesthetically undesirable, causing consumer dissatisfaction. Turbidity can interfere with disinfection- the particulate matter, which causes turbidity, shielding bacteria and viruses from destruction by the disinfecting agent. Water-borne microorganisms, if not destroyed by disinfection, are capable of causing gastroenteritis, infectious hepatitis or other diseases.

Turbidity also degrades the aesthetic quality of drinking water. Most consumers judge their water supply initially by taste and appearance. Turbidity reduces the clarity of water and makes it aesthetically less desirable. Also, particulates associated with turbidity may adsorb or be comprised of organic material which has undesirable tastes or odors. When particulate material settles in distribution reservoirs it can later be decomposed or resuspended, either of which can intensify tastes and odors.

The DOHS requires that surface supplies exposed to significant sewage hazard or significant recreational use shall receive, as a minimum, pretreatment, filtration and disinfection, and that filtered water turbidity be maintained at less than 0.5 TU, as compared to surface supplies not exposed to microbiological contamination, where a standard of 1 TU applies.

All monthly average turbidity levels in raw waters of Hennessey, Milliken and Jameson Water Treatment Plants (North Bay Aqueduct) exceeded 0.5 TU, and they ranged between 3 and 26 TU, 2.3 and 18 TU, and 2 and 68 TU, respectively. All monthly average turbidity levels in treated waters of each plant was below 0.5 TU.

Turbidity levels in two raw water samples from Kimball Reservoir were 8 and 11 TU. Turbidity levels in four treated samples were less than 0.5 TU; in two treated samples between 0.5 and 1 TU; and in one treated sample it was 8.7 TU. The high turbidity level noted in the last sample may have been because it was taken from a faucet that was not used often. This sample also had high iron concentration and color values.

Three raw water samples from Bell Canyon Reservoir had turbidity levels between 1.6 and 2.5. One treated water sample exceeded the 1 TU level (2.2 TU), another one was between 0.5 and 1 TU (0.71 TU), and two others were below the 0.5 TU level.

One raw sample from Rector Reservoir had a turbidity level greater than 1 TU (8 TU) and another raw sample was below 0.5 TU. Two treated water samples exceeded the 1 TU level (1.6 and 2.5 TU).

## Color

Color in water results from the presence of metallic ions such as iron and manganese, or the presence of organic material such as humus or peat, plankton, and weeds. The DOHS recommends a drinking water standard of 15 color units. Although aesthetically color may be objectionable, it does not pose a health hazard.

In Hennessey, Milliken and Jameson Treatment Plants, color levels in the raw water ranged between 0 and 100 color units, 2.5 and over 70 color units, and 2 and 77 color units, respectively. Drinking water standards in raw waters of these plants were exceeded twenty eight, twenty seven and twenty nine times, respectively. Color values in all treated samples of the three plants were below the standard.

Two raw water samples from Rector Reservoir had values of 35 and 50 color units. All five treated samples met the standard.

Two raw water samples from Kimball Reservoir had values of 20 and 35 color units. Eight treated samples had color levels below the standard. High color value (30 color units) in one particular sample may be attributed to infrequent use of the faucet from which the sample was obtained.

Raw water samples in Bell Canyon Reservoir had values between 1 and 30 color units. Two samples had values of 20 and 30 color units. Color levels in all treated samples were below the standard.

## Odor

Odor is an important aesthetic quality of water. Its intensity is measured as the "threshold odor number" (TON). For drinking supplies, the recommended threshold odor number is 3 units. At the Hennessey Treatment Plant, odor values in the raw water ranged between 2 and 4 TON, and exceeded the recommended standard four times. At Jameson Treatment Plant, the standard was exceeded once at 8 TON. All treated samples at both Hennessey and Jameson Treatment Plants had odor values below the standard.

Drinking water quality standard for odor was exceeded in one raw water sample from Bell Canyon Reservoir, and in one raw and two treated water samples from Kimball Reservoir.

## Iron and Manganese

High levels of iron in water imparts an unattractive appearance and taste. High concentrations of manganese result in disagreeable taste and discolors laundry. Iron and manganese concentrations can be caused by anaerobic conditions resulting from reservoir stratification. The DOHS recommended drinking water standard for iron and manganese are 0.3 mg/l and 0.05 mg/l, respectively.

Iron concentrations in raw waters of Hennessey and Milliken Treatment Plants were between 0 and 0.46 mg/l, and 0.05 and 1.63 mg/l, respectively. Drinking water standards in raw waters of these two plants were exceeded two and four times, respectively. All the treated samples met the drinking water standards.

In raw waters of Bell Canyon Reservoir, iron concentration ranged from less than 0.1 to 0.61 mg/l, and the standard was exceeded twice. All treated samples met the standards.

One raw water sample from Kimball Reservoir had iron concentration of 0.83 mg/l. All treated samples, except one, had values below the drinking water standard. The high iron concentration of 1 mg/l in one treated sample was attributed to the infrequently-used faucet.

In raw waters of Rector Reservoir, iron concentration ranged from 0.085 to 0.65 mg/l, the standard was exceeded once. All treated samples met the standards.

Northern Napa groundwaters exhibit high iron concentrations. Four wells northwest of St. Helena had iron concentrations from 0.88 to 5.1 mg/l. One well south east of St. Helena had an iron level of 3.8 mg/l. One well, measured in 1915, north of the Milliken-Sarco-Tulucay basin, had an iron level of 67 mg/l, and another well in the northern part of Milliken-Sarco-Tulucay basin contained an iron concentration of 15 mg/l.

Manganese concentrations in raw waters of Hennessey, Milliken and Jameson Treatment Plants ranged from 0.01 to 1.2 mg/l, 0.01 to 0.15 mg/l, and 0.01 to 0.63 mg/l, respectively. Drinking water standards at these plants were exceeded forty eight, eleven and twenty five times, respectively. At the Hennessey plant, manganese levels in treated water samples exceeded the standard nine times. At Milliken and Jameson plants, all treated samples had manganese values below the standard.

All of the raw and treated samples collected from Kimball and Bell Canyon waters had manganese values below the standard. Raw water from Rector Reservoir had manganese levels ranging from less than 0.05 to 0.27 mg/l. They exceeded the drinking water standards twice. All of the treated samples met the standard.

## Hardness

Hardness is a term applied to the soap-consuming power of a water. Any substance that will form an insoluble curd or scum with soap causes hardness. In natural water, hardness is caused mainly by calcium and magnesium ions. Other ions which cause hardness such as iron, manganese, copper, barium, lead or zinc, are normally present in trace quantities and do not contribute significantly to hardness. Hardness is traditionally reported in milligrams per liter as calcium carbonate.

Although hardness is not regulated in drinking water supplies, the historical concern has been its aesthetic and economic impact. According to Davis and DeWeist (1966), water hardness, measured as calcium carbonate, can be classified as follows: up to 60 mg/l classified as soft; between 60-120 mg/l as moderately hard; between 120-180 mg/l as hard; and greater than 180 as very hard. Moderately hard levels require consumers to use more soap and detergent, even with the use of synthetic detergents. Hardness can also lead to the formation of scale in plumbing fixtures, mainly in boilers and other heat exchange equipment, and the precipitation of scum in laundry equipment and cooking utensils. Thus, higher hardness levels would require consumers to spend more in purchase of cleaning materials and repair or replacement of plumbing or hot water heating equipment. In industrial supplies, in general, a hardness level of 120 mg/l or less is preferred.

Hardness in the raw water of Hennessey, Milliken and Jameson Water Treatment Plants ranged from 100 to 147 mg/l, below 120 mg/l, and 90 to 186 mg/l, respectively. The 120 mg/l hardness level was exceeded forty six and forty three times at Hennessey and Jameson plants, respectively.

Bell Canyon and Rector Reservoir waters are soft. Hardness in Kimball Reservoir water is between 69 and 150 mg/l. The 120 mg/l level was exceeded twice.

Lake Berryessa water exceeds the 120 mg/l level all the time. Hardness values range between 139 and 178 mg/l.

Hardness levels in the Napa River are between 33 and 182 mg/l. Eighty six samples exceeded 120 mg/l level and two samples exceeded 180 mg/l level.

Hardness values in the Northern Napa groundwater basin ranges between 0 and 315 mg/l. Seventeen wells had levels above 120 mg/l.

## Nitrates

Nitrates are common contaminants in surface and groundwaters in many rural communities in California and are becoming increasingly widespread because of agricultural activities and disposal of sewage on or below the land surface. Nitrates can enter the groundwater through either the conversion of naturally-occurring or introduced organic nitrogen or ammonia. The primary drinking water quality standard for nitrates is 45 mg/l as nitrate (10 mg/l as nitrogen). Excess nitrates cause methemoglobinemia in infants (the blue baby syndrome). Nitrates are converted to nitrites in the intestines and inhibit the body's ability to ingest oxygen. Water quality requirements for irrigation of vineyards as well as for industrial supply espouse more stringent nitrate limits than drinking water standards. In irrigation supplies, nitrate levels exceeding 5 mg/l up to 30 mg/l cause increasing problems, and values over 30 mg/l are usually unsatisfactory. In industrial supplies, values below 8 mg/l are preferred, and over 30 mg/l are not recommended.

Nitrate levels in the Napa River (reported as nitrogen) range between 0.44 and 53 mg/l as nitrate. Drinking water standards were exceeded once (in May 1962). Forty samples had nitrate levels within the "increasing problem" category for irrigation requirements for vineyards and fifteen fell in the "usually unsatisfactory" category. Thirty seven samples had values above the preferred requirements for industrial supply, and fifteen above the recommended limits.

High nitrate levels in groundwaters have been noted in several areas of Napa County. Nitrate levels in Northern Napa groundwaters (measured between December 1955 and July 1971) ranged from 0.06 to 50 mg/l. Two Northern Napa wells, located northwest of the City of Napa, had levels exceeding the drinking water standard. Six wells had nitrate values that were within the "increasing problem" category for irrigation requirements and above the preferred requirements for industrial supply. In the Carneros basin, 2 wells, one located in the northern part of the basin and the other west of Cuttings Wharf, had nitrate levels above the drinking water standard.

## Total Dissolved Solids (TDS)

Surface and groundwater contains a variety of dissolved inorganic constituents as a result of chemical and biochemical interactions with geological materials. The major constituents in TDS - sodium, magnesium, calcium, chloride, bicarbonate, and sulfates, occur in ionic form and normally comprise more than 90 percent of the TDS. The DOHS recommended TDS concentration for municipal supply is 500 mg/l, which is also the limit for the "no problem" category for irrigation requirements for vineyards. For industrial supply, TDS levels of 150 mg/l or less are preferred.

TDS concentration in the Napa River is between 99 and 256 mg/l. Fifty six samples had concentrations above the preferred industrial supply requirement.

Northern Napa groundwaters have TDS values between 98 and 1000 mg/l. High TDS concentrations (greater than 500 mg/l) are found northwest of Calistoga. Thirty two wells had TDS values above the preferred industrial supply requirements. Groundwaters in the Carneros basin have TDS concentrations between 500 to over 2000 mg/l. TDS concentrations between 500 and 1000 mg/l are found in the eastern and southern boundaries of the Carneros basin. The northeastern part of the basin had values between 1000 and 2000 mg/l. Two wells, one in the eastern part of the basin and another in the southern part of the basin, had values exceeding 2000 mg/l. In the Milliken-Sarco-Tulucay groundwater basin, east of Napa, TDS concentrations range between 500 and 1000 mg/l, and south of Napa, they exceed 1000 mg/l. One well in Pope Valley (in the Putah Creek basin) had TDS levels exceeding 2000 mg/l.

**Sodium**

Although sodium is not regulated in drinking water supplies, the Environmental Protection Agency (EPA) has recommended that a 20 mg/l be used as a goal for public water systems. The American Heart Association has suggested the same level (20 mg/l) to afford protection to those individuals with heart or kidney disease who require a low sodium diet. In supplies for vineyard irrigation, sodium concentrations above 69 and up to 184 mg/l cause increasing permeability problems, and those above 184 mg/l are usually unsatisfactory.

Northern Napa groundwaters had sodium concentrations ranging from 7.7 to 644 mg/l. Thirty two wells have values above 20 mg/l, the EPA recommended value for public drinking supplies. Eighteen wells had sodium concentrations above 69 mg/l, the increasing problem category for vineyard irrigation, and seven above 184 mg/l, the unsatisfactory category.

Sodium adsorption ratio (SAR) provides an indicator of the salt balance between the major cations (sodium, calcium and magnesium). For irrigation of vineyards, SAR values greater than 6 to 9 could cause permeability problems in shrinking-swelling types of soils. SAR values greater than 9 are usually unsatisfactory for vineyard irrigation. SAR values in Northern Napa groundwaters range from less than 1 to over 56. Eleven wells had SAR values above 6, nine of which had values greater than 9. One well in Pope Valley had a SAR of 23.6.

# Water Quality

## Chlorides

Chlorides in excess of 100 mg/l impart a salty taste to drinking water. The recommended drinking water standard for chlorides is 250 mg/l. Industrial users prefer a concentration of 200 mg/l or less. For vineyard irrigation, levels above 106 mg/l may cause increasing problems and those above 284 mg/l are usually unsatisfactory.

Groundwaters of Northern Napa have chloride concentrations between 50 and 300 mg/l, with thirteen wells having levels above 106 mg/l, six above 200 mg/l, three above 250 mg/l, and one over 284 mg/l.

Much of Northern Napa groundwater is classified as sodium-chloride waters.

## Boron

Boron is an essential element for plant growth but is needed in relatively small amounts. If excessive, boron becomes toxic. The recommended boron level for vineyard irrigation is 1 mg/l; concentrations above 1 mg/l causing increasing problems and those above 3 mg/l are usually unsatisfactory for vineyard irrigation.

Boron levels in the Napa River are between 0.05 and 1.9 mg/l. Concentrations in five samples exceeded 1.0 mg/l.

Boron levels in groundwaters of Napa County are high. They range between 4.2 and 12 mg/l in groundwaters around and north west of Calistoga, and between 1.6 and 32 mg/l in groundwaters west of St. Helena, north of Oakville and North of Yountville. In the Milliken-Sarco-Tulucay basin, especially south and south east of Napa, boron levels exceed 1 mg/l.

Boron levels in three wells in the Putah Creek basin, (in Pope Valley) exceeded 1 mg/l with one well having as much as 10 mg/l.

Boron levels in groundwaters of Napa County are high. They range between 4.2 and 12 mg/l in groundwaters around and north west of Calistoga, and between 1.6 and 32 mg/l in groundwaters west of St. Helena, north of Oakville and North of Yountville. In the Milliken-Sarco-Tulucay basin, especially south and south east of Napa, boron levels exceed 1 mg/l. Boron levels in three wells in the Putah Creek basin, (in Pope Valley) exceeded 1 mg/l with one well having as much as 10 mg/l.

# SECTION 5

# EXISTING WATER SUPPLIES

Napa County's agriculture and municipalities satisfy their current water needs from five supplies:

- Groundwater
- River Diversion
- Reservoirs
- Imported Water
- Reclamation

In assessing the balance between County water needs and supplies, the quantity and its availability must be considered in determining how effective and reliable a given supply can be. In the case of groundwater, a safe yield estimate must be obtained which represents a long-range amount of pumping that can be sustained by recharge of the groundwater basin. In the case of river diversion, with the focus on the Napa River, the variations of flow, seasonally and year-to-year, must be related to the timing of water need. For the major local reservoirs, the variation of inflow from their respective watersheds and variation of consumption play major roles in arriving at a yield-frequency relationship. For imported water, contract entitlement buildup and dry-period cutbacks are the major considerations. For reclamation, the quality of the treated effluent is a key determinant of usability.

The above existing County water supplies are discussed in detail below.

## GROUNDWATER

The objective of this section is to address water supply availability in groundwater basins located in Napa County. Napa County is located within the northern half of the Coast Ranges geomorphic province. In general, the Northern Coast Ranges are composed of marine sedimentary sandstones and shales that have been folded and faulted for millions of years creating the northwest-southeast trending valley-ridge topography. More recently, volcanic activity and erosion have assisted in the landscape process. It is these later geologic events which created the water bearing units of interest in and around the Napa Valley. Many of the faults which originally created the Coast Ranges are not presently active (an active fault has had surface displacement within the last 11,000 years), but some have shown evidence of faulting within the last 2 million years. Some of the faults in Napa County include: Carneros Fault, Cordelia Fault Zone, Green Valley Fault Zone (active), Soda Creek Fault, West Napa Fault Zone (active), Wilson Fault and the Wragg Fault.

## Section 5

## Existing Water Supplies

The focus of this analysis is on four key areas with potential for feasible extraction of groundwater. These areas, as shown in Figure 5-1, are: (1) North Napa Valley Groundwater Basin; (2) Milliken-Sarco-Tulucay Groundwater Basins; (3) Carneros; and (4) Lake Berryessa Basin (Pope and Capell Valleys).

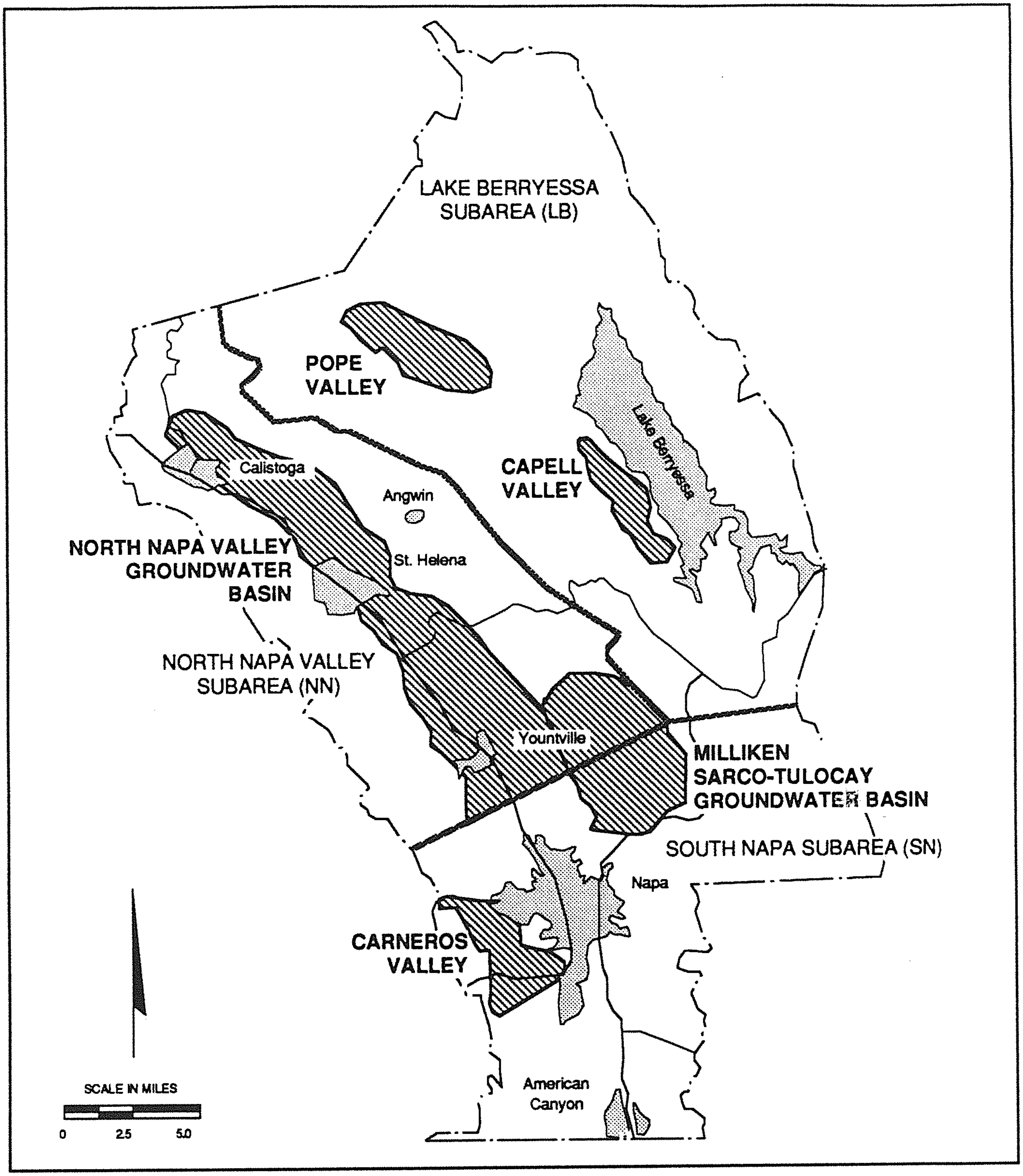
The primary aquifer depended upon in Napa County is that of the North Napa Valley Groundwater basin. Formed by the alluvium found in the Napa Valley east of the City of Napa, and extending north of the City of Calistoga, this aquifer provides water for irrigation and frost and heat protection for the highly valued grapes in the region. To a lesser extent, it is used for domestic purposes as well. Because of the importance of this aquifer as a source of supply, sources of recharge were analyzed facilitating the calculation of the safe yield of the groundwater basin. To validate the recharge estimates, a hydrologic budget was performed as well.

The other basins mentioned above are discussed in less detail. Existing information is reviewed together with additional insight provided by the Advisory Committee panel members, providing a summary of the basin characteristics and the potential water supply.

### North Napa Valley Groundwater Basin

Napa Valley is located 40 miles northeast of San Francisco. The North Napa Valley groundwater basin lies beneath the valley floor. The boundaries of the basin, as described by the U.S. Geological Society (USGS) in 1973 (USGS, 1973), extends from Oak Knoll Avenue (just north of the City of Napa) to the northwestern end of the valley just beyond the City of Calistoga. The boundary encompasses approximately 60 square miles of valley floor.

The valley floor is drained by the Napa River which extends longitudinally through the study area, starting in the northwestern section and proceeding south past Oak Knoll to San Pablo Bay. Tributary flows occur along the western and eastern boundaries; the primary regulated watersheds are situated on the east side and consist of Bell Canyon, Conn, Moore, Chiles, and Sage Creeks supplying Lake Hennessey, and Rector Creek. Along the west side there are numerous creeks, mostly unregulated, with a total watershed area of approximately 71 miles adjacent to the study area. Water use in the North Napa Valley region is dominated by agricultural needs, mostly for vineyards established in the basin. Of the total water use in 1989 in this region, 82 percent was needed to support 19,100 acres of land dedicated to vineyards. As discussed in the previous sections, water for vineyards is needed both for irrigation and frost and heat protection. There are small acreages of other agriculture that for purposes of this




**GROUNDWATER HYDROLOGIC STUDY AREAS**

FIGURE 5-1

analysis were assumed negligible. In addition to agriculture, municipal and industrial needs in the North Napa Valley were 12 percent of the total water use in 1989 and domestic use by the rural population was approximately 6 percent.

The North Napa Valley Groundwater basin has been studied numerous times in the past. The most relevant work of this present study includes four previous investigations: (1) a joint study by the USGS and the California Department of Water Resources (DWR) completed in 1960 involving an analysis of groundwater characteristics in Napa Sonoma Valleys; (2) a U.S. Bureau of Reclamation (USBR) study in 1966 as part of the Knights Valley unit investigation; (3) a study by the Napa County Flood Control and Water Conservation Service in 1972 evaluating the potential for increased groundwater use for vineyard irrigation and frost protection; and (4) the most recent work by the USGS in which North Napa Valley groundwater hydrology was studied in detail and analyzed for its groundwater yielding capabilities (USGS, 1973).

In the Northern Napa Valley Groundwater Basin, the hydrogeologic units of interest include the water bearing Quaternary Alluvium and Pliocene Sonoma Volcanics, and the non-water bearing Cretaceous-Jurrassic Franciscan Formation and Great Valley Sequence.

Most of the valley floor is composed of alluvium which occurs as poorly sorted lenticular stream deposits of sand and gravel surrounded by silts and clays of the floodplain deposits. Alluvial deposits vary in thickness from more than 300 feet in the south end of the Napa Valley near San Pablo Bay to less than 50 feet near Calistoga. The alluvium tends to be thicker in the center of the valley near the Napa River.

The Sonoma Volcanics provide additional water to wells penetrating through the alluvium on the valley floor or located on the foothills surrounding the valley. The Sonoma Volcanics are a thick highly variable series of 4 different volcanic members. Only a tuffaceous member in the upper half of the volcanic deposit yields moderate amounts of water to wells. The Sonoma Volcanics which underlie most of the valley floor are believed to reach up to 2000 feet thick. The entire east side of the valley floor is flanked by the volcanics, as is most of the west side north of St. Helena.

The Franciscan Formation and The Great Valley Sequence flank most of the west side of the valley south of St. Helena. This is important to local groundwater users because these two deposits yield even less water to wells than the adjacent volcanics.

During pre-development conditions, groundwater generally flowed from the valley's edges toward the valley axis, and then south to San Pablo Bay. Some of the faults located within the valley floor modify these general flow patterns. The Soda Creek Fault is the only fault documented to obstruct the flow of groundwater. It appears to restrict the westward flow of groundwater just north of Milliken Creek, but only during times of low water levels.

Most of the groundwater in the Napa Valley is pumped from the Quaternary Alluvium which is considered the best aquifer in the area. Most water produced from the alluvium is pumped from unconfined aquifers; and the yields from wells depend on the number of gravel beds penetrated and screened by the well. Individual sand and gravel lenses tend to be less than 10 feet thick. Well production averages 223 gpm, but ranges from 50-3000 gpm at a specific capacity of 10 gpm per foot of drawdown. Storage capacity of the alluvium in the north Napa Valley is estimated at 190,000 Acre-Feet.

The Sonoma Volcanics are the other main source of groundwater in and around the Napa Valley. Few wells penetrate the alluvium on the valley floor to pump water from the lower producing volcanic deposits. Water in the Sonoma Volcanics commonly is confined though a few wells actually do produce flowing water. Most of the flowing wells occur near Calistoga, and many of these produce hydrothermal water. Hydrothermal water is described as having a temperature equal to or greater than 20.5°C (69°F). Wells tapping the Sonoma Volcanics produce an average of 32 gpm at a specific capacity of 0.6 gpm/ft of drawdown. No estimate of the storage capacity of the Sonoma Volcanics was found, but one report stated that the 230 square mile Napa Valley Basin contained 300,000 AF of water in all the units between 10-200 feet below the ground surface.

Wells tapping the Franciscan Formation and the Great Valley Sequence yield an average of 19 gpm at a specific capacity of 0.1 gpm/ft of drawdown. Most wells tapping these formations produce less than 10 gpm. The few wells that do produce more water extract it from the highly fractured zone at depth.

The main objective of this analysis was to estimate groundwater yield, which is comprised of groundwater recharge from deep percolation of direct precipitation and irrigation-applied water and other inflows including recharge from neighboring tributaries and subsurface inflows from adjacent areas.

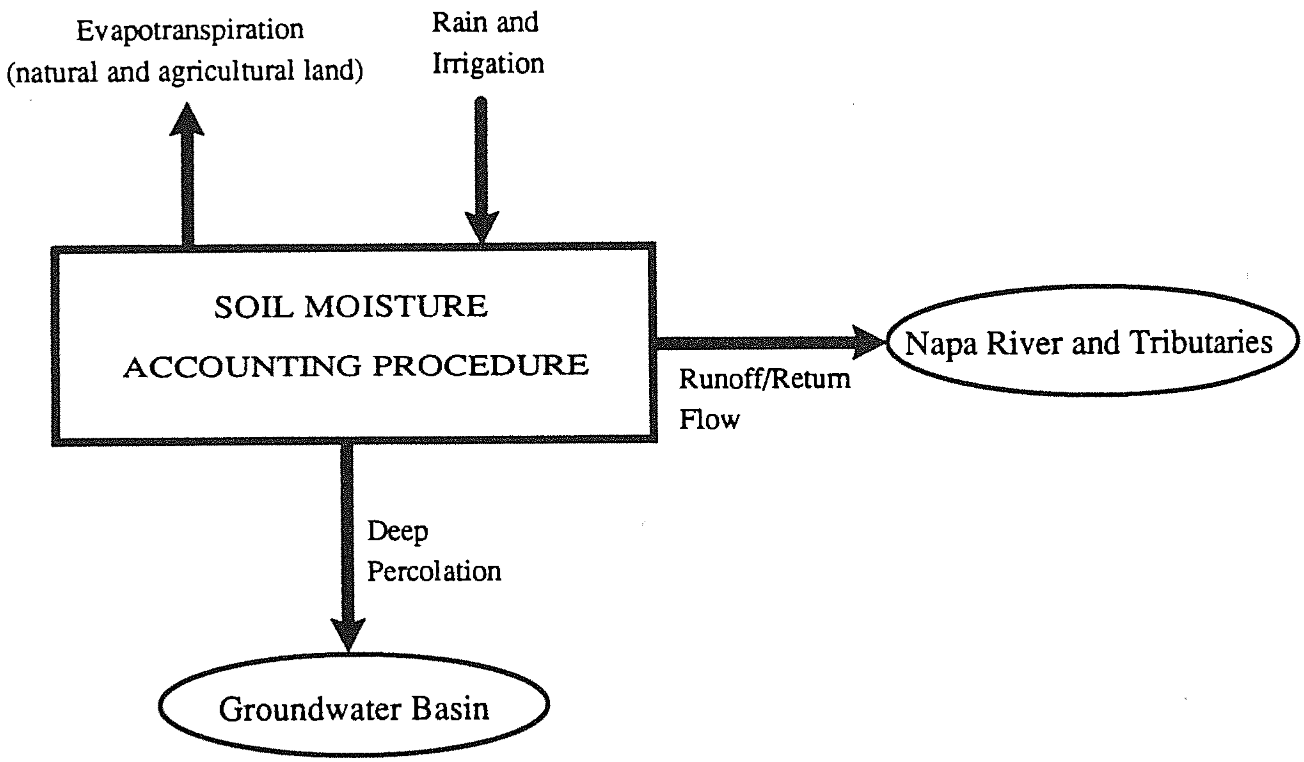
To estimate the groundwater yield of the North Napa Valley Groundwater basin, the individual components of recharge to and discharge from the basin were computed by independent methods. The results were then employed in an analysis of the hydrologic balance represented by the equation of hydrologic equilibrium stating that inflow less outflow is equal to the change in storage. The estimated change in storage was then compared with known groundwater level data for the purpose of validating or refining the initial estimates of inflow and outflow components. The methodology used in estimating the groundwater inflow and outflow components are discussed further below.

An aquifer may be replenished by several different sources, both natural and artificial. Deep percolation of precipitation, stream flow, or water in lakes and reservoirs exemplifies natural recharge. Seepage from irrigation applied-water and canals, and water purposely applied in spreading grounds or injected via wells can be classified as artificial recharge.

Deep percolation can be calculated by considering the natural processes occurring when precipitation and irrigation-applied water proceed through the hydrologic cycle. The most important factors to consider are surface runoff, evapotranspiration, and soil moisture retention. Deep percolation takes place when water reaching the soil exceeds these factors and infiltrates past the root zone depth, and eventually into the groundwater aquifer below. Recharge also occurs when streams cross regions where the pervious nature of the channel allows seepage to the groundwater system below. The amount of recharge is a function of stream flow, channel characteristics, and soil properties. Another possible source of recharge is from subsurface flow originating in adjacent groundwater systems.

To calculate annual deep percolation for the North Napa Valley Groundwater basin, a soil moisture accounting procedure was employed. This procedure, depicted in Figure 5-2, calculates the deep percolation resulting from precipitation and irrigation-applied water. This is accomplished on a monthly basis by solving a mass balance equation which relates the change in soil water content to precipitation, direct runoff, irrigation-applied water, evapotranspiration (actual), and deep percolation. Direct runoff was computed by the Soil Conservation Service (SCS) runoff curve number method. Curve numbers for the Napa Valley are available in the Soil Survey Report for Napa Valley (SCS, 1977). The curve number is a function of vegetative cover and soil group. Deep percolation is a function of rainfall (in excess of direct runoff) combined with irrigation-applied water (less the return flow) that infiltrates into the soil. As this excess water seeps down, some of the infiltrated water percolates due to gravity, contributing to an increase in groundwater storage, while the remainder is held in the soil moisture zone and subject to evapotranspiration.

The main input data required for this program includes historical monthly rainfall, existing land use acreage and its respective evapotranspiration, average monthly




**CALCULATION OF DEEP PERCOLATION IN THE NORTH NAPA VALLEY GROUNDWATER BASIN**

FIGURE 5-2

irrigation applied-water, and two soil parameters (SCS curve number and field capacity).

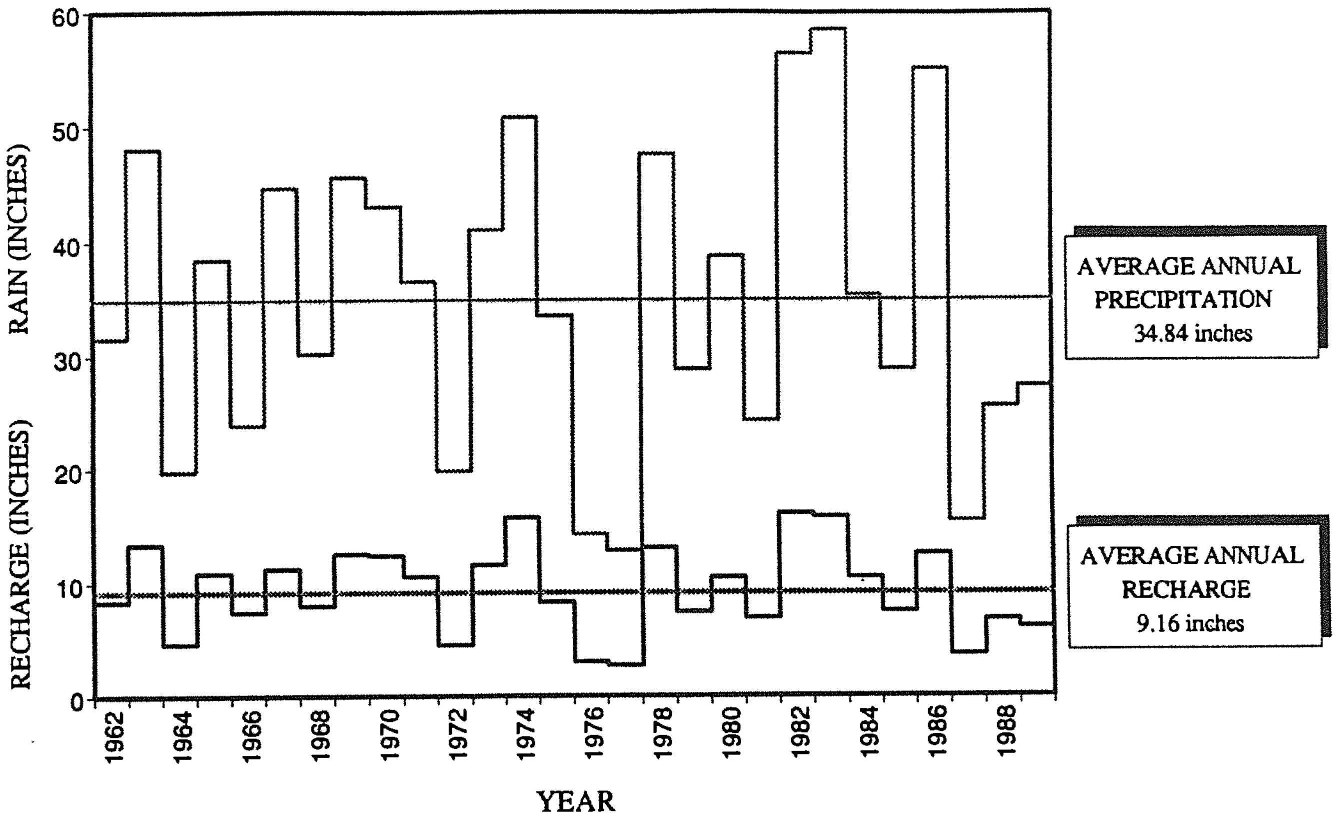
Applying this program to the North Napa Valley resulted in monthly values of deep percolation recharging the groundwater basin from natural, agricultural, and urban areas.

Recharge from the percolation of tributary streamflow is also mostly dependent on precipitation patterns. Percolation occurs as the tributaries enter the basin boundary passing from older impermeable geologic formations to permeable channel deposits in the alluvium. To fully understand the tributary interaction with the underlying groundwater basin on a monthly basis would require a sophisticated modeling approach based on simulation of the hydrologic cycle. For purposes of this study, an estimate of the average annual recharge from the percolation of tributary streams was determined using an average infiltration rate and the total wetted perimeter. The infiltration rate was taken from the Soil Survey of Napa County report (SCS, 1977), and the wetted perimeter was estimated from DWR land use-type classification maps (DWR, 1987).

Subsurface inflow occurs from adjacent groundwater bodies along the periphery of the North Napa Valley Groundwater basin. It is possible to estimate this recharge component using Darcy's Law and information concerning the hydraulic gradient across the adjoining basins. However, USGS reported that this component was relatively insignificant, occurring primarily east and southeast of St. Helena where Sonoma volcanics are known to exist (USGS, 1973). For purposes of this study, the subsurface inflow was taken to be that estimated by USGS in the 1973 investigation.

The estimated annual recharge in inches was plotted along with annual precipitation recorded at St. Helena. This is shown in Figure 5-3. The period chosen for the analysis, 1962 through 1989, is consistent with available well levels monitored by the Napa County Flood Control and Water Conservation District. As was stated earlier, the natural recharge occurring in the North Napa Valley Groundwater basin follows a pattern largely dependent on the precipitation patterns in the basin. Average annual recharge for the entire basin, which consists of deep percolation, tributary recharge, and subsurface inflow, from 1962 to 1989 was approximately 26,800 acre-feet per year.

A groundwater hydrologic budget considers the change in storage of the aquifer as a result of inflows into, and outflows out of, the basin. The change in storage is reflected in recorded well level fluctuations; an estimated change in storage can be computed from the inflow and outflow components and compared to recorded values. This provides a means for validating and refining the estimates of inflow and outflow.




**ANNUAL PRECIPITATION AND RECHARGE IN NORTH NAPA VALLEY GROUNDWATER BASIN**

FIGURE 5-3

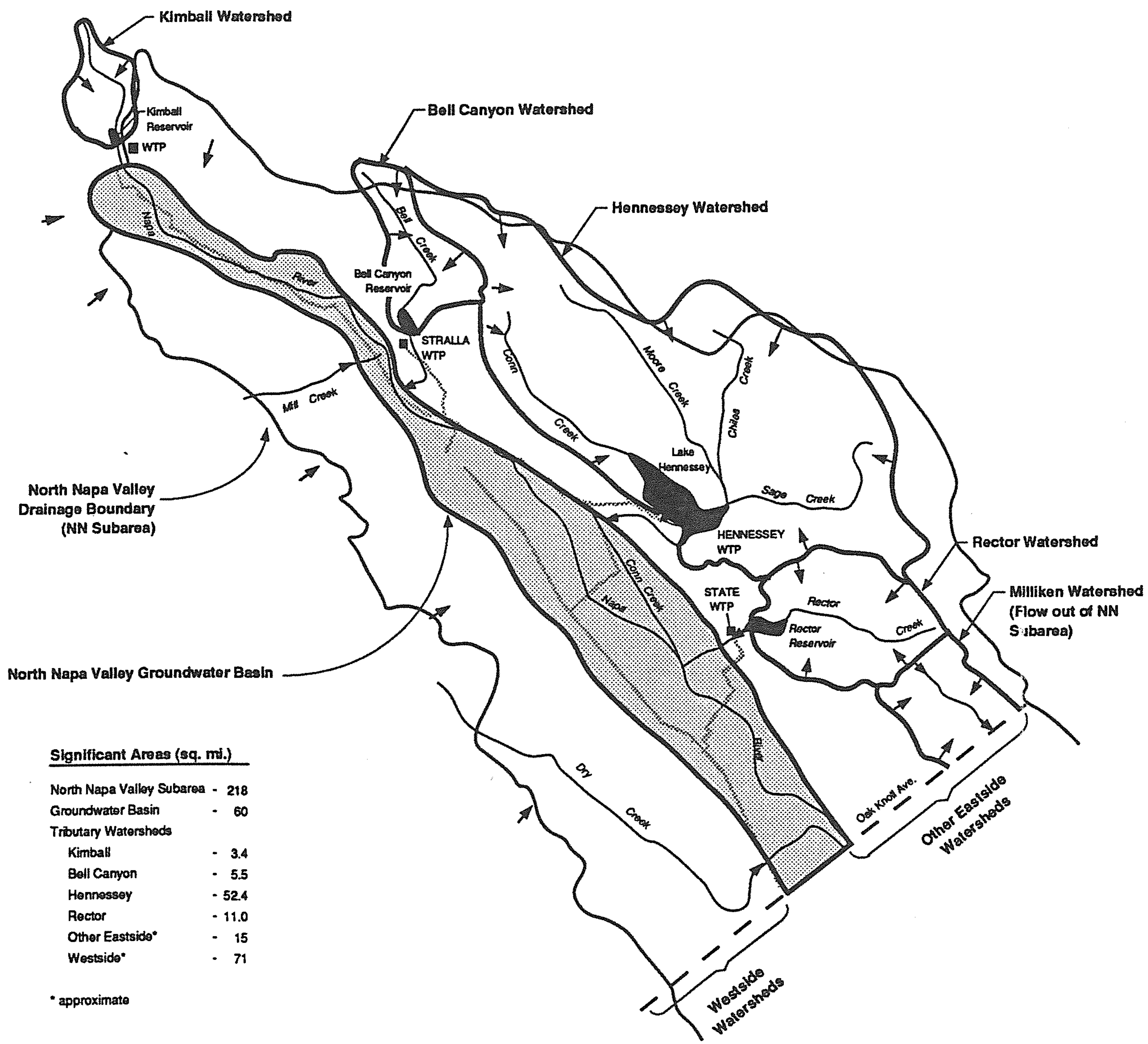
The surface/groundwater system interaction is depicted in Figure 5-4, and below this schematic the inflow and outflow components are shown. Inflow to the basin includes rain, irrigation-applied water, tributary recharge, and subsurface inflow. These components were discussed previously. The unit rate (inches/year) and average volume (acre-feet/year) are given in Table 5-1. These values are averaged over the historical period 1962 through 1989.

Outflow from the North Napa Valley Groundwater basin can be separated into the following categories: groundwater pumpage; net discharge to Napa River; evapotranspiration; irrigation return flow; surface runoff; and subsurface outflow.

Groundwater pumping for agricultural purposes can be estimated from an analysis of the annual crop consumptive use of applied water and irrigation efficiency. Annual consumptive use of applied water as the portion of crop consumptive use that is met by irrigation water for an average year. The annual consumptive use of applied water was determined from crop acreage data (DWR, 1987) and crop evapotranspiration (DWR, 1975). The annual consumptive use of applied water divided by irrigation efficiency provides an estimate of total agricultural groundwater pumping. Groundwater pumpage for domestic uses was estimated based on historical rural population data in the North Napa Valley and a per capita consumption factor developed in Section 3.

In the 1973 USGS investigation, the Napa River was reported as a gaining stream. On a local scale, some regions of the Napa River may be recharging the aquifer below, and other reaches may gain water from the aquifer. However, an analysis of the recorded streamflow of Napa River at the outlet of the basin (Oak Knoll Avenue) indicates that on an annual average, the Napa River receives a net gain from the groundwater system below. This is reflected graphically in Figure 5-5. This figure indicates that even during months of little or no precipitation, flow persists. It should also be noted that on the average, tributary streams are intermittent. Hence, flows during the dry periods are a result of groundwater discharge. Using baseflow separation techniques, the average annual net gain to the Napa River was determined to be 12,700 acre-feet per year. This is in good agreement with the USGS estimate of 13,200 acre-feet per year.

Evapotranspiration, irrigation return flow, and surface runoff are direct outputs from the soil moisture accounting routine shown previously in Figure 5-2. The results are tabulated in Table 5-1 Subsurface outflow can be estimated using the same techniques, employed for calculating subsurface inflow. However, because of the lack of detailed information regarding the hydraulic gradient across the southern boundary, the estimate developed by USGS in 1973 was used.

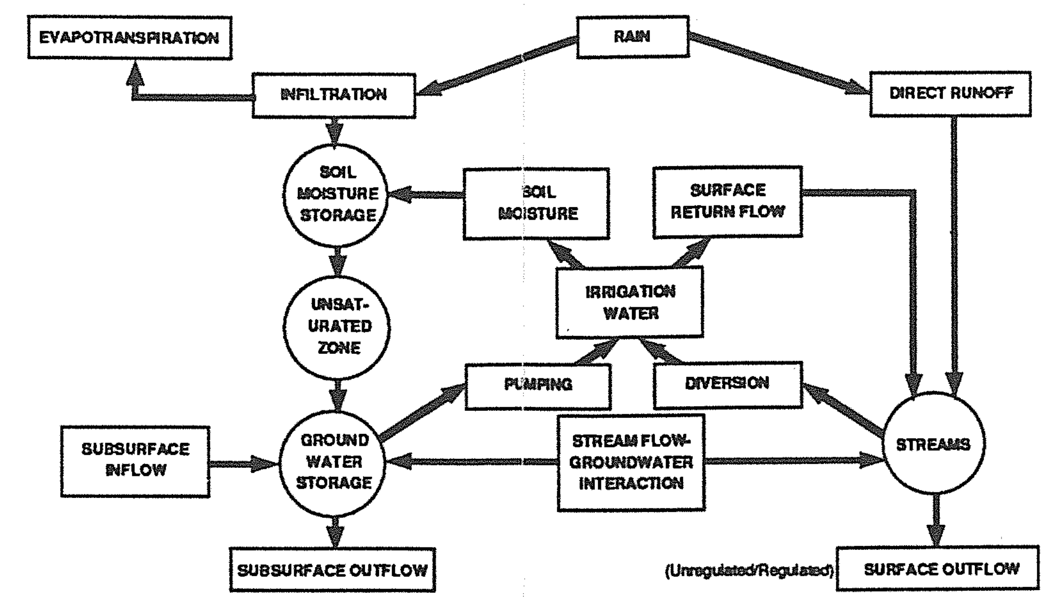



**Significant Areas (sq. mi.)**

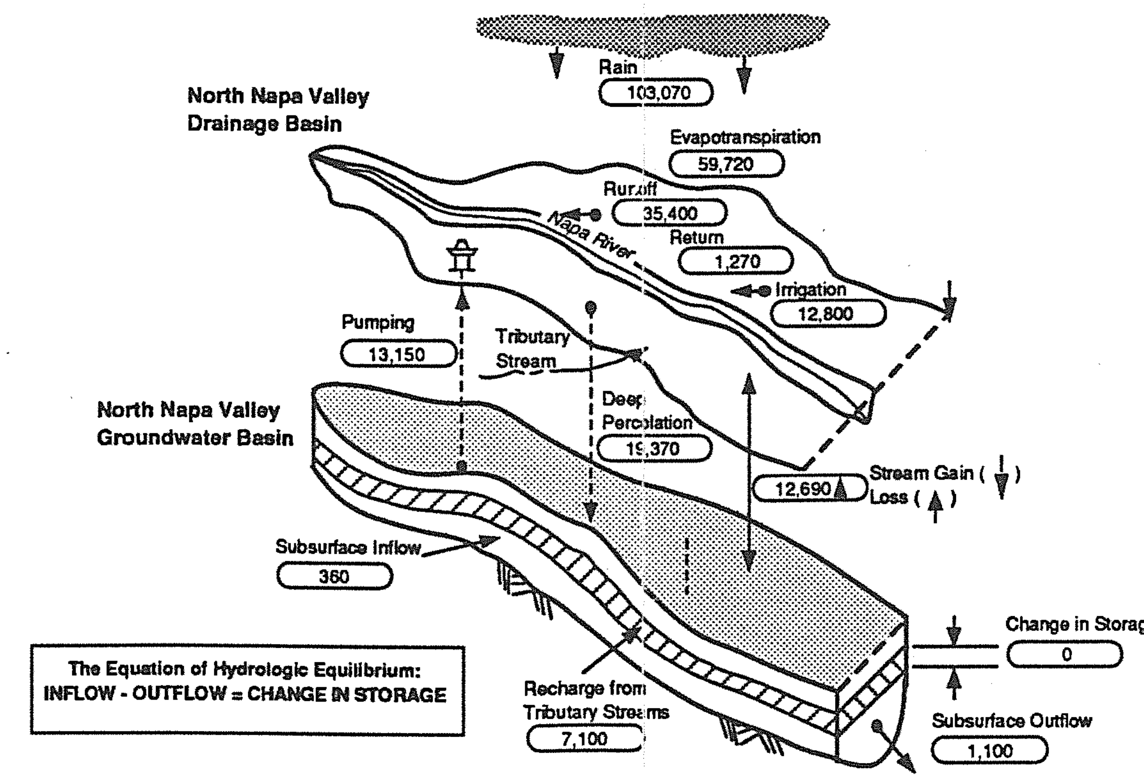
| | |
|---|---|
| North Napa Valley Subarea | - 218 |
| Groundwater Basin | - 60 |
| Tributary Watersheds | |
| Kimball | - 3.4 |
| Bell Canyon | - 5.5 |
| Hennessey | - 52.4 |
| Rector | - 11.0 |
| Other Eastside* | - 15 |
| Westside* | - 71 |

* approximate

LOCATION OF GROUNDWATER BASIN AND TRIBUTARY SURFACE WATER INFLOWS




SURFACE/GROUNDWATER SYSTEM INTERACTION




GROUNDWATER BUDGET DURING 1962 TO 1989 (Ac-Ft/Yr)

**DETERMINATION OF GROUNDWATER BASIN YIELD**

FIGURE 5-4

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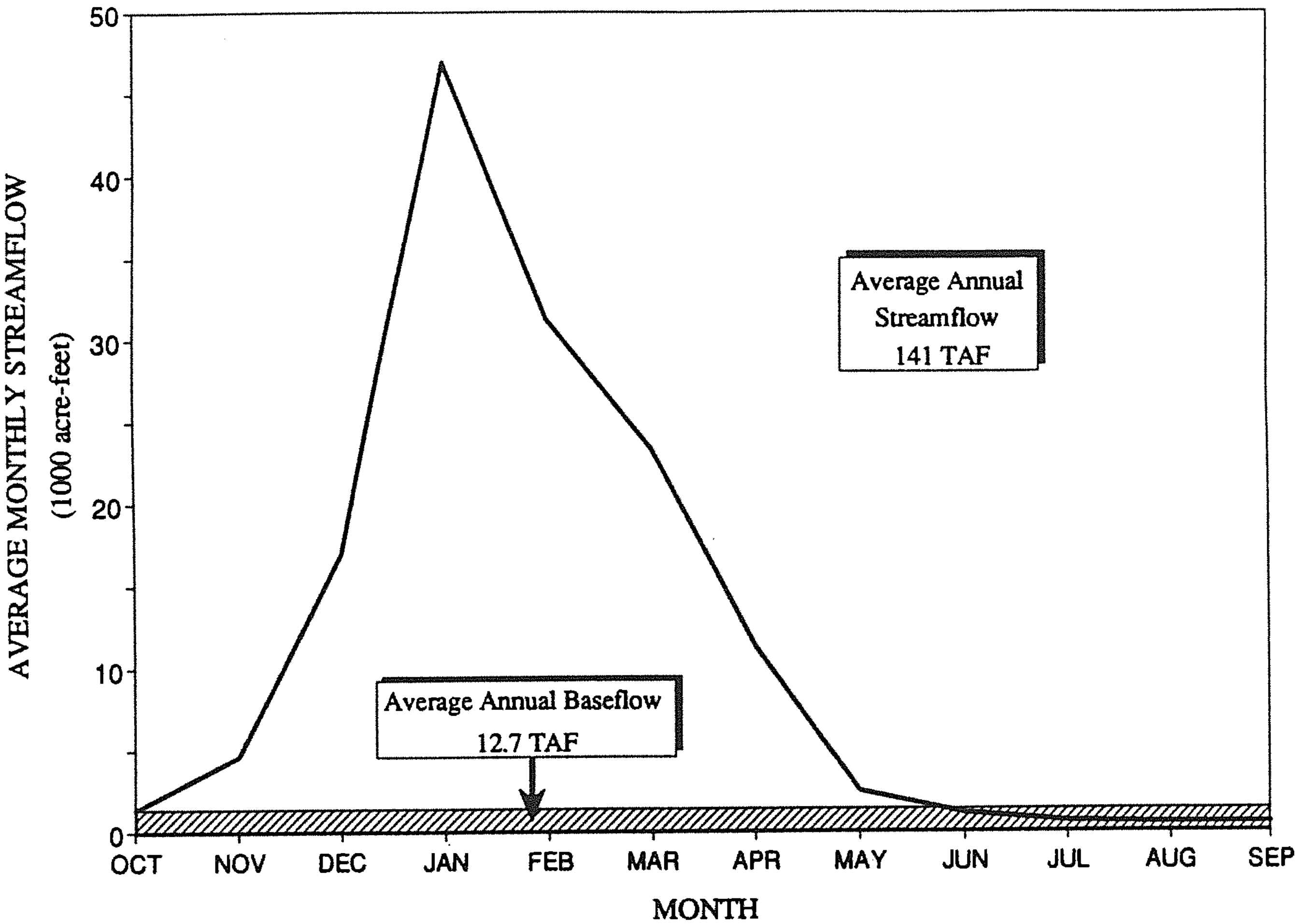
## TABLE 5-1

## GROUNDWATER HYDROLOGIC BUDGET
## NORTH NAPA VALLEY GROUNDWATER BASIN
## (PERIOD OF RECORD: 1962 TO 1989)

| PARAMETER | UNIT RATE (1) (inches/yr) | AVERAGE VOLUME (acre-feet/yr) |
|---|---|---|
| Inflow to Basin | | |
| Rain | 34.84 | 103070 |
| Irrigation-Applied Water | 4.33 | 12800 |
| Tributary Recharge | 2.40 | 7100 |
| Subsurface Inflow (2) | .12 | 360 |
| Outflow from Basin: | | |
| Evapotranspiration - Natural Land | 18.59 | 22460 |
| Evapotranspiration - Agricultural Land | 21.56 | 34320 |
| Evapotranspiration - Pervious Rural/Urban Land | 18.59 | 2940 |
| Groundwater Pumpage | 4.45 | 13150 |
| Irrigation Return Flow | .43 | 1270 |
| Surface Runoff - Natural Land | 10.58 | 12780 |
| Surface Runoff - Agricultural Land | 13.16 | 20950 |
| Surface Runoff - Previous Rural/Urban Land | 10.58 | 1670 |
| Net Discharge to Napa River | 4.30 | 12690 |
| Subsurface Outflow (2) | .37 | 1100 |
| Total for Basin: | | |
| Inflow | 41.69 | 12330 |
| Outflow | 41.69 | 12330 |
| Net Change in Groundwater Storage | 0.00 | 0 |

(1) Unless land type is specified, unit rate is averaged over entire basin. Basin land use areas are:
Natural Land - 14500 acres
Agricultural Land - 19100 acres
Pervious Rural/Urban Land - 1900 acres

(2) Estimate developed by USGS, 1973.




**STREAMFLOW HYDROGRAPH - NAPA RIVER NEAR NAPA**
**(PERIOD OF RECORD: 1962-1989)**

FIGURE 5-5

A complete tabulation of the inflow and outflow components is given in Table 5-1. A review of well level data collected by the County over the period 1962 through 1989 indicates that no net change of storage has occurred. This was reinforced by panel members associated with the Advisory Committee. This indicates that the groundwater basin has been in a state of equilibrium, and has not been exploited beyond the safe yield of the aquifer.

The average annual yield of an aquifer can be equated to the average annual recharge to the groundwater system. However, this definition does not factor in the reliability of the aquifer as a source of supply. If pumping were practiced such that it equalled the average annual recharge, in years of low rainfall the groundwater level would decline. For example, in recent years annual recharge has been less than 50 percent of normal (See Figure 5-3). Pumping according to average conditions would cause serious drawdown resulting in local overdraft and potential failing of wells.

The safe yield of an aquifer is defined as that amount of water that can be pumped from the groundwater which does not result in degradation to the aquifer, (such as poor water quality or causes economic hardship due to failure of wells. With this in mind, the groundwater system was evaluated in much the same way as the surface water reservoirs were in this study. Using historical precipitation recorded in St. Helena for the period 1940 through 1989, the soil moisture accounting routine was employed to estimate monthly deep percolation.

The average annual recharge from tributary watersheds was distributed on a monthly basis by relating it directly to precipitation patterns. The subsurface inflow was assumed to be constant annually and distributed equally over the months. The sum of these three components provided recharge to the groundwater basin on a monthly basis. This recharge is equivalent in definition to the inflow associated with a surface water reservoir. The criteria used in operating the groundwater reservoir was to ensure that shortages occurred no more than one year over the simulated 50 year period. Using RESSIM (discussed further in the reservoir safe yield section), a safe yield that provides reliable groundwater extraction was determined to be 22,500 acre-feet per year. This estimated safe yield resulted in a shortage of six percent in 1950; the late 1940s experienced low rainfall and was the critical period of the simulated planning horizon.

## Milliken-Sarco-Tulucay Creeks Area

The Milliken-Sarco-Tulucay Creeks Basin was specifically defined by the USGS in an investigation conducted in the later 1970s (USGS 1977). The area, approximately 15 square miles, is located adjacent to the City of Napa along the eastern boundary of the Napa Valley floor. The area is distinguished from the Napa Valley because of its high-yielding Sonoma Volcanics east of the Soda Creek Fault. The heaviest precipitation occurs in the upper Milliken Creek basin. The area is drained primarily by Milliken, Sarco, and Tulucay Creeks. The 1977 USGS investigation estimated surface water outflow at an average of 24,100 acre-feet per year. However, records of streamflow were only available for several years in the 1970s. The primary use of water is for domestic and agricultural purposes. In addition, two golf courses report the use of well water. Groundwater availability was evaluated in two studies by the USGS, one published in 1960 and the more recent in 1977. The first study was of a regional nature considering the entire Napa Valley; the 1977 study focused only on this area and investigated the groundwater hydrology in detail.

In the Milliken-Sarco-Tulucay Creeks area, both the Sonoma Volcanics and alluvium yielded water to wells. Geographic location of the well dictates the source of water. The largest groundwater reserves exist east of the Soda Creek Fault in the Sonoma Volcanics. West of the Soda Creek Fault, alluvium is the primary source of groundwater. The fault is a normal fault, down-dropped to the west with as much as 700 feet of vertical displacement. The water-bearing characteristics of the alluvial aquifer were described in the section on North Napa Valley so they will not be repeated. The description of the water-bearing properties of the Sonoma Volcanics is similar to that previously mentioned in the North Napa Valley section, but there are some additions.

As before, the tuffaceous deposits are the most permeable unit in the Sonoma Volcanics. In this area, the specific yield of the tuff is estimated at 4 percent. Although the tuff is continuous throughout the area east of the Soda Creek Fault, the tuff in the Milliken and Sarco Creeks area is not believed to be hydraulically connected to the tuff near Tulucay Creek. A high point in the underlying impermeable material splits the continuous tuff into two subbasins. The north subbasin contains the Milliken and Sarco Creeks, and the southern basin contains Tulucay Creek. In the Milliken-Sarco Creek area, sedimentary deposits of low permeability previously described as the Huichica Formation overlie portions of the more permeable tuff. It is estimated that 196,000 Acre-Feet of water is stored in the Sonoma Volcanics in the 15 square mile area around the Milliken-Sarco-Tulucay Creeks area between 10- 500 feet below the ground surface. Of this, only 20,000 Acre-Feet is considered to be economically feasible to extract.

Natural recharge to the underlying groundwater formations is reported to occur primarily from Milliken, Sarco, and Tulucay Creeks, and geologic outcrop areas.

Subsurface inflow is reported to occur from Wild Horse Valley east of the area (USGS, 1977). Groundwater is primarily obtained from the Sonoma Volcanic Formations, a confined aquifer. Wells generally penetrate this aquifer at depths of 100 feet or greater. The average annual natural recharge was estimated at 5,400 acre-feet per year; the natural discharge was estimated at 2,650 acre-feet per year; and the pumping in 1977 was estimated to be 3,000 acre-feet (USGS, 1977). The USGS reported a gradual decline of the groundwater level occurring under these conditions. For purposes of this report it was assumed that the yield of the groundwater in this area is equivalent to the total recharge of 5,400 acre-feet per year. This number should be used with caution, however, since pumping at this rate would cause an initial significant drawdown possibly requiring wells to be deepened. Ideally, the aquifer would again stabilize when equilibrium was met. In addition, the safe yield is most likely less than this amount.

### Carneros Area

The Carneros Valley is located in the southwestern portion of Napa County. The Carneros region has seen tremendous growth in vineyard acreage in recent years due to its prime suitability for providing high quality vine grapes. The primary surface water source is Carneros Creek which crosses through the Carneros Valley in a south by southeast direction. Carneros Creek is approximately 12 square miles; no streamflow records were available for Carneros Creek, but it has been reported as being ephemeral. Agricultural and domestic water needs rely primarily on surface water diversions and, to a lesser extent, pumping of groundwater.

Very little information is available concerning the hydrology of the Carneros Valley. The valley floor was described as Pleistocene terrace deposits and Recent alluvium with some Pleistocene Huichica Formation flanking the sides of the south end of the valley. A later report incorporates the terrace deposits into the alluvium.

The Huichica Formation contains fluvial deposits of gravel, silt, sand, and clay with an interbedded tuff. The basal 200-300 feet of the formation contains reworked pumice from the underlying Sonoma Volcanics. The Huichica Formation attains a maximum thickness of about 900 feet, but no information is available for the Carneros Valley area. The limited information available describes the Huichica Formation as having a low permeability with well yields less than 5 gpm. Extended pumping of wells screened in this unit often require several days to fully recover.

The younger alluvium, including the previously mentioned terrace deposits, are generally thin with much of their volume above the saturated zone. This unit also has a low permeability. Available information stated that only a few wells tap this unit, and no additional well information was available.

Precipitation in the area is similar to the City of Napa, and is estimated to be approximately 23 inches. Natural recharge to the underlying groundwater formations is reported to occur primarily from geologic outcrop areas (mostly in the hillsides bordering he Carneros Valley) and infiltration from streambeds where they cross the geologic formations (USGS 1960). No extensive studies of the region concerning groundwater availability have been conducted, making accurate determination of the safe yield difficult. According to the Advisory Committee, there are reports of recent successful well development in this area. For purposes of this report, based on an assessment of existing geologic formations, the safe yield of the groundwater is estimated at less than 300 acre-feet per year.

### Putah Creek Basin

Two regions in the Putah Creek Basin were of interest in this study: (1) Pope Valley; and (2) Capell Valley. Pope Valley is located west of the north portion of Lake Berryessa. It is drained by Pope Creek and Maxwell Creek and has an average annual precipitation of approximately 34 inches. Water is required primarily for agricultural purposes (vineyards and other irrigated agriculture). Direct diversion of surface is a key source, and pumping of groundwater is also practiced. Capell Valley, located in the southern most area of the upper Putah Creek watershed, is drained primarily by Capell Creek with some additional minor tributaries. Precipitation in this region averages approximately 31 inches. Like Pope Valley, the soil and climate conditions provide a very suitable environment for vineyard development. Previous investigations of groundwater hydrology in this area are contained in two key reports: (1) a reconnaissance report by DWR in 1962 which investigated the upper Putah Creek basin; and (2) a report on water supply alternatives prepared by the County in 1977.

Limited information is available regarding the hydrogeology of this area. Most of the information is from a reconnaissance level investigation. This report is only interested with the part of the Putah Creek Basin in Napa County. Within the Putah Creek Basin, only the alluvium is considered a significant water bearing deposit. Within Napa County, only the Pope Valley and the Capell Valley are large enough to be described here.

Stream development in the Pope Valley has been limited to small creeks with low flows. The lack of large streams prevented thick accumulations of alluvium from being deposited on the valley floor. This resulted in a limited groundwater storage capacity in the alluvium of the Pope Valley. The only other source of groundwater in the Pope Valley comes from a pervious unit in the Sonoma Volcanics near Aetna Springs.

Most of the groundwater extracted in the Pope Valley comes from the alluvium The alluvium averages 25-30 feet thick and consists of silty clayey sands and gravel. With an assumed specific yield of 3 percent, the alluvium in the basin is estimated to contain 7000 Acre-Feet of water. Infiltration of winter precipitation recharges the basin. With most wells yielding less than 100 gpm, there is little opportunity for additional groundwater development.

Like the Pope Valley, the Capell Valley is also a structural basin surrounded by Pre-Cretaceous marine rocks. The thin alluvium cover on the valley floor is estimated to store only 700 Acre-Feet of water. No wells in the valley produce more than 15 gpm. Water in the alluvium is stored in small local sand and gravel lenses limiting well yields to less than 15 gpm. A few wells tap the fractured Pre-Cretaceous rocks that surround the valley. These wells yield 10-12 gpm with a drawdown of about 100 feet. Little opportunity exists for further development of groundwater in the Capell Valley.

Groundwater resources in the Pope and Capell Valleys are relatively limited. It was reported by DWR that the best source of groundwater is in the shallow alluvium and to some extent the Sonoma Volcanics along the hillside of the valley floor. Pope Valley has been estimated to have approximately 7,000 acre-feet of usable storage. Capell Valley has a less well defined alluvial aquifer from which groundwater can be extracted. It has been estimated that less than 700 acre-feet of storage exist in this region. Historically, well yields in Pope Valley have been limited to less than 100 gpm, while in Capell Valley well yields greater than 15 gpm are rare. These low yields are due to the nature of the alluvium, consisting of silt and fine grain sands derived from adjacent hillsides. In a memorandum released by DWR in 1980, a groundwater yield estimate was reported as 400 acre-feet per year for Pope, Capell, and Chiles Valleys combined (DWR, 1980). For purposes of this study, it was assumed that the safe yield for Pope and Capell Valleys was less than 400 acre-feet. Further revision of this estimate was not possible given the available information.

A summary of the estimated safe yields and usable storage of the groundwater supplies discussed above is provided in Table 5-2.

## RIVER DIVERSION

The Napa River, which flows through the entire Napa Valley, from its uppermost northwestern end above Calistoga, to San Pablo Bay, offers a potential for direct

TABLE 5-2

SUMMARY OF GROUNDWATER BASIN SUPPLY

| Basin | Safe Yield (acre-feet/yr) | Usable Storage (acre-feet) |
|---|---|---|
| North Napa Valley GWB | 22500 | 190000 |
| Milliken-Sarco-Tulucay GWB | <5400 | 20000 |
| Lake Berryessa Basin (Pope and Capell Valleys) | < 400 | 7700 |
| Carneros Area | < 300 | <3000 |

diversion for the prime valley vineyards located between Highway 29 and the Silverado Trail. As a review of Napa River flows at Oak Knoll Avenue for the period 1962 to 1989 indicates (See Figure 5-5), a well-defined seasonal pattern is present, with flows predominantly occurring in the period December through March and minimum flows in the summer and early fall. Yearly variations are significant as can be seen from Table 5-3, and consecutive dry years, are not uncommon, as is the case in the current four-year drought period. Water quality may impact divertability in the winter due to high turbidity.

Without storage, river diversion capability is mainly determined by the match of seasonal variation of water need and river flow. For vineyards there are three water uses:

- Irrigation
- Frost Protection
- Heat Protection

Although some irrigation may occur in the winter, the months May to September form the principal irrigation season. Frost protection by sprinklers is generally needed between mid-March and mid-May, while heat protection by sprinklers would occur most likely during July and August. Clearly there is no real match between seasonal supply and need variation, except for some potential for frost protection. A 1973 estimate by Metcalf and Eddy ("Napa County Water Resources Development Study-Phase II") put the spring frost season Napa River diversion at approximately 2,000 Ac-Ft above St. Helena and 4,500 Ac-Ft above Oak Knoll Avenue with an 80 percent reliability, assuming a 60 percent capture rate and a 10 cubic feet per second fish release. The 1973 Metcalf and Eddy analysis of Napa River diversions also determined that 10,000 Ac-Ft/Yr could be obtained from the river if storage were constructed in Spring Valley (10,000 Ac-Ft) and from on-site vineyard reservoirs (3,000 Ac-Ft), assuming some portion of this reservoir storage is unavailable due to carryover storage or is supplied from groundwater. Review of the more extensive Napa River flow data for the period 1960-88 shows that mid-March to mid-May flows available for frost protection probably do not exceed 10,000 Ac-Ft/Yr during the drier years.

## RESERVOIRS

Local County reservoirs include five major facilities serving basically municipal drinking water needs. These facilities including the City of Napa's Milliken Reservoir and Lake Hennessey; the State of California's Rector Reservoir; St. Helena's Bell Canyon Reservoir; and Calistoga's Kimball Reservoir. Lake Berryessa, owned by the U.S.

# TABLE 5-3

## MONTHLY FLOW, 1960-88, NAPA RIVER NEAR NAPA

| | | | | | | | | | Irrigation | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Frost Protection | | | | Heat Protection | | | |
| Year | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Year Total |
| 1960 | 44 | 82 | 192 | 2306 | 42620 | 19910 | 4211 | 1708 | 308 | 12 | 0 | 0 | 71393 |
| 1961 | 0 | 261 | 3066 | 6935 | 14490 | 9826 | 3667 | 1447 | 201 | 0 | 0 | 0 | 39893 |
| 1962 | 0 | 209 | 4719 | 3918 | 56880 | 34080 | 4187 | 1377 | 208 | 2 | 0 | 0 | 105580 |
| 1963 | 20770 | 1680 | 14020 | 31350 | 59830 | 22840 | 51620 | 6891 | 1697 | 320 | 105 | 96 | 211219 |
| 1964 | 449 | 6129 | 2116 | 16160 | 3546 | 2089 | 1101 | 320 | 149 | 23 | 0 | 4 | 32086 |
| 1965 | 40 | 3527 | 60250 | 77930 | 9110 | 3854 | 16290 | 3209 | 736 | 191 | 218 | 119 | 175474 |
| 1966 | 146 | 3362 | 8069 | 53500 | 25870 | 7976 | 2785 | 1055 | 206 | 24 | 36 | 12 | 103041 |
| 1967 | 26 | 7734 | 37040 | 101000 | 23190 | 32720 | 42240 | 7377 | 3306 | 1120 | 274 | 187 | 256214 |
| 1968 | 298 | 443 | 3275 | 26150 | 35560 | 27320 | 5792 | 1664 | 373 | 156 | 165 | 63 | 101259 |
| 1969 | 224 | 591 | 19680 | 114400 | 90900 | 32300 | 7236 | 2596 | 986 | 396 | 219 | 41 | 269569 |
| 1970 | 344 | 487 | 31320 | 164300 | 28490 | 22500 | 4070 | 1525 | 345 | 111 | 64 | 66 | 253622 |
| 1971 | 118 | 12840 | 74870 | 28100 | 6760 | 14370 | 6315 | 2307 | 807 | 276 | 136 | 177 | 147076 |
| 1972 | 189 | 481 | 5378 | 5147 | 8795 | 3463 | 2110 | 829 | 146 | 12 | 0 | 34 | 26584 |
| 1973 | 437 | 7816 | 9594 | 100000 | 69240 | 35520 | 6657 | 2412 | 569 | 136 | 97 | 156 | 232634 |
| 1974 | 233 | 36630 | 31980 | 60470 | 16730 | 69090 | 30710 | 4005 | 1400 | 838 | 474 | 496 | 253056 |
| 1975 | 415 | 444 | 1979 | 2844 | 56860 | 60740 | 12410 | 3574 | 1184 | 561 | 306 | 397 | 141714 |
| 1976 | 631 | 815 | 682 | 650 | 374 | 1242 | 889 | 151 | 6 | 0 | 3 | 10 | 5453 |
| 1977 | 35 | 71 | 45 | 179 | 24 | 160 | 12 | 0 | 0 | 0 | 0 | 0 | 526 |
| 1978 | 0 | 4472 | 14370 | 95830 | 45450 | 44080 | 13190 | 3906 | 1119 | 502 | 266 | 182 | 223367 |
| 1979 | 155 | 278 | 358 | 18726 | 35907 | 18006 | 6568 | 3406 | 783 | 371 | 250 | 154 | 84963 |
| 1980 | 759 | 1268 | 12762 | 72372 | 93484 | 28924 | 6558 | 2627 | 862 | 345 | 242 | 202 | 220405 |
| 1981 | 174 | 207 | 4835 | 21766 | 9966 | 13433 | 4527 | 1580 | 421 | 135 | 169 | 86 | 57300 |
| 1982 | 445 | 32042 | 81185 | 90227 | 56776 | 49801 | 79973 | 5673 | 2307 | 1063 | 562 | 639 | 400694 |
| 1983 | 699 | 14707 | 31781 | 74152 | 101025 | 160069 | 22867 | 13948 | 3108 | 1192 | 581 | 450 | 424581 |
| 1984 | 722 | 30249 | 90823 | 19363 | 9072 | 9789 | 3492 | 2065 | 803 | 341 | 281 | 222 | 167221 |
| 1985 | 371 | 10570 | 6466 | 4433 | 21758 | 10343 | 5560 | 1872 | 686 | 252 | 215 | 252 | 62779 |
| 1986 | 310 | 815 | 3019 | 13290 | 227501 | 75019 | 7092 | 2786 | 970 | 525 | 315 | 320 | 331962 |
| 1987 | 295 | 301 | 475 | 1248 | 11329 | 11959 | 2744 | 1027 | 345 | 211 | 132 | 60 | 30127 |
| 1988 | 84 | 301 | 14284 | 28043 | 4505 | 1802 | 1395 | 1099 | 459 | 159 | 108 | 76 | 52316 |
| Total | 28413 | 178813 | 568635 | 1234791 | 1166041 | 823226 | 356267 | 82437 | 24490 | 9274 | 5218 | 4502 | 4482107 |
| Average | 980 | 6166 | 19608 | 42579 | 40208 | 28387 | 12285 | 2843 | 844 | 320 | 180 | 155 | 154555 |
| Maximum | 20770 | 36630 | 90823 | 164300 | 227501 | 160069 | 79973 | 13948 | 3306 | 1192 | 581 | 639 | 424581 |
| Minimum | 0 | 71 | 45 | 179 | 24 | 160 | 12 | 0 | 0 | 0 | 0 | 0 | 526 |

Bureau of Reclamation, is the key feature of eastern Napa County. Numerous smaller reservoirs or ponds exist throughout the County, including those in the Angwin and eastern valley (Pope, Chiles, Capell) areas. Lake Curry, whose supply goes to the City of Vallejo, is not considered part of Napa County's supply. The supplies available from the reservoirs are discussed below under three headings:

- Major Municipal Reservoirs
- Lake Berryessa
- Miscellaneous Reservoirs

## Major Municipal Reservoirs

An analysis was conducted for each of the five major municipal reservoirs in Napa County to determine the firm surface water yield and develop yield-frequency curves (See Figure 5-6). The reservoirs studied were Lake Hennessey, Milliken Reservoir, Rector Reservoir, Bell Canyon Reservoir, and Kimball Reservoir. The reservoirs are located in the mountains on the east and north sides of the Napa Valley.

The yield analysis provides a measure of the water quantity available from each reservoir, and the reliability of that supply under varying hydrologic conditions. The timing and volume of the natural seasonal streamflow is different from year to year because of varying seasonal weather conditions. The availability of water may not coincide with the seasonal timing of municipal and agricultural demands. Thus, the function of a reservoir is to redistribute the streamflow with respect to time so that water demands can be satisfied on a dependable long term basis.

The yield of a reservoir is that amount of water that can be reliably supplied to meet demands over time. The firm yield of a reservoir is defined as the amount of water that can be supplied, without any shortage, during a specific critical time interval, usually the driest period of years on record.

The yield analysis was divided into two tasks. The first task was to extend the existing streamflow record in order to analyze the operation of each reservoir over a longer hydrologic period. The second task was to use the streamflow values, developed in task one, as input to a reservoir simulation model in order to evaluate the yield of each reservoir under varying hydrologic conditions.

**Streamflow Generation.** Of the five reservoirs in the analysis, historical reservoir inflow data was available only for a 10 year period for Lake Hennessey. This inflow data, for the period 1980 to 1989, was too short a period of record to allow an adequate analysis

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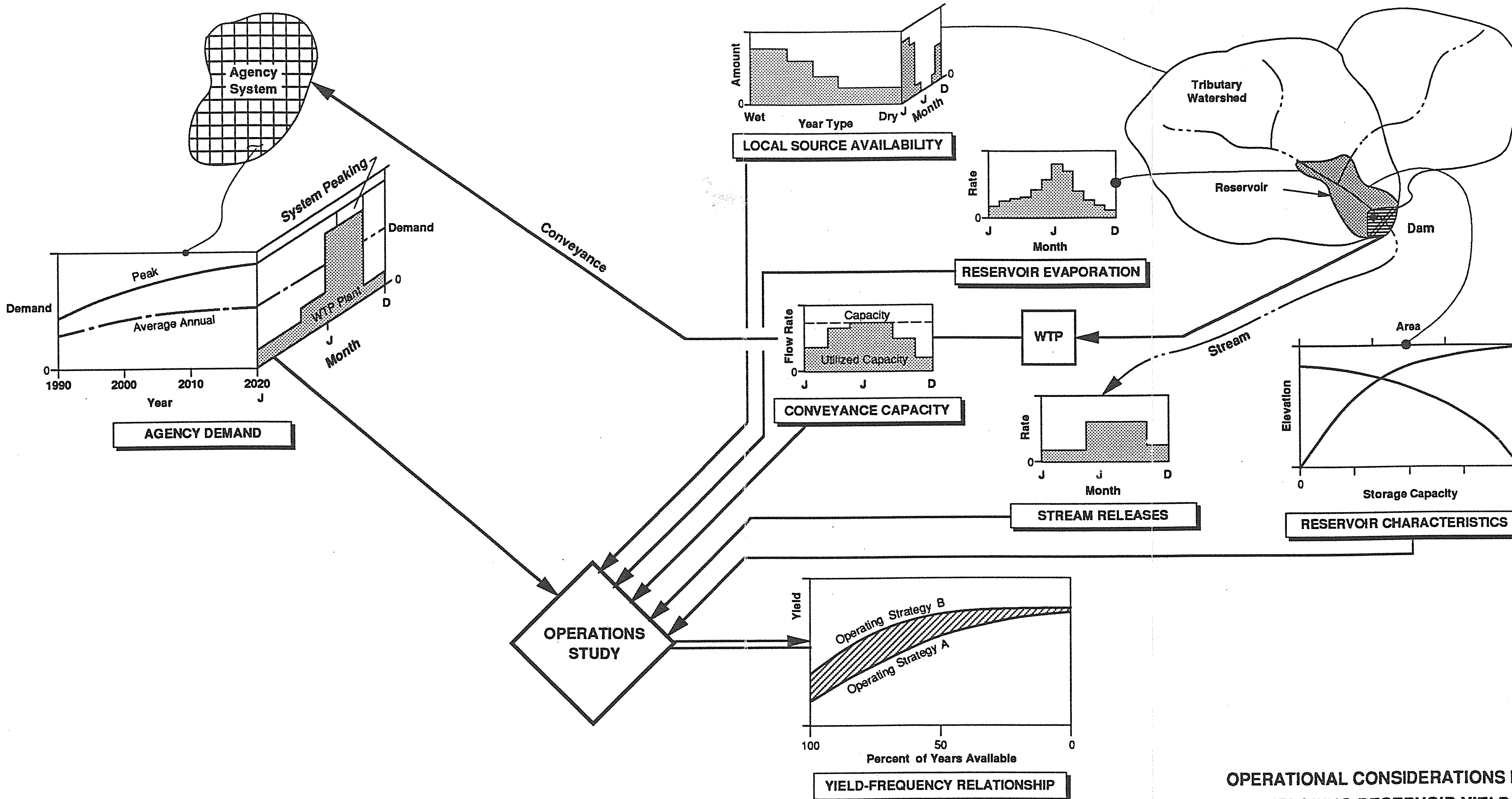


**OPERATIONAL CONSIDERATIONS IN DEVELOPING RESERVOIR YIELD**

FIGURE 5-6

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under a range of different hydrologic conditions. In order to provide a longer period of record that includes a wider variety of tributary streamflows for the yield analysis, the 10 years of historical inflow data for Lake Hennessey was used to calibrate a Runoff Simulation Model (RUNOFF), and generate streamflows for the period of available rainfall data between 1940 and 1989.

The RUNOFF model was used to generate the extended streamflow record because it performs a soil moisture accounting and unsaturated flow simulation for the watershed based on actual historical rainfall data. Standard rainfall-streamflow correlation techniques were inadequate due to the number of variables affecting the generation of runoff, including soil type and antecedent soil moisture conditions. Input data for the RUNOFF model includes monthly precipitation data for the period of record from a rain gauge representative of the watershed. Monthly average evaporation and evapotranspiration data and an appropriate Soil Conservation Service (SCS) curve number are also required. The SCS curve represents the runoff potential of the watershed based on soil group, vegetative ground cover, and amount of impervious area in the watershed. Model output includes direct runoff from the watershed, evapotranspiration, and groundwater flow for each month in the simulation period.

Precipitation data was obtained from rain gauges at Napa, Angwin, and Calistoga and adjusted to represent rainfall in each watershed. The Napa gauge was used to generate the streamflows for the Milliken and Rector Reservoirs, and the Angwin gauge was used for Lake Hennessey and Bell Canyon Reservoir. The Calistoga gauge was used for Kimball Reservoir streamflow.

Average monthly evaporation data was obtained from DWR Bulletin 73-79, "Evaporation From Water Surfaces in California". This data, for a Type A evaporation pan in Yountville-Gamble, was adjusted to a free water surface by applying a pan coefficient of 0.74. This data was assumed to be representative of the evaporation at each of the five reservoir locations. Average monthly evapotranspiration data representative of the natural vegetative cover in the watersheds was taken from DWR Bulletin 113-3, "Vegetative Water Use In California". SCS curve number 82 was selected based on the hydrologic soil group, vegetative cover, and amount of impervious area contained in the watersheds.

The RUNOFF model was calibrated using historical streamflow data for the Lake Hennessey watershed for the period 1980 to 1989. Based on similar physical characteristics between the reservoir watersheds, the calibrated model was then used to generate streamflows for the watersheds tributary to each reservoir for the period of record between 1940 and 1989. Streamflow from the watershed tributary to Kimball

Reservoir was generated for the period 1949 to 1989 due to the shorter record of rainfall data available at the Calistoga rain gauge.

Table 5-4 presents a summary of the streamflows generated for each of the five reservoirs. The table includes the watershed drainage area and the maximum, average, and minimum yearly inflow for each reservoir.

**Reservoir Yield Analysis.** The yield analysis provides a measure of the quantity of water available from a reservoir and the reliability of that supply under varying hydrologic conditions. The Reservoir Simulation Model (RESSIM) was used to evaluate the yield of each of the five reservoirs based on the 50 years of monthly streamflow generated by the RUNOFF model.

