Status of Habitat Mitigation and Monitoring for

The North Area Local Flood Control Project

2010 Report

Prepared By:

SAFCA
Sacramento
Area Flood
Control
Agency

December 2010

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INTRODUCTION

This annual monitoring report addresses the status of the Sacramento Area Flood Control Agency's (SAFCA) effort to comply with the specific wetland and riparian habitat mitigation requirements of the North Area Local Project (NALP) pursuant to applicable federal, state, and local laws and regulations. The report is specific to the NALP's habitat compensation and enhancement program and does not include accounting for mitigation associated with project construction procedures.

Regulatory Setting

The NALP includes levee and channel improvements for Steelhead Creek, formerly the Natomas East Main Drainage Canal (NEMDC), Arcade Creek, Dry/Robla creeks, and the Natomas Cross Canal. The project also consists of several borrow sites (i.e. Wolf Ranch Wildlife Sanctuary and Discovery Park East Module 1 Reclamation18A site), and ancillary facilities such as the Steelhead Creek Pumping Station. Restoration and enhancement of areas impacted by the NALP are among the many environmental mitigation requirements that have been attached to the project pursuant to a web of interdependent, and often overlapping, regulatory mechanisms. The primary operational federal, state, and local regulations directing habitat mitigation efforts for the NALP include the following:

- California Environmental Quality Act
- Federal Clean Water Act, Section 404
- Federal Endangered Species Act
- California Endangered Species Act
- California Department of Fish and Game Code, Section 1601
- Surface Mining and Reclamation Act
- City of Sacramento Heritage Tree Ordinance
- County of Sacramento Native Oak Preservation and Protection Ordinance
- Sacramento County General Plan Conservation Policies
- Sutter County Heritage Tree Ordinance

California Environmental Quality Act (CEQA)

Regulatory permitting and compliance activities for the NALP have involved several phases, beginning with the development of the program-level CEQA document, *Final Environmental Impact Report for the Revised Natomas Area Flood Control Improvement Project,* prepared by Fugro-McClelland (WEST), Inc., May 1993. Over 20 subsequent or tiered documents, with detailed analyses of impacts for specific project actions, have been prepared pursuant to CEQA and certified in the form of Environmental Impact Reports or Negative Declarations with associated mitigation and monitoring requirements. Each subsequent tiered document represents a refinement of project design, actions, impacts, and proposed mitigation. In some cases, final project designs and construction practices resulted in a reduction in the level of impacts (e.g., number of trees removed) from that originally anticipated at the programmatic level. As necessary, the applicable regulatory permits, implementing agreements, and other supporting documents for the project have been amended to reflect these refinements, and mitigation strategies adjusted accordingly.

Clean Water Act, Section 404 Permit

In addition to measures addressed in CEQA documents, specific mitigation requirements for the NALP have been adopted pursuant to several other laws and regulations. In accordance with Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (Corps) issued Permit Number 199200719 on April 1, 1994. This permit included a variety of mitigation and monitoring requirements as compensation for

impacts to individual plants and cover types. The implementing agreement for the original Corps permit was the document, *Wetlands Mitigation Plan for the Revised Natomas Area Flood Control Project*, prepared by Jeffrey A. Hart, Ph.D. and Associates, March 1994. Hart's document was amended in 1995 and again in 1996 to reflect revised project schedules, impact assessments, and mitigation strategies. The Corps permit was revised again in May 2001 to reflect the current requirements imposed by the U.S. Fish and Wildlife Service's (USFWS) most recent Biological Opinions (1-1-98-F-0109, issued on December 8, 1998, and 1-1-01-F-0031, issued on March 5, 2001).

Federal Endangered Species Act, USFWS Biological Opinion

The U.S. Fish and Wildlife Service (USFWS) issued four separate Biological Opinions for the NALP, as part of consultation with the Corps, in accordance with the Fish and Wildlife Coordination Act and Section 7 of the Federal Endangered Species Act. The latest Biological Opinions (1-1-98-F-0109 and 1-1-01-F-0031) provide an updated and comprehensive list of requirements for listed species and habitat conservation. Actions pertaining to habitat preservation and creation include:

1) Purchasing, from a Service-approved conservation bank, conservation credits equivalent to the planting of 1,184 elderberry cuttings/seedlings and 1,184 native plant cuttings/seedlings, as 8:1 compensation for impacts on 113 elderberry stems measuring one inch or greater in diameter at ground level (confirmed complete by USFWS per 81420-2010-TA-0261-1);
2) Creating 5.76 acres of constructed seasonal wetlands at Wolf Ranch, as 2:1 compensation for indirect impacts to 2.88 acres of degraded vernal pool habitat (confirmed complete by USFWS per 81420-2010-TA-0261-1);
3) Purchasing, from a Service-approved conservation bank, conservation credits equivalent to the creation of 1.87 acres of vernal pool habitat (confirmed complete by USFWS per 81420-2010-TA-0261-1); and
4) Preservation of 3.74 acres of vernal pool habitat at Hansen Ranch (will be considered complete by USFWS per 81420-2010-TA-0261-1 after 10 years of monitoring is completed in 2011 as long as performance criteria are met).

CA Department of Fish and Game Streambed Alteration Agreements

The California Department of Fish and Game (DFG) has jurisdiction over any work in the stream zone of the historic bed of a waterway pursuant to Fish and Game Code Section 1600 et. seq. Sections 1601 and 1603 authorize the DFG to execute Streambed Alteration Agreements for any activity that will alter or obstruct the natural flow of a channel, or change the bank or bed of a river, stream, or lake. The eight Streambed Alteration Agreements issued to SAFCA, one for each major construction phase of the NALP, and are outlined in Table 1. Each Agreement identifies procedures for protection, restoration, and/or enhancement of wetland and/or riparian habitats that may be impacted by the NALP. Specific requirements for riparian tree protection are incorporated into the Agreements as references to specific mitigation project agreements or plans.

Table 1 – Streambed Alteration Agreements Issued for the NALP

Arcade Creek Unit 1A	II-083-94 (May 1994)
Dry/Robla Creeks, Magpie Creek Diversion	II-195-94 (June 1994; rev. April 1995)
Steelhead Creek 3A, Wolf Ranch	II-061-95 (April 1995)
Steelhead Creek Pump Station	II-157-95 (May 1995)
Steelhead Creek Units 2A and 3C	II-517-95 (September 1995)
Arcade Creek Unit 1B	II-067-96 (March 1996)
Steelhead Creek Units 2B and 3B, Site 18A	II-237-96 (June 1996)
Natomas Cross Canal, Pleasant Grove Creek	II-238-96 (June 1996)
Robla Creek South Levee and Steelhead Creek west levee mitigation	II-170-2001 (2001)

Local Tree Ordinances

In addition to measures identified by the applicable Streambed Alteration Agreements, larger trees are also protected by the following City and County of Sacramento ordinances and policies:

City of Sacramento Heritage Tree Ordinance

The City of Sacramento Heritage Tree Ordinance applied to all phases of the NALP, except the Dry/Robla Creek and Natomas Cross Canal (NCC) components, which are under County jurisdiction. The City tree ordinance addresses three classes of trees: 1) any tree in a riparian zone (or channel) greater than 36 inches in trunk circumference; 2) any native oak, sycamore, or California buckeye greater than 36 inches in trunk circumference; and 3) any tree over 100 inches in trunk circumference. The City negotiates mitigation, on a case-by-case basis, for losses of trees that are protected under this ordinance.

