NAPA WETLANDS MONITORING PROGRAM

February, 2007

FINAL REPORT

Prepared By

Napa County Resource Conservation District

For

United States Environmental Protection Agency

USEPA Grant ID # CD-97954901-0

NAPA WETLANDS MONITORING PROGRAM

NAPA COUNTY RESOURCE CONSERVATION DISTRICT
1303 JEFFERSON ST. SUITE 500B
NAPA, CALIFORNIA 94559
www.naparcd.org

JONATHAN KOEHLER
SENIOR BIOLOGIST
jonathan@naparcd.org
(707) 252 - 4188

This project was funded with a grant awarded to the Napa County Resource Conservation District through the Wetlands Protection Development-Ecology Volunteer Monitoring Program administered by the USEPA (Grant ID # CD-97954901-0).

ACKNOWLEDGEMENTS
We would like to thank the following volunteers for assisting with the project: Ellen Sabine, Lida Kvashina, Vicki Heiner, Tara Jones, Herb McGrew, Robin Leong, Mike Parmeter, Jim Hench, Austin Underhill, Mark Couchman, Kathy O'Dell, Kent Rupert, and Jaye Cook. The RCD would like to thank the landowners that made this work possible by granting access to their properties. We are grateful for the assistance we received from the following agencies, groups, and individuals: Point Reyes Bird Observatory, San Francisco Bay Regional Water Quality Control Board, Mike Napolitano, Napa County Flood Control and Water Conservation District, Todd Adams, the City of Napa, the County of Napa Conservation, Development, and Planning Department, California Department of Fish & Game.

EXECUTIVE SUMMARY

The Napa County RCD received funding from the United States Environmental Protection Agency (EPA) in 2003 to initiate a volunteer-based wetland monitoring program in Napa County. A total of five wetland sites were established to monitor birds, fish, vegetation, and water quality. This program was intended to provide the necessary training and organizational structure for ongoing volunteer monitoring of wetland sites.

The program successfully enlisted and involved sixteen citizen volunteers for over two and a half years. A core group of approximately seven volunteers were involved throughout the project period. The remaining volunteers included high school students and others citizens available only for a limited time. Several members of the core volunteer group had local expertise in plant and bird identification. This core group is continuing to monitor birds and water quality at three sites and is being coordinated by RCD staff.

A total of nine presentations were given at seven local elementary schools, which covered wetland ecology and the results of our ongoing monitoring program. Each presentation was approximately one hour long and involved interactive demonstrations to help students understand key wetland functions. Presentations were coordinated with the RCD's ongoing outreach program, which targets 20-30 groups per year for educational presentations.

Monitoring sites fit broadly into several distinct wetland classes including estuarine intertidal marsh, estuarine subtidal marsh, seasonal freshwater ponds, and freshwater emergent marshes. The five sites included Stanly Ranch (STRA), South Wetland Opportunity Area (SWOA), Huichica Creek Vineyard Wetland (HCV), Salvador Creek Wetland (SALV), Alston Park Wetland (ALST).

All sites were mapped in GIS format to include site boundaries, hydrologic features, sampling points, and geographic location. These data have been compiled in ArcGIS shapefile format and are available from the RCD.

Water quality monitoring was conducted monthly at all sites when water was present. Bird monitoring was conducted quarterly at STRA, SWOA, HCV, ALST, and SALV. Vegetation surveys were conducted at STRA, HCV, ALST, and SALV. Fish sampling was conducted quarterly at STRA, and seasonal amphibian observations were made at ALST and SALV.

Results from SWOA show extensive use by resident and migratory bird species. A total of 71 bird species were documented at the site including two special status species: Peregrine Falcon and Burrowing Owl. Stanly Ranch supported migratory shorebirds and waterfowl from October through May. Bird abundance and diversity increased at the site during periods of flooding inundation and was relatively low throughout the rest of the year.

Our three seasonal pond sites (HCV, ALST, SALV) experienced the highest bird abundances while flooded, on average from November to May. Wetland bird species at these sites including Great Blue Heron, Black Phoebe, Mallard, and others were present during this period. During the dry season, the bird community consisted primarily of passerines.

We captured six species of fish at Stanly Ranch including two natives: three spine stickleback and prickly sculpin. Four exotic fish species were also collected at the site: common carp, green sunfish, western mosquitofish, and rainwater killifish.

TABLE OF CONTENTS

1 INTRODUCTION

Napa County is a unique ecological region that is home to a diverse community of plants and animals. Wetlands of the Napa River provide habitat for several special status species including the salt marsh harvest mouse, California Clapper Rail, delta smelt, Sacramento splittail, and steelhead. Additionally, thousands of migratory waterfowl and other bird species visit Napa River wetlands during seasonal migrations along the Pacific flyway. This monitoring program was intended to involve citizen volunteers in the assessment of wetland habitats and demonstrate their value for native animals and plants.

1.1 Background

Human activities over the past 150 years have significantly altered the natural systems of Napa County. Sloughs have been straightened, levees have been built, development has occurred near streams and in their floodplains, and historic valley floor wetlands have been drained or filled. The ecosystem has been impacted by flow alterations, floodplain changes, channel form changes, degraded water quality, exotic and invasive species, undesirable effects of land use practices, and human disturbance in aquatic systems. In addition, river tributaries and the habitat along the Napa River itself have been gradually fragmented.

Despite this intensive history, efforts to reverse the ecological trends of the past are taking shape as citizens, governments, and local groups are working together to improve and restore the land. As a local non-regulatory agency, the Napa RCD involves the community in wetland stewardship through education and habitat restoration. Our mission is "to encourage and assist acceptance of individual responsibility for watershed management," and to use "… education and partnerships as the major tools for implementation of district goals." This project was successful in expanding community involvement through voluntary monitoring of wetlands.

1.2 Project Description

The Napa County RCD began this monitoring program in wetlands of the Napa River watershed (Figure 1-1) as a component of our existing volunteer stream-monitoring program. This wetland program effectively expanded our capacity to monitor wetland function, health, and biological trends within Napa River watershed. The RCD also used the program as a tool to educate citizens and school children about the value of wetland ecosystems through technical training, and presentations at local schools.

The Napa Wetland Monitoring Program consisted of several interrelated components including bird counts, water quality sampling, fish collection, and vegetation surveys at five sites between 2004 and 2006. Ongoing monitoring is anticipated with trained volunteers under the guidance of RCD staff at several sites.

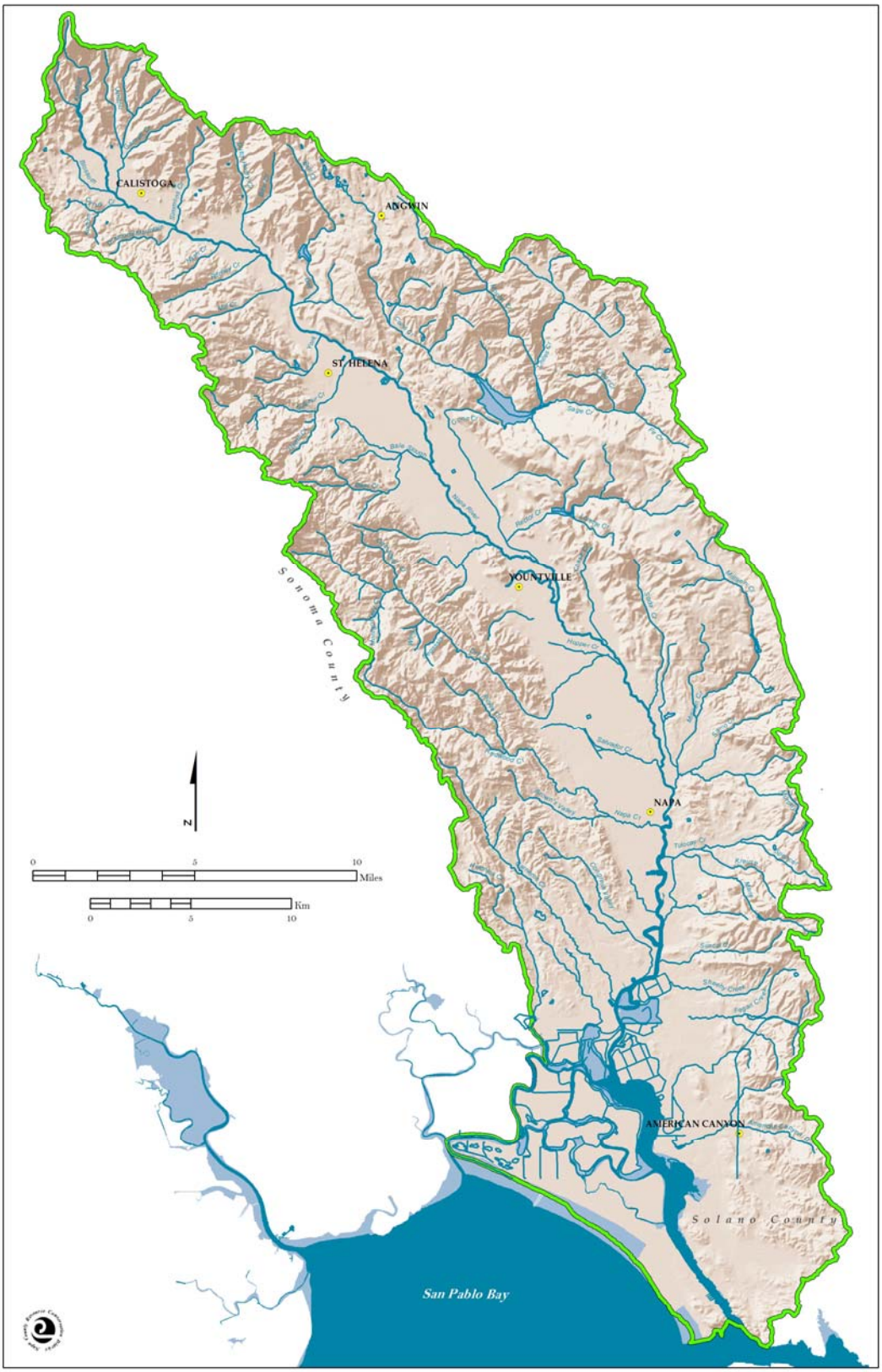


Figure 1-1. Map of the Napa River watershed.

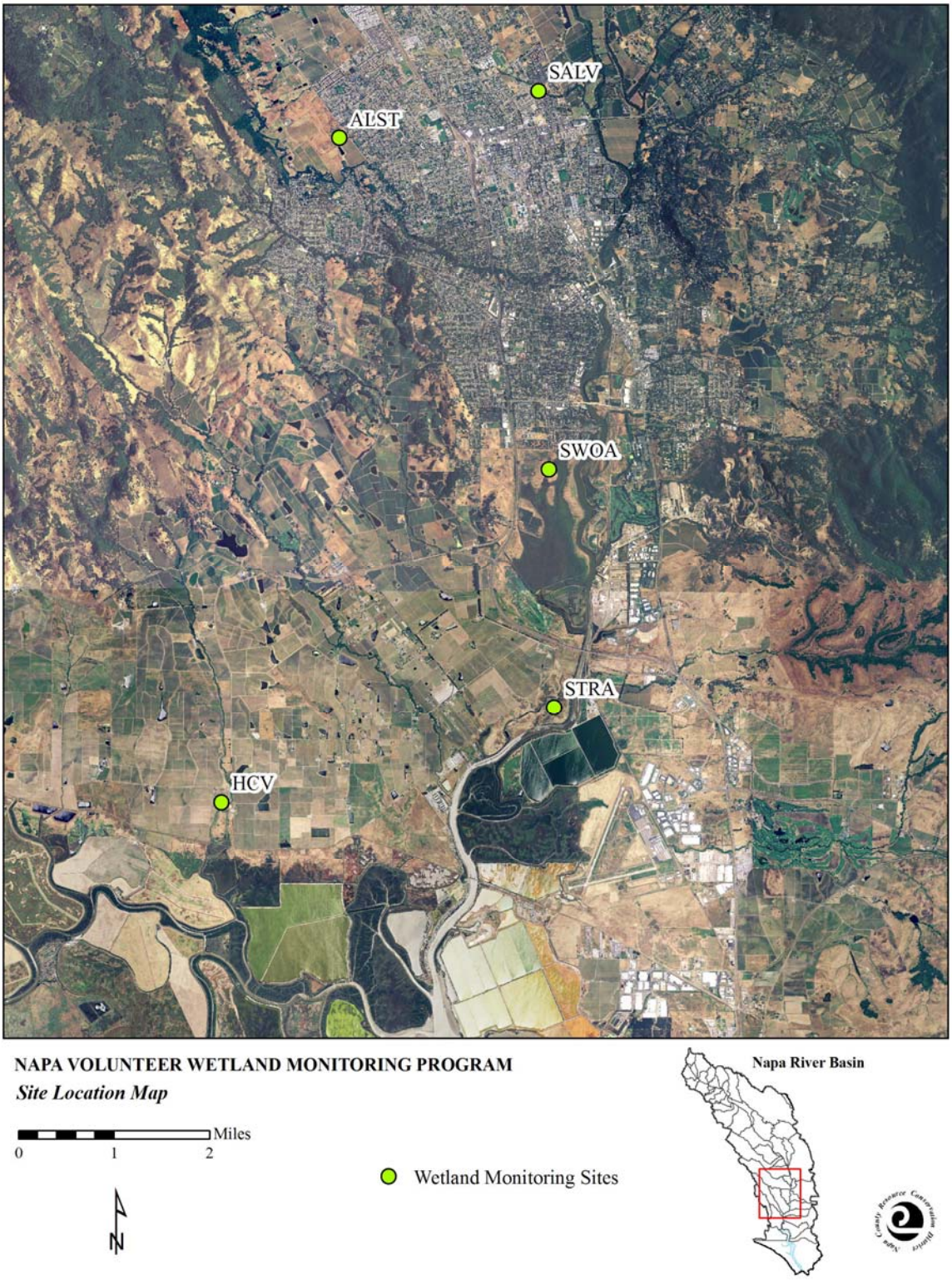


Figure 1-2. Aerial photograph of the Napa Wetland Monitoring Program sites.

(HCV = Huichica Creek, STRA = Stanly Ranch, SWOA = South Wetland Opportunity Area, SALV = Salvador Creek, ASLT = Alston Park. (2002 photo).

1.3 Project Objectives

The purpose of this project was to engage citizens in wetland monitoring activities and form a group of trained volunteers to carry out standardized data collection. Volunteers were trained in the following methods:

- Water Quality Sampling
- Point Count Bird Surveys
- Transect Vegetation Surveys
- Fish Surveys

This project had the following objectives:

1) Establish between 5 and 10 monitoring sites that represent a range of wetland types.