The Reservoir Simulation Model was adapted from the SIMYLD2 model developed in 1972 by the Texas Water Development Board. RESSIM is a computer program designed to simulate the monthly operation of a reservoir subject to a sequence of reservoir inflows and demands. The model can also determine the maximum firm yield of the reservoir for the period of inflow record. RESSIM accounts for reservoir inflow, evaporation, releases, spills, and changes in storage on a monthly time step. The model incorporates a reservoir operating rule and allows the user to specify the desired amount of water held in storage at the end of each month.

For each reservoir yield analysis, input data for RESSIM included the monthly streamflow record generated for each of the reservoirs along with the same average monthly evaporation data used with the RUNOFF model. Reservoir capacity versus surface area data was obtained from reservoir capacity curves for each reservoir. Monthly reservoir storage goals were approximated based on a general monthly operations rule curve that was applied to each reservoir.

The monthly municipal demand distribution for each reservoir was taken from work done in the Water Needs Analysis (Section 3) of this study. The demand distribution was based on an analysis of monthly water production data for the period 1985-1989. Table 5-5 shows the monthly demand distribution used for each reservoir.

The yield analysis was conducted without allowing water transfers between water suppliers in order to determine the yield and supply reliability of each reservoir on an individual basis. For both Lake Hennessey and Milliken Reservoir, water rights documents and operational records were reviewed to evaluate the effect of water rights and instream-flow requirements on reservoir yield and reliability.

## TABLE 5-4
## RESERVOIR INFLOW SUMMARY

| Reservoir | Drainage Area (Sq. Mile) | Annual Inflow (AF/YR) | | |
|---|---|---|---|---|
| | | Maximum | Average | Minimum |
| Milliken | 9.6 | 14,154 | 3,656 | 0 |
| Rector | 11.0 | 13,800 | 3,354 | 0 |
| Lake Hennessey | 52.4 | 82,890 | 19,692 | 0 |
| Bell Canyon | 5.5 | 12,166 | 3,133 | 4 |
| Kimball | 3.4 | 8,904 | 2,817 | 3 |

TABLE 5-5
MONTHLY MUNICIPAL DEMAND DISTRIBUTION
(Percent of Annual)

| Reservoirs | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Milliken | 5.2 | 4.9 | 5.8 | 7.4 | 10.1 | 12.0 | 13.1 | 12.1 | 9.8 | 8.3 | 5.9 | 5.5 |
| Rector | 4.2 | 5.3 | 4.9 | 6.5 | 9.7 | 14.0 | 11.0 | 11.4 | 11.1 | 8.9 | 5.9 | 5.1 |
| Lake Hennessey | 5.2 | 4.9 | 5.8 | 7.4 | 10.1 | 12.0 | 13.1 | 12.1 | 9.8 | 8.3 | 5.9 | 5.5 |
| Bell Canyon | 4.5 | 4.3 | 5.4 | 7.6 | 10.0 | 12.1 | 13.2 | 13.4 | 10.7 | 8.4 | 5.5 | 4.7 |
| Kimball | 6.6 | 6.1 | 6.9 | 7.8 | 9.2 | 10.4 | 11.7 | 10.9 | 8.8 | 7.9 | 6.7 | 6.9 |

Note: Percentages based on 1985-1989 production data.

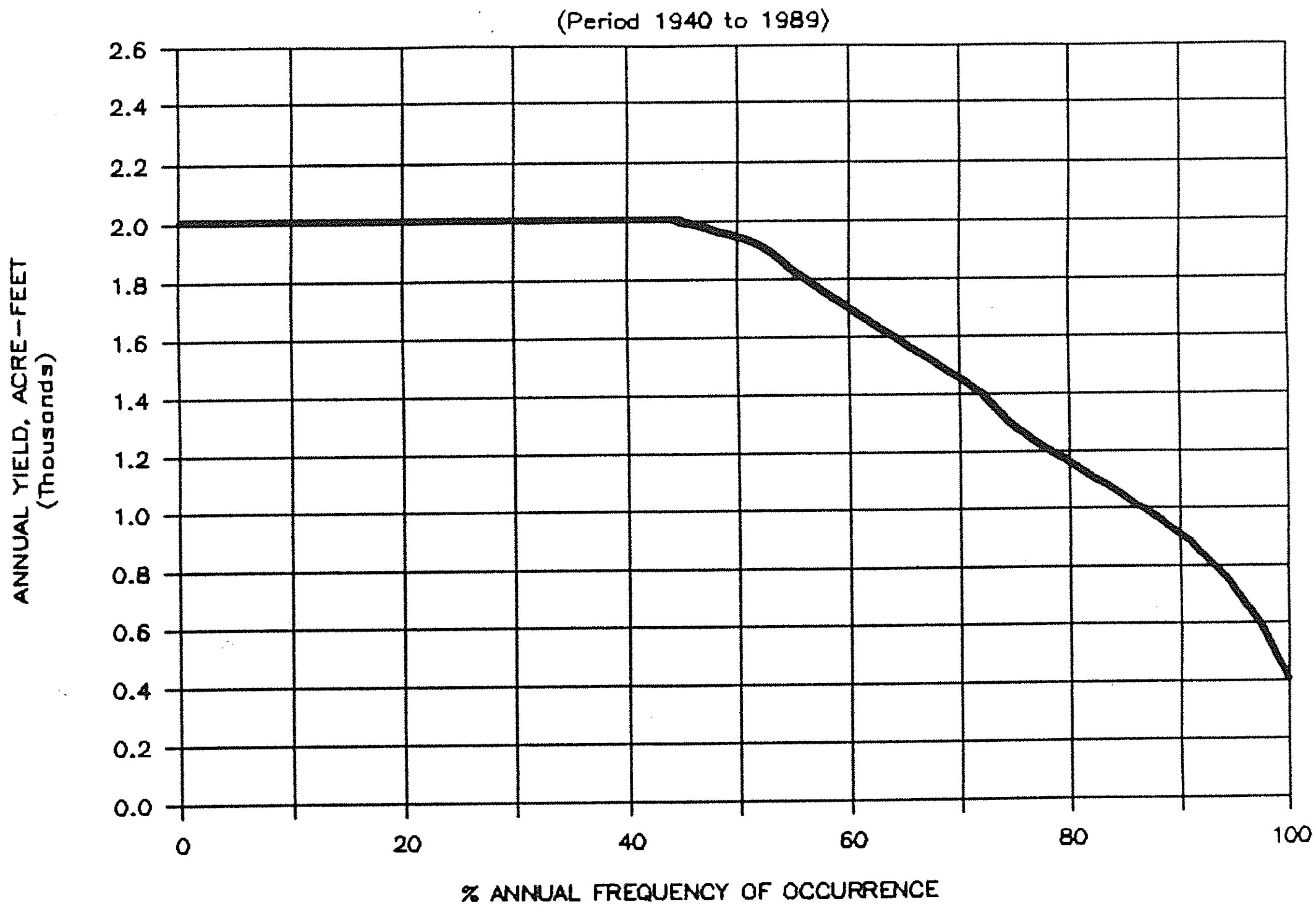
For this study, firm yield was defined as the reservoir yield that could be supplied for the 50 years of record, between 1940 and 1989, without any shortage. The Kimball Reservoir analysis used a 40 year period of record, from 1949 to 1989, due to the shorter period of data available at the Calistoga rain gauge. Thus, the firm yield for each reservoir is the largest annual volume of water that can be supplied during the driest critical period in the historical record, without any shortage.

The yield frequency curve developed for each reservoir is shown in Figures 5-7 through 5-11. The shape of each curve is a function of the annual streamflow, reservoir storage capacity, and the water supply demand distribution. The frequency curves provide an estimate of the reliability of each reservoir for different levels of annual yield. The frequency curve shows the percent of the time that a given level of annual yield can be supplied, without any shortage, based on the period of record for the RESSIM simulations. The firm yield is shown as the annual yield that can be supplied 100 percent of the time. As an example, Milliken Reservoir can supply a yield of 1,150 acre-feet per year 80 percent of the time. This means that there were 10 years out of the 50 year simulation period when this yield could not be met. The firm yield for Milliken Reservoir or the yield that could be supplied 100 percent of the time, in all 50 years without any shortage,is about 400 acre-feet.

The firm yield of the smaller reservoirs with little carry-over storage, such as Kimball and Bell Canyon, was determined by the short, but very dry period from 1976-1977, whereas the firm yield for Lake Hennessey, the largest reservoir at 31,000 acre-feet, was determined by the longer drought period from 1945-1949. The longer drought period used up the carry-over storage that allowed Lake Hennessey to provide a larger reliable quantity of water during the 1976-1977 drought.

Table 5-6 presents a summary of the results of the yield analysis for each of the five reservoirs. The table includes the reservoir storage capacity and reservoir yield reliability levels at 50, 80, 90 and 100 percent. The firm yield is shown in the 100 percent column and represents the yield that can be supplied every year without shortage based on the reservoir simulations for the period of record. The reservoir storage utilized in the yield analysis does not include surcharge storage created by flashboards in the spillway. Flashboard use is regulated by the State Division of Safety of Dams and would only be allowed late in the rainy season to avoid any danger from storms.

The reservoir yields shown in Table 5-6 are significantly lower than the yields estimated in previous studies. Since the background data and period of record used for these previous estimates are unknown, it is impossible to make any kind of valid comparison.




**MILLIKEN RESERVOIR ANNUAL YIELD**

FIGURE 5-7

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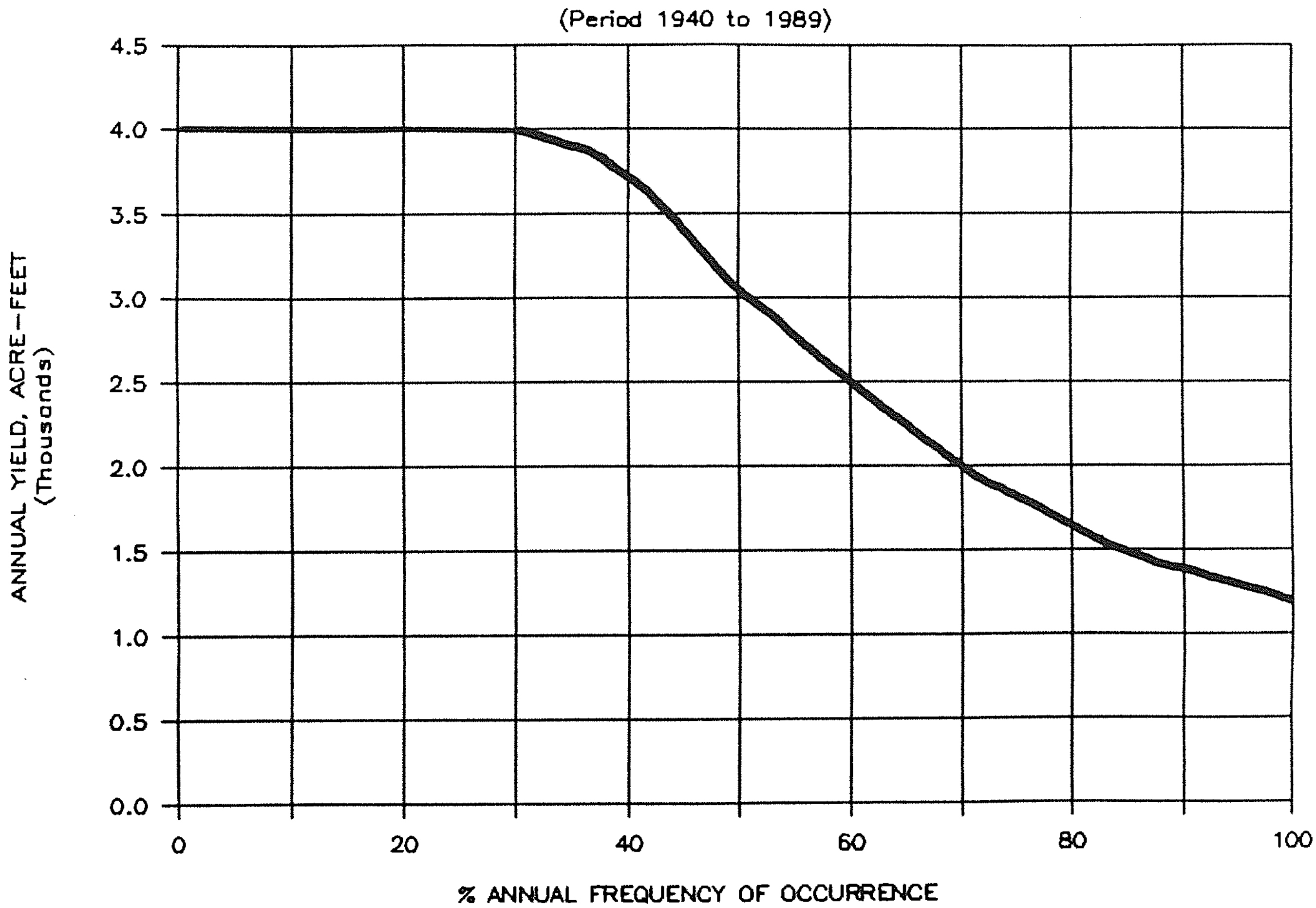
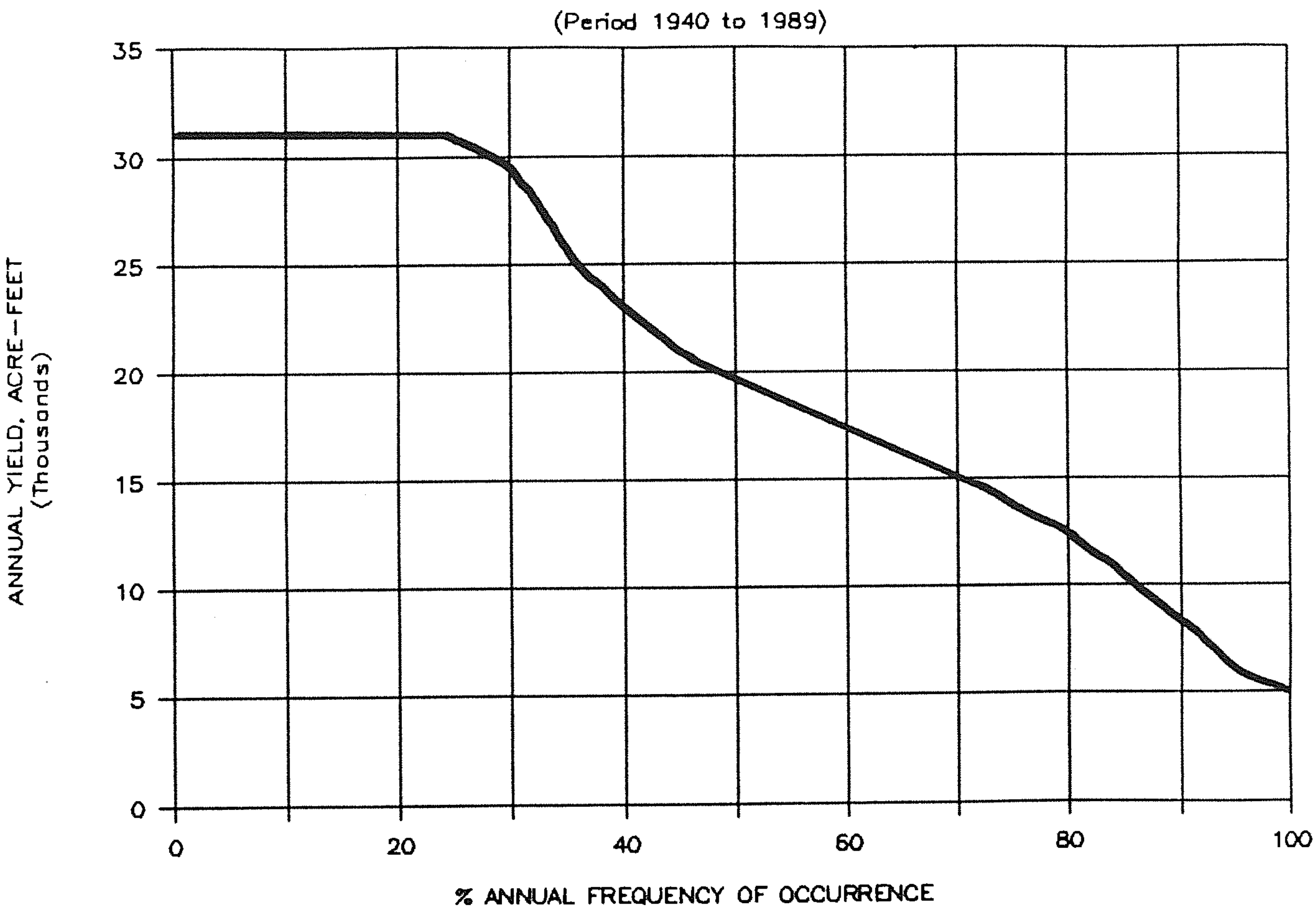



**RECTOR RESERVOIR ANNUAL YIELD**

FIGURE 5-8




**LAKE HENNESSEY ANNUAL YIELD**

FIGURE 5-9

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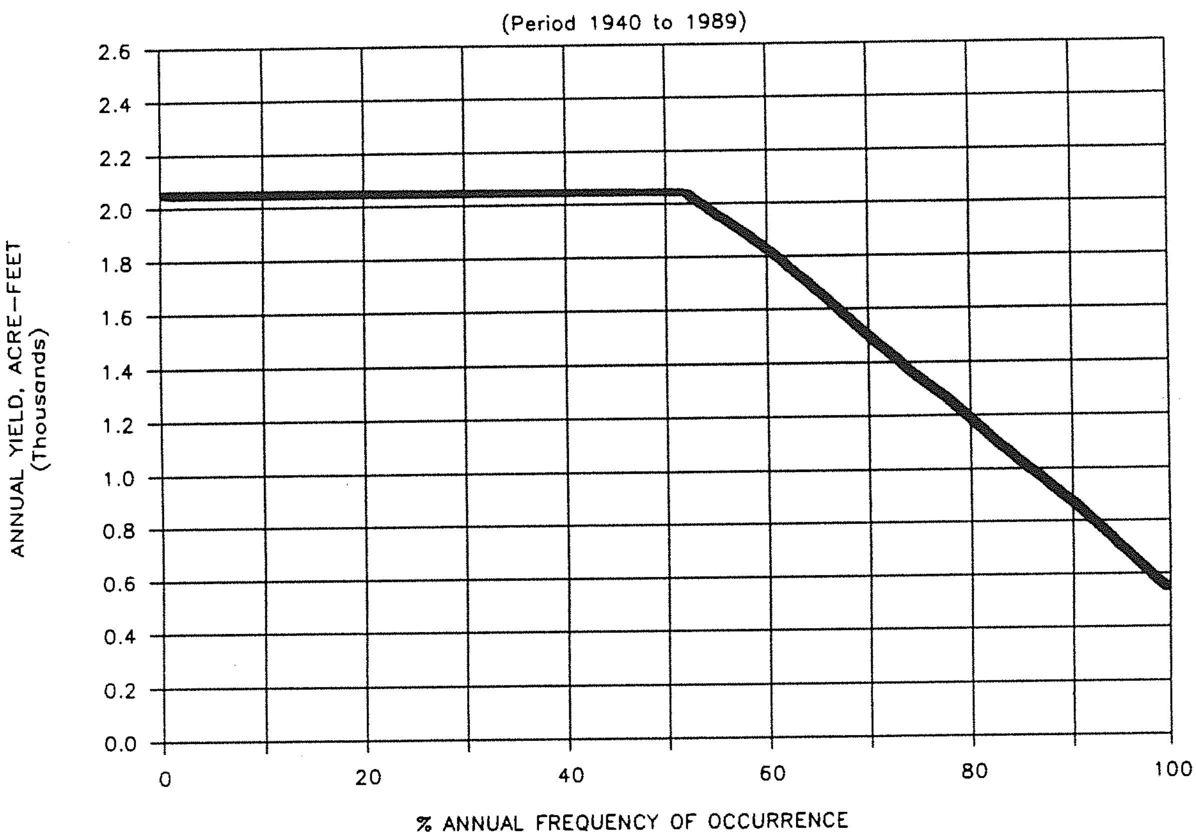
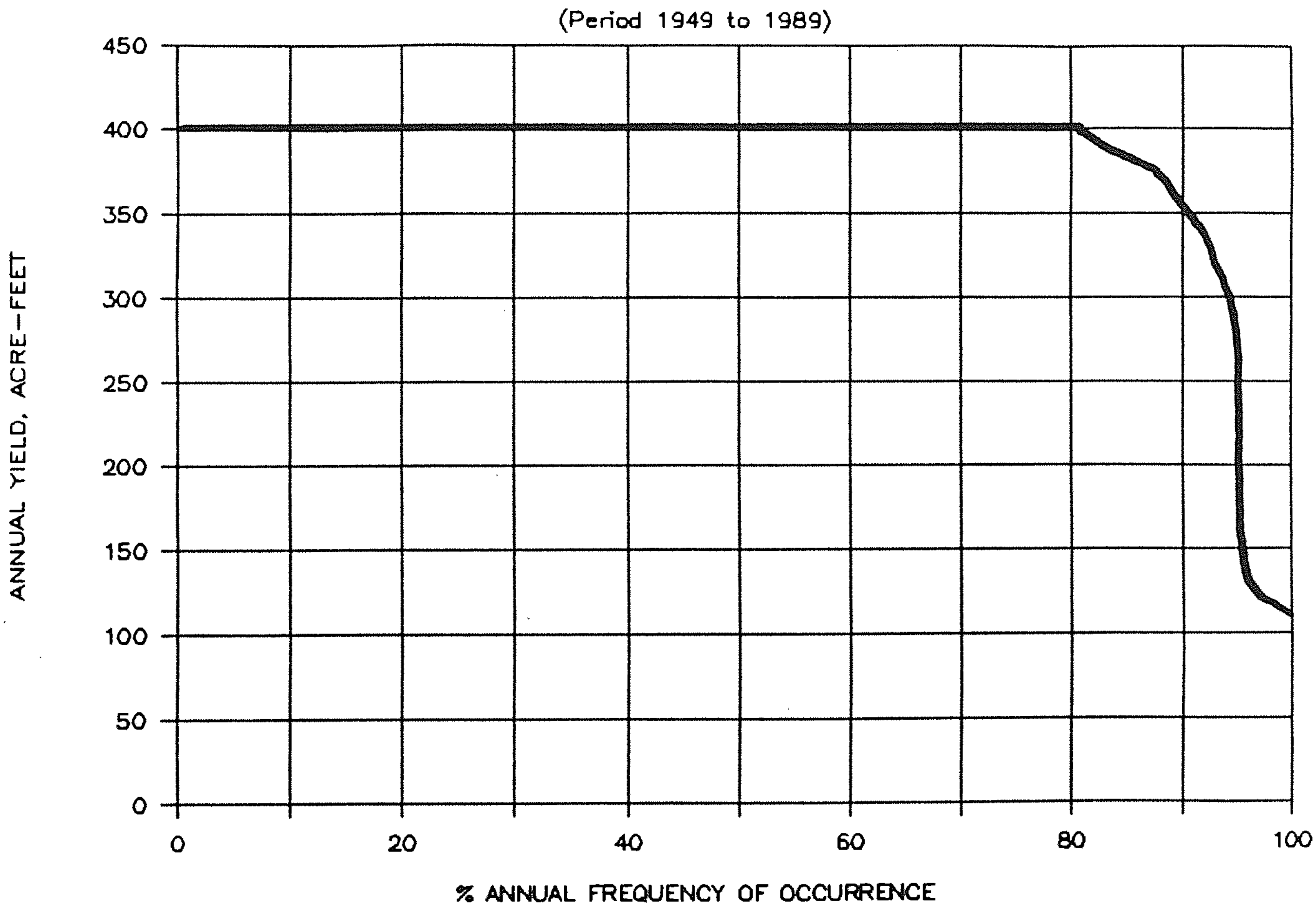



**BELL CANYON RESERVOIR ANNUAL YIELD**

FIGURE 5-10




**KIMBALL RESERVOIR ANNUAL YIELD**

FIGURE 5-11

## TABLE 5-6
## RESERVOIR YIELD ANALYSIS SUMMARY

| Reservoir | Storage Capacity (AF) | Reservoir Yield Reliability (AF/YR)[1] | | | |
|---|---|---|---|---|---|
| | | 100% | 90% | 80% | 50% |
| Milliken | 2,000 | 400 | 900 | 1,150 | 1,950 |
| Rector[2] | 4,000 | 1,200 | 1,400 | 1,650 | 3,000 |
| Lake Hennessey | 31,000 | 5,000 | 8,300 | 12,000 | 19,500 |
| Bell Canyon | 2,050 | 530 | 870 | 1,200 | 2,050 |
| Kimball[3] | 335 | 110 | 350 | 400 | 400 |

(1) Reservoir yield was computed for a range of reliability levels. Firm yield (yield that can be supplied every year without any shortage) is shown in the 100 percent column. Other columns show the percent of the time the specific yield can be supplied, based on the period of record 1940-1989.

(2) Rector provides 325 Ac-Ft/Yr of yield to the Town of Yountville; the remainder to the State for the Veterans Home and Napa State Hospital.

(3) Kimball yields and average inflow based on period 1949-1989.

But the probable primary differences are that the RESSIM model allows a much more detailed level of analysis then was used previously, and that the present analysis was based on an extended streamflow record that included three major droughts that were not previously analyzed. These three droughts include the periods 1945-1949, 1976-1977, and 1987-1989.

## Lake Berryessa

In the eastern part of Napa County, the 1.6-million-acre-feet Lake Berryessa dominates the landscape. This 15-mile-long reservoir was created in the 1950s by the U.S. Bureau of Reclamation by constructing Monticello Dam which is located at the junction of Napa, Solano, and Yolo Counties. The lake itself is entirely within Napa County. On March 7, 1955, the Bureau of Reclamation entered into a 40-year contract with the Solano County Flood Control and Water Conservation District for Lake Berryessa's full yield of 247,000 Ac-Ft/Yr for agricultural and municipal and industrial water. To deliver that water, Solano County residents constructed the required regulating reservoirs, canals, pipelines, and pumping stations. The key water users are farmers and such municipalities as the City of Fairfield and Vacaville. At the time of construction of Lake Berryessa, the California State Water Resources Control Board said that an Upper Putah Creek "depletion reservation" of 33,000 Ac-Ft/Yr must be set aside from the 247,000 Ac-Ft/Yr yield for future use upstream of the lake-namely for Lake and Napa Counties, and further required a downstream release of an additional 20,000 Ac-Ft/yr.

The key issue with water rights is that such rights are often reserved only as they relate to a proposed beneficial use implemented within a date specified by the Board. Over the years, the water need has developed in Solano County so that today it is actually using some of the Upper Putah Creek "depletion reservation". Of that 33,000 Ac-Ft/yr reservation, Lake County was allocated 7,500 Ac-Ft/yr for the proposed Dry Creek Dam, a project that has not been built. The State now has applications for some 80,000 Ac-Ft/Yr of the unused portion of the "depletion reservation".

Solano County's growth and presence of a delivery system from Lake Berryessa have facilitated its use of the unused portion of the reservation. It is permitted to do so by the Board on a year-to-year basis. In 1993, when the permit goes to license, and actual beneficial use has to be demonstrated, Solano County could most likely point to its needs and capability to deliver that water through an existing distribution system. However, the State Board would consider Lake, Napa, and Yolo Counties' protests in making any decision, and would prefer that a negotiated allocation of the unused water be achieved between the counties. An agreement between Napa County and Solano

County now provides that 1,500 Ac-Ft of Lake Berryessa water will be available for lakeside use. The desire of Solano County to purchase Monticello Dam from the Bureau has further complicated the water rights issue in that the Bureau would prefer that such an unresolved issue be taken care of before any potential sale which must be approved by Congress. As a result, negotiations were begun in 1988 between Napa and Solano Counties, with Napa requesting 15,000 Ac-Ft/Yr, and in 1989 with Lake County which requested 10,000 Ac-Ft/Yr. In the case of Napa County, Solano offered approximately 10,000 Ac-Ft/Yr. During the 1988 Napa election period, talks between the two counties were put on hold after three new supervisors were elected to the Napa board. In February 1989, the board voted to go back to the negotiating table. At this time, the water rights issue has not been resolved.

The issue was further complicated by recent legal action of several Solano County agencies who are requesting court adjudication of the Putah Creek water supply.

As a Napa County supply, water would most likely be restricted to use within the lake's watershed, a consideration that was incorporated in establishing the Lake Berryessa Subarea (LB) boundaries for the current water resource study. Key users of this water would be residents and visitors of Lake Berryessa, and irrigation of vineyards such as in Pope and Capell Valley from storage of winter stream flows in the upper Berryessa watershed.

The amount of Lake Berryessa water that will be permanently available to Napa County is indeterminate at this time.

## IMPORTED WATER

Napa County is a contractor with the State of California Department of Water Resources for water for municipal and industrial water from the State Water Project via the North Bay Aqueduct. This facility derives its water from the Delta at Barker Slough and delivers it to cities in Solano County via conduit and then by supplemental pumping into the Jameson Canyon area of southeast Napa County. For many years, an interim supply source was provided from Lake Berryessa via the Putah South Canal until the recent completion of Phase II of the aqueduct. The master water supply contract between the County and the State was signed on December 19, 1963 with subsequent amendments revising contract repayment and entitlement buildup.

The current contract buildup schedule is shown in Table 5-7, derived from Contract Amendment No. 12 of February 11, 1986. The entitlement culminates with a total of 25,000 Ac-Ft/Yr in the year 2021, allocated as follows:

| Contractor | Entitlement (Ac-Ft/Yr) |
|---|---|
| City of Napa | 18,800 |
| American Canyon CWD | 5,200 |
| Town of Yountville | 500 |
| City of Calistoga | 500 |
| Total | 25,000 |

The City of St. Helena is not a participant in the contract.

A plot of the entitlement (Figure 5-12) shows an approximate linear buildup to year 2020 (24,900 Ac-Ft/Yr) from year 1990 (6,745 Ac-Ft/Yr). The current (1990) allocation among the County water supply entities is Napa (4,000), American Canyon CWD (2200), and Yountville/Calistoga (545). The contract states that the specified water quantities are based on a "minimum project yield" defined as an ultimate dependable State Water Project supply of 4,230,000 Ac-Ft/Yr (when all required facilities are in place). The contract also provides for "allowable reduction" in the contract quantity due to drought, with agricultural cutbacks coming first in an amount up to 50 percent in any one year, and additional cutbacks distributed equally among agricultural and municipal and industrial users. (Thus a 65 percent agricultural use cutback translates to a 15 percent municipal and industrial use cutback.) Napa County's contract is for municipal and industrial use exclusively.

The reliability of the North Bay Aqueduct water supply thus comes down to two issues:

- the potential cutbacks during droughts
- the inability of the State to deliver its ultimate contract entitlement with current State Water Project Facilities.

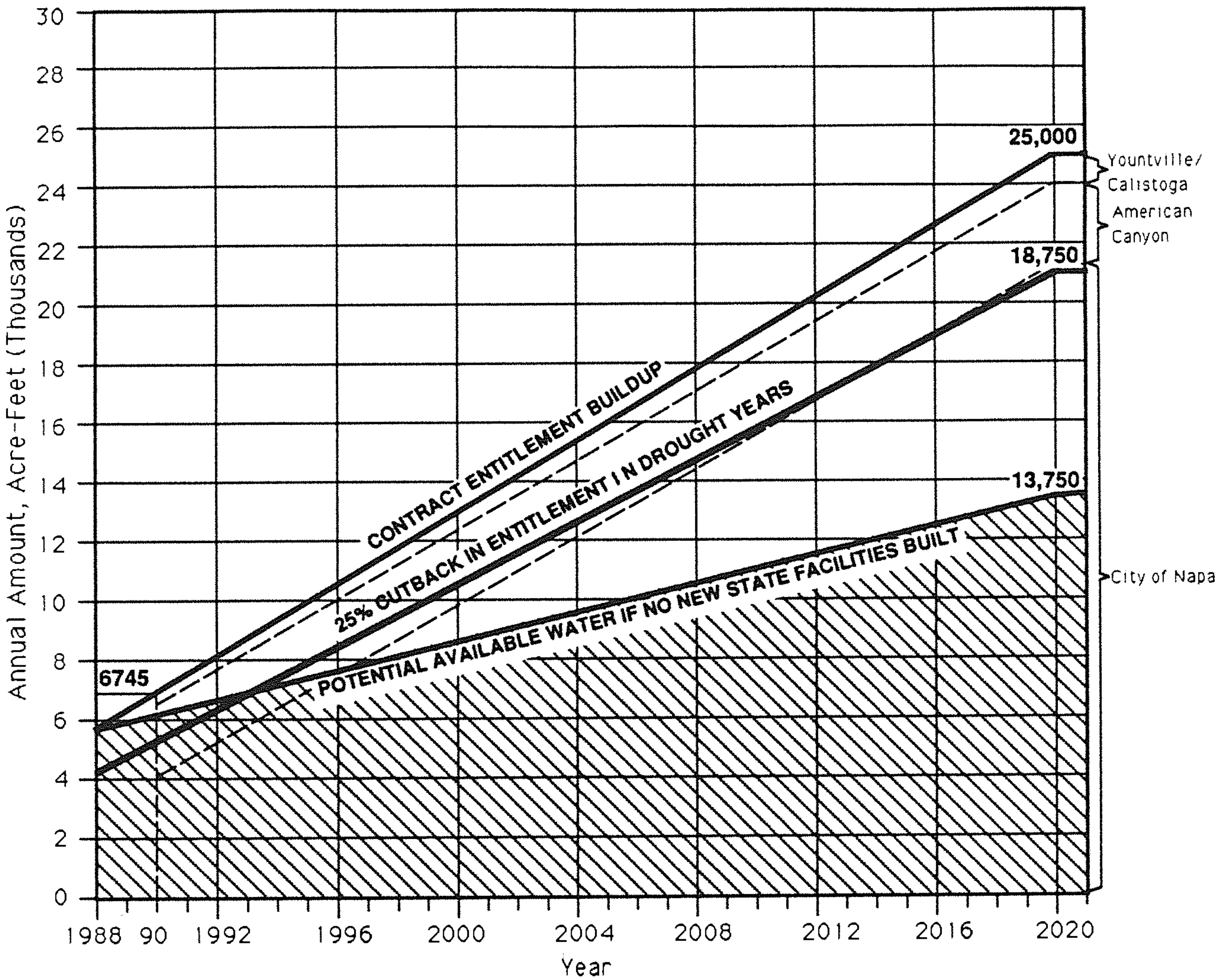
If we look at Figure 5-12, then it can be said that if State facilities are built (such as additional Banks Pumping Plant units, Delta channel modifications, Los Banos Grandes, Kern Water Bank, etc.), then in any year, the entitlement for that year can be reduced due to drought, such as the current four-year period (1987-90). Such cutbacks have been kept to a maximum of about 10 percent for municipal and industrial users, such as in 1977. It is conceivable that such cutbacks could approach 25 percent (when

TABLE 5-7

NORTH BAY AQUEDUCT ENTITLEMENTS
NAPA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

| Year | Total Annual Amount (Acre-Feet) |
|---|---|
| 1988 | 5,745 |
| 1989 | 6,195 |
| 1990 | 6,745 |
| 1991 | 7,290 |
| 1992 | 7,840 |
| 1993 | 8,490 |
| 1994 | 9,135 |
| 1995 | 9,780 |
| 1996 | 10,425 |
| 1997 | 11,065 |
| 1998 | 11,710 |
| 1999 | 12,330 |
| 2000 | 13,050 |
| 2001 | 13,665 |
| 2002 | 14,185 |
| 2003 | 14,800 |
| 2004 | 15,400 |
| 2005 | 16,000 |
| 2006 | 16,450 |
| 2007 | 17,000 |
| 2008 | 17,650 |
| 2009 | 18,200 |
| 2010 | 18,750 |
| 2011 | 19,400 |
| 2012 | 19,950 |
| 2013 | 20,600 |
| 2014 | 21,250 |
| 2016 | 22,500 |
| 2017 | 23,100 |
| 2018 | 23,700 |
| 2019 | 24,300 |
| 2020 | 24,900 |
| 2021 | 25,000* |

NOTE: * and each succeeding year thereafter for the term of the contract as a maximum entitlement.




## NORTH BAY AQUEDUCT CONTRACT BUILDUP

FIGURE 5-12

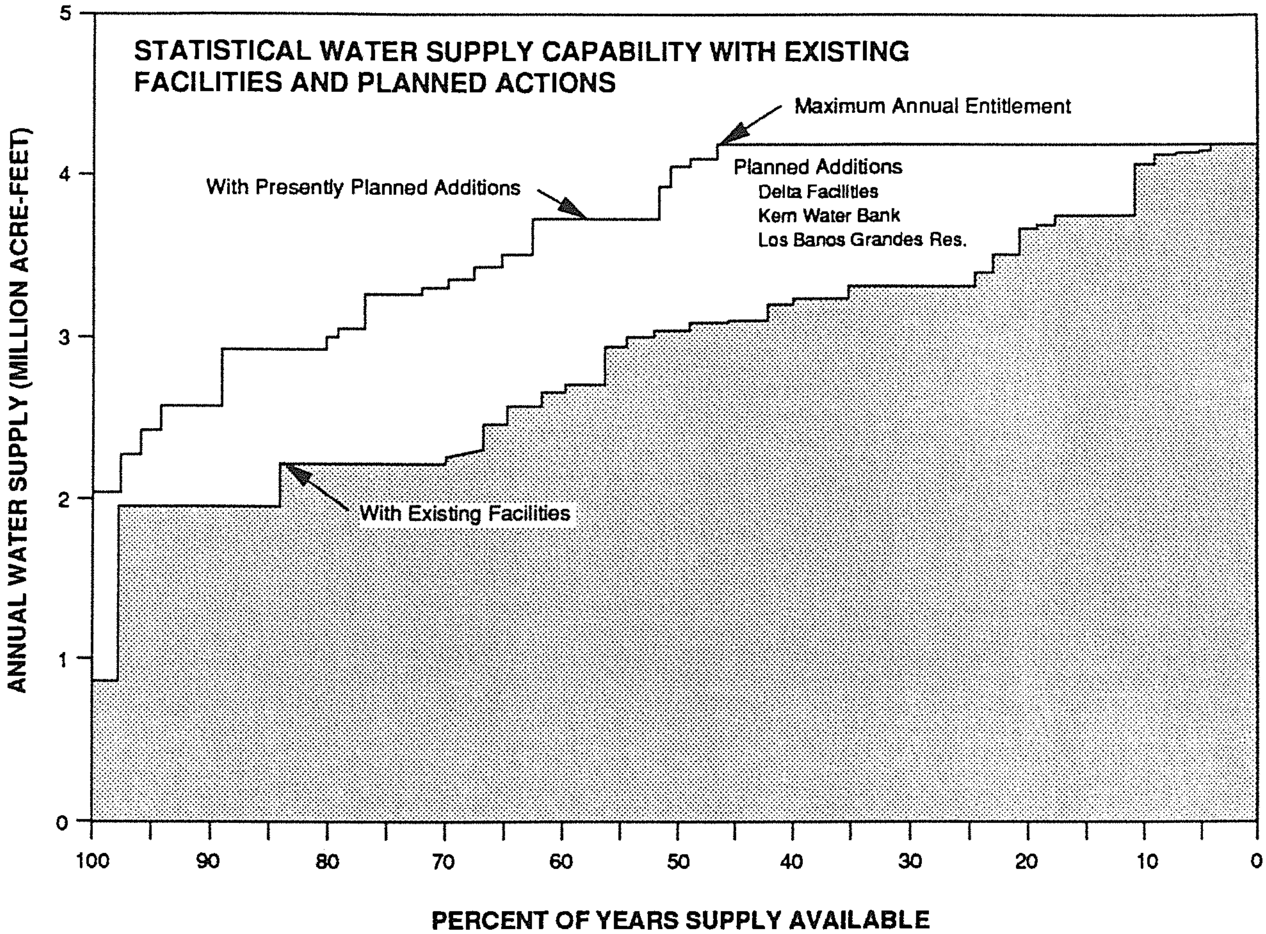
agriculture is cut back by 75 percent). So in any year, depending upon uncontrollable hydrologic events (rainfall), the County's supply could be cut back to 75 percent of its entitlement for that year.

The second aspect of reliability can also be shown on Figure 5-12. The State has said that with current State Water Project Facilities it is capable of delivering a dependable yield of 2,300,000 to 2,400,000 Ac-Ft/Yr, approximately 55 percent of its contracted-for ultimate dependable yield of 4,230,000 Ac-Ft/Yr. What this means is that if the State builds no new project facilities it would have to cut back its deliveries by 45 percent of ultimate contract entitlement. If distributed uniformly to all State water contractors, then Napa County could count on only 13,750 Ac-Ft/Yr of its 25,000 Ac-Ft/Yr contract. The situation could possibly be even slightly worse since Sierra "area of origin" Counties' water rights might further reduce the State project's supplies. Because municipal and industrial demand has not built up as rapidly as originally envisioned (slower growth and conservation), cutbacks of contract entitlement are not yet imminent. As demand grows, however, the State Water Project reliability will further deteriorate from its current level of 65 percent (percent of years supply is available, according to Figure 5-13), a level which is not acceptable for any municipality dependent on such a source as its only supply.

It should be pointed out that surplus water has been and would be available in the future during wetter years, with North Bay Aqueduct delivery capacity becoming the chief limitation.

## RECLAMATION

Reclamation of municipal wastewater effluent is currently being accomplished in Calistoga, Yountville, and at Napa Sanitation District plants. For Calistoga and Yountville, turf areas such as parks, sport fields, and a golf course are being irrigated by approximately 200 and 300 Ac-Ft/Yr of treated effluent, respectively. The Sanitation District currently disposes approximately 1600 Ac-Ft/Yr of effluent by irrigation of 590 acres of ranch pasture in the Soscol area during the summer months. The District's current reclamation practice is very restricted as to use due to the level of wastewater treatment provided - oxidation ponds, with no additional disinfection. The key reason for current reclamation here is due to an annual Napa River effluent discharge prohibition between May 1 and October 31.




SOURCE: DWR BROCHURE (1989) "THE CALIFORNIA STATE WATER PROJECT"

# NORTH BAY AQUEDUCT SUPPLY RELIABILITY

FIGURE 5-13

## SECTION 6

## BALANCING WATER NEEDS AND SUPPLIES

The goal of the current water resources study is to find the best mix of supplies that can satisfy the County's water needs to the year 2020. The study's effort has focused on estimating the likely range of water needs through development of a baseline projection and alternative demand scenarios. The water needs projection methodology is well documented in this report and based to the greatest extent possible on local and regional planning agency land use and population estimates. On the supply side, this study has strived to establish the reliability of the individual supplies - groundwater, river diversion, reservoirs, and imported water. This reliability aspect points up that all supplies vary in availability by season (month) and by year. Such supply variation can be unpredictable to a large degree depending on weather. Yet, long-term historical records of rainfall and streamflow make statistical analysis possible that gives some indication of what supplies are available in the future. With longer and longer historical records, more extreme hydrologic events become incorporated, and the supply reliability estimate becomes somewhat better. In other cases, such as the imported water from the North Bay Aqueduct and the Lake Berryessa supply, both hydrologic and political factors impact supply availability. For example, construction of additional State Water Project facilities to insure that Napa County's full, ultimate contract entitlement becomes available, depends on the outcome of the Bay-Delta Hearings being conducted by the California State Water Resources Control Board, environmental organizations, State and Federal fisheries policies, the north-south water controversy, governmental actions, voter approval of initiatives and bonds, etc. Yet one can arrive at some estimate of the range of water supply availability and consider that in balancing water needs and supplies.

### WATER NEED/SUPPLY RELATIONSHIP

The balancing of water needs and supplies must be approached from several levels:

- By User
- By Subarea
- County-wide

The user assessment is necessary based on individual reliability requirements, as well as water quality concerns.

The subarea assessment is necessary based on legal requirements-Lake Berryessa "depletion reservation" for "reasonable beneficial use within the watershed of Putah Creek above said reservoir", and on obtaining economic supplies based on proximity to user. As an example of the latter, Napa River diversions and groundwater in the North Napa Valley Basin made available to vineyards in the Napa Valley.

## Section 6

### Balancing Water Needs and Supplies

The County-wide assessment is necessary since State and Federal water contracts and water rights often are placed into county hands for allocation to in-county water supply entities. The county acts as the umbrella organization, minimizing the number of potential contracts with the State or Federal government. Such is the case with the North Bay Aqueduct contract and the recent request for supplemental Central Valley Project water from the Bureau of Reclamation. It is also the case with the Lake Berryessa water, where Napa County has been involved in agreements and negotiations to resolve the water supply issues.

Using the water need projections presented in Section 3, and existing supply availability as discussed in Section 5, water need/supply relationships were developed for individual water users, subareas, and Napa County as a whole, as shown in Table 6-1 and Figure 6-1. The key assumptions underlying these relationships are summarized below.

- **Water Needs**
  - Total County baseline water need projection for the period 1990 through 2020 with breakdown by user-agricultural (total crop requirement for vineyards and other), rural, and municipal and industrial. The alternative demand scenarios for total County water need are also shown.
  - Subarea baseline water need projection for the same period and breakdown by user.
- **Water Supplies**
  - Supplies are "stacked" from bottom to top in the following order: groundwater, river diversion, reservoirs, and imported supply, in order to correspond to water need "stacking" and allow review of need/supply balance by user.
  - The groundwater supply shown in Figure 6-1 represents safe yield, which is that amount of pumping that can be sustained in the long term based on natural basin recharge. Pumping extractions may be more in certain years, but would have to be balanced by reduced pumping in other years. The allocation to subarea and safe yield is as follows:

# TABLE 6-1
## NAPA COUNTY WATER NEED/SUPPLY RELATIONSHIP

| | | | | | | | | Safe/Firm Yield from Existing Water Supplies | | | | | | | | | | | Supply-Need (Ac-Ft/Yr) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline Water Need (Ac-Ft/Yr) | | | | | | | Ground-Water | River Diversion | | Reservoirs | | | Imported (NBA) | | Recla-mation | Total | | | |
| Water User | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | | Napa | Others | Muni-cipal | Berryessa | Misc. | 1990 | 2020 | | 1990 | 2020 | 1990 | 2020 |
| North Napa Valley (NN) Subarea | | | | | | | | | | | | | | | | | | | | |
| Muncipal & Industrial (M&I) Calistoga | 990 | 1060 | 1190 | 1340 | 1405 | 1460 | 1515 | 75 | 0 | 0 | 400 | NA | 0 | 272 | 275 | 200 | 947 | 950 | -43 | -565 |
| St. Helena | 1935 | 2195 | 2275 | 2380 | 2495 | 2595 | 2690 | 0 | 0 | 0 | 1200 | NA | 0 | 0 | 0 | 0 | 1100 | 1200 | -835 | -1490 |
| Yountville | 450 | 490 | 515 | 540 | 570 | 595 | 625 | 0 | 0 | 0 | 325 | NA | 0 | 272 | 275 | 0 | 597 | 600 | 147 | -25 |
| Subtotal M&I | 3375 | 3745 | 3980 | 4260 | 4470 | 4650 | 4830 | 75 | 0 | 0 | 1925 | 0 | 0 | 544 | 550 | 200 | 2744 | 2747 | -631 | -2083 |
| | | | | | | | | | | | | | | | | | | | | |
| Rural(1) | 2438 | 2506 | 2623 | 2745 | 2882 | 2996 | 3111 | * | * | * | 875 | NA | * | NA | NA | 0 | — | — | — | — |
| | | | | | | | | 22500* | 10,000* | | | | | | | | 35175 | 35175 | 9762 | 2034 |
| Agricultural-Vineyard | 22181 | 23356 | 24532 | 25708 | 26883 | 28059 | 29235 | | | | | | | | | | | | | |
| Agricultural-Other | 797 | 797 | 797 | 797 | 797 | 797 | 797 | | | | | | | | | | | | | |
| Agricultural-Total | 22978 | 24153 | 25329 | 26505 | 27680 | 28856 | 30032 | * | * | * | 1500** | NA | * | NA | NA | 300 | — | — | — | — |
| **Total for Subarea NN** | **28791** | **30404** | **31932** | **33510** | **35032** | **36502** | **37973** | **22575** | **10000** | **0** | **4300** | **0** | **0** | **544** | **550** | **500** | **37919** | **37922** | **9128** | **-51** |
| | | | | | | | | | | | | | | | | | | | | |
| South Napa (SN) Subarea | | | | | | | | | | | | | | | | | | | | |
| Municipal & Industrial (M&I) City of Napa | 13825 | 14675 | 15305 | 15685 | 16625 | 17410 | 18195 | 0 | 0 | 0 | 6150 | NA | NA | 4000 | 10285 | 0 | 10150 | 16435 | -3675 | -1760 |
| American Canyon | 1591 | 1721 | 1846 | 2031 | 2136 | 2226 | 2316 | 0 | 0 | 0 | NA | NA | NA | 2200 | 2860 | 0 | 2200 | 2860 | 609 | 544 |
| Subtotal M&I | 15416 | 16396 | 17151 | 17716 | 18761 | 19636 | 20511 | 0 | 0 | 0 | 6150 | 0 | 0 | 6200 | 13145 | 0 | 12350 | 19295 | -3066 | -1216 |
| | | | | | | | | | | | | | | | | | | | | |
| Rural | 1705 | 1732 | 1811 | 1903 | 2017 | 2112 | 2207 | * | * | * | NA | NA | * | NA | NA | 0 | — | — | — | — |
| | | | | | | | | 5700* | 1000** | 500** | | | 500** | | | | 9300 | 9300 | 841 | -1629 |
| Arigcultural-Vineyard | 3248 | 3576 | 3904 | 4232 | 4560 | 4888 | 5216 | | | | | | | | | | | | | |
| Agricultural-Other | 3506 | 3506 | 3506 | 3506 | 3506 | 3506 | 3506 | | | | | | | | | | | | | |
| Agricultural-Total | 6754 | 7082 | 7410 | 7738 | 8066 | 8394 | 8722 | * | * | * | NA | NA | * | NA | NA | 1600 | — | — | — | — |
| **Total for Subarea SN** | **23875** | **25210** | **26372** | **27357** | **28844** | **30142** | **31440** | **5700** | **1000** | **500** | **6150** | **0** | **500** | **6200** | **13145** | **1600** | **21650** | **28595** | **-2225** | **-2845** |
| | | | | | | | | | | | | | | | | | | | | |
| Lake Berryessa (LB) Subarea | | | | | | | | | | | | | | | | | | | | |
| Municipal & Industrial (M&I) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| | | | | | | | | | | | | | | | | | | | | |
| Rural | 95 | 96 | 101 | 106 | 112 | 117 | 123 | * | NA | * | NA | * | * | NA | NA | 0 | — | — | — | — |
| | | | | | | | | 400* | | 100* | | 1500* | 250* | | | | 2250 | 2250 | -3664 | -5744 |
| Agricultural-Vineyard | 2460 | 2802 | 3144 | 3486 | 3828 | 4170 | 4512 | | | | | | | | | | | | | |
| Agricultural-Other | 3359 | 3359 | 3359 | 3359 | 3359 | 3359 | 3359 | | | | | | | | | | | | | |
| Agricultural-Total | 5819 | 6161 | 6503 | 6845 | 7187 | 7529 | 7871 | * | NA | * | NA | 0 | * | NA | NA | 0 | — | — | — | — |
| **Total for Subarea LB** | **5914** | **6257** | **6604** | **6951** | **7299** | **7646** | **7994** | **400** | **0** | **100** | **0** | **1500** | **250** | **0** | **0** | **0** | **2250** | **2250** | **-3664** | **-5744** |
| | | | | | | | | | | | | | | | | | | | | |
| **Total All Subareas** | **58580** | **61871** | **64908** | **67818** | **71175** | **74290** | **77407** | **28675** | **11000** | **600** | **10450** | **1500** | **750** | **6744** | **13695** | **2100** | **61819** | **68770** | **3239** | **-8637** |

NOTES: * Supply available to rural and agricultural, combined - ** Assumed (no detailed information available) - NA - Not available to user - (1) Includes Veterans Home at Yountville.

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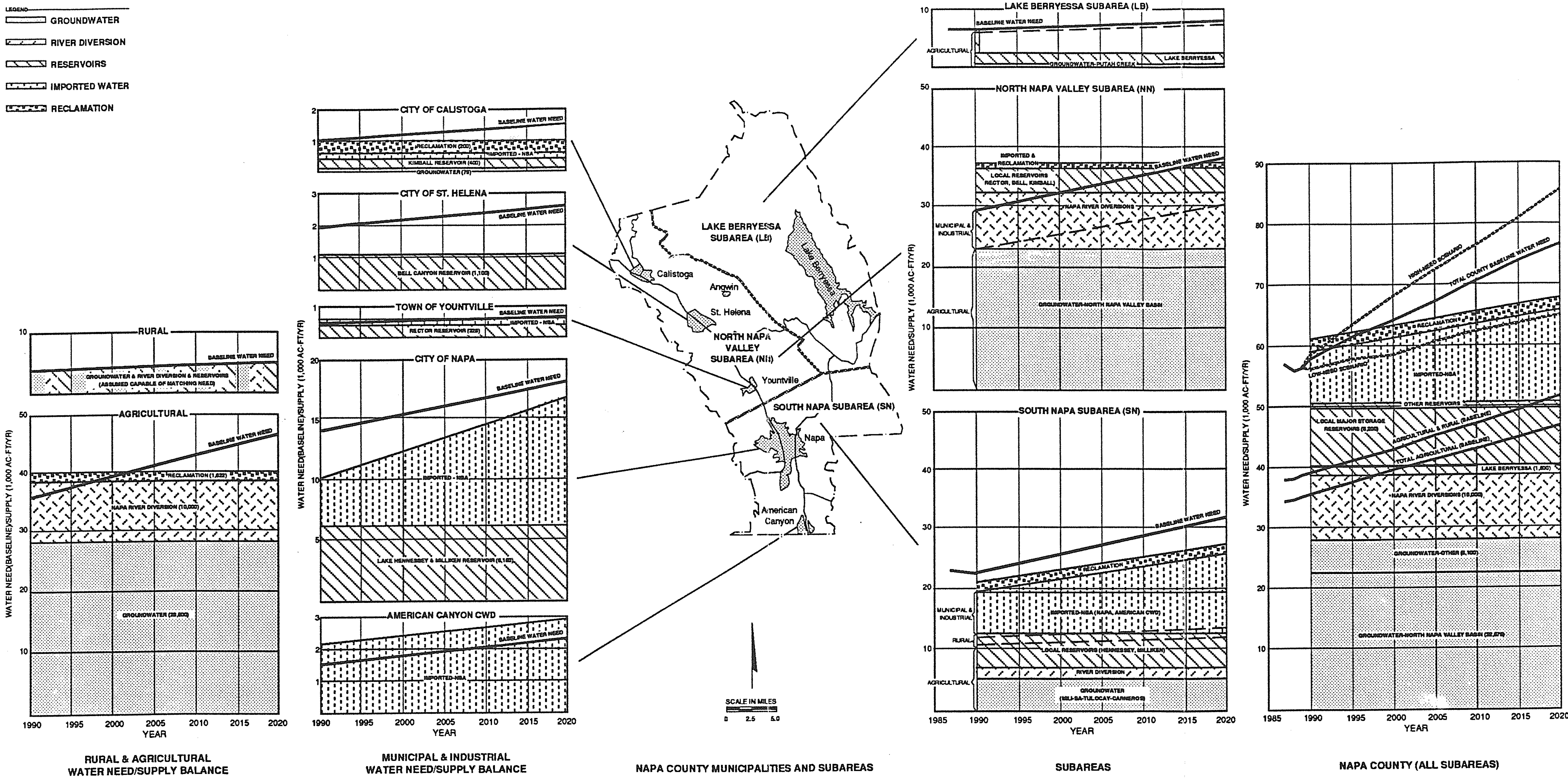


## WATER NEED/ SUPPLY RELATIONSHIPS

FIGURE 6-1

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## Section 6

### Balancing Water Needs and Supplies

| Groundwater Basin (Ac-Ft/Yr) | Subarea | Safe Yield |
|---|---|---|
| Northern Napa Valley | NN | 22,500 |
| NN Subarea Total | | 22,500 |
| Carneros | SN | 300 |
| Milliken-Sarco-Tulucay | SN | 5,400 |
| SN Subarea Total | | 5,700 |
| Putah Creek | LB | 400 |
| Total for all Subareas | | 28,600 |

- Potential river diversions for vineyards are estimated at up to 10,000 Ac-Ft/Yr based on review of prior work and Napa River flows during the mid-March to mid-May frost protection season.

- The supply from local reservoirs is dependent on the minimum level of reliability (lowest frequency of occurrence) that is acceptable for that reservoir based on hydrologic availability and the likelihood that short-term supplemental alternate supplies could be obtained if a reservoir were operated to get more water most of the time. That is, to get a larger, long-term yield from a given reservoir, one must back off the "firm yield" operating strategy (100 percent frequency yield) and be willing to accept running low during infrequent critically-dry periods. This risk is acceptable if short-term water rationing can be imposed or an alternate short-term supply can be obtained. A review of actual 1989 local reservoir deliveries shows that the three smallest reservoirs - Kimball, Bell Canyon and Milliken, were operated at an 80 percent reliability level, whereas Hennessey and Rector were operated near the "firm yield" level. A purchase of 7,000 Ac-Ft for 1989 and 1990 from the Yuba County Water Agency, delivered via the North Bay Aqueduct, served as a short-term supplemental supply. Reservoir size plays an important role here in that Lake Hennessey, and Rector to a lesser extent, are carry-over reservoirs, and their "firm yield" is determined by multi-year drought periods, such as the current one, while the smaller reservoirs, with little carry-over storage, are impacted by single-year extreme hydrologic conditions, such as 1977. In Table 6-1 and Figure 6-1, local reservoir supply yield is based on the 80 percent frequency level for Kimball, Bell Canyon, and Milliken, and the 100 percent level for Hennessey and Rector. The allocation of reservoirs by subarea and their 80 percent and 100 percent-level yields are as follows:

**Balancing Water Needs and Supplies**

| Storage Reservoir | Subarea | Yield (Ac-Ft/Yr) 80% | 100% |
|---|---|---|---|
| Lake Hennessey | SN | 12,000 | 5,000* |
| Milliken | SN | 1,500* | 400 |
| SN Subarea Total | | 13,150 | 5,400 |
| Kimball | NN | 400* | 110 |
| Bell Canyon | NN | 1,200* | 530 |
| Rector | NN | 1,650 | 1,200* |
| NN Subarea Total | | 3,250 | 1,840 |
| Total for all Subareas | | 16,400 | 7,240 |

NOTE: Asterisk indicates yield selected for use in Table 6-1 and Figure 6-1.

As of this date (November 1990), no final allocation of the Lake Berryessa water between Napa and Solano Counties has been established beyond a 1981 agreement which specified 1500 Ac-Ft/Yr for lakeside municipal and industrial use.

- The imported supply represents the North Bay Aqueduct contract entitlement buildup from a total of 6,745 Ac-Ft/Yr in 1990 to 24,900 Ac-Ft/Yr in 2020. This supply is allocated as follows to the subareas with contract entitlement at a reduced 55 percent of the ultimate amount based on the delivery capability of existing State Water Project Facilities.

| Subarea | User | Yield (Ac-Ft/Yr) 1990 | 2020 100% | 2020 55%* |
|---|---|---|---|---|
| SN | City of Napa | 4,000 | 18,700 | 10,285 |
| | American Canyon | 2,200 | 5,200 | 2,860 |
| | SN Subarea Subtotal | 6,200 | 23,900 | 13,145 |
| NN | Calistoga | --- | 500 | 275 |
| | Yountville | --- | 500 | 275 |
| | NN Subarea Total | 545 | 1,000 | 550 |
| | --- | | 0 | 00 |
| LB | Total All Subareas | 6,745 | 24,900 | 13,695 |

NOTE: Asterisk indicates yield selected for use in Table 6-1 and Figure 6-1.

- The current reclamation supply is distributed as follows:

| Source | Use | Amount (Ac-Ft/Yr) |
|---|---|---|
| City of Calistoga | Turf-Parks/Sport Fields | 200 |
| Town of Yountville | Turf-Golf Courses | 300 |
| Napa Sanitation District | Ranch Pasture | 1,600 |

From a review of the baseline water need/existing supply relationship for Napa County water users, its three subareas, and County as a whole, as shown in Table 6-1 and Figure 6-1, the following observations can be made regarding the adequacy of existing water supplies:

| | Adequacy of Existing Supplies | |
|---|---|---|
| User Group | 1990 | 2020 |
| **Individual User:** | | |
| **Municipal and Industrial** | | |
| City of Calistoga | Barley Adequate | Inadequate |
| City of St. Helena | Inadequate | Inadequate |
| Town of Yountville | Adequate | Barely Adequate |
| City of Napa | Inadequate | Inadequate |
| American Canyon CWD | Adequate | Adequate |
| **Rural** | Probably Adequate | Probably Adequate |
| **Agricultural** | Adequate | Inadequate |
| **Subareas:** | | |
| Lake Berryessa (LB) | Adequate* | Inadequate |
| North Napa Valley (NN) | Adequate | Inadequate |
| South Napa (SN) | Inadequate | Inadequate |
| **Napa County:** | Adequate | Inadequate |

* Due to the SWRCB depletion reservation for the Putah Creek area, the right to develop any water supply has been available.

## Section 6

## Balancing Water Needs and Supplies

A review of municipal and industrial production records for the recent drought years, 1987 to 1989, indicates that the smaller municipal reservoirs have been yielding close to their storage capacity, with however some yield declines in 1989, as the drought period lengthened. In the case of Lake Hennessey, however, there is a definite reduction in yield year by year, with current production near the firm-yield rate (100 percent frequency).

Current Napa County deliveries from its imported supply-the North Bay Aqueduct, have exceeded contract entitlements by over 60 percent. That extra water has come from the Yuba County Water Agency in a separate agreement negotiated between the City of Napa and the Agency for 7,000 Ac-Ft/Yr. The water is obtained from New Bullards Bar Reservoir via the Sacramento River and picked up at the Barker Slough intake of the North Bay Aqueduct. The City of Napa plays a key role in delivering the imported supply to the three up-valley water users - Calistoga, St. Helena and Yountville, by exchanging imported water for Lake Hennessey water. The latter can be delivered via the City's Conn Transmission Main and main extensions that have been established by Calistoga and St. Helena. In the case of St. Helena, which is not a contract participant for North Bay Aqueduct water, the non-State Water Project Yuba supply has been provided. Individual North Bay Aqueduct contract entitlements have been exceeded for Calistoga and the City of Napa, while Yountville's and American Canyon's entitlements have not been exceeded. It is the imported supply that has clearly made up for the reduced local reservoir yields.

Certain data and information inadequacies must be considered when reflecting on the water need/supply relationships shown in Table 6-1 and Figure 6-1:

- The lack of publicly-available groundwater pumping rates for agricultural and rural water users requires an indirect approach to estimate water use through land use acreage and crop unit water consumption.

- Sparse hydrogeological information for some of the smaller groundwater basins, such as the Carneros area.

- Little information on actual direct river and stream diversions, and available reservoir storage capacity for capturing direct diversions. Due to the timing mismatch between water need and river/stream flows, it is the amount of storage that really establishes direct river diversion capability.

Although some additional data and information may be available upon more intensive effort, the scope of this County-wide water resource study was not focused on specific individual water users. It is believed, however, that the water need/supply relationships for the major County water users has been established with a satisfactory level of confidence.

## Section 6

## Balancing Water Needs and Supplies

### BALANCING WATER NEEDS AND SUPPLIES

In attempting to balance Napa County's water needs and supplies for the period 1990 through 2020, certain issues must be addressed:

- Hydrologic uncertainty is a way of life in semi-arid California, impacting virtually all supplies that Napa County water users have available - groundwater, river diversion, local reservoirs, and the imported North Bay Aqueduct supply. A key point here is whether the hydrologic uncertainty is concurrent for the different sources and what the shape of their yield-frequency curves is. Note that hydrologic uncertainty may decrease as the years go on since a longer-term hydrologic database becomes available. However, it does not appear likely that the hydrologic conditions for this coming water year, nor any subsequent years, will become known in advance so that supply operations could be adjusted accordingly. The reservoir yield that one seeks to operate at reflects the required dependability (reliability) and the availability of alternate supply sources. Municipal and industrial use generally requires a higher level of dependability than agricultural use.

- Political uncertainty may also be a way of life with respect to tying down supplies in water-deficient California as the state's population continues to expand. Such uncertainty clearly is a factor in the Lake Berryessa supply and the State Water Project North Bay Aqueduct supply. In the Berryessa case, approximately 35 years after construction of the Monticello Dam, no final allocation of water from the Solano Project (Lake Berryessa) among Napa, Solano, Lake and Yolo Counties has been established. Although several agreements exist between Napa, Solano, and the U.S. Bureau of Reclamation, the actual water rights have not been established. If putting water to beneficial use is a key criteria for developing water rights, then Solano County is much further along in establishing water need from Lake Berryessa. As to the State Water Project supply, its dependability will continue to decline as the years go on if no additional facilities are constructed. The implementation of such facilities are highly dependent on political solutions reached in Sate and Federal legislative bodies, with Delta and north-south issues predominating.

- Groundwater and direct river and stream diversions within Napa County are essentially dedicated to agriculture and rural domestic water needs. At present, Calistoga's Fiege well field is the only municipal groundwater supply.

## Balancing Water Needs and Supplies

- The City of Napa's water transmission system, supplied by three sources - Lake Hennessey, Milliken Reservoir, and the North Bay Aqueduct, provides an extensive interconnecting conveyance system among the five major County municipal water agencies and the State of California's Rector Reservoir.

- Opportunities exist for expansion of reclamation within the County, especially in the South Napa Subarea from the Napa Sanitation/American Canyon wastewater treatment facilities. The timing of such reclamation is, however, dependent on economics and institutional arrangements. The economic aspects are significantly influenced by alternative supplies available to potential reclaimed water users. The existing reclaimed water use in this area does not really satisfy a true water need, but actually reflects a developed a use (ranch pasture irrigation) driven by the order to comply with Napa River effluent discharge limitations.

- The baseline water need projection and the alternative demand scenarios depict a likely range of future water needs. Such projections do not include additional short-term management of water demand during droughts. Voluntary and mandatory demand cutbacks for municipalities of 25 percent have become common in northern California since the 1976-77 drought. Agricultural-use cutbacks of up to 60 percent have occurred in deliveries from the State Water Project and the Federal Central Valley Project. But, those cutbacks become increasingly difficult as water system efficiencies are increased and as conservation becomes imbedded; and as people tire of too-frequent emergencies.

Based on the current water needs and supply analyses, and the issues described above, the following issues in balancing the County's water needs and supplies must be addressed:

- What is a realistic short-term drought-period cutback in the future water need?

- Can groundwater serve as a potential alternate supply to municipalities, especially during drought periods?

- Have river diversions been maximized through the development of storage?

- Are local municipal reservoirs developed such as to derive the maximum yield from tributary watersheds?

- What supply should be anticipated from Lake Berryessa and who would it serve?

- What can be done about firming up the North Bay Aqueduct supply?
- Can any additional in-County water transfers be implemented?
- What supplemental water supplies might be considered?

Each of these issues is discussed in the following paragraphs.

### Drought-Period Water Use Cutbacks

On a short-term basis, supply and water need can be brought into balance by asking for voluntary cutbacks or imposing mandatory water rationing during critical drought periods. Although 1976-77 demand cutbacks in the Bay Area approached 40 and 50 percent for municipal users, future cutbacks probably should not exceed about 25 percent.

### Groundwater as Municipal Supply

Water quality is an important consideration in the suitability of groundwater as a municipal water supply. The greatest need would come from the Cities of Calistoga, St. Helena, and Napa. According to Table 4-5, quality parameters of concern to these municipalities in obtaining groundwater from the Northern Napa basin would be high levels of iron and manganese, nitrates, TDS, sodium, chlorides, and boron. Although many of these parameters are represented by secondary standards, nitrates could pose a health risk to children, and sodium could be a problem for persons with restricted sodium diets. Treatment would be mandatory for nitrate control.

Development of municipal groundwater would require the availability of municipally-owned property located suitably. Such suitability would include proximity to water-bearing strata and distance to any potential contaminant source. A recent search for groundwater near St. Helena by Beckstoffer Vineyards produced 7 gpm at 400 feet instead of the hoped-for 150 gpm. Clearly there is no easy way to predict well production, especially for larger-capacity municipal wells. For short-term groundwater extraction by municipalities the major concern would not be the impact on basin safe yield but rather the effects on adjacent well owners.

### Maximizing River Diversions

The State Water Resources Control Board's decision on Napa River diversions during the frost protection period emphasizes the value of storage so that winter flows can be captured. The existing annual diversion rate of 10,000 Ac-Ft that the current study uses in the water need/supply balance is not based on an inventory of actual storage but on an estimate. Any refinement of this estimate would require a detailed storage inventory.

## Maximizing Municipal Reservoir Yield

In connection with the reservoir yield analysis detailed in Section 5, the potential for increasing yield by reservoir enlargement was reviewed and is summarized below.

- **Milliken Reservoir.** A one foot increase in dam height would produce 39 Ac-Ft of new storage capacity. Road relocation and diversion limits impact consideration of enlargement. A 20-foot increase in dam height (792 Ac-Ft of new capacity) would produce 615 Ac-Ft of new yield.

- **Rector Reservoir.** Every foot of increased dam height produces 68 Ac-Ft of new capacity. Need saddle dams. Spillway enlargement may be difficult. Appears to be inadequate annual inflow to increase yield.

- **Lake Hennessey.** 1000 Ac-Ft of new capacity per foot of increased dam height. Highway relocation and spillway of concern. A 15-foot increase in dam height (15,000 Ac-Ft capacity change) would produce 1,500 Ac-Ft of new yield; not a very efficient yield/capacity ratio.

- **Bell Canyon Reservoir.** Every foot of dam height increase would produce 73 Ac-Ft of new capacity. Road relocation and dikes required. Based on an average annual inflow, additional yield appears to be available.

- **Kimball Reservoir.** A one-foot increase in dam height would produce 12 Ac-ft of new storage. Extensive physical works required for enlargement. An additional 500 to 1,000 Ac-Ft of yield could be developed based on average annual inflow.

In summary, several thousand acre-feet of new yield could be developed from the existing municipal reservoirs, however the cost of dam expansions are high based on previous studies by the individual agencies.

## Lake Berryessa Supply

A maximum Lake Berryessa Subarea water need of 11,801 Ac-Ft/Yr (high-demand scenario) can be anticipated by the year 2020, excluding lakeside use. Any negotiations for Lake Berryessa water rights should consider this water need projection.

## Section 6

## Balancing Water Needs and Supplies

### Firming Up North Bay Aqueduct Supply

The current reliability of about 65 percent (frequency of entitlement availability) and likely decline in future reliability as State-wide entitlements build up, is not acceptable for municipal supplies. Obviously, support for the State's program of development of additional facilities to increase yield, such as the Delta Facilities, Los Banos Grandes Reservoir, and the Kern Water Bank are a way to assure North Bay Aqueduct yield. For Napa County as a whole, a more rapid buildup of contract entitlement would be desirable. A more permanent agreement with agencies that have surplus water, such as the Yuba County Water Agency, might be obtained under sponsorship of the Department of Water Resources, rather than obtaining year-by-year individual agreements with the Agency. Another possibility is to evaluate participation in such future facilities as Contra Costa Water District's Los Vaqueros Project, as was done for the Solano Water Authority. Further, supplemental water recently offered by the Central Valley Project (requests now on hold based on concerns regarding availability of water and environmental impacts) could be used to firm up the North Bay Aqueduct supply since it could be picked up from the Sacramento River.

### In-County Water Transfers

Two County water users have current water supply surpluses - the American Canyon CWD (North Bay Aqueduct contract entitlement) and agriculture (groundwater). The former supply excess will be maintained to year 2020, while the latter excess will turn into a deficiency in ten years. The American Canyon supply could be transferred to other Napa County municipal entities via the City of Napa transmission system. Use of the groundwater surplus would require development of municipal wells and probably some well-head treatment facilities.

### Additional Wastewater Reclamation

An engineering study currently being conducted for the Napa Sanitation District states that there are opportunities for additional reclamation in the South Napa Subarea from the jointly owned Napa Sanitation District/American Canyon CWD Soscol Wastewater Plant. These opportunities are proposed for staged implementation as follows:

| Reclaimed Water Use | Date in Place | Quantity of Reclaimed Water (Ac-Ft/Yr) Stage | Cumulative |
|---|---|---|---|
| Irrigated Ranch Pasture (Kirkland, Smoky, and Fagundes Properties) | Existing | 1,622 | 1,622 |
| Chardonnay Golf Course/Vineyards | 1995 | 647 | 2,269 |
| Kennedy Golf Course/Park; Napa Community College; Napa Valley Memorial Gardens; Bedford Industrial Park | 2000± | 828 | 3,097 |
| Napa State Hospital; Potential Development Acreage; Various Industrial Park Landscaping | 2012 | 1,365 | 4,462 |
| Additional Irrigated Ranch Pasture (Airport and new Kirkland Ranch) | 2012 | 1,481 | 5,943 |

Wastewater treatment will be such that Title 22 unrestricted use will be allowed. The sum of the ranch pasture requirements represents a minimum reclamation quantity for the wastewater plant (total of 3,103 Ac-Ft); the additional 2,840 Ac-Ft represents a replacement for fresh water now being used or which would need to be used in the future for irrigation of these properties.

In addition, landscape irrigation at the California Veterans Home could be supplied by reclaimed water from the Yountville wastewater plant.

## New Supplemental Water Supplies

Supplemental water supplies that have been previously considered include new local reservoir storage and new imported water. A review of the mean annual runoff isohyetal map developed by the U.S. Geological Survey shows the most productive watersheds to be in the northwestern corner of the County (Kimball and Bell Canyon Reservoirs are located in this area) and along a narrow ridge on the western County line north of Yountville. Watersheds to the east and south show relatively low mean annual runoffs. A recent study for St. Helena (1989) suggested three potential reservoir sites - Spring Valley, Bale Slough, and York Creek. The latter two reservoirs are small; the former, supplied primarily from Napa River diversions, had a maximum capacity of 10,000 Ac-Ft. However, vineyard development in the area probably precludes any further consideration of this site. It would appear that any significant new surface water supply within the County would have to tap Napa River flows since they originate in the productive northwest corner. (Enlargement of Kimball and Bell Canyon Reservoirs would also be productive according to the mean annual runoff map, as per prior discussion of yield from the reservoirs but would be very costly).

New imported supplies, in addition to firming up the existing North Bay Aqueduct supply, as previously discussed, could include extension of the Central Valley Project's Tehama-Colusa Canal into Solano County to the Vacaville area, and use of the North Bay Aqueduct for conveyance. In reference to the aqueduct, expansion of terminal storage in the Jameson Canyon area would improve the flexibility of the aqueduct and perhaps its yield.

## WATER MANAGEMENT PLAN

Where supply deficiencies are indicated in Table 6-1 and Figure 6-1, water management measures, such as discussed above, can be implemented to match needs. In some cases, there is a current urgency to achieve a balance, while in others, the gradual water need build up out to the year 2020 will allow a more planned, staged approach. The current drought period, which began after the wet year of 1986, clearly has stressed several of the County's municipalities since they are almost exclusively dependent on surface water supplies, both local and imported. It is these multi-year, rain-deficient periods that must be used in planning water management strategy. That the current drought period is not a real extreme situation can be seen by looking at the 1928-34 period, which is several years longer, and is in fact the critical period for the much larger water projects of the state and the federal government in the Central Valley. What is apparent is that if the drought continues, the County's imported supply will most likely face a temporary contract entitlement cutback. A ten percent cutback for municipal and industrial users (60 percent for agriculture) was envisioned in the spring of 1989 when a late-season rainfall made those cutbacks unnecessary. Such a cutback should be anticipated if the drought continues into 1991.

Where immediate action is required to balance water need and supply, the following water management measures would be available:

- Mandatory rationing of municipality-supplied customers.
- Re-activation or construction of new wells to tap groundwater.
- In-County water transfers.

- Purchase of additional water from water-surplus entities such as the Yuba County Water Agency and Placer County Water Agency, whose water can be wheeled via the North Bay Aqueduct.

Where the need/balance is a longer-range problem, all of the previously discussed measures would be available for consideration.

Based upon the water need/supply balance (surplus or deficit) for 1990 and 2020, (as shown in Table 6-1, and the incremental supply available from alternative water management measures, as summarized in Table 6-2, it is recommended that the Napa County Water Management Plan consist of the following elements:

- **Public Information Element.** As monitor of the County's groundwater supplies; as holder of a key water contract (North Bay Aqueduct); and based on involvement in the potential reserved water from Lake Berryessa, the District should develop, maintain, and distribute information to County water users regarding:

  - the source of the County's water supplies including groundwater, river diversion, local reservoir storage, imported water, and wastewater reclamation. The recent presentation by County Board and engineering staff at the Napa County Water Forum and resultant newspaper coverage is a good example of this type of activity.

  - current hydrologic conditions in the County and for the State Water Project (North Bay Aqueduct) and how County water users will be impacted. Conditions would include rainfall to date versus normal and recent years; general groundwater levels; storage level in the five municipal reservoirs; Napa River flow; and anticipated North Bay Aqueduct delivery rates. Consideration should be given to establishing a water deficiency (drought) index that would trigger certain actions to restrain water use and to enhance supplies through transfers or short-term supplemental supplies. The focus would be on critical drought periods, such as the current four-year period. Early public information and written guidelines and criteria would enhance voluntary adjustments to any water/need supply imbalance and minimize economic hardships.

  - status of State's efforts to meet its water contract entitlement buildup (key projects under way and their implementation schedule; legislative activities; etc.)

## TABLE 6-2
## INCREMENTAL SUPPLY FROM WATER MANAGEMENT MEASURES

| Water Management Measure | Incremental Supply (Ac-Ft/Yr) 1990 | 2020 |
|---|---|---|
| Drought-Period Water Use Cutback (25%) | | |
| Calistoga | 248 | 379 |
| St. Helena | 484 | 672 |
| Yountville | 112 | 156 |
| City of Napa | 3,456 | 4,549 |
| American Canyon | 398 | 579 |
| Rural (Total) | 947 | 1,245 |
| Agricultural (Total) | 8,888 | 11,656 |
| Total | 14,533 | 19,236 |
| Groundwater as Municipal Supply | | |
| Calistoga | --- | --- |
| St. Helena | --- | --- |
| Yountville | --- | --- |
| City of Napa | --- | --- |
| American Canyon | Not Available | |
| Total | 9,776 | 2,048 |
| Maximizing River Diversions | | |
| Napa River above Oak Knoll Avenue | --- | |
| Other Streams | --- | |
| Total | 5,000 | |
| Maximizing Municipal Reservoir Yield | | |
| Milliken (20-ft dam height increase) | 600 | |
| Rector | Minimal | |
| Lake Hennessey (15-ft dam height increase) | 1,500 | |
| Bell Canyon (20-ft dam height increase) | 700 | |
| Kimball (40-ft dam height increase) | 500 | |
| Total | 3,300 | |
| Lake Berryessa Supply | Indeterminate | |
| Firming Up North Bay Aqueduct Supply (45%) | | |
| Calistoga | 0 | 225 |
| Yountville | 0 | 225 |
| City of Napa | 0 | 8,415 |
| American Canyon | 0 | 2,340 |
| Total | 0 | 11,205 |

**TABLE 6-2**
**INCREMENTAL SUPPLY FROM WATER MANAGEMENT MEASURES**
**(CONTINUED)**

| Water Management Measure | Incremental Supply (Ac-Ft/Yr) 1990 | 2020 |
|---|---|---|
| In-County Water Transfers | | |
| American Canyon NBA Entitlement | 610 | 546 |
| North Napa Valley Groundwater | 9,776 | 2,048 |
| Total | 10,386 | 2,594 |
| Additional Wastewater Reclamation | | |
| Napa Sanitation District | 4,321 | |
| Calistoga | 200 | |
| St. Helena | 500 | |
| Yountville | 100 | |
| Total | 5,121 | |
| New Supplemental Water Supplies | | |
| Local Storage Reservoirs | | |
| Napa River, Off-stream | 10,000 | |
| Others | 1,000 | |
| Imported | | |
| Central Valley Project | 10,000 | |
| Total | 21,000 | |

- status of municipal, industrial, and agricultural water conservation efforts.

- status of wastewater reclamation efforts.

- **Water Need Element.** At five-year intervals (1995, 2000, etc.), the District should update the County-wide water needs analysis to track the baseline water use and establish revised alternative demand need projections, if necessary. A key future issue will be beneficial use, water conservation, and reuse. For example, turf irrigation and vineyard frost and heat protection may not represent the optimum beneficial use of stored (reservoir), imported, or groundwater, respectively. Alternative water, such as reclaimed wastewater, can be used for turf irrigation, while, for example, wind machines could be used for vineyard frost and heat protection, replacing the use of sprinklers for this purpose. The District should encourage compliance by municipalities with the conservation commitments contained in their State - mandated urban water management plans, and should foster introduction of incentives and ordinances to increase water conservation, especially with respect to turf and landscape layout. The District should also encourage agriculture to use advanced water-saving vineyard development methods including the use of drip irrigation and soil moisture tracking.

- **Water Supply Element.** With the completion of the current Water Resource Study for the Napa County Region, the District has added two key water supply evaluations-determination of the safe yield of the North Napa Valley Groundwater Basin, and yield-frequency relationships for the five municipal water supply reservoirs-Milliken, Hennessey, Rector, Bell Canyon, and Kimball. The study also reviewed available information on the safe yields of three other County groundwater basins: Milliken-Sarco-Tulucay, Lake Berryessa (Pope and Capell Valleys), and Carneros; the flow variation of the Napa River at Oak Knoll Avenue; the reliability of the North Bay Aqueduct supply; and the reclamation plans of the Napa Sanitation District.

  Based on the Water Resource Study, the following guidelines are offered to the District in resolving near-term and short-term imbalances between County water needs and supplies:

  - Water conservation can have a very significant impact on getting through drought periods. An automatic drought action triggering mechanism would provide early warning of the need for temporary measures and would minimize economic impacts.

- There appears to be adequate groundwater reserve in the North Napa Valley Groundwater Basin to allow municipalities to use wells as a supplemental drought-period supply. Such a short-term use may, however, not be economically justified, and once in-place would tend to be used more continuously. Sharing of such facilities with agricultural users might enhance the economics of such an arrangement.

- Reservoir storage, especially as supplied from the Napa River, is the key to river diversion capability for vineyard irrigation and frost protection. The total current storage capacity is not well documented.