County of Sacramento Tree Preservation and Protection Ordinance

The County of Sacramento Tree Preservation and Protection Ordinance applies to the Dry/Robla Creek component of the NALP. This ordinance addresses native oak trees with either 1) at least one trunk measuring six inches or more in diameter at breast height (DBH), or 2) several trunks with a cumulative trunk diameter of 10 inches or greater.

County of Sacramento General Plan Tree Conservation Element

The County of Sacramento General Plan Tree Conservation Element applies to the Dry/Robla Creek component of the NALP. The General Plan includes policies to conserve Landmark trees. Landmark trees are either 1) any native or nonnative tree species with a DBH of 19 inches or more, except native oaks (which have their own ordinance – see above) and cottonwood trees. The Plan recommends that Landmark trees should be replaced in-kind, and that the cumulative stem diameter of replacement trees should be equal to the cumulative diameter of trees removed.

MITIGATION PROJECT SITES

Mitigation for Federally Listed Species

Valley Elderberry Longhorn Beetle

The NALP impacted Valley Elderberry Longhorn Beetle habitat by removing elderberry shrubs, the host species designated as critical habitat for the beetle. Beetle habitat mitigation for the NALP is governed under the USFWS Biological Opinion, 1-1-98-F-0109 dated December 8, 1998. SAFCA mitigated for the NALP Valley Elderberry Longhorn Beetle impacts by purchasing 236.8 units of mitigation credit at an approved mitigation bank (Conservation Resources, LLC mitigation bank in southern Sacramento County). The purchased mitigation credits covered the following action required in the USFWS's Biological Opinion: planting 1184 elderberry seedlings and 1184 native plant cuttings/seedlings as 8:1 compensation for the loss of 113 elderberry stems measuring one (1.0) inch or greater in diameter at ground level. The USFWS concurred that this mitigation is complete per 81420-2010-TA-0261-1.

Vernal Pool Habitat

The NALP project also impacted vernal pools, which are potential habitat to several listed species. Vernal pool mitigation for the NALP is governed under the U.S. Fish and Wildlife Service Biological Opinions, 1-1-95-F-25 dated June 28, 1995, 1-1-98-F-0109 dated December 8, 1998, and 1-1-01-F-0031 dated March 5, 2001. SAFCA's anticipated impacts included 1.87 acres of vernal pool habitat but actual impacts were only 1.55 acres. Required mitigation for the creation of vernal pool habitat (1:1 ratio) was fulfilled by purchasing 1.87 vernal pool creation credits through the Conservation Resources mitigation bank (leaving a credit of 0.32 acres). To fulfill the preservation component of the vernal pool mitigation, SAFCA acquired a Conservation Easement from the City of Sacramento on a portion of Hansen Ranch in August 2000 (Figure 1). In 2001, SAFCA also prepared an approved Conservation, Monitoring and

Management Plan and contracted with a vernal pool consultant (Kimball, Neely, and Associates, LLC) to preserve and manage the Hansen Ranch vernal pools. A report on the status of these pools will be provided under separate cover.

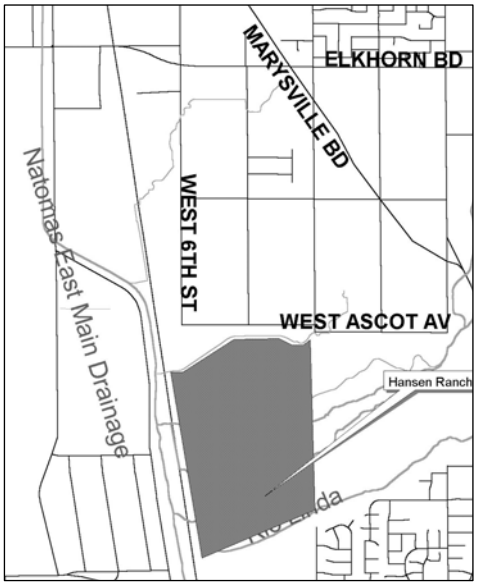

Figure 1 – Area of conservation Easement at Hansen Ranch, City of Sacramento, CA

Dry Creek – Robla Creek Area

Wetland mitigation requirements for the Dry Creek – Robla Creek components of the NALP are covered by the DFG Streambed Alteration Agreement II-195-94, as amended, and in accordance with the County of Sacramento's Tree Preservation and Protection Ordinance. Mitigation included planting 55 one-gallon oak trees to replace the four oaks (54.2 total dbh) that were removed in Dry Creek – Robla Creek. These required mitigations for NALP impacts to Dry Creek – Robla Creek were included in the Wolf Ranch tree planting and site design (described below).

Wolf Ranch Wildlife Sanctuary (formerly Site 2L)

The Wolf Ranch Wildlife Sanctuary (formerly known as Site 2L) encompasses approximately 60 acres of created wetland and upland habitat in northern Sacramento County (Figure 2). It is located adjacent to Steelhead Creek, north of the Dry Creek confluence, west of the Union Pacific Railroad line, and south of the automobile auction center on Elkhorn Boulevard and Sorento Road. The site was renamed in 2005 to honor the Wolf family who originally owned the property, and to reflect the sites wildlife habitat objective.

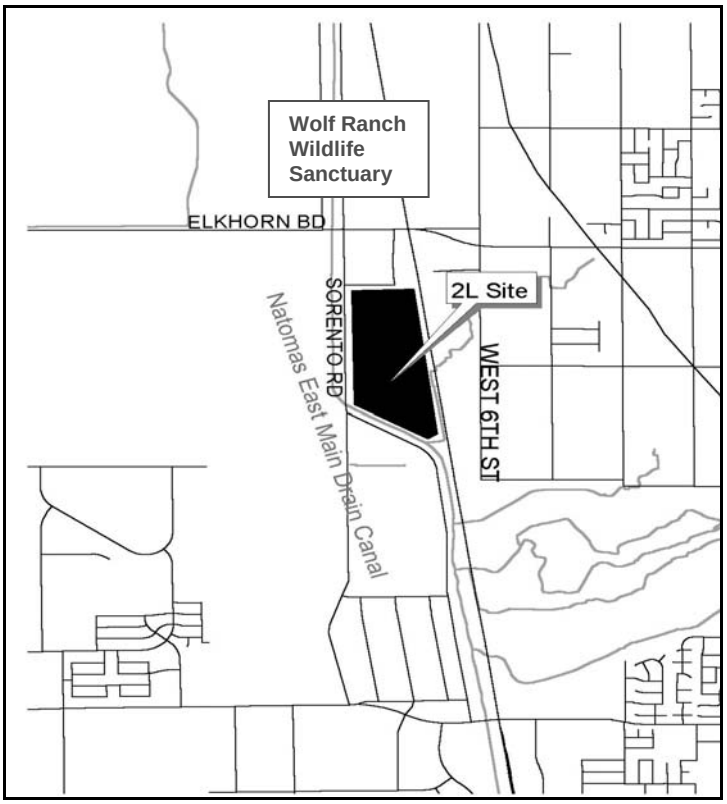

Figure 2 – Location of Wolf Ranch Wildlife Sanctuary, Sacramento County, CA

Prior to project implementation, much of the project area was classified as upland irrigated pasture lacking natural plant communities, with 0.89 acres of existing wetland. The area was excavated as a borrow site for earthen fill material (approximately 800,000 cubic yards) for the North Area Local Project levee improvements, and then graded and contoured to support the establishment of wetland and riparian habitats (see Appendix B). Trees, shrubs, and rhizomatous herbaceous species were planted at prescribed densities.

Water from the adjacent Steelhead Creek fills the excavated area during wet portions of the year. When water levels drop below 20 feet (above sea level), supplemental water is pumped to the wetland to maintain perennial open water habitat. Other water sources include rainfall, and supplemental drip and flood irrigation during the 5-year establishment period.

