



TECHNICAL MEMORANDUM NO. 7

DATE: October 19, 2005 Project No.: 423-02-03-01

TO: Don Ridenhour, Project Manager

CC: WATRTAC Members

FROM: Gerry Nakano, Project Manager
Jim Connell, Project Engineer
Elizabeth Drayer, Project Engineer

SUBJECT: 2050 Napa Valley Water Resources Study Project
Potential Local and Regional Water Supply Projects

PURPOSE

The purpose of this Technical Memorandum No. 7 (TM 7) is to describe several local and regional water supply projects which have the potential to resolve the valley-wide municipal and industrial (M&I) water supply deficit described in TM 6, Comparison of Demand Projections and Supply Capabilities¹. This TM 7 describes the benefits, issues, and costs associated with these potential urban water supply and/or water reliability projects. This TM 7 also includes a discussion on the water supply projects previously recommended in the 1991 and 1992 studies.

SUMMARY OF FINDINGS

TM 6 provided a valley-wide comparison of incorporated (M&I) and unincorporated (rural residential, wineries, improved open areas, and agriculture) present and projected demands and available water supplies. The comparison of M&I supplies and demands suggests, based on the assumptions used in this 2050 Study, a supply deficit during single-dry years for the 2020 and 2050 study periods and for multiple-dry years for the 2050 Study period. Excess supplies are currently available during all hydrologic conditions, and projected to be available in 2020 during normal and multiple-dry years, and in normal years in 2050. For Main Basin unincorporated area water users (the Main Basin doesn't include groundwater users in the MST or Carneros areas), while unincorporated demands will be dependent upon climate, marketability of wine, and water supply availability, there could be a projected deficit in water supplies for all periods studied, except for present normal years. A summary of key findings of the 2050 Study follows:

¹ Technical Memorandum No. 6, 2050 Napa Valley Water Resources Study Project, Comparison of Demand Projections and Supply Capabilities, prepared by West Yost & Associates, October 19, 2005.

- M&I areas are or will be facing water supply shortages and/or cutbacks in the future under various climatic conditions.
- M&I is aggressively looking at ways to mitigate/deal with these projected supply shortfall periods. These agencies have organized and are evaluating opportunities, both as individual agencies and collectively, to address their existing and future water supply issues.
- Unincorporated areas could be facing water supply shortages and/or cutbacks now under all hydrologic conditions except during a normal supply year, and will continue to face future water supply shortages under all climatic conditions if irrigated agricultural demands continue to increase.
- Water demands are increasing in the unincorporated areas. Additional solutions beyond the initial evaluation of potentially providing recycled water to portions of the Milliken-Sarco-Tuluca (MST) area should be developed and explored.
- The groundwater supply in the Main Basin is an extremely valuable resource for all Napa Valley residents and should be maintained. Historic, although somewhat limited, water level data indicates that current usage is within the “perennial yield” of the Main Basin. However, to ensure that water levels are maintained, additional data (groundwater monitoring) is required to better assess the impacts of increasing groundwater demands.
- During wet periods, there are more than enough supplies available to provide for the needs for both M&I and unincorporated area demands. However, the issue is that there is not enough local storage available to provide “carry-over” storage from year to year in the locally available reservoirs.
- Water supply projects involving increased diversions from the Napa River, or increased existing dam heights to expand local reservoir capacities, are probably not feasible due to increased regulatory and environmental concerns and high capital costs.

SUMMARY OF CONCLUSIONS

Based on the findings of the 2050 Study, several conclusions can be made. These conclusions reflect the importance of cooperation between and among the municipalities and various interests within the Napa Valley to ensure that the Valley’s valuable water resources will be available for use by existing and future generations.

- Municipalities should pursue a number of diversified individual and/or joint projects to reliably meet the demands of existing and future users. One such project is the acquisition of “dry year supplies” from outside the County to increase the reliability of existing supplies. As described later in this TM 7, it may not be necessary for the municipalities to expand the capacity of the NBA to import new supplies.
- Unincorporated area and agricultural water users are the primary users of groundwater in the County, with the exception of a very small quantity pumped by some of the municipal agencies. Unincorporated and agricultural demands will continue to grow and further increase extractions from the groundwater basin. As described in TM 5, based on the

estimated perennial yield of the Main Basin and the existing agriculture demands, about 10 percent of the Main Basin's available storage capacity is currently being used for "working storage" or seasonal use (10 to 15 percent is fairly typical). However, as agricultural demands continue to increase in the future, a larger percentage of the Main Basin's storage capacity will be seasonally used.

- Municipalities are also considering very small increases in the quantities of groundwater they pump. While municipalities may pursue individual project opportunities to increase the use of local groundwater resources, it is recommended that the groundwater basin be managed appropriately, if used as a supply source for M&I supply reliability during a drought condition. As municipalities are considering increases in groundwater pumpage, they should exercise caution as they move forward, so that they do not adversely impact existing groundwater users.
- The use of recycled water or other alternative supply sources to meet non-potable water demands should be aggressively pursued, where possible, to offset groundwater and/or potable use.

SUMMARY OF RECOMMENDATIONS

Recommended water supply projects were grouped into three categories:

- Regional Projects,
- Individual Area Projects, and
- Unincorporated Area Projects.

Specific, individual water supply projects within each of these three categories are discussed in the following sections.

Recommended Regional Project

As described in this TM 7, the recommended regional water supply project is to maximize the use of the North Bay Aqueduct (NBA) through the acquisition of imported dry year supplies. This recommended project is also known as the "Fill the Pipe" alternative. This project involves maximizing the use the existing conveyance capacity in the NBA and importing water supplies acquired from other water agencies through supply agreements or options in dry years when deliveries from the State Water Project (SWP) to Napa County and other SWP Contractors are curtailed. A complete description of this proposed regional project is provided later in this TM 7.

Recommended Individual Agency Projects

As described later in this TM 7, each municipality has developed a prioritized list of potential water supply projects which they are considering. These individual projects include the following:

- Increasing the use of groundwater (either as a potable water supply, or a non-potable water supply to offset potable water use),
- Expanding recycled water programs,
- Exercising available water options to purchase additional supplies,
- Purchasing additional entitlements,
- Exploring opportunities to engage in the purchase of dry year water supply options, and
- Modifying standard operational procedures and/or facilities to enhance available local water resources.

Recommended Unincorporated Area Projects

As described above in the Summary of Findings, for Main Basin unincorporated area water users, there appears to be a projected deficit in water supplies for all periods studied, except under current normal supply conditions. The potential projects/solutions to address these projected supply shortfalls are those being pursued by Napa County and the Napa Sanitation District (NSD), which involve the use of recycled water supplies in the MST area, and possibly in the Carneros area. No other regional or local projects are currently being considered.

Also, to ensure that groundwater levels are maintained, additional groundwater level data should be collected to better assess the impacts of increasing pumpage.

SUMMARY OF TM 6 SUPPLY AND DEMAND FINDINGS

Comparison of Present and Future Annual Demand and Supply

Previous TMs prepared for this 2050 Study have described the present and projected future M&I water demands for the incorporated areas of Napa County, in addition to the water demands in the unincorporated areas (rural residential, wineries, improved open areas and agriculture). TM 6 provided a comparison of these present and projected demands to the water supplies available to Napa County municipalities and unincorporated areas during normal years, single dry years and multiple dry years. Table 1 provides a summary of the findings described in TM 6.

The findings summarized in Table 1 are also graphically shown on Figures 1, 2 and 3. Figure 1 demonstrates that M&I users only have projected supply shortfalls in single dry years under 2020 and 2050 demand and during a multiple dry year drought condition under 2050 demands. On the other hand, as shown on Figure 2, unincorporated users have projected supply shortfalls under all hydrologic conditions, except under existing demands during a normal hydrologic year. As shown on Figure 3, if it is assumed that available supplies can be distributed among all parties, the combined M&I and unincorporated users experience multiple dry year shortfalls under 2020 and 2050 demands and single dry year shortfalls under present, 2020 and 2050 demands. This indicates that while regional water supply solutions may be possible, closer attention should be focused on water supplies and supply reliability for unincorporated users, as

well as the different institutional issues which relate to and impact both M&I and agricultural water supplies and demands.