- There are some opportunities for near-term transfers among the North Bay Aqueduct contractors from surpluses indicated for American Canyon and Yountville.

- Near-term multi-year arrangements for water to supplement the North Bay Aqueduct entitlement from the State are vital. Arrangements should be made through the State with such sources as Yuba and Placer County Water Agencies, using unused aqueduct capacity, as available.

- A review of the watershed inflow - storage relationship for the 50 percent frequency yield shows that there are opportunities to enhance the supply at Kimball, Milliken, and Bell Reservoirs. The efficiency of such yield enhancement at Rector and Hennessey is poor. A major constraint on dam enlargement is the cost.

As far as future activities with regard to water supply, it is recommended that the District consider the following:

- encourage or sponsor additional investigation of the smaller groundwater basins to refine safe yield estimates.

- track exploration for new wells by municipalities and wineries with regard to depth, production, and water quality.

- inventory County storage facilities beyond the five major municipal reservoirs, with special focus on facilities that derive water from the Napa River. Such an inventory may best be accomplished through a follow-up on the Questionnaire for the Napa County Wine Industry that was conducted during the current study. Information on alternate sources, such as groundwater, for filling such storage facilities should be requested, as well as the timing of filling and emptying. Review offstream storage potential if unused Napa River flows are available.

- for County development use permits, insure that drainage is retained on site to encourage groundwater recharge, and that the adequacy of water supply is fully demonstrated.

- negotiate with Solano County for allocation of the water rights reservation from Lake Berryessa considering the water needs and supplies of the Lake Berryessa Subarea.

- serve as the lead agency in firming up the North Bay Aqueduct supply. Incorporate St. Helena into the contract entitlement.

- encourage the implementation of Napa Sanitation/American Canyon Water District's reclamation plans at the joint Soscol Wastewater Plant.

- investigate the advantages of conversion of the District into a County Water Agency if water supply consumes an increasing share of District's activities. Such a conversion is currently under way by the Monterey County Flood Control and Water Conservation District which becomes effective January 1, 1991. Monterey's recent activities have focused more and more on County-wide management of groundwater and seeking supplemental water supplies.

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**3. Redding, J. R. 1991. Water Availability Analysis Policy. *Public Works Department Report on Water Availability Analysis* [Memorandum] and *Water Availability Analysis* [Staff Report]. Napa, CA: Napa County Department of Conservation, Development, and Planning. February 27, 1991.**

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NAPA COUNTY

CONSERVATION — DEVELOPMENT
AND PLANNING DEPARTMENT

1195 THIRD STREET, ROOM 210 • NAPA, CALIFORNIA 94559-3092
AREA CODE 707/253-4416

JEFFREY R. REDDING
Director

MEMORANDUM

**TO:** Conservation, Development and Planning Commission

**FROM:** Jeffrey R. Redding, Director

**SUBJECT:** Public Works Department Report on Water Availability Analysis

**DATE:** February 27, 1991

In response to the Commissions concerns regarding water availability, the Department of Public Works has prepared a report outlining a three phase process. (see attached) The three phases are 1) a reconnaissance report required at the application stage for all use permits and parcel/subdivision maps; 2) study of the effects of additional water consumption on suronding users based on a threshold level of water consumption; and 3) development of a contingency plan.

The report outlines the content of the Phase 1 Reconnaissance Report and the Phase 3 Contingency Plan; however, additional description is required for the Phase 2 Study. The water consumption thresholds need to be refined and criteria and guidelines must be developed for the the study content and methodology. Based on comments from the Commission and the Departments of Conservation, Development and Planning and Environmental Management, Public Works will proceed with these changes.

RECOMMENDATIONS

1. **The Commission approve, as an interim policy, the recommendations by Public Works for a three phase process to determine water availability for all use permits and parcel/subdivision maps.**

2. **The Commission direct staff to refine the water consumption threshholds and develop criteria and guidelines for the Phase 2 study.**

st\f\water

NAPA COUNTY DEPARTMENT OF PUBLIC WORKS

1195 THIRD STREET • ROOM 201 • NAPA, CALIFORNIA 94559-3082
AREA CODE 707/253-4351

HARRY D. HAMILTON
Director of Public Works
County Surveyor — County Engineer
Road Commissioner

# STAFF REPORT
## Water Availability Analysis

As a result of the environmental review process and the current drought conditions, the Napa County Planning Commission has expressed concern over water availability for Use Permit and Parcel Map applications. The availability of groundwater and the effects of pumping projected water demands of proposed facilities on the neighboring wells is of ultimate concern to both the Commission, neighbors and the applicant. In an effort to adress these concerns, the Public Works Department has attempted to establish criteria by which the applicant can perform well tests to satisfactorily evaluate the effects of projected water use on the local groundwater aquifer. This Department contracted with J.M.Montgomery, the County's consultant for the Water Resources Study currently in progress, to help establish these criteria. The resulting letter report submitted by Montgomery engineers has revealed two basic flaws in this approach:

1 - The general nature of the criteria to include all types of applications may not give specific enough direction to the applicant or his consultant resulting in a general evaluation of the aquifer no more informative to the Commission than current information presently provided;

2 - The cost of such well studies may be prohibitive to applicants of small wineries or parcel maps.

While this Department is working to bring local experts together to refine these criteria and provide a more definitive result, it is apparent that some form of interim guidelines are required. Therefore, this staff report has been put together to provide the Commission with some basic information pertaining to water use, available groundwater, existing information and interim recommendations to assist the Commission's decision-making process. This report is comprised of the following sections:

I. Existing Groundwater Studies and General Evaluation of Aquifers for Various Areas

II. Projected Water Use of Various Applications

III. Recommendations

I. Existing Groundwater Studies and General Evaluation of Aquifers for Various Areas

The most comprehensive study of groundwater in Napa County was done by the USGS in 1973. This study involved extensive monitoring of hundreds of wells within the Napa Valley floor from Calistoga south to the Oak Knoll Avenue. The Napa County Flood Control and Water Conservation District contracted the study and provided the monitoring program of these selected wells from 1962 to about 1975. The report concluded that the main Napa Valley aquifer was quite large, relatively stable and not in an overdraft situation. It was estimated that the basin contained about 200,000 acre-feet of water of which 24,000 acre-feet per year can be safely withdrawn without overdrafting the aquifer. The 1991 Montgomery study is suggesting a slightly lower "safe yield" for the basin of 22,000 acre-feet per year. Current usage is estimated at 16,000 acre-feet per year available befor an overdraft occurs.

In 1972 a prior USGS study investigated the groundwater basin for the Lower Miliken-Sarco-Tulucay Creeks area east of the City of Napa. Based upon this study, the usable storage capacity of that basin is approximately 20,000 acre-feet per year. The aquifer in this area is considerably more confined than the main Valley floor with lower tranmission rates (slower recharge of wells), fractured rock formations (segmenting of the aquifer) and generally a lower annual yield than the Valley floor. This annual yield is estimated at 3,000 acre-feet and pumpage at times is thought to exceed this amount.

Although no other extensive groundwater studies have been completed in the County, certain lesser investigations have been performed by the Flood Control and Water Conservation District. These investigations are primarily centered in areas with known groundwater problems and relative concentrated use. These areas are: Carneros, Coombsville (area discussed above), Dry Creek, Angwin, Mt. Veeder (and similar mountainous areas in volcanic formations), Pope/Chiles Valley, and Calistoga (mainly from a water quality standpoint). While no estimate of annual yield from these areas has been determined, they have been labeled as areas with groundwater problems that should be dealt with cautiously.

II. Projected Water Demand of Various Applications

It is extremely difficult to apply "across the board" criteria for evaluating water demand without first considering the relative consumptions of various uses for proposed sites. Some of these uses are currently regulated by the Planning Commission while some are not. Following is a table of various uses, their current average water demand and the County process, if any, that regulates that use.

| USE | Projected Water Demand, (note units) | County Process |
|---|---|---|
| Residential: | | |
| -primary residence | 0.75 AC-FT/YR | BP |
| -secondary res. | 0.33 AC-FT/YR | UP,BP |
| -farm labor dwell. | 1.0 AC-FT/YR(6people) | UP,BP |
| Agricultural: | | |
| -vineyards | 1.0 AC-FT/AC-YR | None |
| -irrigated pasture | 4.0 AC-FT/AC-YR | None |
| -orchards | 4.0 AC-FT/AC-YR | None |
| -livestock (sheep or cows) | 0.01 AC-FT/AC-YR | None |
| Winery: | | |
| -process water | 2.15 ac-ft/100kgalwine | UP,BP |
| -domestic & land. | 0.5 " " | UP,BP |
| Industrial: | | |
| -food processing | 31.0 ac-ft/employee-yr | UP,BP |
| -Printing/Publishing | 0.6 " | UP,BP |
| Commercial: | | |
| -office space | 0.01 ac-ft/employee-yr | UP,BP |
| -warehouse | 0.05 " | UP,BP |

From these estimated water usage numbers we can consider typical and "worst" case scenarios. For example, consider an 80 acre parcel currently in non-irrigated pasture land. If this parcel is used for grazing cattle or sheep, the water consumption will be approximately 1 ac-ft/yr for 320 head of sheep (or 80 cattle) on non-irrigated pasture. The parcel may also be irrigated to provide grazing for the same number of sheep and require 320 ac-ft/yr for irrigated pasture land. Either of these situations would not require any County permit or land division process. The same 80 acre parcel planted in vineyard would require about 80 ac-ft/yr of water and would likewise not require County approval. A third scenario would be the split of the 80 acre parcel into two 40 acre pieces requiring the owner to apply for a parcel map with the County. If the proposed purpose was to construct two single family dwellings, the resulting water consumption would be approximately 2 ac-ft/yr. All three of these scenarios would most likely rely on groundwater for their water supply though cattle and vineyard operations many times build reservoirs to store surface waters. To take the worst case possible in these three development scenarios let's add a primary residence, secondary residence and farm labor residence all with ample landscaping. Then the water consumption may be as shown in the following table.

| SCENERIO | DESCRIPTION | ANNUAL WATER USE ac-ft/yr |
|---|---|---|
| #1 | 320 sheep<br>irrigated pasture<br>primary residence<br>secondary res.<br>farm labor dwell. | 324 |
| #2 | 80 acre vineyard<br>primary residence<br>secondary res.<br>farm labor dwell.<br>50,000 gal winer | 83.5 |
| #3 | primary residence<br>secondary res. | 1.2 |

It is apparent from this analysis that certain unregulated uses of parcels can utilize far more groundwater than regulated parcel splits confined to permitted dwelling units. While water consumption for industrial and commercial uses vary greatly and are supplied almost exclusively by M & I suppliers, they do have an overall effect on water supply for the County and during drought periods such as the current one, will cause a shift from imported water to groundwater, the impact of which is difficult to gage.

III. Recommendations

In an effort to provide the Commission with an interim, workable evaluation procedure the Public Works Department proposes the following recommendations:

1. Establish a three phase policy at the aplication stage for all use permit and parcel/subdivision map applications. The initial phase would be a reconnaisance level letter report which would include;

A. Site Map including
 - property boundaries
 - proposed building facilities
 - proposed agricultural development
 - existing and/or proposed water systems
 - adjoining neighbors
 - adjoining water systems

B. Narrative on the proposed project with description of processes or land use intended. This should include
 - acreage of vineyard/agricultural development
 - gallons of wine to be produced
 - homesites and number of occupants
 - potential for future development

C. Projected water consumption to include
   - total water requirement in acre-feet per year
   - peak demands and time of year
   - water source and delivery facilities

D. Summary of available information on groundwater for the specific site and general evaluation of the groundwater basin to include
   - list of available published information
   - available history of wells or water service for site
   - probable effects on surrounding wells
   - proposed mitigation measures

2. Establish a threshold level of acceptance for various permit processes that would determine the need for further study by the applicant. This threshold level of water consumption would be expressed in acre-feet per year and could be on a sliding scale depending on the hydrologic conditions for that period of time. For example, during the current drought period an appropriate threshold level might be 1 acre-foot per year on the Napa Valley floor. This is the expected demand of an average vineyard. This consumption would have relatively little effect on neighboring wells. In hillside areas, where the aquifer is more fractured, an appropriate threshold level might be 1/2 acre-foot per year. The applicant would then be able to design their facilities to that level of water usage without having to provide a more extensive well study involving the drilling and testing of wells on the site. Applicants wishing to exceed these threshold levels, whether use permit, parcel map or building permit, could provide the phase two study to inform the Commission on the effects of additional water consumption on surrounding users. This concept during the current drought conditions could be applied to all applications including building permits, subdivision development, industrial use permits, etc. with a more extensive study being required for exceeding the threshold levels. In years of average or above rainfall, these thresholds could be adjusted upward and as such be less restrictive on water use. The applicants would have to make certain assumptions for land use of their development and may wish to provide two different scenarios: the most probable use of the property and the worst case (greatest water consumption) for the property. Certain standards for testing of wells for the phase two studies would be necessary and could be developed by this Department in cooperation with the Environmental Management Department which administers the County well ordinance.

Based upon the estimated water usage described in II above, the following threshold levels are suggested:

| | Acceptable Water Usage ac-ft/ac-year Below Average Rainfall (Current 1991) Applications AREAS* | | | Rainfall at Average or Above AREAS* | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 |
| USE PERMIT | | | | | | |
| M&I Supplied** | 1 | .5 | 0 | 3 | 2 | 0 |
| Well | 1 | .5 | 0 | 3 | 2 | 0 |
| PARCEL MAP | | | | | | |
| M&I Supplied** | 1 | .5 | 0 | 3 | 2 | 0 |
| Well | 1 | .5 | 0 | 3 | 2 | 0 |
| Building Permits | | | | | | |
| M&I Supplied** | 1 | .5 | 0 | 3 | 2 | 0 |
| Well | 1 | .5 | 0 | 3 | 2 | 0 |

*AREAS: 1-valley floor
2-hillside
3-historically poor water areas as identified by maps and records on file with the Department of Public Works

**Water supplied thru municipality or District

3. Develop a contingency for water supply. Even the most exhaustive hydrogeologic study contains assumptions and evaluations which may or may not prove correct. In instances where the study does not accurately evaluate the effects of project water usage on surrounding wells or users, a contingency plan would be required. This may be as simple as implementation of water conservation measures on a permanent basis to adding storage facilities for use during peak demands. Implementation of this contingency plan would be achieved in one of a few different ways:

- application for modification of the permit use
- verified recordings of negative effects on neighboring uses as presented to the Commission through a formal complaint process simular to an appeal
- static well level deterioration documented by Flood Control District monitoring program
- determination by the Board of Supervisors as to a state of emergency requiring severe measures.

At the application stage, the initial phase one study would be required to be submitted to the Department of Public Works for review prior to public hearing or permit issuance. This Department would review the letter report to determine the accuracy of the proposed water usage and it's initial evaluation of the water source and, if acceptable, compare to the threshold levels appropriate at the time and location. The applicant would then be advised to either submit additional study (phase two) or the probable acceptance by the Commission. The phase one study could be performed by the applicant or his representative depending on its complexity. The phase two study would require hiring a professional groundwater expert from a list available in the Department or submit qualification of their chosen expert for prior Department approval. The content of the phase two studies would meet certain minimum requirements by this Department, as outlined by the JMMontgomery letter report attached, with the primary purpose to measure the effects of proposed well pumping or water use on surrounding existing users. Should the phase two study result in "significant" effects on surrounding users, then the applicant would be expected to mitigate to an acceptable level. If the study results in "possibly significant" effects, then the applicant would be required to do the phase three study and develop a contigency plan as described in paragraph #3 above. Implementation of this proposal could occur immediately after establishment of acceptable threshold levels of water use. These levels would be established by this Department after receiving imput from the Departments of Conservation, Development and Planning and Environmental Management.

4. **Napa County Planning Commission. 1991. *Minutes of the Meeting of the Conservation, Development and Planning Commission*, County of Napa. March 6, 1991.**

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MINUTES OF THE MEETING OF THE

CONSERVATION, DEVELOPMENT AND PLANNING COMMISSION

COUNTY OF NAPA

March 6, 1991

1. Call to Order
**THE CONSERVATION, DEVELOPMENT AND PLANNING COMMISSION OF THE COUNTY OF NAPA MET IN REGULAR SESSION, WEDNESDAY, MARCH 6, 1991 AT 9:00 A.M.**

2. Roll Call
**THE FOLLOWING MEMBERS WERE PRESENT: CHAIRMAN DANIEL JONAS, COMMISSIONERS TONY HOLZHAUER, KATHRYN WINTER, NAN VAALER, AND DIANA MITCHELL.**

3. Pledge of Allegiance
**COMMISSIONER DIANA MITCHELL LED THE SALUTE TO THE FLAG.**

4. Citizen Comments and Recommendations
**NONE**

5. Closed Session: re: Litigation, if necessary
**NOT REQUIRED**

6. Approval of Minutes
**APPROVED MINUTES OF FEBRUARY 6, 1991 MEETING AS AMENDED TO CORRECT A TYPOGRAPHICAL ERROR ON ITEM NUMBER 3 (GARY MINNIS - VARIANCE REQUEST #V-90-13) TO INDICATE THAT THE COMMISSION DISCUSSED THE AVAILABILITY OF WATER NOT ONLY FOR THIS PROJECT, BUT FOR THE ENTIRE COUNTY (RATHER THAN THE COMMISSION DISCUSSED THE AVAILABILITY OF WATER FOR THE PROJECT).**
**MVHWJ**

**APPROVED MINUTES OF FEBRUARY 13, 1991 MEETING**
**MWHVJ**

**APPROVED MINUTES OF FEBRUARY 20, 1991 MEETING**
**MVHWJ**

PUBLIC HEARINGS:

7. Consent Agenda - Item *8
**(SEE ITEM NUMBER *8)**

**ADDED AGENDA ITEM NUMBERS 9 AND 10 TO THE CONSENT AGENDA AS RECOMMENDED BY STAFF.**

***8. Round Hill Cellars - Use Permit Request #U-90-33**
Environmental Determination: Negative Declaration approved.
Request: To increase the approved annual wine production from 144,000 to 850,000 gallons per year within existing facilities, of which a maximum of 250,000 gallons per year would be produced from grapes, and a maximum of 600,000 gallons per year would be produced from bulk wine, including related bottling and storage. The 17.35 acre parcel is located on the northeast side of Silverado Trail between State Highway 128 (Sage Canyon Road) and Rutherford Hill Road within an AW (Agricultural Watershed) Zoning District (Assessor's Parcel #30-300-30) 1680 Silverado Trail, St. Helena. (Continued from February 20, 1991)
**PUBLIC HEARING HELD**

**THE COMMISSION APPROVED THE USE PERMIT REQUEST ON THE BASIS OF FINDINGS NUMBERS ONE THROUGH FIFTEEN AS LISTED IN THE STAFF REPORT DATED FEBRUARY 20, 1991, SUBJECT TO THE REVISED CONDITIONS OF APPROVAL NUMBERS ONE THROUGH TEN AS LISTED IN THE STAFF REPORT DATED MARCH 6, 1991.** **VHWMJ**

**9. Eagle Ridge Developments and American Canyon Associates Use Permit #U-90-1**
Environmental Determination: Denial not subject to CEQA.
Request: Approval to create a 229-lot detached single-family residential planned development on a 53 acre parcel located on the east side of Broadway on the Solano County Line within a PD (Planned Development) Zoning District. (Assessor's Parcel #59-110-37 and 38)
**THE COMMISSION ACKNOWLEDGED THE WITHDRAWAL OF THIS ITEM BY THE APPLICANT.** **VHWMJ**

**10. Palmer Jenkins and Lynnton Enterprises, Ltd. - Use Permit Request #U-90-20**
Environmental Determination: Negative Declaration prepared.
Request: Approval to establish a 12,500 gallons per year winery within a combination winery/residence of approximately 10,300 square feet with approximately 6,000 square feet of caves on a 112.89 acre parcel located approximately 2,000 feet due north of the intersection of Mt. Veeder Road and Lokoya Road within an AW (Agricultural Watershed) Zoning District. (Assessor's Parcel #34-030-49 SFAP and 50 SFAP)
**CONTINUED TO MARCH 20, 1991 TO ENABLE STAFF TO COMPLETE ENVIRONMENTAL PROCESSING.** **VHWMJ**

Discussion Item

**11. Groundwater Availability Analysis:** Commission review of proposed guidelines and criteria proposed by the Department of Public Works for applicant-preparation of groundwater studies.
**REPORT PRESENTED - DISCUSSION HELD**

**THE COMMISSION APPROVED, AS AN INTERIM POLICY, THE RECOMMENDATIONS BY PUBLIC WORKS FOR A THREE PHASE PROCESS TO DETERMINE WATER AVAILABILITY FOR ALL USE PERMITS AND PARCEL SUBDIVISION MAPS.**
**VWHMJ**

11. Continued

**THE COMMISSION DIRECTED STAFF TO REFINE THE WATER CONSUMPTION THRESHOLDS AND DEVELOP CRITERIA AND GUIDELINES FOR THE PHASE 2 STUDY.**
**MWHVJ**

PUBLIC HEARINGS:

12. **Burt and Lois Raynes - Tentative Parcel Map Request #2528-PM**
Environmental Determination: Negative Declaration prepared.
Request: Approval of a division of property into three (3) parcels of 40, 40 and 69 acres located to the south of the City of Napa approximately 1,000 feet west of Foster Road and its intersection with Imola Avenue within an AW (Agricultural Watershed) District. (Assessor's Parcel #43-061-01)
**PUBLIC HEARING OPENED - STAFF REPORT PRESENTED**

**COMMISSIONER HOLZHAUER STATED THAT HE HAD READ THE MATERIAL AND LISTENED TO A TAPE RECORDING OF THE PREVIOUS MEETING OF DECEMBER 19, 1990, AND IS PREPARED TO PARTICIPATE IN THE DISCUSSION.**

**TESTIMONY PRESENTED**

**PUBLIC HEARING CLOSED**

**PUBLIC HEARING REOPENED TO ALLOW FOR FURTHER TESTIMONY**

**THE COMMISSION DIRECTED STAFF TO MEET WITH THE APPLICANT AND HIS LEGAL REPRESENTATIVE TO REVIEW THE COMMISSION'S PROPOSED CHANGES TO THE PROPOSAL AND TO REPORT BACK TO THE COMMISSION ON MARCH 20, 1991 (FIRST ITEM ON THE AGENDA) FOR DELIBERATION AND POSSIBLE ACTION.**
**MHWVJ**

OTHER BUSINESS:

13. City Referrals
**NONE**

14. Discussion of items for the March 20, 1991 meeting
**MARCH 20, 1991 AGENDA ITEMS WERE NOTED**

15. Commissioner Comments
**THE COMMISSION THANKED DAN JONAS FOR SERVING AS CHAIRMAN OVER THE PAST TWO YEARS.**

**COMMISSIONER WINTER REQUESTED THAT A GUIDED FIELD TRIP TO THE WOODEN VALLEY AREA BE SCHEDULED.**

**THE CHAIRMAN STATED THAT THE PARTY TO HONOR GUY KAY ON HIS RETIREMENT FROM THE COMMISSION IS SCHEDULED FOR FRIDAY, MARCH 15, 1991 AT HIS HOME. THE PLANNING DIRECTOR WILL CIRCULATE FLYERS.**

16. Director's Report on Board of Supervisors' Actions
THE DIRECTOR ADVISED THE COMMISSION THAT AT THE FEBRUARY 26, 1991 BOARD OF SUPERVISORS' MEETING:

THE BOARD DENIED THREE PROPOSED GENERAL PLAN AMENDMENTS: (EUGENE BRUINGTON, FLYNN/ROBINSON, AND MORLEY SHAPIRO)

THE BOARD ALLOWED RALPH TROST'S USE PERMIT TO REMAIN IN FORCE.

THE BOARD CONCURRED TO PROCEED WITH THE HATCH AND KIRK GENERAL PLAN AMENDMENT AND MERLE MEYER GENERAL PLAN AMENDMENT (AS MODIFIED BY THE COMMISSION) AND REFERRED THEM BACK TO STAFF FOR ENVIRONMENTAL REVIEW.

THE DIRECTOR ADVISED THE COMMISSION THAT AT THE FEBRUARY 26, 1991 BOARD OF SUPERVISORS' MEETING:

THE BOARD CONTINUED THE HEARING ON THE SECURITY OWNER'S CORPORATION APPEAL OF THE COMMISSION'S DETERMINATION THAT AN ENVIRONMENTAL IMPACT REPORT (EIR) BE PREPARED FOR A PROPOSED REZONING TO MARCH 26, 1991 AT THE REQUEST OF THE OWNER.

THE BOARD UPHELD THE APPEAL OF IRVING THOMAS/SINSKEY WINERY AND MODIFIED CERTAIN CONDITIONS OF APPROVAL IN AN EFFORT TO LESSEN NOISE IMPACTS TO THE SURROUNDING NEIGHBORS.

THE BOARD REVIEWED AND ENDORSED THE COMMISSION'S COMMENTS ON THE BAY VISION 2020 REPORT.

THE BOARD REVIEWED A POLICY RELATING TO THE PAYMENT OF ELECTION COSTS FOR GENERAL PLAN AMENDMENTS SUBJECT TO MEASURE "J" AND CONTINUED THEIR DISCUSSIONS TO MARCH 12, 1991.

17. Future Agenda Items
MARCH 11, 1991 - 1:30 P.M. (NAPA AIRPORT LAND USE COMPATIBILITY PLAN)
RECONVENING AT 7:00 P.M. (CALISTOGA GLIDERPORT AND PARRETT FIELD (ANGWIN AIRPORT) LAND USE COMPATIBILITY PLANS)

18. Election of Officers
CHAIRMAN JONAS COMMENTED THAT IT HAS BEEN ENJOYABLE AND REWARDING TO SERVE AS CHAIRMAN FOR THE PAST TWO YEARS AND THANKED STAFF FOR DOING A FANTASTIC JOB.

COMMISSIONER VAALER MADE A MOTION, SECONDED BY COMMISSIONER HOLZHAUER, TO NOMINATE COMMISSIONER WINTER TO SERVE AS CHAIRMAN.

THE NOMINATIONS FOR CHAIRMAN WERE CLOSED.

MVHWJ

5. **Woodbury, M. L. 1991 Memorandum titled Local Authority to Adopt Regulations for the Protection of Groundwater Resources [Memorandum]. Napa, CA: Napa County Counsel. March 28, 1991.**

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# INTER-OFFICE MEMO

RECEIVED
MAR 28 19[illegible]

PUBLIC WORKS DEPT.
COUNTY OF NAPA

TO: BOARD OF SUPERVISORS

FROM: MARGARET L. WOODBURY, Chief Deputy County Counsel

RE: Local Authority to Adopt Regulations for the Protection of Groundwater Resources

DATE: March 28, 1991 PROJECT LOG NO. 91-18

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This memorandum is in response to recent interest expressed by the Board regarding the extent to which the County may regulate, directly or indirectly, the drilling and use of private groundwater wells when the purpose of such regulation is water conservation and prevention of overdraft of groundwater basins.

## Direct Regulation

Based upon review of the State Constitution, the California Water Code, and key court decisions over the last eighty years, it is our opinion that the County of Napa has, with one exception, no present authority to regulate directly the drilling and use of private groundwater wells when the purpose of such regulation is water conservation and overdraft prevention rather than prevention of contamination. The exception relates to local regulation for the prevention of "waste", defined by the California Supreme Court in 1933 as use of water for purposes not recognized as "beneficial" (In re Application of Maas, 219 Cal.422 (1933) which upheld a local prohibition of groundwater pumping to fill recreational duck ponds). This exception is very narrow because over the years the courts have recognized most domestic, agricultural, industrial, and even habitat conservation uses of water as "beneficial".

Our analysis starts with the statutory indications that the State Legislature generally desires to preempt the subject of direct groundwater regulation and delegates this regulatory authority to local agencies only in a few situations not presently applicable in Napa County. In key declarations in the California Water Code, the Legislature expressly states that the State shall determine what water of the State, surface or underground, can be converted to public use or controlled for public protection (Water Code section 104) and the manner in which such waters shall be developed for greatest public benefit (Water Code section 105).

In accordance with these declarations, the Legislature has created an extensive system of permits, licenses and allocations administered by the State Water Resources Control Board to regulate rights to surface (riparian) waters. While the Legislature has not adopted a similar system for groundwater rights, it has also not delegated to local agencies any authority to do so at a local level. Instead, the Legislature has left groundwater rights dispute resolution in the hands of the courts who have developed their own common law on the subject, utilizing the State Water Resources Control Board as an investigating body, as needed, pursuant to the authority contained in Water Code section 2001. The essential principles of this common law are discussed further below.

Second, the Legislature has adopted statutes which both regulate and delegate regulatory authority to public entities who supply water to customers on a retail basis, regardless of whether the water provided is surface water or groundwater. These statutes regulate, and authorize these local public suppliers to regulate appropriate uses of water, water conservation, waste prevention, and compensation for infringement on the private rights of riparian and overlying owners (Water Code sections 275, 375, 350, 353, 354, 356, 357, 1009, and 1245). However, unless the Board of Supervisors in its capacity as the governing board of the Napa County Flood Control and Water Conservation District becomes a public water retailer under the authority granted to such districts by Water Code sections 74520 et seq., the Board cannot take advantage of this delegation of regulatory authority. If the Board does become a public water retailer in order to utilize this authority, its authority would extend only to water actually supplied to customers by the District and any attempt to regulate water use by landowners or appropriative rights holders who produce their own water might be viewed as interference for which the District would have to pay compensation for any business or residential impairment (Water Code section 1245).

Finally, the Legislature has created a comprehensive scheme of regulations designed to prevent contamination of groundwater resources (Health and Safety Code section 13801 et seq.) and has delegated responsibility for enforcement of this system within Napa County to the Napa County Department of Environmental Management. This particular delegation of authority is the basis for the County's "Well Ordinance" (Napa County Code sections 5200 et seq.). This delegation does not include any authority to regulate well drilling and pumping solely for purposes of water conservation and overdraft protection.

The judicially-created law of groundwater rights starts with the premise that the owner of land overlying a groundwater basin has a real property right to take from that basin as much water as he or she can "beneficially" use (Tehachapi-Cummings County Water District v. Armstrong (1975) 49 Cal.App.3d 992) as long as the total draw by all such users does not exceed the average yield or capacity of the basin. When there is no overdraft of the average capacity, the courts may recognize "appropriative" rights in the surplus for persons who are not overlying owners. These rights may be acquired by purchase or by adverse possession (prescription) if the user who is not an overlying landowner has taken surplus groundwater without permission for at least five years.

Disputes over groundwater rights have generally ended up in the courts because of persistent overdrafts of a groundwater basin. When there is no surplus or, worse, when there is an overdraft, each overlying owner is expected under the theory of "correlative rights" to share proportionately in what is available, and the rights of appropriative owners disappear altogether

(Katz v. Walkinshaw (1903) 141 Cal. 116; Burr v. Maclay Rancho Water Co. (1908) 154 Cal.428).

Unfortunately, permanent overdraft situations are seldom immediately obvious because basin levels normally fluctuate a great deal from year to year. If overdraft of a basin has occurred for a least five consecutive years, the courts may hold that all of the users during that period acquire "prescriptive" rights in each other's water interests, whether they are overlying owners, holders of legal appropriative rights, or trespassers, and the court will then ration each user according to historic use in order to save the basin from further depletion (Pasadena v. Alhambra (1949) 33 Cal.2d 908). Where the groundwater dispute before a court does not include all of overlying owners, including those who may not yet even have drilled wells, the courts will ration the current users but not preclude the missing parties from claiming part of the water if they decide to drill in the future (Wright v. Goleta (1985) 174 Cal.App.3d 74).

The County of Napa is not an overlying owner in all of the basins within the unincorporated area and does not own significant appropriative or prescriptive groundwater rights in these basins. As a result, the Board lacks standing to seek direct court regulation of overdrafting by initiation of an Alhambra or Wright type of lawsuit.

While the Legislature has generally been content to leave groundwater rights disputes to the courts, it has been willing to step in and authorize the creation of groundwater management districts in exceptionally complex and longterm overdraft situations. Such creation requires special legislation and support by substantially all affected landowners. These districts generally are granted a variety of enforcement methods to prevent overdrafts and ensure that the various users have equitable access to the available supply. Examples are the Mono County Tri-Valley Water Management Agency (Water Code Appendix sections 128-311), the Pajaro Valley Water Management Agency (Water Code Appendix sections 124-308), and the Honey Lake Valley Groundwater Management District (Water Code Appendix sections 129-101).

There is presently no groundwater management district within Napa County. Because the County is comprised of a number of distinct groundwater basins with different capacities and overdraft (or surplus) histories, it is unlikely that any district would be authorized by this method which would cover the entire County.

## Indirect Regulation

Although the foregoing review leads to the conclusion that direct regulation of groundwater rights for the purpose of water conservation is not presently within the authority of the Board of Supervisors, the Board does have considerable authority to slow the trend toward overdraft of local groundwater basins indirectly through its authority under the State Planning and Zoning Law (Government Code section 65000 et seq.) and the Subdivision Map Act (Government Code section 66410 et seq.) to regulate land use development.

Other than agriculture and single-family residences, most development in the unincorporated are of the County is allowed only upon approval of use permits and subdivision maps. Such approvals are discretionary approvals subject to the California Environmental Quality Act (CEQA) which permits approval only if significant adverse impacts are fully mitigated or overriding considerations are expressly found to exist which justify each particular development regardless of the impacts. Impacts of a project on water quality and quantity are already routinely examined during the CEQA review process and mitigation measures (including water conservation) imposed where necessary.

In addition to the CEQA process, the Napa County Code already allows use permits to be issued only if the Planning Commission (or, in some instances the Zoning Administrator) finds that the proposed use will not be detrimental to the health, safety and welfare of the County [Napa County Code section 12805(c)]. This finding obviously cannot be made for projects which would create or aggravate a groundwater overdraft situation.

Because of this requirement and the CEQA process, use permit applications are not "deemed complete" and processed further without evidence of adequate water availability for the project. If the project is located within a public water district such as the American Canyon County Water District, that evidence is a "will-serve" letter from the District. Imposition of water conservation measures on customers or denial of new hookups is solely within the discretion of these providers for projects within their service areas. If the project will rely on surface or groundwater water rights, the projects can be denied unless proof of legal right to water <u>and</u> of actual availability without encroachment on the rights of others is first established. The County's approving bodies for use permits have in fact used these review procedures and authority to deny projects or require detailed studies and project revision with increasing frequency during the last few years.

Similarly, the Subdivision Map Act requires disapproval of a division of land if the approving body (generally the Commission) finds that the site is not "physically suitable" for the type of development or density of development, or that the proposed improvement of the subdivided site is "likely to cause substantial environmental damage" [Government Code section 55474(c),(d), and (e); implemented by Napa County Code Section 11624(a), subsections (3), (4) and 5].

Where a subdivision is part of an immediate development project, the density can be determined by reference to the accompanying project. Where the division is of residentially-zoned or agriculturally-zoned land, the maximum density increase made possible by the subdivision without further discretionary permits can be calculated even if no project is immediately proposed because residential density in Napa County is on a per-parcel basis and the mere act of subdividing will increase the number of parcels on the same land unless the landowner records against the land a permanent restriction on further building.

In either situation, "physical suitability" of the site proposed for division logically should include availability of adequate groundwater for the proposed development or maximum future non-discretionary development made possible by the division unless the site is served by an outside water provider which does not rely upon Napa County-produced groundwater. In addition, whether that necessary level of groundwater can be obtained without adverse drawdown of the water needed for neighboring parcels is an issue which the approving body must decide in order to make the Map Act finding that the approval of the subdivision will not cause substantial environmental damage.

As you can see from the foregoing discussion, the County already has a considerable "toolkit" for controlling future groundwater depletion through the discretionary land use approval process. To ensure that the Commission and Zoning Administrator use this authority to the fullest, however, the Board may wish to consider amendment of Napa County Code section 11624 to clarify for subdivisions that "physically suitable" includes water availability and "environmental damage" includes depletion of groundwater for the development site and surrounding sites. The Board may also wish to eliminate those current provisions of the current County Code and policies which have permitted approval of subdivisions in the absence of water supply evidence as long as a "buyer beware" notice regarding water supply was placed on the final map. The Board may also wish to expand Napa County Code section 12805(c) to expressly state that "health, safety and welfare of the County" includes prevention of water waste and groundwater depletion.

Such local clarification may be unnecessary for discretionary approvals such as use permits and subdivision maps if Assembly Bill 455, introduced on February 7, 1991, is adopted. That bill would prohibit a local agency from approving any "development project" unless an applicant has identified a reliable, long-term supply of water for the project. The term "development project" includes all discretionary projects, but does not include projects which require only ministerial permits such as building permits (Government Code section 65928). This bill was referred to the Assembly Committee on Local Government on February 14, 1991 and has not yet been set for hearing. A copy of the bill is enclosed for your information.

There is presently no authority in the County Code to limit or condition non-discretionary approvals, such as building permits, or to regulate water-using development projects for which permits are not required at all, such as new irrigated agricultural projects. Residential building permits are issued as long as the applicant shows that he or she has available a very minimal flow of water. The Code does not authorize conditioning of the permit to limit the maximum amount of water that can be used by a new home for the purpose of preventing overdraft. While the County now requires new agricultural developers in certain hilly areas to go through an approval process, that process is designed solely to prevent erosion from water runoff, not to prevent overdevelopment of water-using projects in groundwater-short areas. Because neither new homes nor agricultural activities currently require discretionary permits, adoption of AB 455 would not automatically fill this regulatory gap.

The lack of regulation of new agricultural developments has been a matter of local choice. It is well within the County's zoning authority to place agricultural activities, especially those in areas never before irrigated, under land use controls and to require as a condition of issuance of an agricultural "use" permit as well as of a new residential building permit that both availability and lack of adverse impacts on the groundwater basin be proven. Such controls can be implemented outside the CEQA and Commission process through an administrative permit procedure utilizing objective criteria incorporated into the authorizing ordinance. In either case, such new regulations would require amendment of the building permit provisions of Title XI of the Napa County Code and the agricultural zoning provisions of the Title XII of the Napa County Code.

In summary, the County's present authority to regulate private groundwater rights directly for the purpose of water conservation is extremely limited, although special state legislation could be sought to expand this authority. However, the County can control the potential for future overdrafts indirectly through clarification and vigorous enforcement of its present ordinances and procedures pertaining to new discretionary developments (use permits, subdivision maps) and through amendment of the Napa County Code to require ministerial permits for new agricultural activities other than dry-farming and denial of issuance of such permits and residential building permits unless the applicants can demonstrate that any groundwater used for the project will not overdraft the groundwater basin.

POSSIBLE ACTION Direction to staff of the Conservation, Development and Planning Department and the County Counsel to prepare amendments of the Napa County Code to do one or more of the following:

1. Clarify necessary water availability findings for use permits and subdivision map approvals.

2. Require a ministerial permit for new agricultural developments other than those involving only dry-farming.

3. Require all ministerial permits for agricultural or residential developments not involving discretionary approvals to be issued only upon proof of adequate water availability (surface or groundwater) for the project and proof that such water use will not overdraft a groundwater basin in Napa County.

Enc.

cc: Jeffrey Redding
Ken Johanson
Gail Feldman

CALIFORNIA LEGISLATURE—1991–92 REGULAR SESSION

# ASSEMBLY BILL No. 455

Introduced by Assembly Member Cortese

February 7, 1991

An act to add Section 65958 to the Government Code, relating to development projects, and declaring the urgency thereof, to take effect immediately.

LEGISLATIVE COUNSEL'S DIGEST

AB 455, as introduced, Cortese. Development projects: water supply.

(1) Existing law relating to local agency approval of development projects does not require applicants to identify a water supply for the proposed project.

This bill would require that no lead agency shall approve a development project unless the applicant identifies a long-term, reliable supply of water to serve the proposed project.

(2) This bill would declare that it is to take effect immediately as an urgency statute.

Vote: ⅔. Appropriation: no. Fiscal committee: no. State-mandated local program: no.

*The people of the State of California do enact as follows:*

SECTION 1. Section 65958 is added to the Government Code, to read:

65958. No lead agency shall approve a development project unless the applicant identifies a long-term, reliable supply of water to serve the proposed project.

SEC. 2. This act is an urgency statute necessary for the immediate preservation of the public peace, health, or safety within the meaning of Article IV of the

Constitution and shall go into immediate effect. The facts constituting the necessity are:

The severe drought conditions currently prevailing throughout California make it imperative that this act take effect immediately.

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6. **Bickell, B. 1993. *Report of the Water Advisory Committee* [Memorandum and Report]. Napa, CA: Napa County Department of Public Works. February 4, 1993.**

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NAPA COUNTY

DEPARTMENT OF PUBLIC WORKS

1195 THIRD STREET • ROOM 201 • NAPA, CALIFORNIA 94559-3092
AREA CODE 707/253-4351

WILLIAM E. BICKELL
Director of Public Works
County Surveyor—County Engineer
Road Commissioner

MEMORANDUM

TO: Board of Supervisors

FROM: Bill Bickell, Director of Public Works William E. Bickell

DATE: February 4, 1993

SUBJECT: Report of the Water Advisory Committee

Attached for your review and consideration is a copy of the cover memo and report developed by the Water Advisory Committee as presented to a joint meeting of Board members and Mayors/Vice Mayors on January 25, 1993 at the Yountville Town Hall. At that time the Committee did not give a presentation nor was there an in-depth discussion of the contents of this report. I wish to share this report with you, allow time for you to consider the information contained within and I will schedule a study session at a convenient regularly scheduled Board meeting. We welcome the opportunity to explore recommendations and issues with you at any time. During the study session, we will provide an in depth review of our activities to date and attempt to answer all questions that might arise.

SUGGESTED ACTIONS:

Based on the finding of the Water Advisory Committee (WAC), the conclusions drawn and goals developed, we will suggest that the Board consider the following:

1. Accepting the attached report developed by staff representatives from each of the municipalities, and adopt the goals, conclusions and recommendations contained therein as policy guidance for developing and managing future water supplies.

2. Discuss establishing a mechanism by which these policies can be effectively implemented, that mechanism may include entering into a joint powers agreement for development of additional water supplies; reforming the governing Board of the Napa County Flood Control & Water Conservation District, or other means to insure cooperative planning and implementation.

BRDDIVME.MGP

NAPA COUNTY

FLOOD CONTROL AND WATER CONSERVATION DISTRICT

WILLIAM E. BICKELL
District Engineer

1195 Third St., Rm. 201
Napa, California 94559-3082
(707)253-4351

MEMORANDUM

January 19, 1993

TO: Mayors, Vice Mayors and Members of the Board of Supervisors

FROM: Water Advisory Committee

SUBJECT: Report of the Water Advisory Committee (WAC)

The attached Committee Report is being provided to commence the next phase local agencies will consider in planning long term water policy for the Napa Communities. The Committee believes the most important committment that can be made by these agencies is to continue to work cooperatively and dynamically to reach common objectives in developing and maintaining water supplies serving the Napa Communities. This report identifies a phased approach to meeting targeted water supply shortfalls anticipated in the next 30 years.

The attached report has been compiled by the staffs from the community jurisdictions as directed by locally elected officials to advise all of the Napa Communities as to the most feasible methods to insure future water supplies within Napa County. The report relies heavily upon the 1990 Montgomery Water Resources Study and the 1992 Kennedy/Jenks Napa River Diversion Study.

It is suggested that each jurisdiction undertake review and evaluation of this Committee Report, consider the approaches presented and determine how appropriate recommendations can best be implemented.

## Background:

A Technical Advisory Committee (TAC) was established in July of 1991 to review and guide the work done on the Napa River Diversion Study by Kennedy/Jenks Consultants. After presentation of their study to the Board and participating City Councils in May of 1992, the same staff members of the TAC continued to meet and formed the WAC. This group was established to evaluate the merits of a diversion project in conjunction with other water supply alternatives being considered and to provide technical assistance to policy makers from the various Napa Communities.

The WAC met over a dozen times from June 1992 to the present and includes the following individuals:

| | |
|---|---|
| City of American Canyon | - Steven Kimborough, former Interim City Manager<br>Robert Schwerin III, Operations Superint.<br>Ronald Kiedrowski, City Manager |
| City of Napa | - Bob Peterson, Manager Water Department<br>Michael O'Bryon, Director of Public Works |
| Town of Yountville | - Robert Myers, former Town Administrator<br>Walt Graham, Consulting Town Engineer<br>Jan Wellman, Town Administrator |
| City of St. Helena | - Marty Oldford, Director of Public Works |
| City of Calistoga | - Wally Kolb, Director of Public Works |
| Napa County & District | - Ken Johanson, Assistant District Engineer<br>Bob Sorsen, Project Manager District<br>Myke Praul, Assistant Engineer |

**Conclusions:**

The WAC concluded that Napa County will require an additional 10,900 Acre-Feet of additional water supply by the year 2000. This deficiency will increase to 18,600 by 2020 and 23,000 by 2030.

Projections beyond 2030 are quite difficult, but it is generally agreed that somewhere in the order of 30,000 Acre-Feet will be required in the next 50 years. This magnitude of new supply requires development of an action plan by local water supply agencies which must come from the following combination of sources:

- Local Groundwater
- Local Surface Water
- Reclamation
- State Water Project Entitlements
- Outside Water Purchases
- More Efficient Utilization & Conservation

All future water supplies require consideration of reliability, cost, environmental, institutional and legal issues. The process to fully evaluate these parameters will require a conscientious plan on strict time lines for completion. While it is common for us to think of droughts as temporary water shortages, they are part of the normal weather pattern for California and have significant effects on long range water supply planning. It is with that in mind that the WAC established two major goals for a Napa County Water Policy:

- Assure adequate water supply during periods of prolonged periods of below average rainfall which equates to reliability or drought protection;

- Provide a phased approach to increasing future supplies to meet projected shortfalls which provides added flexibility through cooperative planning.

COMMITTEE REPORT

TO: Napa County Board of Supervisors; Directors, Napa County Flood Control & Water Conservation District,(NCFC & WCD); Council Members, Cities of American Canyon, Napa, St.Helena, Calistoga and Town of Yountville

FROM: Water Advisory Committee (WAC)

SUBJECT: Recommendations for a Countywide Policy for Water Supply

The Directors of the NCFC & WCD and Council Members of the various Cities directed staff to meet with local water departments in Napa County for the review and evaluation of water supply studies in order to suggest a countywide water policy and recommendations for future planning activities. The District Engineer has met with the public work directors and water supply staff from the various Cities, which formed this Water Advisory Committee (WAC) to consolidate information and to determine the most reasonable way of meeting projected water supply shortfalls. This report summarizes the activities of the WAC to date and sets forth the following short, mid and long term recommendations for future actions by the District and Cities.

## RECOMMENDATIONS:

Based upon the analysis and conclusions reached, the Committee has developed several recommendations for the respective Board/Councils. The Water Advisory Committee recommends that a three phased approach to meeting the targeted shortfalls be taken.

Short Term Strategies (1992 to 2000)

1. Develop a minimum of 10,900 AF of new, highly reliable water supplies by focusing on the following sources:

    a. Groundwater. Perform studies as needed to determine more accurate yield information in targeted sub-basins. Investigate the feasibility of a Countywide Groundwater Recharge and Management Program.

b. <u>Reclamation.</u> Support and cooperate with the Napa Sanitation District in the development of a customer base and master plan to provide reclaimed water as an economical source of supply on a larger scale . Establish development policies that require the use of reclaimed water where feasible.

c. <u>Water transfers through NBA.</u> Continue to pursue the purchase of permanent water rights and/or mid or long term drought protection agreements with other entities, using the NBA for wheeling ( the physical moving of the water supply). Although these supplies are not considered very reliable during drought conditions, they have the potential to be consummated in the short term. A larger quantity may be needed to offset the lower reliability. As more reliable supplies come on line it may be possible to sell these water rights to others.

d. <u>Milliken watershed.</u> Perform a feasibility and yield analysis study to determine the possible benefits of year round operation of the treatment plant or other, more optimum utilization of the water rights. Fund and construct improvements as warranted.

2. Complete all preliminary steps necessary to be able to construct the Napa River diversion facilities and raise Conn Dam by the year 2005.

   a. This involves applying to the State for water rights, preparing a detailed operations plan, financing plan, environmental impact report, preliminary design and construction drawings.

   b. It is important that the process begin early because many of the steps are time-consuming and will be dealing with some very substantive issues that could jeopardize the project. It is critical that these issues surface early so that there is time to either deal with them or turn our attention to another option. For example, the water rights process may take 8-10 years. The financing plan may recommend partnership arrangements that could require a number of years to develop.

3. Each water agency should determine its water supply needs and the extent to which it will want to participate in the Napa River Division project.

4. Complete current study being conducted for the Cities of Napa, American Canyon and Vallejo to determine the feasibility of providing additional NBA storage in a reservoir in the Jamieson Canyon area to better utilize water bank, carryover and unscheduled NBA water when available.

5. Provide funding to purchase land in the Carneros area for possible future construction of a Carneros area reservoir site. The land could be leased until needed. The purchase would preserve the ability to develop a reservoir on one of the few sizeable sites remaining in the Valley. It would also make it more difficult for another agency outside Napa County from gaining control of the potential reservoir site.

6. Continue support of the Department of Water Resources in it's attempt to fully develop the State Water Project, and continue to monitor Statewide water marketing attempts.

7. Review the existing policy making structure relative to water supply issues and determine if alternatives should be developed to better address them.

8. Establish negotiations with the State of California pertaining to the utilization of unused yield available from Rector Reservoir.

### Mid-term Strategies (2000 to 2020)

1. Develop a minimum of 7,700 acre feet of additional, highly reliable water supplies by constructing the Napa River diversion facilities and raising Conn Dam. Timing of the project should be in accordance with the financing plan. Construction of the project early in the time period will result in more water supplies than the County Communities will need initially. This would give these communities the ability to be a net exporter of water until about the year 2020, at which time it is anticipated the communities would need the full supply. The sale of this water would assist in paying for the project.

2. Continue to expand the use of reclaimed water in accordance with the Master Plans of the various sewer agencies in the County.

3. Investigate the feasibility of enlarging Bell Canyon Reservoir.

4. Continue support of the State Water Project and determine if conditions have changed regarding the 45% unfilled entitlement figure. WAC feels that the need for water in Southern California may become so critical as to eventually force a political solution that will bring at least some of that entitlement to us. This possibility is too speculative to be counted on for drought planning purposes. It is sufficient at this point to simply keep an eye on it.

**Long-term Strategies (2020 to 2050)**

1. Develop new, highly reliable water supplies as needed to meet drought protection and future agricultural and municiple needs.

2. Replace less reliable supplies with more reliable supplies.

3. Pursue the feasibility of a diversion/storage facility on the Carneros region site.

4. Continue support of the State Water Project.

# BACKGROUND:

The 1991 Montgomery report identified certain water supply shortfalls in the year 2020. Those shortfalls have been reviewed and refined by the WAC. That review shows that the major water supply deficiency in 2020 will be in the Municipal & Industrial areas closely followed by Agriculture & Rural Residential. In 2030, shortfalls will increase as projections of State Water Project deliveries decrease. Continued shortfalls will occur well into the year 2050 - the fiscal life of the State Water Project. Solutions to future water supply deficiencies must address both M & I and Agriculture & Rural Residential.

Municipal & Industrial:

The term "Municipal and Industrial" (or M & I) use is standard phraseology in water circles for urban water demand, as contrasted to agricultural demand. In Napa County, the water supplies that have been developed by each of our cities and towns are considered to be M & I supplies.

The current 6 year drought has caused each water agency to reevaluate the reliability of its water supplies. Firm yield is a term that refers to the amount of water that can be used each year consistently without running short during drought periods. The drought has shown us that the firm yield of our existing supplies is far lower than we once thought. For example, the firm yield of Lake Hennessey was thought to be 10,000 acre-feet before the drought. It has been re-evaluated to be 5000 acre-feet. Likewise, before the drought no one questioned the ability of the State Water Project to provide us with our current entitlements, even though we all knew that they wouldn't be able to in the future. It was quite an impact when the State cut our entitlement to 20% in 1991.

The WAC believes that the reliability of our existing M & I supplies must be considered in determining our current and future needs. Each Napa community should go through the exercise of gaining a clear understanding of the vulnerability of its current supplies and then set tentative goals for the community relative to where it wants to be when the next drought hits. For example, a goal might be: our community should not have to suffer more than a 10% shortage of water during a drought similar to the one we are currently in. Staff can then determine strategies and associated costs for reaching the goal. This level of conservation equates to a 20% reduction in shortfalls as presented in Table #1, attachment #1.

The WAC believes that most agencies will want to improve their water supply situation and that the most cost effective solutions may very well be achieved through a cooperative effort among all interested agencies in one or more water supply projects. New water supplies will be expensive and it will be well worth the effort of all agencies to give serious consideration to joint projects in order to keep the costs down.

In projecting the drought shortfalls of each Napa Community for this report, the firm yields of existing supplies were compared to projected normal demands. Normal demands have a 10% permanent conservation figure factored in to them as a result of measures taken during this drought. The target values assume that as a whole, all county water users can be called upon to conserve an additional 10% in a drought. This does not preclude each agency from determining its own goal. It simply provides a point from which to start to review the overall magnitude of the water supply problem of the County as a whole.

Agricultural & Rural Residential:

Most of these water users are vineyards, wineries, and residences with a combination of uses that lie outside the jurisdictional boundaries of water service areas. A minor amount of water is supplied to these users by water service districts but it is interruptible at various times. Groundwater and river/stream diversions are the primary source of water for these users. The major portion of this use, agriculture and commercial (wineries), is during the irrigation and frost/heat protection months and as such is not a constant demand during the year. Domestic and livestock uses are much more evenly distributed monthly. All uses need a high degree of reliability and tend to require onsite storage sufficient to meet the demand. Storage is provided, in the case of diversions, by onsite reservoirs and in the case of groundwater by the local aquifer.

While the upper Napa Valley has an extremely reliable groundwater basin (static water levels respond quickly to rainstorms), certain areas within the County suffer from declining groundwater levels. Wells that supply water to rural residential users are typically shallow, older wells which tend to be effected more by fluctuating water levels. Groundwater has long been viewed as the only reasonable, economical and reliable source of supply for agriculture.

In the process of developing projected water needs, the Montgomery report made certain demand assumptions for vineyards that can be challenged. The rate of new planting, the rate of replanting, the density and yield of existing acreages and the water application rate for irrigation and frost/heat protection are ever changing and therefore somewhat elusive. Past studies have validated the fact that if water is available, it will get applied to the vines. If not, then other varieties of grapes and growing techniques will be developed that need less water. We do know that the initial planting of the vines requires substantially more water during the first few years than needed to support the vines on a long term basis. We also know that densities of vines per acre are increasing. With the current replanting due to the phyloxera outbreak, the WAC believed it important to assume that substantial quantities of water will be needed in the future to support Napa County's most valuable industry. Projections of the growth of the wine industry can be found in the Napa County Wine Industry Growth Master Environmental Assessment, 1990-2010, Section III Industry Projections and the Napa County General Plan.

Based upon these projections, and the demand information presented in the Montgomery report, the additional water requirement for agriculture and rural residential in the year 2020 is estimated to be 9,400 Acre-Feet and in the year 2030, 12,000 Acre-Feet ( see attachment #1, Table #1 ).

Increased utilization of groundwater as a source of supply can have severe detrimental effects on the rural residential community. In response to this, the Napa County Planning Commission adopted a policy requiring every applicant for a use permit or parcel division utilizing groundwater as their source of supply, to submit a "Water Availability Analysis" which essentially evaluates potential effects of the project on the local aquifer. Agricultural users not tied to a use permit process, are not required to provide this analysis.

The Montgomery report recommends increased utilization of groundwater as a source of supply. To further this concept, each water agency within Napa County is looking to further utilize groundwater and, as such, more information is needed to determine the effect of this pumping on the groundwater subbasins within the County.

In addition to utilizing groundwater to meet these needs, increased private river/stream diversions will also provide another source of supply. The 1992 Kennedy/Jenks diversion report provides some convincing information about the potential to more fully utilize the Napa River as an M & I source and through a program of conjunctive use, could provide substantial benefit to the agricultural and rural residential needs. Conjunctive use is defined in the water supply area as the cooperative joining together of two or more entities to increase the safe yield of a common source of supply. For example, the development of well fields by local water agencies can, when used in conjunction with an effective groundwater management program, result in greater yield from local aquifers. This use of groundwater for M & I users would be temporary and replaced by other surface sources as they come on line. Groundwater would then be available in the future for Agricultural & Rural Residential users. The information in the Kennedy/Jenks report and communications with other potential water supply sources have been closely reviewed by the WAC in an attempt to fully evaluate the various water supply alternatives.

# GOALS OF THE WATER ADVISORY COMMITTEE:

Water Resource Planning for Napa Communities must be a dynamic process involving all water supply interests. There is a very important timing element to meeting future water needs as well as the need to plan for future periods of below average rainfall. It is important to realize that California will always have these periods and to insure continuous water supply we must plan accordingly. The Water Advisory Committee sought to achieve two major goals in planning for future water sources:

> Assure adequate water supply during prolonged periods of below average rainfall (Reliability or Drought Protection), and

> Provide a phased approach to increasing future supplies to meet projected shortfalls (added Flexibility through Conjunctive Use)

The Water Advisory Committee then set out to meet these goals by reviewing and analyzing all information gathered during the last few years and developed the following specific conclusions from that information.

# ANALYSIS AND CONCLUSIONS OF THE WAC:

The Committee concluded that, due to the State Department of Water Resources inability to construct statewide water supply facilities integral to the State Water Project, Napa County can reasonably expect to only receive 55% of its full entitlement in the year 2021. This 45% reduction in entitlement will continue for the short and mid term periods and could conceivably continue to the end of the economic life of the State Project, 2050. All efforts to "fill" the North Bay Aqueduct through the State Water Project will be long and arduous. Such efforts will require State and local policy making bodies to support some or all of the following projects: The Los Banos Grande Reservoir, enlargement of the Clifton Forebay, a thru-Delta facility, environmental studies to quantify Delta and Bay flow requirements, the purchase by the State of the Federally owned Central Valley Project, continued support of the activities of the State Water Contractors Association, and the support of Department of Water Resource controlled water marketing. Efforts by the State to "fill" the pipe and meet their contractual entitlements must rely on either construction of some or all of these facilities or, water marketing. The hurdles to construction of additional facilities include environmental, financial and institutional constraints and appear almost insurmountable. Water marketing, while appearing attractive to environmental interests, contains many second and third impacts which must be fully evaluated. Open market bidding on water rights may also drive prices up leaving smaller, northern California agencies outbid by larger southern California interests.

The Committee further concluded that additional information pertaining to the quantities of groundwater and divertible surface water are necessary to fully evaluate the local water supply potentials. Groundwater has been identified as a very desirable and immediate source of water supply but the short and long term effects of such development need to be evaluated. Surface water diversions were studied by the Kennedy/Jenks Napa River Diversion Report and the Committee confirms that excess winter flows are available for diversion to offstream locations.

The WAC also concluded that current and projected water shortfalls are time dependent and greatly controlled by periods of below average rainfall. While shortfalls currently exist in certain users categories, they will change over the next 40 to 50 years as will the period of hydrologic record. Current and future supplies, which are both reliable and flexible, need to be pursued with joint consideration by each water agency within the County.

Water shortfalls need to be categorized as short term, middle term and long term with corresponding supply alternatives. To fully accomplish that potential, it is necessary to promote cooperation between local agencies in the area of conjunctive use. Where shortfalls exist for one user, a particular surplus supply might be diverted from another user on a temporary basis, and later be replaced by a newly developed source as discussed earlier.

The Advisory Committee utilized water need projections from the Montgomery report supplemented with additional information developed during 1991 to obtain figures for projected shortfalls in the years 1991, 2020 and 2030. The Montgomery report gives shortfall figures based upon "normal" years or years of average rainfall. The Committee developed additional shortfalls based upon historical production records for the year 1991. We know that 1991 water demand numbers reflect the effects of 5 years of below average rainfall and, as such, the figures are taken to be the "worst case" scenario for future water shortfall projections. These values are compared to what the County's projected shortfall would be during a normal rainfall year. This then gives us a range of values to plan water needs and is presented in Table #1, attachment #1.

It was then assumed that the mandatory and voluntary water rationing all Napa communities invoked in 1991/1992 was marginally acceptable. The approximate average cutbacks were 30%. The Montgomery report assumes a 10% permanent reduction in individual water use due to State and local water conservation measures. Therefore, to obtain a projected water shortfall, the Committee assumed that an additional 10% reduction from "normal" consumption for all user groups would be acceptable for short periods of time. The "targeted" shortfalls used for planning future water needs were obtained by taking the assumed drought condition or "worst case" scenario and reducing the projected shortfall by 20%. This analysis also assumes that, in a period of sustained below average rainfall, it is expected that the State Water Project would reduce entitlements to 20% thus causing a shortage in water supply. The resulting shortfall, reduced for 20% conservation effort, became the "targeted shortfalls" or additional need for 1991, 2020, and 2030 are shown in Table #1, column #3, #5, and #7.

Examination of these values shows a shortfall to Municipal & Industrial users in 2020 of 11,100 Acre-feet and the year 2030 of 13,500 Acre-feet. Agriculture & Rural Residential show a 2020 shortfall of 7,520 Acre-feet and the year 2030 of 9,600 Acre-feet. The total projected shortfalls for 2020 is 18,600 Acre-feet and for 2030 is 23,000 Acre-feet.

# ALTERNATIVE WATER SUPPLY SOURCES:

The Water Advisory Committee then sought to evaluate all reasonable additional water supply sources based upon the conclusions, goals and targeted shortfalls as established. Identifying alternatives resulted from information contained in the Montgomery report, Kennedy/Jenks report and continued communications with Solano County and other outside water agencies. Table #2 lists these alternatives and separates them into two categories; those that utilize the North Bay Aqueduct (NBA) and those that don't. The following seven alternatives are ones that attempt to "fill the pipe" and include the following:

SWP/NBA (45%) - Given the assumption that the State will only supply 55% of the 2021 entitlement of 25,000 Acre-feet, this alternative assumes that the State will construct additional facilities that will eventually deliver Napa full contracted entitlement. Napa is already subscribed to this supply but has no real control over its future.

Yuba County Water - The City of Napa has for the last few years, entered into short term (annual) contracts with Yuba County to purchase and release given amounts of water to the Delta which is then collected at the intake for the NBA facility. This alternative assumes, as above, 45% capacity available in the NBA facilities. It is not likely to involve permanent water rights but could become long term.

Glenn-Colusa Plan - This alternative involves conjunctive use with Yolo and Solano Counties the details of which are contained in the Borcalli report. It also assumes the 45% capacity of the NBA is available and results in the sale of permanent water rights.

Lake Berryessa Plan - The County of Napa agreement for the sale of Monticello Dam to Solano County contains a provision for Solano County to provide Napa County with 2,000 AF of water. This water could be delivered a number of ways but would probably involve the NBA as stated above.

Delivery of this water is conditioned on Congressional passage of the sale of the dam facilities to the Solano Water Agency.

SWP Unscheduled - The State Water Project has available at certain times of the year, excess water that can be delivered to Napa thru the NBA facilities. This seasonal water is usually available in early spring.

SWP Water Bank - Last year due to the drought, the Department of Water Resources purchased additional water from various sources and made it available to State Water Contractors thru their existing facilities. Continuation of this program is uncertain at this time but is likely to occur during drought periods.

Waikea - A private farm group in the Redding area possesses pre-1914 water rights and have offered them for sale on the open market. This alternative would require them to release, or not divert, their water from the Sacramento River and in turn Napa would intake this water at its NBA facilities which are assumed not to be at capacity.

The second set of alternatives in Table #2 represent locally developed sources which do not rely upon the NBA facilities to deliver water to Napa County. They are;

NSD Reclamation - The Napa Sanitation District has plans to upgrade their facility to produce Title 22 water which can be applied to turf and agricultural areas. The District anticipates this water to be available about 1995. One interesting option of this alternative may be to recharge groundwater basins with reclaimed water.

Milliken Upgrade - The City of Napa believes that additional water may be available from Milliken Reservoir with certain improvements made to the treatment plant. A reservoir operation/yield study will be required to determine the feasibility of this alternative. Utilization of unused flows might also support a groundwater recharge program for the Milliken basin.

Well Fields - This alternative combines privately and municipally owned wells that would put to use the full safe yield from the upper Napa Valley and other subbasins. Such plans should fully evaluate the impact on the Napa Valley's entire groundwater basin and its ability to to be recharged.

Napa River Diversion - This alternative is as described in the Kennedy/Jenks report and would involve the diversion of excess winter flows of the Napa River to an enlarged Lake Hennessey.

Enlarge Bell Canyon - Both the Montgomery and the Kennedy/Jenks report believe that Bell Canyon Reservoir could be increased and provide an additional amount of water. A feasibility level report would be required to further evaluate this alternative.

Rector - The State of California owns Rector as the source of supply to the Vet's Home and the State Hospital. Through negotiations with the Town of Yountville or the City of Napa, there may be water available for other users.

The bottom row of Table #2 gives information on our current situation with the State Water Project and its delivery through the NBA. It is included for informational purposes and is not an alternative.

The balance of Table #2 is an evaluation matrix, developed by the WAC, of the above alternatives. Each alternative was evaluated based on six separate parameters, each given a different weighted value as follows:

| | |
|---|---|
| - Reliability | 30% |
| - Cost | 25% |
| - Water Quality | 20% |
| - Environmental/Institutional | 15% |
| - Flexibility | 5% |
| - Other Benefits | 5% |

Reliability refers to the expected quantity of water received from a source in drought years. The reliability number is stated in percent and relates to the percentage of years during which the full amount of water listed would be available. The lower the reliability factor, the less likely Napa Communities are of getting the full amount of water from that source during a period of below average rainfall.

Cost attempts to include all cost to develop the source of raw water and does not include treatment, pumping or distribution costs. For example, the cost for developing well fields includes the cost to purchase the land ( or water rights ), the cost of drilling the well and the cost of maintaining the facilities. Cost for Waikea Water, for another example, includes the purchase of the water right from the seller and transportation costs thru the NBA. It does not include costs for construction of the NBA or its maintenance which will have to be born even if this alternative was not selected.

Water Quality evaluates the source of supply to determine the quality of the source relative to the other alternatives. This factor is important in that it effects treatment costs, as well as, future problems that may result from the increasing Federal and State reporting and monitoring requirements. For example, the water we receive from the Delta has been used upstream by several entities before it reaches the NBA intake. It also comes from a very large watershed which may contain thousands of sources of contaminants. Treatment of this water and monitoring or control of the contaminants can be costly and may eventually reduce reliability. Water from the Milliken watershed, for example, does not have near the same concerns.

Environmental parameters to evaluate include: concerns for salmon spawning, the loss of Delta smelt at the NBA intake, potential loss of fresh water shrimp, possible loss of wildlife habitat, effects of groundwater pumping or river diversions and aesthetics. Institutional parameters are included with this category since so many constraints to development of water supplies are controlled by State or Federal agencies embroiled in environmental issues. For example, the issue of loss of Delta smelt during pumping periods from the Delta is an environmental issue that may cause DWR to not allow diversion pumping from Contractor facilities during certain periods of the year. While this is an environmental issue, it can become an institutional constraint placed on Napa Communities by DWR. Another example of an institutional parameter is various jurisdictions within the County which control the various facilities. It may prove to be unfeasible to provide certain sources of water to certain users.

Flexibility parameters take into account the ability of an alternative to supply various users at a variety of times. For example, groundwater can be pumped in most areas of the County at any time of year by any user group. Development of well fields therefore have the highest level of flexibility. Other alternatives utilizing the SWP/NBA as the source, have much less flexibility because they can only originate at one point, at certain times and be delivered to the County at one point in the system. Groundwater, on the other hand, can at times be an unreliable resource. During the period of 1976-77, several wells in the Valley went dry. The reliability of well water as a source of supply can be periodic. This makes the need to manage the resource very important.

The other benefits category attempts to take into account all other parameters otherwise unevaluated. An example is the additional recreational benefits that diverting water to Lake Hennessey have. Another such benefit is the utilization of reclaimed water which helps to finance the Napa Sanitation District's plant which is required by Federal and State standards.

All evaluation parameters within a certain category require the ranking between 0 and 10 relative to the other alternatives. Where there is essentially no difference between two alternatives, they can receive the same ranking score. The ranking number is then multiplied by the weighing factor (enumerated above) to obtain a weighted score for that parameter and that alternative. The scores are then added to get a total score (see column #11 of Table #2, attachment #2) which can be a maximum of 10. The Committee acknowledges that the consideration and ranking of many evaluation parameters is subjective in nature. Different people may rank these parameters differently but it is felt that, given the goals established earlier, the variation would not be significant. Once again, the planning of future water resources is a dynamic process which will require constant monitoring and updating.

The four alternatives that scored highest from this analysis, have been shaded in column #12, Table #2. They are:

| ALTERNATIVE: | SCORE: | YIELD(cumulative) |
|---|---|---|
| Well Fields | 9.10 | 6,100 |
| Milliken Upgrade | 8.85 | 8,100 |
| NSD-Reclamation | 8.00 | 11,100 |
| Napa River Diversion | 7.65 | 23,300 |

It is important to note that the estimated yield of water from these four sources is 23,300 Acre-feet compared to a targeted shortfall in the year 2020 of 18,600. The estimated time frame for completion of these four alternatives is the year 2020 which would indicate a water surplus of 4,700 Acre-Feet in 2020 and declining to about a 0 shortfall in 2030. Napa communities would, during this period, be in a position to market this surplus on a short term basis at some point past 2020. The recommended river diversion project, as stated in the Kennedy/Jenks report, is staged to provide 9,000 Acre-Feet initially and 12,200 ultimately with the raising of the dam. The diversion project ranks high in flexibility for this reason.

If the State is able to improve on its contract entitlements, Napa communities would be able to adjust the completion schedule of one of the local projects to accommodate meeting the shortfall. Should the State be successful, or the efforts by Napa communities, to "fill the pipe", the total amount of water planned for is 34,550. This should be very close to our targeted amount in 2050 ( the economic life of the SWP/NBA ). The Committee concluded, with the probability that the water market will only become more intense in the future and because Napa Communities will have more flexibility in our sources, our communities will always be able to market any surplus water.

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ATTACHMENT #1

TABLE #1

| AGENCY | SHORTFALLS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1991 | | 2000 | | 2020 | | 2030 | |
| | Drought | Normal | Drought | Normal | Drought | Normal | Drought | Normal |
| CITY OF NAPA | 7,800 | 3,550 | 8,800 | 3,225 | 11,300 | 2,350 | 13,500 | 4,510 |
| CITY OF AMERICAN CANYON | 626 | 0 | 1,153 | 0 | 1,216 | 0 | 1,460 | 360 |
| TOWN OF YOUNTVILLE | 0 | 0 | 90 | 0 | 200 | 125 | 392 | 317 |
| CITY OF ST. HELENA | 0 | 0 | 11 | 11 | 192 | 192 | 391 | 391 |
| CITY OF CALISTOGA | 589 | 414 | 625 | 443 | 940 | 765 | 1,115 | 1,690 |
| SUBTOTAL | 9,015 | 3,964 | 10,679 | 3,679 | 13,848 | 3,432 | 16,858 | 7,268 |
| AGRICULTURE & RURAL RES. | 0 | 0 | 2,917 | 2,917 | 9,400 | 9,400 | 12,000 | 12,000 |
| TOTAL NAPA COUNTY | 9,015 | 3,964 | 13,596 | 6,596 | 23,248 | 12,832 | 28,858 | 19,268 |
| TARGETED SHORTFALLS | 7,200 | | 10,900 | | 18,600 | | 23,000 | |
| COLUMN NUMBER #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 |

ATTACHMENT #2

TABLE #2

| POTENTIAL SUPPLY ALTERNATIVES | YIELD Ac-ft/yr | COST per AC-FT | RELIA. in % of yield | Reliability ranking x 30% | Cost ranking x 25% | Water Quality ranking x 20% | Environmental & Institutional ranking x 15% | Flexibility ranking x 5% | Other Benefits ranking x 5% | SCORE max. of 10 | ALTERNATIVES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SWP/NBA (45%) | 11,250 | $185 | 35 | 3 x 30% = 0.9 | 5 x 25% = 1.25 | 5 x 20% = 1.0 | 4 x 15% = 0.6 | 5 x 5% = 0.25 | 5 x 5% = 0.25 | 4.25 | SWP/NBA (45%) |
| Yuba County Water | 11,250 | $200 | 75 | 8 x 30% = 2.4 | 4 x 25% = 1.0 | 5 x 20% = 1.0 | 5 x 15% = 0.75 | 5 x 5% = 0.25 | 3 x 5% = 0.15 | 5.55 | Yuba County Water |
| Glen-Colusa Plan | 10,000 | $100 | 75 | 8 x 30% = 2.4 | 9 x 25% = 2.25 | 5 x 20% = 1.0 | 4 x 15% = 0.6 | 4 x 5% = 0.20 | 3 x 5% = 0.15 | 6.60 | Glen-Colusa Plan |
| Lake Berryessa Plan | 2,000 | $100 | 75 | 8 X 30% = 2.5 | 9 x 25% = 2.25 | 5 x 20% = 1.0 | 4 x 15% = 0.6 | 6 x 5% = 0.30 | 5 x 5% = 0.25 | 6.90 | Lake Berryessa Pla |
| SWP - Unscheduled | 1,000 | $50 | 10 | 2 x 30% = 0.6 | 10 x 25% = 2.5 | 5 x 20% = 1.0 | 4 x 15% = 0.6 | 4 x 5% = 0.20 | 7 x 5% = 0.35 | 5.25 | SWP-Unscheduled |
| SWP - Water Bank | 1,000 | $100 | 0 | 0 x 30% = 0 | 9 x 25% = 2.25 | 5 x 20% = 1.0 | 5 x 15% = 0.75 | 3 x 5% = 0.15 | 5 x 5% = 0.25 | 4.40 | SWP-Water Bank |
| Walkea | 3,000 | $120 | 80 | 9 x 30% = 2.7 | 8 x 25% = 2.0 | 5 x 20% = 1.0 | 5 x 15% = 0.75 | 5 x 5% = 0.25 | 6 x 5% = 0.3 | 7.00 | Walkea |
| | | | | | | | | | | | |
| NSD - Reclamation | 3,000 | $100* | 95 | 10 x 30% = 3. | 9 x 25% = 2.25 | 5 x 20% = 1.0 | 7 x 15% = 1.05 | 4 x 5% = 0.20 | 10 x 5% = 0.5 | 8.00 | NSD-Reclamation |
| Milliken Upgrade | 2,000 | $100 | 80 | 9 x 30% = 2.7 | 9 x 25% = 2.25 | 9 x 20% = 1.8 | 8 x 15% = 1.2 | 10 x 5% = 0:5 | 8 x 5% = 0.40 | 8.85 | Milliken Upgrade |
| Well Fields | 6,100 | $150 | 95 | 10 x 30% = 3. | 8 x 25% = 2.0 | 10 x 20% = 2.0 | 9 x 15% = 1.35 | 10 x 5% = 0.5 | 5 x 5% = 0.25 | 9.10 | Well Fields |
| Napa River Diversion | 12,200 | $670 | 95 | 10 x 30% = 3. | 4 x 25% = 1.0 | 8 x 20% = 1.6 | 7 x 15% = 1.05 | 10 x 5% = 0.5 | 10 x 5% = 0.5 | 7.65 | Napa River Diversio |
| Enlarge Bell Canyon | 1,000 | $1,800 | 95 | 10 x 30% = 3. | 2 x 25% = 0.5 | 9 x 20% = 1.8 | 7 x 15% = 1.05 | 10 x 5% = 0.5 | 8 x 5% = 0.40 | 7.25 | Enlarge Bell Canyo |
| Rector | 200 | $250 | 80 | 9 x 30% = 2.7 | 6 x 25% = 1.5 | 9 x 20% = 1.8 | 3 X 15% = 0.45 | 2 X 5% = 0.10 | 7 x 5% = 0.35 | 6.90 | Rector |
| | | | | | | | | | | | |
| SWP/NBA (55%) | 13,750 | $430 | 65 | 4 X 30% = 1.2 | 5 x 25% = 1.25 | 5 x 20% = 1.0 | 8 x 15% = 1.2 | 5 x 5% = 0.25 | 5 x 5% = 0.25 | 5.15 | SWP/NBA (55%) |
| #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 | #10 | #11 | #12 |

* cost is assumed equal to other raw water sources

## 7. County of Napa. 1996. *Napa County Ordinance No. 1117*. Adopted December 3, 1996

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## ORDINANCE NO. 1117

**AN INTERIM ORDINANCE OF THE BOARD OF SUPERVISORS OF THE COUNTY OF NAPA TEMPORARILY SUSPENDING THE RECEIPT, PROCESSING OR APPROVAL OF PERMITS FOR THE DRILLING OF MULTIPLE WELLS ON ADJACENT PARCELS OR FOR THE PURPOSE OF DRILLING SINGLE WELLS THAT WILL SERVE MULTIPLE PARCELS**

The Board of Supervisors of the County of Napa, State of California, ordain as follows:

SECTION ONE: The Board of Supervisors hereby finds as follows:

(a) Napa County land use regulations at the present time are unclear as to whether or not a use permit must be obtained prior to drilling one or more wells for the purpose of extracting groundwater and providing same to parcels other than the parcel on which the well is located, or prior to drilling multiple wells on adjacent parcels.

(b) Groundwater supplies in Napa County are limited. As a consequence, and in part to protect the groundwater supplies of the County to the maximum extent possible, Napa County through the Flood Control and Water Conservation District has spent significant time and money attempting to develop water supplies from out of county sources. Additionally, the Board is presently considering whether or not to implement a groundwater management program for the purpose of further protecting the scarce groundwater supplies of the County.

(c) Continuing to allow the drilling of additional wells for the purpose of extracting scarce groundwater without first requiring, in some situations and locations, that a use permit be obtained, thereby ensuring that such extraction will not be detrimental to the health, safety and welfare, should not be permitted.

(d) This Board has ordered the Conservation, Development and Planning Department and the Conservation, Development and Planning Commission to review all of the applicable land use regulations of the County and report back to the Board with recommendations regarding whether or not land use regulations should be adopted that will require the issuance of use permits prior to individuals being authorized to drill wells for the purpose of extracting scarce groundwater in some situations and locations.

SECTION TWO: Except as otherwise provided in Section Three of this ordinance, and notwithstanding any other provision of the Napa County Code, for the duration of this interim ordinance, no applications filed pursuant to Chapter 13.04, 13.08, 13.14, or any other applicable provision of the Napa County Code, shall be received, accepted, processed or approved by any employee, department, or body of the County of Napa if said application is filed for the purpose of permitting the improvement or development of a water system that would serve multiple parcels or which would result in wells being drilled involving a significant number of adjacent parcels in areas designated as Open Space on the Napa County General Plan.

SECTION THREE: This interim ordinance shall not apply to any application for a permit that would authorize the improvement or development of a water system that would serve multiple parcels or would result in multiple wells being drilled on adjacent parcels which has been filed, whether or not deemed complete, prior to the effective date of this ordinance. This interim ordinance shall not apply to any application for a permit that would authorize the improvement or development of a water system that would serve adjacent parcels that cannot develop their own water supply because of the small size of the adjacent parcel. The Board finds that due to the limited number of applications presently on file and because of the historically small number of applications that are received annually for the purpose of allowing one parcel to provide water to another parcel that is too small in size to develop its own water supply, these exemptions will not cause an adverse effect on the groundwater supplies of the County pending adoption of the contemplated zoning changes.

SECTION FOUR: This interim ordinance shall terminate on January 17, 1997, forty–five days from the effective date of this ordinance, as required by Government Code section 65858. Said term may be further extended by this Board in the manner provided by law.

SECTION FIVE: The Board hereby finds that this interim ordinance must take effect immediately without notice because the processing of additional new applications allowing groundwater extraction in areas designated as Open Space on the Land Use Map of the Napa County General Plan of the County could have a detrimental effect on the groundwater supplies of the County. The Board further finds that the potential for significant applications for wells in areas designated as Open Space on the Land Use Map of the Napa County General Plan has been exacerbated in recent years to the issuance of more than 150 Unconditional Certificates of Compliance and the recent approval of lot line adjustments, many of which involve areas of the County where groundwater supplies are particularly limited in supply. Due to these factors, this Board further finds that should the owners of these parcels apply for well drilling permits, the effect on the groundwater table in the judgment of this Board would constitute a current and immediate threat to the public health, safety and welfare of the people of the County of Napa.

SECTION SIX: The Board finds that passage of this interim ordinance has no potential for causing a substantial or potentially substantial adverse change in any physical conditions within the area affected and therefore determines with certainty that this interim ordinance has no potential for producing a significant effect on the environment as that term is defined in section 15382 of the State CEQA Guidelines found in Title 14 of the California Code of Regulations. Therefore, this Board hereby finds that this action is not subject to the California Environmental Quality Act (CEQA), pursuant to the general rule that CEQA only applies to projects which have a potential for causing a significant effect on the environment. [14 Cal. Code of Regulations section 15061(b)(3)].

SECTION SEVEN: The Director of Conservation, Development and Planning is hereby directed to prepare and submit to the Board on or before January 7, 1997, a written report describing the progress and development of regulatory proposals to alleviate the conditions which have led to the passage of this interim ordinance.

SECTION EIGHT: This is an urgency ordinance that pursuant to Government Code section 65858 shall take effect immediately.

SECTION NINE: This ordinance shall be published before the expiration of fifteen (15) calendar days after its passage at least once in the Napa Valley Register, a newspaper of general circulation printed and published in the County of Napa, together With the names of the members voting for and against the same.