Summary of Wolf Ranch Wildlife Sanctuary Habitat Mitigation Requirements

Mitigation required at Wolf Ranch Wildlife Sanctuary is described in the reclamation and restoration plan, *2L Wetland and Valley Elderberry Longhorn Beetle (VELB) Mitigation Plan*, prepared by Jeffrey A. Hart, Ph.D. and Associates (May 1996). A portion of Wolf Ranch satisfies a requirement of the USFWS Biological Opinion (1-1-98-F-0109) to create 5.76 acres of constructed seasonal wetlands, as compensation for indirect impacts to 2.88 acres of degraded vernal pool habitat (2:1 ratio). The USFWS concurred that this mitigation is complete per 81420-2010-TA-0261-1.

The 1996 Mitigation Plan included 52.0 acres of wetland and riparian habitats and 3.9 acres of upland habitat on the site. These habitats included: Palustrine Open Water (POW); Perennial Emergent Marsh (PEM); Riparian Marsh (RM); Mixed Riparian (MR); and Oak Riparian (OR). The planting prescription reflected the type of vegetation each habitat category was expected to support given its elevation above the water table and the expected depth and duration of flood events. The acreages delineated in the 1996 Mitigation Plan have been amended several times to reflect actual on-site and inundation conditions (Appendix B).

Success Criteria for Wolf Ranch Wildlife Sanctuary

According to the mitigation plan (Hart 1996) a successful project will have 70% of the target number of prescribed plantings (combined habitats) alive after three years, and 50% alive after five years. Riparian mitigation areas shall be monitored for ten years or until the success criteria are met and monitoring of the freshwater marsh mitigation area shall occur for five years or until the success criteria are met (Corps 404 permit). Once the criteria have been met, the site must remain successful for an additional three years without human intervention to show that the vegetation is self sustaining (Corps 404 permit).

The site was initially planted at 389 plants/acre (289 trees/acre and 100 shrubs/acre) across 19.13 acres[1]; totaling approximately 7442 plants. The final success criterion for survival was 50% or 3720 plants by the fifth year of monitoring. This success criterion pertains to the total plant count, and not to the counts of individual species within the planting plan. This criterion ensures a minimum plant density and survival, while allowing modification of the specific species mix to favor successful species. Thus, the ultimate species richness of the site will reflect a natural self-selecting process of species tolerances to specific site conditions.

Implementation and Mitigation History of Wolf Ranch Wildlife Sanctuary

Prior to project implementation, much of the project area was classified as upland irrigated pasture with a small existing wetland. The area was excavated as a borrow site for the NALP levee improvements, and then graded and contoured to create a variety of wetland and riparian habitats, including a system of flood-irrigation pods. Pods were 30-60 feet across and bounded by two-foot tall berms that were individually flooded to irrigate the plantings.

Planting was initiated in 1996 and continued into 1997 by the North Area Jobs/Training Program, following the specifications of Hart's 1996 Mitigation Plan. In 1997 SAFCA retained Restoration Resources to continue the planting and general site maintenance which included the installation of a drip irrigation system to replace some of the flood irrigation and the implementation of a weed control program using mowing and herbicide treatments. Between 1997 and 1999 SAFCA also revised the original HART plan (May 1996) habitat site map to better reflect actual site conditions, including acreage of each habitat type (Appendix B). This acreage map was further updated in 2004 to reflect current conditions (Figure 4).

Additional plants were installed between fall 1997 and fall 1998 to meet the target densities prescribed for each habitat type, including 4,454 trees and shrubs, and 6,626 plugs of herbaceous plants. Some species, including mugwort, bur-reed, and elderberry, were eliminated from the planting plan. Other species, such as brown dogwood, were planted in lower numbers due to their relative intolerance to flooding. In exchange, hibiscus was added and the number of cottonwood and black willow trees was increased.

In April 1999 and 2000 a fertilization program was implemented to promote tree and shrub root development and stimulate tree recovery from insect borer damage and beaver pruning.

During 2000, the supplemental irrigation was reduced to a monthly basis but the plant health declined. Consequently, plants were irrigated bi-weekly in 2001 and 2002 to help increase plant health and vigor throughout the entire site. During this time, several methods of watering were used including drip irrigation, hand-watering, and flood irrigation.

In 2002, a total of 204 plants were installed along the northern section of Wolf Ranch and along Sorento road (34 interior live oaks, 34 blue oaks, 68 coyote brush, and 68 ceanothus shrubs) to create a vegetation screen to block the noise and disturbance from the adjacent auto auction. In addition, approximately 15 valley oak trees were planted on Peninsula 'B'. No success criteria were established for these new plantings however, they have been actively maintained during the establishment period and plant health and survival rates are monitored annually.

[1] Total acreage prior to 2005 were reported as 19.37 acres

In 2003, regular weed maintenance included the removal of red sesbania by a cut stump herbicide application of Garlon 4. Other notable actions that were taken included laying gravel on the access road to the well pump and the installation of large riprap barriers to block motorized vehicles along Sorento road. Additionally, SAFCA's maintenance contractor designed and installed an automated above ground irrigation system for the entire site. An automated sensor was also installed that activates the well pump when water levels fall below a prescribed level and this allows the Palustrine Open Water (POW) habitat to be maintained at a constant level for aquatic species and wading birds. Additionally, SAFCA had perching deterrents installed on transmission poles at three locations on site to prevent injuries to raptors from electrical transmission lines after SAFCA staff consulted with the Sacramento Municipal Utilities Department (SMUD) and a raptor biologist.

In 2004, site management continued to include fence and beaver cage maintenance, weed control, biweekly irrigation, and mowing of firebreaks. Additional plants were installed along the northern vegetation screen and Sorento Road to fill any empty planting basins and some oaks along the northern vegetation screen that were exhibiting poor growth form and health were replaced with new trees. A formal experiment on the use of paintable beaver gnawing deterrents began and was monitored into 2005. Maintenance contractors also installed a kestrel nesting box on the east side of the lake and a raptor perch on the west side of the lake.

In 2005, maintenance activities continued as usual with bi-weekly automated irrigations, regular mowing events to create firebreaks, and string trimming in tree basins to prevent overgrowth by weeds. The data collection for the beaver experiment was completed in the summer of 2005, but did not provide conclusive evidence that either of the deterrents prevented significant beaver pruning. A fire occurred in the Northeast part of the site in July which burned approximately three acres of non-native grassland including a small section of the vegetation screen and a portion of oak riparian habitat. The affected trees were subsequently irrigated which prevented their loss and led to stump sprouting and some crown leafing. The burned grassland will provide an opportunity to convert the area to native grassland in 2007/2008. SAFCA had soil moisture sensors installed in two tree basins on the site to help determine a healthy watering regime, and found that the current irrigation regime is not thoroughly soaking the soil in the tree basins, but still managing to provide enough water to allow growth of the trees. The boxcar barrier at the site's inner gate was removed in 2005, improving site aesthetics.

In 2006, plants continued to perform well on supplemental irrigation. A large portion of the site was inundated in the winter and spring due to very wet weather, however over all vegetation fared well. The site was mowed several times and basins were string trimmed to keep weed competition down. Activities such as disking were initiated to convert the hibernacula and upland to native grassland in 2007. The vegetation, which was burned in 2005, has recovered well with the majority of the surviving trees and shrubs exhibiting vigorous growth. Beaver damage was evident this spring, but the amount of damage appears sustainable and may be further reduced by extending fencing along Steelhead Creek. Also, the Grant Union School High School District installed eight (8) wood duck nest boxes that they will be monitoring.