Table 1. Summary of Water Supply Findings for Incorporated and Unincorporated Areas of Napa County

Hydrologic Condition	Excess Supply (Shortfall), afa		
	Present	2020	2050
Incorporated Areas (M&I Supply)^(a)			
Normal Year	16,590	14,987	10,679
Multiple Dry Year	6,037	3,127	(559) (3,354 af total for 6 year drought)
Single Dry Year	344	(3,921)	(7,604)
Unincorporated Areas^(b)			
Normal Year	1,248	(1,340)	(5,644)
Multiple Dry Year	(1,596)	(4,184)	(8,488)
	(9,576 af total for 6 year drought)	(25,104 af total for 6 year drought)	(50,928 af total for 6 year drought)
Single Dry Year	(3,176)	(5,764)	(10,068)
Combined Incorporated and Unincorporated Areas^(c)			
Normal Year	17,838	13,646	5,034
Multiple Dry Year	4,441	(1,057)	(9,047)
		(6,340 af total for 6 year drought)	(54,282 af total for 6 year drought)
Single Dry Year	(2,832)	(9,685)	(17,672)

(a) Source: TM 6 dated October 19, 2005, Table 4. Comparison of Projected M&I Supply and Demand.

(b) Source: TM 6 dated October 19, 2005, Table 12. Comparison of Present and Projected Unincorporated Area Supply and Demand.

(c) Source: TM 6 dated October 19, 2005, Table 13 Comparison of Combined Incorporated and Unincorporated Area Main Basin Supply and Demand. Assumes available supplies could be distributed among all parties to meet demands.

TM 6 also provided supply and demand data for the individual municipalities within Napa County, including the cities of Napa, American Canyon, St. Helena and Calistoga and the Town of Yountville. Table 2 provides a summary of the supply surpluses, or shortfalls, projected for each municipality for normal, single dry and multiple dry years under present, 2020 and 2050 demands.

Table 2. Summary of Water Supply Findings for Individual Municipalities within Napa County^(a)

Municipality/ Hydrologic Condition	Excess Supply (Shortfall), afa		
	Present	2020	2050
City of Napa			
Normal Year	13,166	14,374	11,605
Multiple Dry Year	4,826	4,352	1,974
Single Dry Year	1,656	(38)	(2,437)
City of American Canyon			
Normal Year	2,393	(194)	(1,235)
Multiple Dry Year	789	(1,600)	(2,485)
Single Dry Year	(256)	(2,891)	(3,776)
Town of Yountville			
Normal Year	480	621	621
Multiple Dry Year	498	663	663
Single Dry Year	(97)	68	68
City of St. Helena			
Normal Year	61	71	(152)
Multiple Dry Year	(319)	(363)	(552)
Single Dry Year	(655)	(512)	(679)
City of Calistoga			
Normal Year	490	115	(160)
Multiple Dry Year	243	74	(159)
Single Dry Year	(304)	(547)	(781)

^(a) Source: TM 6 dated October 19, 2005, Attachment B, Comparison of Incorporated Area Water Supplies and Demands.

Figures 4 through 8 graphically demonstrate the individual supply surpluses and shortfalls for each municipality. Figure 4 indicates that the City of Napa will experience shortfall in single dry years under 2050 demands. Figure 5 indicates that American Canyon will experience shortfalls for single dry years under present demands and for normal, single dry and multiple dry years under 2020 and 2050 demands. Figure 6 indicates that the Town of Yountville will experience a shortfall for a single dry year under present demands, but has supply surpluses in future years under normal, single dry and multiple dry years (due to the construction of a new municipal supply well). Figure 7 indicates that the City of St. Helena experiences shortfalls for single dry years and multiple dry years under present, 2020 and 2050 demands and in normal years under 2050 demands. Figure 8 demonstrates that the City of Calistoga experiences shortfalls for single

dry years under present, 2020 and 2050 demands and for normal and multiple dry years under 2050 demands.

DWR has recently indicated that State Water Project (SWP) deliveries could potentially be reduced to only 5 percent of agency’s Table A Entitlement during a catastrophic event. If such an event were to occur, it is anticipated that each municipality would mandate emergency water conservation measures and would do whatever was necessary to reduce water demand to within the available supply. Table 3 presents the anticipated supplies, normal demands and required demand reduction for each municipality under such a catastrophic emergency event.

Table 3. Water Supply Findings for Individual Municipalities within Napa County during a Catastrophic Water Supply Reduction

Municipality	Present	2020	2050
City of Napa			
Reduced Supply (5 percent SWP Delivery), afa	12,680	12,985	12,990
Normal Demand, afa	15,370	18,798	21,643
Required Demand Reduction, percent	20	30	40
City of American Canyon			
Reduced Supply (5 percent SWP Delivery), afa	818	1,631	1,631
Normal Demand, afa	2,187	6,459	7,500
Required Demand Reduction, percent	65	75	80
Town of Yountville			
Reduced Supply (5 percent SWP Delivery), afa	180	480	480
Normal Demand, afa	520	679	679
Required Demand Reduction, percent	65	30	30
City of St. Helena			
Reduced Supply (5 percent SWP Delivery), afa	1,124	1,340	1,411
Normal Demand, afa	2,092	2,179	2,458
Required Demand Reduction, percent	45	40	45
City of Calistoga			
Reduced Supply (5 percent SWP Delivery), afa	238	256	256
Normal Demand, afa	910	1,285	1,560
Required Demand Reduction, percent	75	80	85

As shown in Table 3, the cities with the highest dependence on SWP supplies are impacted the most by such a catastrophic event. The cities of Napa and St. Helena, which have alternative water supplies to the SWP supply, would have the lowest required demand reduction during the catastrophic event. However, the cities of American Canyon and Calistoga would require extreme demand reduction measures. This is largely due to these cities’ high dependence on SWP water

supplies. The Town of Yountville is also extremely dependent on SWP water supplies at present; however, once groundwater supplies become available to Yountville, the dependence on SWP water supplies decreases, resulting in lower required demand reduction during a catastrophic event in future years.

Comparison of Present and Future M&I Maximum Day Demand and Production Capacity

In addition to looking at overall annual demands versus available supplies in TM 6, WYA evaluated M&I maximum day demands and available production capacities. The evaluation indicated that there was an overall maximum day production deficiency of 4.4 mgd (6.6 cfs) based on 2050 M&I maximum day demands and production capacities². This relatively small deficiency would seem to indicate that Napa County's participation in the proposed expansion of the North Bay Aqueduct (NBA) may not be worthwhile and that a local solution may be more appropriate to meet the projected maximum day production deficiency.

Upon closer evaluation of the maximum day demand and production capacities, it is evident that the maximum day production deficiencies indicated in TM 6 can be primarily attributed to the City of American Canyon, based on its projected maximum day demand and production capabilities. The American Canyon projected maximum day production capacity includes the potable water delivered through the Vallejo potable water distribution system. The current potable water maximum day delivery is 1 mgd, projected to increase to 2 mgd in the near future, then remain at 2 mgd for the foreseeable future (2020 and 2050). This water supply is not dependent on the NBA for conveyance. As shown in Table 4 and Figure 9, the maximum day production deficiencies for the City of American Canyon are 4.7 mgd based on 2020 maximum day demands and 6.6 mgd based on 2050 maximum day demands. The other municipalities, including the cities of Napa, St. Helena and Calistoga and the Town of Yountville, either have maximum day production surpluses or very small maximum day production deficiencies (less than 1 mgd). The City of American Canyon's production deficiency primarily stems from the fact that American Canyon's water treatment plant production capacity is constrained by the conveyance capacity in the NBA. Based on this analysis it would seem that the City of American Canyon could potentially benefit from the proposed expansion of the NBA. However, because Napa County's other SWP contractors (the cities of Napa and Calistoga and the Town of Yountville) do not have a maximum day production deficiency, they would not need or likely desire to contribute to the proposed NBA expansion. Therefore, it may be beneficial for the City of American Canyon to pursue alternative water supplies to meet its maximum day production deficiency. Some of the projects which the City of American Canyon is considering are described in the Potential Local Water Supply Projects section below.

² Table 6. Present and Projected M&I Maximum Day Production, Technical Memorandum No. 6, 2050 Napa Valley Water Resources Study Project, Comparison of Demand Projects and Supply Capabilities, prepared by West Yost & Associates, October 19, 2005.

