SECOND ANNUAL RESTORATION MONITORING REPORT (YEAR 2)

SOUZA II RESTORATION PROJECT
CONTRA COSTA COUNTY, CALIFORNIA

NOVEMBER 2011

Prepared for

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Section 1. INTRODUCTION

1.1. SUMMARY

The East Contra Costa County Habitat Conservancy (Conservancy), in partnership with the East Bay Regional Park District (District), implemented the 94-acre Souza II Restoration Project. The 190-acre Souza II parcel was acquired by the District with support from the Conservancy. The Souza II acquisition and the restoration project were initiated as a component of the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP) (Jones and Stokes 2006). This Plan provides regional conservation and development guidelines to protect natural resources while improving and streamlining the permit process for endangered species and wetland regulations. A critical component of the HCP/NCCP is the implementation of the conservation strategy, which provides for the creation of a preserve system that will protect land for the benefit of covered species, natural communities, biological diversity, and ecosystem function and compensate for habitat loss by restoring or creating specific habitats and land cover types.

The restoration project was completed in fall/winter of 2009 as outlined in the *Souza II Restoration Project Restoration Management Plan* (Restoration Management Plan; Jones and Stokes 2009).

This report provides the results of Year 2 restoration monitoring conducted in 2011 which was carried out as detailed in the Restoration Management Plan (Jones and Stokes 2009). Results of Year 1 restoration monitoring activities are detailed in the *First Annual Monitoring Report, Souza II Restoration Project, Contra Costa County, CA* (Nomad 2010). This report provides: a summary of the restoration project; monitoring requirements, timing, and methodology; performance standards; monitoring results; and recommendations.

1.2. SETTING

The 94-acre Souza II Restoration Project (project area) is located in southeastern Contra Costa County (Figure 1), approximately two miles from the town of Byron. The project area is near the Byron Airport, and bound on the west by Vasco Road, and on the north and east by Armstrong Road. The project area can be accessed from Armstrong Road via Byron Hot Springs Road. As recorded in the public land survey system, the project area lies within Transverse 1, Range 3 East, Section 21 of the Byron Hot Springs (37121g6) 7.5-minute U.S. Geological Survey (USGS) quadrangle.

The project area is located on the eastern edge of the Diablo Range near the San Joaquin County border, and lies approximately 16 miles southeast of Mount Diablo. It is located within the boundaries of the San Joaquin Valley subregions of the California Floristic Province and within the Brushy Creek watershed. The Brushy Creek Watershed drains eastward from the Byron Hills to the Clifton Court Forebay, a reservoir along the San Joaquin River.

The project area is situated between two existing park/open space areas – Byron Airport’s Habitat Management Lands (adjacent to the Souza II parcel, just to the east), and the Martin Acquisition (immediately west). Private properties in the immediate vicinity are mainly large holdings (approximately 80 to 2,000 acres in size) dominated by annual grasslands, only a few of which have been improved with homesteads and structures (Jones and Stokes 2009). The entire parcel is designated as a high acquisition priority in the HCP/NCCP in Acquisition Analysis Zone 5a (Jones and Stokes 2006).