2) Collect scientifically valid data relating to ecological and physical attributes of each site.

3) Recruit and train citizen volunteers to conduct scientific protocols.

4) Conduct educational presentations at elementary schools about the ecological, social, and economic value and functions of wetlands.

2 METHODS

2.1 Site Selection

One goal of this project was to monitor a variety of wetland types. Site selection criteria was determined by landowner access, wetland indicators, and geographic distribution. Classification of each wetland site was based on indicators outlined in the Hydrogeomorphic (HGM) classification system for wetlands (Brinson 1993). This system classifies wetlands into categories based on landscape position (geomorphic setting), water sources, and hydrodynamics (direction of water flow and strength of water movement). It is being increasingly used as the basis for wetland classification and functional assessment systems. HGM classification focuses on the abiotic features of wetlands rather than on the species composition of wetland vegetation on which most of the more traditional wetland classification schemes are based.

Only one of the five sites (STRA) was privately owned, and this property was acquired by the California Department of Fish & Game in 2004, approximately midway through our sampling period. The SWOA site was selected based on recent restoration work in the area surrounding the site and the need for bird monitoring data

to compliment an ongoing vegetation and fish sampling program being coordinated by Napa County and the United States Army Corps of Engineers (USACE).

Water quality monitoring at a sixth site (Ponds 9 and 10 near Fagan Slough) was conducted briefly in 2006. This site was dropped from our monitoring program, as a environmental consulting firm began intensive studies of the area in mid 2006 as part of planned restoration efforts by CDFG.

2.2 Site Descriptions

A summary of HGM classification for each site is given in Table 2.2-1.

Site locations are shown in Figure 1-2, with brief descriptions of each site provided in the following sections.

SITE NAME	SYSTEM	SUB-SYSTEM	CLASS	SUB-CLASS	DOMINANCE TYPE	WATER REGIME	WATER CHEMISTRY
South Wetland Opportunity Area (SWOA)	Estuarine	Intertidal	Emergent Wetland	Persistent		Regularly Flooded	Mixosaline
Stanly Ranch (STRA)	Estuarine	Diked-subtidal	Emergent Wetland	Persistent	Salt Grass, Pickleweed	Permenently flooded channels, Seasonally flooded marsh plain	Mixosaline
Huichica Vineyard Wetland (HCV)	Palustrine		Emergent Wetland	Persistent		Seasonally flooded - artificially	Fresh
Alston Park (ALST)	Palustrine		Unconsolidated Bottom	Mud		Seasonally flooded	Fresh
Salvador Wetland (SALV)	Palustrine		Emergent Wetland	Persistent	Cattails	Seasonally flooded	Fresh

Table 2.2-1. Hydrogeomorphic (HGM) classification of all wetland monitoring sites.

2.2.1 South Wetland Opportunity Area (SWOA)

This site is located at the southern end of the city of Napa adjacent to the Napa River (Figure 2-1). The SWOA is part of the Napa River/Napa Creek Flood Protection Project (Napa Flood Project), which was designed by the Napa County Flood Control and Water Conservation District and the U.S. Army Corps of Engineers (USACE) to provide flood protection and improve habitat by reconnecting the Napa River to its floodplain, creating wetlands, and restoring the natural characteristics of the river.

The SWOA was reopened to tidal action by removal of a levee in 2001 as part of the Napa Flood Project. This action included restoration of physical and biological processes in the Napa River estuary and the SWOA, extending along the west side of the river from Newport North Marina to the Highway 29 bridge, by creating 104 acres of emergent marsh, converting 262 acres of farmland to emergent marsh, and creating and enhancing 136 acres of seasonal wetlands. The enhancement plan included lowering levees, breaching dikes, and constructing marsh plain and floodplain terraces (USACE 2001).

This site was monitored for birds. During our sampling period between 2004 and 2006, various environmental consulting firms conducted monitoring activities at this site including water quality, fish, and vegetation surveys. Data from these efforts are available from the Napa County Flood Control and Water Conservation District.

South Wetland Opportunity Area (December, 2004)

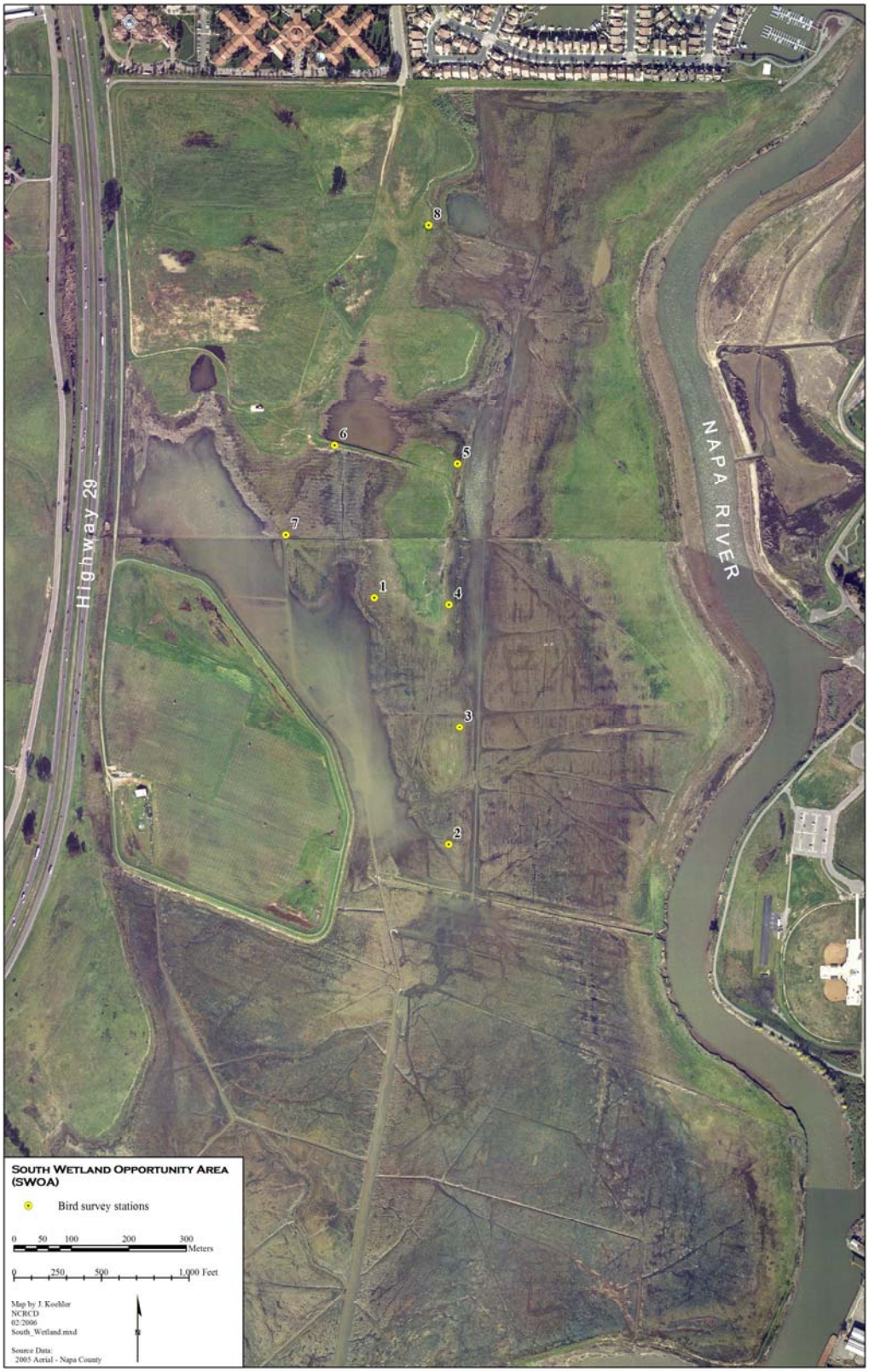


Figure 2-1. Aerial photograph of SWOA.

2.2.2 Stanly Ranch (STRA)

This site is located adjacent to the Napa River south of the Hwy 12/29 bridge (Figure 2-2). Stanly Lane provides access to the site from Hwy 12/121. STRA is entirely within Napa City limits, and was acquired in 2005 by the California Department of Fish and Game (DFG). The DFG has not developed a management plan for the property at the time of this report, but public access is anticipated.

The site is leased for low intensity cattle grazing, and cattle were present year-round during this project from 2004-2006. The upland areas west of STRA consist of vineyards; a winery was built near the north end of the site at the end of Stanly Lane in 2006.

The hydrology of the site is largely regulated by levees and tide gates. The site is mostly inundated in winter and spring by rainfall and runoff from the Congress Valley watershed. Freshwater inputs are channeled through the site from the north end to two outlet culverts along the Napa River. These culverts are equipped with cast iron tide gates to limit tidal exchange from the Napa River.

An Environmental Impact Report was developed for Stanly Ranch in 1998 (LSA 1998), which covered both Stanly North and Stanly South. This document provides a substantial amount of background information about STRA that is not included here.

This site was monitored for birds, water quality, vegetation, and fish.

Stanly Ranch near north slough (March, 2005)

Figure 2-2. Aerial photograph of STRA.

2.2.3 Huichica Creek Vineyard Wetland (HCV)

This site is located adjacent to Huichica Creek in the RCD's demonstration vineyard (Figure 2-3). The site consists of a seasonally flooded marsh that drains a small area north of the RCD vineyard and flows into Huichica creek via a flashboard drop inlet. The soils at this site remain saturated for much of the spring and early summer following flashboard removal.

The Napa County RCD acquired the property with the proceeds of a Coastal Conservancy grant in 1990. The 21 acres is part of a former dairy that had operated (farmed and grazed) for several decades. The site was overgrown with thistles, with little or no riparian vegetation, but a few remnant stands of native grasses.

The purpose of the grant was to demonstrate the compatibility of commercially viable agricultural endeavor as part of a biologically viable site. Vineyard blocks were planted among three, pre-existing wetland features: 1) the Huichica Creek frontage; 2) a linear, "by-pass" flood channel; and 3) a small lowland area west of the by-pass that was recognized on the USGS quad as a swampy area as early as the 1940's.

RCD installed a flashboard weir at the (existing, man-made) outfall of the wetland to the creek in the mid 1990's. This structure backs up winter flood waters into the mapped wetland and the by-pass, where ponded water can be retained until vineyard operations require drainage in the spring.

RCD began tree-planting along the riparian corridors of the creek and bypass (essentially bare in 1990) in 1991. The first plantings were primarily willows; later successional species (black walnut, buckeye, valley oak) are beginning now to provide some shading overstory.

Native wetland grasses, primarily creeping wildrye (*Leymus triticoides*), have steadily increased in the wetland and riparian areas. RCD planted 6000 plugs of this species, in an effort to increase coverage in a roughly half-acre perimeter around the wetland. If successful, this planting will provide increased, superior nesting habitat for ground-nesting birds.

This site was monitored for birds, water quality, and vegetation.

HCV wetland when filled (March, 2005)

HCV after being drained in spring. (April, 2006)

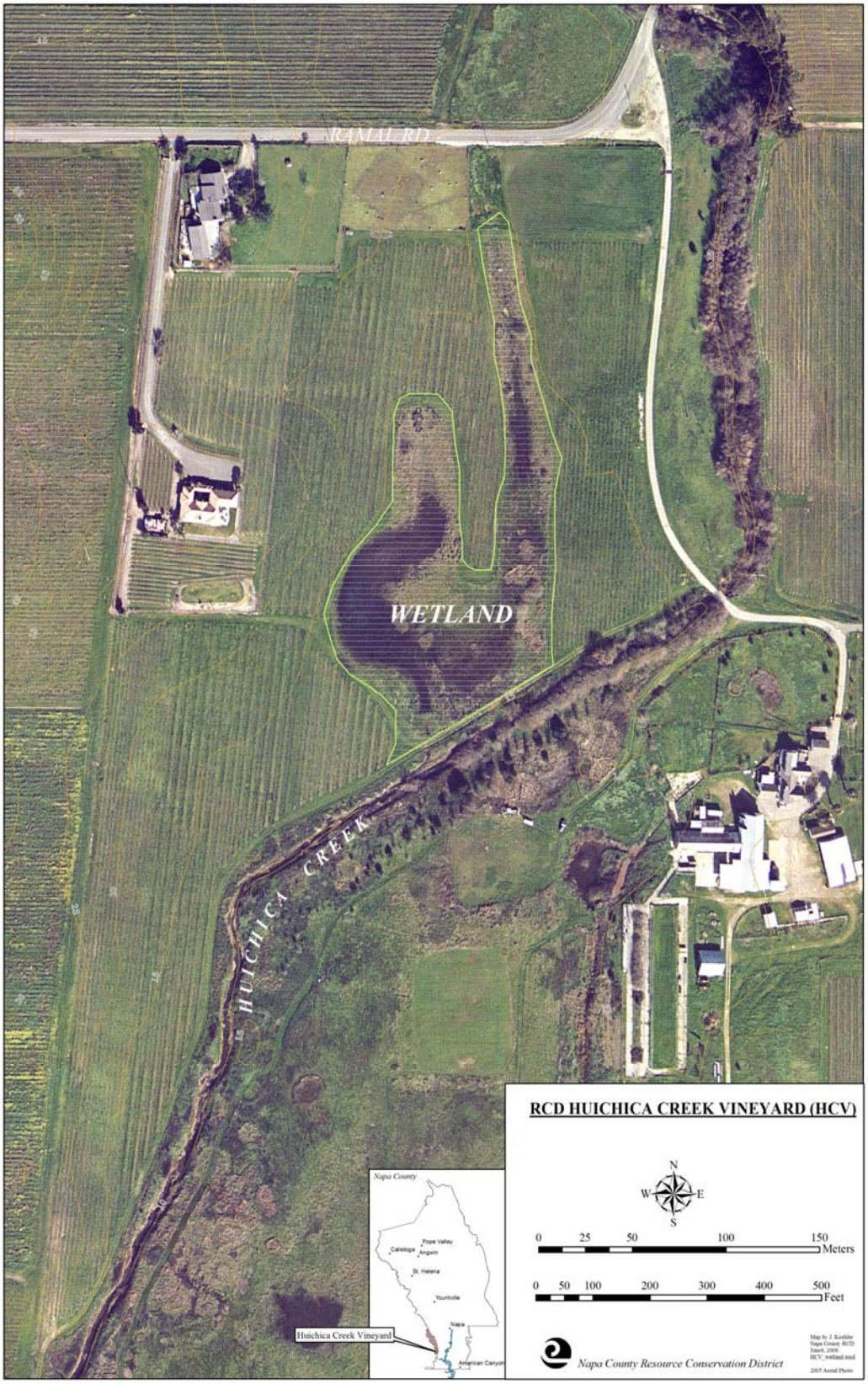


Figure 2-3 Aerial photograph of HCV.