Table 4. Summary of M&I Maximum Day Demands and Production Capabilities for Individual Municipalities within Napa County

Municipality/Parameter	Maximum Day Demand, Production Capabilities and Surpluses (Deficiencies), mgd		
	Present	2020	2050
City of Napa			
Maximum Day Demand	27.4	33.6	38.6
Maximum Day Production Capacity (includes Hennessey WTP, Milliken WTP and Jamieson WTP)	35.0	43.4	43.4
Maximum Day Surplus (Deficiency)	7.6	9.8	4.8
City of American Canyon			
Maximum Day Demand	3.9	11.5	13.4
Maximum Day Production Capacity (includes American Canyon WTP and Vallejo Potable Water)	6.6	6.8	6.8
Maximum Day Surplus (Deficiency)	2.7	(4.7)	(6.6)
Town of Yountville			
Maximum Day Demand	0.9	1.2	1.2
Maximum Day Production Capacity (includes Rector and Jamieson WTP)	1.5	1.6	1.6
Maximum Day Surplus (Deficiency)	0.6	0.4	0.4
City of St. Helena			
Maximum Day Demand	3.7	3.9	4.4
Maximum Day Production Capacity (includes Louis Stralla WTP and Stonebridge Wells)	3.9	3.9	3.9
Maximum Day Surplus (Deficiency)	0.2	0.0	(0.5)
City of Calistoga			
Maximum Day Demand	1.6	2.3	2.8
Maximum Day Production Capacity (includes Kimball WTP and Jamieson WTP)	1.8	2.2	2.2
Maximum Day Surplus (Deficiency)	0.2	(0.1)	(0.6)
Total Combined Maximum Day Surplus (Deficiency) for all Municipalities	11.3	5.4	(2.5)

REVIEW OF PREVIOUSLY EVALUATED WATER SUPPLY PROJECTS

A number of potential water supply projects were previously evaluated in the 1991 and 1992 studies. These projects, as discussed in TM 1³, included the following:

- Diverting water from the Napa River to Hennessey Reservoir during the October to May time period and enlarging Hennessey Reservoir to accept additional river diversions by raising Conn Dam and modifying the spillway,
- Enlarging Bell Canyon Reservoir as a option for storage of diverted Napa River water,
- Constructing a new reservoir on Carneros Creek,
- Investigating a groundwater recharge/conjunctive use project using surface water from the Milliken-Sarco-Tuluca (MST) groundwater basin in the southeastern portion of the City of Napa service area. Municipal water supplies from Milliken used for groundwater recharge could be replaced with diverted Napa River flows into Lake Hennessey. The groundwater recharge project should be coordinated with a County-wide groundwater management strategy that protects groundwater resources.

With regard to the proposed river diversions and reservoir enlargements listed above, no action has been taken. The proposed enlargement of Bell Canyon Reservoir was eliminated from consideration as a result of the 1992 Study. The enlargement of Hennessey Reservoir and the construction of a new Carneros Creek Reservoir have also been dismissed from further consideration. This is primarily due to the listing of steelhead as a threatened species under the Federal Endangered Species Act of 1997, potential increased flow release requirements, and increased regulatory concerns with maintaining habitat areas and flushing flows. Based on these concerns, the river diversion projects evaluated in the 1992 Study are not believed to be viable water supply alternatives.

As described in TM 1, Napa County and the United States Geological Survey (USGS) have conducted a cooperative study of the MST Basin, and Napa County has begun a more comprehensive program of collecting and monitoring groundwater level information throughout the County. This information will be useful when evaluating the potential for increased conjunctive use of the groundwater basin (see Potential Regional Water Supply Projects below) or increased groundwater pumpage by individual municipalities (see Potential Local Water Supply Projects below).

POTENTIAL LOCAL M&I WATER SUPPLY PROJECTS

As discussed in TM 6, each municipality in Napa County is anticipated to experience a supply shortfall in present and/or future years under normal, single dry and/or multiple dry year conditions. Supply shortfalls will also occur for some municipalities as a result of a catastrophic

³ Technical Memorandum No. 1, 2050 Napa Valley Water Resources Study Project, Review of 1991 and 1992 Studies, prepared by West Yost & Associates, October 19, 2005.

supply event. The individual municipal supply shortfalls are shown in Tables 2, 3 and 4 and Figures 4 through 9 of this TM 7. In response to these anticipated supply shortfalls, each municipality is actively evaluating individual water supply projects to ensure that the needs of their existing and future customers will be met. These individual projects include increasing the use of groundwater (either as a potable water supply or a non-potable water supply to offset potable water use), expanding recycled water programs, exercising available water options to purchase additional supplies, purchasing additional entitlements, exploring opportunities to engage in the purchase of dry year water supply options, and modifying standard operational procedures and/or facilities to enhance available local water resources. These projects, by individual agency, are discussed briefly below.

City of Napa

The City of Napa is considering the following water supply projects:

Priority Projects

1. Jamieson Water Treatment Plant Improvements: Allows the City to maximize the use of existing State Water Project entitlements and save local supplies in Lake Hennessey for dry-year use.
2. Dry Year Water: Negotiate a long-term agreement for reliable dry year water supplies to be imported via the North Bay Aqueduct. Agencies that may have dry year supplies available include Sacramento River users, Butte County and City of Vallejo (possibly in partnership with the City of American Canyon). The City may want to consider joining a larger group of SWP Contractors in such an acquisition process.
3. Purchase Additional SWP Entitlements: Acquire/purchase additional entitlements to Table "A" with SWP, either within Napa County or externally (i.e. Kern County Water Agency).
4. Conjunctive Use: Store excess SWP entitlements in groundwater wells along the NBA pipeline (Solano County).
5. Municipal Groundwater Well for Dry-Year Supply: Develop a groundwater source that will be used for dry-year supply.
6. Recycled Water: Continue working with the Napa Sanitation District to further expand the use of recycled water to meet non-potable demands.

Other Projects City of Napa may Consider

1. Groundwater Wells for Schools/Parks: Develop on-site wells to provide non-potable supply at individual parks/schools, instead of using potable water supplies. The potable water saved through the use of groundwater supplies will then be available to meet other potable water demands. Converting the four schools with the highest demand would net a total annual savings of 150 AF of potable supply per year. However, the investment in well infrastructure may not be worth the gain in supply.

2. Maximize Use of Milliken Reservoir: Install treatment plant modifications so the Milliken source could be used year-around. However, the investment may not be worth the supply savings. Supply is only saved if use of Milliken reduces the supply required from Hennessey or Jamieson. However, since Hennessey spills frequently, it is unclear whether this would be worth the investment.
3. Napa Pipe Wells: There are a number of large wells on the former Napa Pipe Corporation property near Napa. The property is not in the City limits but is adjacent to it. The property may be developed in the future, and if so, will need a water supply. Existing wells have unknown quality/quantity.

City of American Canyon

The City of American Canyon is moving forward with several projects or is considering the following water projects:

1. Vallejo Potable Water: The City currently has an agreement with the City of Vallejo for options to purchase additional potable water in future years. The “option to buy” specific blocks of water can be exercised between now and 2021. If all of the remaining options were exercised, this would provide a total entitlement of 8,144, afa which would exceed demand in wet and average years. Only one of the additional options was assumed in this study because that is what the current capacity connection fee provides for.
2. Vallejo Raw Water: The City is investigating the purchase of additional raw water instead of potable water from the City of Vallejo. This would be more cost effective for the City of American Canyon.
3. Purchase of Entitlements from Other Agencies: The City is currently investigating the purchase of State Water Project water entitlements that can be wheeled through the NBA system. In addition, the City is investigating the purchase of other water from Napa County agencies. This project could also include short term transfers and exchanges during drought years.
4. Condition Assessment: The City will be completing a condition assessment beginning in October 2005 to estimate the quantity of real annual water losses within the City’s distribution system, facilitate future leak repair by pinpointing the locations of significant leaks, and develop an infrastructure replacement program that prioritizes repairs. Replacement of the several severely deteriorated pipelines is currently in progress.
5. Recycled Water Distribution System: The construction of the recycled water distribution system is being conducted in phases. One customer is currently receiving recycled water and segments of recycled water pipeline to other customers have been constructed. It is anticipated that the recycled water distribution system will be completed as early as 2008.
6. Using recycled water to meet agricultural demands: The one existing recycled water customer is a vineyard, and it is planned that a significant proportion of the identified potential customers are vineyards.

7. Continuing implementation of BMPs: The City has created and filled a new “environmental program specialist” position with water conservation being one of the duties of the position. The addition of this staff person ensures continued implementation of water conservation BMPs as well as establishing additional water conservation programs.
8. Demand Management Standards for New Development: The City will look at additional demand management measures that go beyond the State requirements for water conservation to find additional water savings; for example, watering front yards and requiring commercial low-flow toilets.
9. Groundwater Wells for Drought: The City is currently completing a preliminary groundwater study to determine the potential for groundwater resources available to the City. Construction of municipal wells for drought contingency would be the objective, if groundwater sources can be identified.
10. Dry Year Reserves: In order to be ready to purchase short term water during drought years and to ensure the fiscal health of the City’s water enterprise fund during drought years, the City is planning to establish dry year reserves.
11. NBA Reliability Improvements: The City is supporting the improvements for the NBA, such as the terminal tank. The tank is not seismically retrofitted and can only be filled to 5.3 million gallons. The Joint Powers Authority is constructing two new tanks that will provide 10-million gallons storage that will result in better water quality and meet current seismic standards.
12. Jamieson Canyon Reservoir: In 1994, the City of American Canyon, along with the Cities of Vallejo and Napa, investigated the feasibility constructing a 4000 acre-foot raw water reservoir in Jamieson Canyon for storage during the winter for summer use. The study found that the reservoir would cost approximately \$47 million, and in today cost, would be \$65-million or \$16,000 per acre-foot. It was concluded that the project was not cost effective.