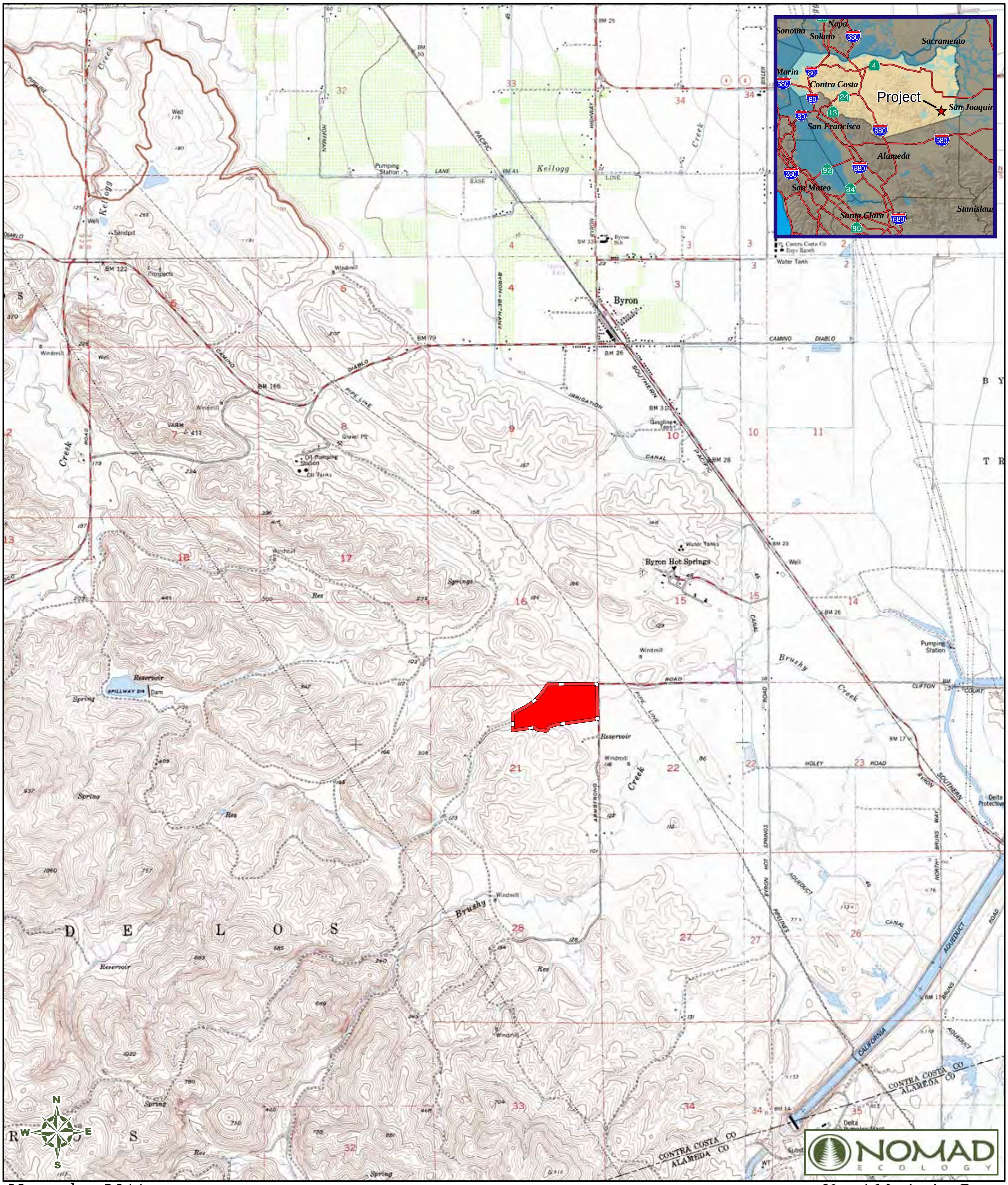
Cattle ranching was the primary historical land use on the parcel and surrounding area. Based on a historical ecology analysis prepared by Grossinger and Askevold (2008 in Jones and Stokes 2009), the parcel was historically a diffuse, seasonally flooded drainage system with alkali wetlands, perhaps vernal pool/swale features, and a discontinuous channel. The parcel probably had a high degree of topographic variability with shallow channels or sloughs and perhaps larger bodies of persistent surface water. It appears that this system was converted to a relatively straight artificial channel in the early 20th Century, presumably to improve drainage characteristics (Grossinger and Askevold 2008 in Jones and Stokes 2009).

The project area is relatively flat, ranging in elevation from approximately 75 feet in its lowlands to 200 feet in the gently sloping hills and ridges to the south. An unnamed intermittent tributary to Brushy Creek with seasonally continuous flow is the dominant hydrological feature in the study area. The unnamed tributary of Brushy Creek bisects the project area, flowing from west to east for approximately 2,700 linear feet. It flows eastward from the project area under Armstrong Road to the adjacent Byron Airport Habitat Management Lands. It then converges with Brushy Creek east of the parcel, which eventually reaches the Clifton Court Forebay (Jones and Stokes 2009).

1.3. Restoration Summary

The restoration project includes the unnamed tributary to Brushy Creek. The banks of the Brushy Creek tributary were stabilized and additional seasonal wetlands were restored in association with the tributary (Figure 2). Channel banks were sloped in a manner to promote onsite flooding, and seeded with native grass species (Figure 2). The berms north and south of the tributary were removed to increase tributary connectivity with the adjacent wetlands and floodplain. Rock weirs were installed in the tributary to increase structural diversity and provide ponding for California red-legged frog. Additionally, a 0.18-acre pond was created south of the channel to provide breeding habitat for California tiger salamander. The pond may also provide aquatic habitat for California red-legged frog, although it will not necessarily hold water for a sufficient period to support a breeding California red-legged frog subpopulation. An existing dirt road was retired, and restored to wetland habitat in the wetland portions (including removal of a culvert from the Brushy Creek tributary), and seeded with native grasses in the upland portions.