2.2.4 Alston Park Wetland (ALST)

This site is located in Alston Park, which is owned and maintained by the City of Napa Parks and Recreation Department. The site is located along Dry Creek Road in the Redwood Creek watershed (Figure 2-4). The wetland at this site is a small seasonal pond that forms during winter and remains flooded through late spring. The site receives water from an ephemeral stream that drains the upland areas of the park to the west. The site maintains a water depth of approximately 1.5 feet (0.5 meters) during the rainy season.

Alston Park receives heavy use from visitors with dogs, including a fenced area adjacent to the wetland known as "Dog Commons". Dogs frequently swim in the wetland and are unrestricted in the area.

Alston Park wetland in winter (January, 2005)

Alston Park wetland in summer (September, 2005)

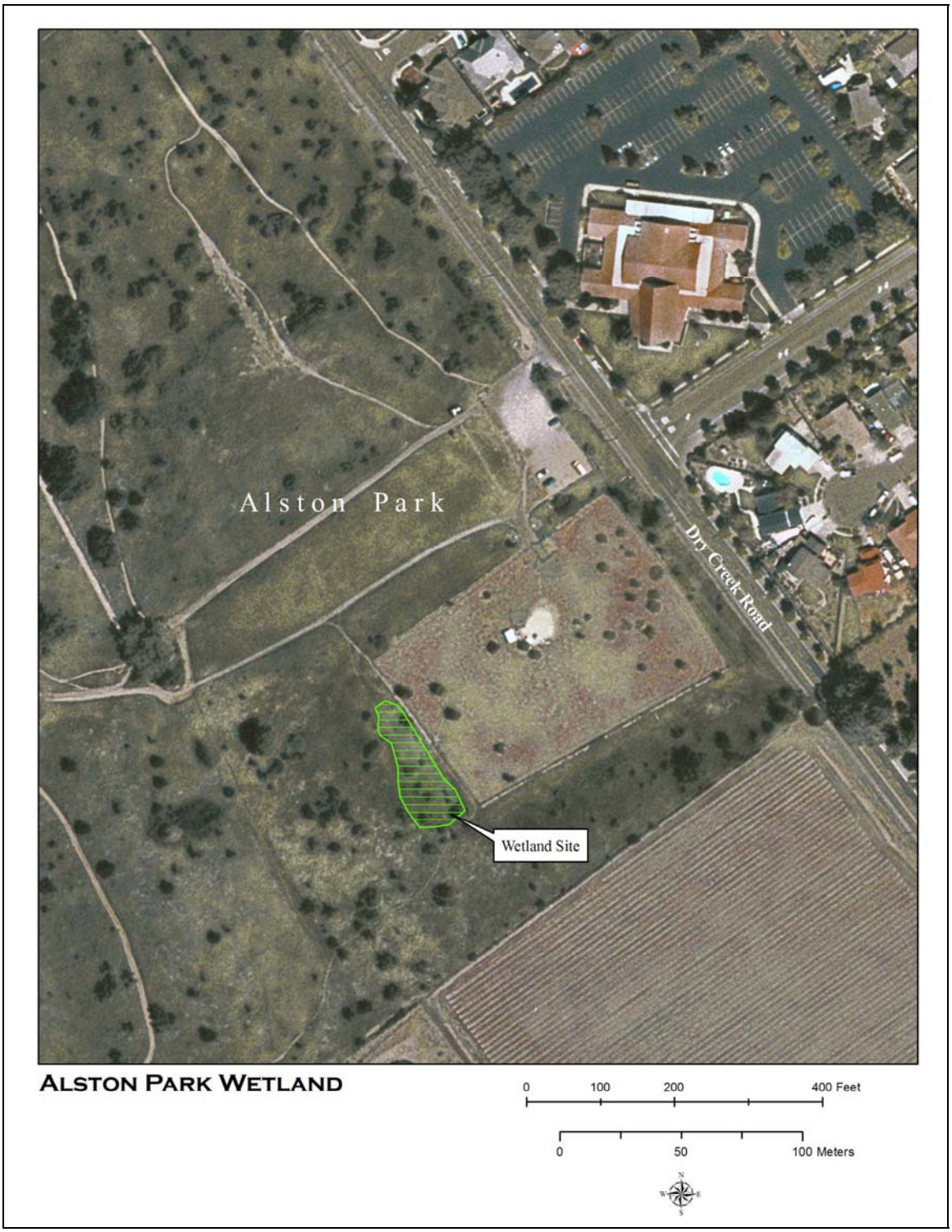


Figure 2-4. Aerial photograph of the Alston Park Wetland site.

2.2.5 Salvador Creek Wetland (SALV)

This site is located at the confluence of Salvador Creek with an unnamed tributary in the city of Napa (Figure 2-5). The site consists of a seasonally inundated pond that fills with the first rains of the winter and remains flooded through midsummer. The wetland is surrounded by housing developments and a paved pedestrian trail to the north. The site is owned by the City of Napa and is intended to improve flood protection of local residences by providing flood storage capacity.

The site maintains an average water depth of 1-2 feet (0.45-0.6 meters) throughout the wet season. The soils at the site remain saturated at the surface during much of the summer and typically become completely dry in September.

Salvador Creek wetland in winter. (February, 2005)

Salvador Creek wetland in summer. (September, 2005)

Figure 2-5. Aerial photograph of the Salvador Creek wetland site.

2.3 Sampling Schedule

Sites were sampled at various intervals according to protocol requirements. A summary of the project sampling schedule is given in table 2.3-1.

Site	Bird Survey	Fish Survey	Vegetation	Water Quality
SWOA	5/04 – 8/06	*Stillwater Sciences*	*CH2M Hill*	*Stillwater Sciences*
STRA	11/04 – 9/06	8/04 – 8/06	8/05 – 10/05	11/04 -9/06
HCV	12/04 – 9/06	*No fish present*	9/06	1/05 – 7/06
ALST	12/05 – 9/06	*No fish present*	7/06	12/05 – 5/06
SALV	12/05 - 9/06	*No fish present*	10/05	12/05 – 6/06

Table 2.3-1. Summary of monitoring activity for each site.

2.4 Quality Control Procedures

All monitoring was conducted in accordance with a Quality Assurance Project Plan (QAPP) prepared at the start of the project. Standard quality control procedures were implemented for data collection, processing, and storage including calibration of field instruments and documentation of volunteer trainings.

2.4.1 Equipment Preparation

Water quality measurements were taken with a handheld YSI 85 electronic multimeter, which measures dissolved oxygen (DO), specific conductance, salinity, and water temperature. The meter was calibrated prior to each sampling event according to the manufacturer's specifications.

Fish sampling equipment was visually inspected for holes and other defects prior to deployment.

2.5 Field Methods

We assessed the appropriateness of the wetland for each monitoring parameter on a site by site basis. Monitoring was conducted if appropriate conditions for the parameter being assessed were present. Water quality sampling was conducted monthly when there was sufficient water to submerge the sampling probe, which required approximately 5 cm (2 inches) of depth.

2.5.1 Bird Survey

Bird surveys were conducted quarterly at all sites using a point count method adopted from the Point Reyes Bird Observatory (PRBO). RCD staff members were trained in the method by PRBO in 2003 and 2004. Volunteers with local bird identification expertise were recruited to collect data at each site. Survey points were marked with PVC pipe and steel rebar, and each survey location was recorded with a handheld GPS unit.

The bird survey methodology is described in Appendix A.

2.5.2 Fish Collection

Fish sampling was conducted at Stanly Ranch using stationary bucket-style minnow traps, and beach seines. Seining proved ineffective at the site due to the presence of soft mud substrate, steep channel sides, and bank vegetation. Consequently the site was seined only when conditions permitted, typically after a series of rain events that temporarily flooded the upland areas adjacent to the channels.

Two sets of bucket-style minnow traps were deployed per sampling event, which consisted of two traps joined by an intermediate drift fence. The traps were oriented at both ends of the drift fence to direct fish into the trap's funnel opening. Traps were placed in channels with adequate depth to fully submerge them. Traps were collected and samples processed after approximately 24 hours.

The fish collection methodology is described in Appendix B.

2.5.3 Vegetation Survey

Vegetation was surveyed along transects at each site. Transects were marked with PVC pipe stakes in the field and start and end points were recorded with a handheld GPS. Transects were digitized into a GIS layer and distances were calculated from these data.

The vegetation survey methodology is described in Appendix C.

2.5.4 Water Quality

Water quality sampling consisted of monthly testing for the following measured parameters:

- Dissolved Oxygen (DO)
- Specific Conductance
- pH
- Water Temperature
- Salinity

Additional qualitative observations on flow, water color, water depth, odor, habitat change, and water appearance were also made.

3 RESULTS AND DISCUSSION

3.1 Bird Survey Results

3.1.1 SWOA Birds

A total of 69 species of birds were documented at SWOA during point count surveys between May 2004 and August 2006 (Table 3.1-1). Two additional species of significance were also sited at SWOA during non-survey visits: Peregrine Falcon (*Falco peregrinus*) and Burrowing Owl (*Athene cunicularia*). The Burrowing Owl was sited in the northern end of the property in an upland transition area adjacent to grassland. The Peregrine Falcon was observed roosting on an electrical transmission tower at the far south end of the site.

Mallard nest at SWOA (May, 2004)

Volunteers (Herb McGrew and Mike Parmeter) conducting a bird survey at SWOA.

1	American Avocet	44	Northern Pintail
2	American Coot	45	Northern Shoveler
3	American Crow	46	Pine Siskin
4	American Goldfinch	47	Red-shouldered Hawk
5	American Green-winged Teal	48	Red-tailed Hawk
6	American Kestrel	49	Red-winged Blackbird
7	American Pipit	50	Ring-billed Gull
8	American White Pelican	51	Rock Dove (Feral Pigeon)
9	American Wigeon	52	Ruddy Duck
10	Barn Swallow	53	Savannah Sparrow
11	Black Phoebe	54	Scaup Species
12	Black-bellied Plover	55	Scrub Jay
13	Black-necked Stilt	56	Snow Goose
14	Black-shouldered Kite	57	Snowy Egret
15	Blue-winged Teal	58	Snowy Plover
16	Brewer's Blackbird	59	Song Sparrow
17	California Gull	60	Tree Swallow
18	Canada Goose	61	Turkey Vulture
19	Caspian Tern	62	Western Bluebird
20	Cinnamon Teal	63	Western Gull
21	Cliff Swallow	64	Western Meadowlark
22	Common Raven	65	Western Sandpiper
23	Double-crested Cormorant	66	White-crowned Sparrow
24	European Starling	67	White-faced Ibis
25	Forster's Tern	68	White-tailed Kite
26	Gadwall	69	Willet
27	Great Blue Heron		
28	Great Egret		
29	Greater White-fronted Goose		
30	Greater Yellowlegs		
31	Horned Lark		
32	House Finch		
33	Killdeer		
34	Least Sandpiper		
35	Lesser Yellowlegs		
36	Long-billed Curlew		
37	Long-billed Dowitcher		
38	Mallard		
39	Marbled Godwit		
40	Marsh Wren		
41	Mourning Dove		
42	Northern Harrier		
43	Northern Mockingbird		

Table 3.1-1. SWOA bird list

3.1.2 STRA Birds

A total of 51 bird species were documented at Stanly Ranch during point count surveys between November 2004 and September 2006 (Table 3.1-2).

1	American Coot	26	House Finch
2	American Crow	27	Killdeer
3	American Green-winged Teal	28	Long-billed Curlew
4	American Kestrel	29	Mallard
5	American Pipit	30	Marbled Godwit
6	American Robin	31	Marsh Wren
7	American Wigeon	32	Mourning Dove
8	Ash-throated Flycatcher	33	Northern Flicker
9	Bank Swallow	34	Northern Harrier
10	Barn Swallow	35	Belted Kingfisher
11	Black Phoebe	36	Northern Mockingbird
12	Black-necked Stilt	37	Northern Pintail
13	Brewer's Blackbird	38	Northern Shoveler
14	Canada Goose	39	Peregrine Falcon
15	Cinnamon Teal	40	Pied-billed Grebe
16	Cliff Swallow	41	Red-tailed Hawk
17	Common Raven	42	Red-winged Blackbird
18	Double-crested Cormorant	43	Ring-billed Gull
19	Dowitcher species	44	Ruddy Duck
20	European Starling	45	Savannah Sparrow
21	Gadwall	46	Say's Phoebe
22	Golden Eagle	47	Snowy Egret
23	Great Blue Heron	48	Turkey Vulture
24	Great Egret	49	Violet-green Swallow
25	Greater Yellowlegs	50	Western Meadowlark
		51	White-tailed Kite

Table 3.1-2. Stanly Ranch bird list

3.1.3 HCV Birds

A total of 40 bird species were documented at HCV during point count surveys between December 2004 and September 2006 (Table 3.1-3).

1	American Crow	21	House Finch
2	American Goldfinch	22	Killdeer
3	American Pipit	23	Lesser Goldfinch
4	American Robin	24	Mallard
5	Barn Swallow	25	Mourning Dove
6	Black Phoebe	26	Northern Flicker
7	Black-shouldered Kite	27	Northern Harrier
8	Brewer's Blackbird	28	Northern Mockingbird
9	Bushtit	29	Pheasant
10	California Quail	30	Red-tailed Hawk
11	California Towhee	31	Red-winged Blackbird
12	Canada Goose	32	Ring-billed Gull
13	Cliff Swallow	33	Savannah Sparrow
14	Common Raven	34	Say's Phoebe
15	Common Yellowthroat	35	Scrub Jay
16	Double-crested Cormorant	36	Snowy Egret
17	Dunlin	37	Song Sparrow
18	European Starling	38	Spotted Towhee
19	Golden-crowned Sparrow	39	White-crowned Sparrow
20	Greater Yellowlegs	40	Yellow-rumped Warbler

Table 3.1-3. HCV bird list

3.1.4 ALST Birds

A total of 18 bird species were documented at ALST during point count surveys between December 2005 and September 2006 (Table 3.1-4).

1	Acorn Woodpecker	11	Northern Mockingbird
2	American Crow	12	Oak Titmouse
3	Anna's Hummingbird	13	Rufous-sided Towhee
4	Black Phoebe	14	Tree Swallow
5	Bushtit	15	Western Bluebird
6	California Towhee	16	Western Meadowlark
7	Common Raven	17	White-crowned Sparrow
8	Great Egret	18	Yellow-rumped Warbler
9	Hairy Woodpecker		
10	House Finch		

Table 3.1-4. ALST bird list

3.1.5 SALV Birds

A total of 17 bird species were documented at SALV during point count surveys between December 2005 and September 2006 (Table 3.1-5).