Town of Yountville

The Town of Yountville is moving forward with/considering the following water supply projects:

1. Constructing a proposed municipal production well and wellhead treatment facilities, and
2. Possibly expanding its recycled water program to increase the offset of existing water uses.

City of St. Helena

The City of St. Helena is considering the following water supply projects:

1. Continuing negotiations with interested parties regarding long-term transfer of 1,000 af of KCWA entitlements in exchange for water supply/wheeling capacity and/or money,

2. Possibly changing its institutional constraints which currently limit existing groundwater withdrawals for M&I uses,
3. Possibly installing additional groundwater wells for potable use and/or non-potable use (to offset existing potable water uses), and
4. Developing Title 22 recycled water supplies for non-potable use.

City of Calistoga

The City of Calistoga is considering the following water supply projects:

1. Constructing additional wells with wellhead treatment,
2. Possibly expanding its recycled water program (to increase potable water offset), and
3. Purchasing the City of St. Helena's KCWA entitlements.

POTENTIAL LOCAL AGRICULTURE WATER SUPPLY PROJECTS

The potential projects/solutions currently being pursued to address the projected supply shortfalls for the unincorporated areas (including rural residential, wineries, improved open areas, and agriculture) are those which are being pursued by Napa County and the Napa Sanitation District (NSD). These potential projects involve the use of recycled water supplies generated by NSD for use in the MST area, and possibly in the Carneros area. No other regional or local projects are currently being considered.

Also, to ensure that groundwater levels are maintained, additional groundwater level data should be collected to better assess the impacts of increasing pumpage.

POTENTIAL REGIONAL M&I WATER SUPPLY PROJECTS

In addition to the individual water supply projects being considered by Napa County's municipalities, a regional water supply project is proposed to address the present and projected supply deficits. The project is the maximized use of the North Bay Aqueduct (NBA) through the acquisition of imported dry year supplies (a.k.a. "Fill the Pipe").

It should be noted that implementation of one or more of the individual local agency water supply projects listed above would decrease the amount of water needed from a regional water supply project. The following sections describe the regional project in detail, along with potential benefits and issues, which are summarized in Table 5.

Table 5. Summary of Regional M&I Water Supply Project Considerations

Consideration	Description
Project Name & Description	Maximize Use of the North Bay Aqueduct (NBA) through the Acquisition of Imported Dry Year Supplies
Quantity of Supply Deficit	<u>Single Dry Years:</u> Up to 7,614 AF <u>Multiple Dry Years:</u> Up to 569 AF/yr for 6 years (3,414 AF)
Project Beneficiaries	Current SWP Contractors only: <ul style="list-style-type: none"> • City of Napa • American Canyon • Yountville • Calistoga
Project Benefits	<ul style="list-style-type: none"> • Does not require expansion of NBA • Utilizes existing NBA capacity even when SWP deliveries are curtailed
Project Issues	<ul style="list-style-type: none"> • Requires acquisition of non-local dry year supplies • Requires environmental review and SWRCB approval • Supply not available for non-SWP contractors (City of St. Helena and ag users) • Requires prior negotiation of a “supply option” to allow for “on demand” delivery in future single or multiple dry years based on hydrologic conditions • Multi-year dry year supply options have not yet been approved • Acquisition of imported water supplies can be expensive
Project Costs	<ul style="list-style-type: none"> • Legal and administrative costs associated with acquisition negotiations and agreements • Environmental consulting costs associated with preparation of EIR • Approximate water supply cost (see Table 7): <ul style="list-style-type: none"> – Annual Water Option Cost = \$15/AF – Water Supply Cost (when called on) = \$150/AF – Estimated Total Project Cost = \$6.84 million – Estimated Total Project Cost = \$310/AF of delivered water

Maximize Use of the North Bay Aqueduct (NBA) Through the Acquisition of Imported Dry Year Supplies (a.k.a. “Fill the Pipe”)

Background

The North Bay Aqueduct (NBA) is a part of the State Water Project (SWP), which conveys SWP water to water users in Napa and Solano counties. The Napa County Flood Control and Water Conservation District represents the interests of those Napa County agencies obtaining supply from the NBA. The NBA is composed of a 27-mile long underground pipeline that runs from Barker Slough in the Delta to Cordelia Forebay, just outside of Vallejo. The size of the pipeline

varies from 72 inches in diameter at Barker Slough to 54 inches in diameter at Cordelia Forebay, then a 36-inch diameter pipeline from Cordelia to the turn-out reservoir at Jamieson Canyon. The NBA is operated remotely by the State Department of Water Resources (DWR).

The contractual conveyance capacity of the Napa County Flood Control District's entitlement in the NBA is 45.6 cubic feet per second (cfs). However, the estimated actual capacity of the NBA is only 40 cfs. The NBA conveys untreated water supplies to Napa and Solano counties from the SWP. Within Napa County, the NBA conveys water supplies for M&I purposes for the cities of Napa, American Canyon, and Calistoga, and the Town of Yountville. Annual deliveries from the SWP are based on a percentage of the contractual entitlement, which is established annually by DWR based on hydrologic conditions. Table 6 summarizes the estimated delivery percentages during various hydrologic conditions used for this 2050 Study.

Table 6. Estimated SWP Deliveries During Various Hydrologic Conditions^(a)

Water Supply Year	Yield Condition	Percent of Entitlement Delivered, percent	Exceedence Probability, percent
Wet Year	Maximum Yield	100	0
Normal Year	Average Yield	76	60
Multiple Dry Year	Reliable Yield	40	85
Single Dry Year	Perennial Yield	20	100

^(a) Based on SWP 2001 Reliability Report

Currently, the NBA conveys only SWP supplies. Therefore, in single dry, multiple dry and even normal years, when SWP deliveries are less than 100 percent of contractual entitlements, the full existing capacity of the NBA is not utilized. If additional dry year supplies were to be acquired, it may be possible to utilize the NBA to convey those supplies to water users in Napa County.

Project Description

This proposed project would involve the acquisition of additional dry year supplies from water agencies outside of Napa County to be conveyed to project-participating M&I agencies within Napa County via the NBA in single and multiple dry years. This additional dry year water supply would only be available to existing SWP contractors in Napa County, namely the cities of Napa, American Canyon, and Calistoga, and the Town of Yountville⁴ (if they opt to participate in this proposed project). Other water users within Napa County (including the City of St. Helena, rural residential, wineries and agriculture in the unincorporated areas) would not have access to this

⁴ The City of St. Helena is not an SWP contractor and does not currently have access to conveyance capacity in the NBA.

additional supply, as the supplemental supply would be acquired and paid for by SWP contactors, and conveyed/distributed through facilities financed by only the SWP contractors.

The project would require the acquisition of up to 7,604 acre-feet of dry year supplies for use during a single dry year and up to 559 acre-feet per year of dry year supplies for up to six years (totaling approximately 3,354 acre-feet) for use during a multiple year drought.

Potential water agencies outside of Napa County with available dry year supplies for acquisition include water rights holders in the Sacramento Valley. Acquisition of dry year supplies will require extensive negotiations before an agreement can be finalized. Acquisition of dry year supplies will also require environmental review in accordance with the California Environmental Quality Act (CEQA), and review and approval by the State Water Resources Control Board (SWRCB). To date, while single year water transfers have become more commonplace, multi-year transfers of this nature have not yet occurred.

Potential Benefits

The major benefit of this proposed project is that it takes full advantage of the existing NBA capacity and does not require a costly expansion of the NBA. This proposed project would take advantage of the existing capacity of the NBA in years when SWP deliveries are reduced through the acquisition of an alternative supply that can be delivered to Napa County users through the NBA. This "Fill the Pipe" project maximizes the use of the existing NBA facilities by continuously delivering water supplies to Napa County users, even when SWP deliveries are curtailed.

This recommendation has the added benefit of allowing the unincorporated and agricultural water demand increases to continue to be served by groundwater. This will allow these existing groundwater users to take stewardship for maintaining the quality, reliability and integrity of this valuable resource for generations to come.

Potential Issues

The major issue associated with this proposed project is the need to negotiate a long-term agreement with a willing seller to acquire dry year water supplies. The water supply acquisition process can be a lengthy one, requiring extensive negotiations and legal review regarding the terms and conditions of the agreement. Such a supply acquisition will require an Environmental Impact Report (EIR) in accordance with CEQA, and review and approval by the SWRCB, both taking into account place of use issues and potential third-party impacts of the water supply transfer.