The foregoing ordinance was introduced, read, and passed at a regular meeting of the Board of Supervisors of the County of Napa, State of California, held on the 3rd day of December, 1996, by the following vote:

| | | |
|---|---|---|
| AYES: | SUPERVISORS | VARRELMAN, FERRIOLE, NEGRI, RIPPEY and BATTISTI |
| NOES: | SUPERVISORS | NONE |
| ABSTAIN: | SUPERVISORS | NONE |
| ABSENT: | SUPERVISORS | NONE |

PAUL BATTISTI, CHAIRMAN
Board of Supervisors

ATTEST:

MARY JEAN McLAUGHLIN
Clerk of the Board

By: Teri Sisson
Deputy

APPROVED AS TO FORM
Office of County Counsel
By: 
Date: 1/13/97

APPROVED DEC 3 1996
BOARD OF SUPERVISORS
COUNTY OF NAPA

MARY JEAN MCLAUGHLIN
CLERK OF THE BOARD

BY Teri Sisson Deputy

**8. County of Napa. 1997. *Napa County Ordinance No. 1119*. Adopted January 21, 1997**

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**ORDINANCE NO.** 1119

**AN INTERIM URGENCY ORDINANCE OF THE BOARD OF SUPERVISORS OF THE COUNTY OF NAPA EXTENDING THE TEMPORARY SUSPENSION OF THE RECEIPT, PROCESSING OR APPROVAL OF PERMITS WHICH WOULD AUTHORIZE THE DRILLING OF MULTIPLE WELLS ON ADJACENT PARCELS OR WOULD AUTHORIZE THE DRILLING OF SINGLE WELLS THAT ARE INTENDED TO SERVE MULTIPLE PARCELS**

The Board of Supervisors of the County of Napa ordains as follows:

SECTION ONE: The Board of Supervisors hereby finds as follows:

(a) On December 3, 1996, by enacting Ordinance No. 1117, this Board determined that the processing of additional new applications for well drilling permits in those areas designated as Open Space on the Land Use Map of the Napa County General Plan was creating a current and immediate threat to the health, safety and welfare of the residents of the County of Napa because continuing to issue such permits, to the extent same authorizes the concentrated extraction of groundwater within limited areas and/or the transfer and use of water on parcels other than the parcel on which the well is located, within or without the County, would result in the extraction of significant quantities of groundwater and therefore has the potential to have a detrimental effect on the limited groundwater supplies of the County. The Board further determined that this was particularly the case due to the fact that more than 150 unconditional certificates of compliance have been issued during the past several years and numerous lot line adjustments have been approved and that most of said certificates of compliance and lot line adjustments are located in the open space areas of the County where groundwater supplies are particularly limited. Based upon these findings, the Board on December 3, 1996, imposed a 45-day moratorium pursuant to Government Code section 65858 on the receipt, processing or approval of applications for well drilling permits which would authorize the drilling of multiple wells on adjacent parcels or would authorize the drilling of single wells that are intended to service multiple parcels pending the development of adequate regulations for adoption by the Board.

(b) Based upon the report to the Board on January 3, 1997, by the Departments of Environmental Management and Conservation, Development and Planning, as required by

Ordinance No. 1117 and Government Code section 65858(d), the Board hereby determines that the circumstances described in the findings contained in Ordinance Nos. 1117 still exist, but that the aforementioned departments are still actively working on developing regulations which the Board could adopt to alleviate the conditions which led to the need for the adoption of Ordinance No. 1117.

SECTION TWO: The Board hereby readopts its findings of December 3, 1996, as follows:

(a) Napa County land use regulations at the present time continue to be unclear as to whether or not a use permit must be obtained prior to drilling one or more wells for the purpose of extracting groundwater and transferring the water extracted to parcels other than the parcel on which the well is located, or prior to drilling multiple wells on adjacent parcels, whether or not under the same ownership.

(b) Groundwater supplies in Napa County, particularly in those areas of the County designated as Open Space on the Land Use Map of Napa County, are limited. As a consequence, and in part to protect the groundwater supplies of the County in its agricultural areas to the maximum extent possible, Napa County through the Flood Control and Water Conservation District has spent significant time and money attempting to develop water supplies from out of county sources. Additionally, the Board is presently considering whether or not to implement a groundwater management program for the purpose of further protecting the scarce groundwater supplies of the County.

(c) To protect the limited groundwater that exists in Napa County, particularly in those areas of the County designated as Open Space on the Land Use Map of Napa County, continuing to allow the drilling of additional wells for the purposes identified above without first adopting regulations requiring that, in the circumstances identified in the regulations a permit be obtained, thereby ensuring that such extraction will not be detrimental to the health, safety and welfare of the residents of Napa County, is not possible.

(d) The Conservation, Development and Planning Department is currently reviewing all of the applicable land use regulations of the County and is expected to report back to the Board shortly with recommendations regarding whether or not land use regulations should be adopted that will require the issuance of permits prior to individuals being authorized to drill wells for the purpose of extracting scarce groundwater in areas of the County where a demonstrable lack of groundwater exists and/or where the projected amount of ground water to be extracted is expected to have an adverse affect on the groundwater table which in turn will impact existing property owners that rely on the groundwater and existing wells for their water supply.

SECTION THREE: Except as otherwise provided in Section Four of this ordinance, and notwithstanding any other provision of the Napa County Code, for the duration of this interim ordinance, no applications filed pursuant to Chapter 13.04, 13.08, 13.12, or any other applicable provision of the Napa County Code, shall be received, accepted, processed or approved by any employee, department, or body of the County of Napa if said application is filed for the purpose of permitting the improvement or development of a water system that would serve multiple parcels or which would result in wells being drilled involving a significant number of adjacent parcels in areas of known water shortage and designated as Open Space on the Napa County General Plan. Such areas include, but are not limited to, the Pope Valley, Chiles Valley, Capell Valley, Carneros Valley and Milliken–Sarco–Tulocay groundwater basins.

SECTION FOUR: This interim ordinance shall not apply to any application for a permit that would authorize the improvement or development of a water system that would serve multiple parcels or would result in multiple wells being drilled on adjacent parcels which has been filed, whether or not deemed complete, prior to the effective date of the original urgency ordinance. This interim ordinance shall not apply to any application for a permit that would authorize the improvement or development of a water system that would serve adjacent parcels that cannot develop their own water supply because of the small size of the adjacent parcel for the reasons set forth in Section 3 of Ordinance No. 1117.

SECTION FIVE: This interim ordinance shall terminate on December 2, 1997, ten months and fifteen days from the expiration of Ordinance No. 1117 as authorized by Government Code section 65858. Said term may be further extended by this Board in the manner required by law.

SECTION SIX: The Board hereby finds that the extension of this interim ordinance must take effect immediately because continued processing of applications for well drilling permits would exacerbate an already serious water shortage in the area and might adversely and permanently affect the water table while a permanent regulatory solution is being sought. Due to this, the Board further finds these conditions constitute a current and immediate threat to the public health, safety and welfare of the people of the County of Napa. The Board further finds that the approval of additional subdivisions, use permits, variances, building permits, or other applicable entitlements for use which would be required in order to comply with those provisions of the Napa County Code relating to zoning, and more likely than not would result in groundwater being utilized as the water source, would result in a threat to the public health, safety, or welfare.

SECTION SEVEN: The Board hereby finds that extension of this interim ordinance has no potential for causing a substantial or potentially substantial adverse change in any physical conditions within the area affected and therefore determines with certainty that this interim ordinance has no potential for producing a significant effect on the environment as that term is defined in section 15382 of the State CEQA Guidelines found in Title 14 of the California Code of Regulations. Therefore, the Board hereby finds that this action is not subject to the California Environmental Quality Act (CEQA) pursuant to the general rule that CEQA only applies to projects which have any potential for causing a significant effect on the environment [14 Cal. Code of Regulations section 15061(b)(3)].

SECTION EIGHT: The Director of Conservation, Development and Planning is hereby directed to prepare and submit to the Board on or before November 22, 1997, a written report describing the progress and development of regulatory proposals to alleviate the conditions which have led to the passage of this interim ordinance.

SECTION NINE: This is an urgency ordinance that shall take effect immediately.

SECTION TEN: This ordinance shall be published before the expiration of fifteen calendar days after its passage at least once in the Napa Valley Register, a newspaper of general circulation printed and published in the County of Napa, together with the names of the members voting for and against the same.

The foregoing ordinance was introduced, read, and passed at a regular meeting of the Board of Supervisors of the County of Napa, State of California, held on the 21th day of January, 1997, by the following vote:

AYES: SUPERVISORS VARRELMAN, LUCE, WINTER and RIPPEY

NOES: SUPERVISORS NONE

ABSENT: SUPERVISORS FERRIOLE

Mike Rippey

MIKE RIPPEY, Chairman
Board of Supervisors

ATTEST:

MARY JEAN McLAUGHLIN
Clerk of the board

By: Teri Sisson
Deputy

**APPROVED AS TO FORM**
Office of County Counsel
By: [illegible]
Date: 1/17/96

APPROVED JAN 21 1997
BOARD OF SUPERVISORS
COUNTY OF NAPA

MARY JEAN MCLAUGHLIN
CLERK OF THE BOARD

BY Michelle Price Deputy

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## 9. County of Napa. 1997. *Napa County Ordinance No. 1130*. Adopted November 25, 1997

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**ORDINANCE NO.** 1130

**AN INTERIM URGENCY ORDINANCE OF THE BOARD OF SUPERVISORS OF THE COUNTY OF NAPA EXTENDING THE TEMPORARY SUSPENSION OF THE RECEIPT, PROCESSING OR APPROVAL OF PERMITS WHICH WOULD AUTHORIZE THE DRILLING OF MULTIPLE WELLS ON ADJACENT PARCELS OR WOULD AUTHORIZE THE DRILLING OF SINGLE WELLS THAT ARE INTENDED TO SERVE MULTIPLE PARCELS**

The Board of Supervisors of the County of Napa ordains as follows:

SECTION ONE: The Board of Supervisors hereby finds as follows:

(a) On December 3, 1996, by enacting Ordinance No. 1117, this Board determined that the processing of additional new applications for well drilling permits in those areas designated as Open Space on the Land Use Map of the Napa County General Plan was creating a current and immediate threat to the health, safety and welfare of the residents of the County of Napa because continuing to issue such well drilling permits, to the extent same authorizes the concentrated extraction of groundwater within limited areas and/or the transfer and use of water on parcels other than the parcel on which the well is located, which parcels could be located within or without the County, could result in the extraction of significant quantities of groundwater which in turn would have the potential to adversely and irreversibly affect the limited groundwater supplies of the County. The Board further determined that the possibility of such groundwater extraction having a detrimental effect on the limited groundwater supplies of the County was immediate due to the fact that during the mid 1990s more than 150 unconditional certificates of compliance have been issued as well as numerous lot line adjustments approved, these newly recognized or configured parcels can be expected to develop in the short–term, and most of these parcels are located in those open space areas of the County where groundwater is both scarce and, for all practical purposes, the only source of water. Based upon these findings, the Board on December 3, 1996, pursuant to Government Code section 65858, imposed a 45–day moratorium on the receipt, processing or approval of applications for well drilling permits which would result in wells being drilled involving a significant number of adjacent parcels or would authorize the drilling of single wells that are intended to service multiple parcels pending the development and adoption of regulations that will protect the limited groundwater supplies of the County.

(b) Based upon the report to this Board on January 3, 1997 by the Director of the Conservation, Development and Planning Department, as required by Section 7 of Ordinance No. 1117 and Government Code section 65858(d), this Board on January 21, 1997, determined that the circumstances described in the findings contained in Ordinance No. 1117 still existed, and that the Departments of Environmental Management and Conservation, Development and Planning were actively working on developing regulations suitable for adoption by this Board that would alleviate the conditions which led to the need for the adoption of Ordinance No. 1117.

(c) On January 21, 1997, by Ordinance No. 1119, this Board readopted its findings of December 3, 1996, extended the provisions of Ordinance No. 1117 to December 2, 1997, as authorized by Government Code section 65858, and directed the Director of the Conservation, Development and Planning Department to prepare and submit to the Board on or before November 22, 1997, a written report describing the progress and development of regulatory proposals that will protect the limited groundwater supplies of the County and alleviate the conditions which led to the passage of Ordinance Nos. 1117 and 1119.

(d) Notice of the proposed extension of Ordinance No. 1119 was published in the manner required by Government Code section 65858(a) on November 14, 1997.

(e) Based upon the report to this Board on November 20, 1997 by the Director of the Conservation, Development and Planning, as required by Section 8 of Ordinance No. 1119 and Government Code section 65858(d), and a review of the findings previously adopted by this Board, this Board hereby determines that the circumstances described in the findings contained in Ordinance Nos. 1117 and 1119 still exist, and that the Departments of Environmental Management and Conservation, Development and Planning are continuing to actively work on developing regulations that will protect the limited groundwater supplies of the County and alleviate the conditions which led to the need for the adoption of Ordinance Nos. 1117 and 1119.

SECTION TWO: This Board hereby readopts its findings of December 3, 1996, and January 21, 1997, as follows:

(a) Napa County land use regulations at the present time continue to be unclear as to whether or not a use permit must be obtained prior to drilling one or more wells for the purpose of extracting groundwater and transferring the water extracted to parcels other than the parcel on which the well is located, or prior to drilling multiple wells on adjacent parcels, whether or not under the same ownership.

(b) Groundwater supplies in Napa County, particularly in those areas of the County designated as Open Space on the Land Use Map of Napa County, are scarce. As a consequence, and in part to protect the groundwater supplies of the County in its agricultural areas to the maximum extent possible, Napa County through the Flood Control and Water Conservation District has spent significant time and money attempting to develop water supplies from out–of–county sources. Additionally, the County is presently developing and consolidating information that will enable this Board to consider whether or not to implement a groundwater management program for the purpose of further protecting the scarce groundwater supplies of the County.

(c) If the scarce groundwater that exists in Napa County is to be protected, particularly in those areas of the County designated as Open Space on the Land Use Map of Napa County, continuing to allow the drilling of additional wells for the purposes identified in Section 1 of this Ordinance without first adopting regulations requiring that, in the circumstances identified in the regulations, a permit be obtained, thereby ensuring that such extraction will not be detrimental to the health, safety and welfare of the residents of Napa County, is not possible.

(d) The Conservation, Development and Planning Department is currently consulting with specially appointed Water Counsel as well as reviewing all of the applicable land use regulations of the County and is expected to report back to the Board by March, 1998, with recommendations regarding whether or not additional land use regulations should be adopted that will require the issuance of permits prior to individuals being authorized to drill wells for the purpose of extracting groundwater in those areas of the County where a demonstrable lack of groundwater exists and/or where the projected amount of ground water to be extracted is expected to have an adverse affect on the groundwater table.

SECTION THREE: Except as otherwise provided in Section Four of this ordinance, and notwithstanding any other provision of the Napa County Code, for the duration of this interim ordinance, no applications filed pursuant to Chapter 13.04, 13.08, 13.12, or any other applicable provision of the Napa County Code, shall be received, accepted, processed or approved by any employee, department, or body of the County of Napa if said application is filed for the purpose of permitting the improvement or development of a water system that would serve multiple parcels or would result in multiple wells being drilled involving a significant number of adjacent parcels in areas of known water shortage and designated as Open Space on the Napa County General Plan. Such areas include, but are not limited to, the Pope Valley, Chiles Valley, Capell Valley, Carneros Valley and Milliken–Sarco–Tulocay groundwater basins.

SECTION FOUR: This interim ordinance shall not apply to any application for a permit that would authorize the improvement or development of a water system that would serve multiple parcels or would result in multiple wells being drilled on a significant number of adjacent parcels which has been filed, whether or not deemed complete, prior to the effective date of urgency Ordinance No. 1117. This interim ordinance shall not apply to any application for a permit that would authorize the improvement or development of a water system that would serve adjacent parcel(s) that cannot develop its own water supply because of its small size for the reasons set forth in Section 3 of Ordinance No. 1117. This interim ordinance shall not apply to any application for a permit that would authorize the drilling of a well for the purpose of replacing an existing well so long as the existing well will not continue to be used as a water source and the expected extraction from each well is approximately the same.

SECTION FIVE: This interim ordinance shall terminate on December 2, 1998, twelve months from the expiration of Ordinance No. 1119 as authorized by Government Code section 65858. Said term may not be further extended by this Board.

SECTION SIX: The Board hereby finds that the extension of this interim ordinance must take effect immediately upon the expiration of Ordinance No. 1119 on December 2, 1997, because continued processing of applications for well drilling permits would exacerbate an already serious water shortage in those areas designated as Open Space on the Land Use Map of the Napa County General Plan and might adversely and permanently affect the water table while a permanent regulatory solution is being sought. The Board further finds that these conditions, as is more fully set forth in Sections 1 and 2 of this Ordinance, constitute a current and immediate threat to the public health, safety and welfare of the people of the County of Napa. The Board further finds that the approval of additional subdivisions, use permits, variances, building permits, or other applicable entitlements for use in those areas designated as Open Space on the Land Use Map of the Napa County General Plan, which would be required in order to comply with those provisions of the Napa County Code relating to zoning, would more likely than not result in groundwater being utilized as the water source, and this in turn would result in the aforementioned threat to the public health, safety, or welfare.

<u>SECTION SEVEN:</u> The Board further finds that the extension of this interim ordinance merely maintains the *status* quo and therefore has no potential for causing a substantial or potentially substantial adverse change in any physical conditions within the area affected. The Board concludes that for this reason it can be seen with certainty there is no possibility that the enactment of this interim ordinance may have a significant effect on the environment and therefore compliance with the California Environmental Quality Act is not required [14 Cal. Code of Regulations section 15061(b)(3)].

<u>SECTION EIGHT:</u> The Director of Conservation, Development and Planning is hereby directed to prepare and submit to the Board on or before November 22, 1998, a written report describing the progress and development of regulatory proposals to alleviate the conditions which have led to the passage of this interim ordinance.

<u>SECTION NINE:</u> This is an urgency ordinance that shall take effect immediately upon the expiration of Ordinance No. 1118 on December 2, 1997.

<u>SECTION TEN:</u> This ordinance shall be published before the expiration of fifteen calendar days after its passage at least once in the <u>Napa Valley Register</u>,

a newspaper of general circulation printed and published in the County of Napa, together with the names of the members voting for and against the same.

The foregoing ordinance was introduced, read, and passed at a regular meeting of the Board of Supervisors of the County of Napa, State of California, held on the 25th day of November, 1997, by the following vote:

| | |
|---|---|
| AYES: SUPERVISORS | VARRELMAN, WINTER, FERRIOLE, LUCE and RIPPEY |
| NOES: SUPERVISORS | NONE |
| ABSENT: SUPERVISORS | NONE |

Mike Rippey

MIKE RIPPEY, Chairman
Board of Supervisors

ATTEST:
MARY JEAN McLAUGHLIN
Clerk of the board

By: Teri Sisson
Deputy

APPROVED NOV 25 1997
BOARD OF SUPERVISORS
COUNTY OF NAPA

MARY JEAN MCLAUGHLIN
CLERK OF THE BOARD

BY Michelle Price Deputy

APPROVED AS TO FORM
Office of County Counsel
By: [illegible]
Date: 11/20/97

**10. Cave T., Johanson K., Redding J., Westermyer, R. 1999. *General Plan Amendment #GPA98-04 and Napa County Code Amendment #98279-ORD* [Staff Report to the Conservation, Development and Planning Commission]. Napa, CA. April 7, 1999.**

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**TO:** CONSERVATION, DEVELOPMENT AND PLANNING COMMISSION

**FROM:** TRENT CAVE, DIRECTOR, ENVIRONMENTAL MANAGEMENT
KEN JOHANSON, DIRECTOR, PUBLIC WORKS
JEFF REDDING, DIRECTOR, CDPD
ROBERT WESTMEYER, COUNTY COUNSEL

**SUBJECT:** GENERAL PLAN AMENDMENT #GPA98-04: County-initiated text amendment to the Land Use Element of the County General Plan to require groundwater findings prior to certain specified redesignations of land.

NAPA COUNTY CODE AMENDMENT #98279-ORD: County-initiated text amendment to Titles 13, 15 and 18 of the Napa County Code to establish findings and permit requirements for the extraction and use of pumped groundwater as a water source on affected properties.

**DATE:** APRIL 7, 1999

## BACKGROUND

Article XI, section 7 of the California Constitution provides counties with the power to make and enforce within their limits all local police, sanitary and other ordinances not in conflict with the general laws. Article X, section 2 of the California Constitution provides an additional constitutional basis for counties to enact ordinances prohibiting the extraction and use of groundwater resources for wasteful, unreasonable or non-beneficial purposes. This self-executing constitutional provision requires that water use be reasonable and that waters be conserved for as many uses as possible. In short, that local management of groundwater resources is a valid exercise of the police power has been a well established principle of California law since the 1930's. In recent years, this principle has been applied to promote conservation and protect and enhance environmental quality.

Various studies conducted or reviewed by the County demonstrate the need for the zoning ordinance proposed. The most important of these studies are attached hereto in full for your review. The remainder are on file with the Department of Public Works.

**1991 Study ( full copy enclosed for Commission, Executive Summary for others).**

The 1991 study provides a detailed review of the relationship between water needs and supply in the short and long term for urban, rural and agricultural users in Napa County, including groundwater needs and supplies. Drawing upon the 1973 and 1977 USGS reports and dividing the county into several discrete subareas, the study calculates the estimated safe yield for each of the four areas in the county with a potential for groundwater extraction. The estimated annual safe yield figures for these regions include 22,500 acre feet for the North Napa Valley Basin, less than 5,400 acre feet for the Milliken-Sarco-Tulucay Groundwater Basins, less than 300 acre feet for Carneros, and less than 400 acre feet for the Lake Berryessa Basin.

The 1991 study also develops short and long-term projections of water needs among users and regions in Napa County using these figures to balance water needs and supplies for the period 1990 through 2020. The results of this balance reveal substantial long-term inadequacies in supply throughout the county's subareas, although admittedly at present some areas have a short-term surplus. From this study it is reasonable to conclude that as the county's water needs increase in the future, increases in agricultural and rural uses are likely to eliminate any existing groundwater surplus. This change from surplus to deficit is likely to be far more pronounced and occur sooner rather than later if increased municipal and industrial demands are also satisfied by using groundwater. Staff notes that in recent years various proposals have surfaced involving the City of Napa and the City of St. Helena proposing to augment their water supplies through increased use of groundwater. Thus, the possibility of municipal and industrial increased water demands being satisfied from groundwater supplies is far from a theoretical concept in Napa County. In 1991, the surplus presently existing for agricultural groundwater users was projected to turn into a deficiency in ten years.

The study concluded in part that the County in issuing use permits should ensure that the applicant demonstrates the adequacy of water supply and retain drainage on site to encourage groundwater recharge.

<u>**1993 Report of the Water Advisory Committee (copy enclosed)**</u>

The 1993 Report confirmed the 1991 Study's results and projected a growing deficiency in overall county water supply. The Report identified shortfalls of 10,900 acre feet by the year 2000 which would increase to 18,600 acre feet by 2020 and 23,000 acre feet by 2030.

<u>**May 1992 Napa River Diversion Feasibility Study**</u>

The Napa River Diversion Feasibility Study suggests pursuing further investigation of a groundwater recharge/conjunctive use project that would use surface water from the Milliken Reservoir to recharge the Milliken-Sarco-Tulocay groundwater basin in the southeast portion of the county. This was to be expected, since the Milliken-Sarco-Tulocay groundwater basin is presently, and has been for some time, in a deficit situation. The 1992 Study also recommended that this recommended groundwater recharge project should be coordinated with a County-wide groundwater basin management plan strategy that protects groundwater resources. This proposed ordinance and general plan amendment begin the implementation of an overall groundwater basin management plan.

<u>**Conclusions**</u>

The studies referenced above demonstrate the presence of an emerging long-term shortfall in water resources, and particularly in groundwater resources heretofore serving agriculture, throughout Napa County's subareas. The emerging shortfall appears to be particularly acute in certain areas surrounding the groundwater basins which have been designated as open space in the county's general plan, but does not appear to be exclusively confined to these areas.
As a result of these studies, the Board during 1996-1997 adopted a series of urgency ordinances

restricting the extraction of groundwater to varying degrees (See Napa County Ordinance Nos. 1117, 1118, 1119, 1122 and 1130). The purpose of these ordinances ~~was~~ to maintain ~~the~~ *status quo* to the maximum extent possible while the comprehensive groundwater ordinance and general plan amendment you are considering today were developed.

1977

It is staff's view that when ~~these studies~~, as well as other reports on file with the Department of Public Works (i.e. August 1997 USGS report "Groundwater Hydrology of the Lower Milliken-Sarco-Tulucay Creeks Area" and the November 1973 USGS report "Groundwater Hydrology of Northern Napa Valley") are taken into account, it becomes clear that if the water supplies of the County are to be protected, additional regulations are needed to ensure that further development, be it agricultural or urban, will be required to demonstrate that its development will not adversely impact the groundwater basins located in Napa County.

## ENVIRONMENTAL

Staff has prepared an Initial Study on the proposed General Plan amendment and Zoning Ordinance text amendment (attached). No potential significant adverse environmental effects have been identified. The proposed amendments will have an overall <u>beneficial</u> impact on the environment by establishing General Plan findings and additional regulations to avoid overdrafts and maximize the long-term beneficial use of groundwater resources, thus serving to protect the public health, safety and welfare of the citizens of Napa County. As such, no adverse environmental effects have been identified as resulting from the adoption of these amendments. A Negative Declaration has been prepared, and the attached Planning Commission Resolution includes a recommendation to the Board of Supervisors to adopt the Negative Declaration.

## STAFF ANALYSIS

### Amendment of the General Plan:

The proposed groundwater ordinance, like all other zoning ordinances, must be consistent with the Napa County General Plan.. Although the county general plan does not expressly call for the adoption of a groundwater ordinance, the general plan contains sufficient language to enable the Commission to make a finding that the proposed ordinance is consistent with the Napa County General Plan (see section 2 of the proposed ordinance).

The purpose of the proposed general plan amendment is to make clear that the Board of Supervisors considers groundwater usage and impacts in the redesignation of lands currently designated "Agriculture, Watershed and Open Space" or Agricultural Resource". Specifically, the proposed general plan amendment would add a seventh mandatory finding to subsection 3.f.9.d of the Land Use Element that the Board must make prior to any Board-adopted redesignation of land now designated on the land use map as "Agriculture, Watershed or Open Space" or "Agricultural Resource" to a designation other than "Agriculture, Watershed or Open Space" or "Agricultural Resource" This additional finding would state that, " The applicant for redesignation and its successors will not extract groundwater from the affected property or use pumped groundwater as a water source on the affected property except pursuant to a valid groundwater permit or use permit meeting the requirements of the Napa County Groundwater Conservation Ordinance, unless a final determination of exemption or waiver is made under that ordinance."

The proposed amendments do not change the following provisions of the Land Use Element of the Napa County General Plan: Sections 3.F.7.a, 3.F.7.c, 3.F.7.d, 3.F.8.a, 3.F.8.c, 3.F.8.d of the Land Use Element. Nor do the amendments propose changing the Land Use Map. Therefore, the proposed general plan amendments contained in this resolution do not require a vote of the people pursuant to Measure J.

State law allows the County to amend its General Plan up to four times within a calendar year. No amendments have yet been adopted for calendar year 1999.

**Groundwater Ordinance:**

General Rule. With certain exceptions to be discussed below, the installation of a new water system or the improvement of an existing water system that may use groundwater as a water source requires a groundwater permit or the equivalent. As one would expect, this requirement applies to use permits, variances, subdivisions and the like. In addition, the ordinance requires development that heretofore has not been required to obtain permits as a condition of commencing a use (other than a building permit if construction is involved) will be required to obtain a groundwater permit or the equivalent. Thus, for example, agriculture in Napa County is not typically required to secure a use permit prior to commencing operations. If this ordinance is enacted as proposed, an agricultural operation that will utilize a new water system or require the improvement of an existing water system that may utilize groundwater as a water source will be required to obtain a groundwater permit prior to commencing operations unless it is exempt.

Exemptions From the General Rule. There are three exemptions from this general requirement that development must secure a groundwater permit or the equivalent. The first exemption applies to development that does not require the issuance of a use permit prior to commencing the use (i.e. the construction of a single family residence). Applications to install or improve a water system for development that will serve the parcel on which the water system is located or a single contiguous parcel are exempt from the groundwater permit requirement. The second exemption applies to agricultural operations. Applications to install or improve a water system for development involving agricultural operations are exempt even if the water system will serve multiple contiguous parcels. In the case of this exemption, contiguity is defined in a manner that should allow for a series of parcels that are part of a single agricultural operation to draw water from a single source without being required to secure a groundwater permit or the equivalent (see subparagraph (A) of section 13.15.040 of the attached ordinance). The third exemption applies to emergencies. The Director of Environmental Management is authorized to declare a site specific emergency if an individual has lost his/her water source and needs to immediately improve the on-site water system to restore his/her water supply.

Exceptions to the Exemption. There are two exceptions to the first two exemptions identified above. First, neither of these exemptions apply if the parcel on which the water system is located within a groundwater deficient area. At present, only the Milliken-Sarco-Tuolcay (hereafter "Milliken") groundwater basin is classified as a groundwater deficient area. However, as the attached studies indicate, it is possible that other groundwater basins in the ensuing years will join Milliken on the list of groundwater deficient areas in Napa County. Second, parcels of less than one acre where the water system would serve only that parcel and public water is available cannot qualify for first exemption described above.

Groundwater Permit Equivalent. The ordinance provides that in the case of uses requiring the issuance of a use permit a separate groundwater permit shall not be required. In those circumstances the required groundwater review will occur as a part of the use permit approval process.

Procedures - Applications For Exemptions. Any applicant is entitled to apply for an exemption from the provisions of the ordinance. Any such application is first reviewed by the Public Works Department to determine whether an exemption is appropriate and by the Conservation, Development and Planning Department for the purpose of environmental review of the application. In the case of environmental review, the ordinance provides that determinations of exemption involving development serving not more than one contiguous parcel (see the first exemption discussed above) are ministerial and therefore exempt from CEQA. In all other cases, a determination of the appropriate level of environmental review will need to be conducted by the Conservation, Development and Planning Department prior to the time that the Director of Environmental Management considers whether the application for an exemption should be approved or denied. No notice of determinations of exemption are required to be provided to anyone other than the applicant. An individual wishing to be provided notice of such determinations should file a request with the Director of Environmental Management that he or she be provided with notice.

Procedures - Applications For A Groundwater Permit

If an exemption is not sought, or an application for an exemption is denied, the following procedure is followed. The applicant is required to file a Groundwater Declaration on a form that will be developed by the Director of Environmental Management (The content of this declaration is described in section 13.15.060 of the attached ordinance). The Director of Environmental Management is also required to notify the applicant that a Phase I, II and III water availability study must be performed. As a part of the staff presentation before the Commission, the Director of Public Works or his designee will describe the function of these water availability studies and how it is determined which study is required to be performed.

The Declaration and Study is then forwarded to the Public Works Department and the Conservation, Development and Planning Department for review. The Public Works review will determine whether approving the application would adversely affect static water level of neighboring wells, assess any drawdown of the impacted groundwater table, assess the degradation of water quality, evaluate the adverse effects on reasonable and beneficial uses of groundwater and determine whether the application, if approved, would interfere with surface water flows or result in other adverse changes to the physical environment. The Conservation, Development and Planning review is for the purpose of conducting the required environmental review.

After reviewing the various documents described above, including the reports/comments from the Public Works and Conservation, Development and Planning Departments, the Director of Environmental Management is required to approve or deny the requested groundwater permit. Approval may occur only after making any required environmental determination (i.e. determining the application is categorically exempt, adoption of a Negative Declaration, certification of Final EIR) and finding that the water system would not significantly affect the impacted groundwater basin. This decision is referred to as the Director's *tentative* decision.

Factors that will be considered in making the decision include, but are not limited to: drawdown of the impacted groundwater table; degradation of water quality; adverse effects on the reasonable and beneficial uses of groundwater; interference with surface water flows; or other adverse changes in the environment. As in the case of a use permit, the Director of Environmental Management may impose reasonable conditions as needed to satisfy the requirements of this Chapter and protect the public health, safety and welfare.

Within seven days of the date the Director of Environmental Management makes his tentative decision, notice of the tentative decision must be given to the applicant, affected public agencies, and to all persons owning real property within 300 feet of the site of the proposed extraction. For this purpose, the site of the proposed extraction is considered the outer perimeter of the properties the water system will serve. Written requests for notices of such decisions may also be filed by any interested person with the Director of Environmental Management, regardless of where such interested persons live in relation to the proposed water system. The Notice will identify the date by which a hearing must be requested if the individual receiving the notice objects to the tentative decision of the Director of Environmental Management. Noticed individuals must be given at least ten calendar days following the mailing of the notice to request a hearing.

If a hearing is not requested in a timely manner the tentative decision becomes final. In such a case, an appeal to the Board of Supervisors is not permitted.

If a hearing is requested in a timely manner, the Director of Environmental Management will establish a hearing date and notify all persons who have been previously notified of the tentative decision of the hearing date. The notification will be mailed at least ten days prior to the hearing date. The hearing is expected to be handled in the same procedural manner as a hearing before the Commission. Not later than five days after the close of the hearing the Director of Environmental Management will render his final decision. Notice of the final decision will be given to all persons who both appeared *and* presented testimony at the hearing. Written requests for notices of final decisions may also be filed by any interested person with the Director of Environmental Management. Appeals of the Director's decision to the Board of Supervisors occur in the usual manner.

Technical changes to the Zoning Code are made by Sections 5 through 10 of the proposed Ordinance to ensure internal consistency. The changes to these existing Code sections are clearly indicated in the attached ordinance by underlining.

## AMENDMENT PROCEDURES

The provisions for amendment of the General Plan are set forth by State law and by resolution of the Board of Supervisors. The provisions for the amendment of the County Code are set forth by State law, resolution of the Board of Supervisors, and Chapter 18.136 of Title 18 of the County Code. These provisions require a public hearing before the Planning Commission. Consideration of the proposed general plan amendment and Code amendment was duly noticed by a one-eighth page display ad in both the Napa Valley Register and the St. Helena Star. At the conclusion of the public hearing, the Commission must render its written recommendation to the Board of Supervisors.

If the Commission acts to recommend the adoption of the proposed general plan amendment and the Code amendment to the Board of Supervisors, they would do so by adoption of the attached resolutions. The resolutions include a finding of general plan consistency and a finding that the amendments will not have a significant effect on the environment.

## RECOMMENDATION

**ADOPT RESOLUTION NO. 99-04** recommending that the Board of Supervisors approve General Plan Amendment #GPA98-04, as described in Exhibit A; and

**ADOPT RESOLUTION NO. 99-05** recommending that the Board of Supervisors amend the Napa County Code by approving Code Amendment #98279-ORD, as described in Exhibit B.

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## 11. County of Napa. 1999. *Napa County Ordinance No.1162*. Adopted August 3, 1999

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ORDINANCE NO. 1162

**AN ORDINANCE OF THE BOARD OF SUPERVISORS OF THE COUNTY OF NAPA AMENDING THE NAPA COUNTY CODE TO ESTABLISH FINDINGS AND PERMIT REQUIREMENTS FOR THE EXTRACTION AND USE OF PUMPED GROUNDWATER AS A WATER SOURCE ON AFFECTED PROPERTIES.**

The Board of Supervisors of the County of Napa ordains as follows:

**SECTION ONE.** The Board of Supervisors hereby finds and declares as follows:

(a) The groundwater basins of Napa County, including the North Napa Valley Basin, the Milliken-Sarco-Tulucay Groundwater Basin, the Carneros Basin, and the Pope Valley, Chiles Valley and Capell Valley Basins, have historically supplied the people of Napa County with significant water resources that are likely to increase in importance in the future.

(b) The groundwater basins of Napa County form significant water resources that must be managed in trust, and must be conserved so that they may be placed to the reasonable and beneficial use of all potential users, while avoiding the waste and unreasonable use of these resources.

(c) Napa County has a right and a duty to govern the management and extraction of resources within its jurisdiction in order to protect the health, safety and welfare of the citizens of Napa County. Conserving the water resources in the groundwater basins of Napa County to avoid overdrafts and maximize the long-term beneficial use of groundwater resources, best serves the health, safety and welfare of residents of Napa County. These objectives are of particular importance to the future productivity of Napa County agriculture, which presently and for the foreseeable future serves as the cornerstone of Napa County's economy.

(d) On December 3, 1996, the Board adopted Ordinance No. 1117, which determined that the processing of additional new applications for well drilling permits in areas designated as "open space" on the land use map of the Napa County General Plan created an immediate threat to the health, safety and welfare of Napa County residents. The Board concluded that issuing such new permits would authorize either the concentrated extraction of groundwater within limited areas, or the transfer and use of water on parcels other than the parcel where the well is located, or both. Doing so would result in significant extraction of groundwater and potentially detrimental effects on the limited groundwater supplies of Napa County.

(e) In adopting Ordinance No. 1117 on December 3, 1996, the Board also found that more than 150 unconditional certificates of compliance had been issued during the past several years and numerous lot line adjustments had been approved, with most of these certificates of compliance and lot line adjustments located within open space areas of the county where groundwater supplies are particularly limited.

(f) Passage of Ordinance No. 1117 on December 3, 1996, resulted in the Board imposing a 45-day moratorium pursuant to Government Code section 65858 upon the receipt, processing or approval of applications for well drilling permits that would authorize the drilling of multiple wells on adjacent parcels, or would authorize the drilling of single wells that are intended to service multiple parcels, pending the Board of Supervisors' development of adequate land use regulations regulating the extraction and use of groundwater resources in Napa County.

(g) Based upon a report to the Board dated January 3, 1997, by the Departments of Environmental Management, and Conservation, Development and Planning, the Board determined on January 21, 1997, that the circumstances described in the findings contained in Ordinance No. 1117 still existed. Noting that those departments were still working on regulations the Board could adopt to alleviate the conditions that prompted the adoption of Ordinance No. 1117, the Board on that same date adopted Ordinance No. 1119, which extended the terms of Ordinance No. 1117 until December 2, 1997. In approving this extension, the Board relied upon the authority of Government Code section 65858.

(h) Based upon a report to the Board dated November 20, 1997 by the Director of Conservation, Development and Planning, the Board determined on November 25, 1997, that the circumstances described in the findings contained in Ordinance No. 1117 and 1119 still existed. Noting that the departments of Environmental Management and Conservation, Development and Planning were still working on regulations that the Board could adopt to alleviate the conditions that prompted the adoption of Ordinance No. 1117 and 1119, the Board on November 25, 1997, adopted Ordinance No. 1130, which extended the terms of Ordinance No. 1117 and 1119 until December 2, 1998. In approving this extension, the Board relied upon the authority of Government Code section 65858.

(i) The Board reaffirms its conclusion in Ordinances No. 1117, 1119 and 1130 that Napa County land use regulations at the present time continue to be unclear as to whether or not a use permit must be obtained either prior to drilling one or more wells for the purpose of extracting groundwater and transferring the water extracted to parcels other than the parcel on which the well is located, or prior to drilling multiple wells on adjacent parcels, whether or not under the same ownership.

(j) The Board reaffirms its conclusion in Ordinances No. 1117, 1119 and 1130 that groundwater supplies in Napa County are limited, particularly but not solely including those areas designated as open space on the land use map of Napa County. Areas of special concern to the County which are designated as open space in the Napa County General Plan include, but are not limited to, the Pope Valley, Chiles Valley, Capell Valley, Carneros and Milliken-Sarco-Tulucay groundwater basins. As a consequence, and in part to protect the groundwater supplies of the county to the maximum extent possible, Napa County through its Flood Control and Water Conservation District has spent significant time and money attempting to develop water supplies from sources outside of Napa County.

(k) The Board reaffirms its conclusion in Ordinances No. 1117, 1119 and 1130 that to protect the limited groundwater that exists in Napa County, particularly but not solely in those areas of the county designated as open space on the land use map of Napa County, the drilling of additional wells for the purposes identified above should not be allowed without first adopting regulations establishing permitting requirements, to ensure that such extraction will not be detrimental to the health, safety and welfare of the residents of Napa County.

(l) The Board finds that without immediate county action, long-term inadequacies in surface and groundwater supplies are likely to develop soon throughout Napa County. As the growing demand for water consumption in Napa County approaches existing available supply capabilities and limitations, supply deficiencies will likely be met by increased reliance on groundwater extraction. As the county's agricultural and rural uses continue to expand, the demand for water will also increase, resulting in potential elimination of any groundwater surplus in those areas of the county where a surplus presently exists. That change is likely to be far more pronounced in the reasonably foreseeable event that other increased demands are also satisfied by using groundwater. The Board concludes that although adequate groundwater reserves may still be present in certain portions of the county, an overdraft in groundwater reserves is likely to be present throughout the county, including the North Napa Valley Basin, within the next several years unless the Board adopts long-term plans and use requirements regulating the extraction and use of groundwater in Napa County.

(m) The Board finds that the public interest in both the conservation and the beneficial use of groundwater resources would be best served by the immediate adoption of groundwater use requirements, and that these requirements would also best serve the health, welfare and safety of those individuals residing within Napa County. Likewise, the Board finds that it would not serve these interests and would jeopardize the health, welfare and safety of those individuals residing within Napa County to avoid adopting such use requirements until scarce groundwater reserves have been depleted and conditions of overdraft become prevalent throughout the county.

(n) The Board finds that those areas depicted on Map "13-1" (hereafter "groundwater-deficient areas") are currently in a groundwater deficit, and that in those areas extraordinary measures are needed to avoid further overdrafts of the groundwater basins.

(o) The Board finds that adoption of the groundwater permitting requirements specified in this ordinance are necessary to ensure, to the maximum extent permissible by law, the sufficiency of groundwater supplies for agricultural uses in Napa County and the long-term viability of agriculture within Napa County and, additionally, to ensure that diversions of groundwater for urban uses are limited to the maximum extent permitted by law;

(p) The Board shall hereafter refer to the present ordinance as the "Napa County Groundwater Conservation Ordinance."

**SECTION TWO**: The Board of Supervisors hereby finds and declares as follows with respect to the Napa County General Plan:

(a) The Napa County general plan includes the following provisions relating to the conservation and beneficial use of groundwater resources within Napa County:

(1) The general plan's goals include the mandates to "take advantage of natural capabilities and minimize conflict with the natural environment" (Goal 3) and to implement the plan to "[e]nsure the long-term protection and integrity of those areas identified in the general plan as agricultural, open space or undevelopable."(Goal 5) (Napa County General Plan ("general plan"), p. 2-16.)

(2) The general plan's "water supply protection" requirement in the land use element includes the county's obligation to "protect public and private water sources from contamination of overdrafts, and encourage groundwater recharge." (Policy 1.9; General plan, p. 2-19.)

(3) The land use element's "resource extraction" provision indicates that county standards "will emphasize environmental implications, such as ... removal of underground water by pumping." (Policy 1.11; General plan, p. 2-20.)

(4) The "water supply" provision of the land use element's agricultural policies provides that "the County will initiate studies to develop a comprehensive understanding of the potentials and deficiencies of surface and underground water supplies in Napa County." (Policy 3.14; General plan, p. 2-24.)

(5) The conservation and open space element of the general plan defines "watershed or groundwater recharge land" as "[l]and designated on the State or any regional or local Open Space Plan as open space land which is important to maintain the quantity and quality of water necessary to the people of the State or any part thereof...," and also establishes as a planning goal "[t]o improve the management and protection of the County's water resources." (General plan, pp. 8-17, 8-18.)

(6) The conservation policy protects "potential groundwater recharge areas from urban encroachment because of the potential need to replenish underground water table to prevent land subsidence or for other reasons." (General plan, p. 8-21.)

(b) The Board finds that this Napa County Groundwater Conservation Ordinance, establishing groundwater findings and use requirements, implements and is fully consistent with the Napa County General Plan, including the provisions identified in subparagraph (a) of Section Two of this ordinance.

**SECTION THREE.** The Board encourages the Napa County Flood Control and Water Conservation District to develop and adopt a coordinated groundwater management program in accordance with the Groundwater Management Act codified at Water Code section 10750, et seq., and other applicable laws.

**SECTION FOUR.** A new Chapter 13.15 is added to Division 1 of Title 13 of the Napa County Code to read in full as follows:

## Chapter 13.15 GROUNDWATER CONSERVATION

**Sections:**


| | |
|---|---|
| **13.15.010** | **Title** |
| **13.15.020** | **Groundwater Permit Required** |
| **13.15.030** | **Classification of Applications** |
| **13.15.040** | **Agricultural Activities Exempt From Groundwater Permitting Requirements** |
| **13.15.050** | **Application for Exemption** |
| **13.15.060** | **Application For Groundwater Permit** |
| **13.15.070** | **Processing of Groundwater Permit Applications** |
| **13.15.080** | **Exceptions** |
| **13.15.090** | **Appeals** |


**13.15.010 Title.** This chapter implements the Napa County Groundwater Conservation Ordinance.

**13.15.20 Groundwater Permit Required.** No applications filed pursuant to division I of title 13 of this code for development of a new water system or improvement of an existing water system within Napa County that may use groundwater as a water source on the affected property shall be approved by any employee, department or body of Napa County until the applicant has obtained a groundwater permit if required by this chapter. Prior to the issuance of a building permit pursuant to chapter 15.08.040, or any other permit or administrative approval facilitating the development or use of any lot that may utilize a groundwater supply, this chapter must first be satisfied. Prior to the final approval of a subdivision a groundwater permit must be secured if an existing, new or improved water system will provide groundwater to the subdivision.

**13.15.030. Classification of Applications.** Applications described in section 13.15.020 shall be classified as follows for the purpose of determining whether a groundwater permit is required under this Chapter:

A. **Applications exempt from groundwater permit requirement.**

1. In the case of uses permitted without a use permit under any provision of this Code, applications to develop or improve an on-parcel water source, or an off-parcel water source serving a single contiguous parcel, are exempt from the requirement that a groundwater permit must be secured under this chapter, unless the water source :

a. Is located on a parcel included within those "groundwater deficient areas" depicted on Map 13-1; or

b. Is located on a parcel of less than one acre, where the development or improvement would serve that parcel only, and public water is available.

2. Applications to develop or improve an on or off-parcel water source serving agriculture are also exempt from the requirement of a groundwater permit under this chapter to the extent provided in section 13.15.040.

3. The director of environmental management may declare a site-specific emergency exempting an application from the requirement of a groundwater permit under this chapter based upon substantial evidence in the record that the applicant's water source is needed to serve an existing use that has lost its water supply.

B. **Applications requiring groundwater permits where a use permit is not required.**

In the case of uses permitted without a use permit under any provision of this Code, applications to develop or improve an on or off-parcel groundwater source, unless exempt under subparagraph (A) above, shall not be approved unless the applicant has first obtained a groundwater permit under this chapter.

C. **Applications requiring use permits.** In the case of uses requiring the issuance of a use permit pursuant to any provision of this Code, applications to develop or improve an on or off-parcel groundwater source in conjunction with such a use are not required to obtain a groundwater permit under this chapter. Groundwater review of such applications shall occur in accordance with the county's procedures to obtain a use permit, including the requirement of groundwater findings under title 18 of this code.

**13.15.040 Agricultural Activities Exempt From Groundwater Permitting Requirements.**

A. Applications to develop or improve a water source serving agriculture, as defined in section 18.08.040 of this code, shall be exempt from the requirement of a groundwater permit under this chapter where the water would only serve the property where the water source is located, or contiguous property. For purposes of this section only, "contiguous property" refers to property in common ownership that is joined at more than one common point to the property where the water source is located, or connected in a pattern of parcels, each joined to another, that includes the property where the water source is located. If the contiguous property consists of more than one (1) parcel, all parcels must be in agricultural production, in order to qualify for an exemption pursuant to this section. Parcels designated Agricultural Resource ("AR") must be in at least 80% agricultural production of the allowable, plantable land and parcels designated Agriculture, Watershed & Open Space ("AWOS") must be in at least 80% agricultural production of the allowable, plantable land.

B. Notwithstanding subparagraph (A), developments or improvements in water sources serving agriculture on any other properties, including adjacent property not qualifying as "contiguous" for purposes of this section, shall be subject to the same permitting criteria and standards identified in sections 13.15.030 and 13.15.070.

C. Notwithstanding subparagraph (A), developments or improvements in water sources located on parcels included within those "groundwater-deficient areas" depicted on Map 13-1 shall be subject to those permitting criteria and standards identified in sections 13.15.030 and 13.15.070.

**13.15.050 Application For Exemption.**

(A) Each applicant seeking a determination that the development of a new water system, or the improvement to an existing water system, is exempt from the requirement of a groundwater permit under this chapter shall submit an application for exemption to the director of the department of environmental management, using a form provided by the director, explaining the basis for the exemption. Where the applicant claims an agricultural exemption under section 13.15.040, the applicant shall provide a declaration to enable the director to determine whether the water system would serve qualifying agriculture on the property where the water system is located, or on contiguous property as defined in section 13.15.040, or both. The director shall furnish a copy of any application for exemption to the department of public works to obtain its written comments on the application.

(B) Reporting. In the case of exemptions granted pursuant to section 13.15.040 the holder of the exemption shall be required to file with the Department biennially a report demonstrating that the parcel continues to be in at least 80% agricultural production of the allowable, plantable land.

**13.15.060 Application for Groundwater Permit.** Each applicant seeking to develop a new water system, or improve an existing water system, requiring a groundwater permit under this chapter shall submit a groundwater declaration to the director of the department of environmental management, using a form provided by the director. That declaration shall:

A. Identify any present and future uses of any existing water system, including whether and to what extent groundwater is or will be used as a water source on the affected property;

B. Identify any water sources other than groundwater intended to be used;

C. State the number of parcels and service connections the new water system or improvement are intended to serve, identify the location of the structures and improvements to be served by that new or improved water system, and identify existing and future uses and users to be served by that new or improved water system; and

D. Indicate whether it is likely the new water system or improvement would significantly affect the impacted groundwater basin within Napa County together with supporting documentation that will enable the Director to determine whether or not the proposed improvement or new system has the potential to adversely impact the affected groundwater table, potentially have a negative effect on agriculture in the affected groundwater basin, degrade water quality, adversely affect reasonable and beneficial uses of groundwater, interfere with surface water flows, or cause other adverse changes to the physical environment adversely affecting the impacted groundwater basin.

**13.15.070 Processing of Groundwater Permit Applications.** The following procedures and standards shall govern the review and disposition of applications requiring groundwater permits or exemptions under this chapter:

A. The director of environmental management or his designee shall review any applicant's groundwater declaration or exemption statement submitted under this chapter for compliance with the requirements of this chapter and any other applicable provisions of law.

B. Prior to approving an exemption, the director shall review the environmental determination and written comments received from the department of public works. Where the director finds that the application is exempt, no further groundwater review shall take place under this chapter. Where the director denies a request for exemption, the applicant shall submit a groundwater declaration in accordance with section 13.15.060 of this code.

C. After receiving a groundwater declaration for an application determined not to be exempt, the director or his designee shall furnish a copy of the applicant's declaration to the department of public works to obtain their written comments on the application. The director shall also furnish a copy of the application to the director of the conservation, development and planning department for purposes of conducting the required environmental review. The director or his designee shall also instruct the applicant to perform any required Phase I, II or III water availability analysis in accordance with procedures established by the department of public works. The department of public works also shall determine whether approving the application would adversely affect static water levels of neighboring wells prior to submitting its comments. The director of public works or his designee shall submit its comments in the form of a written appraisal of the application to the director of environmental management. That appraisal shall assess any impact on the affected groundwater table, assess any potentially negative effect on agriculture in the affected groundwater basin, and assess the degradation of water quality, adverse effects on reasonable and beneficial uses of groundwater, interference with surface water flows, or other adverse changes to the physical environment.

D. The director of environmental management shall consider approving a groundwater permit only after reviewing the declaration, the environmental determination, and any written comments received regarding the application, including the written appraisal of the department of public works. After that review, the director of environmental management shall only approve a groundwater permit after making any necessary environmental determination and concluding, based on substantial evidence in the record, that the new water system or improvement would not significantly affect the impacted groundwater basin in Napa County. In making this determination, the director shall consider, but is not limited to, the following factors: impact on the affected groundwater table; negative impact on agriculture in the affected groundwater basin; degradation of water quality; adverse effects on the reasonable and beneficial uses of groundwater; interference with surface water flows; or other adverse changes to the physical environment.

E. In approving a groundwater permit, the director may impose reasonable conditions on the permittee as needed to satisfy the requirements of this chapter and to protect the public health, safety and welfare; provided however, that any groundwater permit granted to a public agency, or granted to a person or persons who subsequently transfers some or all of the groundwater extracted pursuant to the permit to a public agency for use by a public agency, shall be valid for a maximum of three (3) years. The grant of a permit subject to this three year limitation shall include conditions relating to the termination and renewal of the permit; provided, however, that such conditions shall include, at a minimum, a condition that the permit may be renewed only upon the approving authority finding that the renewal would not cause significant adverse effects on the affected groundwater basin or the surrounding agricultural operations.

F. If the director determines after review that the applicant's groundwater declaration satisfies the groundwater permitting requirements of this chapter, and any other applicable provisions of law, the director shall issue a tentative decision approving or conditionally approving a groundwater permit. If the director determines the application and groundwater declaration do not meet the permitting requirements of this chapter, or any other applicable provisions of law, the director shall issue a tentative decision denying the groundwater permit.

G. Within seven calendar days of the issuance of the tentative decision, the director shall give notice of its issuance, including the date on which a tentative decision will become final if a public hearing is not requested, which date shall be not less than ten calendar days following the date notice of the tentative decision is mailed. The notice shall be given by all of the following means:

1. Notice shall be personally delivered or placed in the mail to the applicant seeking approval of a groundwater permit under this chapter.

2. Notice shall be placed in the mail to each public entity with jurisdiction over any portion of the groundwater basin in which the proposed extraction would be expected to occur.

3. Notice shall be personally delivered or placed in the mail to the owners of all real property, including businesses, corporations, or other public or private entities, as shown on the latest equalized assessment roll, within 300 feet of the outer perimeter of the properties that will utilize the extracted groundwater. In lieu of utilizing the assessment roll, the records of the county assessor or tax collector may be used if they contain information more recent than the assessment roll.

4. Notice shall be mailed to any person who has filed a written request therefor with the director of environmental management. Such requests may be submitted at any time during the calendar year and shall apply for the balance of such calendar year.

H. The tentative decision shall become final once the period identified in the notice during which a public hearing may be requested has expired without a request for a public hearing having been received. If a public hearing is requested in a timely manner, the director shall set the hearing date and personally deliver or mail a notice of the time, place and date of the hearing, in the same manner and to the same persons as the notice of the tentative decision was mailed or delivered. This notice shall be mailed not less than ten and not more than thirty calendar days prior to the date of the hearing.

I. The director shall conduct the public hearing. Any member of the public may attend and present oral testimony, written or other evidence, or both. The proceedings shall be electronically recorded and the tapes thereof retained in the director's custody for three years after the hearing except during such time as they may be undergoing transcription for preparation of the record on appeal.

J. Within five calendar days following the conclusion of the public hearing, the director shall issue a final decision approving, conditionally approving, or denying the request to issue a groundwater permit. The director shall give notice of the final decision to all persons who appeared and presented testimony at the hearing.

K. Final determinations of the director of environmental management (or on appeal, the Board of Supervisors) are discretionary for purposes of the California Environmental Quality Act (Pub. Res. Code, §21000, et seq.) except that determinations of exemption pursuant to subparagraph (A)(1) and (A)(3) of section 13.15.030 and section 13.15.040 are deemed ministerial acts and are exempt from the California Environmental Quality Act.

**13.15.080 Exceptions.** Notwithstanding any other provisions of this chapter:

A. No groundwater permit should be denied where the director of environmental management (or on appeal, the Board of Supervisors) determines, after reviewing the entire record, that a denial would constitute an unconstitutional taking of property without just compensation, or would effect an unreasonable use or waste of water.

B. The groundwater review and permitting requirements of this chapter shall be waived when applying them would delay effective response to a general emergency declared by the Governor or the Napa County Board of Supervisors. "General emergency," as used herein, refers to a sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or other essential public services.

**13.15.090 Appeals.** Any person may appeal a final decision of the director made, following a request for hearing pursuant section 13.15.070(H), in accordance with the procedures set forth in Chapter 2.88 of this code. Appeals of tentative decisions that become final following the expiration of the period of time within which a hearing must be requested, because no request for a hearing was received, are not permitted.

<u>**SECTION FIVE**</u>. The Board reaffirms its finding in Ordinance Nos. 1117, 1119 and 1130 that in the absence of a permanent regulatory solution addressing groundwater extractions that might otherwise adversely and permanently affect the water table, approval of additional subdivisions will likely result in groundwater being used as the water source, resulting in a threat to the public health, safety, and welfare. To address this problem and ensure that subdivision approvals do not produce such an adverse effect, the Board amends Title 17 ("Subdivisions") of the Napa County Code by adding a new Chapter 17.59 to Title 17 of the Napa County Code to read in full as follows:

**CHAPTER 17.59 GROUNDWATER CONSERVATION**

**17.59.010. Subdivision Application; Groundwater Findings Required.** Any subdivision application submitted under this title (including applications for tentative maps, vesting tentative maps, final maps, lot line adjustments and conditional certificates of compliance) shall disclose whether the proposed subdivision requires or anticipates the use of groundwater as a water source. Where the subdivision requires or anticipates the use of groundwater as a water source the subdivision application shall not be approved or conditionally approved until a groundwater permit has been obtained.

**SECTION SIX.** Subsection (A) of Section 17.14.230 of the Napa County Code ("Lack of Water or Sewer Services") is amended to read in full as follows:

A. As a condition of approving a tentative map, the advisory agency, or on appeal the board, shall require that any proposed subdivision that involves parcels on which a water system has not and will not be installed shall include within the document required to be filed by Section 17.08.110, a statement containing the following language in boldface capital letters:

> "No water supply is provided for any parcel located within this subdivision as of the date of recordation of this document. Prior to the issuance of a building permit or any other permit permitting development of any lot requiring a domestic water supply, the requirements of Division I of Title 13 of the Napa County Code, Chapters 13.04 through 13.12, commencing with Section 13.04.010, must first be satisfied. Where that permit requires or is anticipated to require a groundwater supply, the requirements of Chapter 13.15 must also first be satisfied."

**SECTION SEVEN.** The Board reaffirms its finding in Ordinance No. 1119 that in the absence of a permanent regulatory solution addressing groundwater extractions that might otherwise adversely and permanently affect the water table, "the approval of additional subdivisions, use permits, variances, building permits, or other applicable entitlements for use which would be required in order to comply with those provisions of the Napa County Code relating to zoning, and more likely than not would result in groundwater being utilized as the water source, would result in a threat to the public health, safety or welfare." The Board amends title 18 of the Napa County Code ("Zoning") as follows:

(a) Subsection (F) of Section 18.04.010 is amended to read in full as follows:

F. Further, this board deems it necessary, for the purpose of promoting the health, safety and general welfare of the county, to revise the existing zoning ordinance, and in conjunction therewith substantially to revise the number, shape and area of zoning districts into which the unincorporated area of the county is divided, and substantially to revise the regulations pertaining to such zoning districts in accordance with the general plan and the following objectives:

1. To lessen congestion on roads and highways;

2. To protect necessary rights-of-way for streets and highways within the county against encroachment by permanent physical improvements, the existence of which would make unnecessarily difficult or impractical the retention or creation of thoroughfares adequate in alignment, dimension and vision clearance to serve public needs;
3. To secure safety from fire, flood, earthquake and other dangers;
4. To promote health, safety and the general welfare;
5. To provide adequate light and air;
6. To provide open space for the preservation and managed production of natural resources and out-door recreation;
7. To prevent the overcrowding of land;
8. To avoid undue concentration of population;
9. To facilitate adequate provision of transportation, water, sewerage, schools, parks and all other community services in urban areas;
10. To assure that urban development be limited to locations in existing urban areas where adequate utilities and services can be provided;
11. To conserve and protect the natural environment, including fish and wildlife habitat;
12. To encourage avoidance and reduction of inefficient, wasteful and unnecessary consumption of energy;
13. To provide adequate acreage for staged and orderly industrial development in accordance with the county general plan in areas where water and sewer services are best suited for efficient industrial development;
14. To strengthen the county's economic base and increase the county's tax revenues by protecting the value of land zoned for industrial activities;
15. To preserve sites and structures of a special historical, archaeological or architectural character, and to provide for the maintenance and development of appropriate settings for such resources;
16. To provide for recreation vehicle parks in approved locations to serve the needs of both local residents and visitors, and to establish minimum standards and requirements for the location and development of such parks;
17. To provide for agricultural use in predominantly residential areas where agriculture is and should continue to be a compatible use;
18. To discourage to the maximum extent possible further parcelization of agricultural resource and agriculture, watershed and open space areas due to the adverse effect on agriculture such parcelizations generally pose.
19. To avoid overdrafts in extractions from the groundwater basins of Napa County, to maximize the long-term beneficial use of Napa County's groundwater resources, and to ensure that sufficient groundwater is available for the long-term viability of agriculture in Napa County.

(b) Section 18.124.060 is amended to read in full as follows:

**18.124.060 Conditions for issuance.**

The commission may issue a permit subject to conditions specifically set forth in the permit when the commission makes the findings prescribed in Section 18.124.070. Such conditions may include, without limitation, conditions governing the following matters:

A. Ingress and egress to the property and proposed structures thereon with particular reference to automobile and pedestrian safety and convenience, traffic flow and control and access in case of fire or catastrophe;

B. Off-street parking and loading arrangements to facilitate the concerns set forth in subsection (A) of this section;

C. Mitigation of noise, glare, dust, smoke, odor or other effects of the proposed use in relation to adjoining property and property generally in the vicinity;

D. Refuse and service areas;

E. Utilities, and their locations and availability;

F. Screening, buffering and landscaping;

G. Signs, if any;

H. Exterior and interior lighting, particularly with reference to glare, traffic safety and compatibility with nearby properties and uses;

I. Yards;

J. Mitigation of adverse environmental effects if any;

K. The time period for which the permit shall be valid.

L. Mitigation of adverse effects on groundwater resources.

(c) Section 18.124.070 is amended to read in full as follows:

**18.124.070 Issuance—Findings required.**

Before issuing a use permit, the commission shall make the following written findings:

A. That the commission has the power to issue a use permit under the zoning regulations in effect as applied to the property;

B. That the procedural requirements set forth in this chapter have been met;

C. That grant of the use permit, as conditioned, will not adversely affect the public health, safety or welfare of the county;

D. That the proposed use complies with applicable provisions of this code and is consistent with the policies and standards of the general plan and any applicable specific plan.

E. That the proposed use would not require a new water system or improvement causing significant adverse effects, either individually or cumulatively, on the affected groundwater basin in Napa County, unless that use would satisfy any of the other criteria specified for approval or waiver of a groundwater permit under section 13.15.070 or 13.15.080 of this code.

(d) Section 18.128.060 is amended to read in full as follows:

**18.128.060 Findings prior to issuance.**

A. Before issuing a variance, the commission shall make the following written findings:

1. That the procedural requirements set forth in this chapter have been met;

2. Special circumstances exist applicable to the property, including size, shape, topography, location or surroundings, because of which strict application of the zoning district regulations deprives such property of privileges enjoyed by other property in the vicinity and under identical zoning classification;

3. Grant of the variance is necessary for the preservation and enjoyment of substantial property rights;

4. Grant of the variance will not adversely affect the public health, safety or welfare of the county of Napa.

5. Grant of the variance would not require a new water system or improvement causing significant adverse effects, either individually or cumulatively, on the impacted groundwater basin in Napa County, unless that use would satisfy any of the other criteria specified for approval or waiver of a groundwater permit under section 13.15.070 or 13.15.080 of this code.

B. If the proposed variance is for the purpose of permitting the creation of one or more parcels that will be less than the minimum parcel size established by Section 18.104.010(A), the commission shall approve the requested variance only if it makes the following additional written findings:

1. The parcel(s) proposed to be created will be less than the minimum size established by the underlying zoning district regulations;

2. The parcels proposed to be created result from a parcel being bisected by a county road as a result of a county-initiated realignment of an existing public road; and

3. The primary purpose of that realignment is to correct or eliminate a documented hazardous condition.

C. Except as provided in subsection (B), variances of the minimum parcel size are not permitted.

**SECTION EIGHT.** The Board amends chapter 18.118 of the Napa County Code by deleting the present title, "Water Conservation Regulations," and substituting the following title: "Water Conservation Regulations for Landscape Design."

**SECTION NINE.** A new Chapter 18.141 is added to Title 18 of the Napa County Code to read in full as follows:

## CHAPTER 18.141 GROUNDWATER CONSERVATION

**Sections:**
**18.141.010**

**18.141.010** Any zoning applications filed under this title shall disclose whether the proposed use requires or anticipates the use of groundwater as a water source. Where that use requires groundwater review and the issuance of a groundwater permit under chapter 13.15 of this code, the zoning application shall not be approved until that review has been completed and a groundwater permit has been obtained.

**SECTION TEN.** Subparagraph (A) of Section 15.08.040 is amended to read in full as follows:

A. No building permit shall be issued unless and until the building official has made all of the following findings in regard to the proposed development:

1.The director of environmental management has certified or stated that an approved water supply and sewage disposal system exist, or that plans have been submitted and approved by the director that equal or exceed the standards set forth in Chapters 13.04 through 13.56 of Title 13 of this code, and where a groundwater permit will be required, that the requirements of chapter 13.15 have been satisfied.;

2. The planning division of the conservation, development and planning department has certified or stated that all applicable requirements of Titles 17 and 18 of this code have been met, including but not limited to compliance with conditions that were required to be met prior to the issuance of a building permit as a result of the approval of a land division, lot line adjustment, certificate of compliance, use permit, variance, or other entitlement for use relating to the parcel on which the building will be constructed;

3. The director of public works has certified or stated that either Chapter 16.04 is not applicable or that the requirements set forth in that chapter have been met;

4. If the development project is within the fourteen-thousand-foot radius of the boundary of the Napa County Airport, as defined in 18.80 of this code, and any provision of this code or any applicable specific plan requires that an aviation, hazard and noise easement acceptable to the director of aviation and consistent with FAA regulations be executed prior to the construction of the proposed development, the director of aviation has certified or stated that such an easement has been executed in favor of the county;

5. The planning division of the conservation, development and planning department has certified or stated that the proposed development is to occur on a legal lot of record;

6. All applicable fees shall have been paid, including but not limited to fees for:

a. Building and zoning plan-checks, and

b. The issuance of any required building permit, and

c. The issuance of all required permits by the department of environmental management and public works;

7. The school district within whose boundaries the development is proposed to be located has certified or stated that any fee, charge, dedication or other form of exaction levied by the governing board of the school district will be satisfied in a manner acceptable to the district.

<u>**SECTION ELEVEN**</u>. The county may elect to proceed with a civil action against a violator, including seeking injunctive relief. Any person or entity that violates this chapter shall be subject to fines of up to five thousand dollars ($5,000.00) per separate violation. A person or entity shall be deemed to have committed separate violations for each and every day or portion thereof during which any such violation is committed, continued or permitted as well as for each and every separate groundwater well with which any such violation is committed, continued, or permitted.

<u>**SECTION TWELVE**</u>. If a court of competent jurisdiction holds this ordinance or any of its provisions invalid, or application of this ordinance or any of its provisions invalid as to any person, the remaining valid portions of this ordinance and its valid application to other persons

its provisions invalid, or application of this ordinance or any of its provisions invalid as to any person, the remaining valid portions of this ordinance and its valid application to other persons shall continue in full force and effect, to the end that any portion or application held invalid shall be severable.

**SECTION THIRTEEN**. This ordinance shall be published before the expiration of fifteen calendar days after its passage at least once in the Napa Valley Register, a newspaper of general circulation printed and published in the County of Napa, together with the names of the members voting for and against the same.

The foregoing ordinance was introduced and read at a regular meeting of the Board of Supervisors of the County of Napa, State of California, held on the 27th day of July, 1999, and passed at a regular meeting of the Board of Supervisors of the County of Napa, State of California, held on the 3rd day of August, 1999, by the following vote:

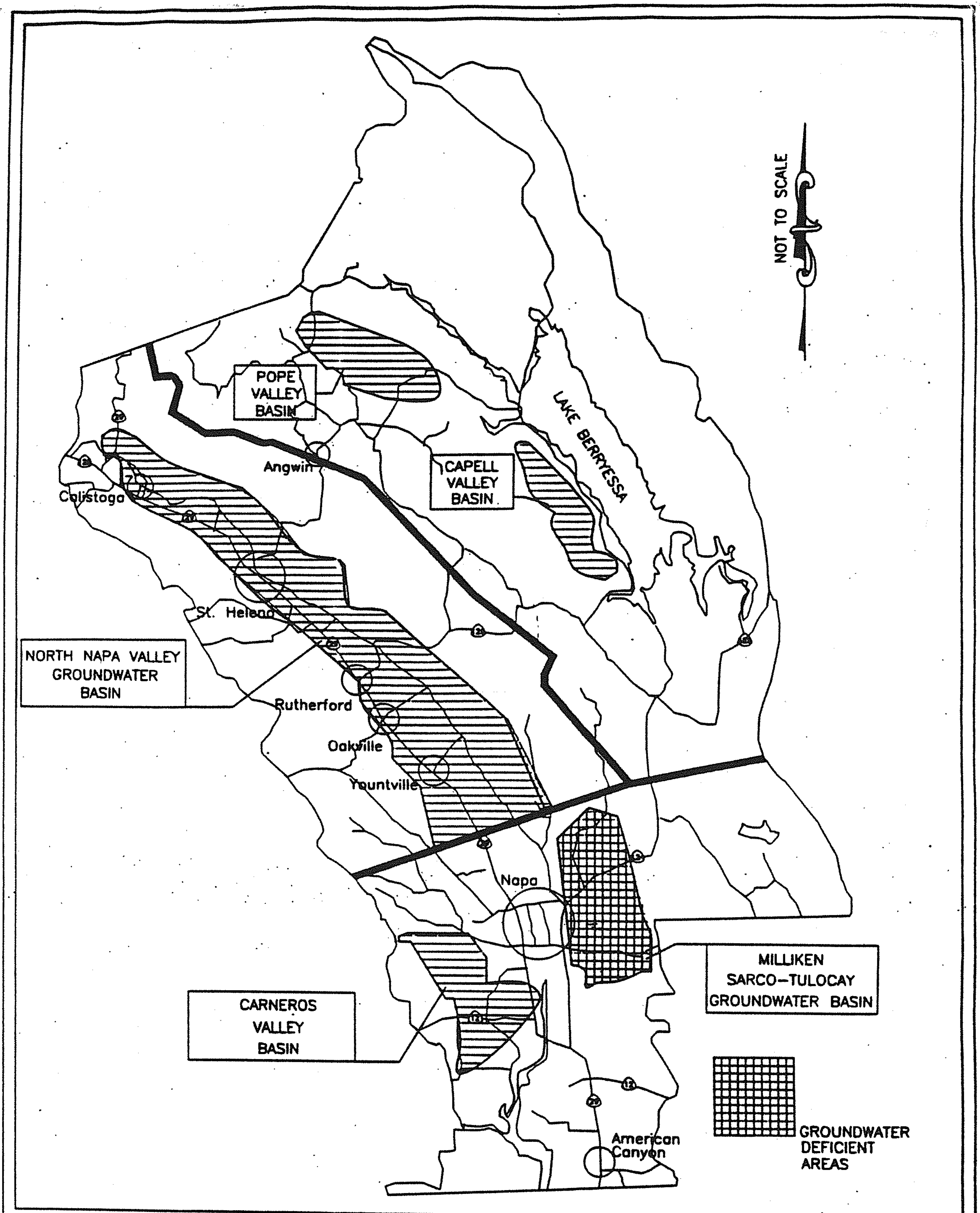
| | | |
|---|---|---|
| AYES: | SUPERVISORS | WINTER, VARRELMAN, RIPPEY, WAGENKNECHT and LUCE |
| NOES: | SUPERVISORS | NONE |
| ABSTAIN: | SUPERVISORS | NONE |
| ABSENT: | SUPERVISORS | NONE |

MARK LUCE, CHAIRMAN
Board of Supervisors

ATTEST:
MARY JEAN McLAUGHLIN
Clerk of the Board

By: Deputy

**APPROVED AS TO FORM**
Office of County Counsel
By:
Date: 7/27/99




# GROUNDWATER BASINS OF NAPA COUNTY

MAP 13-1: Groundwater - Deficient Areas

## 12. County of Napa. 2002 - 2016. Napa County Board of Supervisors Resolutions related to the Watershed Information and Conservation Council (10). May 21, 2002 – December 20,2016

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CERTIFIED COPY

**RESOLUTION NO.** 02-103

**RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF NAPA, STATE OF CALIFORNIA, APPROVING CREATION OF THE NAPA RIVER WATERSHED CONSERVANCY AND WATERSHED INFORMATION CENTER BOARD**

**WHEREAS,** on October 3, 2000, the Board of Supervisors received the Napa River Watershed Task Force ("Task Force") - Phase II Final Report (the "Report") providing the Task Force analysis and recommendations which included, but were not limited to, creation of the Napa River Watershed Conservancy Program and creation of the Napa River Watershed Information Center;

**WHEREAS,** the Conservancy Program is intended to support restoration and resource protection activities and would coordinate land acquisition and restoration projects under the guidance of a board of directors;

**WHEREAS,** the Watershed Information Center is intended to be a long-term resource management program that will provide public outreach, educational efforts and monitoring coordination, inventory and assessment, and data management;

**WHEREAS,** the Watershed Oversight Committee (the "Oversight Committee") recommended the creation of a joint Napa River Watershed Conservancy and Watershed Information Center board ("Conservancy/WIC Board") at its meeting on March 27, 2002, made final recommendations on the composition of the joint Conservancy/WIC Board and directed staff to forward those recommendations to the Board of Supervisors for consideration;

**WHEREAS**, on May 7, 2002, the Board of Supervisors declared its intent to form the Conservancy/WIC Board and approved the following Conservancy/WIC Board members:

A. One (1) member of the Napa County Land Trust;
B. One (1) member of the Napa County Resource Conservation District;
C. One (1) member of the Natural Resource Conservation Service;
D. Two (2) members of the Napa County Board of Supervisors;
E. One (1) member of the Napa County Conservation, Development and Planning Commission;
F. Two (2) members of the cities (represented by the League of Municipalities);
G. Six (6) public at large members representing environmental, agricultural, development and community interests to be appointed by the Board of Supervisors.

<u>Technical Advisory Members:</u>

One (1) representative of the Natural Resource Conservation Service
One (1) representative of the Napa County Flood Control and Water Conservation District

One (1) representative of the California Department of Fish and Game
One (1) representative of the California Department of Forestry and Fire Protection
One (1) representative of the Regional Water Quality Control Board
One (1) representative of the Environmental Protection Agency
One (1) representative of the Napa County Resource Conservation District
One (1) representative of the Napa County Conservation, Development and Planning Department
Four (4) representatives comprised of professional and academic research scientists and technical experts

**NOW, THEREFORE, BE IT RESOLVED** that the Board of Supervisors of the County of Napa hereby creates the Conservancy/WIC Board subject to the following:

1. The Conservancy/WIC Board membership and technical advisory members shall be comprised of the members listed herein.
2. The Conservancy/WIC Board shall conduct its first organizational meeting no later than August 15, 2002.
3. The Conservation, Development and Planning Director or his designee shall serve as Secretary to the Conservancy/WIC Board.
4. To the extent that the Conservancy/WIC Board requires funds for operations and expenses of the Conservancy/WIC Board, it shall submit a proposed budget to the Board of Supervisors consideration and approval.

The foregoing resolution was duly and regularly adopted by said Board of Supervisors of the County of Napa, State of California, at a regular meeting of said Board held on the 21st day of May, 2002, by the following vote:

AYES: SUPERVISORS VARRELMAN, RIPPEY, LUCE AND WAGENKNECHT

NOES: SUPERVISORS NONE

ABSENT: SUPERVISORS DODD

Vice

~~BILL DODD~~, Chairman, Brad Wagenknecht
Board of Supervisors

ATTEST:

MARY JEAN McLAUGHLIN
Clerk of the Board

By: Teri Sisson, DEPUTY

APPROVED AS TO FORM
Office of County Counsel
By:
Date: 5/15/02

THE FOREGOING INSTRUMENT IS A CORRECT COPY OF THE ORIGINAL ON FILE IN THIS OFFICE
ATTEST:
CLERK OF THE BOARD OF SUPERVISORS OF THE COUNTY OF NAPA, STATE OF CALIFORNIA
BY ____________ DEPUTY

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## RESOLUTION NO. 04-26

### A RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF NAPA, STATE OF CALIFORNIA, AMENDING RESOLUTION NO. 02-103 REGARDING THE SELECTION CRITERIA FOR THE NAPA RIVER WATERSHED CONSERVANCY AND WATERSHED INFORMATION CENTER BOARD AND ESTABLISHING TERM LIMITS FOR BOARD MEMBERS

**WHEREAS,** on May 21, 2002, the Board adopted Resolution No. 02-103 creating the joint Napa River Watershed Conservancy and Watershed Information Center Board (the "Conservancy/WIC Board") and the composition of the members of the Conservancy/WIC Board;

**WHEREAS,** the Board desires to amend Resolution No. 02-103 to clarify the selection criteria for members of the Conservancy/WIC Board to reflect organizational changes and to specify term limits;

**WHEREAS,** the Board of Supervisors of the County of Napa declares that the Conservancy/WIC Board shall be comprised of the following individuals:

A. One (1) member nominated by the Napa County Land Trust from among the Land Trust's board of directors;
B. One (1) director or associate director nominated by the Napa County Resource Conservation District;
C. One (1) representative from the Natural Resource Conservation Service;
D. Two (2) members of the Napa County Board of Supervisors;
E. One (1) member of the Napa County Conservation, Development and Planning Commission;
F. Two (2) city members nominated from the City Selection Committee; and
G. Six (6) Napa County residents from the public at large representing environmental, agricultural, development and community interests as selected by the Napa County Board of Supervisors.

**WHEREAS,** the Board of Supervisors declares that the term of office for four (4) members of the Conservancy/WIC Board shall be two (2) years from the initial date of appointment, and three (3) years from the initial date of appointment for five (5) members, and four (4) years from the initial date of appointment for five (5) members. Thereafter, each member shall serve for a period of four (4) years.

**NOW, THEREFORE BE IT RESOLVED** that the Board of Supervisors of the County of Napa hereby finds as follows:

1. The Conservancy/WIC Board membership shall be comprised of the members listed herein.

2. The term limits for the Conservancy/WIC Board members shall be as stated herein.
3. All other terms and provisions in Resolution No. 02-103 shall remain unchanged and in effect.

**THE FOREGOING RESOLUTION WAS DULY AND REGULARLY ADOPTED** by the Board of Supervisors of the County of Napa, State of California, at a regular meeting of said Board held on the 24th day of February, 2004 by the following vote:

| | | |
|---|---|---|
| AYES: | SUPERVISORS | RIPPEY, DODD, DILLON, WAGENKNECHT and LUCE |
| NOES: | SUPERVISORS | NONE |
| ABSENT: | SUPERVISORS | NONE |

MARK LUCE, Chairperson
Napa County Board of Supervisors

ATTEST:

PAMELA MILLER
Clerk of the Board

By: Pamela Miller

**Approved by the Napa County Board of Supervisors**
Date: February 24, 2004
Processed by:
Deputy Clerk of the Board

**Approved As To Form**
**Office of County Counsel**
By:
Deputy County Counsel
Date: 1/26/04

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**RESOLUTION NO. 04-77**

**A RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF NAPA, STATE OF CALIFORNIA, CREATING TWO ALTERNATE MEMBERS FOR THE NAPA RIVER WATERSHED CONSERVANCY AND WATERSHED INFORMATION CENTER BOARD, ESTABLISHING TERM SERVICE AND TERMINATION CONDITIONS FOR BOARD MEMBERS AND APPROVING THE BOARD'S BYLAWS**

**WHEREAS,** on May 21, 2002, the Board adopted Resolution No. 02-103 creating the joint Napa River Watershed Conservancy and Watershed Information Center Board (the "Conservancy/WIC Board") and the composition of the members of the Conservancy/WIC Board;

**WHEREAS,** on February 24, 2004, the Board adopted Resolution No. 04-26 amending Resolution No. 02-103 by clarifying the selection criteria for members of the Conservancy/WIC Board to reflect organizational changes and specifying term limits;

**WHEREAS,** the Board desires to create two alternate members on the Conservancy WIC/Board, one from the cities as nominated by the City Selection Committee and one from the Board as nominated by the Napa County Board of Supervisors, in the event that a member from the cities or the Board of Supervisors is unable to attend a meeting of the Conservancy/WIC Board;

**WHEREAS,** the Board desires to establish service and termination conditions for Conservancy WIC/Board members;

**WHEREAS,** pursuant to County Policy Manual Section G(2) on Page 11 of Section 8, the rules and regulations of a committee's conduct of business must be adopted by the Board of Supervisors. The Conservancy WIC/Board intends to adopt the proposed amended bylaws attached as Exhibit "A" which the Board desires to approve.

**NOW, THEREFORE BE IT RESOLVED** that the Board of Supervisors of the County of Napa hereby finds as follows:

1. The Conservancy/WIC Board membership shall be comprised of the members listed in Resolution No. 04-26. In addition, there shall be two alternate members, one from the cities as nominated by the City Selection Committee and one from the Board as nominated by the Napa County Board of Supervisors.

2. A Conservancy/WIC Board member's term may be concluded before expiration if any one of the following events occurs:

   a) A member will be considered as having involuntarily resigned from his or her position as a Conservancy/WIC Board member if absent from three consecutive regular meetings during the term year, unless confirmed by illness or other absence approved by a majority of the Conservancy/WIC Board members at any meeting thereof;

   b) A member submits his or her resignation to the Chair of the Conservancy/WIC Board;

   c) A member ceases to reside in Napa County;

d) A member is convicted of a felony or any offense involving a violation of his or her official duties; or

e) A member refuses or neglects to file the required oath of office.

3. The proposed amended bylaws of the Conservancy/WIC Board attached as Exhibit "A" are hereby approved.

4. All other terms and provisions in Resolution No. 02-103 as amended by Resolution No. 04-26 not in conflict with the terms and provisions of this Resolution shall remain unchanged and in effect.

5. The County Executive Officer is directed to place a copy of this Resolution, or appropriate summary thereof, in Part II of the Napa County Policy Manual, as a new Section 24.

**THE FOREGOING RESOLUTION WAS DULY AND REGULARLY ADOPTED** by the Board of Supervisors of the County of Napa, State of California, at a regular meeting of said Board held on the 8th day of June, 2004 by the following vote:

| | | |
|---|---|---|
| AYES: | SUPERVISORS | DODD, DILLON, RIPPEY, WAGENKNECHT and LUCE |
| NOES: | SUPERVISORS | NONE |
| ABSENT: | SUPERVISORS | NONE |

MARK LUCE, Chairperson
Napa County Board of Supervisors

ATTEST:
PAMELA MILLER
Clerk of the Board

By: ____________________

**Approved by the Napa County Board of Supervisors**

Date: June 8, 2004

Processed By:

Deputy Clerk of the Board

**Approved As To Form**
**Office of County Counsel**

By: Laura J. Anderson
Deputy County Counsel

Date: May 24, 2004

Attachments:

Exhibit "A" – Proposed Amended Bylaws of the Napa River Watershed Conservancy and Watershed Information Center Board

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# RESOLUTION NO. 04-102

## A RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF NAPA, STATE OF CALIFORNIA, CHANGING THE NAME OF "THE NAPA RIVER WATERSHED CONSERVANCY AND WATERSHED INFORMATION CENTER BOARD" TO "THE WATERSHED INFORMATION CENTER AND CONSERVANCY OF NAPA COUNTY"

**WHEREAS,** on May 21, 2002, the Board adopted Resolution No. 02-103 creating the joint Napa River Watershed Conservancy and Watershed Information Center Board (the "Conservancy/WIC Board") and the composition of the members of the Conservancy/WIC Board;

**WHEREAS,** during their Strategic Planning process, the Conservancy/WIC Board discussed changing its name to reflect that it would address and serve watersheds throughout Napa County not just the Napa River watershed;

**WHEREAS,** the Board desires to change the name of the Conservancy/WIC Board to better reflect its purpose;

**NOW, THEREFORE BE IT RESOLVED** that the Board of Supervisors of the County of Napa hereby finds as follows:

1. The Conservancy/WIC Board shall be known for all purposes as "The Watershed Information Center and Conservancy of Napa County."