In 2007, maintenance activities continued as usual with bi-weekly automated irrigations, regular mowing events to create firebreaks, and string trimming in tree basins to prevent overgrowth by weeds. Red sesbania was detected growing onsite and was mechanically removed. A large beaver lodge was discovered at the southwestern end of the site at the end of 2007 and was largely constructed of trees from Wolf Ranch; an issue to be addressed in 2008. To establish a native grassland on the northern upland further site preparation activities were implemented and consisted of one broadleaf herbicide treatment and disking. In spring, the outer perimeter of the upland was drill-seeded with native grasses but weather conditions prevented the completion of that work. Therefore, only a small portion of the upland was seeded. These grasses grew well indicating good conditions for a successful grassland. A total of 22 plants (coffeberry, coyote brush, sycamore, toyon and valley oak) were installed along the vegetation screen and Sorento Road to fill any empty planting basins. In early 2007, tire tracks were discovered running from the car auction lot onto Sorento Road. The tracks proceeded through a cut fence from west

of Wolf Ranch and adjacent to Steelhead Creek onto the Wolf Ranch property. To resolve the trespass issue additional boulders were placed between the car auction yard and Sorento Road and the fence was fixed; no unwanted vehicle access has been observed since installation.

In 2008, regular maintenance activities included mowing, string trimming, hand pulling and chemically treating invasive weeds (yellow star thistle, red sesbania, milk thistle, pepperweed, etc.), and trash removal. Plants were scheduled to receive water once per week but due to a malfunction in the irrigation system the plants went without irrigation during the summer for no longer than 3 weeks. The plants that appeared most stressed by the decreased water supply were on the south side of the property but once the problem was fixed, the plants were quick to respond. The upland area was drill seeded during the spring with native grasses in areas that were not covered by the drill seeding activities in 2007. Several weeks after the upland was drill seeded overhead irrigation was implemented to encourage the native grass seeds to germinate. These watering events had a positive effect on the native grasses but the coverage of the grasses was severely compromised particularly on the western side of the upland by the foraging activities of numerous American coots. In an effort to control the broadleaf weeds and encourage the remaining grasses, an herbicide application was conducted during the summer. Other planting activities during 2008 included the installation of 160 trees, which included willows, alders, cottonwoods and box elders along the eastern side of Wolf Ranch to create an additional buffer zone from the railroad tracks as well as augment the habitat values at the site. A new beaver lodge was discovered off of the peninsula area and many trees have been severely pruned in that area. In response to the increasing beaver pruning pressure cage installation was initiated in the fall of 2008 and will continue in 2009. During 2008, human activities that threaten the success of the wildlife sanctuary included the destruction of virtually all of the wood duck boxes, littering, illegal camp fires, unauthorized access by off road vehicles and paint ball games.

In 2009, the maintenance of the site included periodic weed control using mowing and herbicide treatments, trash removal and beaver cage installation and maintenance. Additionally, maintenance to the irrigation system was conducted weekly to address malfunctioning or buried emitters, broken lines and leaky valves. During August the lake levels were observed to be dropping and upon investigation it was discovered that the main well pump timer was no longer working and was consequently replaced. Not long after the timer was fixed the motor for the main well pump burned out and is scheduled for replacement in early 2010. Many of the trees and shrubs, especially along the shoreline, have drastically declined in health and is likely attributable to the low water level and malfunctioning irrigation system; an indication that this site is not yet self-sustaining.

Maintenance in 2010 included periodic weed control using mowing and herbicide treatments, trash removal and beaver cage installation and maintenance. The bulk of the temporary irrigation for the native grasses was removed during the late spring and the small amount that was left will be removed in the coming year. The irrigation system requires a great amount of effort to maintain due to vandalism and deterioration of the PVC pipes supplying water as well as the maintenance to clean or replace clogged emitters largely due to the seasonal water inundation. Major maintenance of the aging irrigation system included the replacement of the main well pump in February and the replacement of the booster pump impeller which failed and was quickly replaced in August.

Monitoring Methods

Vegetation

For survey purposes, the site was divided into different counting zones, according to distinct 'Mixed Riparian' (MR), 'Riparian Marsh' (RM) and 'Oak Riparian' (OR) habitat units and plant counts (both planted and naturally occurring) were conducted in each zone. Dead plants, as defined by lack of any green leaves, were not included in the counts. Due to the multi-stemmed growth form of Wild Rose, each 9 $ft.^2$ section of shrub was counted as one (1) plant. In some MR and RM "strips" of habitat around the edge of the open water the vegetation was so dense with naturally regenerating trees that "counts" were

made by clumps, based on the average plant size and density of the vegetation (Table 2). For example, small willow trees occurring in very dense stands were not counted individually, but a 3-foot strip of trees was counted as "1". If the stems were distinctly separate from other clumps they were counted individually. Beginning in 2002 complete plant counts were made for all of the MR, RM, and OR habitat units and were not sub-sampled as was done in 2001. Percent density achieved was calculated by comparing the current density (count/acre) to the prescribed density for each habitat type in the 1996 Mitigation Plan (289 trees/acre and 100 shrubs/acre).

Table 2 – Method used for counting dense clumps of vegetation at Wolf Ranch.

Clump Composition		Clump Size	Counted As
Species	Size Class		
Black willow / Arroyo Willow	1-3 in. diameter	3 ft.	1 stem
Black willow / Arroyo Willow	>3 in. diameter	3 ft.	2 stems
Sandbar willow	All	3 ft.	1 stem

Habitat Acreage

Habitat acreages have not changed since 2004.

Avifauna & Other Wildlife

During 2010 two bird surveys were conducted to track the utilization of the site's restored habitat. The results indicate that Wolf Ranch continues to support an abundance of many different bird species. A SAFCA approved biologist will continue to conduct bird surveys in the future with the intent to survey quarterly to capture the seasonal utilization of the site. The surveys continue to be conducted over a 2-hour early morning survey period and the abundance of each bird species across the site that are detected visually and or by ear are noted. Efforts are made to avoid recounting birds that tend to move between areas within the site. In addition, exceptional sightings of new species or exceptionally large flocks of birds, other animals or their sign are noted during any informal site visits.

Results and Discussion

Vegetation

The results for the 13th year of monitoring at Wolf Ranch indicate that the combined tree and shrub density slightly increased from 67% in 2009 to 68% (263 plants per acre) in 2010 and continues to exceed the 50% survival success criterion that was established for 2002, the 5th monitoring year (

Table **3**). Table 4 provides a breakdown of the number of living plants in each habitat type in 2010. Although low lake levels contributed to high mortality of plants in the riparian marsh in 2009, the total number of plants remained fairly stable from 2009 to 2010. Based on the high mortality rate in 2009, it is apparent that the plants at Wolf Ranch are still dependent on supplemental water after 13 years. Although tree and shrub survival continues to remain above the 50% survival density, the plants have not yet met the requirement of self-sustainability. One major factor that may be causing the high water dependency is the underlying hardpan soils throughout the site which prevent the roots from accessing ground water. Conversely, it may be that the groundwater level is below the reach of the growing roots or that a combination of both hardpan soils and low groundwater levels is affecting plant sustainability. Another factor influencing plant mortality is the severe pruning by the increasing beaver population at Wolf Ranch; there was a loss of 60 cottonwoods in the mixed riparian habitat between 2009 and 2010 alone. There are now three lodges within the lake area and one adjacent to the lake on Steelhead Creek.