Another issue is that the additional supply will be required in future undetermined years, based on hydrologic conditions. As such the agreement would have to be developed in such a way to allow for the Napa County water users to "exercise" or "call on" the water supply option in any particular year of need, and have this previously negotiated water supply quantity available for delivery on demand.

Also, because the use of the NBA is limited to existing SWP contractors, additional dry year supplies acquired via this proposed project would not be available for use by non-SWP

contractors. Thus, this proposed project would not help resolve the projected supply shortfalls for the City of St. Helena or the county's unincorporated areas.

Project Costs

The unit cost for imported dry year water supplies is somewhat variable, but is currently in the range of between \$10 and \$15 per acre-foot per year, to hold the option open. However, this unit cost increases significantly during years when water is actually called upon and delivered to the contractor. Unit costs for water called upon and delivered can range from \$135/acre-foot to \$150/acre-foot. Therefore, the total Project Cost, and the estimated cost per acre-foot of delivered supply, will depend on how often these dry year water supplies are called upon.

The proposed project will also have upfront costs including engineering, planning, legal and administrative costs associated with the acquisition negotiations, and environmental consulting costs associated with environmental review process and EIR preparation. Table 5 provides a summary of anticipated costs and a listing of the planning considerations.

Assuming a 45-year planning period (which would take the evaluation out to year 2050), and further assuming for planning and cost estimating purposes that during this 45-year period there will be two multi-year drought periods (each assumed to be the historic 6-year drought) and that two critical dry years would also occur during this period, then the costs in today's dollars for these dry year supplies would be as shown in Table 7.

Therefore, the total water supply project cost is estimated to be \$6.84 million, and the cost per acre-foot of water delivered is approximately \$310/acre-foot. Costs to perform the other project related components; EIR work, engineering support, legal review, negotiations of terms and conditions of agreement, and other miscellaneous costs are not included in this cost estimate.

Table 7. Estimated Costs for Dry-Year Supplies over a 45-Year Planning Period

Hydrologic Year	Number of Years	Water to be Delivered, AF	Cost Component	Cost Calculation	Estimated Cost, \$ million
Normal (or Wet) Years	31	0	Costs to "Hold Option"	7,604 AF x \$15/AF x 31 years	\$3.54 million
Multiple Dry Years (two 6-year periods assumed in 45-year period)	12	6,708	Costs to Exercise Multiple Year Option	3,354 AF x \$150/AF x 2 multiple year droughts	\$1.01 million
Single Dry Years (two single dry years assumed in 45-year period)	2	15,208	Costs to Exercise Single year Option	7,604 AF x \$150/AF x 2 single dry years	\$2.28 million
Totals	45	21,916			\$6.83 million
Cost Per AF of Water Delivered					\$312/AF

CONCLUSION

As described in this TM 7, there are a number of regional and local water supply projects which have the potential to help resolve the projected water supply shortfalls within the Napa Valley. Although many of the projects can and may be implemented on an individual basis, it is clear that a cooperative approach to water resources management, involving the municipalities and other interests in the Napa Valley, will help ensure that the Valley's valuable resources will be available for use by existing and future generations.