The planting plan included planting wetland, emergent wetland, and wetland transition plants and seeding with native grassland and sterile erosion control mix species (Figure 2). The restoration project components including construction specifications, grading plans, and planting plans are detailed in the Restoration Management Plan (Jones and Stokes 2009).



November 2011

Year 1 Monitoring Report

Legend

Project Boundary

Figure 1

Location of the Project Boundary

Souza II Restoration Project

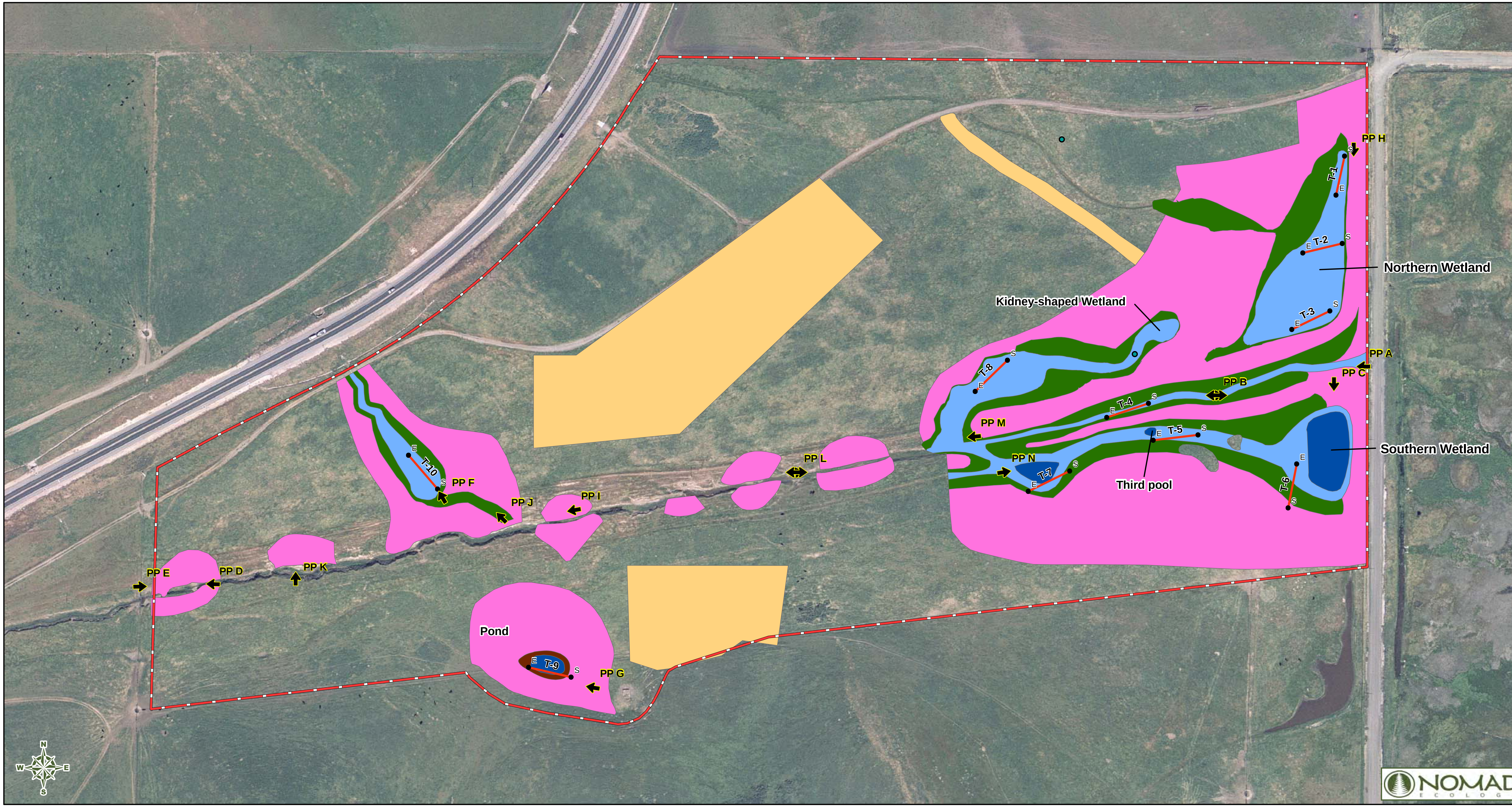
Contra Costa County Department of Conservation and Development

1:47,520

0 0.375 0.75 Miles

Sources: USGS, California Spatial Information Library, Contra Costa County
Projection: State Plane NAD 83 Feet.