2. The County Executive Officer is directed to place a copy of this Resolution, or appropriate summary thereof, in Part II of the Napa County Policy Manual, as a new Section 24.

**THE FOREGOING RESOLUTION WAS DULY AND REGULARLY ADOPTED** by the Board of Supervisors of the County of Napa, State of California, at a regular meeting of said Board held on the 13th day of July, 2004 by the following vote:

| | | |
|---|---|---|
| AYES: | SUPERVISORS | WAGENKNECHT, DODD, RIPPEY, DILLON and LUCE |
| NOES: | SUPERVISORS | NONE |
| ABSENT: | SUPERVISORS | NONE |

Mark Luce

MARK LUCE, Chairperson
Napa County Board of Supervisors

ATTEST:
PAMELA MILLER
Clerk of the Board

By: Pamela Miller

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**Approved As To Form**
**Office of County Counsel**

By: E-Signature by Laura J. Anderson
Deputy County Counsel

Date: June 29, 2004

**Approved by the Napa County Board of Supervisors**

Date: July 13, 2004

Processed by: [signature]
Deputy Clerk of the Board

# RESOLUTION NO. 05-202

## A RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF NAPA, STATE OF CALIFORNIA, ADOPTING A 2005-06 STRATEGIC PLAN FOR THE WATERSHED INFORMATION CENTER AND CONSERVANCY BOARD AND AMENDING RESOLUTION NO. 04-26 AND RESOLUTION NO. 04-77 REGARDING MEMBERSHIP ON THE WATERSHED INFORMATION CENTER AND CONSERVANCY BOARD

**WHEREAS,** on May 21, 2002, the Board adopted a resolution creating the joint Napa River Watershed Conservancy and Watershed Information Center Board (the "Conservancy/WIC Board") and the composition of the members of the Conservancy/WIC Board. The Conservancy/WIC Board was later renamed the Watershed Information Center and Conservancy Board of Napa County (the "WICC Board");

**WHEREAS,** on March 25, 2004, the WICC Board adopted its first Strategic Plan;

**WHEREAS,** the WICC Board has recommended certain changes to its previously adopted Strategic Plan to better reflect the WICC Board's vision and guiding principles. Those changes are reflected in the "Watershed Information Center and Conservancy of Napa County Final 2005-06 Strategic Plan, dated August 2005" (the "2005-06 Strategic Plan") which the WICC Board recommends that the Board of Supervisors adopt;

**WHEREAS,** one of the recommendations in the 2005-06 Strategic Plan is to expand the WICC Board to include one representative from each city or town in Napa County. Currently, the WICC Board's city representation is limited to two city members and one alternate city member. The city members and alternate city members are currently nominated by the City Selection Committee;

**WHEREAS,** having a representative from each city or town in the County on the WICC Board will promote broader public outreach and community dialogue of the WICC Board's visions and goals. The additional representatives from each city or town in the County will also reduce the need to have an alternate city member;

**NOW, THEREFORE BE IT RESOLVED** that the Board of Supervisors of the County of Napa hereby resolves as follows:

1. The 2005-06 Strategic Plan is hereby adopted and the WICC Board is directed to act in accordance with the guiding principles and actions contained therein.

2. Resolution No. 04-26 regarding two city members nominated from the City Selection Committee and Resolution No. 04-77 regarding an alternate city member nominated from the City Selection Committee are hereby amended so that instead of two city members nominated by the City Selection Committee, there shall be one representative from each city or town in Napa County nominated by their respective city or town council. There shall no longer be an alternate city or town member on the WICC Board.

3. All other terms and provisions of Resolution No. 04-26 and Resolution No. 04-77 not in conflict with the terms and provisions of this Resolution shall remain unchanged and in effect.

4. The County Executive Officer is directed to place a copy of this Resolution, or appropriate summary thereof, in Part II of the Napa County Policy Manual, Section 24 in place of the previous Section 24.

5. This Resolution is exempt from CEQA pursuant to Title 14 CCR Section 15061 (b)(3), as it can be seen with certainty that there is no possibility that the proposed action may have a significant effect on the environment and therefore CEQA is not applicable.

**THE FOREGOING RESOLUTION WAS DULY AND REGULARLY ADOPTED** by the Board of Supervisors of the County of Napa, State of California, at a regular meeting of said Board held on the 1st day of November, 2005, by the following vote:

| | | |
|---|---|---|
| AYES: | SUPERVISORS | DODD, WAGENKNECHT, MOSKOWITE, LUCE and DILLON |
| NOES: | SUPERVISORS | NONE |
| ABSENT: | SUPERVISORS | NONE |

Diane Dillon

DIANE DILLON, Chairperson
Napa County Board of Supervisors

ATTEST:
PAMELA A. MILLER
Clerk of the Board

By: Pamela A. Miller

**Approved As To Form**
**Office of County Counsel**

By: Laura J. Anderson (email signature)
Deputy County Counsel

Date: October 11, 2005

**Approved by the Napa County Board of Supervisors**

Date: November 1, 2005

Processed by:
Deputy Clerk of the Board

. . planning/WICC BOARD/RADOPTSTRATPLAN-CITYMEMNS.doc

## RESOLUTION NO. 06-82

## RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF NAPA, STATE OF CALIFORNIA, AMENDING THE BYLAWS OF, AND EXTENDING THE LIFE OF THE WATERSHED INFORMATION CENTER AND CONSERVANCY BOARD OF NAPA COUNTY INDEFINITELY

**WHEREAS,** on May 21, 2002, the Board adopted Resolution No. 02-103 creating the joint Napa River Watershed Conservancy and Watershed Information Center Board which was later renamed the Watershed Information Center and Conservancy of Napa County ("WICC");

**WHEREAS,** since creation of the WICC in 2002, the Board of Supervisors has adopted several resolutions affecting the role and structure of the WICC and those changes need to be memorialized and incorporated into the WICC's bylaws. Since the WICC is an advisory committee, its bylaws can only be amended by the Board of Supervisors;

**WHEREAS,** pursuant to Part I Section 8 of the Napa County Policy Manual, advisory committees have a specific life of four years which may be extended by an action of the Board of Supervisors. The WICC will expire on May 21, 2006, unless the Board extends its term;

**WHEREAS,** the Board of Supervisors desires to extends the life of the WICC indefinitely;

**NOW THEREFORE, BE IT RESOLVED,** by the Board of Supervisors as follows:

<u>Section 1.</u> <u>Amendment of bylaws.</u>

The WICC's bylaws are hereby amended to reflect changes in the composition and role of the WICC as shown in the bylaws attached.

<u>Section 2.</u> <u>Extension of Life.</u>

The life of the WICC is hereby extended indefinitely.

<u>Section 3.</u> <u>Placement of Resolution in Policy Manual.</u>

The County Executive Officer is hereby directed to place a copy of this Resolution, or appropriate summary thereof, in Part II of the County Policy Manual, in Section 24.

<u>Section 4.</u> <u>Effective Date.</u>

This resolution shall become effective upon adoption.

The foregoing resolution was duly and regularly adopted by said Board of Supervisors of the County of Napa, State of California, at a regular meeting of said Board held on the 25th day of April, 2006, by the following vote:

| | | |
|---|---|---|
| AYES: | SUPERVISORS | WAGENKNECHT, DILLON, MOSKOWITE, LUCE and DODD |
| NOES: | SUPERVISORS | NONE |
| ABSENT: | SUPERVISORS | NONE |

BILL DODD, Chair of the Board of Supervisors

ATTEST: PAMELA A. MILLER
Clerk of the Board of Supervisors

By: Pamela A. Miller

**APPROVED AS TO FORM**
Office of County Counsel

By: Laura J. Anderson (by e-signature)

Date: April 14, 2006

**APPROVED BY THE NAPA COUNTY BOARD OF SUPERVISORS**

Date: April 25, 2006

Processed by:

Deputy Clerk of the Board

Attachment – Amended Bylaws

planning/NRWTask Force/WICC Board/ResoAmendingBylaws

**RESOLUTION NO. 2013-06**

**RESOLUTION OF THE BOARD OF SUPERVISORS OF NAPA COUNTY, STATE OF CALIFORNIA, AMENDING THE BYLAWS OF, AND EXTENDING THE LIFE OF THE WATERSHED INFORMATION CENTER AND CONSERVANCY BOARD OF NAPA COUNTY INDEFINITELY**

**WHEREAS,** on May 21, 2002, the Board adopted Resolution No. 02-103 creating the joint Napa River Watershed Conservancy and Watershed Information Center Board which was later renamed the Watershed Information Center and Conservancy of Napa County ("WICC");

**WHEREAS,** since creation of the WICC in 2002, the Board of Supervisors has adopted several resolutions affecting the role and structure of the WICC and those changes need to be memorialized and incorporated into the WICC's bylaws. Since the WICC is an advisory committee, its bylaws can only be amended by the Board of Supervisors;

**WHEREAS,** due to the recent reorganization and consolidation efforts within the Department of Public Works and the current Department of Planning, Building and Environmental Services, the WICC program has been relocated to Public Works and is supported by the Water Resources Division/Natural Resources Conservation staff;

**WHEREAS,** to effectively support both the WICC Board and the Napa County Groundwater Resources Advisory Committee (GRAC), regularly scheduled WICC meetings have been reduced to every other month, alternating with GRAC meetings;

**WHEREAS,** the proposed resolution amends the WICC bylaws to assign proper staff in the Water Resources Division as Secretary to the WICC, modify the WICC Board meeting schedule to every other month, and update language in the bylaws relating to motions to reconsider.

**NOW THEREFORE, BE IT RESOLVED,** by the Board of Supervisors as follows:

<u>Section 1.</u> <u>Amendment of bylaws.</u>

The WICC's bylaws are hereby amended to reflect reorganization of county services, modify the WICC's regular meeting dates, and update bylaw language regarding motions to reconsider as shown in the bylaws attached.

<u>Section 2.</u> <u>Placement of Resolution in Policy Manual.</u> .

The County Executive Officer is hereby directed to place a copy of this Resolution, or appropriate summary thereof, in Part II of the County Policy Manual, in Section 28.[1]

[1] Previously placed in County Policy Manual, Part II as Section 24.

Section 3. Effective Date.

This resolution shall become effective upon adoption.

The foregoing resolution was duly and regularly adopted by said Board of Supervisors of Napa County, State of California, at a regular meeting of said Board held on the 29th day of January, 2013, by the following vote:

| | | |
|---|---|---|
| AYES: | SUPERVISORS | DODD, CALDWELL, DILLON, LUCE and WAGENKNECHT |
| NOES: | SUPERVISORS | NONE |
| ABSENT: | SUPERVISORS | NONE |

BRAD WAGENKNECHT, Chairman
Napa County Board of Supervisors

ATTEST: GLADYS I. COIL
Clerk of the Board of Supervisors

By: Gladys I. Coil

**APPROVED AS TO FORM**
Office of County Counsel

By: Laura J. Anderson (by e-signature)

Date: January 14, 2013

**APPROVED BY THE NAPA COUNTY BOARD OF SUPERVISORS**

Date: 1-29-13

Processed by:
Deputy Clerk of the Board

Attachment – Amended Bylaws

# NAPA COUNTY POLICY MANUAL, PART II, SECTION 28~~24~~

## BYLAWS OF THE WATERSHED INFORMATION CENTER AND CONSERVANCY BOARD OF NAPA COUNTY

(adopted December 18, 2002; amended January 22, 2004; amended June 24, 2004; amended April 25, 2006; amended January 29, 2013)

**I. THE WATERSHED INFORMATION CENTER AND CONSERVANCY BOARD OF NAPA COUNTY**

**A. Name.** The official name of the Board shall be the Watershed Information Center and Conservancy Board of Napa County, hereinafter referred to as the "WICC Board." (per Resolution No. 04-102)

**II. OFFICERS.** The officers of the WICC Board shall be the Chair, Vice-Chair and Secretary, chosen as follows:

**A. Time of Election of the Chair and Vice-Chair.** At the first organizational meeting and thereafter at the WICC Board's annual organizational meeting, the membership of the WICC Board shall elect the Chair and Vice-Chair from among themselves.

**B. Term of the Chair and Vice-Chair.** The Chair and Vice-Chair shall serve one calendar year or until their successors are elected and assume office. If the office of Chair becomes vacant during the term, the Vice-Chair shall become Chair. Vacancy in the office of Vice-Chair during the term shall be filled by election to serve the remainder of the term.

**C. Duties of the Chair and Vice-Chair.** The Chair, or the Vice Chair in the absence of the Chair, shall act as the presiding officer of WICC Board and in that capacity shall preserve order and decorum, decide questions of order subject to being overruled by a two-thirds vote and perform such other duties as are required by the WICC Board. The Chair shall have all the rights and duties enjoyed by any other member of the WICC Board, including the right to make and second motions.

**D. Secretary.** The Natural Resources Conservation Manager~~Deputy Director~~, in the Water Resources Division of the Public Works~~Conservation Division of the Napa County Conservation, Development and Planning~~ Department, shall serve ex officio as the Secretary of the WICC Board.

**E. Authority to Bind WICC Board.** No member of the WICC Board shall have any power or authority to bind the WICC Board by any contract, to pledge its credit, or to render it liable for any purpose in any amount.

**F.** **Term of WICC Board members.** Each member of the WICC Board shall serve for a period of four (4) years. Members serving on the WICC Board as elected officials and the alternate member acting for the County Board of Supervisors shall serve the same term as their elected office.

**G.** **Service and termination of WICC Board membership.**

**1.** **Service.** Members appointed to the WICC Board by the County Board of Supervisors shall serve at the will and pleasure of the County Board of Supervisors.

**2.** **Termination.** A WICC Board member's term may be concluded before expiration if any one of the following events occurs:

**a.** His or her absence from three consecutive regular meetings during the term year, unless confined by illness or other absence approved by a majority of the WICC Board at any meeting thereof, will be considered as having involuntarily resigned her/his position as a member of the WICC Board.

**b.** His or her resignation is submitted to the Chair.

**c.** His or her ceasing residency in Napa County.

**d.** His or her conviction of a felony or any offence involving a violation of his or her official duties.

**e.** Refusal or neglect to file the required oath of office.

## III. MEETINGS

**A.** **Date of Regular Meetings.** All dates of regular meetings of the WICC Board shall be on the fourth Thursday of every other month beginning in January, apart from November, when the meeting shall be held on the third Thursday, as shown on a calendar, which the WICC Board shall adopt at the first meeting of the WICC Board, of each calendar year. Notwithstanding the foregoing, any regularly scheduled meeting of the WICC Board may be canceled by majority vote or, if there is not a quorum, be adjourned by the Chair or Secretary in the manner set forth in Section III(G) of these by-laws.

**B.** **Time of Regular Meetings.** Regular meetings shall commence at 4:00 pm and continue until all agendized business is concluded unless adjourned earlier on motion of the WICC Board for any reason or by the Secretary for lack of a quorum.

C. **Location of Regular Meetings.** Unless specially noticed otherwise, regular meetings shall be held at 1125 Third Street, Hall of Justice Building, 2nd Floor Meeting/Training Room, Napa, California.

D. **Emergency Meetings.** Emergency meetings shall be called in conformance with Section 54956.5 of the California Government Code

E. **Special Meetings.** A special meeting may be called at any time by the Chairman or upon the request of a majority of the members of the WICC Board by delivering written notice to each member and to each person or entity entitled by law to receive such notices in the manner required by Government Code Section 54956 at least 24 hours before the time of the meeting as specified in the notice. The call and notice shall specify the time and place of the special meeting and the business to be transacted or discussed and shall be posted at least 24 hours prior to the special meeting in a location that is freely accessible to members of the public. No other business shall be considered at such meetings by the WICC Board. Such written notice may be dispensed with as to any WICC Board member who at or prior to the time the meeting convenes files with the Secretary of the WICC Board a written waiver of notice. Such waiver may be given by telegram. Such written notice may also be dispensed with as to any member who is actually present at the time the meeting convenes.

F. **Agendas Involving Regular Meetings**. At least 72 hours before a regular meeting, an agenda containing a brief general description of each item of business to be transacted or discussed shall be posted at a location freely accessible to members of the public. All agendas shall include a time period for public comment and shall specify the time and location of the regular meeting. No discussion shall occur, or action be taken, on any item not appearing on the posted agenda except as permitted by law. Questions or comments regarding items not included on the agenda shall be limited to the scope permitted for "public comment". Supplemental agendas involved in a regular meeting will be prepared and considered by the WICC Board only under the following conditions:

1. **Emergencies.** Upon a determination by the WICC Board that an emergency situation exists, as defined in Section 54956.5 of the Government Code.

2. **Need Arising after Posting.** Upon a determination by a two-thirds vote of the WICC Board or, if less than two-thirds of the potential votes are present, a unanimous vote of the WICC Board members present, that there is a need to take immediate action and the need to take action came to the attention of WICC Board or staff subsequent to the regular agenda being posted.

3. **Recently Continued Item.** The item was properly posted for a prior meeting of the WICC Board occurring not more than five calendar days

prior to the date action is taken on the item, and at the prior meeting the item was continued to the meeting at which action is being taken.

G. **Adjourning Meetings.** The WICC Board may adjourn any meeting to a time and place specified in the order of adjournment. Less than a quorum may so adjourn from time to time. If all WICC Board members are absent from any regular meeting or adjourned regular meeting the Secretary or Acting Secretary of the WICC Board may declare the meeting adjourned to the next regular meeting of the WICC Board. A copy of the order or notice of adjournment shall be conspicuously posted on or near the door of the place where the meeting was held within 24 hours after the time of the adjournment. When a regular or adjourned regular meeting is adjourned as provided in this section, the resulting adjourned regular meeting is a regular meeting for all purposes. When an order of adjournment of any meeting fails to state the hour at which the adjourned meeting is to be held, it shall be held at the hour specified for regular meetings.

H. **Meetings to be Open and Public**. All meetings of the WICC Board to take action or to deliberate concerning WICC Board business and its conduct shall be open and public. All persons shall be permitted to attend any such meetings except as otherwise provided or permitted by law.

## IV. CONDUCT OF MEETINGS

A. **Order of Business.** The regular order of business of the WICC Board shall be:

1. Call to order.
2. Approval of the minutes of the previous meeting.
3. Public comment on unagendized items.
4. Consideration and Action on Agenda Items.
5. Adjournment.

B. **Parliamentary Procedure.** Unless otherwise provided by these Bylaws, all proceedings before WICC Board shall be conducted in accordance with and pursuant to the parliamentary procedure prescribed in the most current version of the Sturgis "Standard Code of Parliamentary Procedure." ~~"Sturgis Standard Code of Parliamentary Procedure, 3rd edition."~~

C. **Recording of Meetings.** Any meeting of the WICC Board, other than a closed session permitted under the Brown Act, may be recorded by any person, unless the WICC Board determines that such recording could constitute a disruption of the proceedings.

**D.** **Presentations to the Board**. Any person desiring to address the WICC Board shall, when recognized by the Chair, give his or her name and address. The Chair may, in the interest of facilitating the business of WICC Board, set in advance of the presentation of testimony reasonable time limits for oral presentations. Persons may be required to submit written testimony in lieu of oral testimony if the Chair determines that a reasonable opportunity for oral presentations has been provided, and in such a case, the matter may be continued to a later date to allow a reasonable time for such submittals to occur.

**E.** **Recordation of Board Actions.** All official actions or decisions by the WICC Board shall be documented and ~~entered in the minute book of the WICC Board~~ kept by the Secretary. The vote or votes of each member of the WICC Board on every question shall be recorded. Only action minutes will be maintained, however, tape recordings will be made of each meeting of the WICC Board whenever possible and shall be available to the public at the WICC Board offices.

## V. VOTING AND QUORUM

**A.** **Roll Call Vote.** A roll call vote may be required in voting upon any motion of the WICC Board at the discretion of the Chair.

**B.** **Inaudible Votes.** Any member present who does not vote in an audible voice or abstains for a legally insufficient reason shall be recorded as voting "aye".

**C.** **Quorum.** A majority of the members of the WICC Board shall constitute a quorum for the purpose of conducting its business and exercising its powers and for all other official purposes, except that less than a quorum may adjourn from time to time until a quorum is obtained.

**D.** **Number of Votes Required for Action.** All actions require a motion and a second. No action or recommendation of the WICC Board shall be valid and binding unless a quorum is present and the motion is approved by at least a majority of the members present. Each member shall have one vote. No votes may be cast by proxy. Tie votes shall be considered as denial of the motion.

**E.** **Voting Affected by Conflict of Interest.** As a general rule, no member shall participate as a member in any discussion or voting if to do so would constitute a conflict of interest. However, if a quorum cannot be achieved or the required number of affirmative votes for action obtained because conflicts of interest exist that prevent members having such conflicts from discussing or voting on the matter, and the conflicts are such that the members with conflicts will be unable to vote at a later date even if the matter is continued, the matter shall not be continued and a sufficient number of members having conflicts of interest, selected by lot, shall be allowed to participate to provide enough votes for the WICC Board to form a quorum and take affirmative action.

~~**F. Motion to Reconsider.** The WICC Board may reconsider a matter during the meeting at which the vote was taken, provided all members who were present when the matter was discussed and voted upon are still present, provided that all persons who addressed the WICC Board regarding the matter are still present, and provided the motion to reconsider is made by a member who voted with the prevailing side. A motion for reconsideration shall have precedence over every motion except a motion to adjourn. A final vote on any matter may also be placed on any future agenda for reconsideration by the WICC Board or any member of the WICC Board at the meeting at which the actions was taken or at any later time. Any interested person may request that an action be reconsidered, provided that such a request must be in writing and filed with the Secretary of the WICC Board within ten calendar days of the action of the WICC Board.~~

**1.** A final vote on any matter before the WICC Board may be reconsidered during the meeting at which the vote was taken provided all persons concerned with the matter are still present, and further provided the motion to reconsider shall be made by a member voting with the majority on the final vote.

**2.** If all persons concerned with a matter are not present, or if a member so chooses, a motion to reconsider a final vote on any matter may be given not later than the next regular meeting by a member voting with the majority on the final vote, provided notice of intention to move such reconsideration shall have been given at the meeting on which the final vote was taken.

**3.** A motion for reconsideration shall have precedence over every motion except a motion to adjourn.

## VI. CHANGES TO BYLAWS

The provisions of these Bylaws may be altered, amended, or repealed at any time, within limitations imposed by the Brown Act.

# NAPA COUNTY POLICY MANUAL, PART II, SECTION 28

## BYLAWS OF THE WATERSHED INFORMATION CENTER AND CONSERVANCY BOARD OF NAPA COUNTY

(adopted December 18, 2002; amended January 22, 2004; amended June 24, 2004; amended April 25, 2006; amended January 29, 2013)

### I. THE WATERSHED INFORMATION CENTER AND CONSERVANCY BOARD OF NAPA COUNTY

A. **Name.** The official name of the Board shall be the Watershed Information Center and Conservancy Board of Napa County, hereinafter referred to as the "WICC Board." (per Resolution No. 04-102)

### II. OFFICERS.

The officers of the WICC Board shall be the Chair, Vice-Chair and Secretary, chosen as follows:

A. **Time of Election of the Chair and Vice-Chair.** At the first organizational meeting and thereafter at the WICC Board's annual organizational meeting, the membership of the WICC Board shall elect the Chair and Vice-Chair from among themselves.

B. **Term of the Chair and Vice-Chair.** The Chair and Vice-Chair shall serve one calendar year or until their successors are elected and assume office. If the office of Chair becomes vacant during the term, the Vice-Chair shall become Chair. Vacancy in the office of Vice-Chair during the term shall be filled by election to serve the remainder of the term.

C. **Duties of the Chair and Vice-Chair.** The Chair, or the Vice Chair in the absence of the Chair, shall act as the presiding officer of WICC Board and in that capacity shall preserve order and decorum, decide questions of order subject to being overruled by a two-thirds vote and perform such other duties as are required by the WICC Board. The Chair shall have all the rights and duties enjoyed by any other member of the WICC Board, including the right to make and second motions.

D. **Secretary.** The Natural Resources Conservation Manager, in the Water Resources Division of the Public Works Department, shall serve ex officio as the Secretary of the WICC Board.

E. **Authority to Bind WICC Board.** No member of the WICC Board shall have any power or authority to bind the WICC Board by any contract, to pledge its credit, or to render it liable for any purpose in any amount.

F. **Term of WICC Board members.** Each member of the WICC Board shall serve for a period of four (4) years. Members serving on the WICC Board as elected officials and the alternate member acting for the County Board of Supervisors shall serve the same term as their elected office.

G. **Service and termination of WICC Board membership.**

1. **Service.** Members appointed to the WICC Board by the County Board of Supervisors shall serve at the will and pleasure of the County Board of Supervisors.

2. **Termination.** A WICC Board member's term may be concluded before expiration if any one of the following events occurs:

   a. His or her absence from three consecutive regular meetings during the term year, unless confined by illness or other absence approved by a majority of the WICC Board at any meeting thereof, will be considered as having involuntarily resigned her/his position as a member of the WICC Board.

   b. His or her resignation is submitted to the Chair.

   c. His or her ceasing residency in Napa County.

   d. His or her conviction of a felony or any offence involving a violation of his or her official duties.

   e. Refusal or neglect to file the required oath of office.

## III. MEETINGS

A. **Date of Regular Meetings.** All dates of regular meetings of the WICC Board shall be on the fourth Thursday of every other month beginning in January, apart from November, when the meeting shall be held on the third Thursday, as shown on a calendar, which the WICC Board shall adopt at the first meeting of the WICC Board, of each calendar year. Notwithstanding the foregoing, any regularly scheduled meeting of the WICC Board may be canceled by majority vote or, if there is not a quorum, be adjourned by the Chair or Secretary in the manner set forth in Section III(G) of these by-laws.

B. **Time of Regular Meetings.** Regular meetings shall commence at 4:00 pm and continue until all agendized business is concluded unless adjourned earlier on motion of the WICC Board for any reason or by the Secretary for lack of a quorum.

C. **Location of Regular Meetings.** Unless specially noticed otherwise, regular meetings shall be held at 1125 Third Street, Hall of Justice Building, 2nd Floor Meeting/Training Room, Napa, California.

D. **Emergency Meetings.** Emergency meetings shall be called in conformance with Section 54956.5 of the California Government Code

E. **Special Meetings.** A special meeting may be called at any time by the Chairman or upon the request of a majority of the members of the WICC Board by delivering written notice to each member and to each person or entity entitled by law to receive such notices in the manner required by Government Code Section 54956 at least 24 hours before the time of the meeting as specified in the notice. The call and notice shall specify the time and place of the special meeting and the business to be transacted or discussed and shall be posted at least 24 hours prior to the special meeting in a location that is freely accessible to members of the public. No other business shall be considered at such meetings by the WICC Board. Such written notice may be dispensed with as to any WICC Board member who at or prior to the time the meeting convenes files with the Secretary of the WICC Board a written waiver of notice. Such waiver may be given by telegram. Such written notice may also be dispensed with as to any member who is actually present at the time the meeting convenes.

F. **Agendas Involving Regular Meetings**. At least 72 hours before a regular meeting, an agenda containing a brief general description of each item of business to be transacted or discussed shall be posted at a location freely accessible to members of the public. All agendas shall include a time period for public comment and shall specify the time and location of the regular meeting. No discussion shall occur, or action be taken, on any item not appearing on the posted agenda except as permitted by law. Questions or comments regarding items not included on the agenda shall be limited to the scope permitted for "public comment". Supplemental agendas involved in a regular meeting will be prepared and considered by the WICC Board only under the following conditions:

1. **Emergencies.** Upon a determination by the WICC Board that an emergency situation exists, as defined in Section 54956.5 of the Government Code.

2. **Need Arising after Posting.** Upon a determination by a two-thirds vote of the WICC Board or, if less than two-thirds of the potential votes are present, a unanimous vote of the WICC Board members present, that there is a need to take immediate action and the need to take action came to the attention of WICC Board or staff subsequent to the regular agenda being posted.

3. **Recently Continued Item.** The item was properly posted for a prior meeting of the WICC Board occurring not more than five calendar days prior to the date action is taken on the item, and at the prior meeting the

item was continued to the meeting at which action is being taken.

G. **Adjourning Meetings.** The WICC Board may adjourn any meeting to a time and place specified in the order of adjournment. Less than a quorum may so adjourn from time to time. If all WICC Board members are absent from any regular meeting or adjourned regular meeting the Secretary or Acting Secretary of the WICC Board may declare the meeting adjourned to the next regular meeting of the WICC Board. A copy of the order or notice of adjournment shall be conspicuously posted on or near the door of the place where the meeting was held within 24 hours after the time of the adjournment. When a regular or adjourned regular meeting is adjourned as provided in this section, the resulting adjourned regular meeting is a regular meeting for all purposes. When an order of adjournment of any meeting fails to state the hour at which the adjourned meeting is to be held, it shall be held at the hour specified for regular meetings.

H. **Meetings to be Open and Public**. All meetings of the WICC Board to take action or to deliberate concerning WICC Board business and its conduct shall be open and public. All persons shall be permitted to attend any such meetings except as otherwise provided or permitted by law.

## IV. CONDUCT OF MEETINGS

A. **Order of Business.** The regular order of business of the WICC Board shall be:

1. Call to order.

2. Approval of the minutes of the previous meeting.

3. Public comment on unagendized items.

4. Consideration and Action on Agenda Items.

5. Adjournment.

B. **Parliamentary Procedure.** Unless otherwise provided by these Bylaws, all proceedings before WICC Board shall be conducted in accordance with and pursuant to the parliamentary procedure prescribed in the most current version of the Sturgis "Standard Code of Parliamentary Procedure."

C. **Recording of Meetings.** Any meeting of the WICC Board, other than a closed session permitted under the Brown Act, may be recorded by any person, unless the WICC Board determines that such recording could constitute a disruption of the proceedings.

D. **Presentations to the Board**. Any person desiring to address the WICC Board shall, when recognized by the Chair, give his or her name and address. The

Chair may, in the interest of facilitating the business of WICC Board, set in advance of the presentation of testimony reasonable time limits for oral presentations. Persons may be required to submit written testimony in lieu of oral testimony if the Chair determines that a reasonable opportunity for oral presentations has been provided, and in such a case, the matter may be continued to a later date to allow a reasonable time for such submittals to occur.

E. **Recordation of Board Actions.** All official actions or decisions by the WICC Board shall be documented and kept by the Secretary. The vote or votes of each member of the WICC Board on every question shall be recorded. Only action minutes will be maintained, however, tape recordings will be made of each meeting of the WICC Board whenever possible and shall be available to the public at the WICC Board offices.

## V. VOTING AND QUORUM

A. **Roll Call Vote.** A roll call vote may be required in voting upon any motion of the WICC Board at the discretion of the Chair.

B. **Inaudible Votes.** Any member present who does not vote in an audible voice or abstains for a legally insufficient reason shall be recorded as voting "aye".

C. **Quorum.** A majority of the members of the WICC Board shall constitute a quorum for the purpose of conducting its business and exercising its powers and for all other official purposes, except that less than a quorum may adjourn from time to time until a quorum is obtained.

D. **Number of Votes Required for Action.** All actions require a motion and a second. No action or recommendation of the WICC Board shall be valid and binding unless a quorum is present and the motion is approved by at least a majority of the members present. Each member shall have one vote. No votes may be cast by proxy. Tie votes shall be considered as denial of the motion.

E. **Voting Affected by Conflict of Interest.** As a general rule, no member shall participate as a member in any discussion or voting if to do so would constitute a conflict of interest. However, if a quorum cannot be achieved or the required number of affirmative votes for action obtained because conflicts of interest exist that prevent members having such conflicts from discussing or voting on the matter, and the conflicts are such that the members with conflicts will be unable to vote at a later date even if the matter is continued, the matter shall not be continued and a sufficient number of members having conflicts of interest, selected by lot, shall be allowed to participate to provide enough votes for the WICC Board to form a quorum and take affirmative action.

1. A final vote on any matter before the WICC Board may be reconsidered during the meeting at which the vote was taken provided all persons

concerned with the matter are still present, and further provided the motion to reconsider shall be made by a member voting with the majority on the final vote.

2. If all persons concerned with a matter are not present, or if a member so chooses, a motion to reconsider a final vote on any matter may be given not later than the next regular meeting by a member voting with the majority on the final vote, provided notice of intention to move such reconsideration shall have been given at the meeting on which the final vote was taken.

3. A motion for reconsideration shall have precedence over every motion except a motion to adjourn.

## VI. CHANGES TO BYLAWS

The provisions of these Bylaws may be altered, amended, or repealed at any time, within limitations imposed by the Brown Act.

**RESOLUTION NO. 2015-82**

**A RESOLUTION OF THE NAPA COUNTY BOARD OF SUPERVISORS, STATE OF CALIFORNIA, CHANGING THE NAME OF "THE WATERSHED INFORMATION CENTER AND CONSERVANCY BOARD" TO "THE WATERSHED INFORMATION AND CONSERVATION COUNCIL" AND AMENDING THE WATERSHED INFORMATION AND CONSERVATION COUNCIL BYLAWS AND MEMBERSHIP**

**WHEREAS,** on May 21, 2002, the Board adopted Resolution No. 02-103 creating the joint Napa River Watershed Conservancy and Watershed Information Center Board which was later renamed the Watershed Information Center and Conservancy Board ("WICC Board"); and

**WHEREAS,** since creation of the WICC Board in 2002, the Board of Supervisors has adopted several resolutions affecting the role and structure of the WICC Board and those changes need to be memorialized and incorporated into the WICC Board's bylaws; and

**WHEREAS,** the WICC Board is an advisory committee and its bylaws can only be amended by the Board of Supervisors; and

**WHEREAS,** on March 3, 2015 the Board of Supervisors accepted the WICC Board's 2015 Strategic Plan; and

**WHEREAS,** during their Strategic Planning process, the WICC Board discussed changing its name to "The Watershed Information and Conservation Council" (WICC) to better reflect its current role and responsibilities; and

**WHEREAS,** the Board of Supervisors desires to change the name of the Watershed Information Center and Conservancy Board to better reflect its purpose;

**WHEREAS,** the 2015 Strategic Plan further recommends that the Board of Supervisors allow for alternate city and town council membership on the WICC; and

**WHEREAS,** the WICC's regular meeting space in the Hall of Justice was extensively damaged by the August 2014 South Napa Earthquake and the WICC wishes to designate 625 Burnell Street in Napa, California as its new meeting location.

**NOW, THEREFORE BE IT RESOLVED** that the Napa County Board of Supervisors hereby finds as follows:

1. The Watershed Information Center and Conservancy Board shall be known for all purposes as "The Watershed Information and Conservation Council."

2. The Bylaws of the Watershed Information and Conservation Council shall be amended effective immediately to read in full as set forth in Exhibit "A," attached hereto and incorporated by reference herein.

3. The County Executive Officer is directed to place a copy of this Resolution, or appropriate summary thereof, in Section 28 of Part II of the Napa County Policy Manual.

**THE FOREGOING RESOLUTION WAS DULY AND REGULARLY ADOPTED** by the Napa County Board of Supervisors, State of California, at a regular meeting of said Board held on the 23rd day of June, 2015, by the following vote:

| | | |
|---|---|---|
| AYES: | SUPERVISORS | LUCE, WAGENKNECHT, CALDWELL, PEDROZA and DILLON |
| NOES: | SUPERVISORS | NONE |
| ABSTAIN: | SUPERVISORS | NONE |
| ABSENT: | SUPERVISORS | NONE |

Diane Dillon

DIANE DILLON, Chair of the Board of Supervisors

| | | |
|---|---|---|
| APPROVED AS TO FORM<br>Office of County Counsel<br><br>By: *Robert Martin, Deputy* County Counsel<br><br>Date: June 8, 2015 | APPROVED BY THE NAPA COUNTY BOARD OF SUPERVISORS<br><br>Date: 6/23/15<br>Processed By:<br><br>Deputy Clerk of the Board | ATTEST: GLADYS I. COIL<br>Clerk of the Board of Supervisors<br><br>By Gladys I. Coil |



cc\D\PI\WICC\Bylaws\WICBd bylaws AMD#4 2015.doc

# EXHIBIT A-1 TRACK CHANGES

Adopted May 21, 2002; Resolution 02-103
Amended February 24, 2004; Resolution 04-26
Amended June 8, 2004; Resolution 04-77
Amended April 25, 2006; Resolution 06-82
Amended January 29, 2013; Resolution 2013-06
Amended June ___, 2015; Resolution 2015-___

## BYLAWS OF THE WATERSHED INFORMATION ~~CENTER~~ AND CONSERVATIONNCY BOARD COUNCIL OF NAPA COUNTY

## I. THE WATERSHED INFORMATION AND ~~CENTER AND~~ CONSERVATIONNCY ~~BOARD~~ COUNCIL OF NAPA COUNTY

**A. Name.** The official name of the Board shall be the Watershed Information ~~Center~~ and Conservationncy ~~Board~~ Council of Napa County, hereinafter referred to as the "WICC ~~Board~~." (Per Resolution No. 2015-___ ~~04-102~~)

## II. OFFICERS.

**II. OFFICERS.** The officers of the WICC ~~Board~~ shall be the Chair, Vice-Chair and Secretary, chosen as follows:

**A. Time of Election of the Chair and Vice-Chair.** At the first organizational meeting and thereafter at the WICC ~~Board~~'s annual organizational meeting, the membership of the WICC ~~Board~~ shall elect the Chair and Vice-Chair from among themselves.

**B. Term of the Chair and Vice-Chair.** The Chair and Vice-Chair shall serve one calendar year or until their successors are elected and assume office. If the office of Chair becomes vacant during the term, the Vice-Chair shall become Chair. Vacancy in the office of Vice-Chair during the term shall be filled by election to serve the remainder of the term.

**C. Duties of the Chair and Vice-Chair.** The Chair, or the Vice Chair in the absence of the Chair, shall act as the presiding officer of the WICC ~~Board~~ and in that capacity shall preserve order and decorum, decide questions of order subject to being overruled by a two-thirds vote and perform such other duties as are required by the WICC ~~Board~~. The Chair shall have all the rights and duties enjoyed by any other member of the WICC ~~Board~~, including the right to make and second motions.

**D. Secretary.** The Natural Resources Conservation Manager, in the Water Resources Division of the Public Works Department, shall serve ex officio as the Secretary of the WICC ~~Board~~.

**E. Authority to Bind WICC Board.** No member of the WICC ~~Board~~ shall have any power or authority to bind the WICC ~~Board~~ by any contract, to pledge its credit, or to render it liable for any purpose in any amount.

**F. Term of WICC ~~Board~~ members.** Each member of the WICC ~~Board~~ shall serve for a period of four (4) years. Members serving on the WICC ~~Board~~ as elected officials and the alternate member acting for the County Board of Supervisors shall serve the same term as their elected office.

G. **Service and termination of WICC ~~Board~~ membership.**

1. **Service.** Members appointed to the WICC ~~Board~~ by the County Board of Supervisors shall serve at the will and pleasure of the County Board of Supervisors.

2. **Termination.** A WICC ~~Board~~ member's term may be concluded before expiration if any one of the following events occurs:

   a. His or her absence from three consecutive regular meetings during the term year, unless confined by illness or other absence approved by a majority of the WICC ~~Board~~ at any meeting thereof, will be considered as having involuntarily resigned her/his position as a member of the WICC ~~Board~~.

   b. His or her resignation is submitted to the Chair.

   c. His or her ceasing residency in Napa County.

   d. His or her conviction of a felony or any offence involving a violation of his or her official duties.

   e. Refusal or neglect to file the required oath of office.

## III. MEETINGS

A. **Date of Regular Meetings.** All dates of regular meetings of the WICC ~~Board~~ shall be on the fourth Thursday of every other month beginning in January, apart from November, when the meeting shall be held on the third Thursday, as shown on a calendar, which the WICC ~~Board~~ shall adopt at the first meeting of the WICC ~~Board~~, of each calendar year. Notwithstanding the foregoing, any regularly scheduled meeting of the WICC ~~Board~~ may be canceled by majority vote or, if there is not a quorum, be adjourned by the Chair or Secretary in the manner set forth in Section III(G) of these by-laws.

B. **Time of Regular Meetings.** Regular meetings shall commence at 4:00 pm and continue until all agendized business is concluded unless adjourned earlier on motion of the WICC ~~Board~~ for any reason or by the Secretary for lack of a quorum.

C. **Location of Regular Meetings.** Unless specially noticed otherwise, regular meetings shall be held at 625 Burnell Street, in the NCTPA/NVTA Board Room~~1125 Third Street, Hall of Justice Building, 2nd Floor Meeting/Training Room~~, Napa, California.

D. **Emergency Meetings.** Emergency meetings shall be called in conformance with Section 54956.5 of the California Government Code

E. **Special Meetings.** A special meeting may be called at any time by the Chairman or upon the request of a majority of the members of the WICC ~~Board~~ by delivering written notice to each member and to each person or entity entitled by law to receive such notices in the manner required by Government Code Section 54956 at least 24 hours before the time of the meeting as specified in the notice. The call and notice shall specify the time and place of the special meeting and the business to be transacted or discussed and shall be posted at least 24 hours prior to the special meeting in a location that is freely accessible to members of the public. No other business shall be considered at such meetings by the WICC ~~Board~~. Such written notice may be dispensed with as to any WICC ~~Board~~ member who at or prior to the time the meeting convenes files with the Secretary of the WICC ~~Board~~ a written waiver of notice. Such waiver may be given by telegram. Such written notice may also be dispensed with as to any member who is actually present at the time the meeting convenes.

**F.** **Agendas Involving Regular Meetings**. At least 72 hours before a regular meeting, an agenda containing a brief general description of each item of business to be transacted or discussed shall be posted at a location freely accessible to members of the public. All agendas shall include a time period for public comment and shall specify the time and location of the regular meeting. No discussion shall occur, or action be taken, on any item not appearing on the posted agenda except as permitted by law. Questions or comments regarding items not included on the agenda shall be limited to the scope permitted for "public comment". Supplemental agendas involved in a regular meeting will be prepared and considered by the WICC ~~Board~~ only under the following conditions:

1. **Emergencies.** Upon a determination by the WICC ~~Board~~ that an emergency situation exists, as defined in Section 54956.5 of the Government Code.

2. **Need Arising after Posting.** Upon a determination by a two-thirds vote of the WICC ~~Board~~ or, if less than two-thirds of the potential votes are present, a unanimous vote of the WICC ~~Board~~ members present, that there is a need to take immediate action and the need to take action came to the attention of WICC ~~Board~~ or staff subsequent to the regular agenda being posted.

3. **Recently Continued Item.** The item was properly posted for a prior meeting of the WICC ~~Board~~ occurring not more than five calendar days prior to the date action is taken on the item, and at the prior meeting the item was continued to the meeting at which action is being taken.

**G.** **Adjourning Meetings.** The WICC ~~Board~~ may adjourn any meeting to a time and place specified in the order of adjournment. Less than a quorum may so adjourn from time to time. If all WICC ~~Board~~ members are absent from any regular meeting or adjourned regular meeting the Secretary or Acting Secretary of the WICC ~~Board~~ may declare the meeting adjourned to the next regular meeting of the WICC ~~Board~~. A copy of the order or notice of adjournment shall be conspicuously posted on or near the door of the place where the meeting was held within 24 hours after the time of the adjournment. When a regular or adjourned regular meeting is adjourned as provided in this section, the resulting adjourned regular meeting is a regular meeting for all purposes. When an order of adjournment of any meeting fails to state the hour at which the adjourned meeting is to be held, it shall be held at the hour specified for regular meetings.

H. **Meetings to be Open and Public**. All meetings of the WICC ~~Board~~ to take action or to deliberate concerning WICC ~~Board~~ business and its conduct shall be open and public. All persons shall be permitted to attend any such meetings except as otherwise provided or permitted by law.

## IV. CONDUCT OF MEETINGS

A. **Order of Business.** The regular order of business of the WICC ~~Board~~ shall be:

1. Call to order.
2. Approval of the minutes of the previous meeting.
3. Public comment on unagendized items.
4. Consideration and Action on Agenda Items.
5. Adjournment.

B. **Parliamentary Procedure.** Unless otherwise provided by these Bylaws, all proceedings before the WICC ~~Board~~ shall be conducted in accordance with and pursuant to the parliamentary procedure prescribed in the most current version of the Sturgis "Standard Code of Parliamentary Procedure."

C. **Recording of Meetings.** Any meeting of the WICC ~~Board~~, other than a closed session permitted under the Brown Act, may be recorded by any person, unless the WICC ~~Board~~ determines that such recording could constitute a disruption of the proceedings.

D. **Presentations to the Board**. Any person desiring to address the WICC ~~Board~~ shall, when recognized by the Chair, give his or her name and address. The Chair may, in the interest of facilitating the business of the WICC ~~Board~~, set in advance of the presentation of testimony reasonable time limits for oral presentations. Persons may be required to submit written testimony in lieu of oral testimony if the Chair determines that a reasonable opportunity for oral presentations has been provided, and in such a case, the matter may be continued to a later date to allow a reasonable time for such submittals to occur.

E. **Recordation of Board Actions.** All official actions or decisions by the WICC ~~Board~~ shall be documented and kept by the Secretary. The vote or votes of each member of the WICC ~~Board~~ on every question shall be recorded. Only action minutes will be maintained, however, tape recordings will be made of each meeting of the WICC ~~Board~~ whenever possible and shall be available to the public at the WICC ~~Board~~ offices.

## V. VOTING AND QUORUM

A. **Roll Call Vote.** A roll call vote may be required in voting upon any motion of the WICC ~~Board~~ at the discretion of the Chair.

**B.** **Inaudible Votes.** Any member present who does not vote in an audible voice or abstains for a legally insufficient reason shall be recorded as voting "aye".

**C.** **Quorum.** A majority of the members of the WICC ~~Board~~ shall constitute a quorum for the purpose of conducting its business and exercising its powers and for all other official purposes, except that less than a quorum may adjourn from time to time until a quorum is obtained.

**D.** **Number of Votes Required for Action.** All actions require a motion and a second. No action or recommendation of the WICC ~~Board~~ shall be valid and binding unless a quorum is present and the motion is approved by at least a majority of the members present. Each member shall have one vote. No votes may be cast by proxy. Tie votes shall be considered as denial of the motion.

**E.** **Voting Affected by Conflict of Interest.** As a general rule, no member shall participate as a member in any discussion or voting if to do so would constitute a conflict of interest. However, if a quorum cannot be achieved or the required number of affirmative votes for action obtained because conflicts of interest exist that prevent members having such conflicts from discussing or voting on the matter, and the conflicts are such that the members with conflicts will be unable to vote at a later date even if the matter is continued, the matter shall not be continued and a sufficient number of members having conflicts of interest, selected by lot, shall be allowed to participate to provide enough votes for the WICC ~~Board~~ to form a quorum and take affirmative action.

**1.** A final vote on any matter before the WICC ~~Board~~ may be reconsidered during the meeting at which the vote was taken provided all persons concerned with the matter are still present, and further provided the motion to reconsider shall be made by a member voting with the majority on the final vote.

2. If all persons concerned with a matter are not present, or if a member so chooses, a motion to reconsider a final vote on any matter may be given not later than the next regular meeting by a member voting with the majority on the final vote, provided notice of intention to move such reconsideration shall have been given at the meeting on which the final vote was taken.

3. A motion for reconsideration shall have precedence over every motion except a motion to adjourn.

## VI. CHANGES TO BYLAWS

The provisions of these Bylaws may be altered, amended, or repealed at any time, within limitations imposed by the Brown Act.

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## EXHIBIT A-2 CLEAN COPY

Adopted May 21, 2002; Resolution 02-103
Amended February 24, 2004; Resolution 04-26
Amended June 8, 2004; Resolution 04-77
Amended April 25, 2006; Resolution 06-82
Amended January 29, 2013; Resolution 2013-06
Amended June ___, 2015; Resolution 2015-___

# BYLAWS OF THE WATERSHED INFORMATION AND CONSERVATION COUNCIL OF NAPA COUNTY

## I. THE WATERSHED INFORMATION AND CONSERVATION COUNCIL OF NAPA COUNTY

A. **Name.** The official name of the Board shall be the Watershed Information and Conservation Council of Napa County, hereinafter referred to as the "WICC." (Per Resolution No. 2015-___)

## II. OFFICERS. The officers of the WICC shall be the Chair, Vice-Chair and Secretary, chosen as follows:

A. **Time of Election of the Chair and Vice-Chair.** At the first organizational meeting and thereafter at the WICC's annual organizational meeting, the membership of the WICC shall elect the Chair and Vice-Chair from among themselves.

B. **Term of the Chair and Vice-Chair.** The Chair and Vice-Chair shall serve one calendar year or until their successors are elected and assume office. If the office of Chair becomes vacant during the term, the Vice-Chair shall become Chair. Vacancy in the office of Vice-Chair during the term shall be filled by election to serve the remainder of the term.

C. **Duties of the Chair and Vice-Chair.** The Chair, or the Vice Chair in the absence of the Chair, shall act as the presiding officer of the WICC and in that capacity shall preserve order and decorum, decide questions of order subject to being overruled by a two-thirds vote and perform such other duties as are required by the WICC. The Chair shall have all the rights and duties enjoyed by any other member of the WICC, including the right to make and second motions.

D. **Secretary.** The Natural Resources Conservation Manager, in the Water Resources Division of the Public Works Department, shall serve ex officio as the Secretary of the WICC.

E. **Authority to Bind WICC Board.** No member of the WICC shall have any power or authority to bind the WICC by any contract, to pledge its credit, or to render it liable for any purpose in any amount.

F. **Term of WICC members.** Each member of the WICC shall serve for a period of four (4) years. Members serving on the WICC as elected officials and the alternate member acting for the County Board of Supervisors shall serve the same term as their elected office.

**G. Service and termination of WICC membership.**

1. **Service.** Members appointed to the WICC by the County Board of Supervisors shall serve at the will and pleasure of the County Board of Supervisors.

2. **Termination.** A WICC member's term may be concluded before expiration if any one of the following events occurs:

   a. His or her absence from three consecutive regular meetings during the term year, unless confined by illness or other absence approved by a majority of the WICC at any meeting thereof, will be considered as having involuntarily resigned her/his position as a member of the WICC.

   b. His or her resignation is submitted to the Chair.

   c. His or her ceasing residency in Napa County.

   d. His or her conviction of a felony or any offence involving a violation of his or her official duties.

   e. Refusal or neglect to file the required oath of office.

## III. MEETINGS

A. **Date of Regular Meetings.** All dates of regular meetings of the WICC shall be on the fourth Thursday of every other month beginning in January, apart from November, when the meeting shall be held on the third Thursday, as shown on a calendar, which the WICC shall adopt at the first meeting of the WICC, of each calendar year. Notwithstanding the foregoing, any regularly scheduled meeting of the WICC may be canceled by majority vote or, if there is not a quorum, be adjourned by the Chair or Secretary in the manner set forth in Section III(G) of these by-laws.

B. **Time of Regular Meetings.** Regular meetings shall commence at 4:00 pm and continue until all agendized business is concluded unless adjourned earlier on motion of the WICC for any reason or by the Secretary for lack of a quorum.

C. **Location of Regular Meetings.** Unless specially noticed otherwise, regular meetings shall be held at 625 Burnell Street, in the NCTPA/NVTA Board Room, Napa, California.

D. **Emergency Meetings.** Emergency meetings shall be called in conformance with Section 54956.5 of the California Government Code.

E. **Special Meetings.** A special meeting may be called at any time by the Chairman or upon the request of a majority of the members of the WICC by delivering written notice to each member and to each person or entity entitled by law to receive such notices in the manner required by Government Code Section 54956 at least 24 hours before the time of the meeting as specified in the notice. The call and notice shall specify the time and place of the special meeting and the business to be transacted or discussed and shall be posted at least 24 hours prior to the special meeting in a location that is freely accessible to members of the public. No other business shall be considered at such meetings by the WICC. Such written notice may be dispensed with as to any WICC member who at or prior to the time the meeting convenes files with the Secretary of the WICC a written waiver of notice. Such waiver may be given by telegram. Such written notice may also be dispensed with as to any member who is actually present at the time the meeting convenes.

F. **Agendas Involving Regular Meetings**. At least 72 hours before a regular meeting, an agenda containing a brief general description of each item of business to be transacted or discussed shall be posted at a location freely accessible to members of the public. All agendas shall include a time period for public comment and shall specify the time and location of the regular meeting. No discussion shall occur, or action be taken, on any item not appearing on the posted agenda except as permitted by law. Questions or comments regarding items not included on the agenda shall be limited to the scope permitted for "public comment". Supplemental agendas involved in a regular meeting will be prepared and considered by the WICC only under the following conditions:

1. **Emergencies.** Upon a determination by the WICC that an emergency situation exists, as defined in Section 54956.5 of the Government Code.

2. **Need Arising after Posting.** Upon a determination by a two-thirds vote of the WICC or, if less than two-thirds of the potential votes are present, a unanimous vote of the WICC members present, that there is a need to take immediate action and the need to take action came to the attention of WICC or staff subsequent to the regular agenda being posted.

3. **Recently Continued Item.** The item was properly posted for a prior meeting of the WICC occurring not more than five calendar days prior to the date action is taken on the item, and at the prior meeting the item was continued to the meeting at which action is being taken.

G. **Adjourning Meetings.** The WICC may adjourn any meeting to a time and place specified in the order of adjournment. Less than a quorum may so adjourn from time to time. If all WICC members are absent from any regular meeting or adjourned regular meeting the Secretary or Acting Secretary of the WICC may declare the meeting adjourned to the next regular meeting of the WICC. A copy of the order or notice of adjournment shall be conspicuously posted on or near the door of the place where the meeting was held within 24 hours after the time of the adjournment. When a regular or adjourned regular meeting is adjourned as provided in this section, the resulting adjourned regular meeting is a regular meeting for all purposes. When an order of adjournment of any meeting fails to state the hour at which the adjourned meeting is to be held, it shall be held at the hour specified for regular meetings.

H. **Meetings to be Open and Public**. All meetings of the WICC to take action or to deliberate concerning WICC business and its conduct shall be open and public. All persons shall be permitted to attend any such meetings except as otherwise provided or permitted by law.

## IV. CONDUCT OF MEETINGS

A. **Order of Business.** The regular order of business of the WICC shall be:

1. Call to order.

2. Approval of the minutes of the previous meeting.

3. Public comment on unagendized items.

4. Consideration and Action on Agenda Items.

5. Adjournment.

B. **Parliamentary Procedure.** Unless otherwise provided by these Bylaws, all proceedings before the WICC shall be conducted in accordance with and pursuant to the parliamentary procedure prescribed in the most current version of the Sturgis "Standard Code of Parliamentary Procedure."

C. **Recording of Meetings.** Any meeting of the WICC, other than a closed session permitted under the Brown Act, may be recorded by any person, unless the WICC determines that such recording could constitute a disruption of the proceedings.

D. **Presentations to the Board**. Any person desiring to address the WICC shall, when recognized by the Chair, give his or her name and address. The Chair may, in the interest of facilitating the business of the WICC, set in advance of the presentation of testimony reasonable time limits for oral presentations. Persons may be required to submit written testimony in lieu of oral testimony if the Chair determines that a reasonable opportunity for oral presentations has been provided, and in such a case, the matter may be continued to a later date to allow a reasonable time for such submittals to occur.

E. **Recordation of Board Actions.** All official actions or decisions by the WICC shall be documented and kept by the Secretary. The vote or votes of each member of the WICC on every question shall be recorded. Only action minutes will be maintained, however, tape recordings will be made of each meeting of the WICC whenever possible and shall be available to the public at the WICC offices.

## V. VOTING AND QUORUM

A. **Roll Call Vote.** A roll call vote may be required in voting upon any motion of the WICC at the discretion of the Chair.

B. **Inaudible Votes.** Any member present who does not vote in an audible voice or abstains for a legally insufficient reason shall be recorded as voting "aye".

C. **Quorum.** A majority of the members of the WICC shall constitute a quorum for the purpose of conducting its business and exercising its powers and for all other official purposes, except that less than a quorum may adjourn from time to time until a quorum is obtained.

D. **Number of Votes Required for Action.** All actions require a motion and a second. No action or recommendation of the WICC shall be valid and binding unless a quorum is present and the motion is approved by at least a majority of the members present. Each member shall have one vote. No votes may be cast by proxy. Tie votes shall be considered as denial of the motion.

E. **Voting Affected by Conflict of Interest.** As a general rule, no member shall participate as a member in any discussion or voting if to do so would constitute a conflict of interest. However, if a quorum cannot be achieved or the required number of affirmative votes for action obtained because conflicts of interest exist that prevent members having such conflicts from discussing or voting on the matter, and the conflicts are such that the members with conflicts will be unable to vote at a later date even if the matter is continued, the matter shall not be continued and a sufficient number of members having conflicts of interest, selected by lot, shall be allowed to participate to provide enough votes for the WICC to form a quorum and take affirmative action.

1. A final vote on any matter before the WICC may be reconsidered during the meeting at which the vote was taken provided all persons concerned with the matter are still present, and further provided the motion to reconsider shall be made by a member voting with the majority on the final vote.

2. If all persons concerned with a matter are not present, or if a member so chooses, a motion to reconsider a final vote on any matter may be given not later than the next regular meeting by a member voting with the majority on the final vote, provided notice of intention to move such reconsideration shall have been given at the meeting on which the final vote was taken.

3. A motion for reconsideration shall have precedence over every motion except a motion to adjourn.

## VI. CHANGES TO BYLAWS

The provisions of these Bylaws may be altered, amended, or repealed at any time, within limitations imposed by the Brown Act.

###

**RESOLUTION NO. 2016-118**

**A RESOLUTION OF THE NAPA COUNTY BOARD OF SUPERVISORS, STATE OF CALIFORNIA, AMENDING THE WATERSHED INFORMATION AND CONSERVATION COUNCIL MEMBERSHIP**

**WHEREAS,** on May 21, 2002, the Board adopted Resolution No. 02-103 creating the joint Napa River Watershed Conservancy and Watershed Information Center Board which was later renamed the Watershed Information and Conservation Council ("WICC"); and

**WHEREAS,** since creation of the WICC in 2002, the Board of Supervisors has adopted several resolutions affecting the role and structure of the WICC and those changes need to be memorialized; and

**WHEREAS,** there is currently a vacancy on the WICC due to term expiration representing the Land Trust of Napa County; and

**WHEREAS,** the Land Trust of Napa County is not able to participate in the WICC at this time due to competing demands for their time; and

**WHEREAS,** on July 28, 2016 the WICC recommended amending its membership to replace the Land Trust of Napa County member with a member and alternate member from the Napa County Regional Parks and Open Space District Board of Directors; and

**WHEREAS,** on August 8, 2016 the Napa County Regional Parks and Open Space District Board of Directors expressed interest in serving on the WICC and nominated a member and alternate member for possible appointment; and

**WHEREAS,** the WICC is an advisory committee and its membership can only be amended by the Board of Supervisors; and

**WHEREAS,** the Board desires to change the membership of the WICC to facilitate its role and to continue to reflect its purpose;

**NOW, THEREFORE BE IT RESOLVED** that the Napa County Board of Supervisors hereby finds:

1. Resolution No. 02-103 regarding the composition of the WICC membership shall be amended to replace the Land Trust of Napa County membership with a member and an alternate member nominated from the Napa County Regional Parks and Open Space District Board of Directors, who, upon appointment may serve on the Watershed Information and Conservation Council.

2. All other terms and provisions of Resolution No. 02-103 not in conflict with the terms and provisions of this Resolution shall remain unchanged and in effect.

**THE FOREGOING RESOLUTION WAS DULY AND REGULARLY ADOPTED** by the Napa County Board of Supervisors, State of California, at a regular meeting of said Board held on the 30th day of August, 2016, by the following vote:

| | | |
|---|---|---|
| AYES: | SUPERVISORS | DILLON, WAGENKNECHT, CALDWELL, LUCE and PEDROZA |
| NOES: | SUPERVISORS | NONE |
| ABSTAIN: | SUPERVISORS | NONE |
| ABSENT: | SUPERVISORS | NONE |

NAPA COUNTY, a political subdivision of the State of California

By: ________________________

ALFREDO PEDROZA, Chairman of the Board of Supervisors

| | | |
|---|---|---|
| APPROVED AS TO FORM<br>Office of County Counsel<br><br>By: *Robert Martin, Deputy County Counsel*<br><br>Date: August 16, 2016 | APPROVED BY THE NAPA COUNTY BOARD OF SUPERVISORS<br><br>Date: August 30, 2016<br>Processed By:<br><br>Deputy Clerk of the Board | ATTEST: GLADYS I. COIL<br>Clerk of the Board of Supervisors<br><br>By: Gladys I. Coil |

**RESOLUTION NO. 2016-189**

**A RESOLUTION OF THE NAPA COUNTY BOARD OF SUPERVISORS, STATE OF CALIFORNIA, AMENDING THE WATERSHED INFORMATION AND CONSERVATION COUNCIL BYLAWS**

**WHEREAS,** on May 21, 2002, the Board adopted Resolution No. 02-103 creating the joint Napa River Watershed Conservancy and Watershed Information Center Board which was later renamed the Watershed Information and Conservation Council ("Council"); and

**WHEREAS,** since creation of the Council in 2002, the Board of Supervisors has adopted several resolutions affecting the role, structure and meeting details of the Council and those changes need to be memorialized and incorporated into the Council's bylaws; and

**WHEREAS,** the Council is an advisory committee and its bylaws can only be amended by the Board of Supervisors; and

**WHEREAS,** on November 3, 2016 the Council discussed and recommended that the Board of Supervisors amend the Council's bylaws to change the Council's regular meeting time and location; and

**WHEREAS,** the Board of desires to change the time and location of the Council's meetings to better secure the Council's meeting location and address the needs of the Council membership;

**NOW, THEREFORE BE IT RESOLVED** that the Napa County Board of Supervisors hereby finds as follows:

1. The Bylaws of the Watershed Information and Conservation Council shall be amended effective immediately to read in full as set forth in Exhibit "A", attached hereto and incorporated by reference herein.

2. All other terms and provisions of prior Resolutions pertaining to the Watershed Information and Conservation Council not in conflict with the terms and provisions of this Resolution shall remain unchanged and in effect.

3. The County Executive Officer is directed to place a copy of this Resolution, or appropriate summary thereof, in Section 28 of Part II of the Napa County Policy Manual.

**THE FOREGOING RESOLUTION WAS DULY AND REGULARLY ADOPTED** by the Napa County Board of Supervisors, State of California, at a regular meeting of said Board held on the 20th day of December, 2016, by the following vote:

| | | |
|---|---|---|
| AYES: | SUPERVISORS | DILLON, WAGENKNECHT, CALDWELL, LUCE and PEDROZA |
| NOES: | SUPERVISORS | NONE |
| ABSTAIN: | SUPERVISORS | NONE |
| ABSENT: | SUPERVISORS | NONE |

NAPA COUNTY, a political subdivision of the State of California

By: ______________________________

ALFREDO PEDROZA, Chair of the Board of Supervisors

| APPROVED AS TO FORM<br>Office of County Counsel | APPROVED BY THE NAPA COUNTY<br>BOARD OF SUPERVISORS | ATTEST: GLADYS I. COIL<br>Clerk of the Board of Supervisors |
|---|---|---|
| By: *Robert Martin, Deputy* County Counsel<br><br>Date: December 19, 2016 | Date: December 20, 2016<br>Processed By:<br>______________________<br>Deputy Clerk of the Board | By: ______________________ |



cc/d/pl/WICC/Bylaws/
2015 BOS Reso Amend Bylaws FINAL.doc

## EXHIBIT A-1 TRACK CHANGES

Adopted May 21, 2002; Resolution 02-103
Amended February 24, 2004; Resolution 04-26
Amended June 8, 2004; Resolution 04-77
Amended July 13, 2004; Resolution 04-102
Amended November, 1, 2005; Resolution 05-202
Amended April 25, 2006; Resolution 06-82
Amended January 29, 2013; Resolution 2013-06
**Amended June 23, 2015; Resolution 2015-82**

# BYLAWS OF THE WATERSHED INFORMATION AND CONSERVATION COUNCIL OF NAPA COUNTY

## I. THE WATERSHED INFORMATION AND CONSERVATION COUNCIL OF NAPA COUNTY

**A. Name.** The official name of the ~~Board~~ Council shall be the Watershed Information and Conservation Council of Napa County, hereinafter referred to as the "WICC." (Per Resolution No. 2015-82)

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**A. Time of Election of the Chair and Vice-Chair.** At the first organizational meeting and thereafter at the WICC's annual organizational meeting, the membership of the WICC shall elect the Chair and Vice-Chair from among themselves.

**B. Term of the Chair and Vice-Chair.** The Chair and Vice-Chair shall serve one calendar year or until their successors are elected and assume office. If the office of Chair becomes vacant during the term, the Vice-Chair shall become Chair. Vacancy in the office of Vice-Chair during the term shall be filled by election to serve the remainder of the term.

**C. Duties of the Chair and Vice-Chair.** The Chair, or the Vice Chair in the absence of the Chair, shall act as the presiding officer of the WICC and in that capacity shall preserve order and decorum, decide questions of order subject to being overruled by a two-thirds vote and perform such other duties as are required by the WICC. The Chair shall have all the rights and duties enjoyed by any other member of the WICC, including the right to make and second motions.

**D. Secretary.** The Natural Resources Conservation Manager, in the Water Resources Division of the Public Works Department, shall serve ex officio as the Secretary of the WICC.

**E. Authority to Bind the WICC ~~Board~~.** No member of the WICC shall have any power or authority to bind the WICC by any contract, to pledge its credit, or to render it liable for any purpose in any amount.

**F. Term of WICC members.** Each member of the WICC shall serve for a period of four

(4) years. Members serving on the WICC as elected officials and their alternates ~~member acting for the County Board of Supervisors~~ shall serve the same term as their elected office.

**G. Service and termination of WICC membership.**

1. **Service.** Members appointed to the WICC by the County Board of Supervisors shall serve at the will and pleasure of the County Board of Supervisors.

2. **Termination.** A WICC member's term may be concluded before expiration if any one of the following events occurs:

    a. The member's ~~His or her~~ absence from three consecutive regular meetings during the term year, unless confined by illness or other absence approved by a majority of the WICC at any meeting thereof, will be considered as having involuntarily resigned the ~~her/his~~ position as a member of the WICC.

    b. The member's ~~His or her~~ resignation is submitted to the Chair.

    c. The member no longer ~~His or her ceasing~~ resides~~ney~~ in Napa County.

    d. The member is convicted ~~His or her conviction~~ of a felony or any offence involving a violation of the member's ~~his or her~~ official duties.

    e. Refusal or neglect to file the required oath of office.

## III. MEETINGS

**A. Date of Regular Meetings.** All dates of regular meetings of the WICC shall be on the fourth Thursday of every other month beginning in January, apart from November, when the meeting shall be held on the third Thursday, as shown on a calendar, which the WICC shall adopt at the first meeting of the WICC, of each calendar year. Notwithstanding the foregoing, any regularly scheduled meeting of the WICC may be canceled by majority vote or, if there is not a quorum, be adjourned by the Chair or Secretary in the manner set forth in Section III(G) of these by-laws.

**B. Time of Regular Meetings.** Regular meetings shall commence at ~~4~~3:00 pm and continue until all agendized business is concluded unless adjourned earlier on motion of the WICC for any reason or by the Secretary for lack of a quorum.

**C. Location of Regular Meetings.** Unless specially noticed otherwise, regular meetings shall be held at 2751 Napa Valley Corporate Drive, Building A, First Floor Conference Room - Madrone ~~625 Burnell Street, in the NCTPA/NVTA Board~~ Room, Napa, California.

**D. Emergency Meetings.** Emergency meetings shall be called in conformance with Section 54956.5 of the California Government Code

E. **Special Meetings.** A special meeting may be called at any time by the Chairman or upon the request of a majority of the members of the WICC by delivering written notice to each member and to each person or entity entitled by law to receive such notices in the manner required by Government Code Section 54956 at least 24 hours before the time of the meeting as specified in the notice. The call and notice shall specify the time and place of the special meeting and the business to be transacted or discussed and shall be posted at least 24 hours prior to the special meeting in a location that is freely accessible to members of the public. No other business shall be considered at such meetings by the WICC. Such written notice may be dispensed with as to any WICC member who at or prior to the time the meeting convenes files with the Secretary of the WICC a written waiver of notice. Such waiver may be given by telegram. Such written notice may also be dispensed with as to any member who is actually present at the time the meeting convenes.

F. **Agendas Involving Regular Meetings**. At least 72 hours before a regular meeting, an agenda containing a brief general description of each item of business to be transacted or discussed shall be posted at a location freely accessible to members of the public. All agendas shall include a time period for public comment and shall specify the time and location of the regular meeting. No discussion shall occur, or action be taken, on any item not appearing on the posted agenda except as permitted by law. Questions or comments regarding items not included on the agenda shall be limited to the scope permitted for "public comment". Supplemental agendas involved in a regular meeting will be prepared and considered by the WICC only under the following conditions:

1. **Emergencies.** Upon a determination by the WICC that an emergency situation exists, as defined in Section 54956.5 of the Government Code.

2. **Need Arising after Posting.** Upon a determination by a two-thirds vote of the WICC or, if less than two-thirds of the potential votes are present, a unanimous vote of the WICC members present, that there is a need to take immediate action and the need to take action came to the attention of WICC or staff subsequent to the regular agenda being posted.

3. **Recently Continued Item.** The item was properly posted for a prior meeting of the WICC occurring not more than five calendar days prior to the date action is taken on the item, and at the prior meeting the item was continued to the meeting at which action is being taken.

G. **Adjourning Meetings.** The WICC may adjourn any meeting to a time and place specified in the order of adjournment. Less than a quorum may so adjourn from time to time. If all WICC members are absent from any regular meeting or adjourned regular meeting the Secretary or Acting Secretary of the WICC may declare the meeting adjourned to the next regular meeting of the WICC. A copy of the order or notice of adjournment shall be conspicuously posted on or near the door of the place where the meeting was held within 24 hours after the time of the adjournment. When a regular or adjourned regular meeting is adjourned as provided in this section, the resulting adjourned regular meeting is a regular meeting for all purposes. When an order of adjournment of any meeting fails to state the hour at which the adjourned meeting is to be held, it shall be held at the hour specified for regular meetings.

H. **Meetings to be Open and Public**. All meetings of the WICC to take action or to deliberate concerning WICC business and its conduct shall be open and public. All persons shall be permitted to attend any such meetings except as otherwise provided or permitted by law.

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1. Call to order.
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4. Consideration and Action on Agenda Items.
5. Adjournment.

B. **Parliamentary Procedure.** Unless otherwise provided by these Bylaws, all proceedings before the WICC shall be conducted in accordance with and pursuant to the parliamentary procedure prescribed in the most current version of the Sturgis "Standard Code of Parliamentary Procedure."

C. **Recording of Meetings.** Any meeting of the WICC, other than a closed session permitted under the Brown Act, may be recorded by any person, unless the WICC determines that such recording could constitute a disruption of the proceedings.

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E. **Recordation of ~~Board~~ Council Actions.** All official actions or decisions by the WICC shall be documented and kept by the Secretary. The vote or votes of each member of the WICC on every question shall be recorded. Only action minutes will be maintained, however, ~~tape~~ electronic recordings will be made of each meeting of the WICC whenever possible and shall be available to the public at the WICC offices.

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A. **Roll Call Vote.** A roll call vote may be required in voting upon any motion of the WICC at the discretion of the Chair.

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C. **Quorum.** A majority of the members of the WICC shall constitute a quorum for the purpose of conducting its business and exercising its powers and for all other official purposes, except that less than a quorum may adjourn from time to time until a quorum is obtained.

D. **Number of Votes Required for Action.** All actions require a motion and a second. No action or recommendation of the WICC shall be valid and binding unless a quorum is present and the motion is approved by at least a majority of the members present. Each member shall have one vote. No votes may be cast by proxy. Tie votes shall be considered as denial of the motion.

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1. A final vote on any matter before the WICC may be reconsidered during the meeting at which the vote was taken provided all persons concerned with the matter are still present, and further provided the motion to reconsider shall be made by a member voting with the majority on the final vote.

2. If all persons concerned with a matter are not present, or if a member so chooses, a motion to reconsider a final vote on any matter may be given not later than the next regular meeting by a member voting with the majority on the final vote, provided notice of intention to move such reconsideration shall have been given at the meeting on which the final vote was taken.

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The provisions of these Bylaws may be altered, amended, or repealed at any time, within limitations imposed by the Brown Act.

**EXHIBIT A-2 CLEAN COPY**

Adopted May 21, 2002; Resolution 02-103
Amended February 24, 2004; Resolution 04-26
Amended June 8, 2004; Resolution 04-77
Amended July 13, 2004; Resolution 04-102
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## 13. County of Napa. 2003. *Water Availability Analysis Policy Report*. Napa, CA. August 2003

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# WATER AVAILABILITY ANALYSIS

**Policy Report**
**August 2003**

## Introduction:

At the height of the 1990 drought in Napa County, the Napa County Board of Supervisors and the Napa County Planning Commission became very concerned with the approval of use permits and parcel division that would cause an increased demand on groundwater supplies within Napa County. During several Commission hearings, conflicting testimony was entered as to the impact of such groundwater extraction on water levels in neighboring wells. The Commission asked the Department of Public Works to evaluate what potential impact an approval might have on neighboring wells and on the basin as a whole. In order to simplify a very complex analysis, the Department developed a three phase water availability analysis to provide a cost-effective answer to the question.

On March 6, 1991, an interim policy was presented and approved by the Commission which requires the applicants for use permits and parcel divisions to submit a water availability analysis with their proposal. The staff report that provides the procedure to follow for compliance with the Commission policy was intended to be an interim one. With the passage on August 3, 1999 by the Board of Supervisors of Napa County Ordinance #1162 (the Groundwater Conservation Ordinance) it became apparent that the interim policy required updating and formalization. The purpose of the revised report is to provide the procedure for preparation of water availability analysis and to restate the purpose and functionality of the analysis as related to the revised Groundwater Ordinance (Napa County Ordinance # 1162).

## Water Availability Analysis:

The Water Availability Analysis (WAA) sets up guidelines to determine if a proposed project will have an adverse impact on the groundwater basin as a whole or on the water levels of neighboring wells with the overriding benefit of helping to manage groundwater resources. An important sidelight to the process is public education and awareness. WAA's are comprised of potentially three phases; phase one, phase two and phase three.

A **phase one analysis** is a reconnaissance level report that may be prepared by the applicant or their agent. **It must be signed by the applicant. If prepared by the applicant's agent, it must contain the letterhead of the agent, the name of the agent, and the agent's signature.** The phase one WAA contains the following information:

1. The name and contact information of the property owner and the person preparing the phase one report.

2. Site map of the project parcel and adjoining parcels. The map should include: Assessor's Parcel Number (APN), parcel size in acres, location of project well(s) and other water sources, general layout of structures on the subject parcel, location of agricultural development and general location within the county.

3. Narrative on the nature of the proposed project including: all land uses on the subject parcel, potential for future water uses, details of operations related to water use, description of interconnecting plumbing between the various water sources and any other pertinent information.

4. Tabulation of existing water use compared to projected water use for all land uses contained on the parcel. Should the water use extend to other parcels, they should be included in the analysis (see Appendix E for additional information on determining fair share estimates when multiple parcels are involved). **These estimates should reflect the specific requirements of the applicant's operations.** The applicant should use the guidelines attached in Appendix A

The Department will review the analysis for completeness and reasonableness (based on the guidelines outlined in Appendix A) and then compare the analysis to a threshold level of groundwater use for the subject parcel. The threshold is based upon several factors including annual rainfall, topography, soil types, proximity to recharge zones and available groundwater information. In general, parcels located on the Valley Floor or in strong alluvial areas will be assigned a threshold of 1 acre-foot per acre of land (an acre-foot of water is the amount of water it takes to cover one acre of land to a depth of one foot, or 325,851 gallons). Therefore, a 40-acre parcel will have an acceptable level of groundwater use of 40 acre-feet per year. The threshold for Hillside parcels (primarily located in volcanic rock and soils) is 0.5 acre-feet per acre or 20 acre-feet per year for a 40-acre parcel. Areas designated as "Groundwater Deficient Areas" as defined in the Groundwater Conservation Ordinance will have threshold established for that specific area. For example, the Milliken-Sarco-Tulocay Basin (M-S-T) is currently the only "groundwater deficient area" and has an established threshold of 0.3 acre-feet per acre per year. Thus, the same 40-acre parcel has an acceptable level of water use of 12 acre-feet per year (see Appendix B).

If the Phase I analysis shows a water use above the parcel threshold then further analysis may be required in the form of a Phase II or Phase III analysis.

In instances where the applicant is in the M-S-T basin and their estimated future water usage will be significantly less than the values listed in Appendix A, or if the estimate is within 50% of the estimated threshold, the County may require the applicant to install a water meter to verify actual groundwater usage. If the actual usage exceeds the parcel's threshold, applicant may be required to reduce groundwater consumption and/or find alternate water sources to ensure that no more groundwater is consumed than the threshold for the parcel(s) (See Appendix D).

In the M-S-T basin a phase one analysis examines only the estimated quantity of groundwater water usage as compared to the established water usage threshold. It is assumed that if all consumers within the MST basin were to limit their consumption to 0.3 acre-feet per acre per year* there will be sufficient groundwater for all properties within that area.

* Does not apply to the Ministerial Exemption as outlined in the Groundwater Conservation Ordinance

Any new project within the M-S-T Basin whose estimated use exceeds the threshold use will likely be recommended for denial to the County Department requesting review of the application.

For projects in all other areas within Napa County whose estimated water use exceeds the threshold, the applicant will be required to conduct either a **phase two or a phase three analysis (or both).**

The phase two analysis is commonly called an acquifer test or well test. It requires the pumping of the project well(s) at the maximum rate needed to meet project water demands and at the same time requires the monitoring of the immediate effects of groundwater pumping on a neighboring or monitoring well(s). The following requirements must be met when performing a phase two analysis:

- An approved hydrogeologist, a list of which is on file with the Department of Public Works, must develop the test procedure. Upon approval of test procedures, the hydrologist will supervise the test and submit a report to the Department evaluating impacts to neighboring static water levels.
- A licensed well drilling contractor must perform the actual testing and monitor static and dynamic water levels of the project well and monitoring wells during the duration of the test, including the recovery phase of the project well and monitoring wells.
- The test must be conducted long enough to stabilize the dynamic water level of the project well or include an analysis of what the impact* of continued pumping would have.

- The applicant or agent must notify the Department at least 48 hours prior to conducting the test.

* Impact is unique to each project and will be evaluated on a case by case basis by the department of public works.

Any projects requiring a phase two analysis may also be required to install water meters to measure the actual amount of water consumed, and be required to find alternate water sources if their actual groundwater usage exceeds the threshold for their property (see Appendix D).

The Department will review the phase two analysis and determine if the impacts to static water levels of neighboring wells are within acceptable limits. If the phase two is unacceptable, **a phase three analysis** is required. The phase three analysis may include many measures aimed at reducing water consumption and/or the maximum pumping rate. The Department will require periodic monitoring of static water levels with annual submittals of well production and static water level reports.

The phase three analysis only determines possible actions which could be taken to moderate the immediate effects of groundwater pumping to neighboring wells. These mitigation measures will be designed to reduce, but may not eliminate, the immediate effects of groundwater pumping to neighboring wells.

The preparation and submittal of WAA's for all use permits and parcel divisions, as well as for all Groundwater Conservation Ordinance permits must be submitted through the normal procedures for the Conservation, Development and Planning Department (CDPD) and the Department of Environmental management (DEM) respectively. All subsequent communication should likewise pass through CDPD or DEM. Any mitigation measures identified in the phase three analysis will become either project modifications to, or conditions of approval for, the proposed project.

Details of the use permit or land division can be obtained from CDPD and details of the Groundwater Ordinance and related permit process can be obtained from the Department of Environmental Management. Mapping of "Groundwater Deficient Areas" is available at all three Departments with final determination being supplied by the Department of Public Works.

**Conclusions:**

The Napa County Board of Supervisors has long been committed to the preservation of groundwater for agriculture and rural residential uses within the County. It is their belief that through proper management, the excellent groundwater resources found within the county can be sustained for future generations.

Since 1991, several conclusions can be drawn from application of the water availability analysis process:

- In the process of conducting the analysis, applicants become much more aware of water use for their project, providing a higher level of awareness and potentially leading to more efficient use of the resource.

- Information submitted by applicants has lead to a broader database for future study and management.

- Groundwater use can vary widely depending upon its availability.

- The current practice of evaluating an applicant's Phase I WAA to determine if additional analysis is needed has been the accepted method for making groundwater determinations. Due to the limited information available on Napa County groundwater basins in general (with the exception of the MST basin), the Phase 1 WAA has been the most reasonable approach to the process and has not been shown to be inaccurate or inadequate. As such, the established WAA procedures for making groundwater determinations as outlined above and throughout the Appendices will continue to be the accepted method of making groundwater determinations and findings.

The water availability analysis is based upon the basic premise that each landowner has equal right to the groundwater resource below his or her property. By attempting to limit the extraction to a threshold amount, it is believed that sufficient groundwater will be available for both current and future property owners.

## APPENDIX A: Estimated Water Use for Specified Land Use

### Guidelines For Estimating Residential Water Usage:

Residential water use can vary dramatically from house to house depending on the number of occupants, the number and type of appliances and water fixtures, the amount and types of lawn and landscaping. Two homes sitting side by side on the same block can consume dramatically different quantities of water.

### Example:

Home #1 is 2500 square feet. Outside the house there is an extensive bluegrass lawn, a lot of water loving landscaping, a swimming pool with no pool cover. Inside the house all the appliances and fixtures, including toilets and showerheads, are old and have not been upgraded or replaced by water saving types. The owners wash their cars weekly but they don't have nozzles or sprayers on the hose. They do not shut off the water while they are soaping up the vehicles, allowing the water to run across the ground instead. Water is commonly used as a broom to wash off the driveways, walkways, patio, and other areas. The estimated water usage for Home #1 is 1.2 acre-feet of water per year.