Table 3 – 2010 Density of Trees and Shrubs per Acre at Wolf Ranch

Habitat	Units	Tree (Planted: 289/acre)	Shrub (Planted: 100/acre)	Tree + Shrub (Planted: 389/acre)
Riparian Marsh (5.64 acres)	# plants	365	94	459
	plants/acre	65	17	81
	% density achieved	**22%**	**17%**	**21%**
Mixed Riparian (5.61 acres)	# plants	2469	158	2627
	plants/acre	440	28	468
	% density achieved	**152%**	**28%**	**120%**
Oak Riparian (7.88 acres)	# plants	1345	593	1938
	plants/acre	171	75	246
	% density achieved	**59%**	**75%**	**63%**
Combined Habitats (19.13 acres)	# plants	4179	845	**5024** *(2002 Goal = 3720)*
	plants/acre	218	44	**263** *(2002 Goal = 195)*
	% density achieved	**76%**	**44%**	**68%** *(2002 Goal = 50%)*

Table 4 – 2010 Survival Data for the Wolf Ranch Riparian Habitats

Species	Riparian Marsh				Mixed Riparian				Oak Riparian			
	'02	'08	'09	'10	'02	'08	'09	'10	'02	'08	'09	'10
Alder												
Blue oak										1	3	2
Box elder	8				66	75	85	72	300	215	179	182
Cottonwood	188	35	10	49	252	241	212	152	3	1		
Live oak									6	5	4	4
Oregon ash	131	15	21		187	203	218	198	136	129	115	126
Valley oak	11				27	90	119	105	1230	1003	1098	1008
Willow, arroyo	35		1	1	165	219	125	93				
Willow, black	258	576	226	168	276	853	674	854				
Willow, red	4				30	15	19	18				
Willow, sandbar	253	262	192	147	324	851	825	957		24	12	23
Willow, yellow	30				30		19	20				
Tree Total	**918**	**888**	**450**	**365**	**1357**	**2547**	**2296**	**2469**	**1675**	**1378**	**1411**	**1345**
Blackberry					12		2	1				
Button bush	159	153	135	94	86	120	116	121	2			
California rose					4	3	32	13	229	422	329	396
Coyote brush						3	2	4	108	78	95	87
Dogwood					8	3	6	3	7	1		2
Hibiscus												
Mulefat									89	18	14	13
Wild grape					24	11	22	16	87	71	112	95
Shrub Total	**159**	**153**	**135**	**94**	**134**	**140**	**180**	**158**	**522**	**590**	**550**	**593**
Grand Total	**1077**	**1041**	**585**	**459**	**1491**	**2687**	**2476**	**2627**	**2197**	**1968**	**1961**	**1938**

The vegetation screen along the northern border of Wolf Ranch does not have any established success criteria but the trees and shrubs are surveyed annually to track changes (Table 5). The results of the 2010 survey indicate that the survival rate of trees and shrubs increased from 58% in 2009 to 92% in 2010, attributable to the number of coyote brush doubling within this upland area. The average height of trees slightly decreased from 10.3 feet in 2009 to 10.2 feet in 2010 (Table 6). The average shrub height also decreased, from 5.4 feet in 2009 to 4.7 feet in 2010 but this decrease is a direct result of the natural recruitment of coyote brush (Table 6).

Table 5 – 2010 Survival Data for the Wolf Ranch Vegetation Screen

Species	# planted 2002	2003	2004	2005	2006	2007	2008	2009	2010
Blue oak	34	30	30	8	1	7	6	11	9
*Cottonwood	4			4	4	3	2	2	2
Interior Live Oak	34	34	28	32	22	23	26	29	27
*Sycamore	8			8	9	7	8	7	7
*Valley Oak	9			9	14	8	9	3	6
Total Trees	**89**	**64**	**58**	**61**	**50**	**48**	**51**	**52**	**51**
Coyote brush	68	67	67	66	50	60	60	78	162
Ceanothus	68	40	40	7	4	2	1	2	2
*Toyon	9			9	2	6	4	3	3
*Coffeeberry	7					7	6	5	5
Total Shrubs	**152**	**107**	**107**	**82**	**56**	**75**	**71**	**88**	**172**
Total Tree & Shrub	**241**	**171**	**165**	**143**	**106**	**123**	**122**	**140**	**223**
Total % Survival		**79%**	**68%**	**59%**	**44%**	**51%**	**51%**	**58%**	**92%**

*Remedial plantings post 2002

Table 6 – 2010 Average Height (ft.) Data for the Wolf Ranch Vegetation Screen

Species	2002	2003	2004	2005	2006	2007	2008	2009	2010
Blue oak	3.8	3.6	3.0			6.1	7.7	8.0	10.1
*Cottonwood						14.3	14.0	16.0	20.0
Interior Live Oak	5.2	5.1	4.5			6.7	8.5	9.2	10.1
*Sycamore						6.4	7.6	10.6	10.4
*Valley Oak						4.8	5.1	7.7	7.2
Total Trees	**4.5**	**4.4**	**3.8**			**7.7**	**8.6**	**10.3**	**10.2**
Coyote brush						6.1	6.0	6.3	4.6
Ceanothus						3.5	5.0	5.5	4.5
*Toyon						2.3	4.3	5.7	7.3
*Coffeeberry						3.0	4.7	4.2	5.4
Total Shrubs						**3.7**	**5.0**	**5.4**	**4.7**

* Remedial plantings post 2002

During early 2008, 160 trees consisting of alder, cottonwood, box elder and various willow species were planted along the eastern border of Wolf Ranch to enhance the habitat and provide a vegetation screen (barrier) from the Union Pacific Railroad tracks. The survival rate for these plants decreased from 88% in 2009 to 69% in 2010 and the decline may be attributable to the well pump failure in 2009. However, the growth of these plants has been vigorous since 2008 (Figure 3).

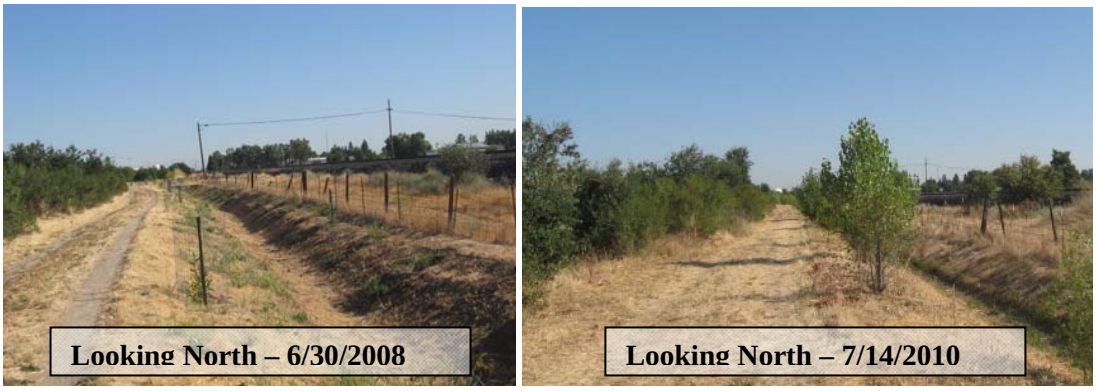

Figure 3 – The newly planted "Eastern Vegetation Screen" at Wolf Ranch

Plant growth and plant sustainability varies across the site and is likely associated with the distribution of hardpan subsoil. This hardpan extends across much of the site, as shallow as 3-5 feet in some test pits, and likely impedes deep root growth to the water table which is needed for long-term vegetation survival. For example, plants in Zone D (Figure B-4) experience drought stress throughout much of the summer despite weekly irrigation. The tallest and most vigorous trees are generally localized in the northeast corner of the site, along the eastern edge of Peninsula B, and along the eastern portion of the property in Area J (Figure B-4). Despite the decrease in vigor of these plants in 2009, after the irrigation system was repaired in 2010, plant vigor greatly increased; again illustrating a dependence on supplemental irrigation. Ground-level photos of Wolf Ranch are found in Appendix A.