Contra Costa County, California



November 2011

Year 1 Monitoring Report

Legend

- Invasive Weed Locations 2011
- Project Boundary
- Photo Point Location and Direction
- Transect Start and End
- Transects

Planting Sites

- Sterile Erosion Control Mix
- Emergent Wetland
- Grassland
- No Planting/Seeding - Inoculum
- Wetland
- Wetland Transition

Figure 2

Planting Plan, Photo Point Locations, and Transect Locations

Souza II Restoration Project

Contra Costa County Department of Conservation and Development

1:2,400

0 100 200 Feet

Aerial photography (2008) provided by Contra Costa County Department of Information Technology. Planting Sites provided by Jones and Stokes. Projection:NAD 83 SP CA Zone III.

Section 2. MONITORING METHODS

2.1. MONITORING OBJECTIVES, PERFORMANCE CRITERIA, AND SCHEDULE

Table 1 outlines each monitoring activity, the project objectives, the performance criteria and timing for the monitoring activity as outlined in the Restoration Management Plan (Jones and Stokes 2009).

Table 1. Performance Standards for Restoration Activities

MONITORING ACTIVITY	PROJECT OBJECTIVES	PERFORMANCE CRITERIA	MONITORING ACTIVITY TIMING
Vegetation Monitoring	SO-1 Increase the abundance and distribution of native emergent vegetation onsite.	See Table 2	Early to mid spring, after the rainy season. (Conducted late spring 2010)
	SO-5 Reduce non-native plant species in the wetlands onsite	See Table 2	
	SO-6 Restore 8.5 acres of seasonal wetlands onsite.	Ensure 8.5 acres of seasonal wetlands have been restored.	
Erosion Monitoring	SO-2 Reduce erosion along the tributary to Brushy Creek	Qualitative assessment including photo-documentation before and annually for five years after restoration activity determines that erosion along the Brushy Creek tributary onsite has been reduced.	Late spring or early summer, after the rainy season.
Wetland and Pond Acreage Monitoring	SO-3 Increase wetland and pond capacity and water duration onsite	Wetland acreage onsite has increased by 8.3 acres and pond acreage onsite has increased by 0.18 acres by five years following restoration construction.	Early to mid spring, after or during the end of the rainy season.
Hydrologic Connectivity Monitoring	SO-4 Hydrologically reconnect the tributary to Brushy Creek with its floodplain and adjacent wetland complex.	Qualitative assessment based on photo-documentation before and annually for five years after restoration activity determines that the Brushy Creek tributary is hydrologically connected with its floodplain and adjacent wetland complexes	Within a week of a major storm event.
Depth and Duration of Inundation Monitoring	SO-7 Increase acreage of pond habitat onsite capable of supporting California Tiger Salamander	The depth and duration of inundation at the newly created pond is not significantly different than the reference pools (at $\alpha \leq 0.05$ or 95% confidence) over a five-year monitoring period.	During the rainy season.
	SO-8: Restore 8.5 acres of suitable habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp	No performance standard.	
Milk Thistle Monitoring	SO-9 Eliminate milk thistle from the project area	No milk thistle is present five years after restoration	Late spring.

Monitoring Activity	Project Objectives	Performance Criteria	Monitoring Activity Timing
Atriplex Monitoring	SO-10: Increase the population size and distribution of brittlescale (*Atriplex depressa*) to the project area, if feasible.	No performance standard.	Late spring.
In-stream Pool Monitoring	SO-11 Enhance structural diversity by creating in-stream pools in the Brushy Creek tributary	Qualitative assessment based photo-documentation before and annually for five years after restoration activity determines that pools have formed behind rock weirs along the Brushy Creek Tributary.	During the rainy season.
Photo Point Monitoring	To monitor overall project performance.	See performance criteria for Erosion Monitoring, Hydrologic Connectivity Monitoring, and In-stream Pool Monitoring for these specific photo points. No performance standards for general photo points.	During Vegetation Monitoring and Erosion Monitoring in early to mid-spring and during Hydrologic Connectivity Monitoring in winter.