GSN/JPC:ajb

Figure 1. Napa County Incorporated Area (M&I) Supply and Demand

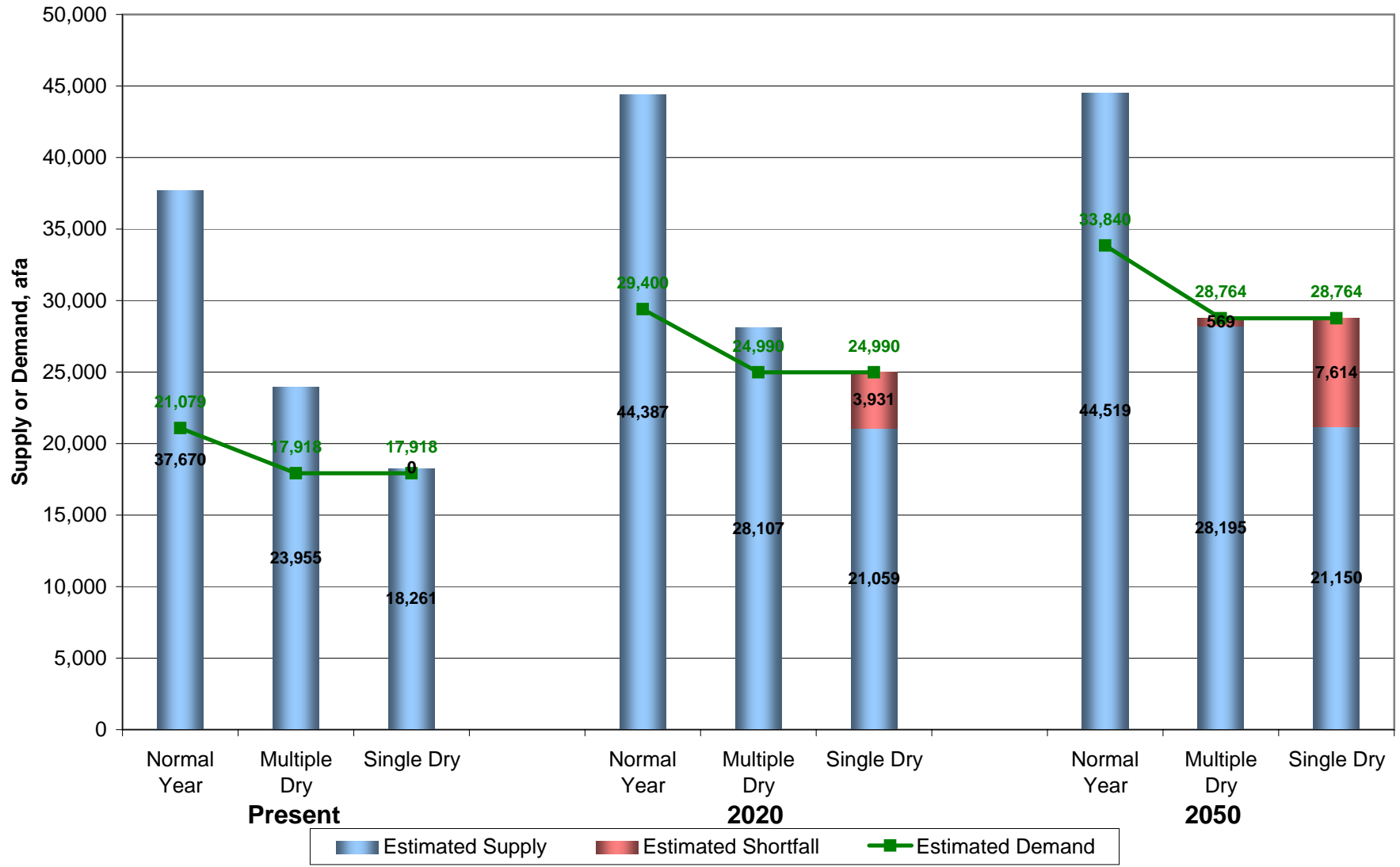


Figure 2. Napa County Unincorporated Area Supply and Demand

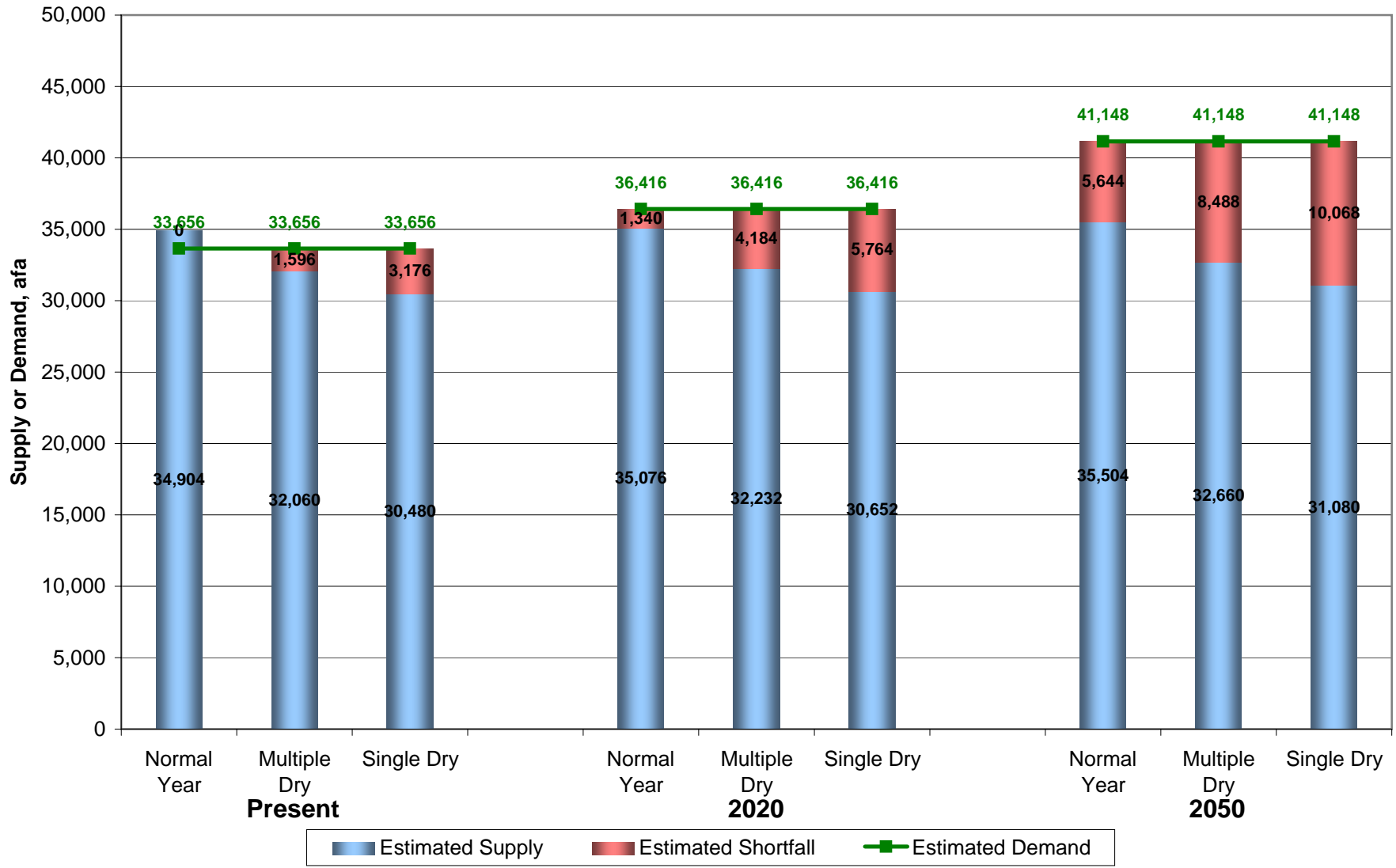


Figure 3. Napa County Combined Incorporated and Unincorporated Area Supply and Demand
 (assumes available supplies can be distributed among all parties)