Home #2 is also 2500 square feet. Outside of the house there is a small lawn of drought tolerant turf, extensive usage of xeriscape landscaping, and no swimming pool. Inside the house all of the appliances and fixtures, including toilets and showerheads, are of the low flow water saving types. The owners wash their cars weekly, but have nozzles or sprayers on the hose to shut off the water while they are soaping up the vehicles. Driveways, walkways, patios, and other areas are swept with brooms instead of washed down with water. Estimated water usage for Home #2 is 0.5 acre-feet of water per year.

Residential water usage can be estimated in a number of ways, however, for the purpose of the WAA, estimates based on the potential number of people who can live on the parcel, and the type of water saving techniques employed, is preferred. The following paragraphs outline this method.

### Estimating water use:

Determine if you will be using passive or active water saving techniques on your parcel. Passive techniques require that all appliances and fixtures be of the low flow water saving type. It also requires that the area of your lawn be of drought tolerant turf and no larger that the square footage of your house. If there is a pool, it must be covered whenever it is not in use to prevent evaporation.

Active techniques require all appliances and fixtures to be of the low flow water saving type. The lawn area cannot exceed 1000 square feet of drought tolerant turf, and xeriscape landscaping techniques must be employed. Any plant watering will be accomplished through drip irrigation. No swimming pools are allowed.

**<u>Guidelines for Estimating Residential Water Use-</u>**<u>For use with the Phase I WAA</u>

1. Count the total number of bedrooms and potential bedrooms on the parcel.
2. Assume 2 people per bedroom.
3. Add 0.2 people for every full time employee not living on site. (maids, landscapers etc.)
4. Calculate the water demand using 0.084AF/year per person (number of people x 0.084)
5. Determine if you will be using passive or active landscaping techniques.
6. If you will use passive water saving your water usage factor is 0.08 per person. If you will use active water saving techniques your water usage factor is 0.04. If no water saving techniques are employed, then an unlimited use factor of 0.14 should be used.
7. Multiply the number of potential residents by the appropriate factor to determine the additional estimated outdoor annual water usage in acre-feet per year. Add the additional estimated outdoor annual water usage number to the number calculated in 4 above to determine the total estimated annual water use.

If you have very limited outdoor irrigation and feel the additional water use included in number 7 above is not relative to your property, you must submit evidence in the form of pictures or a site plan of existing/proposed landscaping (or other indication of vegetation or lack thereof) on the property. The department of public works will evaluate submittals and a lesser number may be allowed. On the contrary, if there is extensive landscaping and outdoor irrigation, you must account for it as noted below.

**<u>Example:</u>** A Three Bedroom residence with a full time maid using passive water saving techniques.

- 3 Bedrooms x 2 people per bedroom = 6 people + 0.2 (maid)
- 6.2 people x 0.084 AF = .50 AF/year
- 6.2 people x 0.08 AF (passive)=.52AF
- Total annual water use estimated at 1.02 AF/year.

<u>Additional Usage To Be Added</u>

1. Add an additional 0.1 acre-feet of water for each additional 1000 square feet of drought tolerant lawn or 2000 square feet of non-xeriscape landscaping above that already counted above.
2. Add an additional 0.05 acre-feet of water for a pool with a pool cover.
3. Add an additional 0.1 acre-feet of water for a pool without a cover.

**Guidelines For Estimating Non-Residential Water Usage:**

| | |
|---|---|
| Agricultural: | |
| Vineyards | |
| Irrigation only | 0.2 to 0.5 acre-feet per acre per year or 100 to 200 gallons of water per vine per year |
| Heat Protection | 0.25 acre feet per acre per year |
| Frost Protection | 0.25 acre feet per acre per year |
| Farm Labor Dwelling | 1.0 acre-feet per year (6 people) |
| Irrigated Pasture | 4.0 acre-feet per acre per year |
| Orchards | 4.0 acre-feet per acre per year |
| Livestock (sheep or cows) | 0.01 acre-feet per acre per year |
| Winery: | |
| Process Water | 2.15 acre-feet per 100,000 gal. of wine |
| Domestic and Landscaping | 0.50 acre-feet per 100,000 gal. of wine |
| Industrial: | |
| Food Processing | 31.0 acre-feet per employee per year |
| Printing/Publishing | 0.60 acre-feet per employee per year |
| Commercial: | |
| Office Space | 0.01 acre-feet per employee per year |
| Warehouse | 0.05 acre-feet per employee per year |

**Parcel Location Factors:**

The Fair share allotment of water is based on the location of your parcel. There are 3 different location classifications. Valley Floor, Hillside and Groundwater Deficient Areas. Valley Floor areas include all locations that are within the Napa Valley and the Carneros Region except for areas specified as groundwater deficient areas. Groundwater Deficient areas are areas that have been determined by the Department of Public Works as having a history of problems with groundwater. The only Groundwater Deficient Basin in Napa County is the MST basin. All other areas are classified as Hillside Areas. Public Works can assist you in determining your classification.

| Parcel Location Factors | |
|---|---|
| Valley Floor | 1.0 acre feet per acre per year |
| Hillside Areas | 0.5 acre feet per acre per year |
| MST Groundwater Deficient Area | 0.3 acre feet per acre per year* |

* Does not apply to the Ministerial Exemption as outlined in the Groundwater Conservation Ordinance

The threshold for the Valley Floor Area was determined in 1991 in the form of a Staff Report to the Board of Supervisors. The value of 1.0 AF/A/Year was established as the expected demand an average vineyard would have. It was noted that the Valley Floor threshold would have relatively little effect on neighboring wells.

The threshold for the Mountain Area was established due to the uncertainty of the geology, and the increasingly fractured aquifer in the mountainous and non Napa Valley areas.

The threshold for the Groundwater Deficient Areas was determined using data from the 1977 USGS report on the Hydrology of the Milliken Sarco Tulocay region. The value is calculated by dividing the "safe annual yield" (as determined by the USGS study of 1977) by the total acreage of the affected area (10,000 acres).

**APPENDIX B: Values Used to Establish Thresholds**

Average Annual Rainfall (Source: Napa County Road & Streets Standards):

| | |
|---|---|
| American Canyon | 1.5 feet per year |
| City of Napa | 2.0 feet per year |
| Yountville | 2.5 feet per year |
| Oakville | 2.5 feet per year |
| Rutherford | 2.67 feet per year |
| St. Helena | 2.75 feet per year |
| Calistoga | 3.0 feet per year |
| Western Hills | increase by 20% |
| Eastern Hills | increase by 10% |

Threshold Factors of Acceptable Water Use:

| | |
|---|---|
| Valley Floor | 1.0 acre-foot per acre |
| Hillsides | 0.5 acre-foot per acre |
| MST Groundwater Deficient Areas | 0.3 acre-foot per acre* |

* Does not apply to the Ministerial Exemption as outlined in the Groundwater Conservation Ordinance

## APPENDIX C: Guidance for M-S-T Basin Permit Applications

Data collected from the monitoring of wells within the M-S-T Basin over the last forty years indicate that it may be in overdraft, leading to the conclusion that the existing water users within the basin are pumping more water from the ground than is being naturally replaced each winter season. The only way to end the overdraft trend is to cease all water extraction from the basin. However, as no other reasonable water resources exist in the M-S-T, the Department, to avoid a ban on all new construction, has assumed that each property owner should be able to develop their property to a "reasonable" level of water use while reducing the rate at which the groundwater levels are being lowered.

Within the near future, the U.S.G.S. will release a report on a recent study of the M-S-T Basin. From the U.S.G.S. report we will be able to determine to what extent the overdraft condition may exist and infer what problems may occur from the continued extraction of groundwater from the Basin. Results of the study will be used to plan for alternatives to address these problems. Until the report is available, and alternative measures can be implemented, the Department will use the following analysis to evaluate impacts from proposed projects in the M-S-T Basin:

**Single Family Dwellings on Small Parcels In the M-S-T Basin:** The average, single family dwelling will likely use between 0.5 and 1.5 acre-feet of groundwater per year. Using a threshold of 0.3 acre-ft/year/acre, the minimum parcel size able to support the above range is between 1.5 to 5.0 acres. Therefore, if an existing residence that uses 0.5 acre-feet per year of groundwater is located on a one-acre parcel, it already exceeds the acceptable level of water use for the property. Applications for the construction of a single family home in these instances can be approved ministerially if the owner agrees to the conditions outlined in the Groundwater Ordinance. If the conditions are not agreed upon, or if the project involves a secondary dwelling or other groundwater uses not consistent with a single family dwelling, then the project would be subject to the complete groundwater permit process including but not limited to the submittal of a Phase 1 analysis detailing all water use, existing and proposed, on the project parcel.

**Agricultural Development In the M-S-T Basin:** Agriculture in the M-S-T Basin is not exempt from the groundwater permit process. In these cases, such development will require an application for a groundwater permit including a phase one analysis detailing the existing and proposed water use(s) on the project parcel(s). It is likely that all agricultural development in the M-S-T will be required to meter all wells supplying water to the property with periodic reports to the Department.

**Existing Vineyard, New Primary or Secondary Residence In the M-S-T Basin:** On an application related to a new residence on a parcel with an existing

vineyard or residence, the Phase 1 WAA shall include all water use on the property, both existing and proposed. Projects on parcels with an established vineyard will likely be required to meter all wells supplying water to the property with periodic reports to the Department.

**Wineries and Other Use Permits In the M-S-T Basin:** On an application for a use permit, the applicant is required to provide a phase one analysis. Should the application be approved, a specific condition of approval will be required to meter all wells supplying groundwater to the property with periodic reports to the Department. It is also possible that water conservation measures will be a condition of approval. All new use permits must meet the threshold water use for the project parcel.

## APPENDIX D: Water Meters

If required, water meters shall measure all groundwater used on the parcel. Additional meters may also be required for monitoring the water use of individual facilities or operations, such as a winery, residence, or vineyard located on the same parcel. If a meter(s) is installed, the applicant shall read the meter(s) and provide the readings to the County Engineer at a frequency determined by the County Engineer. The applicant shall also convey to the County Engineer, or his designated representative, the right to access and verify the operation and reading of the meter(s) at any time.

If the meters indicate that the water consumption of a parcel in the M-S-T basin exceeds the fair share amount, the applicant will be required to submit a plan which will be approved by the Director of Public Works to reduce water usage. The applicant may be required to find additional sources of water to reduce their groundwater usage. Additional sources may include using water provided by the City of Napa, the installation of water tanks which are filled by water trucks, or other means which will ensure that the groundwater usage will not exceed the fair share amounts.

The readings from water meters may also be used to assist the County in determining trends in groundwater usage, adjusting baseline water use estimates, and estimating overall groundwater usage in the M-S-T basin.

## Appendix E: Determining water use numbers with multiple parcels

The water availability analysis is based on the premise that each landowner has equal right to the groundwater resource below his or her property. There will be cases where one person or entity owns multiple parcels and requests that the total water allotment below all of his or her parcels be considered in the Phase I water availability analysis. Determining the total threshold based on multiple parcels is acceptable, however to protect future property owners, certain safeguards must be in place to ensure that the water allotment and transfer between parcels is clearly documented and recorded, especially in cases where the water from more than one parcel will ultimately serve a use on a single parcel.

When multiple parcels are involved, the parcels for which the total threshold is being based on must be clearly identified on a site plan with assessors parcel numbers noted. The transfer of water from these parcels to the parcel on which the requested use is located must be documented using the form provided by the department of public works. The form must be approved by the County and subsequently recorded by the applicant prior to commencement of any activity authorized by the groundwater permit or other county permit or approval. A condition requiring such will be placed on the use permit, groundwater permit or other permit for approval.

## 14. County of Napa. 2003. *Napa County Ordinance No. 1230*. Adopted November 4, 2003

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**ORDINANCE NO. 1230**

**AN ORDINANCE OF THE BOARD OF SUPERVISORS OF THE COUNTY OF NAPA AMENDING CHAPTERS 13.15, 15.08, 18.124 AND 18.128 OF THE NAPA COUNTY CODE ESTABLISHING PERMIT REQUIREMENTS FOR THE EXTRACTION AND USE OF PUMPED GROUNDWATER AS A WATER SOURCE ON AFFECTED PROPERTIES, EXEMPTIONS THEREFROM AND RELATED FINDINGS**

The Board of Supervisors of the County of Napa ordains as follows:

**SECTION ONE.** The Board of Supervisors hereby finds and declares as follows:

(a) The groundwater basins of Napa County, including the North Napa Valley Basin, the Milliken-Sarco-Tulucay Groundwater Basin, the Carneros Basin, and the Pope Valley, Chiles Valley and Capell Valley Basins, have historically supplied the people of Napa County with significant water resources that are likely to increase in importance in the future.

(b) The groundwater basins of Napa County form significant water resources that must be managed in trust, and must be conserved so that they may be placed to the reasonable and beneficial use of all potential users, while avoiding the waste and unreasonable use of these resources.

(c) Napa County has a right and a duty to govern the management and extraction of resources within its jurisdiction in order to protect the health, safety and welfare of the citizens of Napa County. Conserving the water resources in the groundwater basins of Napa County to avoid overdrafts and maximize the long-term beneficial use of groundwater resources, best serves the health, safety and welfare of residents of Napa County. These objectives are of particular importance to the future productivity of Napa County agriculture, which presently and for the foreseeable future serves as the cornerstone of Napa County's economy.

(d) On December 3, 1996, the Board adopted Ordinance No. 1117, which imposed a moratorium on the processing of additional new applications for well drilling permits in areas designated as "open space" on the land use map of the Napa County General Plan until a permanent Groundwater Protection Ordinance could be adopted. Extensions of that moratorium (Ordinances 1119 and 1130) resulted in the moratorium remaining in effect until December 2, 1998.

(e) The Board reaffirms its conclusion in Ordinances No. 1117, 1119 and 1130 that groundwater supplies in Napa County are limited, and that:

1. The Milliken-Sarco-Tulucay groundwater basin is an area of existing groundwater deficiency and is designated as open space in the Napa County General Plan.

2. Areas of potential water deficiency which are designated as open space in the Napa County General Plan include, but are not limited to, the Pope Valley, Chiles Valley, Capell Valley, and Carneros groundwater basins.

(f) The Board finds the area shown on Map "13-1" (hereafter "groundwater-deficient areas") continues to be in a groundwater deficit condition, and in that area extraordinary measures are needed to avoid further overdrafts of the groundwater basins.

(g) The Board finds that the following revisions of Ordinance No. 1162 (hereafter the "Groundwater Ordinance") are necessary to ensure, to the maximum extent permissible by law, the sufficiency of groundwater supplies for agricultural uses in Napa County and the long-term viability of agriculture within Napa County and, additionally, to ensure that diversions of groundwater for urban uses are limited to the maximum extent permitted by law.

**SECTION TWO.** The Board finds that this Groundwater Ordinance, establishing groundwater findings and use requirements, implements and is fully consistent with the Napa County General Plan including but not limited to those goals set forth in Section 1 of the

Groundwater Ordinance.

**SECTION THREE.** Chapter 13.15 of the Napa County Code is amended to read in full as follows:

## Chapter 13.15

## GROUNDWATER CONSERVATION

**Sections:**


**13.15.010 Title, Purpose and Definitions**
**13.15.020 Groundwater Permit Required**
**13.15.030 Classification of Applications**
**13.15.040 Agricultural Activities Exempt From Groundwater Permitting Requirements**
**13.15.050 Determination of Exemption**
**13.15.060 Application for Groundwater Permit**
**13.15.070 Processing of Groundwater Permit Applications**
**13.15.080 Exceptions**
**13.15.090 Appeals**
**13.15.100 Enforcement – Violation**


### 13.15.010 Title, Purpose and Definitions.

A. Title.

This chapter implements the Napa County Groundwater Conservation Ordinance.

B. Purpose.

This chapter is intended to regulate, to the maximum extent possible, the extraction and use of groundwater resources in Napa County and to prohibit extraction for wasteful, unreasonable or non-beneficial purposes in order to promote groundwater conservation and the use of Best Management Practices and maximize the long-term beneficial use of the county's groundwater resources, thus serving to enhance environmental quality and protect the public health, safety and welfare of the citizens of Napa County.

C. Definitions. For the purpose of this chapter, the following definitions shall apply:

"Agricultural land development" means the development, new plantings, or other improvement of a property greater than one–quarter of an acre for the purposes of farming a crop, orchard, vineyard or other agricultural product.

"Agricultural land re-development" means the re-development or replanting of an existing crop, orchard, vineyard or other agricultural product of greater than one-quarter of an acre.

"Aquifer" means a geologic formation, underground layers of porous rock that are saturated from above or from structures sloping toward it, that stores, transmits and yields significant quantities of water to wells and springs. Aquifer capacity is determined by the porosity of the subsurface material and its area.

"Best Management Practices (BMP)", as used in this chapter, means structural, nonstructural and managerial techniques generally recognized to be the most effective and practical means to reduce contamination and consumption of groundwater while still allowing productive use of the resource, including, but not limited to: low flow fixtures, drip in lieu of broadcast irrigation, irrigation during hours of least evaporation loss, timers on irrigation systems, use of pool and spa covers to reduce evaporation, use of xeriscape landscaping, use of recycled water for landscaping purposes, and monitoring of wells.

"Conservation" means the conscious effort to prevent waste and minimize the consumption of groundwater by utilizing reasonable and economically justifiable methods to improve its delivery and use, thus increasing water supplies for optimum long-term benefits. When referring to landscaping or agricultural uses of groundwater this term includes water reuse, processes to reduce the amount of water irretrievably lost to moisture deficient soils, water surface evaporation, or evapotranspiration.

"Contiguous parcel" means parcels which abut, adjoin or otherwise touch each other at more than one point along a common boundary or which would do so except for separation by a strip of land over which some person or entity, other than the owner of the parcels, has some property interest, including fee title or some lesser interest, such as a leasehold or easement. Examples of such strips of land include but are not limited to roads, streets, utility easements, railroad rights-of-way, canals and drainage channels.

"Convenience improvement" means an addition, change, upgrade or improvement to a site's existing well or water supply and distribution system (including the addition of plumbing fixtures) which is for purposes of rendering the system more efficient and is not intended to supply water or make plumbing fixtures available to additional users of said system and does not increase the total consumption of groundwater at that site.

"Department" means the Napa County Department of Environmental Management.

"Director" means the Napa County Director of Environmental Management or the designee of the Director.

"Director of Public Works" means the Napa County Director of Public Works or the designee of the Director.

"Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

"Evapotranspiration" means the loss of water from the soil through both evaporation and transpiration from plants.

"Graywater" means domestic wastewater other than that containing human excrete such as sink drainage, washing machine discharge or bathwater.

"Groundwater" means all water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water.

"Groundwater deficient area" means an area where the amount of groundwater is inadequate to meet particular demands at a particular time, as shown in Map 13-1 at the end of this chapter.

"Groundwater permit" means a permit issued pursuant to this chapter to use groundwater.

"Harvested water" means the collection and use of rainwater as a means to augment or replace other sources of water.

"Improvement" or "improve", as related to a well or water supply system means the construction, re-construction, replacement, or addition to, any portion of a water supply and distribution system for the purposes of providing water for a new use or an additional use (unless specifically exempt under this chapter). This definition is not intended to include simple plumbing repairs to existing fixtures, pipes or equipment such as replacing or repairing existing faucets, hoses, drains, sinks, toilets, tubs, showers, washing machines, swimming pool and spa filter pumps, irrigation equipment, and the like, unless such repair or replacement will potentially increase the rate and/or amount of groundwater extraction.

"Minor improvement" means a modification to an existing water supply that involves simple repair or replacement of pipes, fittings, faucets, hoses, pumps, meters, components of irrigation systems, sinks, tubs, toilets, showers, washing machines, and all other elements of the water supply and delivery system that will not potentially increase the amount of groundwater extraction at that site. For the purposes of this definition, swimming pools (if filled with trucked in water from a supply source that does not include groundwater from a groundwater deficient area, is provided with a cover, and has an installed meter) and additional potential bedrooms in a single family dwelling unit are considered minor improvements. Any modification that will potentially increase the amount of groundwater extracted is not a minor improvement.

"Overdraft" means the withdrawal of water from an aquifer in excess of the amount of water that recharges the basin over a period of years during which water supply conditions approximate the average, and which, if continued over time, could eventually cause the underground supply to be exhausted, cause subsidence, cause the water table to drop below economically feasible pumping lifts, cause a detrimental change in water quality, or produce other adverse environmental impacts.

"Parcel" means a legal lot of record.

"Potential bedroom" means any room with a floor area equal to or greater than seventy square feet, including lofts, sewing rooms, offices, game rooms, etc. that meet building codes for a sleeping room. A closet or lack thereof is not used in determining whether a room is a potential bedroom.

"Public water supply" means a water supply provided by a local agency, publicly owned corporation, or approved utility company.

"Recharge" means replenishment of groundwater by flows to groundwater storage from precipitation, irrigation, infiltration from streams, a spreading basin or other sources of water.

"Recycled water" means the reclamation and reuse of wastewater or graywater for beneficial use.

"Single-family dwelling unit" means a dwelling unit containing not more than one kitchen, designed to be occupied by not more than one family, and includes a manufactured home as defined in Section 18.08.360 which is installed on a permanent foundation and certified under the National Manufactured Housing Construction and Safety Standards Act of 1974.

"Site" means the location of a system to extract and distribute groundwater, such as a well and connecting plumbing which supplies water to a residence or other structure or use.

"Subsidence" means lowering or sinking of the land surface as a result of the extraction of groundwater.

"Transpiration" means the process by which water absorbed by plants (usually through the roots) is evaporated into the atmosphere from the plant surface.

"Water supply system" means any system including the water source the purpose of which is to extract and distribute groundwater.

"Water table" means the surface or level where groundwater is encountered in an unconfined Aquifer.

"Xeriscaping" means a form of landscaping that uses a variety of indigenous and drought-tolerant plants, shrubs and ground cover to provide environmental benefits.

**13.15.020 Groundwater Permit Required.**

A. No applications filed pursuant to division I of title 13 of this code for development of a new water system or improvement of an existing water system within Napa County that may use groundwater as a water source shall be approved by any employee, department or body of Napa County until the applicant has obtained a groundwater permit if required by this chapter.

B. Prior to the issuance of a building permit pursuant to section 15.08.040, or any other permit or administrative approval facilitating the development or use of any parcel that may utilize a groundwater supply, a groundwater permit must be obtained if required by this chapter.

C. Prior to the final approval of a subdivision a groundwater permit must be obtained if required by this chapter and an existing, new or improved water system will provide groundwater to the subdivision.

D. No application filed pursuant to chapter 18.108 shall be approved by any employee, department or body of Napa County until the applicant has obtained a groundwater permit if required by this chapter.

E. Agricultural land development or re-development that is located on parcels included within those groundwater deficient areas depicted on Map 13-1 which will utilize groundwater and is not subject to the requirements of subsection (D) of section 13.15.020 and chapter 18.108 is subject to review and approval by Napa County in the form of a groundwater permit.

**13.15.030 Classification of Applications.**

Applications described in section 13.15.020 shall be classified as follows for the purpose of determining whether a groundwater permit is required by this chapter:

A. Applications exempt from groundwater permit requirement.

1. In the case of uses permitted without a use permit under any provision of this code, the applications or development set forth in section 13.15.020 are exempt from the requirement that a groundwater permit must be obtained unless the application or development:

a. Is for a project located on a parcel included within those groundwater deficient areas depicted on Map 13-1 and is not otherwise specifically exempted; or

b. Is to develop or improve an on-site or off-site water supply serving more than a single contiguous parcel; or

c. Where the development or improvement, regardless of the number of parcels served, is able to connect to a public water supply.

2. Applications to develop or improve an on-site or off-site water source serving agriculture are also exempt from the requirement of a groundwater permit under this chapter to the extent provided in section 13.15.040.

3. Applications to construct or develop rainwater harvesting or graywater recycling systems when that is the sole purpose of the project and the resulting harvested or recycled water will be used to augment existing groundwater sources or as the sole source of water for use at that site.

4. The Director may declare a site-specific emergency exempting an application

from the requirement of a groundwater permit under this chapter for the following reasons:

a. Based upon substantial evidence in the record that the applicant's water source is no longer capable of supplying the amount of water needed to serve an existing legal use and/or the water source has lost its water supply.

b. Based upon substantial evidence in the record, it is determined by the Director that the water source is a threat to public health or groundwater contamination and cannot reasonably be treated or corrected.

In either case, the existing well shall be properly destroyed prior to the use of the new well.

5. Minor improvements to a water system.

6. Convenience improvements to a water system.

B. Applications requiring use permits.

In the case of proposed development requiring the issuance of a use permit pursuant to any provision of this code, applications which propose to develop, improve or utilize an on or off-parcel groundwater source in conjunction with such development are not required to obtain a groundwater permit under this chapter. Groundwater review of such applications shall occur in accordance with the county's procedures to obtain a use permit.

C. Applications involving a ministerial approval.

1. Applications for a single-family dwelling unit and associated landscaping, when such residence will be the only use on the parcel, shall be issued a groundwater permit providing they meet the following requirements:

a. The permittee shall install a meter on the well serving the parcel to measure all groundwater used on the parcel. The configuration of the installation shall conform to a drawing prepared by the permittee and shall conform to the technical standards set forth by the Director of Public Works.

b. On or near the first day of each month the permittee shall read the water meter and provide this data to the Director of Public Works during the first week of April and October of each year. The permittee shall also grant to the Director of Public Works, the right to access and verify the operation and readings of the meters and well levels at any reasonable time during regular working hours.

c. The permittee shall be limited to 0.60 acre feet of water per year or such other amount as may be adopted by the board by resolution.

This groundwater permit shall not be available when other dwellings, accessory uses, agricultural development or other discretionary uses exist on the property. In such case, a groundwater permit must first be obtained pursuant to the procedures set forth in section 13.15.060 et seq. Any permittee that qualifies for a groundwater permit issued pursuant to this section may instead apply for a groundwater permit pursuant to the procedures set forth in section 13.15.060 et seq.

2. Applications for agricultural land re-development that will utilize groundwater on parcels included within those groundwater deficient areas depicted on Map 13-1 shall be issued a groundwater permit providing that they meet the following requirements:

a. The permittee shall install a meter on all wells or water supply and distribution systems serving the parcel to measure all groundwater used on the parcel. The configuration of the installation shall conform to a drawing prepared by the permittee and shall conform to the technical standards set forth by the Director of Public Works.

b. On or near the first day of each month the permittee shall read the water meter and provide this data to the Director of Public Works during the first week of April and October of each year. The permittee shall also grant to the Director of Public Works the right to access and verify the operation and readings of the meters and well levels at any reasonable time during regular working hours.

c. The permittee shall be limited to an average of 0.30 of acre feet of water per acre per year or such amount as may adopted by the board by resolution. This limitation shall be calculated as the average water used over a three-year period with no yearly use exceeding the acre foot of water per acre per year allotment by more than fifteen percent.

Any permittee that qualifies for a groundwater permit issued pursuant to this section may instead apply for a groundwater permit pursuant to the procedures set forth in section 13.15.060 et seq.

**13.15.040 Agricultural Activities Exempt From Groundwater Permitting Requirements.**

A. Applications to develop or improve a water source serving agriculture, as defined in section 18.08.040 of this code, shall be exempt from the requirement of a groundwater permit under this chapter where the water would only serve the property where the water source is located, or contiguous property. For purposes of this section only, "contiguous property" refers to property in common ownership that is joined at more than one common point to the property where the water source is located, or connected in a pattern of parcels, each joined to another, that includes the property where the water supply system is located. If the contiguous property consists of more than one parcel, all parcels must be in agricultural production, in order to qualify for an exemption pursuant to this section. To qualify for the exemption in this section, in the case of parcels designated Agricultural Resource ("AR") or Agriculture, Watershed and Open Space ("AWOS") at least eighty percent of the allowable, plantable land of each parcel must be in agricultural production.

B. Developments or improvements in water sources serving agriculture on any other properties, including adjacent property not qualifying as "contiguous" for purposes of this section, shall be subject to the same permitting criteria and standards identified in sections 13.15.030 and 13.15.070.

C. Notwithstanding subsection (A), developments or improvements in water sources located on parcels included within those groundwater deficient areas depicted on Map 13-1 shall be subject to those permitting criteria and standards identified in sections 13.15.030 and 13.15.070.

**13.15.050 Application for Determination of Exemption.**

A. Prior to any employee, department or body of Napa County issuing any permit or approval as set forth in section 13.15.020, said employee, department or body must first make a preliminary determination if a groundwater permit is required (or must be provided with such preliminary determination from another employee, department or body). Said determination shall consider if the permit or approval:

1. Is for a specific exemption as set forth in this chapter; or
2. Falls within the definition of a minor improvement or convenience improvement.
3. Is eligible for a groundwater permit issued pursuant to section subsection (C) of

section 13.15.030.

B. If the proposed project is determined to be exempt from the requirement of a groundwater permit for reasons other than an agricultural exemption, no further groundwater review shall take place and a determination of exemption shall be issued by the Director.

C. If the proposed project is claiming an agricultural exemption, the applicant must submit to the department an application for a groundwater permit agricultural exemption. The Director shall respond, in writing, to the applicant on or before the end of fifteen days from the date of submittal. If the proposed project is determined by the Director to be exempt from the requirement of a groundwater permit on the basis of the agricultural exemption authorized by section 13.15.040 the holder of the exemption shall be required to file with the department a biennial report demonstrating that the parcel continues to be in at least eighty percent agricultural production of the allowable, plantable land. If the proposed project is determined not to be exempt from the groundwater review process, the determination of the Director shall serve as notice to the applicant that a groundwater permit must be issued before the proposed project is begun.

D. If the proposed project is determined not to be exempt based on a preliminary determination, the employee, department or body of Napa making such determination shall provide written notice to the applicant that a groundwater permit must first be issued.

**13.15.060 Application for Groundwater Permit.**

Each applicant determined not to be exempt or eligible for a groundwater permit issued pursuant to subsection (C) of section 13.15.030 shall be required to obtain a groundwater permit and shall submit a groundwater declaration to the Director, using a form provided by the Director. That declaration shall:

A. Identify any present and future uses of any existing water system, including whether and to what extent groundwater is or will be used as a water source on the affected property. For the purposes of the application, future uses are those for which permits will be secured or improvements completed within two years of the application;

B. Identify any water sources other than groundwater intended to be used;

C. If the proposed use involves the development of a new water system or improvement to an existing water system, state the number of parcels and service connections the new water system or improvement are intended to serve, identify the location of the structures and improvements to be served by that new or improved water system, and identify existing and future uses and users to be served by that new or improved water system;

D. Whether the intent is to transfer some or all of the groundwater extracted pursuant to the permit to a public agency for use by a public agency following issuance of the groundwater permit; and

E. In the form of a Water Availability Analysis-Phase I, as outlined in the Department of Public Works Water Availability Policy Report, as it may be amended from time to time, provide sufficient information and supporting documentation to enable the Director of Public Works to determine whether it is likely the new water system, improvement or addition might significantly affect the impacted groundwater basin within Napa County, whether or not the proposed improvement or new system may be reasonably expected to adversely affect reasonable and beneficial uses of groundwater, interfere with surface water flows, or cause other adverse changes to the physical environment adversely affecting the impacted groundwater basin.

**13.15.070 Processing of Groundwater Permit Applications.**

The following procedures and standards shall govern the review and disposition of applications requiring groundwater permits other than groundwater permits issued pursuant to subsection (C) of section 13.15.030:

A. The Director shall review an applicant's groundwater declaration submitted under this chapter for compliance with the requirements of this chapter and any other applicable provisions of law.

B. Following the Director's determination that the groundwater declaration complies with section 13.15.060, the Director shall furnish a copy of the applicant's declaration to the Director of the Department of Public Works to obtain the written comments of that department on the application. The Director of Public Works shall instruct the applicant to perform any required phase II or III water availability analysis required by the written procedures established by the Department of Public Works. The Department of Public Works, in assessing any required phase II or phase III analysis, shall take into consideration the potential changes in static water levels of neighboring wells prior to submitting its comments. The Director of Public Works shall submit its comments in the form of a written appraisal of the application to both the Director of the Conservation, Development and Planning Department and the Director. That appraisal shall assess the potential for significant negative impacts on the affected groundwater table, and assess potential adverse effects on reasonable and beneficial uses of groundwater, interference with surface water flows, or other adverse changes to the physical environment. The Director of the Conservation, Development and Planning Department shall review the application and the written comments and appraisal from the Director of Public Works for the purposes of conducting the required environmental review and shall submit their written comments to the Director.

C. The Director shall consider approving a groundwater permit only after reviewing the declaration, the environmental determination, and any written comments received regarding the application, including the written appraisal of the Department of Public Works. After that review, the Director shall only approve a groundwater permit after making any necessary environmental determination and concluding, based on substantial evidence in the record, that the new water system, improvement or addition would not significantly affect the impacted groundwater basin in Napa County. In making this determination, the Director shall consider, but is not limited to, the following factors: impact on the affected groundwater table; adverse effects on the reasonable and beneficial uses of groundwater; interference with surface water flows; implementation of Best Management Practices; or other adverse changes to the physical environment.

D. In approving a groundwater permit, the Director may impose reasonable conditions on the permittee as needed to satisfy the requirements of this chapter, minimize groundwater use and to protect the public health, safety and welfare including but not limited to requiring implementation of Best Management Practices, plumbing retrofits, installation of meters, monitoring and reporting, limits on groundwater consumption, and requirements that groundwater consumption be reduced in the future if the basin develops an overdraft condition. Additionally, any groundwater permit granted to a public agency, or granted to a person or persons who, subsequent to the issuance of the groundwater permit, intends to transfer some or all of the groundwater extracted pursuant to the permit to a public agency for use by a public agency, shall be valid for a maximum of three years. The grant of a permit subject to this three year limitation shall include conditions relating to the termination and renewal of the permit; provided, however, that such conditions shall include, at a minimum, a condition that the permit may be renewed only upon the approving authority's finding that the renewal would not cause significant adverse effects on the affected groundwater basin or the surrounding agricultural operations.

E. If the Director determines after review that the applicant's groundwater declaration satisfies the groundwater permitting requirements of this chapter, and any other applicable provisions of law, the Director shall issue a tentative decision setting forth the conclusions reached in making the determination, and approving or conditionally approving a groundwater permit. If the Director determines the application and groundwater declaration do not meet the permitting requirements of this chapter, or any other applicable provisions of law, the Director shall issue a tentative decision denying the groundwater permit and setting forth the reasons therefore. Any tentative decision will be issued within thirty days of the date comments are received from the Directors of Public Works and Conservation, Development and Planning.

F. Within seven calendar days of the issuance of the tentative decision, the Director shall give notice of its issuance, including the date on which a tentative decision will become final if a written request for a public hearing is not requested, which date shall be not less than ten calendar days following the date notice of the tentative decision is mailed. The notice shall be given by all of the following means:

1. Notice shall be personally delivered or placed in the mail to the applicant seeking approval of a groundwater permit under this chapter.

2. Notice shall be placed in the mail to each public entity with jurisdiction over any portion of the groundwater basin in which the proposed extraction would be expected to occur.

3. Notice shall be personally delivered or placed in the mail to the owners of all real property, including businesses, corporations, or other public or private entities, as shown on the latest equalized assessment roll, within three hundred feet of the outer perimeter of the properties that will utilize the extracted groundwater. In lieu of utilizing the assessment roll, the records of the county assessor or tax collector may be used if they contain information more recent than the assessment roll.

4. Notice shall be mailed to any person who has filed a written request therefor with the Director. Such requests may be submitted at any time during the calendar year and shall apply for the balance of such calendar year.

G. The tentative decision shall become final once the period identified in the notice during which a public hearing may be requested has expired without such written request for a public hearing having been received.

H. If a public hearing is requested in a timely manner, the tentative decision shall be a nullity, in which case the Director shall set the hearing date and personally deliver or mail a notice of the time, place and date of the hearing, in the same manner and to the same persons as the notice of the tentative decision was mailed or delivered. This notice shall be mailed not less than ten and not more than thirty calendar days prior to the date of the hearing. Any required hearing shall be de novo and shall commence within ninety days of receipt of a request for a hearing.

I. The Director shall conduct the public hearing. Any member of the public may attend and present oral testimony, written or other evidence, or both. The proceedings shall be electronically recorded and the tapes thereof retained in the Director's custody for three years after the hearing except during such time as they may be undergoing transcription for preparation of the record on appeal.

J. Within five calendar days following the conclusion of the public hearing, the Director shall issue a final decision approving, conditionally approving, or denying the request to issue a groundwater permit. The Director shall give notice of the final decision to all persons who appeared and presented testimony at the hearing.

K. Final determinations of the Director (or on appeal, the Board of Supervisors) are discretionary for purposes of the California Environmental Quality Act (Pub. Res. Code, §21000, et seq.) except that determinations of exemption pursuant to subsection (A) of section 13.15.030 or the issuance of a groundwater permit pursuant to subsection (C) of section 13.15.030 are deemed ministerial acts and are exempt from the California Environmental Quality Act.

**13.15.080 Exceptions.**

Notwithstanding any other provisions of this chapter:

A. No groundwater permit shall be denied where the Director (or on appeal, the Board of Supervisors) determines, after reviewing the entire record, that a denial would constitute an unconstitutional taking of property without just compensation, or would effect an unreasonable use or waste of water.

B. The groundwater review and permitting requirements of this chapter shall be waived when applying them would delay effective response to a general emergency declared by the Governor of the State of California or the Napa County Board of Supervisors. "General emergency," as used herein, refers to a sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or other essential public services.

**13.15.090 Appeals.**

Any person may appeal a final decision of the Director made, following a request for hearing pursuant to subsection (H) of section 13.15.070, in accordance with the procedures set forth in chapter 2.88 of this code. Appeals of tentative decisions that become final because no request for a hearing was received, are not permitted.

**13.15.100 Enforcement – Violation.**

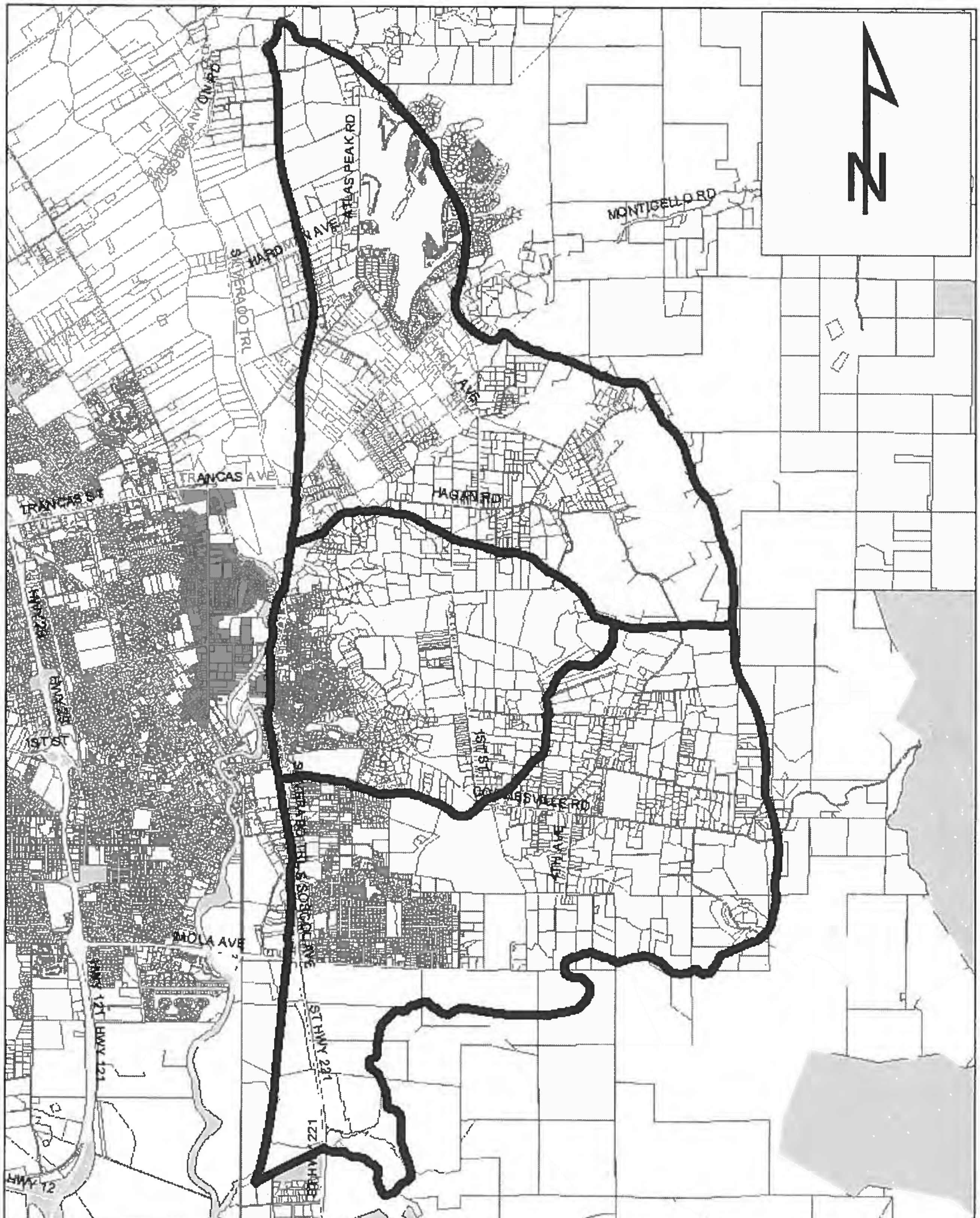
A. Criminal Penalties.

Any person, firm or corporation, whether acting as principal, agent, employer or otherwise, who violates any provision of this chapter, or the terms and/or conditions of any permit issued pursuant to this chapter, with intent to do so shall be guilty of an infraction with a fine not exceeding one hundred dollars for the first violation, two hundred dollars for the second violation within one year, and five hundred dollars for the third violation within one year. Any subsequent violation shall be punishable as a misdemeanor, punishable by a fine not to exceed one thousand dollars per violation, or imprisonment not exceeding six months, or both such fine and imprisonment. Any person shall be deemed guilty of a separate offense for each and every day or portion thereof during which any such violation is committed, continued, or permitted.

B. Civil Actions – Injunctive Relief.

Napa County may elect to proceed with a civil action, including seeking injunctive relief, rather than proceed with criminal actions as described in subsection (A) of section 13.15.100.

Any person, firm or corporation, whether acting as principal, agent, employer or otherwise, who willfully violates any provision of this chapter, or the terms and/or conditions of any permit issued pursuant to this chapter, shall be liable for a civil penalty not to exceed one thousand dollars for each day or portion thereof, that the violation continues to exist. Any person shall be deemed guilty of a separate offense for each and every day or portion thereof during which any such violation is committed, continued, or permitted. In determining the amount of the civil penalty to impose, the court shall consider all relevant circumstances, including, but not limited to, the extent of the harm caused by the conduct constituting the violation, the nature and persistence of such conduct, the length of time over which the conduct occurred, the assets, liabilities, and net worth of the violator, whether corporate or individual, and any corrective action taken by the violator.




Map 13-1: Milliken Sarco Tulocay Groundwater Deficient Basin

**SECTION FOUR.** Section 15.08.040 of the Napa County Code is amended to read in full as follows:

**15.08.040 Building permit--Issuance prerequisites.**

A. No building permit shall be issued unless and until the building official has made all of the following findings in regard to the proposed development:

1. the director of environmental management has certified or stated that an approved water supply and sewage disposal system exist, or that plans have been submitted and approved by the Director that equal or exceed the standards set forth in chapters 13.04 through 13.56 of title 13 of this code, and where a groundwater permit will be required, that the requirements of chapter 13.15 have been satisfied;

2. The planning division of the conservation, development and planning department has certified or stated that all applicable requirements of Titles 17 and 18 of this code have been met, including but not limited to compliance with conditions that were required to be met prior to the issuance of a building permit as a result of the approval of a land division, lot line adjustment, certificate of compliance, use permit, variance, or other entitlement for use relating to the parcel on which the building will be constructed;

3. The director of public works has certified or stated that either Chapter 16.04 is not applicable or that the requirements set forth in that chapter have been met;

4. If the development project for which the permit is sought is located within an "AC" (airport compatibility) combination zone, as defined in Chapter 18.80, and any provision of this code or any applicable airport land use compatibility plan requires that an aviation, hazard and noise abatement easement consistent with FAA regulations be executed prior to the construction of the proposed development or issuance of permits for such construction, at least one of the following has occurred:

a. If the AC zone is based upon proximity of the development project to the Napa County Airport, the director of aviation has certified or stated that such an easement, in a form acceptable to the county counsel, has been executed in favor of the county.

b. If the AC zone is based upon proximity of the development project to Parrett Field or other privately-owned public use airport located within the unincorporated territory of the county, the executive officer of the county airport land use commission has certified or stated that such an easement, in a form acceptable to the legal counsel for the county airport land use commission, has been recorded in favor of such airport, except that where the parcels involved in the development are in common ownership with the airport at the time of issuance of the building permit, this requirement may be satisfied by recordation of a contract between the owner and the county, in a form acceptable to the legal counsel for the county airport land use commission, under which the owner agrees to convey such easement upon severance of common ownership.

5. The planning division of the conservation, development and planning department has certified or stated that the proposed development is to occur on a legal lot of record;

6. All applicable fees shall have been paid, including but not limited to fees for:

a. Building and zoning plan-checks, and

b. The issuance of any required building permit, and

c. The issuance of all required permits by the department of environmental management and public works;

7. The school district within whose boundaries the development is proposed to be located has certified or stated that any fee, charge, dedication or other form of exaction levied by the governing board of the school district will be satisfied in a manner acceptable to the district.

B. No building permit shall be issued authorizing the construction of improvements on a parcel that is adjacent to agricultural land, as that term is defined by Section 2.94.010 of this code, until the owner(s) of the parcel have signed and filed with the planning division of the conservation, development and planning department a statement acknowledging that they are aware of the "right to farm" policy of the county and have been provided a copy of a "right to farm" statement. The "right to farm" statement provided to applicants for building permits shall be substantially in the form set forth in Section 2.94.030 of this code.

C. No building permit shall be issued for the construction of a structure unless consistent with the county general plan, any applicable specific plan, and the zoning of the parcel, or as permitted by Section 18.132.030 for legal nonconformities.

D. No building permit shall be issued if the building official has actual knowledge that the project as proposed will not be in compliance with all applicable provisions of the county code.

E. No building permit shall be issued for a project on or affecting the portion of a parcel which contains a county code violation of record until such violation is corrected, or unless the building permit is for a project which includes correction of such violation.

F. No building permit shall be issued for a new residential unit unless a valid building permit allocation has been obtained or the proposed residential unit is exempt from the limitations set forth in the growth management system of the county general plan.

G. No building permit shall be issued while any appeal of such permit or any requirement, determination, or other administrative decision relating to the development for which the permit was sought or the legal status of the parcel involved is pending or prior to the expiration of any period prescribed by this code for the filing of a notice of such appeal.

H. (Reserved).

I. No certificate of occupancy shall be issued unless and until the building official finds, in regard to the proposed development, that any applicable housing fee requirements and/or inclusionary requirements as set forth in Chapter 15.60 of the Napa County Code have been met.

J. No building permit for a new dwelling unit or guest cottage or for expansion of the footprint of a dwelling unit or guest cottage shall be issued in the Napa River Reclamation District until the applicant has submitted to the building official a soils report prepared by a civil engineer registered with the state of California which shall include recommendations for a foundation designed to withstand potential tidal effects as well as inundation by flooding.

K. No building permit shall be issued for construction of a new dwelling unit, guest cottage or accessory structure or expansion of the footprint of a dwelling unit, guest cottage or accessory structure within the Napa River Reclamation District until all of the following have occurred:

1. The owner of the property has executed and delivered to the Napa River Reclamation District a deed granting the district a non-exclusive easement at least eight feet in width, commencing at the parcel's public road frontage and extending to the portion of the levee on or adjacent to boundary of the parcel. The easement shall provide the district with the right to access the levee on foot or by vehicle for the sole purpose of maintaining or repairing the levee

during emergencies if the owner of the parcel is absent or is unable or unwilling to do so. Nothing in this subsection shall be deemed to require the owner of the property to provide the public with access to the levee across the parcel.

2. Evidence is on file with the building official that construction of the proposed structure has either been approved by the U.S. Army Corps of Engineers or is exempt from such approval.

L. No certificate of occupancy shall be issued for any new dwelling unit or guest cottage or expansion of the footprint of any new dwelling or guest cottage located within the Napa River Reclamation District until the district has determined that all portions of the levee located on the same lot are consistent with any applicable standards established by the district.

**SECTION FIVE.** Section 18.124.060 of the Napa County Code is amended to read in full as follows:

**18.124.060 Conditions for issuance.**

The commission or board may issue a permit subject to conditions specifically set forth in the permit when the commission or board makes the findings prescribed in section 18.124.070. Such conditions may include, without limitation, conditions governing the following matters:

A. Ingress and egress to the property and proposed structures thereon with particular reference to automobile and pedestrian safety and convenience, traffic flow and control and access in case of fire or catastrophe;

B. Off-street parking and loading arrangements to facilitate the concerns set forth in subsection (A) of this section;

C. Mitigation of adverse environmental effects if any, such as, adverse effects on groundwater resources, noise, glare, dust, smoke, odor or other effects of the proposed use in relation to adjoining property and property generally in the vicinity;

D. Refuse and service areas;

E. Utilities, and their locations and availability;

F. Screening, buffering and landscaping;

G. Signs, if any;

H. Exterior and interior lighting, particularly with reference to glare, traffic safety and compatibility with nearby properties and uses;

I. Yards;

J. (Reserved.);

K. The time period for which the permit shall be valid.

**SECTION SIX.** Section 18.124.070 of the Napa County Code is amended to read in full as follows:

**18.124.070 Issuance--Findings required.**

Before issuing a use permit, the commission or board shall make the following written findings:

A. That the commission or board has the power to issue a use permit under the zoning regulations in effect as applied to the property;

B. That the procedural requirements set forth in this chapter have been met;

C. That grant of the use permit, as conditioned, will not adversely affect the public health, safety or welfare of the county;

D. That the proposed use complies with the applicable provisions of this code and is consistent with the policies and standards of the general plan and any applicable specific plan;

E. That, in the case of groundwater basins identified as "groundwater deficient areas" under section 13.15.010, the proposed use would not require a new water system or improvement, or utilize an existing water system or improvement causing significant adverse effects, either individually or cumulatively, on said groundwater basins in Napa County, unless that use would satisfy any of the other criteria specified for approval or waiver of a groundwater permit under section 13.15.070 or 13.15.080 of this code;

F. That, in the case of other groundwater basins, or areas which do not overlay an identified groundwater basin, substantial evidence has not been presented which demonstrates that the new water system or improvement might cause a significant adverse affect on any underlying groundwater basin, unless that use would satisfy any of the other criteria specified for approval or waiver of a groundwater permit under section 13.15.070 or 13.15.080 of this code;

G. In the case of a development or improvement with a reasonably foreseeable connection to a public water supply as defined in 13.15.010, regardless of the number of parcels served, that the proposed use would not require a new water system or utilize an existing water system necessitating a groundwater permit pursuant to chapter 13.15. This finding shall not be required if the applicant presents substantial evidence demonstrating that the use of groundwater for such development or improvement would not have a significant adverse effect on the underlying groundwater basin; or if that use would satisfy any of the other criteria specified for approval or waiver of a groundwater permit under section 13.15.070 or 13.15.080 of this code.

**<u>SECTION SEVEN</u>.** Section 18.128.060 of the Napa County Code is amended to read in full as follows:

**18.128.060 Findings prior to issuance.**

A. Before issuing a variance, the commission shall make the following written findings:

1. That the procedural requirements set forth in this chapter have been met;

2. Special circumstances exist applicable to the property, including size, shape, topography, location or surroundings, because of which strict application of the zoning district regulations deprives such property of privileges enjoyed by other property in the vicinity and under identical zoning classification;

3. Grant of the variance is necessary for the preservation and enjoyment of substantial property rights;

4. Grant of the variance will not adversely affect the public health, safety or welfare of the County of Napa.

5. That, in the case of groundwater basins identified as "groundwater deficient areas" under section 13.15.010, grant of the variance would not require a new water system or improvement, or utilize an existing water system or improvement causing significant adverse effects, either individually or cumulatively, on said groundwater basins in Napa County, unless

that variance would satisfy any of the other criteria specified for approval or waiver of a groundwater permit under section 13.15.070 or 13.15.080 of this code.

6. That, in the case of other groundwater basins, or areas which do not overlay an identified groundwater basin, where grant of the variance cannot satisfy the criteria specified for approval or waiver of a groundwater permit under section 13.15.070 or 13.15.080, substantial evidence has not been presented demonstrating that grant of the variance might cause a significant adverse affect on any underlying groundwater basin or area which does not overlay an identified groundwater basin.

7. In the case of a development or improvement with a reasonably foreseeable connection to a public water supply as defined in 13.15.010, regardless of the number of parcels served, grant of the variance would not require a new water system or utilize an existing water system necessitating a groundwater permit pursuant to chapter 13.15. This finding shall not be required if the applicant presents substantial evidence demonstrating that grant of the variance for such development or improvement would not have a significant adverse effect on the underlying groundwater basin; or if that variance would satisfy any of the other criteria specified for approval or waiver of a groundwater permit under section 13.15.070 or 13.15.080 of this code.

B. If the proposed variance is for the purpose of permitting the creation of one or more parcels that will be less than the minimum parcel size established by subsection (A) of section 18.104.010, the commission shall approve the requested variance only if it makes the following additional written findings:

1. The parcel(s) proposed to be created will be less than the minimum size established by the underlying zoning district regulations;

2. The parcels proposed to be created result from a parcel being bisected by a county road as a result of a county-initiated realignment of an existing public road; and

3. The primary purpose of that realignment is to correct or eliminate a documented hazardous condition.

C. Except as provided in subsection (B), variances of the minimum parcel size are not permitted.

**SECTION EIGHT**. If any section, subsection, sentence, clause, phrase or word of this chapter is for any reason held to be invalid by a court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this ordinance. The Board of Supervisors of the County of Napa hereby declares it would have passed and adopted this ordinance and each and all provisions hereof irrespective of the fact that any one or more of said provisions be declared invalid.

**SECTION NINE**. This ordinance shall be effective thirty (30) days from and after the date of its passage.

**SECTION TEN.** A summary of this ordinance shall be published at least once 5 days before adoption and at least once before the expiration of 15 days after its passage in the NAPA VALLEY REGISTER, a newspaper of general circulation published in the County of Napa, together with the names of members voting for and against the same.

The foregoing ordinance was introduced and public hearing held thereon before the Napa County Conservation, Development and Planning Commission at a regular meeting of the Commission held on the 6th day of August, 2003, and was passed at a regular meeting of the Board of Supervisors of the County of Napa, State of California, held on the 4th day of November, 2003, by the following vote:

| | | |
|---|---|---|
| AYES: | SUPERVISORS | DODD, DILLON, RIPPEY, LUCE and WAGENKNECHT |
| NOES: | SUPERVISORS | NONE |
| ABSTAIN: | SUPERVISORS | NONE |
| ABSENT: | SUPERVISORS | NONE |

BRAD WAGENKNECHT, Chair
Napa County Board of Supervisors

ATTEST:

PAMELA MILLER
Clerk of the Board

By: Pamela Miller
~~Deputy~~

Approved by the Napa County Board of Supervisors
Date: 11-4-03
Processed by:
Deputy Clerk of the Board

APPROVED AS TO FORM
Office of County Counsel
By: Robert C. Martin
Deputy County Counsel
By: Sue Shragge
County Code Services
Date: 11-5-03

## 15. County of Napa. 2005. *Napa County Ordinance No. 1254*. Adopted March 8, 2005

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**ORDINANCE NO. 1254**

**AN ORDINANCE OF THE BOARD OF SUPERVISORS OF THE COUNTY OF NAPA, STATE OF CALIFORNIA MAKING ADMINISTRATIVE AND PROCEDURAL AMENDMENTS TO PORTIONS OF CHAPTERS 2.12 (COUNTY AUDITOR), 2.88 (APPEALS), 5.20 (CLEANING OF SEPTIC TANKS), 5.40 (PEDDLING AND SOLICITING), 8.16 (NOISE CONTROL REGULATIONS), AND 13.15 (GROUNDWATER CONSERVATION) OF THE NAPA COUNTY CODE**

The Board of Supervisors of the County of Napa, State of California, ordains as follows:

**SECTION 1.** Due to the implementation of PeopleSoft, and since Government Code Section 29742 allows the Board of Supervisors, upon recommendation of the Auditor, to provide by ordinance that the three-day waiting period shall not apply to any claims or to specified classes of claims held by the Auditor's office prior to issuance of a warrant for certain emergency travel situations, Section 2.12.020 (Travel expense warrant issuance conditions) of Chapter 2.12 (County Auditor) of the County Code is hereby amended to read in full as follows:

**2.12.020 Warrant issuance conditions.**

The county auditor-controller may issue his warrant on the county treasury in amounts necessary for any claims he/she finds to be a correct and legal charge for expenses even though the claim for such expenses has not been on file in his office at least three days, as is otherwise required by Government Code Section 29742.

**SECTION 2.** To shorten the time when a decision on appeal becomes final to better coordinate with deadlines with California Environmental Quality Act and shorten time frames within which legal challenges must be brought, Section 2.88.090 (Hearing – Conduct and procedures – Decision) of Chapter 2.88 (Appeals) of the Napa County Code is hereby amended to read in full as follows:

**2.88.090 Hearing--Conduct and procedures--Decision.**

A. In hearing the appeal the board shall exercise its independent judgment in determining whether the decision appealed was correct. If the hearing before the approving authority was recorded, electronically or by a certified court reporter and notice of that hearing had been given in the manner set forth in Section 18.136.040, the decision of the board on appeal shall be based on a review of the documentary record, including a transcription of the hearing, and such additional evidence as may be presented which could not have been presented at the time the decision appealed was made. No other evidence shall be permitted to be presented except as provided in subsection (B) of this section. If the hearing held before the approving authority was not recorded electronically or by a certified court reporter, or if notice of the hearing was not required to be given in the manner set forth in Section 18.136.040, the hearing on appeal shall be heard de novo.

B. If the hearing before the approving authority was recorded electronically or by a certified court reporter then upon request by the appellant or any interested party and upon a showing of good cause, the board may permit additional evidence to be presented which could have been presented at the time the decision appealed from was made but was not or may order that the matter be heard de novo.

C. The board, following close of the hearing on appeal, may affirm, reverse, or modify the decision being appealed, or may remand the matter to the approving authority for further consideration, additional findings, advisory report to the board within forty days of the remand, or other appropriate action consistent with the decision of the board. If the matter is remanded to the approving authority for an advisory report to the board within forty days of the remand, the hearing on appeal shall remain open and the board shall close the hearing and render its final decision on the appeal only after reviewing the advisory report or, if no report is submitted within the forty-day period, following expiration of such forty-day period.

D. A decision on the appeal shall be rendered by the board within thirty calendar days of the close of the hearing except that if the board renders a tentative decision within thirty calendar days of the close of the hearing and refers the matter to its legal counsel for preparation of proposed findings, such proposed findings shall be returned to the board and the board shall thereupon adopt its final findings and decision on the appeal within thirty calendar days following such referral.

E. No building, environmental management or other ministerial permit shall be issued for the purpose of authorizing construction permitted in consequence of the final decision of the board until expiration of the period within which a motion to reconsider must be made, or until the date of the decision of the board on reconsideration of the decision, whichever is later.

F. The decision on appeal shall be final two working days following the date the board takes its final vote to grant or deny the appeal at a public meeting, except that if reconsideration is initiated pursuant to Section 2.88.110, the decision on appeal shall be final on the date the board takes its final vote on the reconsideration. The date of the decision shall not be the date the clerk or any officer, body or department notifies the appellant of the decision of the board and the date of decision shall not relate back to the date of the decision by the approving authority, unless a regulation of the county expressly provides otherwise.

**SECTION 3.** To shorten the time when a decision on appeal becomes final and the time for filing for reconsideration expires to better coordinate with deadlines with California Environmental Quality Act and shorten time frames within which legal challenges must be brought, Section 2.88.110 (Reconsideration of decision – Fees) of Chapter 2.88 (Appeals) of the Napa County Code is hereby amended to read in full as follows:

**2.88.110 Reconsideration of decision--Fees.**

A. Reconsideration of the decision of the board on an appeal may be initiated by request of a member of the board or as the result of a petition for reconsideration being filed by any interested person. The right to petition for judicial review shall not be affected by the failure of any person to seek reconsideration. Any such petition must be filed with the clerk and shall include payment of a filing fee in the amount approved by resolution of the board. The power to initiate a reconsideration by the filing of a petition or by request by a member of the board shall expire two working days following the date the board announced its decision on the appeal pursuant to subsection (D) of Section 2.88.090.

B. Upon receipt by the clerk of a petition for reconsideration or initiation of such reconsideration by request of a member of the board, the clerk shall set the matter for hearing and give notice of the hearing on reconsideration at least ten calendar days prior to the date set for the hearing, with such notice otherwise given in the same manner as notice was given of the hearing on the appeal. Written notice of the hearing on the reconsideration shall also be given by the clerk at least ten calendar days prior to the date set for the hearing to any other persons who filed a written request for such notice, accompanied by payment of a fee in the amount approved by resolution of the board, prior to ten calendar days before the date set for the hearing.

C. The grounds for reconsideration are limited to one or more of the following which shall be stated in the petition for reconsideration, if reconsideration is initiated by other than a member of the board, and the petitioner for reconsideration shall be deemed to have finally waived all objections, irregularities, and illegalities concerning the matter upon which the reconsideration is sought other than those set forth in the petition for reconsideration:

1. The evidence before the board on the appeal does not justify the findings of fact in the decision on the appeal;

2. The findings of fact in the decision on appeal do not support the decision of the board on the appeal;

3. The petitioner has discovered new evidence material to a decision contrary to the decision of the board on the appeal which the petitioner could not, with reasonable diligence, have discovered and produced at the hearing on the appeal;

4. Some other factor renders the decision of the board so unjustified or inappropriate as to require a further hearing before the board, and such other factor could not have been discovered or produced by the appellant or an interested person at the hearing on appeal.

D. At the hearing to consider the petition or motion for reconsideration, the petitioner or requesting member of the board shall be given an opportunity to demonstrate that one or more of the grounds identified in subsection (C) exist. A representative of the approving authority and any other interested persons shall be given an opportunity to respond. The board shall then vote to determine whether or not it wishes to reconsider its previous decision.

E. If the board decides to reconsider its decision, the hearing reconsidering the appeal shall be commenced immediately. At the hearing the board shall choose, at the outset, whether to limit the hearing to the record, to permit additional evidence to be presented by any interested party or to hear the matter de novo. Where the matter is not heard de novo, the board may in its discretion order the transcripts of the appeal hearing to be prepared. If the membership of the board has changed since the appeal, the matter shall be heard de novo unless transcripts of the appeal hearing are prepared. The hearing may be continued from time to time at the discretion of the board.

F. After receiving all evidence accepted pursuant to subsection (E) and hearing the arguments of all interested persons, the board shall close the hearing and render within thirty calendar days its decision reconsidering the appeal. This decision of the board shall be final and conclusive.

**SECTION 4.** Certain provisions and citations to Chapter 5.20 (Cleaning of Septic Tanks) are outdated and need to be revised, therefore Sections 5.20.020 through 5.20.110 of Chapter 5.20 (Cleaning of Septic Tanks) of the Napa County Code are hereby amended to read in full as follows:

**5.20.020 Permit--Required.**

It is unlawful for any person, firm, corporation or institution to do any of the following without a permit issued by the director of environmental management or his duly authorized representative:

A. Pump wastewater from septic tanks, cesspools, grease traps, grease interceptors, seepage pits, wastewater holding tanks or wastewater ponds.

B. Provide and/or service portable toilets.

**5.20.030 Permit--Application.**

The director of environmental management may require any or all of the following items of information before a permit is issued for the activities listed in Section 5.20.020:

A. Business name, and if the business name is a fictitious business name, the true name of the owner of the business;

B. Business Owner(s) name(s);

C. Business and mailing address;

D. Phone Number;

E. Vehicle registration number (license plate number), State of California carrier number for commercial haulers, make and model of the vehicle(s) to be permitted;

F. Written approval from the disposal site(s);

G. A copy of the certified tank capacity in gallons from the Department of Weights and Measures, or other approved sealer of weights and measures, for each vehicle to be permitted; and

H. A five thousand dollar security, in a form acceptable to Napa County Counsel, as outlined in Section 5.20.090 of this Code.

**5.20.040 Permit--Issuance conditions.**

A permit for those activities listed in Section 5.20.020 may be approved and issued by the director of environmental management only after:

A. The requirements of Section 5.20.030 have been met;

B. An inspection of the equipment to be used by the Napa County Department of Environmental Management has been performed; and

C. The operator has demonstrated a satisfactory knowledge of sanitary practices, emergency and cleanup procedures, and of the laws and ordinances affecting human health.

**5.20.050 Permit Revocation or Suspension and appeal.**

Any permit issued under this chapter may be revoked or suspended by the issuing director of environmental management of the county for cause on ten days' notice to the permittee, which notice shall be served by certified mail, return receipt requested, or in person at the last known place of business. The permittee may appeal such revocation or suspension to the board of supervisors pursuant to the procedure set forth in Chapter 2.88 of this code. If the revocation or suspension is so appealed, the revocation or suspension shall not be effective unless and until the action of the director is upheld by the board, except that if the director has found and determined that revocation or suspension is necessary to protect the people and environment of the county from immediate hazard to their health and safety, then the revocation or suspension shall be effective immediately following the action of the director and shall remain in effect until the action of the director is reversed by the board on appeal. The decision of the board shall be final and judicial review thereof shall be pursuant to Sections 1094.5 and 1094.6 of the Code of Civil Procedure.

**5.20.060 Permit--Fee.**

An application for a permit pursuant to this chapter shall be accompanied by that fee established by resolution of the board of supervisors.

**5.20.070 Term of permit.**

Permits for those activities outlined in Section 5.20.020 shall be valid for a period of one year from the date of issuance. Permits may be renewed after the requirements of Section 5.20.040 have been met.

**5.20.080 Changes of address.**

A change of address of any permittee, including a member of a partnership which is permitted and of the place of business thereof, shall be reported to the director in writing by registered mail by the permittee within two days after such change of address.

**5.20.090 Permit--Security.**

Every application for a permit pursuant to this chapter shall be accompanied by security in the amount of no less than five thousand dollars as an assurance that the applicant will well and faithfully perform all duties and obligations required by Sections 117400 to 117450 of the Health and Safety Code of the state, this chapter, and such terms, conditions, orders and directions as the county director of environmental management, or his duly authorized representative, may deem necessary for the protection of human health and comfort and the environment pursuant to Section 5.20.100 of this code and Section 117405 of the Health and Safety Code of the state. The security shall be in one or more of the following forms, which shall constitute a trust fund not subject to levy or attachment by any creditor of the permittee until released by the county and any document evidencing such security shall so provide:

A. A bond or bonds by one or more duly authorized corporate sureties authorized to do business in the state;

B. A deposit with the county treasurer of cash or negotiable bonds of the kind approved for securing deposits of public moneys;

C. An instrument of credit, in a form acceptable to the county counsel, from a financial institution subject to regulation by the state or federal government, pledging that funds constituting the required amount of the security are on deposit and guaranteed for payment;

D. A letter of credit, in a form acceptable to the county counsel, issued by a financial institution subject to regulation by the state or federal government, guaranteeing that all or any portion of the funds available pursuant to the letter of credit will be paid to and upon the written demand of the county director of environmental management and that such written demand need not present any documentation of default or loss as a condition of payment;

E. Assignment to the county of a certificate of deposit with any financial institution subject to regulation by the state or federal government, in a form acceptable to the county counsel, and payable to the county director of environmental management upon written demand of the director. If this form of security is utilized by the permittee, the amount of the certificate of deposit shall be increased to include the largest penalty which might be assessed for early withdrawal in the event demand by the director should occur during the term of the certificate of deposit. Accrued interest may be withdrawn by the permittee at such times as permitted without penalty by the terms of the certificate and shall not constitute part of the security.

**5.20.100 Permittee statement filing requirements.**

A. Applicants may be permitted under such terms, conditions, orders and directions as the director of environmental management of the county may deem necessary for the protection of human health and comfort and the environment.

B. The director is empowered to require any and all persons who are permitted pursuant to this chapter to file with the director at any time and at such frequency or intervals as determined necessary , a statement giving the name and address of the owner or tenant of each of the premises where a septic tank, cesspool, grease trap, grease interceptor, sewage seepage pit, wastewater holding tank, wastewater pond, and/or the provision or service of a portable toilet that has been serviced by said permittee, and said statement shall also describe in precise terms the place where the wastewater shall have been disposed of, the date, and by whom. The director may require such statements to be sworn to before a notary.

**5.20.110 Vehicle identification and equipment.**

A. The business name and phone number shall be permanently affixed on both sides of the vehicle in, plain, legible letters and numbers at least four inches high, and shall be visible at all times. The certified capacity of the tank in gallons shall be permanently affixed on both sides of the tank in plain, legible numbers a minimum of four inches high and shall be visible at all times. The capacity as shown shall be that approved and certified by the sealer of weights and measures of the county, or other approved sealer of weights and measures.

B. A minimum of fifty feet of garden hose, a bucket and detergent shall be carried on each pumping vehicle. All pumping hoses must be cleaned out into the truck tank or into the septic tank, chemical toilet, cesspool, grease interceptor, seepage pit, wastewater holding tank or wastewater pond being pumped, and not on the surface of the ground. The customer's hose shall not be used.

C. There shall be carried on each unit at all times a sufficient quantity of chloride of lime or other chlorine product for disinfection of hose and areas where accidental spillage of sewage might occur.

**<u>SECTION 5.</u>** Since Peddler Permits are approved by the Conservation, Development and Planning Department and expire on December 31st of the year of issuance and the

Department of Environmental Management issues an annual health permit that expires one year after the application processing and approval date, the different expiration dates may cause confusion for the applicant and a duplication of efforts by each department. To simplify the approval and expiration process for the departments as well as the public, provide a more efficient permit process, and increase interdepartmental coordination and service to those engaged in Peddling and Soliciting, Section 5.40.080 (Permit – Term - Renewal) of Chapter 5.40 (Peddling and Soliciting) of the Napa County Code is hereby amended to read in full as follows:

**5.40.080 Permit--Term--Renewal.**

All permits shall be approved for one year and shall expire on the same date as the required annual health permit issued by the department of environmental management. A permit may, without further investigation, be renewed upon payment of the appropriate fee within one month of expiration, provided that renewal may be conditioned by the director on appropriate review and approval as provided in subsections (A)(1) through (A)(3) of Section 5.40.070.

**SECTION 6.** To add the Napa County Sheriff and his designated representatives to the persons authorized to enforce the noise ordinance, Section 8.16.030 (Administration and enforcement--Authority and procedures) of Chapter 8.16 (Noise Control Regulations) of the Napa County Code is hereby amended to read in full as follows:

**8.16.030 Administration and enforcement--Authority and procedures.**

A. The noise control program established by this chapter shall be administered by the director of environmental management or by his designated representatives, and shall be enforced by the director of environmental management and the county sheriff or their designated representatives unless otherwise expressly provided herein.

B. In order to implement and enforce this chapter, and for the general purpose of noise abatement and control, the director of environmental management, as county noise control officer (hereinafter "NCO"), shall have, in addition to any other authority vested in him, the power to:

1. Studies. Conduct or cause to be conducted studies, research and monitoring related to noise, including joint cooperative investigation with public or private agencies, and the application for and acceptance of grants;

2. Education. Conduct programs of public education regarding the cause, effect and general methods of abatement and control of noise and the actions prohibited by this chapter, and the procedures for reporting violations. Public interest groups shall be encouraged in related public information efforts;

3. Training. Provide for training of field inspectors and other technical personnel concerned with noise abatement, in conformance with standards for technical qualifications as established by the State Office of Noise Control;

4. Coordination and Cooperation.

a. Coordinate the noise-control activities of all county departments,

b. Cooperate where practicable with all appropriate state and federal agencies,

c. Cooperate where practicable with appropriate county and municipal agencies;

5. Public and Private Projects. On all public and private projects which are likely to cause noise in violation of this chapter and which are subject to mandatory review or approval by other departments:

a. Review for compliance with the intent and provisions of this chapter,

b. Require sound analyses which identify existing and projected noise sources and associated noise levels;

6. Inspections. Upon presentation of proper credentials, enter upon and inspect any private property of place, at any time when granted permission by the owner, or by some other person with apparent authority to act for the owner. When permission is refused or cannot be obtained, an inspection warrant may be obtained from a court of competent jurisdiction upon showing of probable cause to believe that a violation of this chapter may exist. Such inspection authority may include the conduct of any necessary tests;

7. Zoning Changes. Prior to the approval of any zoning change:

a. Review the potential noise impact of the zoning change by identifying existing and projected noise sources and the associated sound levels,

b. Recommend the imposition of adequate control measures on noise sources identified.

C. Duties of the Noise Control Officer:

1. Develop measurement standards and procedures which will further the purposes of this chapter;

2. Develop administrative procedures which will provide for effective enforcement of this chapter;

3. Investigate and pursue possible violations of this chapter;

4. Where appropriate under this chapter, delegate functions to personnel within his department;

5. Assist in or review the total transportation planning of the county, including planning for new roads and highways, bus routes, airports, and other systems of public transportation, to insure that proper consideration is taken with regard to the impact of sound levels and that the policies set forth in the noise element are adhered to;

6. Provide ongoing assistance to local agencies in determining possible mitigation measures for current or forecast noise problems;

7. Make recommendations to the board of supervisors for modifications or amendments to this chapter to insure consistency with all state and federal laws and regulations, and as may otherwise be deemed appropriate;

8. Administer noise program grants, funds and gifts from public and private sources, including the state and federal governments.

**SECTION 7.** To clarify the prohibition of a ministerial permit under this section if public water is available from a public water system, Section 13.15.030 (Classification of applications) of Chapter 13.15 (Groundwater Conservation) of the Napa County Code is hereby amended to read in full as follows:

**13.15.030 Classification of applications.**

Applications described in Section 13.15.020 shall be classified as follows for the purpose of determining whether a groundwater permit is required by this chapter:

A. Applications exempt from groundwater permit requirement.

1. In the case of uses permitted without a use permit under any provision of this code, the applications or development set forth in Section 13.15.020 are exempt from the requirement that a groundwater permit must be obtained unless the application or development:

a. Is for a project located on a parcel included within those groundwater deficient areas depicted on Map 13-1 and is not otherwise specifically exempted; or

b. Is to develop or improve an on-site or off-site water supply serving more than a single contiguous parcel; or

c. Where the development or improvement, regardless of the number of parcels served, is able to connect to a public water supply.

2. Applications to develop or improve an on-site or off-site water source serving agriculture are also exempt from the requirement of a groundwater permit under this chapter to the extent provided in Section 13.15.040.

3. Applications to construct or develop rainwater harvesting or graywater recycling systems when that is the sole purpose of the project and the resulting harvested or recycled water will be used to augment existing groundwater sources or as the sole source of water for use at that site.

4. The director may declare a site-specific emergency exempting an application from the requirement of a groundwater permit under this chapter for the following reasons:

a. Based upon substantial evidence in the record that the applicant's water source is no longer capable of supplying the amount of water needed to serve an existing legal use and/or the water source has lost its water supply.

b. Based upon substantial evidence in the record, it is determined by the director that the water source is a threat to public health or groundwater contamination and cannot reasonably be treated or corrected.

In either case, the existing well shall be properly destroyed prior to the use of the new well.

5. Minor improvements to a water system.

6. Convenience improvements to a water system.

B. Applications requiring use permits.

In the case of proposed development requiring the issuance of a use permit pursuant to any provision of this code, applications which propose to develop, improve or utilize an on or off-parcel groundwater source in conjunction with such development are not required to obtain a groundwater permit under this chapter. Groundwater review of such applications shall occur in accordance with the county's procedures to obtain a use permit.

C. Applications involving a ministerial approval.

1. Applications for a single-family dwelling unit and associated landscaping, when such residence will be the only use on the parcel, shall be issued a groundwater permit providing they meet the following requirements:

a. The permittee shall install a meter on the well serving the parcel to measure all groundwater used on the parcel. The configuration of the installation shall conform to a drawing prepared by the permittee and shall conform to the technical standards set forth by the Director of Public Works.

b. On or near the first day of each month the permittee shall read the water meter and provide this data to the Director of Public Works during the first week of April and October of each year. The permittee shall also grant to the Director of Public Works, the right to access and verify the operation and readings of the meters and well levels at any reasonable time during regular working hours.

c. The permittee shall be limited to 0.60 acre feet of water per year or such other amount as may be adopted by the board by resolution.

This groundwater permit shall not be available when other dwellings, accessory uses, agricultural development or other discretionary uses exist on the property or when water from an approved public water system is available to the property. In such cases, a groundwater permit must first be obtained pursuant to the procedures set forth in Section 13.15.060 et seq. Any permittee that qualifies for a groundwater permit issued pursuant to this section may instead apply for a groundwater permit pursuant to the procedures set forth in Section 13.15.060 et seq.

2. Applications for agricultural land re-development that will utilize groundwater on parcels included within those groundwater deficient areas depicted on Map 13-1 shall be issued a groundwater permit providing that they meet the following requirements:

a. The permittee shall install a meter on all wells or water supply and distribution systems serving the parcel to measure all groundwater used on the parcel. The configuration of the installation shall conform to a drawing prepared by the permittee and shall conform to the technical standards set forth by the Director of Public Works.

b. On or near the first day of each month the permittee shall read the water meter and provide this data to the Director of Public Works during the first week of April and October of each year. The permittee shall also grant to the Director of Public Works the right to access and verify the operation and readings of the meters and well levels at any reasonable time during regular working hours.

c. The permittee shall be limited to an average of 0.30 of acre feet of water per acre per year or such amount as may adopted by the board by resolution. This limitation shall be calculated as the average water used over a three-year period with no yearly use exceeding the acre foot of water per acre per year allotment by more than fifteen percent.

Any permittee that qualifies for a groundwater permit issued pursuant to this section may instead apply for a groundwater permit pursuant to the procedures set forth in Section 13.15.060 et seq.

**SECTION 8.** If any section, subsection, sentence, clause, phrase or word of this chapter is for any reason held to be invalid by a court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this ordinance. The Board of Supervisors of the County of Napa hereby declares it would have passed and adopted this ordinance and each and all provisions hereof irrespective of the fact that any one or more of said provisions be declared invalid.

**SECTION 9.** This ordinance shall be effective thirty (30) days from and after the date of its passage.

**SECTION 10.** A summary of this ordinance shall be published at least once 5 days before adoption and at least once before the expiration of 15 days after its passage in the Napa

Valley Register, a newspaper of general circulation published in the County of Napa, together with the names of members voting for and against the same.

The foregoing ordinance was first introduced and read at a regular meeting of the Board of Supervisors of the County of Napa, State of California, held on the 1st day of March, 2005, and passed at a regular meeting of the Board of Supervisors of the County of Napa, State of California, held on the 8th day of March, 2005, by the following vote:

| | | |
|---|---|---|
| AYES: | SUPERVISORS | WAGENKNECHT, LUCE, MOSKOWITE and DILLON |
| NOES: | SUPERVISORS | NONE |
| ABSTAIN: | SUPERVISORS | NONE |
| ABSENT: | SUPERVISORS | DODD |

Diane Dillon

**DIANE DILLON, CHAIR**
**Napa County Board of Supervisors**

ATTEST: PAMELA A. MILLER,
Clerk of the Board

By: Pamela A. Miller

**Approved by the Napa County Board of Supervisors**

Date: March 8, 2005

Processed by:

Deputy Clerk of the Board

**APPROVED AS TO FORM**
**Office of County Counsel**

By: *Margaret L. Woodbury,* Chief Deputy County Counsel (E-Signature)

By: E-Signature by Sue Ingalls
County Code Services

Date: March 1, 2005

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**16. County of Napa. 2005. *Napa County Baseline Data Report, Chapter 16 Groundwater Hydrology*. Version 1. November 30, 2005**

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# CHAPTER 16
# GROUNDWATER HYDROLOGY

GROUNDWATER WELL, PUMP, AND DISTRIBUTION PIPES

UPDATE CHRONOLOGY

NOVEMBER 30, 2005—VERSION 1

PURPOSE

This chapter summarizes the basic groundwater hydrology of Napa County and documents the construction of a local integrated groundwater model. The groundwater hydrology analysis and model development were designed to establish a baseline of existing conditions to support countywide programs.

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# LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| 3-D | three dimensional |
| ac-ft | acre-feet |
| ac-ft/yr | acre feet per year |
| BDR | Napa County Baseline Data Report |
| CB | Carneros Groundwater Basin |
| CB | Carneros Basin |
| CEQA | CEQA |
| DHI | DHI Water & Environment |
| EPA | U.S. Environmental Protection Agency |
| ft | feet |
| gpm | gallons per minute |
| K | hydraulic conductivity |
| K | spatial distribution of hydraulic conductivity |
| MIKE SHE | 3-Dimensional Groundwater Model |
| MIKE SHE/MIKE11 | 3-Dimensional Groundwater Model |
| MST | Milliken-Sarco-Tulocay |
| MSTB | Milliken-Sarco-Tulucay Groundwater Basin |
| NNVB | North Napa Valley Groundwater Basin |
| PCG | preconditioned conjugate gradient |
| RWQCBs | Regional Water Quality Control Boards |
| S | storage coefficient |
| SWRCB | State Water Resources Control Board |
| $S_y$ | specific yield |
| USGS | U.S. Geological Survey |

# INTRODUCTION

This chapter of the Napa County Baseline Data Report (BDR) describes the baseline conditions for groundwater hydrology of Napa County (County). In addition to summarizing the hydrogeologic system, this chapter documents the construction of a local integrated surface water and groundwater model developed for the BDR for areas where groundwater is a significant resource.

Groundwater hydrologic analysis and modeling were conducted with the intention of applying the model and analysis for future planning.

This chapter describes the groundwater component of the hydrologic cycle in Napa County, documents the groundwater system, and describes the methods used to determine existing groundwater hydrology and the policies that apply to groundwater in Napa County. In addition, this chapter details the approach and data used in developing a local integrated surface water and groundwater model. As the focus of this chapter is groundwater and the saturated zone, this analysis is complementary and builds on the general surface water hydrology discussion presented in Chapter 15, *Surface Water Hydrology*, of the BDR. A supporting technical report (*Napa BDR Groundwater Hydrology Modeling Report*) includes a more complete documentation of the groundwater model construction, calibration, sensitivity analysis, and presentation of results. Consulting hydrologists from DHI Water & Environment led the surface hydrology, groundwater, and water quality tasks of the BDR (Chapters 15, 16, and 17, respectively), working collaboratively with other specialists from the Jones & Stokes/EDAW project team.