Table 2. Performance Standards for Restoration Plantings

Performance Period	Performance Indicators	Target Value
1	% of plants surviving	At least 75% survival in Good or Fair condition
2 (and subsequent years if necessary)	% of plants surviving	At least 70% survival in Good or Fair condition
3 - 5	Total absolute cover of native wetland vegetation	At least 60% cover
1 – 5	Total absolute cover of non-native invasive species*	No more than 5% cover

* Non-native invasive species = California Invasive Plant Council species with a level "high" rating, and any other species determined to threaten successful restoration of the native plant communities onsite.

2.2. Field Data Collection

The following personnel conducted the spring 2011 monitoring and report preparation:

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Botanist
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Nomad botanist/wetland specialist Erin McDermott conducted site monitoring visits on December 20, 2010, and January 21, February 21, March 21, April 2, April 22, and August 12, 2011 to conduct: 1)

Erosion Monitoring, 2) Hydrologic Connectivity Monitoring, 3) Depth and Duration of Inundation Monitoring, 4) In-stream Pool Monitoring, and 5) Photo Point Monitoring. Grazing moniotring was conducted on April 7 and 22, 2011.

Spring monitoring activities were conducted on May 12 and 13, 2011 by Erin McDermott and Nomad botanist Brain Peterson. These monitoring activities included: 1) Vegetation Monitoring, 2) Wetland and Pond Acreage Monitoring, 3) Milk Thistle Monitoring, 4) Atriplex Monitoring, and 5) Photo Point Monitoring. The results of these monitoring efforts are detailed in Section 3.

2.2.1 Vegetation Monitoring

As detailed in the Restoration Management Plan (Jones and Stokes 2009), vegetation monitoring will occur annually in early to mid spring, after the end of the rainy season. During years one through three, performance criteria will be measured in ten 30-meter long belt transects. Plant survival and health will be measured in the area within five meters on either side of the transect line.

The condition (vigor) of surviving plants will be evaluated on the basis of leaf color and size, as well as the presence of browse damage, disease symptoms and insect infestation, using the following qualifiers.

- Good Condition—Most or all leaves show healthy color and size, and/or <25% of plant's aboveground growth is affected by browse damage, disease or insect infestation.
- Fair Condition—Most leaves show healthy color and size, and/or 25–75% of plant's aboveground growth is affected by browse damage, disease or insect infestation.
- Poor Condition—Few or some leaves show healthy color and size, and/or more than >75% of plant's aboveground growth is affected by browse damage, disease or insect infestation.

As detailed in the Restoration Management Plan (Jones and Stokes 2009), percent absolute cover will be measured for non-native species during years one through eight, and for native species during years four through eight. Based on the recommendations outlined in the First Annual Monitoring Report (Nomad 2010), percent absolute cover was measured in 60 4-meter-square (2 m. x 2 m.) quadrats, randomly located along the ten 30-meter long transects (six quadrats per transect), instead of 40 1-meter-square (1 m. x 1 m.) quadrats, randomly located along the ten 30-meter long transects (four quadrats per transect), as originally designed. Each year the quadrat locations along the line are randomly chosen utilizing a random number table to identify six start points along each transects. The quadrat is aligned such that one corner of the quadrat touches the transect and the quadrat lies to the northwest of that point. During monitoring of vegetative cover, a monitor estimates the percentage of absolute cover of each plant species located in the quadrat. After the target values are met for restoration plantings, monitoring will measure and evaluate native wetland vegetative cover annually for five years. If after five years, the target values detailed in Table 2 for vegetative cover and abundance are met each year, then monitoring will cease and the project will be considered successful. If performance criteria are not met each year, then adaptive management decisions will be made. Monitoring will continue until the criteria are met for five consecutive years.

During spring 2010 monitoring, ten permanent transects were established (Figure 2). The end points of each transect were permanently marked using 3 foot long rebar posts. Transect end points were recorded with a submeter precision global positioning system (GPS) unit and labeled start and end (Table 3). Colored planting flags were present on site in 2010, which showed the location and species of planted plants (Table 4). It was assumed that there were 3 plants per planting flag for calculation of percent survival. Plants that were missing were recorded as dead. The planting flags were removed in March 2011 prior to bringing cattle onto the site.