Habitat Acreage

Acreage by habitat type at Wolf Ranch has been amended several times (1997, 1998, and 1999). In 2005, a geo-referenced aerial photo taken in March 2004 was used to recalculate the acreages of each habitat type (Table 7 and Figure 4).

Table 7 – Wetlands mitigation requirements and mitigation acreage at Wolf Ranch

Habitat Type	Impacted Acreage	Required Mitigation (2:1)	1999 Acreage	2004 Acreage	Requirement Met?
Permanent Emergent Marsh	8.12	16.24	10.87	9.65	Yes (see footnote*)
Riparian	7.79	15.58	19.37	19.13	Yes
Riparian Marsh	-	-	6.24	5.64	-
Mixed Riparian	-	-	5.02	5.61	-
Oak Riparian	-	-	8.11	7.88	-
Vernal Pool	1.73	See "Mitigation for Federal Listed Species" section	2.50	-	Yes (protected pools & purchased mitigation credits)
Open Water	2.48	4.96	18.11	21.42	Yes
Total (without vernal pools)			67.72	69.33	Yes

*There is considerable variation in water levels at Wolf Ranch due to its proximity to the Steelhead Creek. This affects interpretation of PEM, which is defined multiple ways within this table, thereby complicating interpretation of mitigation compliance. Columns 2 and 3, derived from the 1997 Planning Dynamics Report, define PEM as areas with elevations ranging from 17 to 21 feet. Column 4, derived from a 1999 Sierra View Landscape habitat map, defines PEM as areas with an elevation of 20 to 21.4 feet – a much narrower elevation gradient/interpretation (with lower elevations that likely are PEM in the Open Water category). Water elevations were even higher than this in 2004 (Column 5). Thus, we believe that Wolf Ranch is likely meeting or exceeding all habitat mitigation acreage requirements for PEM.

Figure 4 – Habitat acreages at Wolf Ranch as measured on March 2004 aerial photo.

Avifauna & Other Wildlife

Wolf Ranch continues to support a large number and diversity of birds. During 2010, two surveys were conducted, one in spring and one fall, and a combined total of 47 species (excluding the domestic duck and domestic goose) were detected on site; 20 of the 47 species were detected during both surveys. The majority of birds that have been observed using the site are waterfowl, wading birds, shorebirds or other species commonly found in Central Valley wetland environments. Observations confirmed site use for a variety of behaviors including foraging, resting, nesting, and roosting. A list of the species observed on the site as well as the total number of each species counted in 2010 for each survey can be found in Table 8.

In addition to avifauna, the following species of wildlife have been observed at Wolf Ranch throughout the years: American beaver (*Castor canadensis*), northern river otter (*Lontra canadensis*) , muskrat (*Ondatra zibethicus*), North American bullfrog (*Rana catesbeiana*), crawfish, coyote (*Canis latrans*) and black-tailed jackrabbit (*Lepus californicus*). Trapping surveys conducted for the giant garter snake (*Thamnophis gigas*) in previous years have been unsuccessful; however, many western pond turtles (*Clemmys marmorata*) have been captured. Fishermen have also reported catching both bluegill and catfish in the Wolf Ranch Lake and, when lake water levels receded in spring 2001, carp were observed along the shore. Additionally, the Chinese Mitten crab (*Eriocheir sinensis*) has been previously reported at Wolf Ranch.

Recreational Use

Wolf Ranch is also used for recreation. People visit the site to walk, observe wildlife, fish, and ride horses. Fishing areas have sustained some human-induced impacts including vegetation damage, litter and destruction of seven of the eight Wood Duck nesting boxes. Individuals walking dogs off-leash is a concern during nesting bird season because dogs chase birds and disturb them on their nests. Other less common activities (which are incompatible with the site's intended function) include rafting, campfires and unauthorized motorized vehicle use (on and off-road).

Recommendations for Wolf Ranch Wildlife Sanctuary

For the 13th year of monitoring the plant survival has remained above the required 50% standard that was established for the 5th year. However, the requirement of an additional 3 years showing self-sustainability has yet to be achieved. The majority of the riparian habitat is still critically dependent on supplemental irrigation and it is unlikely to reach self-sustainability without addressing the limiting factors. SAFCA will be consulting with specialists in the coming year to help identify the issues and develop a strategy to encourage a vigorous self-sustaining plant community at Wolf Ranch. Irrigation will need to continue through 2011.

Recommendations for Wolf Ranch include continued monitoring of the site for significant signs of drought stress/reduced plant vigor. Areas that have become infested with a variety of non-native invasive plants will continue to be managed with hand-pulling, mowing and broadleaf herbicide treatments to encourage native plant growth.

To encourage safe nesting for waterfowl and other ground nesting birds, SAFCA is exploring installing nesting and resting platforms anchored at several locations within the lake. Tree and shrub pruning by beaver is an issue at this site and caging efforts may continue in 2011.

Table 8 – List of bird species observed on Wolf Ranch during 2010

Type	Date	3/19/10	10/26/10
Grebes	Pied-billed Grebe	5	3
Cormorants/Pelicans	Double-crested Cormorant	3	51
Herons/Bitterns	American Bittern	1	
	Great Egret	1	1
	Snowy Egret	1	
Waterfowl	American Wigeon	16	6
	Canada Goose	34	63
	Cinnamon Teal	18	
	Greater White-fronted Goose	2	
	Lesser Scaup	2	
	Mallard	11	76
Hawks/Owls	Cooper's Hawk		1
	Northern Harrier		1
	White-tailed Kite		1
Pheasants/Quail	Ring-necked Pheasant		5
Rails/Coots	American Coot	386	20
	Common Moorhen	1	
Shorebirds	Black-necked Stilt	3	
	Greater Yellowlegs	1	3
	Killdeer	3	
	Long-billed Curlew	1	
Gulls/Terns	Gull species		2
Doves	Mourning Dove	2	8
Hummingbirds	Anna's Hummingbird	1	
Fishers	Belted Kingfisher		1
Woodpeckers	Northern Flicker	1	4
Flycatchers	Black Phoebe	1	1
Magpies/Crows	American Crow	3	8
	Western Scrub-Jay	5	
Wrens	Marsh Wren	15	14
Chickadees/Titmice	Bushtit	4	17
Bluebirds/Thrushes	Ruby-crowned Kinglet		6
Thrashers	Northern Mockingbird	7	
Pipits	American Pipit	2	
Shrikes/Starlings	European Starling		3
Warblers	Yellow-rumped Warbler	10	60
Sparrows/Towhees	Golden-crowned Sparrow	22	10
	Lincoln's Sparrow		2
	Song Sparrow	3	1
	Sparrows, unidentified		2
	White-crowned Sparrow	69	104
Blackbirds	Brewer's Blackbird	17	
	Brown-headed Cowbird	2	
	Red-winged Blackbird		1279
	Western Meadowlark	1	3
Finches	American Goldfinch		17
	House Finch	1	4
Grand Total	**47 species**	**655**	**1777**

Arcade Creek Unit 1A at Arcade Creek

The Arcade Creek Unit 1A project area is located along Arcade Creek from the Sacramento Northern Bikeway, west to the Creek's confluence with Steelhead Creek (formerly known as the NEMDC). Mitigation required on Arcade Creek Unit 1A is described in the *Arcade Creek Revegetation Plan Unit 1A (Revised)*, prepared by the Sacramento Tree Foundation (July 5, 1995). The plan required an initial installation of 250 trees and shrubs. Any plant mortality was to be investigated and remedial trees and shrubs planted upon consultation with DFG. An annual monitoring report would be prepared and submitted to DFG by July of each monitoring year.