# PURPOSE

The groundwater hydrologic analyses and modeling efforts conducted in support of the BDR were undertaken with the explicit intention of applying the models and analyses toward future planning considerations. More specifically, the surface water hydrology (see Chapter 15), groundwater (this chapter), and surface water quality (see Chapter 17) studies supporting the BDR were designed to establish baseline conditions by which Countywide planning programs could be assessed and evaluated for their benefits, constraints, and environmental impacts.

# SPECIALIZED TERMS USED

- *Aquifer:* A permeable body of rock capable of yielding quantities of groundwater to wells and springs.
- *Alluvial aquifer:* Aquifer of water-bearing sand and gravel typically found near lakes, streams, and rivers, deposited by a stream and retainsinga hydraulic connection with the depositing stream.
- *Confined aquifer:* An aquifer that is bound above and below by impermeable layers of rock and that contains water under pressure.
- *Unconfined aquifer:* An aquifer without an upper confining layer of impermeable soil or rock material. The water table is exposed to the atmosphere through a series of interconnected openings in the overlying permeable soil and/or rock layers and is in equilibrium with atmospheric pressure.
- *Acre-foot (ac-ft):* The volume of water required to cover one acre of land to a depth of one foot (43,560 cubic feet or 325,851 gallons). An acre-foot can be visualized as water a foot deep, covering an area about the size of a football field.
- *Artesian well:* A well into water held under pressure in porous rock or soil, confined by impermeable geologic formations. Under this pressure, an artesian well is free-flowing to the surface.
- *Darcy's Law:* An equation that can be used to compute the quantity of water flowing through an aquifer, which describes the flow rate of water through porous materials as proportional to the hydraulic gradient. The constant of proportionality is the hydraulic conductivity.
- *Drawdown:* The drop in the water table or level of water in the ground when water is being pumped from a well.
- *Groundwater basins:* A groundwater reservoir defined by all the overlying land surface and the underlying aquifers that contain water stored in the reservoir. Boundaries of successively deeper aquifers may differ and make it difficult to define the limits of the basin.
- *Groundwater recharge:* Process where water enters the soil and eventually reaches the saturated zone. Groundwater recharge can occur through natural means (precipitation, streamflow) or human enhanced means (injection, etc.).
- *Groundwater:* Subsurface water occupying the pores and voids of the saturated zone and moving under the force of gravity. In many instances, groundwater is an important source of well water for domestic and agricultural use.
- *Hydraulic conductivity:* A measure of the capacity of a substance to allow water to flow through it.
- *Interflow:* That part of the precipitation which infiltrates the surface soil and moves laterally through the upper soil horizons above the water table toward surface waters. Also called subsurface runoff or shallow subsurface flow.
- *Losing streams:* Streams that lose water over their downstream course as they supply water to groundwater basins through infiltration from their beds.
- *Permeability:* The ability of a material to allow the passage of a liquid, such as water, through rocks. Permeable materials, such as gravel and sand, allow water to move quickly through them, whereas impermeable materials, such as clay, do not allow water to flow freely.

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- *Potentiometric surface:* The potential level to which water will rise above the aquifer's water level in a well that penetrates a confined aquifer; if the potential level is higher than the land surface, the well will overflow.

- *Safe yield volumes:* The annual amount of water that can be taken from a source or supply over a period of years without depleting that source beyond its ability to be replenished naturally in "wet years."

- *Specific yield:* Specific storage, storativity and specific yield ($S_s$, S and $S_y$) are aquifer properties; they are measures of the ability of an aquifer to release groundwater from storage, due to a unit change in hydraulic head. These properties are often determined in hydrogeology using an aquifer test.

# POLICY CONSIDERATIONS

The following federal, state, and local policies and agencies are pertinent to and involved in management of groundwater in Napa County.

## FEDERAL POLICIES

There are no applicable federal policies regulating groundwater in Napa County. In California, the State Regional Water Quality Control Boards set beneficial uses and water quality objectives for groundwater, usually consistent with Title 22 of the California (state) drinking water standards.

## STATE POLICIES

### GROUNDWATER RIGHTS

Groundwater rights in California are similar to surface water rights (see Chapter 15, *Surface Water Hydrology*, of the BDR); however, no permit system or comprehensive regulatory method exists. The exception is groundwater deemed to be part of a subterranean stream or underflow that is hydraulically connected to a surface water body. In such cases, the source is classified as surface water and remains subject to the permitting authority of the State Water Resources Control Board (SWRCB) (discussed in detail in Chapter 15). Groundwater law is primarily expressed through previous legal decisions, and disputes among groundwater users are usually settled through judicial actions or adjudications.

There are two main types of groundwater rights: overlying and appropriative.

#### OVERLYING RIGHTS

Overlying rights apply to parcels that overlie a groundwater basin. Overlying rights are analogous to riparian rights for surface water. Overlying users do not have priorities with respect to one another, and each holder has a right to a reasonable share of the total groundwater supply available. Overlying rights may be active or dormant, and are generally senior to appropriative rights (defined below). Note that water devoted to public uses (e.g., municipal water supply systems) is considered in most cases to be an appropriative use, rather than an overlying use, regardless of the location of the water use with respect to the aquifer.

> There are two main types of groundwater rights: overlying and appropriative. Overlying rights apply to parcels that overlie a groundwater basin. Appropriative rights apply to groundwater extractions used on lands that do not overlie the aquifer in question.

#### APPROPRIATIVE RIGHTS

Appropriative rights apply to groundwater extractions used on lands that do not overlie the aquifer in question. Appropriate rights are analogous to appropriative rights for surface water. Appropriative rights are protected by the construction and use of a well, and putting the pumped water to reasonable and beneficial use. These rights are subject to a seniority system, where the appropriative right holder with the longest standing right has first priority to groundwater in a condition of shortage.

### GROUNDWATER QUALITY

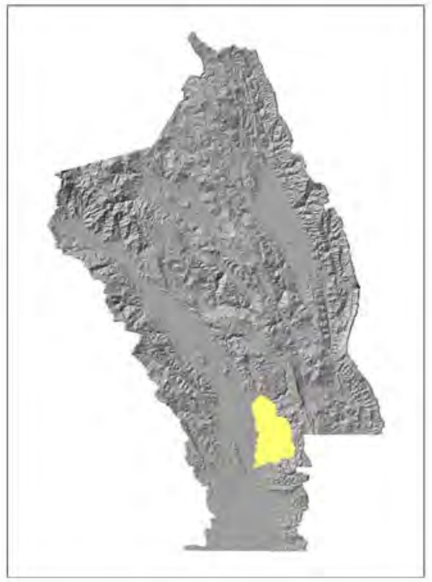
Groundwater quality is regulated through the federal Clean Water Act and State Porter-Cologne Act, and administered by the U.S. Environmental Protection Agency (EPA), the SWRCB, and local Regional Water Quality Control Boards (RWQCBs). These laws and associated regulations are discussed in Chapter 17, *Surface Water Quality*, of the BDR. Additional regulatory authority is exercised by the RWQCB and California Department of Health Services regarding standards for installation, use, and abandonment of wells and septic systems, to ensure that drinking water standards and other water quality criteria are met and beneficial uses of the aquifer are maintained.

> Groundwater quality is regulated through the federal Clean Water Act and State Porter-Cologne Act. Additional regulatory authority is exercised by the Regional Water Quality Control Board and California Department of Health Services.

## LOCAL POLICIES

### NAPA COUNTY DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

The County's Department of Environmental Planning is responsible for multiple issues related to groundwater in the County, including toxic site cleanup, management of groundwater quality, and permitting of underground storage tanks. The department enforces the Safe Drinking Water Act, per agreement with the California Department of Health Services, Division of Drinking Water and Environmental Management. For more information on the Department of Environmental Management's



Milliken-Sarco-Tulocay Groundwater Basin

oversight of groundwater, see the County's website: http://www.co.napa.ca.us/GOV/Departments/DeptPage.asp?DID=40500&LID=984).

### GROUNDWATER ORDINANCE

The Napa County Board of Supervisors adopted a groundwater ordinance in 1996, revised in 2003, to regulate the extraction, use, and preservation of the County's groundwater resources. Compliance with this ordinance applies to development of new water systems or improvements to an existing water system that may use groundwater. Specifically, the ordinance applies to agricultural land development or re-development activities located on parcels within groundwater deficient areas, including the Milliken-Sarco-Tulocay (MST), Pope Valley, Chiles Valley, Capell Valley, and Carneros groundwater basins. The ordinance identifies issuance of groundwater permits based on three types of applications—exempt, ministerial, and required—and the process by which compliance with the ordinance is determined. Applications for a groundwater permit require identification of existing and future uses of any existing water system which is supplied by groundwater, potential alternative water sources, the number of existing and future connections, intent of groundwater use, and an assessment of the potential impacts to the affected groundwater basin. Because groundwater resources are highly valued in the County, further guidance for activities conducted within the MST groundwater deficient area have been developed, as detailed below.

The Milliken-Sarco-Tulocay area is a groundwater deficient area. Due to the sensitive nature of the MST groundwater basin, the County requires special consultation to determine the need for a groundwater permit.

### GUIDELINES FOR PROJECTS WITHIN THE MILLIKEN-SARCO-TULOCAY GROUNDWATER DEFICIENT AREA

The Milliken-Sarco-Tulocay area is a groundwater deficient area. Due to the sensitive nature of the MST groundwater basin, the County requires special consultation to determine the need for a groundwater permit. This particularly applies to construction projects, erosion control plans for new or expanded agricultural projects, and new or expanded wineries that intend to use groundwater from the MST basin. Depending on the governing authority (either the Environmental Management or Conservation Development and Planning Department), the appropriate department will determine which of the following three situations is applicable to the proposed project and its potential effect on the MST groundwater basin.

- No groundwater permit is required.
- A ministerial groundwater permit is required.
- A groundwater permit is required.

A groundwater permit would not be required if agricultural land development is less than or equal to a 0.25 acre, for additions or alterations to existing dwellings, or for swimming pools that are not filled with water from the MST.

Ministerial groundwater permits for new residential units and agricultural land re-development require compliance with water use conditions. For new residential units, the total amount of water used on the parcel must be less than 0.6 acre feet per year (ac-ft/yr). Re-development of agricultural land must limit the total water use on the parcel to an average of 0.3 acre feet per acre per year calculated as an average over a three-year period, with no yearly use exceeding the total average by more than 15%. All water use must be reported to the Department of Public Works under both types of development where a ministerial groundwater permit is issued.

Groundwater permits are issued upon compliance with the "no net increase" and "fair share" standards. The "no net increase" standard encourages applicants to reduce their impact on the MST by giving up an existing groundwater use, changing practices to reduce consumption, or by importing water from outside the MST (only applies for agricultural activities). If the additional water required by the proposed use would not meet the "no net increase" standard, the Planning Department or applicant must conduct a California Environmental Quality Act (CEQA) review to assess the potential environmental impacts of the proposed use. Additionally, the proposed use must comply with the "fair share" standard that no more than 0.3 acre-feet (ac-ft) of groundwater per acre of land owned is used.

# METHODOLOGY

## DEFINITION OF STUDY AREA

The study area for the analysis of groundwater hydrology is all of Napa County.

## GENERAL APPROACH

Analysis of the Napa County's groundwater system involved construction of a spatially referenced numerical model. Following initial data collection, a conceptual model was developed to describe groundwater functioning and identify significant hydrologic variables. This two-step process provided the basis for developing a valid mathematical model.

Analysis of the Napa County's groundwater system (as a component of the hydrologic cycle) involved a literature review, data analysis, and construction of a spatially referenced numerical model. Extensive research was conducted to provide a scientific and valid basis for understanding the groundwater resources of Napa County. Sources for information included but were not limited to local, state, and federal agency reports and data; publicly available data; university research studies; professional engineering and geology reports; privately collected water-use data from throughout the County; and personal communication with various groundwater specialists. A more complete list of sources can be found in the References section below.

Following initial data collection, the main features and driving forces of the groundwater hydrologic system were identified and a conceptual model was developed to describe groundwater functioning and to identify any significant hydrologic variables that would be required in the numeric model. This two-step process of data collection and conceptual model development provided the basis for developing a valid mathematical model.

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Consistent with the description of model selection in Chapter 15, *Surface Water Hydrology*, the numerical model selected to simulate the hydrologic cycle in Napa County is based on the MIKE SHE/MIKE11 code developed by DHI Water & Environment (2005). The MIKE SHE/MIKE11 code has the capability to simulate the major flow components of the hydrologic cycle, including an integrated surface water and groundwater component, which makes the model very well suited for simulating current and future water distribution in Napa County. A more detailed description of the model's capabilities and data requirements is provided in Chapter 15, *Surface Water Hydrology*. A specific discussion of the groundwater module's computational algorithms and outputs is presented in the section *3-Dimens*ional Groundwater Model, below, or can be viewed at http://www.dhisoftware.com/mikeshe/ (DHI Water & Environment n.d.)

# EXISTING STUDIES AND DATA SOURCES

DHI reviewed hydrogeologic reports and studies within Napa County. Of the reports reviewed, only one provided a comprehensive overview of the hydrogeology of the entire County. One study described the development of a numerical hydrogeologic model that simulates groundwater flow on a regional scale; however it only covered a limited portion of Napa County. The documents reviewed provide valuable guidance in understanding the hydrogeologic system in Napa County and were used in the development of the local integrated surface water and groundwater models for the areas where groundwater is a significant and valued resource.

## GROUNDWATER RESOURCES STUDIES

*Water Resource Study for the Napa County Region* (Napa County Flood Control and Water Conservation District 1991) provides an overview of the groundwater hydrology in Napa County within the context of an examination of the current and future water use needs for the County. The report used data collected from the review of the County's general plan, master water supply plans, water management plans, agricultural land use practices, historic water production and metered sales records, historical and projected population data, and land use maps and data, as well as consultation with various agency personnel. The report provides a comprehensive overview of the agricultural, domestic, commercial, municipal, and industrial uses of water; and information regarding locations and volumes of groundwater pumping occurring throughout the County. The report also provides some basic descriptive information for each of the major groundwater basins identified in the County.

*Ground-Water Hydrology of the Lower Milliken-Sarco-Tulucay Creeks Area, Napa County California* by the U.S. Geological Survey (USGS) (Johnson 1977) discusses the water-bearing properties of the various hydrogeologically significant geologic formations in the Milliken-Sarco-Tulucay Groundwater Basin (MSTB). The report also discusses the occurrence, movement, recharge, discharge, water-level fluctuations, ground-water storage capacity, and changes in groundwater storage in the MSTB.

*Ground-Water Resources in the Lower Milliken-Sarco-Tulucay Creeks Area, Southeastern Napa County California, 2000-2002* (Farrar and Metzger 2003) is a more recent update to the 1977 USGS study discussed above. The report discusses recharge to the aquifers in the MSTB in terms of an analysis of streamflow gains and losses, and discharge from the aquifers in terms of groundwater pumping and groundwater underflow. Groundwater levels and groundwater movement are evaluated in terms of annual, seasonal, and long-term changes in levels and flow directions. The report provides numerous datasets, including maps of the potentiometric surfaces in the aquifers, and stratigraphic information in the form of hydrogeologic cross sections.

*Geology and Groundwater in Napa and Sonoma Valleys, Napa and Sonoma Counties California* (Kunkel 1960) provides information on the water-bearing properties of the various geologic formations in the Napa Valley. The report discusses the groundwater hydrology of each of the significant groundwater reservoirs in the Napa Valley in terms of the groundwater abstractions, fluctuations in water levels, and storage capacities. Also included are estimates of total groundwater pumpage from wells in the Napa Valley, volume estimates of the alluvium at various depth intervals, average specific yield and groundwater storage capacities, water-level measurements and water-table maps, and driller's logs of wells developed in the Napa Valley.

*Ground-Water Hydrology of Northern Napa Valley California* (Faye 1973) provides information on the water-bearing properties of the various geologic formations in the northern Napa Valley. The report discusses the groundwater hydrology of each of the significant water-bearing deposits in terms of the spatial and hydrologic properties, recharge and discharge, fluctuations in water levels and streamflows; and the response of these factors to precipitation inputs. The report also documents the construction and calibration of a simple steady-state and transient mathematical groundwater flow model of the alluvial aquifer in the northern portion of the Napa Valley.

*Historical Groundwater Levels in Napa Valley* (California Department of Water Resources 1995) gives a summary of groundwater level data collected in the Napa Valley through 1994. It includes the locations of wells, information related to a monitoring program, hydrographs depicting changes in groundwater levels over time, and a tabulation of groundwater level measurements for 139 wells in the valley.

A series of USGS reports from 1973 are available, which contain data for selected wells within the Napa (Bader and Svitek 1973a), St. Helena (Bader and Svitek 1973b), Rutherford (Bader and Svitek 1973c), Yountville (Svitek 1973), and Calistoga (Svitek and Bader 1973) quadrangles. These reports provide a description of the wells located in each quadrangle as well as water-level records, driller's logs, pumping test results, and groundwater pumpage data for each well.

*Water Resource Study for the Napa County Region* (Napa County Flood Control and Water Conservation District 1991) provides an overview of the groundwater hydrology in Napa County within the context of an examination of the current and future water use needs for the County.

# GEOLOGIC CONTEXT FOR GROUNDWATER

This section provides a general overview of the geology that is important to understanding groundwater resources in Napa County. A more complete discussion of the Napa County geology is presented in Chapter 1, *Geological Resources*, of the BDR.

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In the higher elevations, geologic structures that surround the structural troughs/basins of the County create source areas for surface water and groundwater.

# GEOLOGIC STRUCTURE

The Napa Valley and the smaller basins in Napa County are typically structural troughs formed by folding and faulting associated with the transformation of a subduction zone into the strike-slip movements of the San Andreas and related faults (Howell and Swinchatt 2000). These basins are 1–2 million years old, and have a northwestward trend typical of the coastal basins throughout California (Planert and Williams 1995). Underlying the basins and forming the surrounding mountains are Mesozoic marine sediments and metamorphic and igneous rocks. The basins are partially filled with unconsolidated to semiconsolidated marine sedimentary rocks deposited episodically during times of high sea level. Additionally, the basin fill consists of weathered igneous and sedimentary rock clasts, deposited by mountain streams as well as permeable basalt and tuff in some locations. The rolling topography of the floor of the Napa Valley is the result of its formation primarily on alluvial fan deposits (Planert and Williams 1995).

Numerous faults present within the County generally trend to the northwest (Figure 16-1). Though the majority of these faults are not active, a few are active and others show evidence of displacement within the last 2 million years. Major faults in the County that are still active include the West Napa fault Zone, Green Valley fault Zone, Carneros fault, Cordelia fault Zone, Soda Creek fault, Wilson fault, and the Wragg fault.

Geologic structures create source areas for surface water and groundwater in the higher elevations that surround the structural troughs/basins of the County. Faults, joints, and fractures in the bedrock of Napa County act as preferential flowpaths enhancing groundwater recharge from precipitation and streamflow in some areas. In other areas, geologic structures act as barriers to groundwater flow, restricting the movement of water in the subsurface.

# SURFICIAL GEOLOGY

Geologic formations exposed at the surface in the County include Surficial Deposits, the Clear Lake Volcanics, the Sonoma Volcanics, the Great Valley Complex, and the Franciscan Complex (Figure 16-1) (Graymer et al. 2004).

## SURFICIAL DEPOSITS (HISTORIC TO LATE PLEISTOCENE)

This formation consists of stream channel deposits, alluvium, terrace deposits, alluvial fan deposits, landslide deposits, basin deposits, bay mud, and artificial fill. The largest contiguous area of these deposits is along the floor of Napa Valley proper. The deposits extend away from the mainstem of the Napa River along the lower reaches of most of the major tributary basins; and in the southern portion of the valley, the deposits extend further along the tributaries over most of their length. Isolated deposits occur away from the valley along Troutdale Creek, Van Ness Creek, Conn Creek, Dry Creek, Milliken Creek, and adjacent to Lake Hennessey on the southeast side. Additionally, the deposits are prevalent in the southern most areas of the County that experience tidal influence. Surficial deposits are also present within Pope Valley, Chiles Valley, Capell Creek Valley, Wooden Valley, Suisun Valley, the upper Putah Creek area, along major tributaries feeding Lake Berryessa from the north, and along the northeastern shores of Lake Berryessa (Graymer et al. 2004). In terms of groundwater resources, surficial deposits are typical pathways for groundwater recharge to the nearest surface aquifers and, depending on the properties and depths of the surficial deposits, may hold groundwater to varying capacity. Within the Napa Valley floor, the majority of the groundwater is hosted within these deposits.

## CLEAR LAKE VOLCANICS (HOLOCENE TO PLIOCENE)

This formation consists of rhyolite, basalt, tuff, and siltstone, sandstone, conglomerate, and poorly consolidated gravel. Rocks of this formation outcrop in the northern portions of the Putah Creek subbasin, particularly in the vicinity of the upper reaches of Putah Creek, as well as in the southwestern portion of the study area in the vicinity of Huichica Creek and Carneros Creek subbasins. These rocks are outliers of the large volcanic complex around Clear Lake to the north of the study area. The complex is very young and thought to be related to the initiation of the San Andreas fault system (Fox et al. 1985). In terms of groundwater resources, permeable rocks within the Clear Lake Volcanics exposed in Napa County are the southern extension of an aquifer system that extends northward into Lake County.

## SONOMA VOLCANICS (PLIOCENE TO LATE MIOCENE)

These rocks consist of rhyolite, dacite, andesite, basaltic tuff, glass, flow rock, pyroclastic breccia, intrusives, and interbedded volcanoclastic sedimentary rocks. These rocks are exposed over much of the Napa Valley and are the second most commonly exposed rocks in Napa County. They compose the majority of the hills and mountains to the north and east of the valley as well as large portions of the Mayacama Mountains to the west of the valley. These volcanics are thought to have formed along with the Clear Lake Volcanics as part of the northward trending series of volcanic centers related to initiation of the San Andreas fault system (Fox et al. 1985). In terms of groundwater resources, tuffaceous units within the Sonoma Volcanics host significant volumes of groundwater in many parts of Napa County. In the Napa Valley, these rocks underlie the surficial deposits and receive recharge from the overlying alluvial aquifer, and host significant volumes of groundwater under both confined and unconfined conditions. In the Milliken, Sarco, and Tulucay Creeks area, these deposits are the primary aquifer material and host significant volumes of groundwater primarily under confined conditions. The other units within the Sonoma Volcanics are relatively impermeable and act as confining units, restricting the horizontal and vertical movement of groundwater.

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### GREAT VALLEY COMPLEX (EARLY CRETACEOUS TO LATE JURASSIC)

This formation consists of the Great Valley sequence and the Coast Range ophiolite. The Great Valley sequence consists of sandstone, shale, conglomerate, wacke, and serpentinite. The Coast Range ophiolite consists of basaltic pillow lava and breccia, mafic intrusives, gabbro, serpentinite, silica carbonate rocks, and mélange. Outcrops of this formation are exposed extensively throughout the Putah Creek and Suisun Creek subbasins and are the most commonly exposed rocks in Napa County. Exposures are also found in the central and southern portions of the Mayacama Mountains, along Conn Creek, and in the extreme southwest portion of the study area (Graymer et al. 2004). In terms of groundwater resources, the rocks of the Great Valley Complex are relatively impermeable and act as confining units restricting the horizontal and vertical movement of groundwater.

### FRANCISCAN COMPLEX (EARLY CRETACEOUS TO LATE JURASSIC)

This complex consists of mélange, serpentinite, graywacke, chert, greenstone, sandstone, metagraywacke, metachert, metagreenstone, and other undifferentiated high-grade metamorphic rocks. These rocks are exposed in the central portion of the Mayacama Mountains, in the vicinity of Moore Creek and Sage Creek in the central portion of the County, in the vicinity of James Creek and upper Putah Creek, and in the region just south of Lake Berryessa (Graymer et al. 2004). In terms of groundwater resources, the rocks of the Franciscan Complex are relatively impermeable and act as confining units restricting the horizontal and vertical movement of groundwater.

# OVERVIEW OF GROUNDWATER IN NAPA COUNTY

An analysis of the groundwater system in a particular region requires an understanding of the dominant groundwater processes occurring in that region. These processes include groundwater recharge in terms of the mechanisms of recharge and the spatial and temporal distribution of recharge throughout the region's groundwater basins. Groundwater discharge is another important process. An understanding of the pathways of discharge and the volumes and timing of discharge is critical to the understanding of the regional groundwater system. One important source of discharge is the anthropogenic (human) abstraction of groundwater through production wells. An understanding of the hydrogeologic properties of the various significant geologic units is also critical, as these properties influence the storage and movement of groundwater throughout the system.

This section of the chapter provides a general overview of the groundwater resources of Napa County in terms of the available groundwater supply; the mechanisms and volume estimates of aquifer recharge; the locations of the groundwater in terms of depths below land surface; and groundwater usage in terms of the volumes used, the timing and locations of use, and the types of users and uses of groundwater.

## GROUNDWATER SUPPLY AND PRINCIPAL BASINS

Napa County consists of a series of roughly parallel basins filled to varying depths with unconsolidated and semiconsolidated alluvial material (Figure 16-1). Underlying the basins and forming the intervening mountain ranges are Mesozoic marine sediments, and metamorphic and igneous rocks. The largest volumes of groundwater are hosted in the alluvium, and in general the Mesozoic rocks act as confining units that restrict the flow of groundwater. One major exception is the tuffaceous beds within the Mesozoic volcanic rocks, which are permeable and host significant volumes of water. The water-bearing deposits are often lenticular (spatially discontinuous) in nature and the deeper deposits are offset by faults resulting in a series of variously connected and isolated aquifers (Planert and Williams 1995). Groundwater in the alluvium occurs primarily under unconfined conditions and groundwater in the tuffaceous volcanic rocks occurs under both confined and unconfined conditions.

The major aquifers of the County are the North Napa Valley Groundwater Basin (NNVB) with an estimated storage volume of approximately 300,000 ac-ft, and the MSTB with an estimated storage volume of approximately 200,000 ac-ft (Figure 16-2) (Napa County Flood Control and Water Conservation District 1991) (an ac-ft can be visualized as water a foot deep covering an area about the size of a football field). Smaller aquifers include the Carneros Groundwater Basin (CB) and small basins within the Putah Creek subbasin. Storage estimates for many of these smaller basins do not exist; however, Napa County Flood Control and Water Conservation District (1991) estimates that these basin storage volumes range from less than 1,000 ac-ft to approximately 10,000 ac-ft, and the total storage volume for all of the smaller basins is likely 50,000 ac-ft or less. Map 16-1 shows the primary groundwater basins in Napa County.

### GROUNDWATER RECHARGE

Recharge to the alluvial aquifers occurs primarily by direct infiltration of precipitation and to a lesser extent by the application of applied water from irrigation and infiltration through the stream and lake beds. In the NNVB, average annual recharge between 1962 and 1989 was on the order of 26,800 ac-ft/yr (Napa County Flood Control and Water Conservation District 1991). Due to the dominance of precipitation as the mechanism for recharge, variations in annual recharge rates are strongly correlated with variations in annual precipitation.

Groundwater recharge in the tuffaceous volcanic rocks occurs primarily from infiltration through the stream and lake beds and subsurface inflows from outside the groundwater basins. Also contributing to the recharge but less significantly is the recharge associated with direct infiltration of precipitation and applied water from irrigation. In the MSTB, annual recharge is on the order of 5,400 ac-ft/yr, with

Groundwater recharge in the alluvial aquifers occurs primarily by direct infiltration of precipitation. Recharge in the tuffaceous volcanic rocks occurs primarily from infiltration through the stream and lake beds and subsurface inflows from outside the groundwater basins. In both the alluvial aquifers and tuffaceous volcanic aquifers, applied water from irrigation is a relatively minor component of the total recharge.

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Approximately 92% of the land under irrigation in the County is used for vineyards. Water for irrigation and frost protection are the most significant uses of groundwater in the County.

The stratigraphy, or the layers (or strata) of the aquifers, is a significant factor in the hydrogeology of groundwater basins.

3,050 ac-ft/yr derived from streambed infiltration, 2,100 ac-ft/yr derived from subsurface inflow from the Howell Mountains, and 250 ac-ft/yr derived from direct infiltration of precipitation (Johnson 1977).

In both the alluvial aquifers and tuffaceous volcanic aquifers, applied water from irrigation is a relatively minor component of the total recharge due to the dominance of vineyard growth as the primary agriculture in the County and the efficiency of the irrigation techniques used in vineyard cultivation (Farrar and Metzger 2003; Napa County Flood Control and Water Conservation District 1991).

## ESTIMATED DEPTHS TO WATER

Groundwater in the unconfined alluvial aquifers occurs at relatively shallow depths ranging from approximately 50 to 300 feet below land surface (Napa County Flood Control and Water Conservation District 1991). Within the tuffaceous volcanic aquifers, groundwater occurs over a wide range of depths primarily ranging between 10 and 500 feet below land surface (Farrar and Metzger 2003).

## GROUNDWATER USE

The characterization of groundwater use presented in this section is based on the most current and reliable information available at the time this chapter was prepared. This section does not include information from the *2050 Napa Valley Water Resources Study* (Napa County Flood Control and Water Conservation District 2005). An updating of the groundwater use characterization, including Updated information on water demand and water use in Napa County from the long-range 2050 study will be provided in the supporting groundwater technical report (*Napa BDR Groundwater Hydrology Modeling Report*).

### USERS AND PURPOSE OF USE

Groundwater is not a significant source of water for municipal use, and based on safe yield data from 1989, only 0.25% of the total volume is used for municipal use chiefly by the city of Calistoga (Napa County Flood Control and Water Conservation District 1991). No estimates of the proportions of water use for the other categories of use are known for the County as a whole. Estimates are, however, available for the MSTB. The estimates from this basin indicate that approximately 73% of the total use is for irrigation purposes, and 27% for rural domestic use (Farrar and Metzger 2003). This distribution is probably fairly representative of the County as a whole where the dominant use is for irrigation, followed in relative importance by rural domestic use, and then by municipal use.

### VOLUMES USED

Estimating groundwater pumping rates and volumes is a challenging task due to limited data availability. Estimates of safe yield volumes from groundwater resources in the County are available from 1989, which in conjunction with projections of water needs can be used as a proxy for total pumping volumes. These estimates indicate that approximately 28,700 ac-ft of groundwater was pumped from the various aquifers in the County in 1989, representing 46.4% of the total yield from all sources (Napa County Flood Control and Water Conservation District 1991). Assuming this percentage is representative of the proportion of groundwater used to meet the projected water needs, estimates of abstracted groundwater volumes are 30,100 ac-ft and 31,500 ac-ft for 2000 and 2005, respectively (Napa County Flood Control and Water Conservation District 1991).

### TIMING AND LOCATION OF USE

The majority of the groundwater is abstracted from the NNVB, and based on the safe yield data, approximately 79% of the total groundwater use comes from this basin (Napa County Flood Control and Water Conservation District 1991). The safe yield data does not differentiate between the MSTB and the CB; however, an independent estimate of pumping volumes from the MSTB for the period 2000–2002 indicates that approximately 5,350 ac-ft were abstracted (Farrar and Metzger 2003). Using this estimate indicates that approximately 18% of the total groundwater use comes from this basin, and 2% from the CB. The remaining 1% comes from basins within the Putah Creek Watershed and from other areas throughout the County (Napa County Flood Control and Water Conservation District 1991).

The majority of the land under irrigation in the County (approximately 92%) is used to grow vineyards, making irrigation and other agricultural use the primary use of water in the County, accounting for approximately 61% of the total water use (Napa County Flood Control and Water Conservation District 1991). The next largest category of use in the County is municipal use, which accounts for approximately 29% of the total water use (Napa County Flood Control and Water Conservation District 1991). It is important to note that these estimates represent total water use from all sources and do not necessarily reflect the proportions of groundwater use. For example, only 0.25% of the total groundwater use is municipal, even though municipal use accounts for 29% of the total water use from all sources. These observations indicate that water for irrigation and frost protection are the most significant uses of groundwater in the County. The timing of water application to vineyards for irrigation and frost protection is likely correlated to the timing of groundwater pumping in the County in general. Groundwater is applied to vineyards during two main periods: from June through October for irrigation purposes, and from February through March for frost protection; presumably, the majority of the groundwater pumping in the County occurs during these periods as well.

# GROUNDWATER BASIN OVERVIEW

This section provides a more-detailed overview of the hydrogeology of individual groundwater basins in Napa County in terms of the stratigraphy of the aquifers, the aquifer properties, the recharge to and discharge from the aquifers, the water levels and general directions of groundwater flow in the aquifers, and the groundwater pumping activities taking place in the basins. The discussion of groundwater pumping activities is based on the best information available at the time this chapter was prepared and does not include information from the *2050 Napa Valley Water Resources Study* (Napa County Flood

Control and Water Conservation District 2005). As described above, updated information regarding groundwater pumping will be provided in a supporting technical report (*Napa BDR Groundwater Hydrology Modeling Report*). Map 16-1 shows the primary groundwater basins in Napa County.

# NORTH NAPA VALLEY BASIN

The largest groundwater basin in the County is the NNVB. The basin extends from just north of the city of Napa up the valley floor to the northwestern end of the valley just north of the city of Calistoga covering and an area of approximately 60 square miles (Figure 16-2). By far the most productive aquifer in the basin occurs within the alluvial material, which can locally provide water to wells at rates in excess of 3,000 gallons per minute (gpm) (Faye 1973). This aquifer is an unconfined aquifer in most locations except locally where clay lenses lead to confined conditions. A tuffaceous member of the Sonoma Volcanics, which underlies the alluvium, composes an additional aquifer in the basin, and wells tapping this aquifer yield water at an average rate of 32 gpm (Napa County Flood Control and Water Conservation District 1991). Groundwater in this aquifer occurs under both confined and unconfined conditions.

## STRATIGRAPHY

The majority of the valley floor is alluvium consisting of poorly sorted lenticular stream deposits of sand and gravel interspersed with floodplain deposits of silts and clays. These deposits vary in thickness from over 300 feet at the southern end of the valley to less than 50 feet near Calistoga (Faye 1973). The alluvium also tends to be thickest near the center of the valley and the Napa River, and decreases in thickness toward the valley margins. Underlying the alluvium in most locations are the Sonoma Volcanics, which are believed to be up to 2000 feet thick. The tuffaceous member of the volcanics located within the upper half of the deposits yields moderate amounts of water, while the remaining rocks have relatively low permeabilities and serve as confining units. The Franciscan and Great Valley Complexes on the southern half of the west side of the valley are also low permeability and serve as confining units locally (Faye 1973).

## AQUIFER PROPERTIES

Interpretation of driller's logs and specific capacity data indicates that the hydraulic conductivity (K) (hydraulic conductivity is a measure of the capacity of a substance to allow water to flow through it) of the alluvium ranges from 10 to greater than 100 ft/day (Faye 1973). Variations in K result from spatial variations in the relative proportions of sand and gravel in the aquifer. Although the distribution of these materials is irregular, K values follow a general pattern, increasing from north to south as well as from the valley margins toward the Napa River. K values in the tuffaceous member of the Sonoma Volcanics are on the order of $10^{-2}$ to $10^{-3}$ ft/day while the other volcanic rocks have K values on the order of $10^{-4}$ ft/day or less (Faye 1973).

## AQUIFER RECHARGE AND DISCHARGE

Recharge in the basin occurs primarily by direct infiltration of precipitation, and to a lesser extent by the application of applied water from irrigation and by infiltration through the streambeds of losing streams (stream systems that supply water to groundwater basins). Average annual recharge between 1962 and 1989 was on the order of 26,800 ac-ft/yr (Napa County Flood Control and Water Conservation District 1991). Discharge from the aquifer occurs in the forms of evapotranspiration, discharge to the Napa River and its tributaries, groundwater pumping/extraction, and subsurface outflow. Evapotranspiration is the largest component of discharge from the basin, accounting for about half of the total outflow. Groundwater pumping and discharge to streams are the next largest components of discharge, and subsurface outflow along the southern boundary of the basin accounts for a relatively small portion of the total outflow (Napa County Flood Control and Water Conservation District 1991). A groundwater hydrologic budget for the basin was calculated for the period from 1962 to 1989, suggesting that the basin was in a state of dynamic equilibrium during this period (the total inflow to the basin from recharge approximately equaled the total discharge from the basin).

## GROUNDWATER LEVELS AND FLOW DIRECTIONS

Groundwater in both the alluvial aquifer and the tuffaceous volcanic aquifer occurs at depths ranging from approximately 50 to 300 feet below land surface. Water-table elevation maps indicate groundwater flow in the basin occurs from the valley edges toward the valley axis, as well as southward toward San Pablo Bay. These general flow patterns are modified locally by faults along the valley floor; however, the only fault that has been documented to obstruct flow in the basin is the Soda Creek fault (Napa County Flood Control and Water Conservation District 1991). Water-level data collected between 1962 and 1989 indicates that significant drawdowns have not occurred within the NNVB and that as of at least 1989, the aquifer has been in a state of dynamic equilibrium (Napa County Flood Control and Water Conservation District 1991).

## GROUNDWATER PUMPING

The volume of groundwater pumped from the basin can only be estimated because domestic wells are for the most part not metered and power consumption records for irrigation wells are generally not available. Direct estimates of the volumes of groundwater withdrawn from the basin in recent years are not available; however, projections of water needs for 2000 and 2005 in the basin based on estimates of water needs determined in 1989 are available (Napa County Flood Control and Water Conservation District 1991). Additionally, estimates of the relative percentages of water available from surface water and groundwater sources are available (Napa County Flood Control and Water Conservation District 1991). These two data sets allow estimates of the total volumes of groundwater pumped from the basin in both 2000 and 2005 as given by Equation 16-1.

St. Helena has the largest groundwater basin in Napa County. By far the most productive aquifer in the basin occurs within the alluvial material; it can locally provide water to wells at rates in excess of 3,000 gallons per minute.

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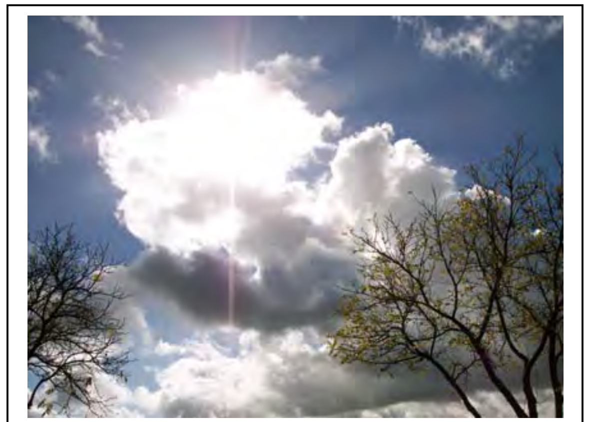

Aquifer recharge in the basin occurs primarily by direct infiltration of precipitation.

**Equation 16-1:**

$$Q_p = P_{gw} \times V_{pn}$$

where

$Q_p$ = the total annual groundwater pumping,
$P_{gw}$ = the proportion of the annual water supply derived from groundwater, and
$V_{pn}$ = the projected annual water need.

Using this method, a total of 19,000 and 19,900 ac-ft of water were abstracted from the basin in 2000 and 2005 respectively.

# MILLIKEN-SARCO-TULUCAY BASIN

The MSTB is the second largest groundwater basin in the County. It is located adjacent to the city of Napa along the eastern edge of the valley floor and covers an area of approximately 15 square miles (Figure 16-2). The area is distinct from the NNVB because of the high-yielding nature of the Sonoma Volcanics to the east of the Soda Creek fault. To the west of the fault, alluvium is the primary water-bearing material and to the east of the fault, the volcanics are the primary water-bearing material. Groundwater in the basin occurs primarily under confined conditions within tuffaceous units of the Sonoma Volcanics (Farrar and Metzger 2003).

## STRATIGRAPHY

West of the Soda Creek fault, the primary water-bearing units are the alluvial deposits, and east of the fault, groundwater is found almost exclusively in the Sonoma Volcanics. The andesitic member is the basal member of the Sonoma Volcanics which underlies the entire basin. These rocks have a low primary permeability and serve as a lower confining unit to the aquifers, except locally in interflow zones and where fracture zones created from folding and faulting are present. Overlying the andesitic member is the tuffaceous member which hosts the majority of the groundwater in the basin. The tuffaceous deposits constitute a leaky multilayered aquifer system with permeable tuffs interbedded with igneous flows and clay of low permeability (Johnson 1977). A high point in the impermeable andesitic bedrock underlying the tuffaceous rocks acts as a groundwater divide splitting the basin into a north basin containing Milliken and Sarco Creeks and a south basin containing Tulucay Creek.

## AQUIFER PROPERTIES

Johnson (1977) estimated the specific yield ($S_y$) of the various deposits in the basin based on inspection of well logs. In the lower Tulucay Creek drainage basin, $S_y$ values ranged from 0.037 to 0.052. In the central hilly portion of the basin, $S_y$ values ranged from 0.019 to 0.037. In the lower portions of the drainage basins of Milliken and Sarco Creeks east of the Soda Creek fault, $S_y$ values ranged from 0.04 to 0.054 and to the west of the Soda Creek fault, values ranged from 0.048 to 0.053. An aquifer test from one location in the basin indicated that the storage coefficient (S) of the tuffaceous member was on the order of 0.00026. Few estimates of K for the aquifer were found; however, Johnson (1977) estimated that the average value in the lower Tulucay Creek basin and west of the Soda Creek fault was on the order of 2 ft/day.

## AQUIFER RECHARGE AND DISCHARGE

Recharge in the basin occurs primarily by infiltration through the streambeds of losing streams, groundwater inflow from the Howell Mountains to the east of the basin, and direct infiltration of precipitation. The application of applied water for irrigation is a relatively minor component of recharge except in localized situations. In 1975, total recharge to the basin was on the order of 5,400 ac-ft/yr, with 3,050 ac-ft/yr derived from streambed infiltration, 2,100 ac-ft/yr derived from subsurface inflow, and 250 ac-ft/yr derived from direct infiltration of precipitation (Johnson 1977). Discharge from the basin occurs primarily as groundwater abstractions and underflow across the western boundary of the basin and toward the Napa River. Estimates of annual groundwater pumping in 2000–2002 range from 3,600 to 7,100 ac-ft/yr, with an average of 5,350 ac-ft/yr (Farrar and Metzger 2003). The volume of water discharging as underflow across the western boundary of the basin was estimated to be about 600 ac-ft/yr in 2000 as determined based on the application of Darcy's Law and estimates of the K values of the deposits.

## GROUNDWATER LEVELS AND FLOW DIRECTIONS

Water levels in the tuffaceous rocks of the Sonoma Volcanics range from 10 to 500 feet below ground surface (Farrar and Metzger 2003) (Figure 16-3). Cones of depression are formed around the largest groundwater pumping centers in the basin, and the predominant directions of groundwater flow are from areas of recharge around the margins of the basin toward the various cones of depression (Figure 16-3). Water levels have been gradually declining since at least the 1960s and probably since the early 1900s, when groundwater in many of the wells occurred under artesian conditions (Farrar and Metzger 2003). Over the period between 1975 and 2001, groundwater levels declined by as much as 125 ft in many portions of the basin, while in other areas levels were relatively unchanged or even increased by as much as 50 ft (Farrar and Metzger 2003). The observed declines in water levels are likely the result of groundwater pumping activities in the basin. In addition to these long-term trends in water levels, seasonal fluctuations in water levels by as much as 50 ft occur as a result of variable recharge rates, due to seasonal changes in streamflow and precipitation, variations in evapotranspiration rates, and differences in groundwater pumping rates (Farrar and Metzger 2003).

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### GROUNDWATER PUMPING

The volume of groundwater pumped from the MST basin can only be estimated because domestic wells are for the most part not metered and power consumption records for irrigation wells are generally not available. Using the data from the Napa County Flood Control and Water Conservation District (1991) report as described above, estimates of the total volume of groundwater pumped from both the MSTB and CB are in the range of 6,860 and 7,110 ac-ft for 2000 and 2005, respectively. In the absence of pumping rates tied to individual well locations, it is difficult to detail the distribution of pumping throughout the basin; however, the distribution of completed wells can serve as a proxy for understanding pumping distributions. The greatest number of wells occurs near Hagen Road, in the east-central portion of the basin, and centered around Third Avenue between Coombsville Road and North Avenue in the southeastern portion of the basin (Farrar and Metzger 2003).

A report by the USGS from 2003 (Farrar and Metzger 2003) provides some detailed estimates of groundwater pumping volumes in the basin. Using both a well-based method and a population-based method, domestic pumping in the basin was estimated at between 800 and 2,100 ac-ft/yr for 2000–2002. Farrar and Metzger 2003). Using both a well-based method and a land-use based method, pumping for irrigation of agriculture was estimated at between 1,180 and 3,440 ac-ft/yr for the same period (Farrar and Metzger 2003). Finally, pumping for irrigation of improved open spaces (golf courses, cemeteries, and public institutions) was estimated, using a land-use based method, at approximately 1,560 ac-ft/yr for 2000–2002. In total, the estimated volume of groundwater abstracted from the basin ranges from 3,600 to 7,100 ac-ft, with an average value of 5,350 ac-ft (Farrar and Metzger 2003).

## CARNEROS BASIN

The Carneros Basin (CB) is located in the southwestern portion of Napa County (Figure 16-2) and very little hydrologic or hydrogeologic information is available for the region. The valley floor consists of alluvium and is underlain by Pleistocene Huichica Formation, which in turn is underlain by the Sonoma Volcanics. The alluvium in this area is generally very thin with much of its volume located above the saturated zone (Napa County Flood Control and Water Conservation District 1991). As a result, the Huichica Formation is the primary water-bearing material in the basin. No estimates of storage were found for the basin; however, lower well yields indicate that storage is probably much less than in the two previously described basins (Napa County Flood Control and Water Conservation District 1991).

### STRATIGRAPHY

The floor of the Carneros Valley consists of Pleistocene terrace deposits and recent alluvium, with some Pleistocene Huichica Formation flanking the sides of the southern end of the valley (Napa County Flood Control and Water Conservation District 1991). The Huichica Formation underlies much of the basin and consists of fluvial deposits of gravel, silt, sand, and clay with interbedded tuff. The lower 200 to 300 feet contains reworked pumice from the underlying Sonoma Volcanics. The Huichica Formation is the primary water-bearing unit in the basin and the underlying Sonoma Volcanics act as a lower confining unit. Limited information is available regarding the thickness of the Huichica Formation in the basin; however it is reported to achieve a maximum thickness of 900 feet (Napa County Flood Control and Water Conservation District 1991).

### AQUIFER PROPERTIES

Limited data concerning the aquifer properties of the deposits found in the basin are available; however, the Huichica Formation is described as having a low permeability, and well yields are generally less than 5 gpm, indicating relatively low K values (Napa County Flood Control and Water Conservation District 1991).

### AQUIFER RECHARGE AND DISCHARGE

Recharge to the basin is reported to occur primarily from direct infiltration of precipitation falling over areas of geologic outcrops, which are primarily located along the hillsides bordering the Carneros Valley. Infiltration from streambeds is also an important source of recharge to the basin (Napa County Flood Control and Water Conservation District 1991). Groundwater pumping from the basin is likely a significant source of discharge; however, limited availability of data make it difficult to estimate the relative importance of the various inflows and outflows within the basin.

### GROUNDWATER LEVELS AND FLOW DIRECTIONS

Groundwater occurs primarily under unconfined conditions and at relatively shallow depths in the basin; however, no water-table maps were found for the basin, making it difficult to specify depths to water and predominant directions of groundwater flow.

### GROUNDWATER PUMPING

No estimates of the volumes of groundwater pumped from the CB basin are available. However, estimates of pumping from both the MSTB and the CB are described in the section *Overview of Groundwater in Napa County*. Taking the estimate for both basins of 6,860 ac-ft and subtracting the estimate for the MSTB determined in the Farrar and Metzger (2003) report (see *Milliken-Sarco-Tulucay Basin* above) yields a rough estimate of groundwater pumping from the CB on the order of 1,510 ac-ft/yr for 2000–2002.

Three-dimensional Mike SHE groundwater models were constructed for the North Napa Valley Groundwater Basin, Milliken-Sarco-Tulucay Groundwater Basin, and Carneros Groundwater Basin. The models can be used to produce maps showing the distribution of water levels in the aquifers under existing conditions and detailed water budgets describing the inflows to and outflows from the basins; to assess and evaluate the relative influence of land use changes on groundwater conditions; and to quantify the volumes of existing groundwater supplies and estimate the safe yield from the various aquifers.

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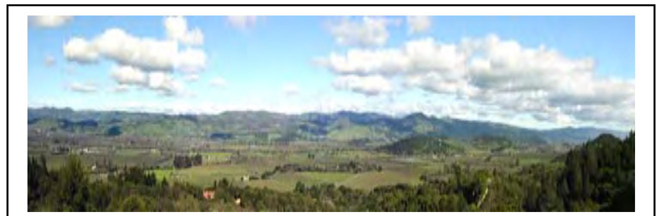

The three largest groundwater basins in the County are the North Napa Valley, Milliken-Sarco-Tulucay, and Carneros Basins.

# THREE-DIMENSIONAL GROUNDWATER MODEL (MIKE SHE)

## OVERVIEW

Mike SHE groundwater models were constructed for the three groundwater basins described in the sections above (NNVB, MSTB, and CB). These three models utilize the same data and methodology described in Chapter 15, *Surface Water Hydrology*, for precipitation, evapotranspiration, overland flow, and unsaturated flow (see surface water modeling portion of the text). In the saturated zone, the models differ from the surface water models in that they utilize a fully distributed (physically/spatially based) approach, where the aquifer geometries and aquifer properties are represented explicitly in three dimensions (3-D), as opposed to the simplified conceptual approach used in the surface water models.

## MODELING ALGORITHM

The 3-D groundwater model used in the saturated zone describes the spatial and temporal variations of the dependent variable (hydraulic head) mathematically using a 3-D Darcy equation solved numerically by an iterative implicit finite difference technique. The models use the preconditioned conjugate gradient (PCG) groundwater solver developed by the USGS based on a preconditioned conjugate gradient solution technique. The saturated zone component of flow interacts with the other components of MIKE SHE primarily by using the boundary flows from the other components implicitly or explicitly as sources and sinks.

## DATA REQUIREMENTS

A key requirement to characterize the saturated flow component is a 3-dimensional geometric description (or mapping) of the hydrogeologic units involved in the study area. Borehole logs and geologic maps are used to delineate the contact locations between geologic units and thereby describe the geometry and spatial relationships between these units. Aquifer property data are also needed. These data include the spatial distribution of hydraulic conductivity (K) values and either the specific yield ($S_y$) or the storage coefficient (S) depending on the type of aquifer being simulated (i.e. confined vs. unconfined). Additional data requirements include information on the boundary conditions of the models including water levels and discharges. These boundary conditions will be determined form the results of the regional surface water model simulations and estimates of groundwater pumping determined from the literature and available data. Finally, measured water levels at representative locations in the basins are needed in order to calibrate the models to existing conditions.

## ASSUMPTIONS AND LIMITATIONS

The models assume a constant density of the water in the saturated zone. The models also assume that the hydraulic properties within each hydrogeologic unit being considered are isotropic and homogenous. Additional assumptions include the assumption that no flow across the lower boundary of the models is present, that recharge due water applied for irrigation is an insignificant portion of the total recharge, and that distributing total annual volumes of groundwater withdrawals based on the distribution of wells developed in the various aquifers accurately represents the effects of anthropogenic (human) use of groundwater in each basin.

Limitations of the models include the inherent limitations associated with numerical modeling codes. Restrictions regarding the detail of input and calibration data, as well as inaccuracies associated with available data, place additional limitations on the accuracy of the models. Specific data gaps include a lack of groundwater pumping rates tied to individual well locations, a lack of detailed stratigraphic information for portions of the NNVB and CB, and a lack of information delineating the spatial variation of aquifer properties. When representing the myriad of complex hydrologic processes occurring in these basin with numerical models, the simplifying assumptions necessary to construct and calibrate the models also leads to inherent limitations in the applicability of the modeling results. Further information regarding the assumptions and limitations of the models will be provided in a supporting technical report (*Napa BDR Groundwater Hydrology Modeling Report*).

## USES OF THE MODEL AND INITIAL RESULTS

The models can be used to produce maps showing the distribution of water levels or potentiometric surfaces in the aquifers under existing conditions, as well as detailed water budgets describing the magnitudes of the various inflows to and outflows from each of the three basins. Applications of the models include estimating changes in water levels, potentiometric surfaces, and water balances associated with changes in land-use and/or groundwater abstractions. There are also several direct linkages between surface land cover and land use and resulting infiltration, runoff/streamflow, and groundwater conditions, as described above for general groundwater processes and sources and in Chapter 15 on the main components of the hydrologic cycle. The groundwater models developed for the BDR can be used to assess and evaluate the relative influence of land use changes at the surface on groundwater conditions. The models can also be used to quantify the volumes of existing groundwater supplies and estimate the safe yield from the various aquifers. A more complete description of the groundwater models and presentation of their results will be provided in a supporting technical report (*Napa BDR Groundwater Hydrology Modeling Report*).

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# CONCLUSIONS AND REPORT UPDATE RECOMMENDATIONS

The primary water-bearing deposits in Napa County are recent and older alluvium which host groundwater primarily under unconfined conditions, and tuffaceous units within the Sonoma Volcanics which host groundwater primarily under confined conditions. The three largest groundwater basins in the County are the North Napa Valley, Milliken-Sarco-Tulucay, and Carneros Basins. Existing information and data concerning basin boundaries, storage capacities, recharge and discharge, groundwater levels, and groundwater pumping activities are available for each of these basins and allow for the characterization of the hydrogeology in each basin, as well as provide the framework for the construction of a numerical groundwater flow model. As described above, information regarding groundwater use was based on available information. Groundwater use information from the recent *2050 Napa Valley Water Resources Study* (Napa County Flood Control and Water Conservation District 2005 will be provided in the supporting groundwater technical report (*Napa BDR Groundwater Hydrology Modeling Report*).

A surface water model has been developed in MIKE SHE/MIKE 11 that simulates the major components of the hydrologic system active in Napa County on a regional scale. Data from the established MIKE SHE-MIKE 11 surface hydrology model will be modified to develop a more detailed coupled surface water and groundwater model for areas of Napa County where groundwater is a significant resource. This model will utilize a 3-D finite-difference approach to simulating flow in the saturated zone, and will focus on simulating flow in the three largest groundwater basins in the County; North Napa Valley, Milliken-Sarco-Tulucay, and Carneros.

Limitations of the combined MIKE SHE/MIKE 11 modeling arise from the inherent limitations of numerical models, the lack of detailed input and calibration data, and inaccuracies associated with available data. If the model is to be used for purposes other than regional hydrology, hydraulic, or local hydrology studies, then additional data of the study area may need to be collected for the model. The developed model will be sensitive to changes in land use and can be used for impact analyses comparing baseline conditions to future scenarios.

The Napa County MIKE SHE/MIKE 11 model is a dynamic model that can be refined and expanded as data becomes available and as new questions are identified. Because the model is set up for a regional analysis of the Napa County hydrologic system, it can be used to help evaluate alternatives developed as part of the current updating of the Napa County General Plan. More detailed recommendations for future model updates and improvements will be provided in a supporting technical report (*Napa BDR Groundwater Hydrology Modeling Report*).

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**watershed information center & conservancy** of napa county

# 2007-08
# STRATEGIC PLAN
**JUNE 2007**

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| Phill Blake | Natural Resource Conservation Service |
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| Diane Dillon | Napa County Board of Supervisors |
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# Watershed Information Center and Conservancy (WICC) *of Napa County*

# 2007-08 Strategic Plan

# June 2007

## Mission Statement

The Watershed Information Center and Conservancy (WICC) of Napa County educates and supports the community in its efforts to maintain and improve the health of Napa County's watershed lands.

## Role and Responsibility

The WICC Board serves as an advisory committee to Napa County Board of Supervisors. The role of the WICC is to assist the Board of Supervisors in their decision-making process and serve as a conduit for citizen input by gathering, analyzing and recommending options related to the management of watershed resources. In that capacity, the WICC has a responsibility to publicly evaluate and discuss matters they have been requested to review and comment upon by the Board of Supervisors. The WICC is not authorized to sign contracts, disburse funds, implement programs, employ or consider any personnel matter or act in any other capacity that involves the direct management or operation of a County program. The Board of Supervisors has charged the WICC (under Resolution 02-103 and through verbal direction) with making recommendations to the Board of Supervisors on matters relating to watershed restoration projects and resource protection activities, coordination of land acquisition, and development of a long-term watershed resource management program providing public outreach and education, monitoring coordination, inventory and assessment, and data management.

## Vision 2025

"Napa County's watersheds will maintain a balance of natural processes to support healthy native fisheries, an abundance of native plants and wildlife, and water quality that meets state standards. The Napa River and its tributaries, no longer listed as impaired, will be a nation-wide example of what a community, working together, can do to improve the health of its watersheds.

The Watershed Information Center and Conservancy of Napa County will be a guiding force in creating a shared, community-wide understanding of Napa County's watershed lands. Having educated a generation of community members about the county's watersheds, all of Napa County's residents will be conscious of the critical balance between agriculture and development, and ecological and natural processes that must be maintained in order to assure continued watershed health.

A network of active creek and land stewardship groups and watershed organizations will carry out watershed monitoring, enhancement projects and management activities. The majority of the County's watershed lands will be certified as "Watershed-Friendly" and those landowners will be among the most conscious of watershed stewards, consistently monitoring and managing their lands for watershed health.

The state-of-the-art WICC WebCenter will be accessible, understandable and user friendly, allowing everyone from school children to scientists access to the most current, valid and vivid information about Napa County's watersheds. This accurate and straightforward information will allow users to weigh scientific facts and recognize community values to make well-informed management decisions."

## Guiding Principles

1. The WICC collects and disseminates the best possible information to aid decision-making and is part of the solution to watershed issues and concerns.

2. The WICC provides tools, information and education so that all members of the community can discover and understand their watershed.

3. Collaboration is the most effective way to accomplish the mission of the WICC. All organizations and individuals working to restore and enhance Napa County's watersheds are encouraged to participate in the WICC.

4. The WICC supports the restoration activities of other watershed restoration organizations and facilitates cooperation among them.

5. Participation in the WICC and provision of information to the WICC WebCenter is done voluntarily by agencies, organizations, and individuals.

6. The WICC seeks and accepts funding from foundations, private individuals, organizations, and local, state, and federal government to address its financial needs and to further its mission and goals.

7. Actions by the WICC remain politically neutral to successfully accomplish its mission and vision for Napa County's watersheds

## Strategic Plan Focus Areas

This plan is organized into five planning focus areas. Each area includes a Goal, Strategies, Potential Measures of Success and Suggested Strategic Plan Actions. The focus areas are not mutually exclusive and should be considered complementary to one another and to the overall mission of the WICC. The five focus areas considered for strategic planning purposes are:

**Watershed Conservation & Management (WCM)**

**Watershed Information Center and Conservancy Website (WEB)**

**Communication, Coordination & Partnerships (CCP)**

**Education & Outreach (EDU)**

**Organizational Structure and Funding (OSF)**

# Watershed Conservation & Management (WCM)

## Goal

**Improve watershed health throughout the entirety of Napa County, which includes its cities and towns, by supporting community efforts to protect and enhance all watershed lands and natural processes with an emphasis on riparian corridors and native species and their habitats.**

## Strategies

- Identify, conduct and coordinate watershed studies and monitoring that will improve the community's understanding and management of its watershed resources.
- Identify key watershed areas for restoration, enhancement, and/or permanent protection.
- Work with and support landowners, citizen organizations, districts and agencies to permanently protect key watershed lands.

## Potential Measures of Success (*)

- Removal of Napa County's "water quality limited" water bodies from California's Sec. 303(d) list established under the Clean Water Act.
- Implementation of long-term/baseline monitoring as identified in a countywide Watershed Monitoring Strategy.
- Implementation of improved management practices based upon monitoring results, feedback and adaptive management principles.
- Development of a specified number of creek/drainage management/enhancement plans.
- Miles of creek restored and/or fish barriers removed.
- Number of acres maintaining a 'natural fire cycle' status.
- Increased numbers and vitality of native fish populations.
- Identification of lands actively improving native species growth.

(*) Measures of Success will be quantified as detailed plans for each action are developed.

## Suggested Strategic Plan Actions

| Priority One Actions | Priority Two Actions | Priority Three Actions | As-Needed Actions |
|---|---|---|---|
| **Action WCM1:** Assist with the development and implementation of a streamlined permitting process. | **Action WCM2 (Recurring):** Provide monthly updates on the WICC WebCenter about the status of the Watershed Monitoring Strategy and the Watershed Management Strategy. | **Action WCM4:** Initiate a program supported by the WICC that identifies and publicizes "Healthy Watershed Demonstration Sites" for residential, agricultural, and business properties. | **Action WCM5:** Support the Land Trust of Napa County and other potential conservation easement holders with easement acquisition efforts. |
| | **Action WCM3:** Complete the Countywide Watershed Management Strategy. Prioritize and incorporate the recommended management actions into the WICC's Strategic Plan. | | |

# Watershed Information Center & Conservancy Website (WEB)

## Goal

**Maintain an understandable, interesting, and user friendly website that provides high-quality environmental data and information allowing the community to better understand and manage the County's watersheds.**

## Strategies

- Increase community awareness of the information and services available via the WICC WebCenter (www.napawatersheds.org).
- Ensure that the data and information on the WICC WebCenter is accurate and current so that it is most effective in informing decisions and meeting community's needs.

## Potential Measures of Success (*)

- Number of webpage hits & quantity of information exchanged.
- Number of calendar events posted.
- Number of organizations hosted/linked on the WICC WebCenter.
- Number of individual users registered on the WICC WebCenter.

(*) Measures of Success will be quantified as detailed plans for each action are developed.

## Suggested Strategic Plan Actions

| Priority One Actions | Priority Two Actions | Priority Three Actions | As-Needed Actions |
|---|---|---|---|
| **Action WEB1:** Continually improve upon the WICC WebCenter, making it more user-friendly and attractive. | **Action WEB2 (Recurring):** On a monthly basis add any new data to the WICC WebCenter that has been developed and maintain the website as necessary. | **Action WEB5 (Recurring):** Annually survey a cross section WICC WebCenter users including watershed organizations, educators, urban and rural residents and members of the agricultural community to identify what works well and what needs improving. Conduct this survey prior to implementing the annual Strategic Plan update and incorporate agreed-upon changes into the revised Strategic Plan (and ultimately the WebCenter). | **Action WEB7:** As new organizations register on the WICC WebCenter, gather the following information to be incorporated into the WebCenter: a) Links from the WICC WebCenter to the organization's website; b) Roles and services tha the organization provides; c) Watershed projects (monitoring, restoration, and enhancement), studies and educational efforts being conducted by the organization; and d) If available, provide an additional link from the WICC WebCenter's volunteer activities section to each organization's volunteer opportunities section. |
| | **Action WEB3 (Recurring):** Update the website annually to reflect the comments received from the WICC's Community and Technical Advisory Committees. | **Action WEB6 (Recurring):** Request an annual review of the WICC WebCenter by the Technical Advisory Committee (TAC) to identify what works well and what needs improving from a technical and scientific user perspective. Conduct this survey prior to implementing the annual Strategic Plan update and incorporate agreed-upon changes into the revised Strategic Plan, as well as the WebCenter. | |
| | **Action WEB4:** Solicit sponsors for the WICC WebCenter. | | |

# Communication, Coordination & Partnerships (CCP)

## Goal

**Build and strengthen effective partnerships to foster communication, coordination and involvement among all those working to improve the health of Napa County's watersheds.**

## Strategies

- Coordinate and facilitate watershed planning, research, and monitoring efforts among Napa County organizations, agencies, landowners, and citizen organizations to limit gaps and overlaps and improve consistency between watershed-related activities.
- Support organizations with a watershed restoration focus.
- Serve as a clearinghouse and coordinator for watershed activities and involvement.

## Potential Measures of Success (*)

- Number of watershed-related projects that involve partnerships.
- Number of organizations participating in the WICC's "Community Advisory Committee."
- Number of organizations contributing to WICC WebCenter.
- Number of new grants funded through increased involvement, coordination and leveraging among watershed organizations.

(*) Measures of Success will be quantified as detailed plans for each action are developed.

## Suggested Strategic Plan Actions

| Priority One Actions | Priority Two Actions | Priority Three Actions | As-Needed Actions |
|---|---|---|---|
| **Action CCP1 (Recurring):** Provide training in the use of the WICC WebCenter to local watershed groups. Seek feedback from these organizations regarding ways to improve the website to meet watershed stewardship needs, as well as the changing needs of the community. | **Action CCP3 (Recurring):** Annually survey each watershed-related organization contributing to the WICC to identify watershed projects (monitoring, restoration, and enhancement), watershed assessments, studies and educational efforts being conducted throughout Napa County. Post this information on the WICC WebCenter to allow organizations to coordinate and collaborate more effectively on a wide range of watershed projects and activities. Maintain and annually update this information to identify overlaps and gaps in projects, activities, and services provided by these organizations, and ways in which the WICC could remedy these gaps and overlaps. Consider including the areas of greatest need as future priority actions in the WICC Strategic Plan. | **Action CCP5:** Establish a WICC "Community Advisory Committee" where interested community members, organizations, watershed groups, and land managers could come together to discuss projects and programs throughout the County's watersheds. This Advisory Committee would also serve as a networking opportunity for these groups and individuals to meet and discuss potential opportunities for collaboration. It also provides a home for ongoing community discussions about the pros and cons of various approaches to watershed management. | **Action CCP8:** Provide recommendations to the Board of Supervisors for letters of support to watershed organizations seeking grant funding. Recommendation for support from the WICC indicates broad community support for watershed proposals and will increase the likelihood of project funding. |
| **Action CCP2 (Recurring)**: Provide annual updates to City and Town councils of Napa County on WICC activities, program and resources. | **Action CCP4**: Develop and post on the WICC WebCenter a directory of watershed organizations and partnerships. | **Action CCP6:** Hold a grant-writing seminars for watershed organizations. | |
| | | **Action CCP7:** Create a section of the WICC WebCenter dedicated to assisting local watershed group with increasing organizational effectiveness and capacity. | |

# Education & Outreach (EDU)

## Goal

**Enable the community - those who live in, work in and visit the County's watersheds - to understand the importance of watershed stewardship and watershed health and be actively involved in improving the health of the County's watersheds.**

## Strategies

- Provide targeted watershed conservation and stewardship-related education and information to various subsets of the community including the agricultural community, educators, urban and rural residents, and sub-watershed organizations of Napa County.
- Support appropriate public access to Napa County's watershed lands where suitable to build appreciation and understanding of the County's watersheds and their resources.

## Potential Measures of Success (*)

- Numbers of presentations to community organizations/groups.
- Number of watershed events listed on the monthly calendar.
- Number of Napa County students and classroom groups that participate in watershed-related education programs.
- Establishment of Watershed Demonstration Sites for agricultural, residential and commercial properties.
- Number of homeowners, farmers, vintners, grape growers, and business owners participating in various known watershed stewardship and conservation programs.
- Number of respondents to WICC online surveys.
- Participation in events celebrating Watershed Awareness Month.
- Number of brochures distributed in target audience categories.
- Number of sub-watershed stewardship groups established in Napa County.
- Number of individuals participating in watershed hikes, outings and guided tours of the County's watershed lands.

(*) Measures of Success will be quantified as detailed plans for each action are developed.

## Suggested Strategic Plan Actions

| Priority One Actions | Priority Two Actions | Priority Three Actions | As-Needed Actions |
|---|---|---|---|
| **Action EDU1 (Recurring):** Update the watershed events calendar on a weekly basis. Include all watershed related events including seminars; monitoring and volunteer days; opportunities for residents to attend guided tours of watershed lands and demonstration projects; and watershed festivals and related public events. | **Action EDU4:** Implement targeted education and outreach strategy for educators and students. | **Action EDU6:** Implement a targeted education and outreach strategy for agriculturalists. | |
| **Action EDU2:** Provide information to the community on regional issues such as TMDL's and related State water quality policies, as well as the directive of the Regional Water Quality Control Board to promote water quality objectives outlined in the Region's (SF Bay and Central Valley) Basin Plan(s) as required under the Clean Water Act throughout the waters of Napa County. | **Action EDU5:** Work with the Napa County Resource Conservation District (RCD) and similar organizations to identify creeks/drainages in Napa County without a watershed stewardship groups. Create a mailing list of landowners within these sub-watershed drainages and provide support to the RCD and others to establish watershed stewardship groups and watershed programs within these areas. | **Action EDU7:** Work with watershed organizations and agencies that are currently providing educational programmin and curricula to schools to identify opportunities to expand existing programs and build connections with the watershed stewardship and watershed demonstration site programs. | |
| **Action EDU3:** Implement a targeted education and outreach strategy for urban and rural residents. | | **Action EDU8:** Establish a permanent physical location for the WICC. | |

# Education & Outreach (EDU)

## Suggested Strategic Plan Actions (Cont.)

| Priority One Actions | Priority Two Actions | Priority Three Actions | As-Needed Actions |
|---|---|---|---|
| | | **Action EDU9:** Establish a "Watershed Stewards Program" based upon watershed-related best management practices that participants would implement based upon property type and use. | |
| | | **Action EDU10:** Implement a targeted education and outreach strategy for watershed groups. | |

# Organizational Structure and Funding (OSF)

## Goal

**Obtain adequate resources and establish the appropriate organizational structure to ensure the WICC's long-term success.**

## Strategies

- Secure reliable long-term (i.e., permanent) funding to fulfill the mission and goals of the WICC.
- Develop adequate coordination and management staff, Board membership, volunteers, and Community and Technical Advisory Committee participation, to guide, support and conduct WICC activities.
- Establish an organizational structure that suits the mission and goals of the WICC.

## Potential Measures of Success (*)

- Dollars acquired through grant funding in support of WICC activities.
- Dollars of sustained local (i.e., County, City, District) funding.
- Number WICC coordinating staff.
- Permanent physical (visual and accessible) location for WICC.
- Dollars acquired from all forms of fundraising.
- Dollars acquired from charitable donations, gifts and foundations.

(*) Measures of Success will be quantified as detailed plans for each action are developed.

## Suggested Strategic Plan Actions

| Priority One Actions | Priority Two Actions | Priority Three Actions | As-Needed Actions |
|---|---|---|---|
| **Action OSF1:** Identify potential grant opportunities and sources of funding for the Priority 1 actions in the 2007-08 WICC Strategic Plan. | **Action OSF4:** Identify funding sources for staff and project-related funding including maintenance of the WICC WebCenter and funding for a physical WICC office. | **Action OSF7:** At each WICC Board Meeting dedicate a portion of the meeting to educating the board on watershed-related issues and potential WICC roles in addressing these issues and watershed management opportunities. | **Action OSF10:** Convene ad-hoc committees as needed to address special watershed management issues. |
| **Action OSF2 (Recurring):** Provide an annual update to the Napa County Board of Supervisors and City and Town Councils about the current activities and successes of the WICC. Update should stress the benefits and values of the WICC to the community. | **Action OSF5 (Recurring):** Annually update the WICC Strategic Plan. Revisit actions from the prior years plan, identify new actions as needed and reprioritize all actions. Assign timeframes and responsibilities to each action. Identify potential sources of funding for each Priority 1 item. | **Action OSF8:** Hold a WICC Board session to evaluate the pros and cons of the WICC holding conservation easements. Should the WICC Board decide that it does not want to hold easements of any type, consider changing the name of the organization to the WIC (Watershed Information Center) thereby deleting the Conservancy portion of the title that relates to land conservation. | |
| **Action OSF3:** Identify and initiate actions needed to implement the WICC's new organizational structure as depicted on the WICC's Organizational Chart; including development of a Memorandum of Understanding between the County, Cities, Town and Districts interested in supporting the WICC as an Advisory Board to their respective organizations.<br>Further explore the establishment of a nonprofit arm or "foundation fund" for the WICC to facilitate the acceptance of charitable donations in support of the WICC's mission and goals. | **OS6:** Explore additional funding sources including donations and sponsorships, membership dues, fee for service opportunities, fundraising, dedicated funding and open space district funding, once the district is formed. | **Action OSF9:** Develop a strategy to recruit and train WICC volunteers. | |

# Appendix

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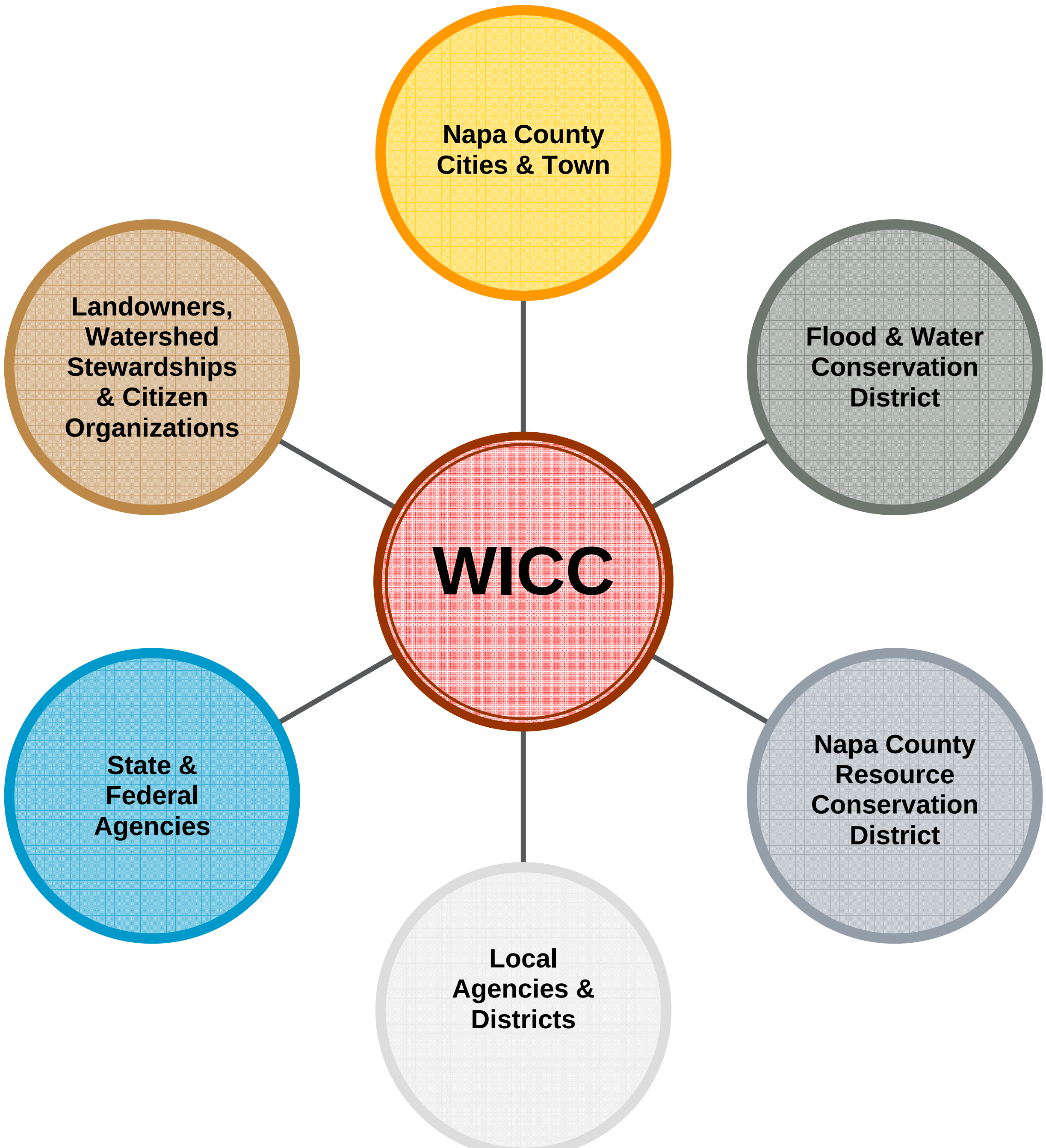
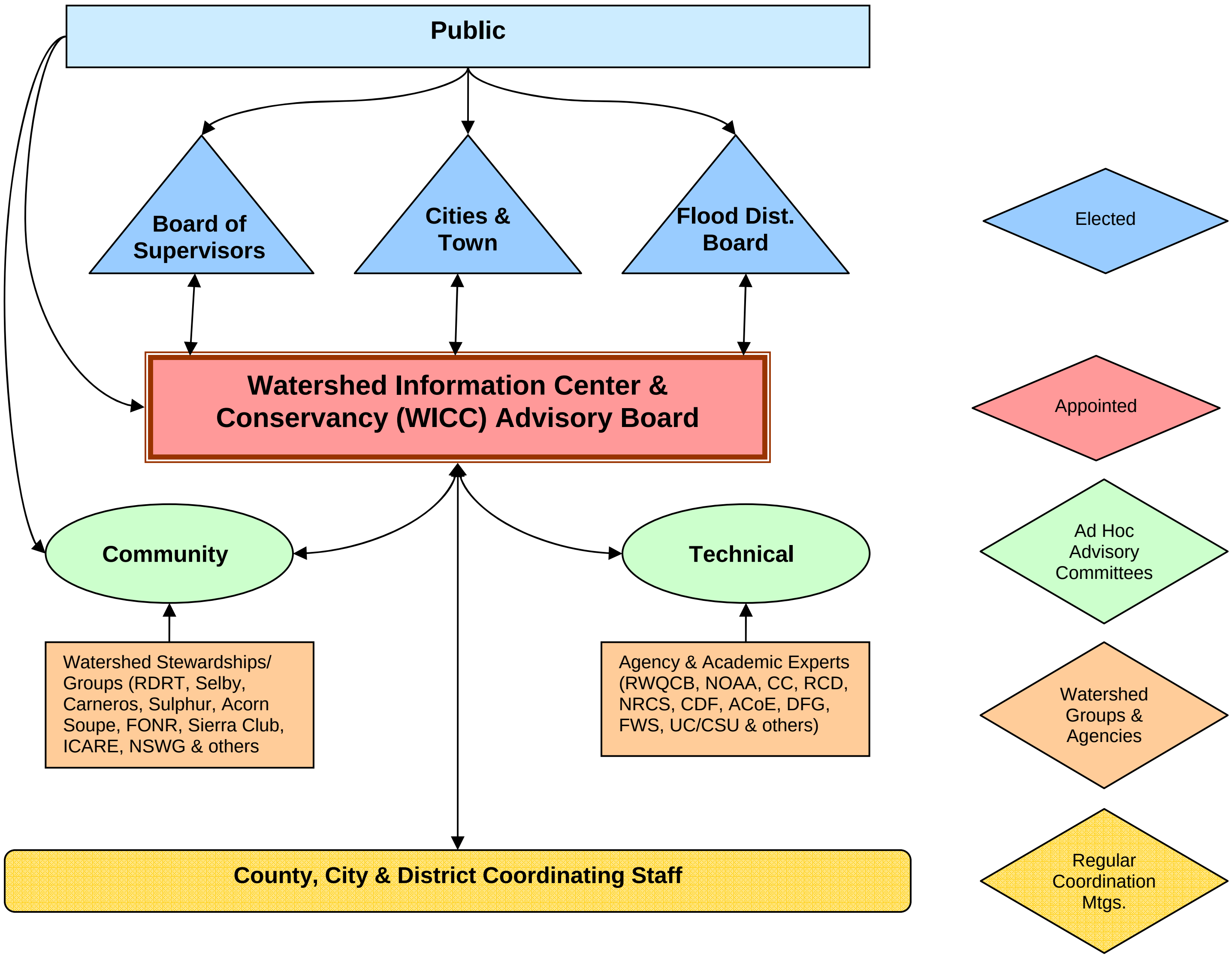
# Many Contribute to the Success of the WICC

The commitment and involvement of these and many others contributes directly to the merit and achievement of the WICC's mission



# WICC Organization Chart



# Coordinating and Support Staff

**County, City & District Coordinating Staff**

Regular Coordination Mtgs.

| County Conservation Development & Planning Dept. | Napa County Resource Conservation District | Flood Control & Water Conservation District | County Department of Public Works | County Department of Environmental Management | Cities & Town Supporting Staff/Depts. |
| --- | --- | --- | --- | --- | --- |
| Land Use Planning<br><br>Watershed Education<br><br>Conservation Regulations<br><br>Agricultural Erosion Control<br><br>Project / Development Permitting<br><br>County Natural Resource & Environmental Data | Monitoring & Assessment<br><br>Watershed Planning<br><br>Watershed Stewardship & Education<br><br>Restoration Design & Implementation<br><br>Project Funding<br><br>Erosion Control Consultation | County-wide NPDES Program Sponsor<br><br>Watershed / Groundwater Monitoring<br><br>Watershed Maintenance & Operations<br><br>Napa Flood Project<br><br>Flood Studies<br><br>State Water Contracts & Supply | County Measure A Programs<br><br>Flood Plain Management / Permitting<br><br>Groundwater Ordinance / Permitting<br><br>County Road Maintenance<br><br>NPDES Implementation<br><br>Grading / Construction Erosion Control | Water Quality Monitoring<br><br>On Site Waste Water Systems<br><br>Hazardous Materials<br><br>Well Monitoring & Permitting<br><br>Environmental Education<br><br>County Materials Recycling Program | County-wide NPDES Program Participant<br><br>Flood Control / Planning<br><br>City Road Maintenance<br><br>Water Supply<br><br>Wastewater Treatment<br><br>Water Re-use / Recycling<br><br>Other Programs |

**MOU**
County, Cities, Town & Districts

Various Related Program Areas

# Example Support Roles for Coordinating Staff

- Coordinating Staff would facilitate and enable the WICC to serve as an advisory board to Board of Supervisors, Flood and Water Conservation Board, and City and Town Councils.
- The County Conservation Development and Planning Department (Conservation Division) would coordinate a Memorandum of Understanding (MOU) between the County, Cities, Town and Districts interested in supporting the WICC as an Advisory Board to their respective organizations.
- Individual organizations under the MOU, as well as those participating in the Community Advisory Committee (CAC), may hold grants and/or contracts for work in the interest of the WICC.
- MOU agencies (Coordinating Staff) would meet monthly to discuss related project areas and coordinate staff support for the WICC Board and its advisory committees.
- MOU agencies (Coordinating Staff) would participate in cooperatively reviewing requests (and application) for funding, collaborate on Integrated Regional Water Management Planning (IRWMP), and work together to better define and provide available services to watershed and stewardship groups throughout Napa County.
- JPAs or other contracts/agreements among MOU agencies may exist to provide efficiencies where needed but would be independent of WICC.
- The Napa County Resource Conservation District (RCD) would facilitate the Community and Technical Advisory Committees on an ad hoc (as needed) basis. At minimum the Community and Technical Advisory Committees would meet quarterly.