Table 3. GPS Coordinates for Vegetation Monitoring Permanent Transects

Transect Number	GPS Coordinates[1]			
	Transect Start		Transect End	
	Easting	Northing	Easting	Northing
1	6231928.1	2129519.9	6231909.4	2129435.1
2	6231923.0	2129329.6	6231837.1	2129309.0
3	6231896.1	2129182.7	6231813.0	2129142.2
4	6231500.8	2128981.2	6231409.8	2128950.5
5	6231608.8	2128912.6	6231511.0	2128900.9
6	6231805.2	2128753.7	6231805.2	2128753.7
7	6231329.0	2128834.1	6231238.8	2128789.7
8	6231193.5	2129075.5	6231123.2	2129007.4
9	6230242.4	2128385.0	6230149.7	2128406.2
10	6229951.6	2128794.5	6229888.3	2128868.4

Table 4. Planting Flag Color and Species

Species	Flag Color
narrowleaf milkweed (*Asclepias fascicularis*)	Purple
saltgrass (*Distichlis spicata*)	Orange
spikerush (*Eleocharis macrostachya*)	Red
alkali heath (*Frankenia salina*)	Blue
gumplant (*Grindelia camporum*)	Pink
salt heliotrope (*Heliotropium curassavicum*)	Yellow
baltic rush (*Juncus balticus*)	Florescent Yellow
common rush (*Juncus effusus*)	Green

[1] GPS Coordinates are in datum NAD83 State Plane CA III feet.

SPECIES	FLAG COLOR
iris-leaved rush (*Juncus xiphioides*)	White

In 2010 and 2011, all plants in the area within 5 meters on either side of the transect line were counted and the health of each planting (good, fair, poor, or dead/missing) was visually estimated using the above criteria. In 2011, due to the absence of flagging, the base line planting numbers recorded in 2010 were used to calculate the percent survival.

Meadow barley (*Hordeum brachyantherum)* and saltgrass (*Distichlis spicata*) were seeded, and saltgrass was planted in the project area. In 2010 there were several small individuals of both species present in the vicinity of the planting flags as well as other locations, making them impractical to count and give a health rating. In 2011 due to their larger size both species were counted and given a health rating. Though this can not be compared to last year's data it shows the current health of both populations in the study area.

During the spring 2011 monitoring, percent absolute cover was measured in six 2-meter-square quadrats randomly located along each of the ten transects (60 quadrats total). The absolute cover of all species in the plots was recorded. The individual plantings in each quadrat were not counted and health was not assessed as stated in the Restoration Management Plan (Jones and Stokes 2009), since this was already conducted in the belt transects. Additionally, there is no way to calculate plant survival using a randomly placed quadrat.

2.2.2 EROSION MONITORING

As detailed in the Restoration Management Plan (Jones and Stokes 2009), erosion monitoring will occur in late spring or early summer, after the rainy season. Permanent photo stations at the location of erosional features were not established prior to the onset of construction. Therefore a complete baseline assessment is not available for comparison to annual monitoring observations or written descriptions.

During the spring 2010 monitoring, Nomad established three photo stations (Photo Points I, J, and K; Figure 2) where erosional problems were identified along the Brushy Creek tributary (Table 5). The photo point locations were permanently marked using 3 foot long rebar posts and recorded with a submeter precision global positioning system (GPS) unit.

During site visits throughout winter 2011, photographs and written descriptions were prepared at each erosional feature location. These written descriptions will be compared at each location with conditions from the previous year in terms of bank stability or degree of erosion. At the end of five years, a determination will be made as to whether the restoration has successfully resulted in reduced erosion along the Brushy Creek Tributary. Table 5 shows the locations of all photo points for the project. Photo Points A-H were established during project construction (Figure 2).