1	Acorn Woodpecker	11	Oak Titmouse
2	American Crow	12	Red-winged Blackbird
3	Anna's Hummingbird	13	Rock Dove (Feral Pigeon)
4	Black Phoebe	14	Ruby-crowned Kinglet
5	Bushtit	15	Scrub Jay
6	California Towhee	16	Song Sparrow
7	European Starling	17	White-crowned Sparrow
8	House Finch		
9	Marsh Wren		
10	Mourning Dove		

Table 3.1-5. SALV bird list

3.2 Water Quality Results

3.2.1 Water Temperature Results

Summarized water temperature results are shown in Table 3.2 – 1 and Figure 3-1

Water temperature measured at the north end of Stanly Ranch (ST1) ranged from 9.4° to 29.7° C with a median value of 15.6° C. The highest recorded temperature occurred in July, 2006 and the lowest temperature occurred in December, 2005.

Water temperatures in the slough at the south end of Stanly Ranch (ST South) ranged from 7° to 22.6° C with a median value of 16.4° C. The highest value occurred in May, 2005 and the lowest in December, 2005.

HCV water temperatures ranged from 8.4° to 19.6° C with a median value of 12.8° C. The highest recorded temperature occurred in July, 2006 and the lowest recorded value was in January, 2006.

Water temperatures measured at ALST ranged from 10.2° to 30.1° C with a median value of 15.2° C. The highest recorded water temperature occurred in May, 2006 and the lowest value was in December, 2005.

Water temperatures at SALV ranged from 10° to 28.2° C with a median value of 16.4° C. The highest recorded value occurred in June, 2006 and the lowest was in January, 2006.

Site	**HCV**	**ST1**	**ST South**	**ALST**	**SALV**
Median (°C)	12.8	15.6	16.4	15.2	16.4
Minimum (°C)	8.4	9.4	7	10.2	10
Maximum (°C)	19.6	29.7	22.6	30.1	28.2

Table 3.2-1. Summarized water temperature results for all sites.

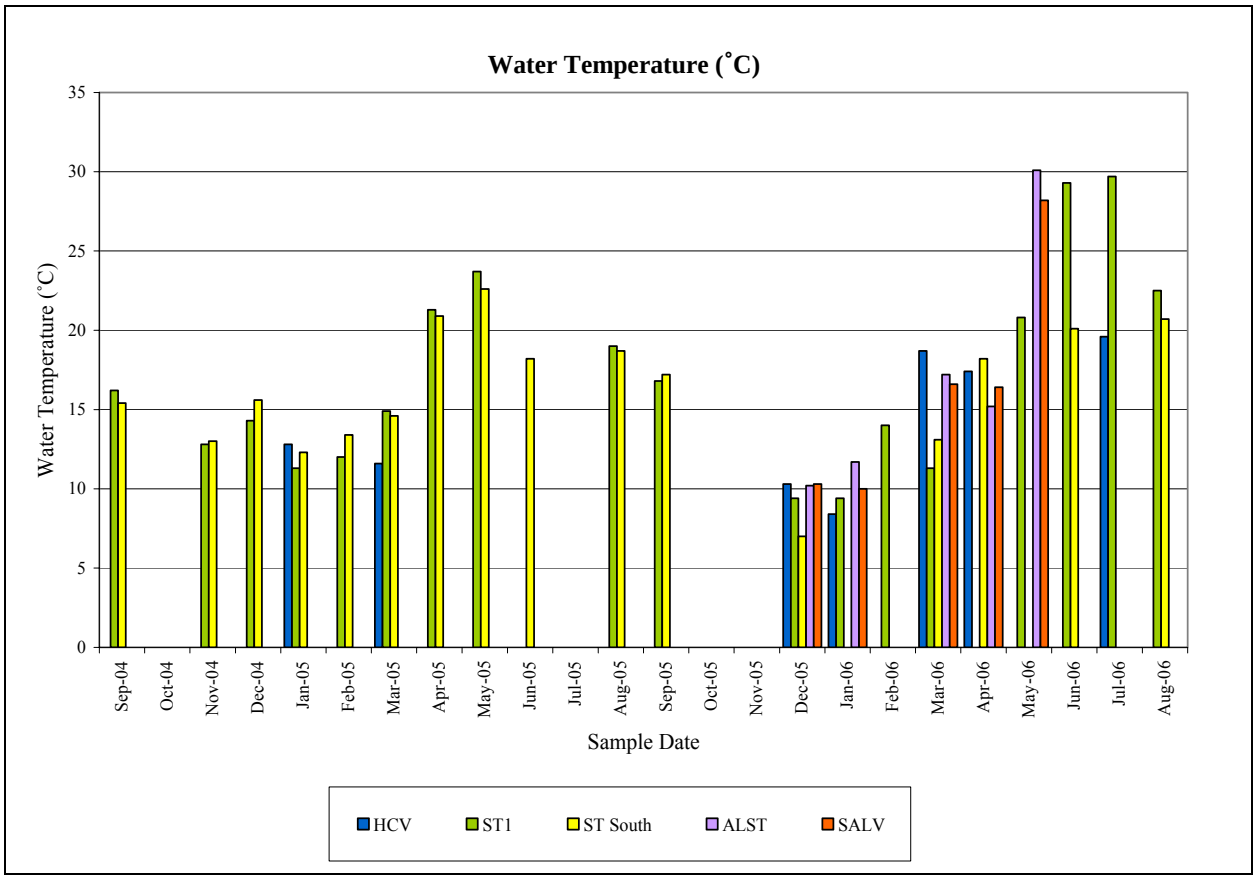


Figure 3-1. Water temperature results for all monitoring sites.

3.2.2 Dissolved Oxygen Results

Summarized water temperature results are shown in Table 3.2 – 2 and Figure 3-2.

Levels of dissolved oxygen (DO) measured in the slough at the south end of Stanly Ranch (ST South) ranged from 0.95 mg/L to 18.95 mg/L with a median value of 8.53 mg/L. The highest value was recorded in June, 2006 and the lowest value was in Dec, 2004.

DO in the channel at the north end of Stanly Ranch (ST1) ranged from 2.81 mg/L to 9.35 mg/L with a median value of 6.58 mg/L. The highest DO value was recorded in February, 2005 and the lowest value was in June, 2006.

DO measured at HCV ranged from 0.09 mg/L to 18.32 mg/L with a median value of 7.08 mg/L. The highest value occurred in January, 2005 and the lowest was in July, 2006.

DO measured at ALST ranged from 3.74 mg/L to 18.64 mg/L with a median value of 6.75 mg/L. The highest value occurred in January, 2006 and the lowest occurred in December, 2005.

DO measured at SALV ranged from 4.4 mg/L to 13.92 mg/L with a median value of 6.67 mg/L. The highest recorded value occurred in January, 2006 and the lowest was in April, 2006.

Site	HCV	ST1	ST South	ALST	SALV
Median (mg/L)	7.08	8.53	6.58	6.75	6.67
Minimum (mg/L)	0.09	0.95	2.81	3.74	4.4
Maximum (mg/L)	18.32	18.95	9.35	18.64	13.92

Table 3.2-2. Summarized dissolved oxygen results from all sites.

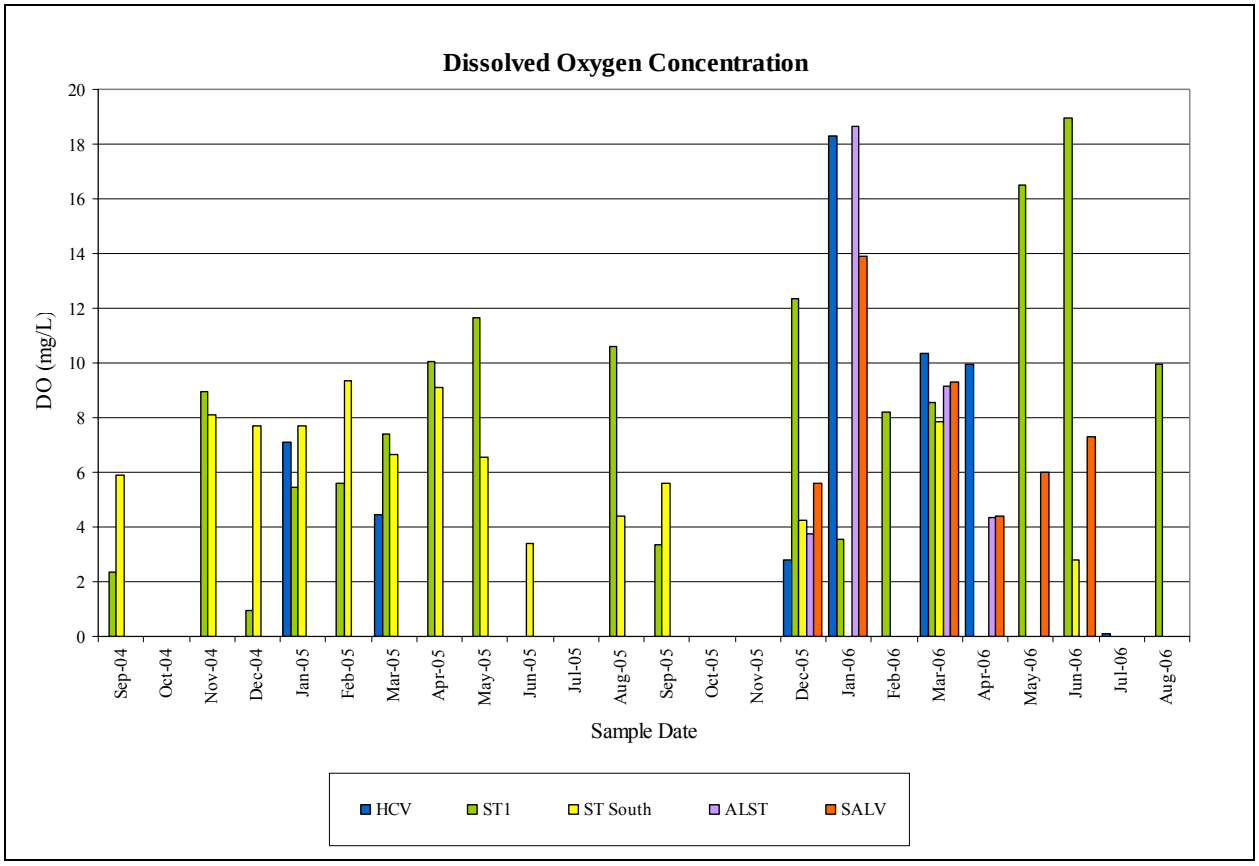


Figure 3-2. Dissolved oxygen concentration results for all sites.

3.2.3 Specific Conductance

Summarized water temperature results are shown in Table 3.2 – 3 and Figure 3-3 and Figure 3-4.

Specific conductance measured in the slough at the south end of Stanly Ranch (ST South) ranged from 1,018 µS/cm to 39,610 µS/cm with a median value of 5,700 µS/cm. The highest recorded value occurred in September, 2004 and the lowest value was in March, 2005.

Specific conductance in the channel at the north end of Stanly Ranch (ST1) ranged from 519 µS/cm to 40,720 µS/cm with a median value of 4,276 µS/cm. The highest value occurred in September, 2004 and the lowest was in March, 2006.

HCV values for specific conductance ranged from 351.8 µS/cm to 1,164 µS/cm with a median value of 496 µS/cm. The highest value occurred in July, 2006 and the lowest occurred in December, 2005.

ALST values for specific conductance ranged from 68.1 µS/cm to 155.1 µS/cm with a median value of 93.4 µS/cm. The highest recorded value at ALST occurred in December, 2005 and the lowest was in April, 2006.

Specific conductance at ALST ranged from 95.6 µS/cm to 139.6 µS/cm with a median value of 102 µS/cm. The highest recorded value occurred in June, 2006 and the lowest was in April, 2006.

Site	**HCV**	**ST1**	**ST South**	**ALST**	**SALV**
Median (µS/cm)	496	4,276	5,700	93.4	102
Minimum (µS/cm)	351.8	519	1,018	68.1	95.6
Maximum (µS/cm)	1,164	40,720	39,610	155.1	139.6

Table 3.2-3. Summarized specific conductance results from all sites.

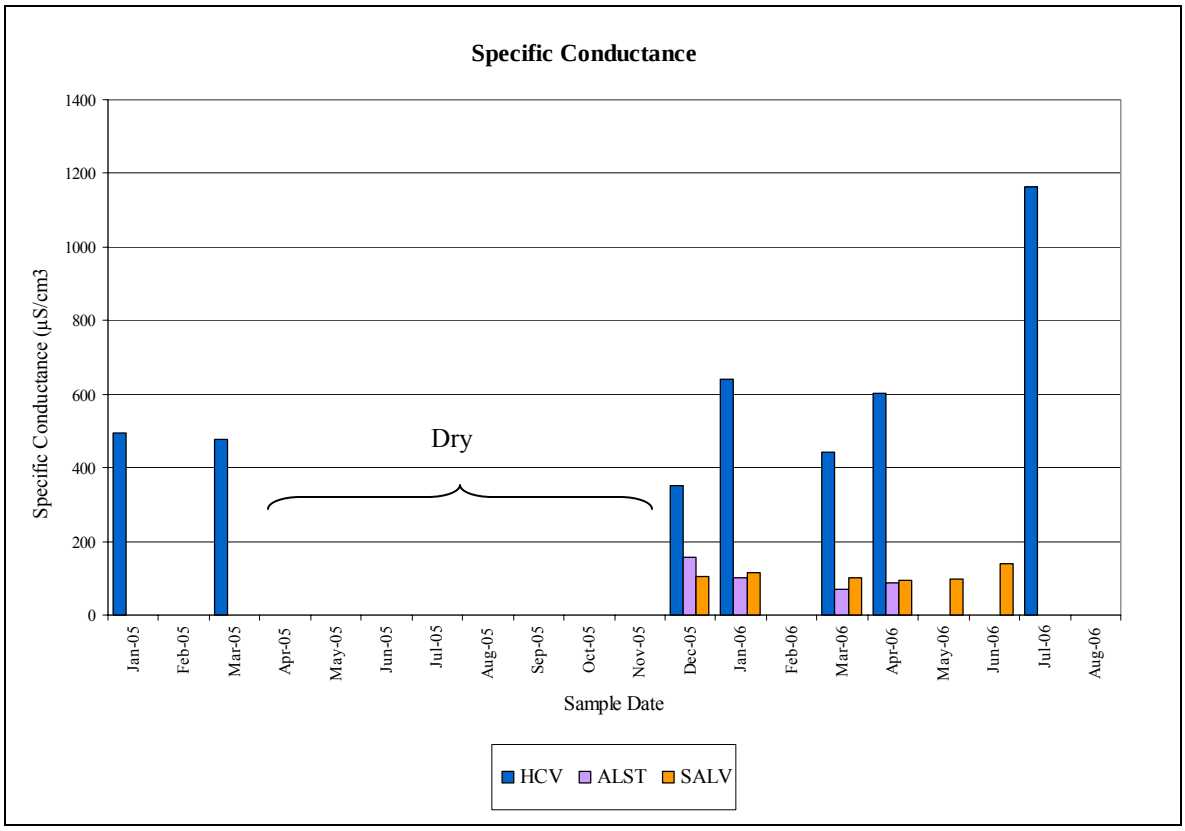


Figure 3-3. Specific conductance concentration results for HCV, ALST, SALV. Note these three sites were dry during summer.