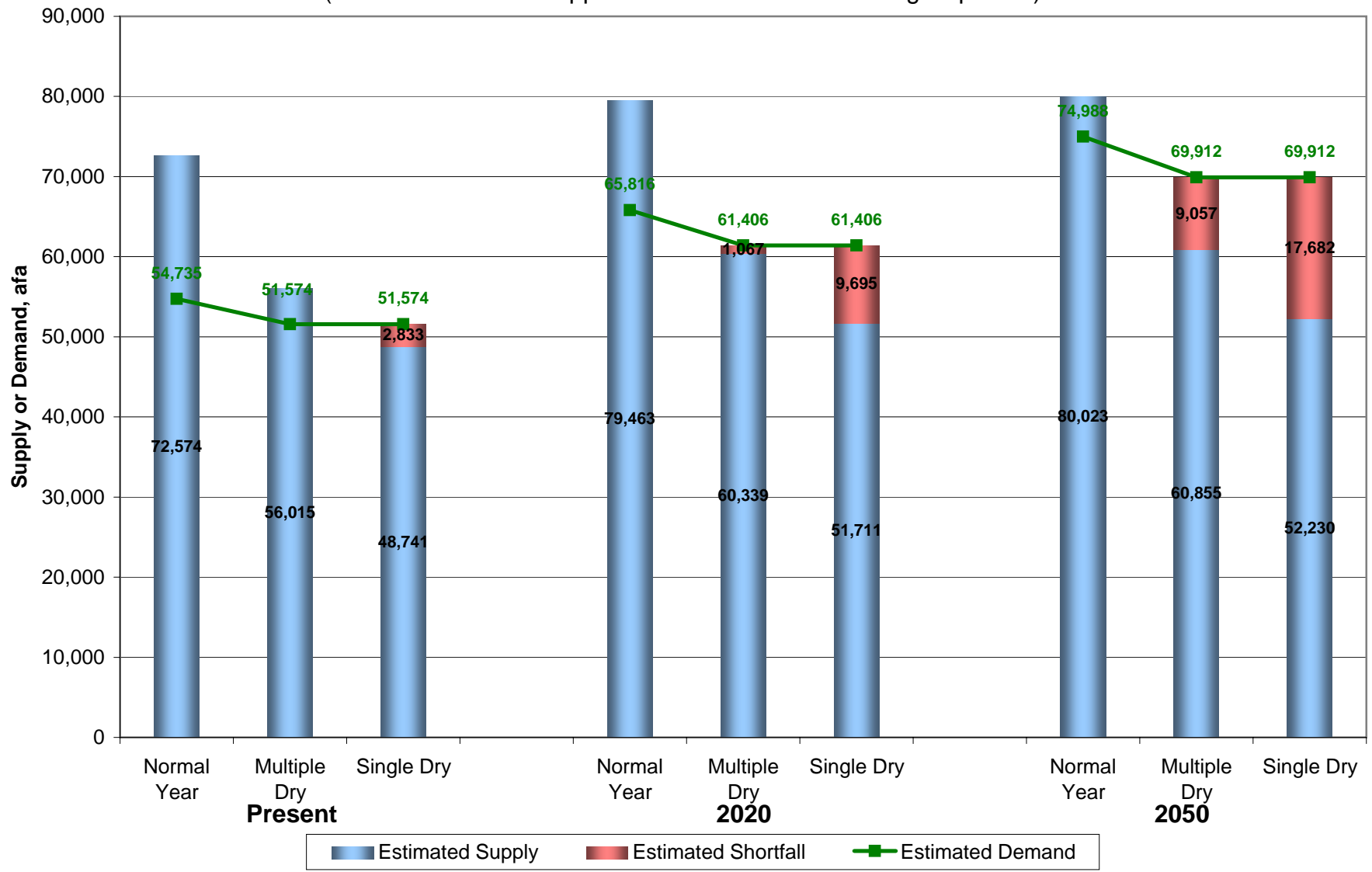


Figure 4. Annual Supply and Demand for the City of Napa

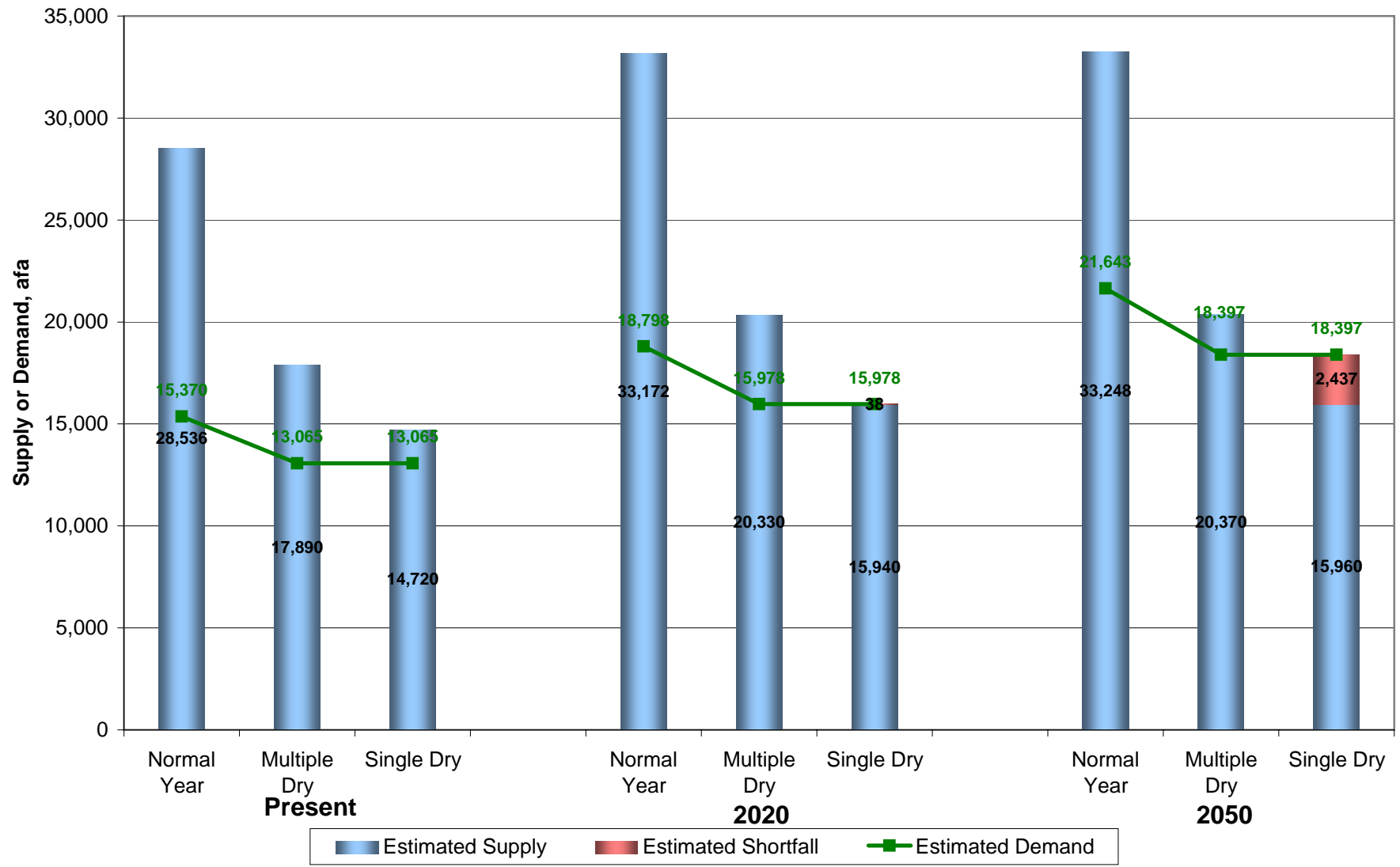


Figure 5. Annual Supply and Demand for City of American Canyon

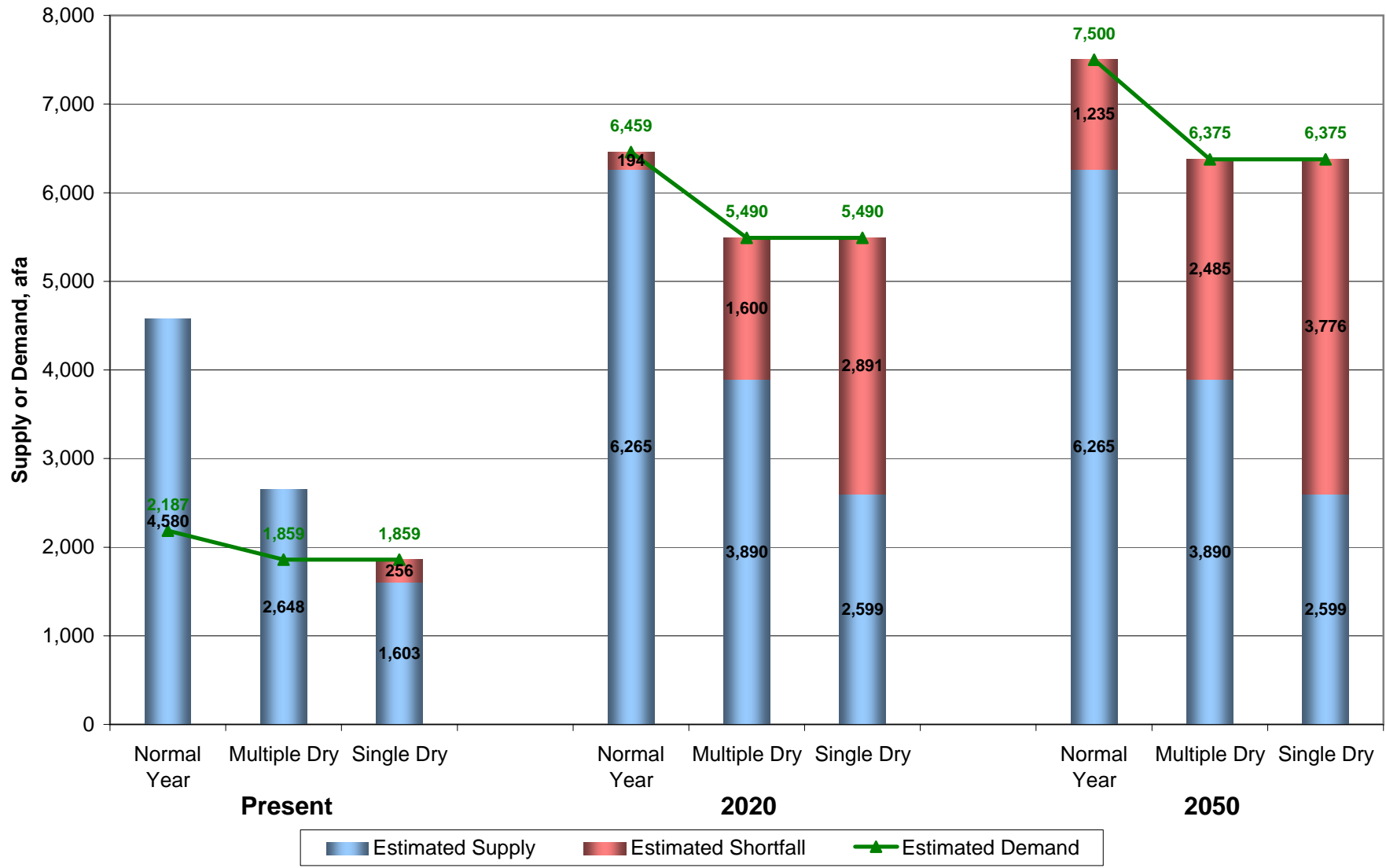


Figure 6. Annual Supply and Demand for Town of Yountville