Table 5. GPS Coordinates for Photo Points

Photo Point	Monitoring Type	GPS Coordinates[2]	
		Easting	Northing
A	Hydrologic Connectivity	6231968.8	2129061.4
B	In-stream Pool Monitoring	6231649.3	2128998.5
C	General Performance	6231905.0	2129022.9
D	In-stream Pool Monitoring	6229461.9	2128587.4
E	In-stream Pool Monitoring	6229303.3	2128582.7
F	General Performance	6229961.3	2128777.4
G	General Performance	6230289.3	2128362.5
H	General Performance	6231948.3	2129533.8
I	Erosion	6230248.2	2128748.7
J	Erosion	6230090.6	2128733.1
K	Erosion	6229641.8	2128599.8
L	Hydrologic Connectivity	6230733.7	2128830.8
M	Hydrologic Connectivity	6231120.3	2128908.9
N	Hydrologic Connectivity	6231186.5	2128831.7

2.2.3 Wetland and Pond Acreage Monitoring

Wetland and pond acreage monitoring will occur in early to mid spring, after or during the end of the rainy season. Nomad will prepare a habitat map at year 5, and the acreage of each habitat type will be calculated. These acreages will be compared with the baseline habitat map and the differences in acreages between baseline and year 5 for each habitat type will be calculated.

Wetland and pond acreage monitoring did not occur during late spring 2010 monitoring because it was not possible to tell the extent of wetlands and ponds this late in the growing season so soon after the restoration was completed. In 2011, wetland and pond acreage monitoring occurred on April 20, and May 12, 2011.

2.2.4 Hydrologic Connectivity Monitoring

As detailed in the Restoration Management Plan (Jones and Stokes 2009), hydrologic connectivity monitoring will occur within a week of a major storm event. We assume photo stations and a baseline

[2] GPS Coordinates are in datum NAD83 State Plane CA III feet.

assessment were not prepared prior to onset of construction which includes photographs and written descriptions of the conditions at each station.

Nomad established photo stations at locations where hydrologic connectivity between Brushy Creek tributary and adjacent wetlands were improved, to be used for the duration of the monitoring period. During the monitoring period Nomad takes photographs and prepares written descriptions from each station on an annual basis. The written descriptions will compare each station with conditions from the previous year in terms of hydrologic connectivity. At the end of five years, a determination will be made as to whether the restoration has successfully resulted in hydrologic connectivity between the Brushy Creek tributary and restored seasonal wetlands.

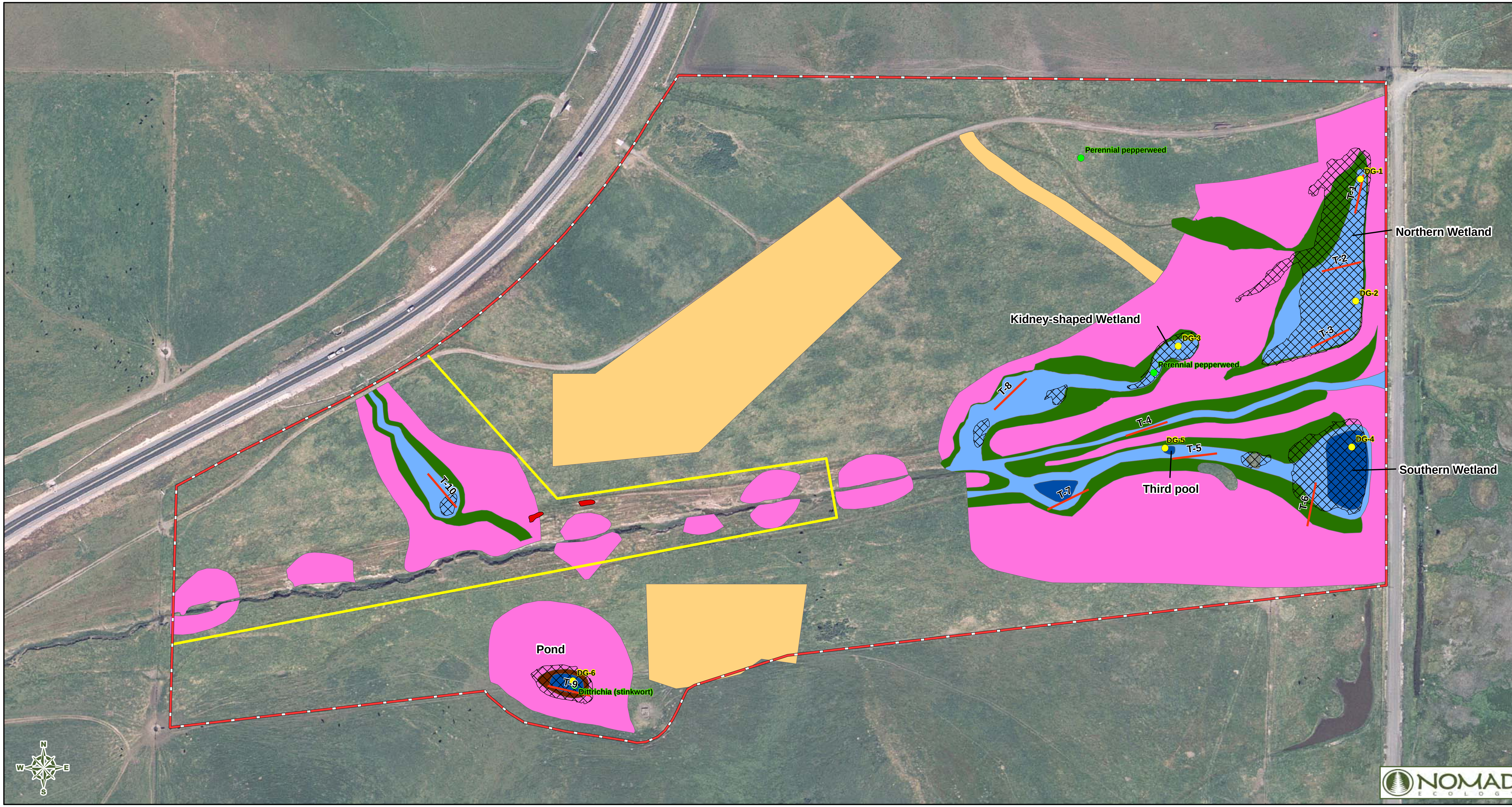
During the spring 2010 monitoring, Nomad established three photostations (Photo Points L, M, and N; Figure 2) where hydrologic connectivity will be monitored. In 2011, Nomad conducted hydrology monitoring at each of the monthly site visits and on April 2, 2011 which was within a week of a major storm event.