**18. County of Napa. 2007. *Napa County Ordinance No. 1294*. Adopted August 7, 2007**

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# ORDINANCE NO. 1294

## AN ORDINANCE OF THE BOARD OF SUPERVISORS OF THE COUNTY OF NAPA, STATE OF CALIFORNIA, MAKING ADMINISTRATIVE AND PROCEDURAL AMENDMENTS TO CHAPTER 13.15 (GROUNDWATER CONSERVATION)

The Board of Supervisors of the County of Napa, State of California, ordains as follows:

**SECTION 1.** Chapter 13.15 (Groundwater Conservation) of the Napa County Code is amended to read in full as follows:

## Chapter 13.15

## GROUNDWATER CONSERVATION

**Sections:**


| | |
|---|---|
| **13.15.010** | **Title, purpose and definitions.** |
| **13.15.020** | **Groundwater permit required.** |
| **13.15.030** | **Classification of applications.** |
| **13.15.040** | **Agricultural activities exempt from groundwater permitting requirements.** |
| **13.15.050** | **Application for determination of exemption.** |
| **13.15.060** | **Application for groundwater permit.** |
| **13.15.070** | **Processing of groundwater permit applications.** |
| **13.15.080** | **Exceptions.** |
| **13.15.090** | **Appeals.** |
| **13.15.100** | **Enforcement--Violation.** |


### 13.15.010 Title, purpose and definitions.

A. Title. This chapter implements the Napa County Groundwater Conservation Ordinance.

B. Purpose. This chapter is intended to regulate, to the maximum extent possible, the extraction and use of groundwater resources in Napa County and to prohibit extraction for wasteful, unreasonable or non-beneficial purposes in order to promote groundwater conservation and the use of Best Management Practices and maximize the long-term beneficial use of the county's groundwater resources, thus serving to enhance environmental quality and protect the public health, safety and welfare of the citizens of Napa County.

C. Definitions. For the purpose of this chapter, the following definitions shall apply:

"Agricultural land development" means the development, new plantings, or other improvement of a property greater than one-quarter of an acre for the purposes of farming a crop, orchard, vineyard or other agricultural product.

"Agricultural land re-development" means the re-development or replanting of an existing crop, orchard, vineyard or other agricultural product of greater than one-quarter of an acre.

"Aquifer" means a geologic formation, underground layers of porous rock that are saturated from above or from structures sloping toward it, that stores, transmits and yields significant quantities of water to wells and springs. Aquifer capacity is determined by the porosity of the subsurface material and its area.

"Best Management Practices (BMP)", as used in this chapter, means structural, nonstructural and managerial techniques generally recognized to be the most effective and practical means to reduce contamination and consumption of groundwater while still allowing productive use of the resource, including, but not limited to: low flow fixtures, drip in lieu of broadcast irrigation, irrigation during hours of least evaporation loss, timers on irrigation systems, use of pool and spa covers to reduce evaporation, use of xeriscape landscaping, use of recycled water for landscaping purposes, and monitoring of wells.

"Conservation" means the conscious effort to prevent waste and minimize the consumption of groundwater by utilizing reasonable and economically justifiable methods to improve its delivery and use, thus increasing water supplies for optimum long-term benefits. When referring to landscaping or agricultural uses of groundwater this term includes water reuse, processes to reduce the amount of water irretrievably lost to moisture deficient soils, water surface evaporation, or evapotranspiration.

"Contiguous parcel" means parcels which abut, adjoin or otherwise touch each other at more than one point along a common boundary or which would do so except for separation by a strip of land over which some person or entity, other than the owner of the parcels, has some property interest, including fee title or some lesser interest, such as a leasehold or easement. Examples of such strips of land include but are not limited to roads, streets, utility easements, railroad rights-of-way, canals and drainage channels.

"Convenience improvement" means an addition, change, upgrade, improvement or replacement of a site's existing well or water supply and distribution system (including the addition of plumbing fixtures) which is for purposes of rendering the system more efficient and is not intended to supply water or make plumbing fixtures available to additional users of said system and does not increase the total consumption of groundwater at that site. If a replacement well is permitted, the existing well must be destroyed under permit by the Department of Environmental Management and the new well must be drilled to the same or smaller diameter as the existing well.

"Department" means the Napa County Department of Environmental Management.

"Director" means the Napa County Director of Environmental Management or the designee of the Director.

"Director of Public Works" means the Napa County Director of Public Works or the designee of the Director.

"Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

"Evapotranspiration" means the loss of water from the soil through both evaporation and transpiration from plants.

"Graywater" means domestic wastewater other than that containing human excrete such as sink drainage, washing machine discharge or bathwater.

"Groundwater" means all water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water.

"Groundwater deficient area" means an area where the amount of groundwater is inadequate to meet particular demands at a particular time, as shown in Map 13-1 at the end of this chapter.

"Groundwater permit" means a permit issued pursuant to this chapter to use groundwater.

"Harvested water" means the collection and use of rainwater as a means to augment or replace other sources of water.

"Improvement" or "improve", as related to a well or water supply system means the construction, re-construction, replacement, or addition to, any portion of a water supply and distribution system for the purposes of providing water for a new use or an additional use (unless specifically exempt under this chapter). This definition is not intended to include simple plumbing repairs to existing fixtures, pipes or equipment such as replacing or repairing existing faucets, hoses, drains, sinks, toilets, tubs, showers, washing machines, swimming pool and spa filter pumps, irrigation equipment, and the like, unless such repair or replacement will potentially increase the rate and/or amount of groundwater extraction.

"Minor improvement" means a modification to an existing water supply that involves simple repair or replacement of pipes, fittings, faucets, hoses, pumps, meters, components of irrigation systems, sinks, tubs, toilets, showers, washing machines, and all other elements of the water supply and delivery system that will not potentially increase the amount of groundwater extraction at that site. For the purposes of this definition, swimming pools (if filled with trucked in water from a supply source that does not include groundwater from a groundwater deficient area and is provided with a cover), replacement dwellings (when an existing legal dwelling unit had previously existed on the property) and additional potential bedrooms whether or not attached to the single family dwelling unit are considered minor improvements. Any modification or improvement that will increase the amount of groundwater extracted is not a minor improvement.

"Overdraft" means the withdrawal of water from an aquifer in excess of the amount of water that recharges the basin over a period of years during which water supply conditions approximate the average, and which, if continued over time, could eventually cause the underground supply to be exhausted, cause subsidence, cause the water table to drop below economically feasible pumping lifts, cause a detrimental change in water quality, or produce other adverse environmental impacts.

"Parcel" means a legal lot of record.

"Potential bedroom" means any room with a floor area equal to or greater than seventy square feet, including lofts, sewing rooms, offices, game rooms, etc. that meet building codes for a sleeping room. A closet or lack thereof is not used in determining whether a room is a potential bedroom.

"Public water supply" means a water supply provided by a local agency, publicly owned corporation, or approved utility company.

"Recharge" means replenishment of groundwater by flows to groundwater storage from precipitation, irrigation, infiltration from streams, a spreading basin or other sources of water.

"Recycled water" means the reclamation and reuse of wastewater or graywater for beneficial use.

"Single-family dwelling unit" means a dwelling unit containing not more than one kitchen, designed to be occupied by not more than one family, and includes a manufactured home as defined in Section 18.08.360 which is installed on a permanent foundation and certified under the National Manufactured Housing Construction and Safety Standards Act of 1974.

"Site" means the location of a system to extract and distribute groundwater, such as a well and connecting plumbing which supplies water to a residence or other structure or use.

"Subsidence" means lowering or sinking of the land surface as a result of the extraction of groundwater.

"Transpiration" means the process by which water absorbed by plants (usually through the roots) is evaporated into the atmosphere from the plant surface.

"Water supply system" means any system including the water source the purpose of which is to extract and distribute groundwater.

"Water table" means the surface or level where groundwater is encountered in an unconfined aquifer.

"Xeriscaping" means a form of landscaping that uses a variety of indigenous and drought-tolerant plants, shrubs and ground cover to provide environmental benefits.

**13.15.020 Groundwater permit required.**

A. No applications filed pursuant to Division I (Water) of Title 13 of this code for development of a new water system or improvement of an existing water system within Napa County that may use groundwater as a water source shall be approved by any employee, department or body of Napa County unless it is specifically exempted by this chapter or unless a groundwater permit is obtained as required by this chapter.

B. Prior to the issuance of a building permit pursuant to Section 15.08.040, or any other permit or administrative approval facilitating the development or use of any parcel that may utilize a groundwater supply, a groundwater permit must be obtained unless specifically exempted by this chapter.

C. Prior to the final approval of a subdivision, a groundwater permit must be obtained if required by this chapter and an existing, new or improved water system will provide groundwater to the subdivision.

D. No application filed pursuant to Chapter 18.108 (Conservation Regulations) shall be approved by any employee, department or body of Napa County until the applicant has obtained a groundwater permit if required by this chapter.

E. Agricultural land development or re-development that is located on parcels included within those groundwater deficient areas depicted on Map 13-1 which will utilize groundwater and which is not subject to the requirements of subsection (D) of Section 13.15.020 or Chapter 18.108 is subject to review and approval by Napa County in the form of a groundwater permit.

F. No application filed pursuant to Chapter 17.46 (Lot Line Adjustments) shall be approved by any employee, department or body of Napa County when the resultant parcel configuration increases the intensity of groundwater use of any parcel unless specifically exempted by this chapter.

G. A Groundwater Permit shall be waived if a new water using activity or use on a parcel will be supported by water from an outside source and will not utilize groundwater. The property owner shall, if and when requested by the County, provide evidence that such an outside source of water is actually available and being used.

**13.15.030 Classification of applications.**

Applications described in Section 13.15.020 shall be classified as follows for the purpose of determining whether a groundwater permit is required by this chapter:

A. Applications exempt from groundwater permit requirement.

1. In the case of uses permitted without a use permit under any provision of this code, the applications or development set forth in Section 13.15.020 are exempt from the requirement that a groundwater permit must be obtained unless the application or development:

a. Is for a project located on a parcel included within those groundwater deficient areas depicted on Map 13-1 and is not otherwise specifically exempted;

b. Is to develop or improve an on-site or off-site water supply serving more than a single contiguous parcel; or

c. Where the development or improvement, regardless of the number of parcels served, is able to connect to a public water supply.

2. Applications to develop or improve an on-site or off-site water source serving agriculture are also exempt from the requirement of a groundwater permit under this chapter to the extent provided in Section 13.15.040.

3. Applications to construct or develop rainwater harvesting or graywater recycling systems when that is the sole purpose of the project and the resulting harvested or recycled water

will be used to augment existing groundwater sources or as the sole source of water for use at that site.

4. Minor improvements to a water system.

5. Convenience improvements to a water system.

B. Applications requiring use permits.

In the case of a proposed development requiring the issuance of a use permit pursuant to any provision of this code, applications which propose to develop, improve or utilize an on or off-parcel groundwater source in conjunction with such development are not required to obtain a groundwater permit under this chapter. Groundwater review of such applications shall occur in accordance with the county's procedures to obtain a use permit.

C. Applications involving a ministerial approval.

1. Applications for a single-family dwelling unit and associated landscaping on parcels two acres in size or less, when such residence will be the only use on the parcel, shall be issued a groundwater permit providing they install a meter on the well serving the parcel, read the meter every six months, and report these meter readings to the public works department when requested by that department. If the parcel is greater than two acres, a ministerial permit shall be issued providing they meet the following requirements:

a. The permittee shall install a meter on the well serving the parcel to measure all groundwater used on the parcel. The configuration of the installation shall conform to a drawing prepared by the permittee and shall conform to the technical standards set forth by the director of public works.

b. On or near the first day of each month the permittee shall read the water meter and provide this data to the director of public works during the first week of April and October of each year. The permittee shall also grant to the director of public works the right to access and verify the operation and readings of the meters and well levels at any reasonable time during regular working hours.

c. The permittee shall be limited to 0.60 acre feet of water per year or such other amount as may be adopted by the board by resolution.

This groundwater permit shall not be available when other dwellings, accessory uses, agricultural development or other discretionary uses exist on the property or when water from an approved public water system is available to the property. In such cases, a groundwater permit must first be obtained pursuant to the procedures set forth in Section 13.15.060 et seq. Any permittee that qualifies for a groundwater permit issued pursuant to this section may instead apply for a groundwater permit pursuant to the procedures set forth in Section 13.15.060 et seq.

2. Applications for agricultural land redevelopment that will utilize groundwater on parcels included within those groundwater deficient areas depicted on Map 13-1 shall be issued a groundwater permit without any additional requirements providing the size of the replant is two acres in size or less. If the replant is greater than two acres, a ministerial permit will be issued providing that they meet the following requirements:

a. The permittee shall install a meter on all wells or water supply and distribution systems serving the parcel to measure all groundwater used on the parcel. The configuration of the installation shall conform to a drawing prepared by the permittee and shall conform to the technical standards set forth by the director of public works.

b. On or near the first day of each month the permittee shall read the water meter and provide this data to the director of public works during the first week of April and October of each year. The permittee shall also grant to the director of public works the right to access and verify the operation and readings of the meters and well levels at any reasonable time during regular working hours.

c. The permittee shall be limited to an average of 0.30 of acre feet of water per acre per year or such amount as may adopted by the board by resolution. This limitation shall be calculated as the average water used over a three-year period with no yearly use exceeding the acre foot of water per acre per year allotment by more than fifteen percent.

Any permittee that qualifies for a groundwater permit issued pursuant to this section may instead apply for a groundwater permit pursuant to the procedures set forth in Section 13.15.060 et seq.

D. Applications for a minor modification or cancellation of an existing groundwater permit.

1. Applications for a minor modification or a cancellation of an existing groundwater permit shall be made through a ministerial permit process.

2. Applications for a minor modification or cancellation of an existing groundwater permit shall be made to the department in writing on a form prescribed by the department. The application shall state the grounds for the application, the specific modification being requested and shall include any information or evidence needed to support the request. The application shall also demonstrate that the proposed use complies with the standards required for issuance of a groundwater permit as set forth in this chapter.

3. An application for an administrative permit for a minor modification or cancellation of an existing groundwater permit shall be accompanied by a fee in the amount established by resolution of the board of supervisors.

4. Issuance Prerequisites: An application for a minor modification or cancellation of an existing groundwater permit shall be considered only if the following standards are met:

a. Minor Modification: The proposed modification does not increase water use over the existing permitted use and the resultant water use request meets the fair share standard for the parcel as established in the Department of Public Works Water Availability Policy Report (even if the original permit allowed a higher water use) and the application does not request a modification to a ministerial permit that would have otherwise been processed through the groundwater permit process outlined in Section 13.15.060; or

b. Cancellation: The cancellation of a groundwater permit shall only be allowed if evidence is submitted that the project which triggered the groundwater permit has been cancelled and is no longer being pursued.

If the modification request is not able to meet the above standards, the applicant has the option of applying for a new groundwater permit pursuant to 13.15.060.

**13.15.040 Agricultural activities exempt from groundwater permitting requirements.**

A. Applications to develop or improve a water source serving agriculture, as defined in Section 18.08.040 of this code, shall be exempt from the requirement of a groundwater permit under this chapter where the water would only serve the property where the water source is located, or contiguous property. For purposes of this section only, "contiguous property" refers to property in common ownership that is joined at more than one common point to the property where the water source is located, or connected in a pattern of parcels, each joined to another, that includes the property where the water supply system is located. If the contiguous property consists of more than one parcel, all parcels must be in agricultural production, in order to qualify for an exemption pursuant to this section. To qualify for the exemption in this section, in the case of parcels designated Agricultural Resource ("AR") or Agriculture, Watershed and Open Space ("AWOS") at least eighty percent of the allowable, plantable land of each parcel must be in agricultural production.

B. Developments or improvements in water sources serving agriculture on any other properties, including adjacent property not qualifying as "contiguous" for purposes of this section, shall be subject to the same permitting criteria and standards identified in Sections 13.15.030 and 13.15.070.

C. Notwithstanding subsection (A), developments or improvements in water sources located on parcels included within those groundwater deficient areas depicted on Map 13-1 shall be subject to those permitting criteria and standards identified in Sections 13.15.030 and 13.15.070.

**13.15.050 Application for determination of exemption.**

A. Prior to any employee, department or body of Napa County issuing any permit or approval as set forth in Section 13.15.020, said employee, department or body must first make a preliminary determination if a groundwater permit is required (or must be provided with such preliminary determination from another employee, department or body). Said determination shall consider if the permit or approval:

1. Is for a specific exemption as set forth in this chapter; or
2. Falls within the definition of a minor improvement or convenience improvement; or
3. Is eligible for a groundwater permit issued pursuant to subsection (C) of Section 13.15.030.

B. If the proposed project is determined to be exempt from the requirement of a groundwater permit for reasons other than an agricultural exemption, no further groundwater review shall take place and a determination of exemption shall be issued by the director.

C. If the proposed project is claiming an agricultural exemption, the applicant must submit to the department an application for a groundwater permit agricultural exemption. The director shall respond, in writing, to the applicant on or before the end of fifteen days from the date of submittal. If the proposed project is determined by the director to be exempt from the requirement of a groundwater permit on the basis of the agricultural exemption authorized by Section 13.15.040 the holder of the exemption shall be required to file with the department a biennial report demonstrating that the parcel continues to be in at least eighty percent agricultural production of the allowable, plantable land. If the proposed project is determined not to be exempt from the groundwater review process, the determination of the director shall serve as notice to the applicant that a groundwater permit must be issued before the proposed project is begun.

D. If the proposed project is determined not to be exempt based on a preliminary determination, the employee, department or body of Napa making such determination shall provide written notice to the applicant that a groundwater permit must first be issued.

**13.15.060 Application for groundwater permit.**

Each applicant determined not to be exempt or eligible for a groundwater permit issued pursuant to subsection (C) of Section 13.15.030 shall be required to obtain a groundwater permit and shall submit a groundwater permit application to the director, using a form provided by the director. That application shall:

A. Identify any present and future uses of any existing water system, including whether and to what extent groundwater is or will be used as a water source on the affected property. For the purposes of this chapter, when an applicant identifies the existing water uses on a parcel to establish the existing water use level on that parcel, those existing uses which will be considered by the director are only those legitimate water using activities such as residential structures, other legal uses (wineries, etc.), vineyards, or other viable agricultural crop or animal operation which were not discontinued for more than two years prior to the date of the application for the groundwater permit. Random irrigation practices that serve no beneficial use (e.g., watering pasture when no animal or crop is dependent on that water) will not be considered as an existing water use. For the purposes of the application, future uses are those for which permits will be secured or improvements completed within two years of the application;

B. Identify any water sources other than groundwater intended to be used;

C. If the proposed application is for the development of a new water system or improvement to an existing water system, state the number of parcels and service connections the new water system or improvement are intended to serve, identify the location of the structures and improvements to be served by that new or improved water system, and identify existing and future uses and users to be served by that new or improved water system;

D. Whether the intent is to transfer some or all of the groundwater extracted pursuant to the permit to a public agency for use by a public agency following issuance of the groundwater permit; and

E. In the form of a Water Availability Analysis-Phase I, as outlined in the Department of Public Works Water Availability Policy Report, as it may be amended from time to time, provide sufficient information and supporting documentation to enable the Director of Public Works to determine whether it is likely the new water system, improvement or addition might significantly affect the impacted groundwater basin within Napa County, whether or not the proposed improvement or new system may be reasonably expected to adversely affect reasonable and beneficial uses of groundwater, interfere with surface water flows, or cause other adverse changes to the physical environment adversely affecting the impacted groundwater basin.

**13.15.070 Processing of groundwater permit applications.**

The following procedures and standards shall govern the review and disposition of applications requiring groundwater permits other than groundwater permits issued pursuant to subsection (C) of Section 13.15.030:

A. The director shall review an applicant's groundwater declaration submitted under this chapter for compliance with the requirements of this chapter and any other applicable provisions of law.

B. Following the director's determination that the groundwater declaration complies with Section 13.15.060, the director shall furnish a copy of the applicant's declaration to the Director of the Department of Public Works to obtain the written comments of that department on the application. The Director of Public Works shall instruct the applicant to perform any required phase II or III water availability analysis required by the written procedures established by the Department of Public Works. The Department of Public Works, in assessing any required phase II or phase III analysis, shall take into consideration the potential changes in static water levels of neighboring wells prior to submitting its comments. The Director of Public Works shall submit its comments in the form of a written appraisal of the application to both the Director of the Conservation, Development and Planning Department and the Director. That appraisal shall assess the potential for significant negative impacts on the affected groundwater table, and assess potential adverse effects on reasonable and beneficial uses of groundwater, interference with surface water flows, or other adverse changes to the physical environment. The Director of the Conservation, Development and Planning Department shall review the application and the written comments and appraisal from the Director of Public Works for the purposes of conducting the required environmental review and shall submit their written comments to the director.

C. The director shall consider approving a groundwater permit only after reviewing the declaration, the environmental determination, and any written comments received regarding the application, including the written appraisal of the Department of Public Works. After that review, the director shall only approve a groundwater permit after making any necessary environmental determination and concluding, based on substantial evidence in the record, that the new water system, improvement or addition would not significantly affect the impacted groundwater basin in Napa County. In making this determination, the director shall consider, but is not limited to, the following factors: impact on the affected groundwater table; adverse effects on the reasonable and beneficial uses of groundwater; implementation of Best Management Practices; or other adverse changes to the physical environment.

D. In approving a groundwater permit, the director may impose reasonable conditions on the permittee as needed to satisfy the requirements of this chapter, minimize groundwater use and to protect the public health, safety and welfare including but not limited to requiring implementation of Best Management Practices, plumbing retrofits, installation of meters, monitoring and reporting, limits on groundwater consumption, and requirements that groundwater consumption be reduced in the future if the basin develops an overdraft condition. Additionally, any groundwater permit granted to a public agency, or granted to a person or persons who, subsequent to the issuance of the groundwater permit, intends to transfer some or all of the groundwater extracted pursuant to the permit to a public agency for use by a public agency, shall be valid for a maximum of three years. The grant of a permit subject to this three year limitation shall include conditions relating to the termination and renewal of the permit; provided, however, that such conditions shall include, at a minimum, a condition that the permit may be renewed only upon the approving authority's finding that the renewal would not cause significant adverse effects on the affected groundwater basin or the surrounding agricultural operations.

E. If the director determines after review that the applicant's groundwater declaration satisfies the groundwater permitting requirements of this chapter, and any other applicable provisions of law, the director shall issue a tentative decision setting forth the conclusions reached in making the determination, and approving or conditionally approving a groundwater permit. If the director determines the application and groundwater declaration do not meet the permitting requirements of this chapter, or any other applicable provisions of law, the director shall issue a tentative decision denying the groundwater permit and setting forth the reasons therefore. Any tentative decision will be issued within thirty days of the date comments are received from the Directors of Public Works and Conservation, Development and Planning.

F. Within seven calendar days of the issuance of the tentative decision, the director shall give notice of its issuance, including the date on which a tentative decision will become final if a written request for a public hearing is not requested, which date shall be not less than ten calendar days following the date notice of the tentative decision is mailed. The notice shall be given by all of the following means:

1. Notice shall be personally delivered or placed in the mail to the applicant seeking approval of a groundwater permit under this chapter.

2. Notice shall be placed in the mail to each public entity with jurisdiction over any portion of the groundwater basin in which the proposed extraction would be expected to occur.

3. Notice shall be personally delivered or placed in the mail to the owners of all real property, including businesses, corporations, or other public or private entities, as shown on the latest equalized assessment roll, within three hundred feet of the outer perimeter of the properties that will utilize the extracted groundwater. In lieu of utilizing the assessment roll, the records of the county assessor or tax collector may be used if they contain information more recent than the assessment roll.

4. Notice shall be mailed to any person who has filed a written request therefor with the director. Such requests may be submitted at any time during the calendar year and shall apply for the balance of such calendar year.

G. The tentative decision shall become final once the period identified in the notice during which a public hearing may be requested has expired without such written request for a public hearing having been received.

H. If a public hearing is requested in a timely manner, the tentative decision shall be a nullity, in which case the director shall set the hearing date and personally deliver or mail a notice of the time, place and date of the hearing, in the same manner and to the same persons as the notice of the tentative decision was mailed or delivered. This notice shall be mailed not less than ten and not more than thirty calendar days prior to the date of the hearing. Any required hearing shall be de novo and shall commence within ninety days of receipt of a request for a hearing.

I. The director shall conduct the public hearing. Any member of the public may attend and present oral testimony, written or other evidence, or both. The proceedings shall be electronically recorded and the tapes thereof retained in the director's custody for three years after the hearing except during such time as they may be undergoing transcription for preparation of the record on appeal.

J. Within five calendar days following the conclusion of the public hearing, the director shall issue a final decision approving, conditionally approving, or denying the request to issue a groundwater permit. The director shall give notice of the final decision to all persons who appeared and presented testimony at the hearing.

K. Final determinations of the director (or on appeal, the Board of Supervisors) are discretionary for purposes of the California Environmental Quality Act (Pub. Res. Code, §21000, et seq.) except that determinations of exemption pursuant to subsection (A) of Section 13.15.030 or the issuance of a groundwater permit pursuant to subsection (C) of Section 13.15.030 are deemed ministerial acts and are exempt from the California Environmental Quality Act.

**13.15.080 Exceptions.**

Notwithstanding any other provisions of this chapter:

A. No groundwater permit shall be denied where the director (or on appeal, the Board of Supervisors) determines, after reviewing the entire record, that a denial would constitute an unconstitutional taking of property without just compensation, or would effect an unreasonable use or waste of water.

B. The groundwater review and permitting requirements of this chapter shall be waived when applying them would delay effective response to a general emergency declared by the Governor of the State of California or the Napa County Board of Supervisors. "General emergency," as used herein, refers to a sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or other essential public services.

**13.15.090 Appeals.**

Any person may appeal a final decision of the director made, following a request for hearing pursuant to subsection (H) of Section 13.15.070, in accordance with the procedures set forth in Chapter 2.88 of this code. Appeals of tentative decisions that become final because no request for a hearing was received, are not permitted.

**13.15.100 Enforcement--Violation.**

A. Criminal Penalties. Any person, firm or corporation, whether acting as principal, agent, employer or otherwise, who violates any provision of this chapter, or the terms and/or conditions of any permit issued pursuant to this chapter, with intent to do so shall be guilty of an infraction with a fine not exceeding one hundred dollars for the first violation, two hundred dollars for the second violation within one year, and five hundred dollars for the third violation within one year. Any subsequent violation shall be punishable as a misdemeanor, punishable by a fine not to exceed one thousand dollars per violation, or imprisonment not exceeding six months, or both such fine and imprisonment. Any person shall be deemed guilty of a separate offense for each and every day or portion thereof during which any such violation is committed, continued, or permitted.

B. Civil Actions--Injunctive Relief. Napa County may elect to proceed with a civil action, including seeking injunctive relief, rather than proceed with criminal actions as described in subsection (A) of Section 13.15.100. Any person, firm or corporation, whether acting as principal, agent, employer or otherwise, who willfully violates any provision of this chapter, or the terms and/or conditions of any permit issued pursuant to this chapter, shall be liable for a civil penalty not to exceed one thousand dollars for each day or portion thereof, that the violation continues to exist. Any person shall be deemed guilty of a separate offense for each and every day or portion thereof during which any such violation is committed, continued, or permitted. In determining the amount of the civil penalty to impose, the court shall consider all relevant circumstances, including, but not limited to, the extent of the harm caused by the conduct constituting the violation, the nature and persistence of such conduct, the length of time over which the conduct occurred, the assets, liabilities, and net worth of the violator, whether corporate or individual, and any corrective action taken by the violator.

**SECTION 2.** If any section, subsection, sentence, clause, phrase or word of this Ordinance is for any reason held to be invalid by a court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance. The Board of Supervisors of the County of Napa hereby declares it would have passed and adopted this Ordinance and each and all provisions hereof irrespective of the fact that any one or more of said provisions be declared invalid.

**SECTION 3.** This Ordinance shall be effective thirty (30) days from and after the date of its passage.

**SECTION 4.** A summary of this Ordinance shall be published at least once 5 days before adoption and at least once before the expiration of 15 days after its passage in the Napa Valley Register, a newspaper of general circulation published in the County of Napa, together with the names of members voting for and against the same.

The foregoing Ordinance was introduced and read at a regular meeting of the Board of Supervisors of the County of Napa, State of California, held on the ___ day of ________________, 2007, and passed at a regular meeting of the Board of Supervisors of the County of Napa, State of

California, held on the 7th day of August_, 2007, by the following vote:

| | | |
|---|---|---|
| AYES: | SUPERVISORS | DODD, DILLON, WAGENKNECHT, LUCE and MOSKOWITE |
| NOES: | SUPERVISORS | NONE |
| ABSTAIN: | SUPERVISORS | NONE |
| ABSENT: | SUPERVISORS | NONE |

Harold Moskowite

**HAROLD MOSKOWITE, CHAIR**
Napa County Board of Supervisors

ATTEST: GLADYS I. COIL
Clerk of the Board of Supervisors

By: Gladys I. Coil

**APPROVED AS TO FORM**
**Office of County Counsel**
By: Silva Darbinian (by e-signature)
Chief Deputy County Counsel
By: Sue Ingalls (by e-signature)
County Code Services
Date: July 20, 2007

**APPROVED BY THE NAPA COUNTY BOARD OF SUPERVISORS**
Date: August 7, 2007
Processed by: Sherry Vattuone
Deputy Clerk of the Board

## 19. County of Napa. 2007. *Water Availability Analysis Policy Report*. Napa, CA. August 2007

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# WATER AVAILABILITY ANALYSIS
**Policy Report**
**August 2007**

## Introduction:

At the height of the 1990 drought in Napa County, the Napa County Board of Supervisors and the Napa County Planning Commission became very concerned with the approval of use permits and parcel division that would cause an increased demand on groundwater supplies within Napa County. During several Commission hearings, conflicting testimony was entered as to the impact of such groundwater extraction on water levels in neighboring wells. The Commission asked the Department of Public Works to evaluate what potential impact an approval might have on neighboring wells and on the basin as a whole. In order to simplify a very complex analysis, the Department developed a three phase water availability analysis to provide a cost-effective answer to the question.

On March 6, 1991, an interim policy was presented and approved by the Commission which requires the applicants for use permits and parcel divisions to submit a water availability analysis with their proposal. The staff report that provides the procedure to follow for compliance with the Commission policy was intended to be an interim one. With the passage on August 3, 1999 by the Board of Supervisors of Napa County Ordinance #1162 (the Groundwater Conservation Ordinance) it became apparent that the interim policy required updating and formalization. The purpose of the revised report is to provide the procedure for preparation of water availability analysis and to restate the purpose and functionality of the analysis as related to the revised Groundwater Ordinance (Napa County Ordinance # 1162).

## Water Availability Analysis:

The Water Availability Analysis (WAA) sets up guidelines to determine if a proposed project will have an adverse impact on the groundwater basin as a whole or on the water levels of neighboring wells with the overriding benefit of helping to manage groundwater resources. An important sidelight to the process is public education and awareness. WAA's are comprised of potentially three phases; phase one, phase two and phase three.

A **phase one analysis** is a reconnaissance level report that may be prepared by the applicant or their agent. **It must be signed by the applicant. If prepared by the applicant's agent, it must contain the letterhead of the agent, the name of the agent, and the agent's signature.** The phase one WAA contains the following information:

1. The name and contact information of the property owner and the person preparing the phase one report.

2. Site map of the project parcel and adjoining parcels. The map should include: Assessor's Parcel Number (APN), parcel size in acres, location of project well(s) and other water sources, general layout of structures on the subject parcel, location of agricultural development and general location within the county.

3. Narrative on the nature of the proposed project including: all land uses on the subject parcel, potential for future water uses, details of operations related to water use, description of interconnecting plumbing between the various water sources and any other pertinent information.

4. Tabulation of existing water use compared to projected water use for all land uses contained on the parcel. Should the water use extend to other parcels, they should be included in the analysis (see Appendix E for additional information on determining fair share estimates when multiple parcels are involved). **These estimates should reflect the specific requirements of the applicant's operations.** The applicant should use the guidelines attached in Appendix A

The Department will review the analysis for completeness and reasonableness (based on the guidelines outlined in Appendix A) and then compare the analysis to a threshold level of groundwater use for the subject parcel. The threshold is based upon several factors including annual rainfall, topography, soil types, proximity to recharge zones and available groundwater information. In general, parcels located on the Valley Floor or in strong alluvial areas will be assigned a threshold of 1 acre-foot per acre of land (an acre-foot of water is the amount of water it takes to cover one acre of land to a depth of one foot, or 325,851 gallons). Therefore, a 40-acre parcel will have an acceptable level of groundwater use of 40 acre-feet per year. The threshold for Hillside parcels (primarily located in volcanic rock and soils) is 0.5 acre-feet per acre or 20 acre-feet per year for a 40-acre parcel. Areas designated as "Groundwater Deficient Areas" as defined in the Groundwater Conservation Ordinance will have threshold established for that specific area. For example, the Milliken-Sarco-Tulocay Basin (M-S-T) is currently the only "groundwater deficient area" and has an established threshold of 0.3 acre-feet per acre per year. Thus, the same 40-acre parcel has an acceptable level of water use of 12 acre-feet per year (see Appendix B).

If the Phase I analysis shows a water use above the parcel threshold then further analysis may be required in the form of a Phase II or Phase III analysis.

In instances where the applicant is in the M-S-T basin and their estimated future water usage will be significantly less than the values listed in Appendix A, or if the estimate is within 50% of the estimated threshold, the County may require the applicant to install a water meter to verify actual groundwater usage. If the actual usage exceeds the parcel's threshold, applicant may be required to reduce groundwater consumption and/or find alternate water sources to ensure that no more groundwater is consumed than the threshold for the parcel(s) (See Appendix D).

In the M-S-T basin a phase one analysis examines only the estimated quantity of groundwater water usage as compared to the established water usage threshold. It is assumed that if all consumers within the MST basin were to limit their consumption to 0.3 acre-feet per acre per year* there will be sufficient groundwater for all properties within that area.

* Does not apply to the Ministerial Exemption as outlined in the Groundwater Conservation Ordinance

Any new project within the M-S-T Basin whose estimated use exceeds the threshold use will likely be recommended for denial to the County Department requesting review of the application.

For projects in all other areas within Napa County whose estimated water use exceeds the threshold, the applicant will be required to conduct either a **phase two or a phase three analysis (or both).**

The phase two analysis is commonly called an acquifer test or well test. It requires the pumping of the project well(s) at the maximum rate needed to meet project water demands and at the same time requires the monitoring of the immediate effects of groundwater pumping on a neighboring or monitoring well(s). The following requirements must be met when performing a phase two analysis:

- An approved hydrogeologist, a list of which is on file with the Department of Public Works, must develop the test procedure. Upon approval of test procedures, the hydrologist will supervise the test and submit a report to the Department evaluating impacts to neighboring static water levels.
- A licensed well drilling contractor must perform the actual testing and monitor static and dynamic water levels of the project well and monitoring wells during the duration of the test, including the recovery phase of the project well and monitoring wells.
- The test must be conducted long enough to stabilize the dynamic water level of the project well or include an analysis of what the impact* of continued pumping would have.
- The applicant or agent must notify the Department at least 48 hours prior to conducting the test.

* Impact is unique to each project and will be evaluated on a case by case basis by the department of public works.

Any projects requiring a phase two analysis may also be required to install water meters to measure the actual amount of water consumed, and be required to find alternate water sources if their actual groundwater usage exceeds the threshold for their property (see Appendix D).

The Department will review the phase two analysis and determine if the impacts to static water levels of neighboring wells are within acceptable limits. If the phase two is unacceptable, **a phase three analysis** is required. The phase three analysis may include many measures aimed at reducing water consumption and/or the maximum pumping rate. The Department will require periodic monitoring of static water levels with annual submittals of well production and static water level reports.

The phase three analysis only determines possible actions which could be taken to moderate the immediate effects of groundwater pumping to neighboring wells. These mitigation measures will be designed to reduce, but may not eliminate, the immediate effects of groundwater pumping to neighboring wells.

The preparation and submittal of WAA's for all use permits and parcel divisions, as well as for all Groundwater Conservation Ordinance permits must be submitted through the normal procedures for the Conservation, Development and Planning Department (CDPD) and the Department of Environmental management (DEM) respectively. All subsequent communication should likewise pass through CDPD or DEM. Any mitigation measures identified in the phase three analysis will become either project modifications to, or conditions of approval for, the proposed project.

Details of the use permit or land division can be obtained from CDPD and details of the Groundwater Ordinance and related permit process can be obtained from the Department of Environmental Management. Mapping of "Groundwater Deficient Areas" is available at all three Departments with final determination being supplied by the Department of Public Works.

## Conclusions:

The Napa County Board of Supervisors has long been committed to the preservation of groundwater for agriculture and rural residential uses within the County. It is their belief that through proper management, the excellent groundwater resources found within the county can be sustained for future generations.

Since 1991, several conclusions can be drawn from application of the water availability analysis process:

- In the process of conducting the analysis, applicants become much more aware of water use for their project, providing a higher level of awareness and potentially leading to more efficient use of the resource.

- Information submitted by applicants has lead to a broader database for future study and management.

- Groundwater use can vary widely depending upon its availability.

- The current practice of evaluating an applicant's Phase I WAA to determine if additional analysis is needed has been the accepted method for making groundwater determinations. Due to the limited information available on Napa County groundwater basins in general (with the exception of the MST basin), the Phase 1 WAA has been the most reasonable approach to the process and has not been shown to be inaccurate or inadequate. As such, the established WAA procedures for making groundwater determinations as outlined above and throughout the Appendices will continue to be the accepted method of making groundwater determinations and findings.

The water availability analysis is based upon the basic premise that each landowner has equal right to the groundwater resource below his or her property. By attempting to limit the extraction to a threshold amount, it is believed that sufficient groundwater will be available for both current and future property owners.

## APPENDIX A: Estimated Water Use for Specified Land Use

**Guidelines for Estimating Residential Water Use-**For use with the Phase I Form

The typical water use associated with residential buildings is as follows:

| | |
|---|---|
| Primary Residence | 0.5 to 0.75 acre-feet per year (includes minor to moderate landscaping) |
| Secondary Residence | 0.20 to 0.50 acre-feet per year |
| Farm Labor Dwelling | 0.06 to 0.10 acre-feet per person per year |

Additional Usage to Be Added

1. Add an additional 0.1 acre-feet of water for each additional 1000 square feet of drought tolerant lawn or 2000 square feet of non-xeriscape landscaping above the first 1000 square feet.
2. Add an additional 0.05 acre-feet of water for a pool with a pool cover.
3. Add an additional 0.1 acre-feet of water for a pool without a cover.

Residential water use can be estimated using the typical water uses above. All typical uses are dependant on the type of fixtures and appliances, the amount and type of landscaping, and the number of people living onsite. If a residence uses low-flow fixtures and has appliances installed, is using xeriscape landscaping, and is occupied by two people, the water use estimates will be on the low side of the ranges listed above.

Examples of Residential Water Usage:

Residential water use can vary dramatically from house to house depending on the number of occupants, the number and type of appliances and water fixtures, the amount and types of lawn and landscaping. Two homes sitting side by side on the same block can consume dramatically different quantities of water.

Example1:
Home #1 is 2500 square feet. Outside the house there is an extensive bluegrass lawn, a lot of water loving landscaping, a swimming pool with no pool cover. Inside the house all the appliances and fixtures, including toilets and shower-heads, are old and have not been upgraded or replaced by water saving types. The owners wash their cars weekly but they don't have nozzles or sprayers on the hose. They do not shut off the water while they are soaping up the vehicles, allowing the water to run across the ground instead. Water is commonly used as a broom to wash off the driveways, walkways, patio, and other areas. The estimated water usage for Home #1 is 1.2 acre-feet of water per year.

Example2:

Home #2 is also 2500 square feet. Outside of the house there is a small lawn of drought tolerant turf, extensive usage of xeriscape landscaping, and no swimming pool. Inside the house all of the appliances and fixtures, including toilets and showerheads, are of the low flow water saving types. The owners wash their cars weekly, but have nozzles or sprayers on the hose to shut off the water while they are soaping up the vehicles. Driveways, walkways, patios, and other areas are swept with brooms instead of washed down with water. Estimated water usage for Home #2 is 0.5 acre-feet of water per year.

The above are only examples of unique situations. The estimated water use for each project will vary depending on existing parcel conditions.

**Guidelines For Estimating Non-Residential Water Usage:**

| | |
|---|---|
| Agricultural: | |
| Vineyards | |
| Irrigation only | 0.2 to 0.5 acre-feet per acre per year |
| Heat Protection | 0.25 acre feet per acre per year |
| Frost Protection | 0.25 acre feet per acre per year |
| Farm Labor Dwelling | 0.06 to 0.10 acre-feet per person per year |
| Irrigated Pasture | 4.0 acre-feet per acre per year |
| Orchards | 4.0 acre-feet per acre per year |
| Livestock (sheep or cows) | 0.01 acre-feet per acre per year |
| Winery: | |
| Process Water | 2.15 acre-feet per 100,000 gal. of wine |
| Domestic and Landscaping | 0.50 acre-feet per 100,000 gal. of wine |
| Industrial: | |
| Food Processing | 31.0 acre-feet per employee per year |
| Printing/Publishing | 0.60 acre-feet per employee per year |
| Commercial: | |
| Office Space | 0.01 acre-feet per employee per year |
| Warehouse | 0.05 acre-feet per employee per year |

**Parcel Location Factors:**

The allotment of water for each parcel is based on the location of the parcel. There are three different location classifications. Valley Floor, Hillside and Groundwater Deficient Areas. Valley Floor areas include all locations that are within the Napa Valley and the Carneros Region except for areas specified as groundwater deficient areas. Groundwater Deficient areas are areas that have been determined by the Department of Public Works as having a history of problems with groundwater. The only Groundwater Deficient Basin in Napa County is the MST basin. All other areas are classified as Hillside Areas. Public Works can assist you in determining your classification.

Parcel Location Factors

| | |
|---|---|
| Valley Floor | 1.0 acre feet per acre per year |
| Hillside Areas | 0.5 acre feet per acre per year |
| MST Groundwater Deficient Area | 0.3 acre feet per acre per year* |

* Does not apply to the Ministerial Exemption as outlined in the Groundwater Conservation Ordinance

The threshold for the Valley Floor Area was determined in 1991 in the form of a Staff Report to the Board of Supervisors. The value of 1.0 AF/A/Year was established as the typical water demand of a vineyard. It was noted that the Valley Floor threshold would have relatively little effect on neighboring wells.

The threshold for the Mountain Area was established due to the uncertainty of the geology, and the increasingly fractured aquifer in the mountainous and non-Napa Valley areas including Carneros, Pope Valley, Wooden Valley, and Capell Valley.

The threshold for the Groundwater Deficient Areas was determined using data from the 1977 USGS report on the Hydrology of the Milliken Sarco Tulocay region. The value is calculated by dividing the "safe annual yield" (as determined by the USGS study of 1977) by the total acreage of the affected area (10,000 acres).

## <u>APPENDIX B:</u> Values Used to Establish Thresholds

Average Annual Rainfall (Source: Napa County Road & Streets Standards):

| | |
|---|---|
| American Canyon | 1.5 feet per year |
| City of Napa | 2.0 feet per year |
| Yountville | 2.5 feet per year |
| Oakville | 2.5 feet per year |
| Rutherford | 2.67 feet per year |
| St. Helena | 2.75 feet per year |
| Calistoga | 3.0 feet per year |
| Western Hills | increase by 20% |
| Eastern Hills | increase by 10% |

Threshold Factors of Acceptable Water Use:

| | |
|---|---|
| Valley Floor | 1.0 acre-foot per acre |
| Hillsides | 0.5 acre-foot per acre |
| MST Groundwater Deficient Areas | 0.3 acre-foot per acre* |

* Does not apply to the Ministerial Exemption as outlined in the Groundwater Conservation Ordinance

## <u>APPENDIX C</u>: Guidance for M-S-T Basin Permit Applications

Data collected from the monitoring of wells within the M-S-T Basin over the last forty years indicate that it may be in overdraft, leading to the conclusion that the existing water users within the basin are pumping more water from the ground than is being naturally replaced each winter season. The only way to end the overdraft trend is to cease all water extraction from the basin. However, as no other reasonable water resources exist in the M-S-T, the Department, to avoid a ban on all new construction, has assumed that each property owner should be able to develop their property to a "reasonable" level of water use while reducing the rate at which the groundwater levels are being lowered.

Within the near future, the U.S.G.S. will release a report on a recent study of the M-S-T Basin. From the U.S.G.S. report we will be able to determine to what extent the overdraft condition may exist and infer what problems may occur from the continued extraction of groundwater from the Basin. Results of the study will be used to plan for alternatives to address these problems. Until the report is available, and alternative measures can be implemented, the Department will use the following analysis to evaluate impacts from proposed projects in the M-S-T Basin:

**Single Family Dwellings on Small Parcels In the M-S-T Basin:** The average, single family dwelling will likely use between 0.5 and 0.75 acre-feet of groundwater per year. Using a threshold of 0.3 acre-ft/year/acre, the minimum parcel size able to support the above range is between 1.5 to 2.5 acres. Therefore, if an existing residence that uses 0.5 acre-feet per year of groundwater is located on a one-acre parcel, it already exceeds the acceptable level of water use for the property. Applications for the construction of a single family home in these instances can be approved ministerially if the owner agrees to the conditions outlined in the Groundwater Ordinance. If the conditions are not agreed upon, or if the project involves a secondary dwelling or other groundwater uses not consistent with a single family dwelling, then the project would be subject to the complete groundwater permit process including but not limited to the submittal of a Phase 1 analysis detailing all water use, existing and proposed, on the project parcel.

**Agricultural Development In the M-S-T Basin:** Agriculture in the M-S-T Basin is not exempt from the groundwater permit process. In these cases, such development will require an application for a groundwater permit including a phase one analysis detailing the existing and proposed water use(s) on the project parcel(s). It is likely that all agricultural development in the M-S-T will be required to meter all wells supplying water to the property with periodic reports to the Department.

**Existing Vineyard, New Primary or Secondary Residence In the M-S-T Basin:** On an application related to a new residence on a parcel with an existing vineyard or residence, the Phase 1 WAA shall include all water use on the property, both existing and proposed. Projects on parcels with an established vineyard will likely be required to meter all wells supplying water to the property with periodic reports to the Department.

**Wineries and Other Use Permits In the M-S-T Basin:** On an application for a use permit, the applicant is required to provide a phase one analysis. Should the application be approved, a specific condition of approval will be required to meter all wells supplying groundwater to the property with periodic reports to the Department. It is also possible that water conservation measures will be a condition of approval. All new use permits must meet the threshold water use for the project parcel.

## APPENDIX D: Water Meters

If required, water meters shall measure all groundwater used on the parcel. Additional meters may also be required for monitoring the water use of individual facilities or operations, such as a winery, residence, or vineyard located on the same parcel. If a meter(s) is installed, the applicant shall read the meter(s) and provide the readings to the County Engineer at a frequency determined by the County Engineer. The applicant shall also convey to the County Engineer, or his designated representative, the right to access and verify the operation and reading of the meter(s) at any time.

If the meters indicate that the water consumption of a parcel in the M-S-T basin exceeds the fair share amount, the applicant will be required to submit a plan which will be approved by the Director of Public Works to reduce water usage. The applicant may be required to find additional sources of water to reduce their groundwater usage. Additional sources may include using water provided by the City of Napa, the installation of water tanks which are filled by water trucks, or other means which will ensure that the groundwater usage will not exceed the fair share amounts.

The readings from water meters may also be used to assist the County in determining trends in groundwater usage, adjusting baseline water use estimates, and estimating overall groundwater usage in the M-S-T basin.

## Appendix E: Determining water use numbers with multiple parcels

The water availability analysis is based on the premise that each landowner has equal right to the groundwater resource below his or her property. There will be cases where one person or entity owns multiple parcels and requests that the total water allotment below all of his or her parcels be considered in the Phase I water availability analysis. Determining the total threshold based on multiple parcels is acceptable, however to protect future property owners, certain safeguards must be in place to ensure that the water allotment and transfer between parcels is clearly documented and recorded, especially in cases where the water from more than one parcel will ultimately serve a use on a single parcel.

When multiple parcels are involved, the parcels for which the total threshold is being based on must be clearly identified on a site plan with assessors parcel numbers noted. The transfer of water from these parcels to the parcel on which the requested use is located must be documented using the form provided by the department of public works. The form must be approved by the County and subsequently recorded by the applicant prior to commencement of any activity authorized by the groundwater permit or other county permit or approval. A condition requiring such will be placed on the use permit, groundwater permit or other permit for approval.

Alternatively, if the method above is not feasible, the applicant may provide a Phase One Analysis for each project parcel, with the understanding that the water use on each individual parcel must not exceed the fair share for that parcel (and or the existing use if the parcel is in the MST groundwater deficient basin).

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## 20. Watershed Information Center and Conservancy of Napa County. 2015. *2015 Strategic Plan*. January 2015

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Watershed Information Center & Conservancy

WICC NAPA COUNTY

# 2015 Strategic Plan

## January 2015

**Prepared for**

**The Napa County Watershed Information Center and Conservancy (WICC) Board**

***Accepted by the Napa County Board of Supervisors***

***March 3, 2015***

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## ACKNOWLEDGEMENTS


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# INTRODUCTION

## STRATEGIC PLAN DEVELOPMENT

This document contains the Watershed Information Center and Conservancy (WICC) of Napa County Strategic Plan for 2015. The Strategic Planning process included the following:

- an online survey of WICC Board members, staff and the WICC email list;
- a review of the prior strategic plan and status of actions;
- a review of the use of the WICC website;
- identification of WICC accomplishments;
- a review of the WICC budget over the past ten years;
- a half-day strategic planning retreat with the WICC Board; and
- two WICC Board meetings to address WICC purpose, mission and goals.

## HISTORY AND ACCOMPLISHMENTS

The Watershed Information Center and Conservancy (WICC) Board was established in 2002 to serve as an advisory committee to Napa County Board of Supervisors – assisting with the Board's decision-making and serving as a conduit for citizen input by gathering, analyzing and recommending options related to the management of watershed resources. The WICC has achieved significant accomplishments in its 12-year history – both alone and in partnership with nonprofits, public agencies and private landowners. Accomplishments include:

- Supported development of the Napa County Baseline Data Report (BDR) (2003-06)
- Provided comments on numerous State and Regional Water Board policies and regulations(2003-09)
- Support updating of Countywide environmental GIS Databases (2003-present)
- Development and management of the WICC Website (2003-present)
- Created Watershed Monitoring Strategy and Brochure (2005-06)
- Developed general WICC brochure and public outreach materials (2005-2013)
- Provided comments on the Conservation Element of the 2008 Napa County General Plan Update (2006-07)
- Hosted bi-annual Napa County Watershed Symposiums (2008, 2009, 2011, 2013, 2015 (planned))
- Participation in Integrated Regional Water Management (IRWM) planning, project coordination and grants (2008-present)
- Supported Voluntary Oak Woodland Management Plan Development (2009-10)
- Support of the Napa River Rutherford Reach Restoration Project (2009 to 2013)
- Developed a Watershed Assessment Framework (2010)
- Provided input on Draft Napa County Climate Action Plan (2011)
- Participation on the Groundwater Resources Advisory Committee (GRAC) (2011-14)
- Supported the Napa Valley Historical Ecology Atlas (2012)
- Supported the Napa River Watershed Profile (2012)
- Held annual joint GRAC/WICC meetings (2012-2013)

- Development of a Napa River Sediment TMDL Implementation Tracking and Accounting System (2012-present)
- Support for adoption of Countywide Groundwater Monitoring Plan (2013)
- Developed Ad Hoc Committee recommendations for Countywide Watershed Monitoring Program (2013)
- Support for the Oakville to Oak Knoll Reach Restoration Project (2013-present)
- Leveraging of local, State and Federal funding (ongoing)
- Building and maintaining partnerships (ongoing)

The WICC has prepared two previous Strategic Plans, one in 2004 and a revision in 2007-08. Since the most recent Strategic Planning effort, changes in Napa County have had significant impacts on the WICC and its activities, leading to this current review and refinement of its mission and purpose. These changes include:

- Completion of the County General Plan (2008) (General Plan items were incorporated into the 2007-08 WICC Strategic Plan)
- Formation of Napa County Regional Parks and Open Space District (2006)
- Recession and subsequent budget cuts to WICC–approximately half of prior budget has been regained
- County reorganization – new Natural Resources Conservation Group created under Public Works, formerly a part of the Planning Department and Department of Environmental Management
- Downsizing and staff cuts in the Planning Department – reduced staff resources available to the WICC
- Completion of Groundwater Monitoring Plan and Groundwater Sustainability Objectives (2013-14)
- State approval of Groundwater Sustainability Legislation (2014)

The WICC has a board of 17 members representing the following:

- Cities of St. Helena, Calistoga, Napa and American Canyon and the Town of Yountville (5)
- Napa County Board of Supervisors (2)
- Napa County Planning Commission (1)
- Land Trust of Napa County (1)
- Napa County Resource Conservation District (1)
- Natural Resources Conservation Service (1)
- At-large representing environment, agriculture, business and community interests (6)

The County of Napa funds the WICC by providing staffing and financial resources through the Napa County Public Works Department – Water Resources Division. Currently, .35FTE is assigned to the WICC. The remaining WICC funding is allocated to the website; data and GIS; and services, meetings, activities and events. The County also provides funds to the Napa County Resource Conservation District (RCD), through a Joint Powers Agreement (JPA), to support the WICC and conduct watershed monitoring and provide education and outreach activities.

## WICC ROLES: INFORM, ENGAGE, PARTNER

- The WICC **improves the health of Napa County's watersheds** by supporting projects, partnerships and community education that maintain and improve water quality, native plant and wildlife habitat, and ecological and natural processes.
- The WICC **collects, distills and disseminates the best possible information, tools and education,** to help the community discover and understand their watersheds, and make well-informed decisions.
- The WICC **supports collaboration and partnership** among all organizations and individuals working to improve and maintain the health of Napa County's watersheds.
- The WICC **seeks and facilitates funding** for watershed projects in Napa County from foundations, individuals, organizations, and public agencies.
- The WICC is **politically neutral, unbiased** and non-regulatory.
- WICC Board members are responsible for:

    - being well-informed about issues pertaining to local water and watersheds
    - sharing information with their respective jurisdictions, organizations, communities and peers to further watershed awareness and informed decision-making.

## WICC MISSION

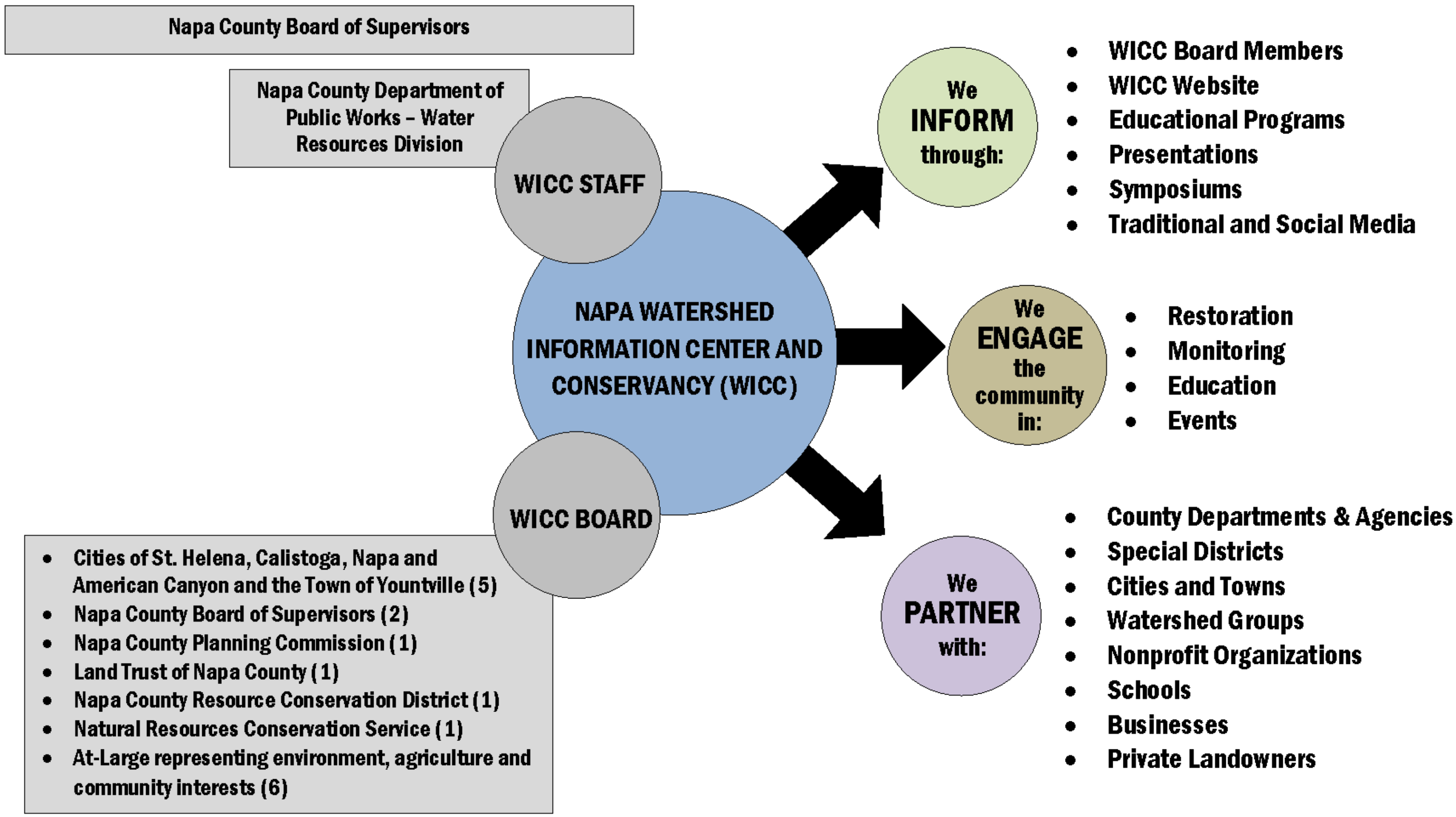
- Improving the health of Napa County's watersheds by informing, engaging and fostering partnerships within the community.

The diagram on the following page illustrates the WICC's mission and roles, its composition and how the WICC fulfills its roles of informing, engaging and fostering partnerships.

## WICC GOALS

- **Goal 1**: Coordinate and facilitate watershed planning, research, and monitoring efforts among Napa County organizations, agencies, landowners and citizens.
- **Goal 2**: Strengthen and expand community understanding, connections and involvement to improve the health of Napa County's watersheds.
- **Goal 3**: Support informed decision-making on topics that affect the health of Napa County's watersheds.
- **Goal 4**: Improve WICC Board efficiency and effectiveness.
- **Goal 5**: Explore additional funding opportunities to support the goals of the WICC.

## Improving the health of Napa County's watersheds by informing, engaging and fostering partnerships within the community.



## WICC STRATEGIC PLAN

Five goals and 23 subgoals have been established to guide the WICC's actions over the next three to five years.

**Subgoals:** These support the main goals and are identified as either existing or proposed activities.

**Priorities:** The WICC Board prioritized the existing and proposed subgoals. Existing subgoals were prioritized based upon whether the activity should continue at its existing level, or be expanded based upon available funding. (The WICC Board did not recommend that any of the current activities should be reduced). Proposed subgoals were also prioritized by the Board as either a Priority 1, 2 or 3. Priorities should be re-evaluated as part of preparing an annual workplan and with an understanding of the resources available to maintain current actions and undertake additional actions. Should the WICC receive funding that is not allocated to a project or program, the WICC Board will review Strategic Plan priorities and allocate the funds to those action(s) that are most beneficial at the time.

Existing ■ Expand (as funds allow)

Existing ■ Maintain

Proposed ■ Priority 1

Proposed ■ Priority 2

Proposed ■ Priority 3

**Actions:** Each subgoal has a series of suggested actions designed to guide implementation of the subgoal. Pertinent actions should be incorporated into the WICC's annual workplan as resources allow. The actions of a single subgoal could be implemented over multiple years.

**Costs**: Order of magnitude resources/costs have been assigned to each subgoal.

$$/Resources

$$$/Resources

- **$/Resources** - Can be completed with current WICC staff and partners
- **$$/Resources** - Requires additional funding for staff and/or partners
- **$$$/Resources** - Requires additional funding for staff, partners and outside consultants/contractors

**Measure of Success:** A proposed measure of success has been identified for each subgoal.

The table on the following page summarizes the Napa Watershed Information Center and Conservancy (WICC) Strategic Plan. It identifies the goals and subgoals and whether they are existing (E) or proposed (P). Existing (E) activities will be either maintained (M) or expanded (+) as funding permits. Proposed activities are prioritized from 1 to 3 with 1 being the highest priority. Costs range from $/Resources for activities that can be completed with current WICC staff and partners and $$/Resources for those activities that require additional funding for staff and/or partners to $$$/Resources for those activities that require additional funding for staff, partners, and outside consultants/contractors. Specific activities to implement each subgoal are included in the body of the Strategic Plan.

| NAPA WATERSHED INFORMATION CENTER AND CONSERVANCY (WICC)<br>STRATEGIC PLAN GOALS AND SUBGOALS 2015 | | | | |
|---|---|---|---|---|
| This table summarizes the Napa Watershed Information Center and Conservancy (WICC) Strategic Plan. It identifies the goals and subgoals and whether they are existing (E) or proposed (P). Existing (E) activities will be either maintained (M) or expanded (+) as funding permits. Proposed activities are prioritized from 1 to 3 with 1 being the highest priority. Costs range from $/Resources for activities that can be completed with current WICC staff and partners and $$/Resources for those activities that require additional funding for staff and/or partners to $$$/Resources for those activities that require additional funding for staff, partners, and outside consultants/contractors. Specific activities to implement each subgoal are included in the body of the Strategic Plan. | | **Existing/Proposed** | **Priority/ Expand/ Maintain** | **Cost** |
| **Goal 1: Coordinate and facilitate watershed planning, research, and monitoring efforts among Napa County organizations, agencies, landowners and citizens.** | Subgoal 1A: Support the development of watershed management and monitoring plans for Napa County's watersheds and secure the resources necessary to implement and maintain the monitoring program over the long-term. | **P** | **1** | **$$$** |
| | Subgoal 1B: Serve as the local clearinghouse for groundwater resource data, mapping and monitoring. | **P** | **1** | **$** |
| | Subgoal 1C: Support ongoing fisheries and fish habitat monitoring of the Napa River and its tributaries. | **E** | **+** | **$$** |
| | Subgoal 1D: Share opportunities for collaboration on and funding for watershed projects and programs that benefit multiple agencies, organizations and the community. | **E** | **+** | **$** |
| | Subgoal 1E: Define the WICC's role in informing the community about climate change and its effects on Napa County's watershed resources. | **P** | **1** | **$** |
| **Goal 2: Strengthen and expand community understanding, connections and involvement to improve the health of Napa County's watersheds.** | Subgoal 2A: Maintain and enhance the WICC's website to educate community members with varying levels of interest and knowledge about Napa County's watersheds. | **E** | **M** | **$$** |
| | Subgoal 2B: Expand the number of users and depth of use of the WICC website. | **E** | **M** | **$$** |
| | Subgoal 2C: Expand the watershed signage program to identify and interpret the county's watersheds. | **P** | **2** | **$$** |
| | Subgoal 2D: Expand the promotion of the WICC to targeted groups to increase watershed understanding and stewardship. | **P** | **2** | **$$** |
| | Subgoal 2E: Annually identify the WICC's education and outreach priorities for the coming year. | **E** | **+** | **$** |
| | Subgoal 2F: Expand the role of the WICC and the WICC website in local community education and student instruction. | **P** | **2** | **$$$** |
| **Goal 3: Support informed decision-making on topics that affect the health of Napa County's watersheds.** | Subgoal 3A: Assure that WICC Board Members are knowledgeable and well-informed spokespersons, able to effectively convey information about the WICC, its mission and watershed health to the community. | **E** | **+** | **$** |
| | Subgoal 3B: Provide regular updates to agencies on the WICC's current activities. | **P** | **1** | **$$** |
| | Subgoal 3C: Provide comments and recommendations to the County Board of Supervisors, as directed, on watershed related studies, reports, and legislation. | **E** | **M** | **$** |
| **Goal 4: Improve WICC Board efficiency and effectiveness.** | Subgoal 4A: Assure that WICC Board meetings allow Board Members to remain engaged and up-to-date on watershed issues affecting Napa County. | **E** | **+** | **$$** |
| | Subgoal 4B: Assure that new WICC Board members understand their roles and responsibilities. | **P** | **2** | **$** |
| | Subgoal 4C: Change the name of the WICC to the Watershed Information and Conservation Council (also WICC) to reflect the outcomes of the Strategic Plan and the WICC's mission, goals, and roles. | **P** | **3** | **$** |
| | Subgoal 4D: Amend the WICC Bylaws and other guiding documents to incorporate the findings of the Strategic Plan. | **E** | **M** | **$** |
| | Subgoal 4E: Review the WICC's accomplishments annually and determine priority activities for the coming year. | **P** | **2** | **$** |
| **Goal 5: Explore additional funding opportunities to support the goals of the WICC.** | Subgoal 5A: Strengthen relationships with existing and potential funding partners. | **E** | **+** | **$$** |
| | Subgoal 5B: Seek sponsorship for the proposed projects identified in the WICC Strategic Plan. | **P** | **2** | **$$** |
| | Subgoal 5C: Evaluate possible ways that the WICC could accept private and non-profit donations for projects and programs. | **P** | **3** | **$$$** |
| | Subgoal 5D: Facilitate a discussion of potential new local conservation funding sources in Napa County. | **P** | **3** | **$$** |

## GOAL 1: COORDINATE AND FACILITATE WATERSHED PLANNING, RESEARCH, AND MONITORING EFFORTS AMONG NAPA COUNTY ORGANIZATIONS, AGENCIES, LANDOWNERS AND CITIZENS.

**Subgoal 1A: Support the development of watershed management and monitoring plans for Napa County's three major watersheds – Napa River, Putah Creek and Suisun Creek.**

(Implements: Napa County General Plan Action Item CON WR-1)

**$$$/Resources**

**Measure of Success: Completed watershed management and monitoring plans for the three Napa County watersheds.**

- Develop plans utilizing adopted Integrated Regional Water Management Plans (IRWMP) that address portions of Napa County (the Bay Area IRWMP for Napa River and Suisun Creek and the Westside Sacramento IRWMP for Putah Creek). Information and data from these documents pertaining to Napa County would be organized by watershed, enhanced with local data so that locally specific management recommendations could be developed. Depending on available funding and commitment of various County departments and agencies, the WICC could provide some or all of the following:
  - Lead the planning effort if funds are available.
  - Provide a forum for public input and review of the management plans.
  - Provide WICC Board input on management plan development and content.
  - Provide accessibility to the planning documents via the WICC Website.
  - Develop monitoring programs for each major watershed to support the watershed management plans. (Implements: Napa County General Plan Action Item CON WR-4)
  - Review and refine management goals and monitoring objectives
  - Develop assessment questions derived from watershed goals and objectives.
  - Design monitoring program elements.
  - Identify and monitor watershed health indicators.
  - Develop data quality objectives and assurances.
  - Establish an information and data management system that can be used to accept and share watershed data with the community.
  - Analyze, assess and report data findings.
  - Evaluate the effectiveness and adaptively manage the monitoring program.
  - Secure the resources necessary to implement and maintain the monitoring program over the long-term.

**Subgoal 1B: Serve as the local clearinghouse for groundwater resource data, mapping and monitoring.**

(Implements: Napa County General Plan Action Item CON WR-4)

**Proposed ■ Priority 1**

**$/Resources**

**Measure of Success: Groundwater data is regularly updated on the WICC website.**

- Establish a portion of the WICC Website dedicated to groundwater. Data and information should be at a watershed scale and not be project or parcel specific. Information is likely to include:
  - Updates on groundwater resource issues locally and throughout California
  - Articles explaining key technical issues related to groundwater
  - Updates on groundwater mapping and monitoring in Napa County.
  - Provide educational materials and resources on groundwater recharge areas and ways to improve these areas.
  - Report on the Napa County Voluntary Groundwater Level Monitoring Program.

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**Subgoal 1C: Support ongoing fisheries and fish habitat monitoring of the Napa River and its tributaries.**

(Implements: Napa County General Plan Action Item CON NR-2)

**$$/Resources**

**Measure of Success: Fisheries monitoring is ongoing and results are regularly updated on the WICC website.**

- Support partnerships that further fisheries and fish habitat monitoring in Napa County.
- Provide monitoring and reporting results on the WICC Website.
- Identify potential funding sources for ongoing fisheries monitoring and habitat maintenance and improvement.
- Promote fisheries education in the community through presentations, events, tours, and curriculum.

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**Subgoal 1D: Share opportunities for collaboration on and funding for watershed projects and programs that benefit multiple agencies, organizations and the community.**

**Existing ■ Expand (as funds allow)**

**$/Resources**

**Measure of Success: One or more collaborative projects completed annually.**

- Share and promote project and funding opportunities among the watershed community as WICC Board Members, staff and key partners become aware of them.
- Add a component to the website that lists project and funding opportunities.

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**Subgoal 1E: Define the WICC's role in informing the community about climate change and its effects on Napa County's watershed resources.**

**Proposed ■ Priority 1**

**$/Resources**

**Measure of Success: Climate change information and methods to reduce carbon footprint included on WICC website.**

- Expand the climate change section of the WICC Website
- Inform the community about climate change challenges and climate action planning activities.
- Provide Napa County and local agencies climate data and other resources, as available.
- Provide information for individuals and businesses on ways to reduce their carbon footprint.
- Promote the need to complete the County's Climate Action Plan.

## GOAL 2: STRENGTHEN AND EXPAND COMMUNITY UNDERSTANDING, CONNECTIONS AND INVOLVEMENT TO IMPROVE THE HEALTH OF NAPA COUNTY'S WATERSHEDS.

**Subgoal 2A: Maintain and enhance the WICC's website to educate community members with varying levels of interest and knowledge about Napa County's watersheds**.

**$$/Resources**

**Measure of Success: Regular website updates.**

- Identify and distill the best possible information about the county's watersheds to share with the community.
- Provide regular updates on key watershed issues and topics:
  - Drought and water conservation strategies.
  - Watershed monitoring updates
  - Fisheries monitoring
  - Climate change and its impact on water, restoration efforts and watershed-related issues
  - Watershed and environmental resource data and maps
- Provide and regularly update links to organizations and agencies with watershed interests and responsibilities. Links should include:
  - Cities, town and relevant agencies
  - Other websites related to specific watershed topics (e.g. monitoring, fisheries, water conservation, etc.)
  - Funding and mitigation opportunities
  - Watershed organizations in the region
- Provide a regularly-updated events calendar of upcoming watershed events and activities hosted by the WICC, the County, the cities and other organizations in which the community can be involved – workshops, symposia, conferences and clean-up days.
- Provide news articles and links to articles related to watersheds and watershed health
- Provide a weekly email digest of key watershed news articles, information and events.

**Subgoal 2B: Expand the number of users and depth of use of the WICC website.**

- Establish website usage goals that reflect and inform WICC strategic goals, (number users, age, content use, and time spent on the site) and track website traffic and behavior using Google Analytics.
- Adjust website content and design annually to address usage goals.
- Evaluate websites of partner organizations and determine if there are links to the WICC from these websites. If not, contact each organization and request that a link be added.

**$$/Resources**

**Measure of Success: Regular increases in number of users and duration of use on website.**

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**Subgoal 2C: Expand the watershed signage program to identify and interpret the county's watersheds.**

- Maintain and expand creek identification and watershed boundary signs
- Work in cooperation with local jurisdictions, agencies and project partners to develop and install additional watershed interpretive signs.

**Proposed ■ Priority 2**

**$$/Resources**

**Measure of Success: Increase in the number of signs identifying creeks and providing interpretive information within all three watersheds in the County.**

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**Subgoal 2D: Expand the promotion of the WICC to targeted groups to increase watershed understanding and stewardship.**

- Identify and prioritize key audiences that would benefit from the information provided by the WICC. Potential audiences include:
  - Agricultural industry groups
  - Business/Construction - annual seminar, technical sessions
  - Water consumers - include information in monthly bills
  - Wineries and Grape Growers
  - Educators/Teachers
  - Neighborhood Groups
  - Social and traditional media providers
  - Others
- Identify key messages about the WICC and what it offers to the community. These could include the educational information available, the mapping tools, opportunities to volunteer and get involved, technical information on watershed management, seminars, events, etc.
- Pair key messages with potential audiences.

**Proposed ■ Priority 2**

**$$/Resources**

**Measure of Success: Outreach to four groups annually through presentations by WICC Board members and staff.**

- Prioritize key audiences and meet with representatives to determine how the WICC could better serve them.
- Identify who should deliver the WICC message (staff, WICC Board Members, partners, paid liaison/circuit-rider)
- Evaluate the use of both traditional and social media as a tool for expanding watershed understanding and awareness of the WICC.

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**Subgoal 2E: Annually identify the WICC's education and outreach priorities for the coming year.**

**$/Resources**

**Measure of Success: Education and outreach priorities included in Annual Workplan.**

- Evaluate activities of the prior year including website content and use; environmental education activities; special events attendance; watershed awareness month participation; the watershed calendar; and community events.
- Determine those to continue, expand or discontinue based upon the prior year's evaluation.
- Determine the key topics, speakers, date, location and key sponsors for the bi-annual Watershed Symposium.

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**Subgoal 2F: Expand the role of the WICC and the WICC website in local community education and student instruction.**

**Proposed ■ Priority 2**

**$$$/Resources**

**Measure of Success: Use of the WICC Website in one or more schools to support science curriculum**

- Identify and prioritize elementary, middle and high school science departments in the County.
- Contact each to determine their interest in augmenting their curriculum with use of the WICC Website.
- Identify pilot project(s) and work with the pilot school(s) to determine how the WICC and the WICC Website could better serve their science and environmental education needs. Possible opportunities include adding projects to the website that could be done as school assignments or conducting watershed education programs tied to the information on the website.
- Based upon feedback received, develop, test and implement education materials and curriculum to be used through the WICC Website.
- Evaluate the success of the pilot project(s); adjust scope and curriculum as needed.
- Expand the program to other schools in the County.

## GOAL 3: SUPPORT INFORMED DECISION-MAKING ON TOPICS THAT AFFECT THE HEALTH OF NAPA COUNTY'S WATERSHEDS.

**Subgoal 3A: Assure that WICC Board Members are knowledgeable and well-informed spokespersons, able to effectively convey information about the WICC, its mission and watershed health to the community**.

**Existing ■ Expand (as funds allow)**

**$/Resources**

**Measure of Success: WICC Board members regularly share watershed information with their colleagues and peers.**

- Identify timely and relevant presentation topics and needs
- Prepare presentations and materials for use by the WICC Board, for distribution, and posting on the WICC Website.
- When possible, for presentations made to the WICC Board, provide a short summary handout of the key points of the presentation that each Board member can take back to their jurisdiction/organization and that can also be posted on the WICC Website.

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**Subgoal 3B: Provide regular updates to agencies on the WICC's current activities.**

**$$/Resources**

**Measure of Success: Presentations provided by WICC Board members and staff annually to the Board of Supervisors, Planning Commission, and each city and town.**

- Develop a worksheet of talking points/quick facts about the WICC that can be used as a guide to talking about the WICC both formally and informally.
- Develop a presentation that can be used and adapted by WICC Board members and WICC staff that includes information about the roles and activities of the WICC, information contained on the WICC Website and how it can assist decision-making. The presentation should also include up-to-date information pertaining to water-related issues such as the drought, fisheries, groundwater, etc.
- WICC staff and the WICC Board representative from each city should provide an annual presentation to each City/Town Council.
- WICC staff and the WICC Board representatives from the Board of Supervisors should provide an annual presentation to the County Board of Supervisors.
- WICC staff and the WICC Board representative from the County Planning Commission should provide an annual presentation to the County Planning Commission.
- WICC staff and the WICC Board representatives from the County Board of Supervisors should provide an annual presentation to the Napa County Flood Control and Water Conservation District Board.
- WICC staff and WICC Board representatives should provide annual presentations to other community agencies and organizations/groups.

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**Subgoal 3C: Provide comments and recommendations to the County Board of Supervisors, as directed, on watershed related studies, reports, and legislation.**

- If timing is critical, identify whether input can be developed and provided by WICC staff with approval by the WICC Board, the Chair, or if an Ad-Hoc subcommittee should convene to compile information and develop recommendations.

**$/Resources**

**Measure of Success: Comments are provided in a timely manner when requested by the Board of Supervisors.**

## GOAL 4: IMPROVE WICC BOARD EFFICIENCY AND EFFECTIVENESS.

**Subgoal 4A: Assure that WICC Board meetings allow Board Members to remain engaged and up-to-date on watershed issues affecting Napa County.**

**Existing ■ Expand (as funds allow)**

**$$/Resources**

- Return to monthly WICC Board meetings when resources are available to assure that information discussed is timely and relevant.
- When possible, hold meetings in various locations to allow WICC Board members to view projects and activities being implemented in different portions of the county.
- At each meeting, identify topics to discuss at the next meeting.
- At each meeting, provide an opportunity for discussion among WICC Board members.
- At each meeting, encourage City and County representatives to provide an update on watershed issues being addressed by their community/agency.
- Identify timely and relevant presentation topics in order to keep the WICC board up-to-date on activities affecting Napa County's watersheds. Recurring presentations should include:
  - Informational presentations on each watershed focusing on current plans and projects and the cumulative impacts of these projects on water-related issues.
  - One to two informational presentations by the County Planning Department on current plans and projects.

**Measure of Success: Board meetings are held more frequently throughout the County in various locations.**

**Measure of Success: WICC Board members regularly share watershed information with their colleagues and peers.**

**Subgoal 4B: Assure that new WICC Board members understand their roles and responsibilities.**

- Provide an orientation to new WICC Board members so that they understand the WICC's mission and goals, roles and responsibilities, and key partners.

**Proposed ■ Priority 2**

**$/Resources**

**Measure of Success: All new WICC Board members are oriented within one month of joining the Board.**

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**Subgoal 4C: Change the name of the WICC to the Watershed Information and Conservation Council (also WICC) to reflect the outcomes of the Strategic Plan and the WICC's mission, goals, and roles.**

- During preparation of this Strategic Plan, the WICC Board agreed to change the name of the Watershed Information Center and Conservancy (WICC) to the Watershed Information and Conservation Council (WICC) to clearly convey the WICC's key roles and mission. The Board evaluated many names and determined this one best reflects what the WICC does and also maintains the acronym WICC which is well-known in the County.
- Request the name change be approved by the Napa County Board of Supervisors.
- Once approved, announce and implement the name change.
  - Change the name on all WICC materials that do not involve printing,
  - Prepare a press release and an article for the website announcing the name change.
  - Publicize the new name to the WICC partners including the cities and County agencies.
  - Do not reprint letterhead or materials until a new supply is needed in order to use funds efficiently.

**Proposed ■ Priority 3**

**$/Resources**

**Measure of Success: WICC name reflects its mission and roles and is replicated in all documents and materials.**

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**Subgoal 4D: Amend the WICC Bylaws and other guiding documents to incorporate the findings of the Strategic Plan.**

- Amendments should include:
  - Revise the WICC Statement of Roles and Responsibilities to reflect the decisions and priorities reflected in the Strategic Plan.
  - Each City and County representative should have an alternate to attend meetings in the absence of the primary representative.
  - The new name of the WICC as set forth in Subgoal 4C above.

**$/Resources**

**Measure of Success: WICC bylaws are updated.**

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**Subgoal 4E: Review the WICC's accomplishments annually and determine priority activities for the coming year.**

- Identify and publish on the WICC Website, a summary of the WICC's collective accomplishments during the prior year.
- Develop an annual workplan based upon Strategic Plan priorities and available funding.
- Should funding become available outside of the annual budget cycle, allocate funds to priority workplan items.
- Develop subcommittees of the WICC Board, as needed, to assist with implementation of priority actions.

**Proposed ■ Priority 2**

**$/Resources**

**Measure of Success: Annual workplan is completed and assigns funding and responsibilities for all activities to be undertaken.**

## GOAL 5: EXPLORE ADDITIONAL FUNDING OPPORTUNITIES TO SUPPORT THE

**Subgoal 5A: Strengthen relationships with existing and potential funding partners.**

- Provide updates to existing funding partners on accomplishments and benefits of the WICC and upcoming priorities.
- Identify and inform potential funding partners of the accomplishments and benefits of the WICC and the upcoming priorities.
- Define potential municipal agencies that benefit from the WICC's services including cities, towns, County special districts – transportation, sanitation, parks and open space, and others.
- Identify and quantify the value the WICC adds to each agency.
- Identify additional services the WICC could provide to each agency.
- Seek an annual contribution from each agency to support the ongoing activities of the WICC.

**Existing ■ Expand (as funds allow)**

**$$/Resources**

**Measure of Success: Identify and pursue one or more additional funding partner annually.**

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**Subgoal 5B: Seek sponsorship for the proposed projects identified in the WICC Strategic Plan.**

- Identify potential sponsors and list of projects that could be funded. Potential projects could include:
    - Develop watershed monitoring program (Subgoal 1A)
    - Establish County clearinghouse for groundwater (Subgoal 1B)
    - Develop watershed management plans (Subgoal 1A)
    - Inform the community about climate change (Subgoal 1E)
    - Expand watershed signage program (Subgoal 2C)
    - Promote the WICC to targeted groups (Subgoal 2D)
    - Expand education and instruction (Subgoal 2F)
    - Provide regular updates to agencies (Subgoal 3B)

**Proposed ■ Priority 2**

**$$/Resources**

**Measure of Success: One or more projects indicated in the Strategic Plan are supported through outside funders.**

- Conduct Board member training (Subgoal 4B)
- Revisit and assess the WICC name (Subgoal 4C)
- Develop annual workplan (Subgoal 4E)
- Miscellaneous services including website sponsors, events, printing, signage, and media (video, print, audio)

- Seek sponsorship of proposed projects

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**Subgoal 5C: Evaluate possible ways that the WICC could accept private and non-profit donations for projects and programs.**

- Investigate the potential for a local nonprofit to accept funds on behalf of the WICC. Possible organizations include the Napa County Community Foundation and other nonprofit organizations.
- If accepting funds is feasible, develop a fundraising strategy, to seek donations from the community for the projects and programs identified in Subgoal 5B.

**$$$/Resources**

**Measure of Success: Fundraising strategy is developed.**

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**Subgoal 5D: Facilitate a discussion of potential new local conservation funding sources in Napa County**

- Seek input from other members of the conservation committee about what types of projects and programs could be funded by countywide conservation funding.
- Identify the dollar amount needed to support conservation countywide.
- Identify potential methods of local funding (sales tax, property tax, special district, etc.)

**Proposed ■ Priority 3**

**$$/Resources**

**Measure of Success: Consensus reached among conservation parties about seeking local funding.**