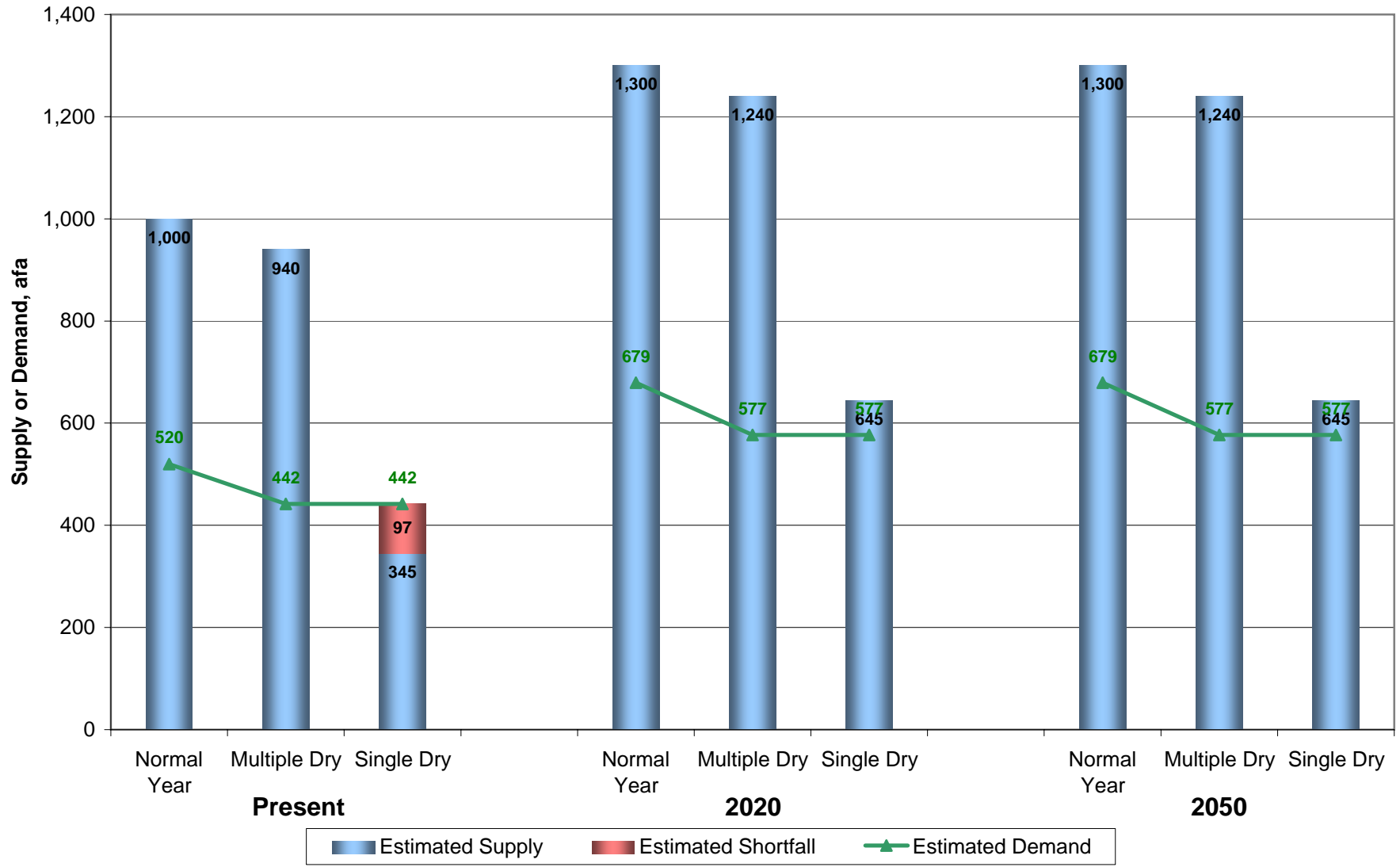


Figure 7. Annual Supply and Demand for City of St. Helena

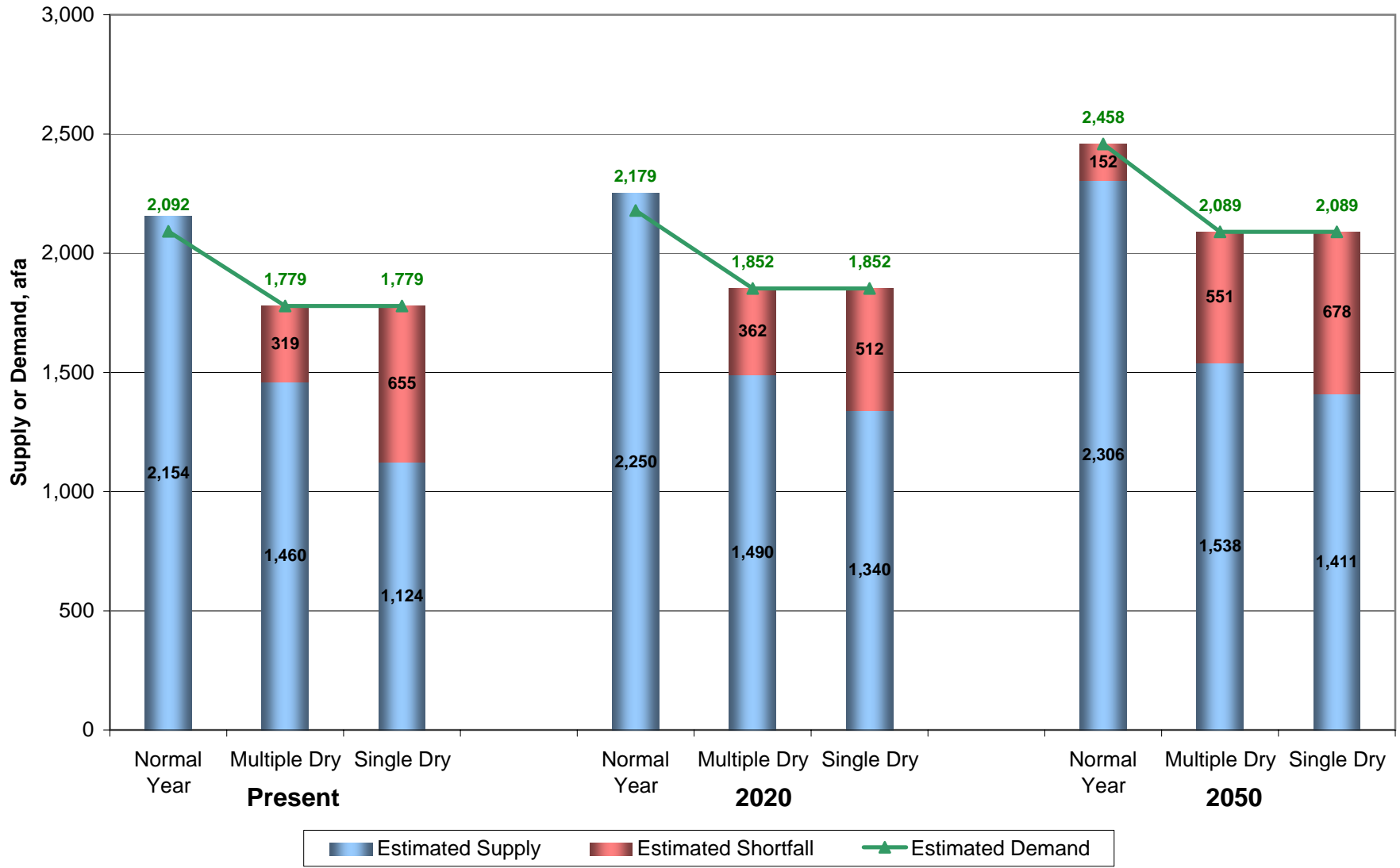


Figure 8. Annual Supply and Demand for City of Calistoga

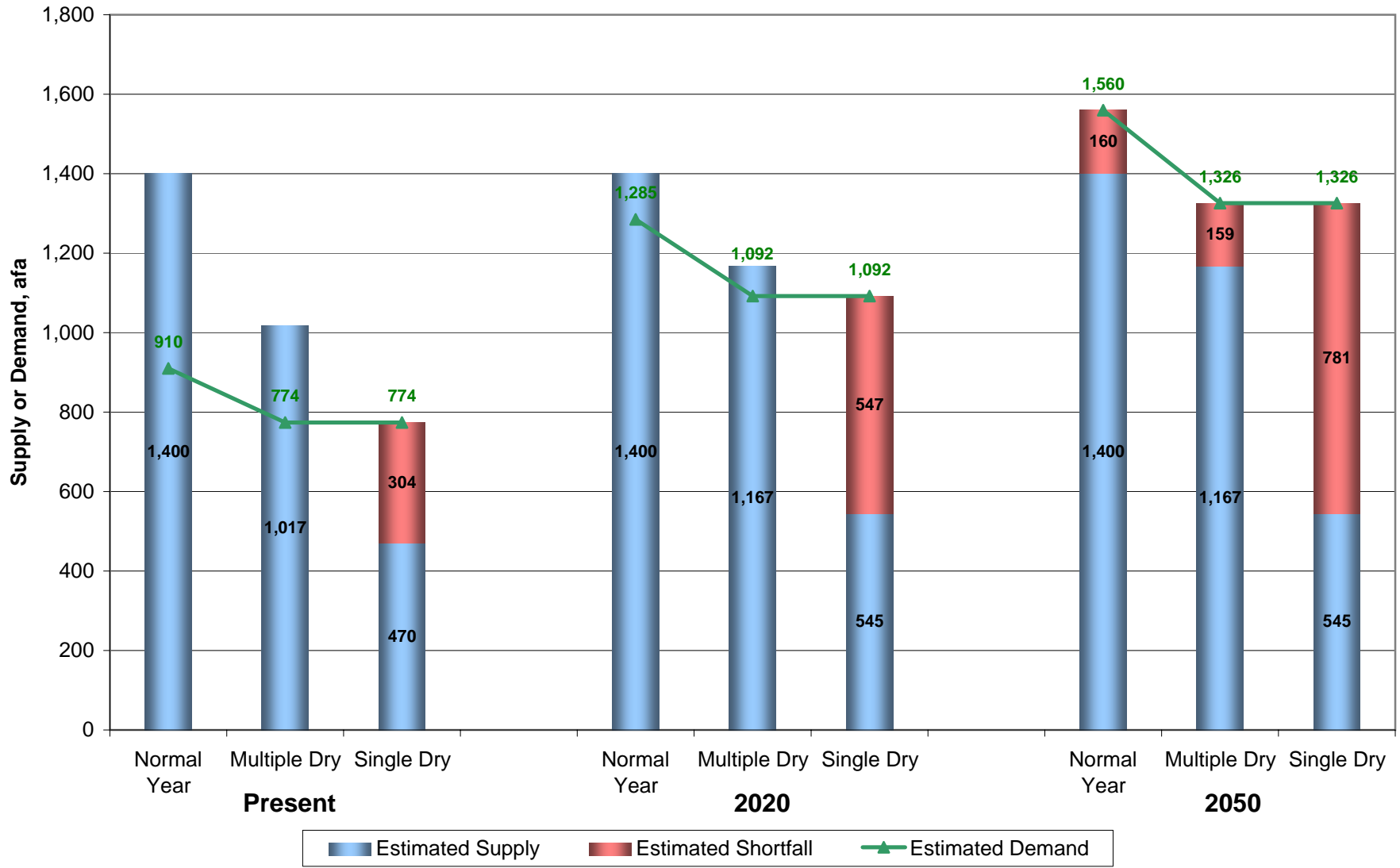


Figure 9. Napa County M&I Maximum Day Demands vs. Production Capacities