Following a review of historical monitoring data, in early 2006, SAFCA concluded that all formal mitigation survivorship goals & requirements at Arcade Creek Unit 1A (2005 Monitoring Report) had been met. A letter was issued on March 16, 2006 to the Corps Regulatory Branch and the California Department of Fish & Game seeking concurrence with SAFCA's conclusion. A response was received from DFG concurring with SAFCA's decision. Field observations by SAFCA biologist's in 2006 and 2007 indicated the mitigation vegetation continued to thrive at the site.

Arcade Creek Unit 1B at Hansen Ranch

Arcade Creek Unit 1B extends along Arcade Creek from the Sacramento Northern Bikeway upstream to Marysville Boulevard. The Arcade Creek Unit 1B mitigation site located at Hansen Ranch is located south of West Ascot Avenue, north of the Robla Creek north levee, and east of the Union Pacific railroad in the City of Sacramento. Prior to project implementation, the site was used for grazing cattle. The Hansen Ranch component of Arcade Creek Unit 1B is governed by the DFG Streambed Alteration Agreement II-067-96. A portion of Hansen Ranch was planted with 343 trees to mitigate for the removal of seven oak trees (combined DBH was 74.5 inches) which occurred as part of the NALP project in Arcade Creek Unit 1B, in accordance with the City of Sacramento Heritage Tree Ordinance. Vernal pools are interspersed throughout the planting site. In addition to the Hansen Ranch trees, SAFCA agreed to grant $100,000 to the City for specific use in the design and planting of trees at various points along the Ueda Parkway.

The City of Sacramento officially concurred with SAFCA that the mitigation has successfully been accomplished and has released SAFCA from further obligations related to mitigating for the removal of the original seven oak trees. SAFCA will continue to manage this site by utilizing mowing and grazing strategies to help reduce the risk of fire and control invasive weeds such as yellow star thistle. Additionally, cages protecting trees from cattle in Units 1 and 3 will also be maintained until the trees are big enough and no longer need protection from grazing.

Appendix A – Photo Documentation

WOLF RANCH WILDLIFE SANCTUARY

Figure A-1: Area A, south side looking north – Fall 2002, August 2009 and July 2010

Figure A-2: Area D, east end looking west – Fall 2002, August 2009 and July 2010

Figure A-3: Areas G and I, looking north – Fall 2002, August 2009 and July 2010

Figure A-4: East end of Area F, taken from Area J – Fall 2002, August 2009 and July 2010

Figure A-5: Middle of Area J, looking north – Fall 2002, August 2009 and July 2010

Figure A-6: Peninsula B – Fall 2002, August 2009 and July 2010

Figure A-7: Peninsula B, south end looking north – Fall 2002, August 2009 and July 2010

Figure A-8: West end of Area F, looking east – Fall 2002, August 2009 and July 2010

Figure A-9: West end of Area I, looking east – Fall 2002, August 2009 and July 2010

Figure A-10: Vegetation Screen, east end looking west – Summer 2002, August 2009 and July 2010

Figure A-11: Vegetation Screen, west end looking east – Fall 2002, August 2009 and July 2010