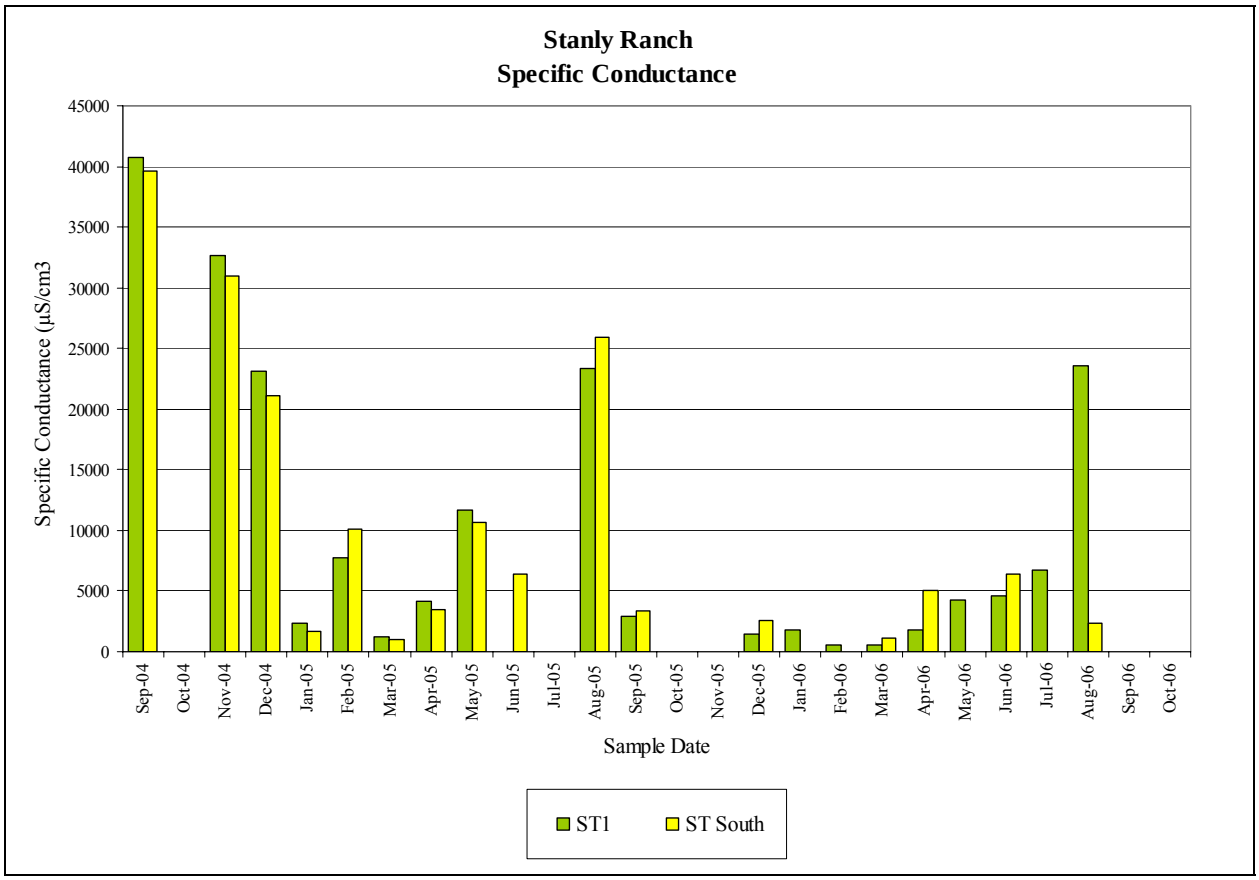


Figure 3-4. Specific conductance concentration results for Stanly Ranch.

3.2.4 pH

Summarized pH results are shown in Table 3.2 – 4, and Figure 3-5.

A total of seven pH samples were collected at HCV ranging from 6.5 to 7 with a median value of 6.5.

The channel at the north end of Stanly Ranch (ST1) had pH values ranging from 6.5 to 9 with a median value of 7.5. The highest values occurred in summer, 2006 and the lowest values were from January through April.

The slough at the south end of Stanly Ranch (ST South) had pH values ranging from 6 to 9 with a median value of 7. The highest value occurred in September, 2004 and the lowest was in January, 2005.

At ALST, the pH ranged from 5.5 to 7 with a median value of 5.5. The highest value occurred in May, 2006 and the lowest value was recorded in April through June.

SALV had pH values ranging from 5.5 to 6.5 with a median value of 5.8.

Site	HCV	ST1	ST South	ALST	SALV
Median (pH units)	6.5	7.5	7	5.5	5.75
Minimum (pH units)	6.5	6.5	6	5.5	5.5
Maximum (pH units)	7	9	9	7	6.5

Table 3.2-4. Summarized pH results from all sites.

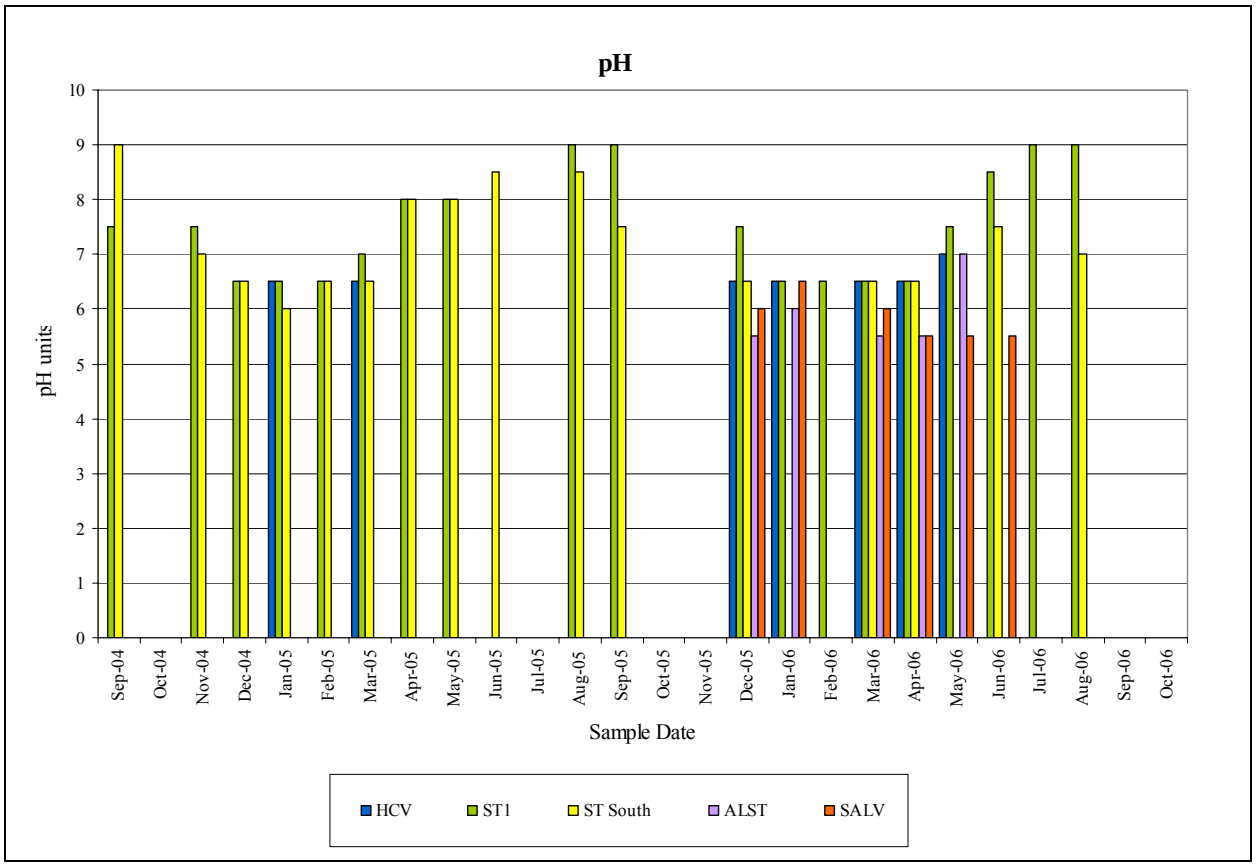


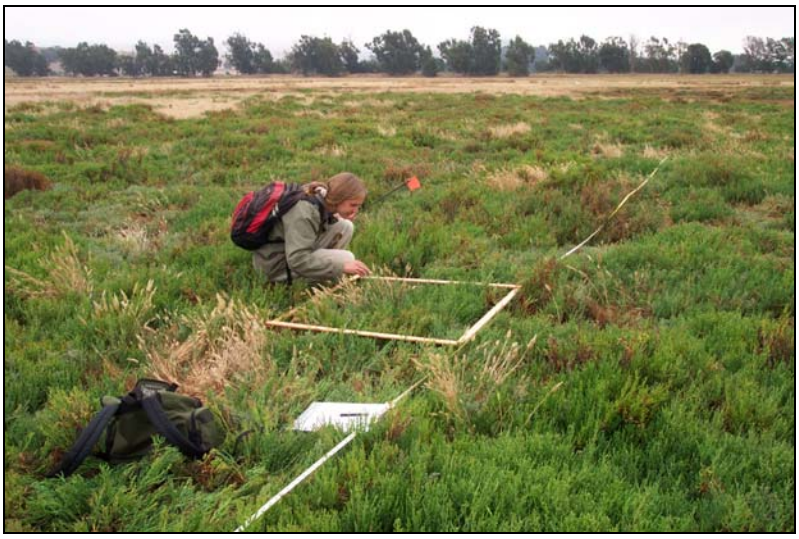
Figure 3-5. pH results for all sites.

3.3 Vegetation Results

3.3.1 STRA Vegetation

A total of five sampling transects were established at STRA between 8/22/2005 and 10/19/2005. Transects were sampled using regularly spaced one square meter (1 m^2) quadrats starting at a random point. Several sampling locations occurred in areas with cattle grazing, which contained trampled and partially eaten vegetation. Identification of some plant specimens in these quadrats was impossible.

A total of 13 plant species were documented along these transects (Figure 3-6). Two additional specimens could only be identified to genus.



Sampling quadrat placed randomly along a transect.

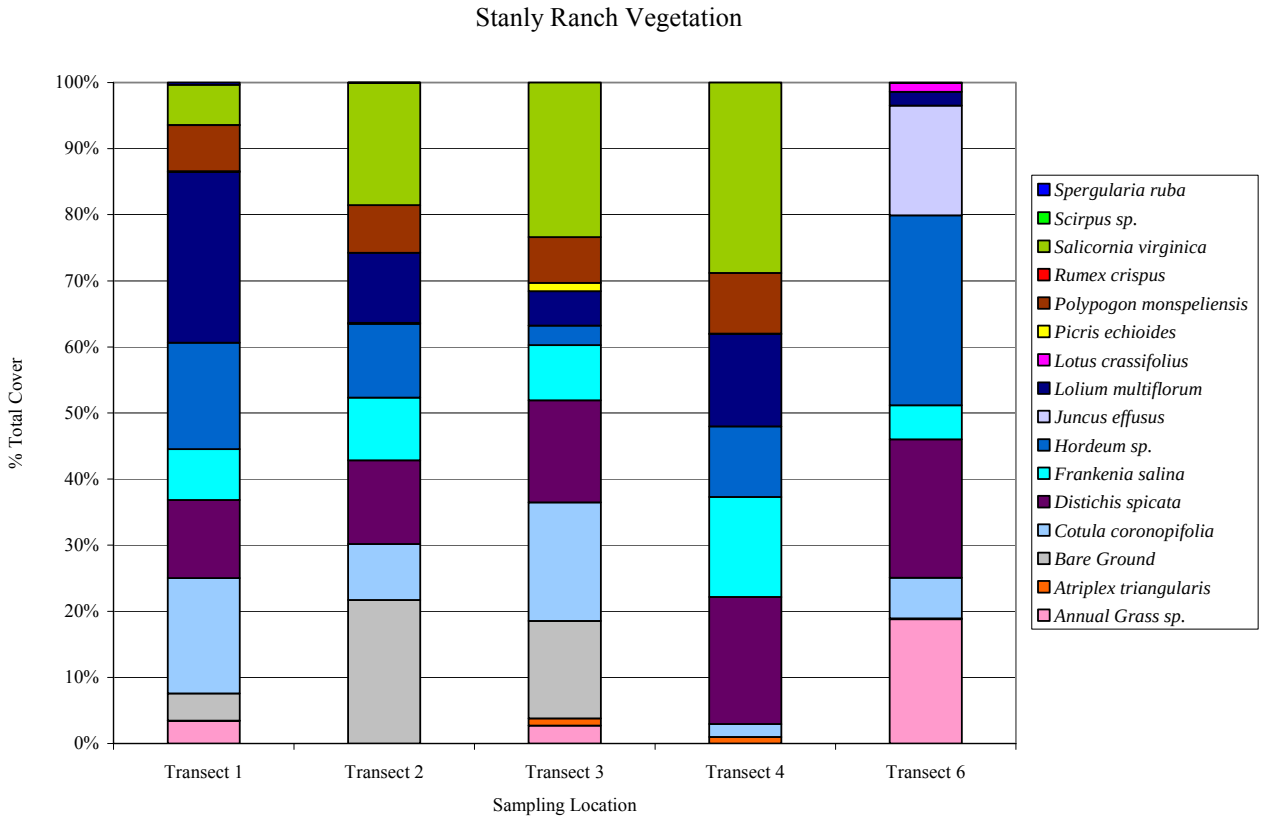


Figure 3-6. Vegetation sampling results from five transects at Stanly Ranch.

3.3.2 HCV Vegetation

A total of five sampling transects were established at HCV between 9/22/2005 and 10/19/2005. Each transect was sampled using regularly spaced one square meter (1 m^2) quadrats. A total of 10 plant species were documented along these transects (Figure 3-7). Two additional specimens were identified to genus level, and one species of annual grass was unidentifiable due to damage.

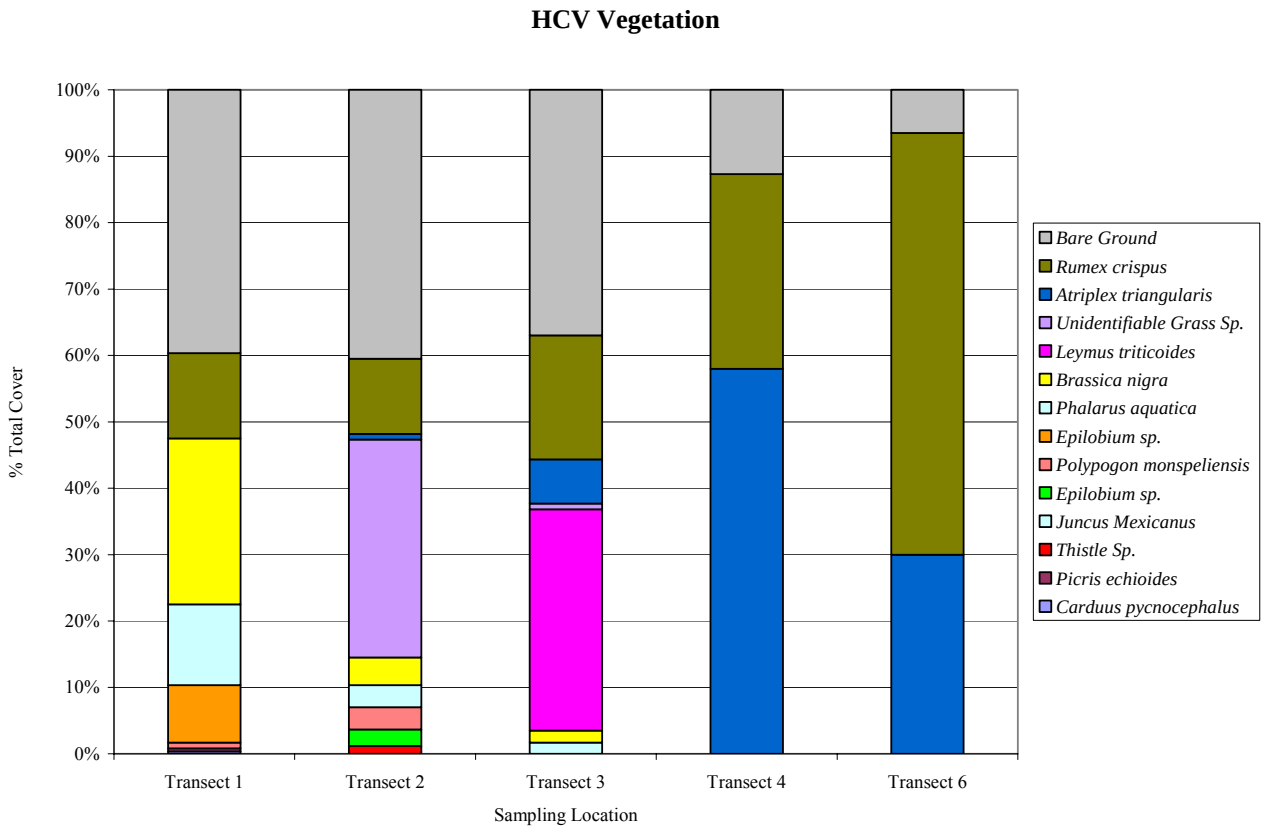


Figure 3-7. Vegetation sampling results from five transects at HCV.

3.3.3 ALST Vegetation

A total of three sampling transects were established at ALST on 7/19/2006. Each transect was sampled using regularly spaced one square meter (1 m^2) quadrats beginning at a random point. A total of 8 plant species were identified along these transects (Figure 3-8). Two additional specimens were identified to genus level.

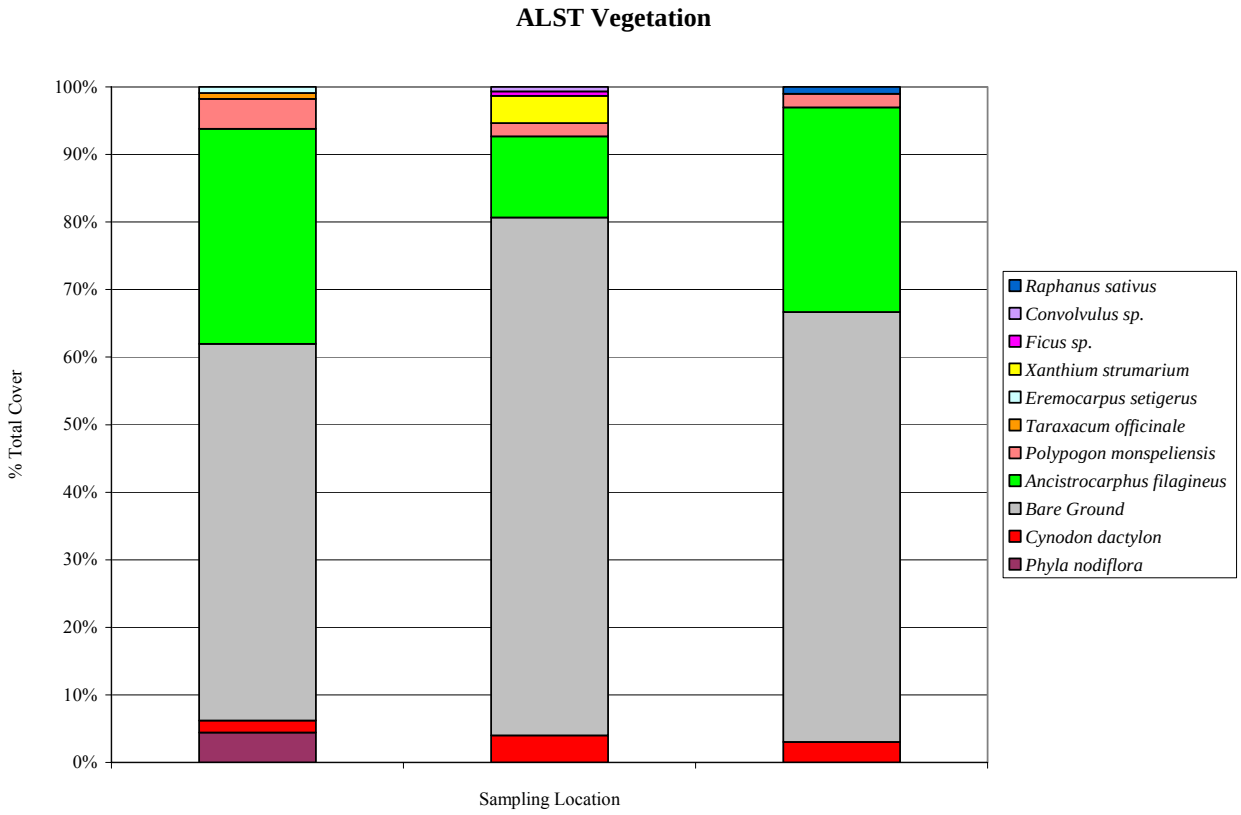


Figure 3-8. Vegetation sampling results from three transects at Alston Park.

3.3.4 SALV Vegetation

A total of five sampling transects were established at SALV on 7/19/2006. Each transect was sampled using one square meter (1 m^2) quadrats placed at regular intervals beginning from a random point. A total of 16 plant species were documented along these transects (Figure 3-9). Seven additional specimens were identified to genus level.

Laying out transects at SALV

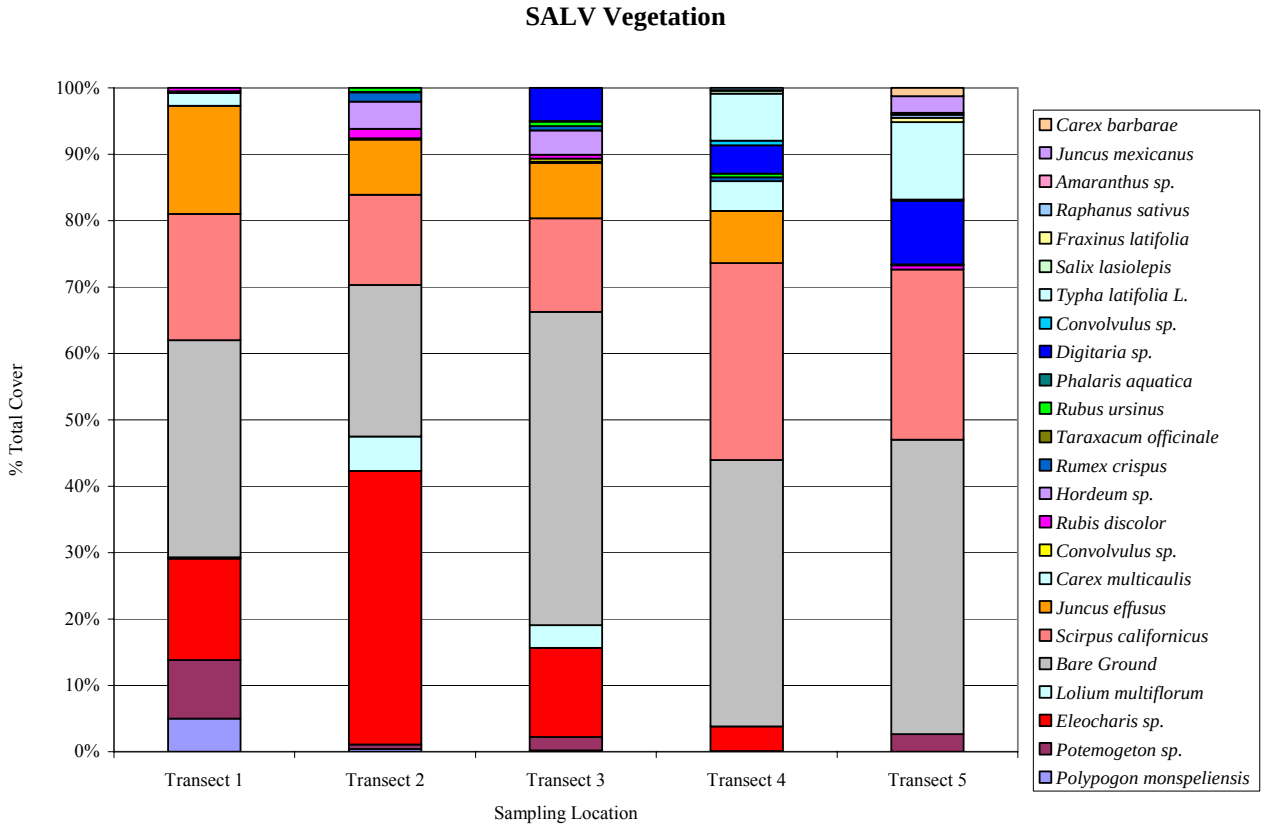


Figure 3-9. Vegetation sampling results from five transects at Salvador Creek.

3.4 Fish Results

3.4.1 STRA Fish

A total of six fish species were captured using minnow traps and beach seines in channels at Stanly Ranch. Two of these species were native and four were exotic (Table 3.4-1). Fish abundance was generally highest during our summer sampling period and lowest in the winter.

Species Code	Common Name	Scientific Name	Origin
CCR	Common carp	*Cyprinus carpio*	Introduced
GRS	Green sunfish	*Lepomis cyanellus*	Introduced
MOF	Mosquitofish	*Gambusia affinis*	Introduced
PSC	Prickly sculpin	*Cottus asper*	Native
RWK	Rainwater Killifish	*Lucania parva*	Introduced
TSS	Threespine stickleback	*Gasterosteus aculeatus*	Native

Table 3.4-1. Fish species captured at Stanly Ranch

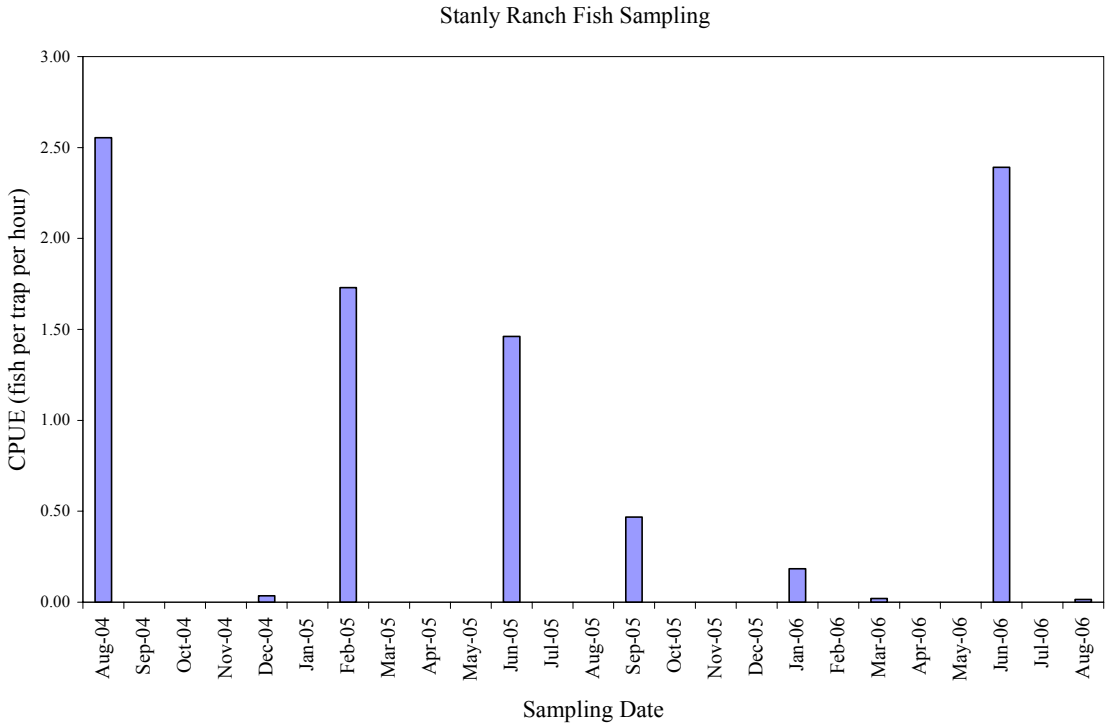


Figure 3-10. Fish sampling results from 8/2004 -8/2006 at Stanly Ranch.

4 CONCLUSIONS

Bird abundance and diversity was highest at the SWOA during all sampling periods. Of the 3 seasonally flooded sites ALST and SALV had relatively low bird abundance and diversity during all seasons. HCV had a consistently moderate number of birds during all seasons, with migratory waterfowl present mostly in winter and spring.