Appendix B – Wolf Ranch Wildlife Sanctuary Maps

Figure B-1 Jeffrey A. Hart, Ph.D. & Associates Acreage Map, May 1996

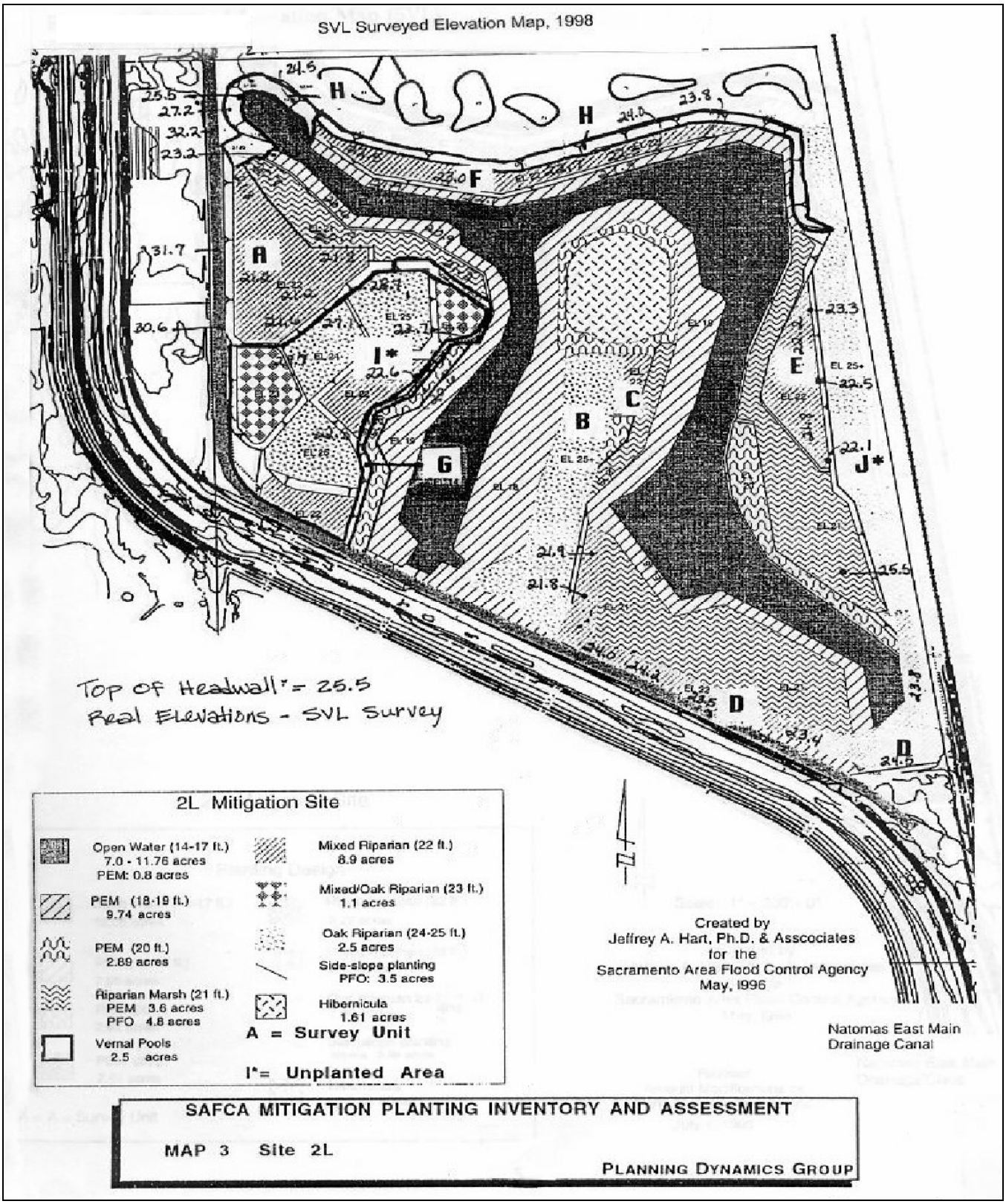

Figure B-2 SVL Surveyed Elevation Map, 1998

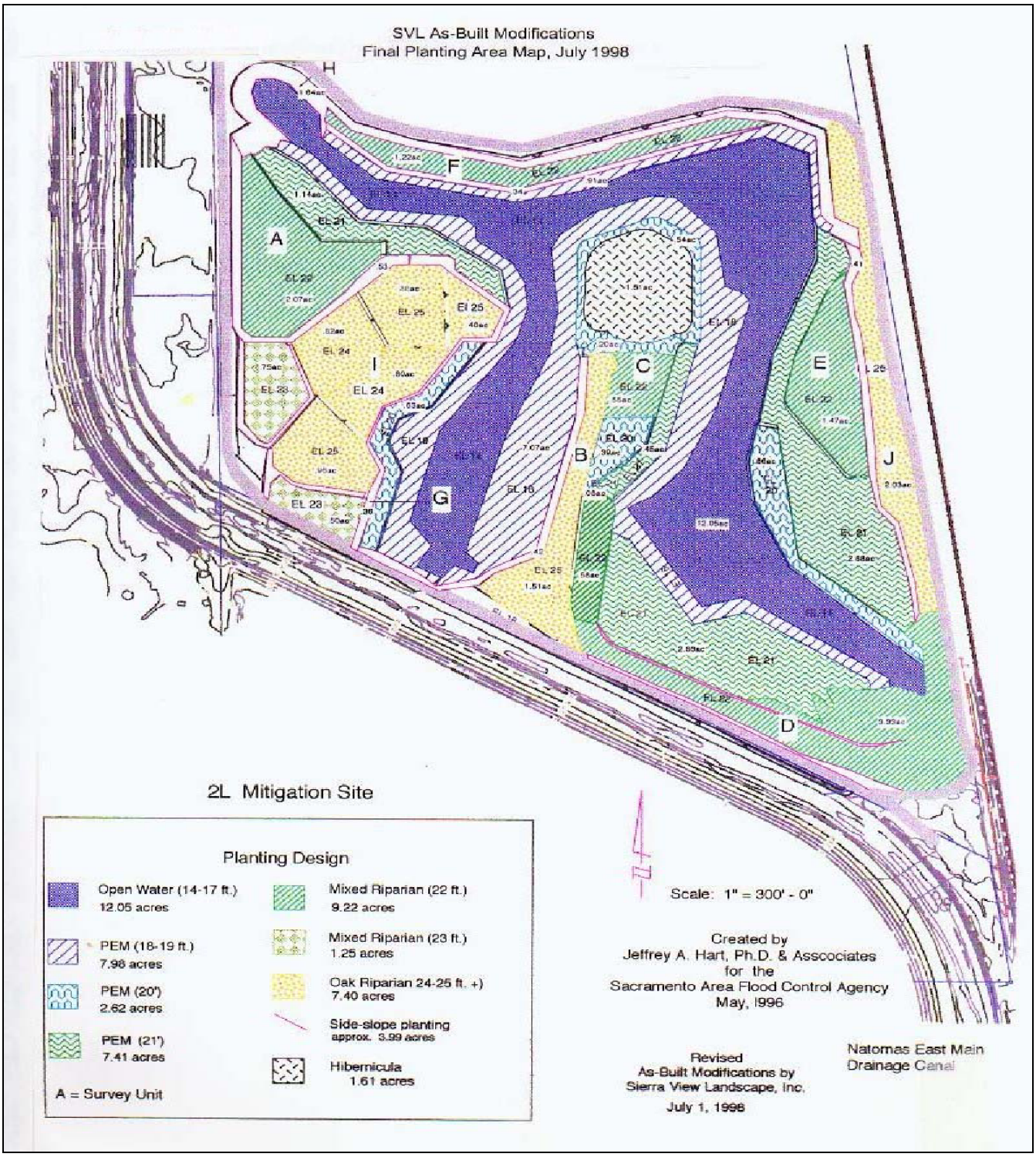

Figure B-3 SVL As-Built Modifications Final Planting Area Map, July 1998

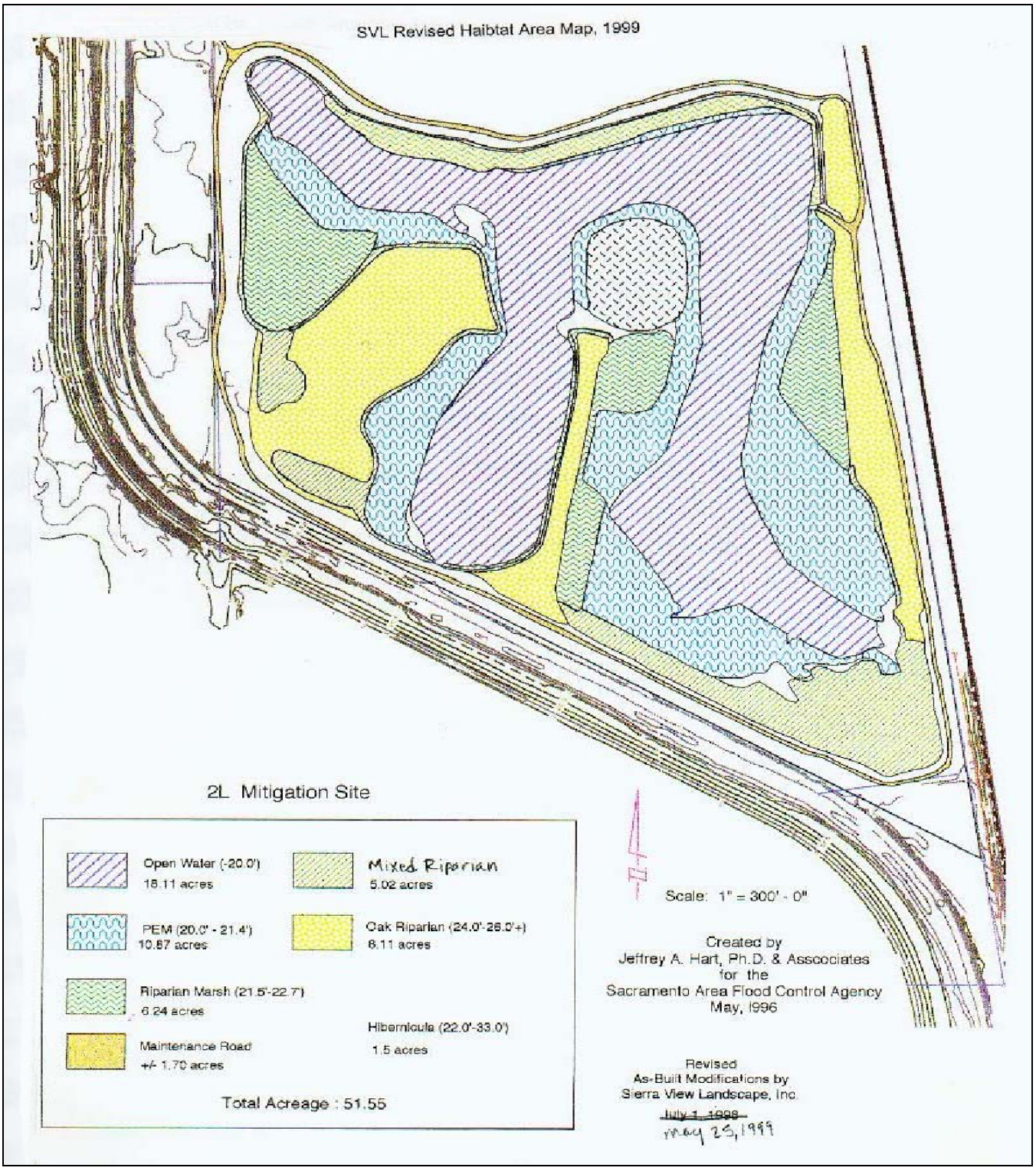

Figure B-4 SVL Revised Habitat Area Map, 1999