Water quality at all sites showed typical seasonal patterns associated with rainfall and the associated flushing effects from runoff. Generally, the best water quality for supporting aquatic organisms was documented during late winter and early spring at all sites.

STRA showed major shifts in water quality throughout the monitoring period, which may be in some part attributed to nutrient inputs from cattle grazing operations at the site. During the summer when flow through the site was generally low, extensive filamentous algae mats were commonly documented covering much of the water's surface in channels at the site.

Our monitoring results for SWOA show extensive use of the site by a high diversity and abundance of local and migratory birds. The current bird community, which includes mostly wetland-dependant species, appears to be a result of the habitat restoration work at this site as part of the Napa River Flood Control Project. Continued bird monitoring at SWOA is recommended to document further change over time.

The fish assemblage captured at Stanly Ranch consists of highly adaptable species, which are able to tolerate variable water quality and salinity conditions. Summer time water quality was generally characterized by low dissolved oxygen, warm water temperature, and moderate salinity. Runoff during the winter created seasonal flooding of the adjacent floodplain and continuous flow through the channels, resulting in cold freshwater conditions from approximately December through April. Fish abundance was highest in summer of all three years, with a noticeable decline in winter. Only one winter sample (February, 2005) had a high number of fish, which consisted mostly of threespine stickleback.

Fish access to Stanly Ranch from the Napa River is restricted by the presence of tide gates on the outlet culverts. The lower Napa River supports a fish community of over 40 species (Stillwater 2005), many of which would be expected to colonize or regularly utilize the channels in Stanly Ranch if access were available.

Successful breeding by two amphibian species, Pacific treefrog (*Hyla regilla*) and western toad (*Bufo boreas*), was documented at ALST and SALV. Both sites appeared to be well seeded with tadpoles in late winter of 2006 and recently metamorphosed juveniles of both species were observed in spring.

STRA had relatively high bird diversity and abundance during winter and spring, and relatively low numbers during the summer and fall. These patterns appeared to be associated with seasonal flooding. On several occasions during spring of 2005 and 2006,

volunteers observed huge swarms of Midge (*Chironomidae*). The aquatic larvae and terrestrial adult stages of these insects may provide an important food source for both birds and fish at the site.

Several wetland-dependant bird species were documented feeding and nesting around the wetland at HCV. The presence of freshwater at the site likely creates a significant attraction for waterfowl and other wading birds in the greater Huichica Creek area.

Dogs swimming in the seasonal pond at Alston Park are likely reducing the site's potential to support complex vegetation and a diverse bird community. The pond's banks were regularly trampled by human and dog traffic during much of our monitoring period, preventing young wetland plants from establishing. Water quality may also be degraded at the site, as we observed dog feces in the immediate vicinity of the wetland on several occasions. Alternatives to improve ecological and water quality conditions of the pond should be considered. These may include a voluntary approach that relies on educational signs placed around the wetland, or a more exclusionary approach such as a fence.

Volunteer monitors are continuing to conduct bird surveys at SWOA, HCV, and STRA as part of the RCD's volunteer monitoring program. Survey frequency is dependant on volunteer availability and resources, but is expected to continue on an approximately semi-annual basis. We are currently trying to recruit volunteers for ALST and SALV. Water quality is also continuing to be monitored at all sites under the RCD's volunteer monitoring program on a quarterly basis.

REFERENCES

Brinson, M.M. 1993. *A Hydrogeomorphic Classification for Wetlands*. Wetlands Research Program Technical Report WRP-DE-3, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.

LSA. 1998. Draft Stanly Ranch Specific Plan Environmental Impact Report.

Mitchell, M. K., W. B. Stapp. 1995. *Field Manual for Water Quality Monitoring.* Thomson-Shore Printers. 272 pp

Moyle, P.B. 2002. Inland Fishes of California. University of California Press, Berkeley. 502 pp

Napa County RCD. 1999. *Napa River Watershed Owner's Manual.*

PRBO San Francisco Bay Project: *Area Survey Transect Protocol* - 2001

PRBO Tidal Marsh Bird Project: *Point Count Protocol* - 2002

U.S. EPA. 2002. *Methods for Evaluating Wetland Condition: Introduction to Wetland Biological Assessment.* Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA-822-R-02-014.

U.S. EPA. 2002. *Methods for Evaluating Wetland Condition: Biological Assessment Methods for Birds.* Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA-822-R-02-023.

U.S. EPA. 2002. *Methods for Evaluating Wetland Condition: Volunteers and Wetland Biomonitoring.* Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA-822-R-02-018.

U.S. EPA. 2002. *Methods for Evaluating Wetland Condition: Study Design for Monitoring Wetlands.* Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA-822-R-02-015.

U.S. EPA. 2002. *Guidance on Choosing a Sampling Design for Environmental Data Collection for Use in Developing a Quality Assurance Project Plan,* United States Environmental Protection Agency Washington, DC, *EPA QA/G-5S*

USACE. 2001. Final workplan and QA/QC plan for implementation of the Year 2001 Napa River fisheries monitoring program. Prepared by Stillwater Sciences, Davis and Jones & Stokes Associates, Sacramento for USACE, Sacramento District, California.

APPENDICES

Appendix A - Bird Survey Methodology (Point Count)

Appendix B - Fish Survey Methodology

Appendix C - Vegetation Survey Methodology (Transect)

Appendix A - Bird Survey Methodology (Point Count)

NAPA COUNTY RESOURCE CONSERVATION DISTRICT

Napa River Watershed Monitoring

Parameter: Wetland Bird Point Count

Importance: The abundance and diversity of bird species within various wetland habitats helps to evaluate the overall ecological condition of the wetland. Few quantitative data on bird use of wetlands have been collected in Napa. Most data have been collected informally, and generally do not follow a standardized protocol.

Protocol Summary: Under this protocol pairs of experienced birders census each study point at least four times a year (summer, fall, winter, and spring) for precisely 5 minutes. Birds identified within the wetland site are tallied by species and distance from the study point.

Constraints: Volunteers must already possess strong birding skills. All point counts must be conducted within 4 hours of sunrise. Accuracy of bird observations and identification is problematic, as it relies heavily upon the individual skills of the individual doing the census.

Quality Assurance: Bird Censusers are required to have considerable birding skills already in place, including the ability to "bird by ear." Data is collected by two people and data sheets are randomly reviewed for completeness and accuracy.

Materials

☐ Digital Watch or Timepiece

☐ Binoculars

☐ GPS unit

☐ Field Guide : National Geographic Society, Birds of North America.

The method chosen to collect information on bird use of wetland habitats is known simply as the "Point Count". This method was first developed and used widely in Europe and has been widely adopted in the U.S. Currently, a number of programs are using point counts to document breeding bird population trends in the U.S. and Canada. The methodologies outlined below were adapted from The Point Reyes Bird Observatory. The point count protocol relies in part upon subjective variables such as individual judgments and abilities. These issues are understood and accepted as limitations of the study.

Each point must have at least four point counts conducted during the year - one each in the Spring, Summer, Fall, and Winter. See Bird Census Schedule for the ideal birding period during each "season". Volunteer time commitment averages 3 hours per season.

Accessing the Point

Before you enter private property, the homeowner will have been contacted by the Volunteer Coordinator or the Field Leader, and permission to enter will have been obtained. In most cases, the bird censuser will merely need to contact the **landowner to give them 24-48 hours notice** that they will be arriving. In some cases, a convenient time will have to be arranged between the censusers and the owner. Please follow the access procedure set up with owners of your points: in most cases they have the right to deny access if they become upset. If any trouble should arise contact the Volunteer Coordinator immediately.

Approach the census points with care -- generally wetlands are not maintained for public use and hazardous conditions may be present. Censusers must use their best judgment to ensure their safety. Never attempt to census alone -- the protocol and NCRCD field procedures require the buddy system. If you feel uncomfortable with any aspect of accessing the points you have been assigned, please discuss it with the Field Leader or the Volunteer Coordinator. Before entering the field, please review the Field Protocol available from your Field Leader or the Volunteer Coordinator.

Selecting the Observation Site

Points are placed 200 meters apart (to avoid counting the same birds from adjacent points) and at least 50 m from the edge of the marsh where possible. Points should be flagged conspicuously, where possible, in order to facilitate finding exact spot for subsequent surveys and vegetation measurements. Where possible, points should be placed randomly, rather than along a habitat feature such as a tidal channel, to avoid bias in sampling. Both the observer and recorder will remain at each spot for the duration of the 5-minute census.

Collection and Recording of Data

Surveys begin within 15 minutes of sunrise and should be completed within approximately 4 hours (time of maximum bird activity). Each point is surveyed for 5 minutes. Counts should not be conducted on rainy or very windy days as birds are normally inactive. Before approaching the observation site, the recorder should fill out the weather information at the top of the data form. This information should correspond to conditions at the site, not at home. If the weather changes significantly between points begin a new sheet with the updated weather information. Use the chart at the end of this protocol to aid in wind speed estimation.

The censusers should approach each point with as little disturbance to the birds as possible. A bird flushed within 50 meters of a point as a censuser approaches or leaves the point should be counted as being at the point, provided that no other individual of that species is recorded from that point during the count period. Counts should begin

immediately when the observer reaches the observation site and should end exactly five minutes later. Use a digital time piece, but avoid "beeps" or electronic noises as they may serve to attract birds.

During the observation period, keep noise and movement to a minimum. Do not "chase" birds to obtain of confirm ID. Passing birds which were not identified should be recorded as unidentified bird species as noted in *"Which Birds To Tally"* section below. You may move around within a step or two at the observation site, sit, squat or use a stool during the census. **No attracting devices or sounds (pishing)** should be used at any time during the count period at each point or when traveling between points. Notes from during and after the count can be logged in the "Notes" section of the form. Feel free to note observations in other subject areas in this section as well, such as other wildlife seen or impacts or changes to the site.

Site: 2-4 letter site code
Point:
Spec: 4-letter species code
Data: combination of detection type and distance band, e.g., S12 for singing between 10-20 m

Detection types are as entered on datasheet, except the following:

Circled C = X
Circled S = B (both)

Habitat:
"T" = tidal marsh, "M" = muted; "R" = restoration; "U" = upland. If the "target" area and non-target area are both within range of the surveyor, and a bird is heard in a non-target area, make sure you designate it in the right habitat. If both target and non-target are of the same habitat type, in this example "T", designate the target one as "T1" and the non-target as "T2"
Date:
Sitename: long version of marsh name to clarify in case site code was entered wrong
Visit: the first breeding season visit is 1, and the 2nd is 2.
Timestart: start time for the first point done
Timeend: end time for the last point done
Initials- surveyor's initials (2-3 letters)
Bay- SF= San Francisco, SP = San Pablo, SU = Suisun.
Region- county
State - CA

Which Birds to Tally
Detections of every individual of every bird species are recorded by distance from observer at 10 meter increments up to 100 meters for 5-minutes at each point. We also have added an additional column for detections beyond 100m. This is especially important for species not otherwise counted in the point count. Analyses will include data only up to 70 m. Beyond that distance, the estimated distances are unreliable. Record the bird in the distance band in which it was originally detected, even if detection type changes.

For each point, record all individuals of any one species on the same line. Use the AOU 4-letter species code.

Priority is given to target tidal marsh species (SOSP, COYE, MAWR, CLRA and BLRA) and other tidal marsh or wetland species. Birds detected outside the marsh (e.g. in adjacent upland habitat, in the adjacent neighborhood) are marked with the type of non-marsh habitat they are found in (default is T= fully tidal marsh, U = upland non-marsh habitat, R = restoration, S = salt pond, P= other non-marsh pond, M = muted marsh). Use a separate line for different individuals of a species detected within and outside the marsh at a single point. If a bird uses both marsh and non-marsh habitat at that point, record it as within the marsh only, e.g. a SOSP sings at the edge of the marsh, flying between upland and marsh vegetation. This bird is included in the focal marsh detections.

One of the symbols below is used to indicate how the individual bird was detected. Every effort is made to record each individual once only. Flyovers are recorded in the last column, also using the symbol for detection type (usually V).

If an adult bird is detected, the detection type is recorded in order of priority: Song > Visual > Call (see table below). Thus a bird both heard calling, singing and detected visually is recorded as a circled "S". If a juvenile is detected, it is recorded as "J". All other detections are assumed to be adults.

Symbol	Detection type
S	Song: bird heard singing but not detected visually (may have also heard bird calling)
S (circled)	Song and visual: bird both heard singing and detected visually (may have also heard bird calling)
V	Visual: adult bird detected visually but not heard either calling or singing.
C	Call: adult bird call only, not singing and not detected visually (i.e. vocalization other than male territorial song)
C (circled)	Call and visual both, not singing.
J	Juvenile: juvenile bird detected either visually or heard calling (usually begging)

If a detection type changes, (e.g. initially heard calling and later heard singing), cross out the original and write in the new code. If a bird moves during the 5 minute period from one distance band to another, keep the detection in the initial band, even if the detection type changes.

Species not detected during the 5-minute point counts (not individuals of species detected during the survey) should be recorded on the back of the form, especially those of the target tidal marsh species (especially COYE, BLRA & CLRA), predators and rare or endangered species.

Remember, you want to count each individual bird only once at each point. Thus, you must try to keep track of mobile individuals so that you don't count them more than once. On the other hand, you must listen carefully to separate counter-singing or calling birds that often sing of call close together, especially near a territorial boundary. Avoid becoming flustered during the first minute or two of the count; five minute counts are actually quite long and will give you time to sort things. Also important to remember is that we are gathering baseline data; we are therefore interested in "common" species as well as unusual species.

If you cannot identify the species of the bird, record all individuals to the closest phylogenetic categories (i.e. unknown hummingbird sp., unknown crowned-sparrow sp., unknown gull species, or unknown passerine sp.). Do not chase birds to obtain or confirm ID. Also, be careful not to spend too much time trying to ID one elusive bird, and thereby miss several others. If, after the census, you feel confident that you have found and identified one of the previously unidentified birds, document this in the notes. Do not alter you original data.

Troubleshooting
Unforeseen events may occur which make data collection difficult or impossible.

Can't find the stake/point: Occasionally the stakes marking the census point are removed or lost. If you are familiar with the point and are confident you are in the right spot go ahead and census as usual. Please report the missing stake to the Volunteer Coordinator. If you are unsure where the point is, contact the Field Leader or the Volunteer Coordinator for assistance.

A Short-term but severe impact is occurring at the point: When an unusual and severe impact such as streambank maintenance or a mob of kids is occurring in the creek you may choose to skip that point and return later in the "season" for the point count. If the impact seems common to the area, however, such as a cat sitting on the fence or heavy traffic on the road, the point count should take place as usual. Note any conditions which could affect bird populations in the comments section of the data sheet.

Something interrupted the count midway: Minor "interruptions" such as a truck or plane going by should not stop the count, but should be noted on the data sheet. Major interruptions may occur, such as the approach of a curious bystander, which significantly impact the team's ability to finish the count. If this occurs, you should start over, or if it is necessary to leave, should return at the earliest possible time to redo the count.

The landownerowner is unavailable or unwilling to allow access: Do not attempt to sneak in. Call the Volunteer Coordinator.

The access gate will not open: Call the Volunteer Coordinator.

Dumping or other suspicious behavior: If you observe signs of dumping, encroachment, damage to the creek, or other issues of concern, document the location of the problem and its nature, and provide access information. Do not enter private property to investigate or attempt to confront the perpetrator. Report the incident tot the Volunteer Coordinator ASAP.

If Volunteer Coordinator is unreachable: Kathleen Edson can be reached weekdays at (707) 252-4188. If she is unavailable to handle you urgent concern, ask for Bob Zlomke at the same weekday number.

Data Reporting

All data is recorded in the filed on copies of the standardized point count data sheets provided by the Napa County Resource Conservation District. Record the data in as neat and legible a condition as possible. Field sheets should be made on waterproof paper, and all writing should be done in pencil to avoid smudging. Transcribe the data onto a fresh data sheet only if necessary, as soon as possible after you leave the field. When data have been transcribed, the original data sheet must be turned in with the transcription. This is very important, as occasionally errors can be made in the transcription process, and we need to be able to refer to the original if there are questions. Make a copy of the completed data sheet(s) as soon as possible and send the original(s) to the Field Leader. Keep the copy safe in a folder or file in case the originals are lost in the mail. Call the Field Leader to alert them to the arrival of the data, and let them know of any exciting or interesting occurrences ASAP.

Use of Data

The bird census is one of several biological variables that Watershed Monitoring volunteers are collecting. All the data are entered into a database and computerized mapping system (Geographic Information System, or GIS) and developed into a comprehensive, watershed level source of information about the presence and condition of wildlife habitat in the Napa Valley. This information will be available to anyone who is interested.

Napa River Watershed Monitoring Bird Census Schedule

Winter: October 30 through March 1. Prime Birding Window:* November 15 through January 15

Spring: April 15 through May 30. Prime Window: May 1 through May 15.

Summer: June 1 through July 31. Prime Window: June 15 through July 15.

Fall: August 15 through September 30. Prime Window: August 30 through September 15.

* "Prime Birding Window" refers to the portion of the season which has held the highest populations of representative species in previous studies. If possible, it is best to time your census for the period.

BEAUFORT SCALE (WIND SPEED)

DO NOT SURVEY

NAME	MPH	DESCRIPTION
Calm	≤ 1	Calm; smoke rises vertically.
Light Air	4 to 7	Wind felt on face; leaves rustle, vane moved by wind.
Gentle Breeze	8 to 12	Leaves and small twigs in constant motion; wind extends flag.
Moderate Breeze	13 to 18	Raises dust and loose paper; small branches are moves.
Fresh Breeze	19 to 24	Small trees in leaf begin to sway; crested wavelets form on inland water.
Strong Breeze	25 to 31	Large branches move, telegraph wires whistle, umbrellas used w/difficulty.
Moderate Gale	32 to 38	Whole trees in motion; inconvenience n walking against wind.
Fresh Gale	39 to 46	Twigs break off trees; generally impedes progress.
Strong Gale	47 to 54	Slight structural damage occurs.
Whole Gale	55 to 63	Trees uprooted; considerable structural damage.
Storm	64 to 72	Very rarely experienced; accompanied by widespread damage.
Hurricane	73 to 136	Devastation occurs.

Appendix B - Fish Survey Methodology

NAPA COUNTY RESOURCE CONSERVATION DISTRICT
Volunteer Monitoring Program

Parameter: Fish Sampling with Traps

This protocol is applicable in wetlands, sloughs, tidal marshes, ponds, and other water bodies with sufficient depth to submerge minnow traps. Sampling can be conducted in moving water in calm side-current areas inline with the current.

Importance: Data collected are intended to provide a description of fish presence, relative abundance, and habitat utilization in the context of planning restoration or enhancement projects. This type of information has many uses in describing existing conditions and comparing observations over several years. Relative abundances of various species can illuminate trends in the ecosystem, and serve as a measurement of ecological function. Age classes of juveniles may indicate the quality of summer and winter nursery areas, as well as document spawning by key species.

Protocol Summary: Field crews are trained in the identification and size-classing of expected fish species. A sampling site is selected to install sampling gear, and team members fill out a field data form that guides them through the required information to be collected. The field crew (minimum of two people for safety) place traps in the water at several locations throughout the sampling site. In tidally influenced areas, bucket-style minnow traps are deployed that retain water during low tide periods and thus prevent unnecessary mortality. Fish are collected from the traps, processed, and immediately returned to the water.

Constraints: Species identification, especially by volunteers or crew members with little experience, can be problematic in any biological survey. One team member must be fully competent in fish identification skills and carry a field guide. Catchability of certain species within a habitat will vary widely. Benthic fishes (e.g. gobies, sculpins) are difficult to capture using traps with an opening in the middle of the water column. Diversity can be described in relative terms, but this method is not meant to create a comprehensive species list. Also, the numbers of fish captured are rough estimates of relative abundance in selected habitats and should be interpreted within those constraints. Data collected by this method are not intended to produce statistically-based population estimates or densities, but it does provide a valid comparison between sites. Catch-per-unit-effort (CPUE) is calculated by dividing the total number of fish captured by the amount of time sampled.

Quality Assurance: Useful data stems from sampling consistency and careful attention to detail. Identification to the species level and size classing are most accurately achieved through fish capture methods, including trapping and electrofishing. State and Federal collector's permits are necessary for any technique involving capture, handling, tagging, or removal of fish from a stream or lake. Any fish sampling or fish data collection must be approved and coordinated with California Department of Fish and Game (DFG) biologists and with the knowledge of the local Fish and Game Warden.
Sample replication is achieved by deploying several (4-6) identical traps within the same site. Comparisons of sample catch are standardized by sample time to give catch-per-unit-effort.

Materials:

- ❑ Clipboard
- ❑ Pencil
- ❑ Field guide
  Freshwater Fishes of California (*California Natural History Guides*)
- ❑ Field measuring tape in feet/meters
- ❑ Field data forms (waterproof paper)
- ❑ Thermometer
- ❑ Rebar
- ❑ Sledge hammer
- ❑ Baling wire
- ❑ Nylon chord
- ❑ Minnow traps (bucket or standard)
- ❑ Mesh erosion cloth (optional drift fence)
- ❑ Flagging
- ❑ GPS
- ❑ Digital camera

METHODS

Site Selection: Experienced RCD staff (fisheries biologist) should select suitable sites based on water depth, water currents, and general position within the monitoring unit. Sites should represent a variety of habitat types (e.g.- channel, marsh plain terrace, etc.) present within the unit. Individual sites are marked by rebar driven into the substrate and painted orange or flagged with fluorescent tape. Geographic coordinates of each site are recorded using a handheld GPS unit and estimated error and precision given by the unit is noted. Photographs should be taken to capture key locations and important site details including water depth and vegetation.

Sample and Data Collection: During field sampling, the first quality control procedure is to check field data sheets before leaving the site. Field data is collected on standard forms to minimize the potential for missing values. Field checking should occur daily, with the Field Leader, or other crewmember that does not record the data, reviewing the datasheets for the following:

- Completion of all data fields
- Reasonableness of measurements
- Legibility of recorded data

The field leader is responsible for checking the data sheet for errors and completeness before leaving the field. The reviewer should then initial each data sheet to verify it has been reviewed.

Sampling Methods: Several gear types are available to collect fish including fyke nets, otter trawls, minnow traps, beach seines, purse seines, tow-nets, and barrel traps. This protocol focuses primarily on the use of minnow traps but is easily adaptable for other gear types. Minnow traps are typically deployed in closely spaced (<5 meters) pairs to achieve sample replication. In tidally influenced areas, traps are placed in the water so they are submerged at mean high tide. The traps are secured to a post or other solid object and left for 24 hours. Longer sampling periods are possible, but mortality, decomposition, and scavenging of trapped specimens can hinder identification when the traps are collected. In general, sampling duration should cover all water level stages present during the sampling period.

The use of bucket-style minnow traps will greatly reduce mortality in locations with variable water level such as tidal marshes. These traps are constructed from a five gallon bucket, which retains a small amount of water in the bottom during low water periods. These traps should be used wherever the possibility of unnecessary mortality exists, especially with listed species.

Traps have various mesh sizes that will greatly influence the number and types of fish captured. Standardized 3mm (1/8 inch) mesh will be used for this protocol. Larger or smaller mesh can be used to target certain species; however these are not comparable datasets.

Fish Processing: After the fish are retrieved from the sampling gear, they are placed into buckets with water. Fish are kept in water during processing, and gloves should be used where necessary and practical to minimize injury to fish. All fish specimens collected are processed and returned the water as soon as possible. All fish sampling data are collected and recorded in the field. The following data is recorded for fishes collected at each sampling site location:

- Identification of all fish captured to species level
- Fork length (mm) on fish with a forked caudal fin, or total length on fish without a forked caudal fin.
- Reproductive state if visibly obvious
- Noticeable lesions

Appendix C - Vegetation Survey Methodology (Transect)

NAPA COUNTY RESOURCE CONSERVATION DISTRICT
Volunteer Monitoring Program

Parameter: Wetland Vegetation

Transect sampling

This protocol uses 200-foot line intercept transects within a wetland, which are systematically located (e.g., at fixed intervals) perpendicular to a baseline. Baselines are generally established parallel to the Napa River or channel (Figure 1). The precise locations of transects relative to the baselines is based on the requirement of obtaining a homogeneous and representative sample and will be determined by the best professional judgment of a wetlands ecologist in the field. Lengths and or numbers of transects may be increased if necessary to obtain representative samples of this habitat type.

The transects will run roughly perpendicular from the river/channel to the upland edge. Transects will be permanently staked using 18-inch by 0.5-inch rebar covered by brightly painted PVC pipe and will be numbered. Marker locations will be carefully mapped on an aerial photograph and recorded using a GPS unit in a coordinate system consistent with the GIS.

A random number table will be used to establish a series of one square meter (1 m^2) quadrats every 50 meters, starting at the river/channel edge and progressing along the entire length of the transect until the upland edge. The last quadrat will be located well within the wetland and not in the upland.

Using a standard data sheet, in each quadrat along each transect, every plant occurring within that quadrat will be identified by genus and species. For each unique species within the quadrat, the abundance of that species will be determined using visual estimates of the percentage of the quadrat occupied by that species. At least two investigators will generate species lists and coverage values independently and then compare with one another and with standardized coverage charts. Investigators will also define the community type that the quadrat falls in: low marsh, high marsh, or fringe. Coverage values will be revised if necessary. To be as accurate as possible, coverage estimates include duff, leaves, bare ground, and open water, collectively designated as other. Coverage estimates will be adjusted during the analysis stage to account for the coverage of this other category.

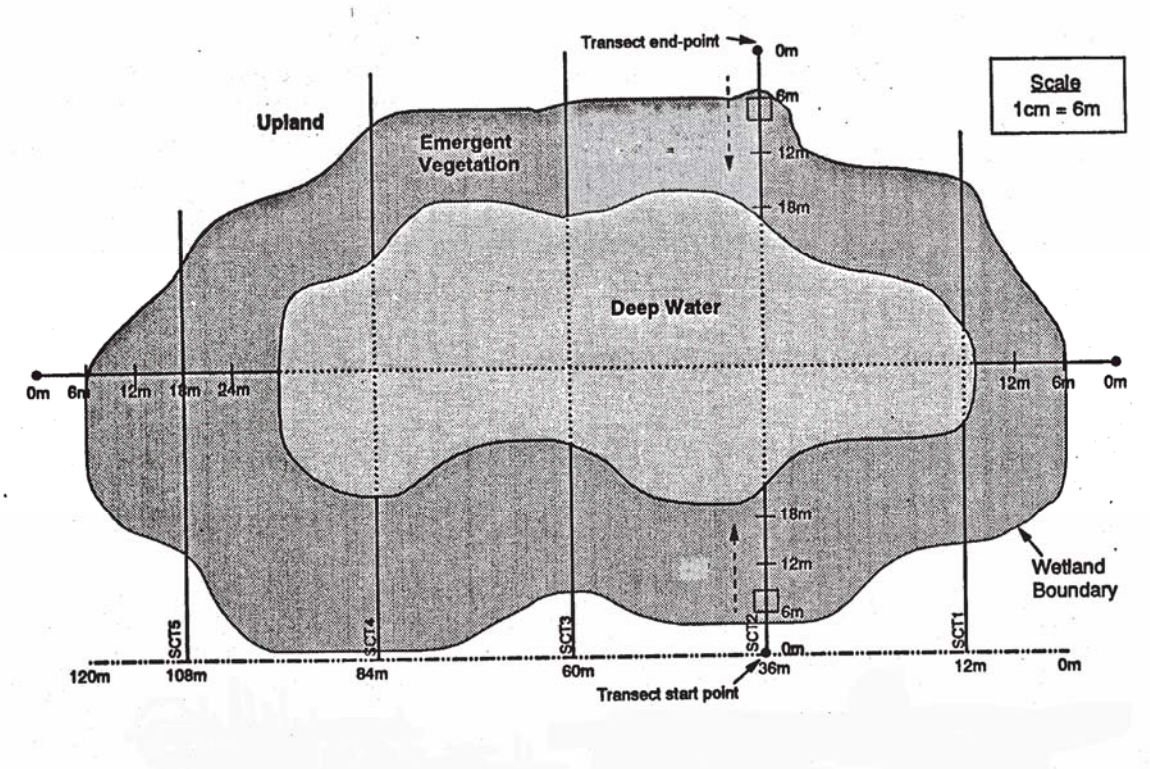


Figure 1. Example of how monitoring transects are established in a wetland. In this case a baseline is established along the long axis of the site, and transects can be run both parallel and perpendicular to this axis.

Materials

- ☐ Field measuring tape (100 m)
- ☐ Square Quadrat (1 m^2)
- ☐ Field Guide / Reference Manual
  The Jepson Manual; *Higher Plants of California*, edited by J.C. Hickman

- ☐ Plant Press
- ☐ Digital Camera
- ☐ Rebar
- ☐ Data sheets & clipboard
- ☐ GPS

Frequency and Timing

Vegetation surveys should be conducted once per year between June and August.