2.2.5 Depth and Duration of Inundation Monitoring

As detailed in the Restoration Management Plan (Jones and Stokes 2009), depth and duration of inundation monitoring will occur during the rainy season. Nomad installed six depth gages on Souza II and one depth gage in a reference pond known to support California tiger salamander on the adjacent Byron Airport's Habitat Management Lands on October 26, 2010. The depth gages were installed in the lowest elevation in each wetland. The lateral extent of inundation will also be estimated based on visual observation and recorded on standardized site base maps. Hydrographs for each created wetland will be compared with hydrographs for the reference wetlands on an annual basis and for the entire 5-year monitoring period.

If the first five years of monitoring are characterized by abnormally dry conditions, an assessment will be conducted that compares the observed hydrological responses of each wetland to various rainfall events during the 5-year period. These rainfall/response relationships will be projected to more normal rainfall years. If the assessment suggests that created the created pool will respond in normal rainfall years in the same pattern as reference wetlands, then the performance criterion will be considered satisfied. If not, then monitoring will continue until the created pond sustains three consecutive years of hydrology that meet the performance criterion.

Staff gages were installed in the project area and reference site on October 26, 2010 (Table 6 and Figure 3). Staff gages were monitored once a month on the following dates: December 12, 2010, and January 21, February 21, March 21, April 2, April 22, and May 12, 2011.



November 2011

Year 2 Monitoring Report

Legend

- Project Boundary
- Cattle Exclusion Fence Location
- Transect Locations
- Depth Gage Location and Name
- Invasive Weed Locations 2011
- San Joaquin Spearscale Topsoil Transplant Area
- Wetland Boundaries Spring 2011 (2.38 acres)

Planting Sites

- Sterile Erosion Control Mix
- Emergent Wetland
- Grassland
- No Planting/Seeding - Inoculum
- Wetland
- Wetland Transition

Figure 3

Location of Depth Gages, Cattle Exclusion Fence, San Joaquin Spearscale Transplant, and Invasive Weeds and Wetland Boundaries

Souza II Restoration Project

East Contra Costa County Habitat Conservancy

1:2,400

0 100 200

Feet

Aerial photography (2008) provided by Contra Costa County Department of Information Technology. Planting Sites provided by Jones and Stokes. Projection:NAD 83 SP CA Zone III.

Contra Costa County, California

Table 6. GPS Coordinates of Depth Gages

Depth Gage	GPS Coordinates[3]	
	Easting	Northing
DG-1	619503.0000	4188680.0000
DG-2	619502.0000	4188599.0000
DG-3	619385.0000	4188566.0000
DG-4	619502.0000	4188502.0000
DG-5	619378.0000	4188498.0000
DG-6	618989.0000	4188333.0000
Byron Airport Reference Site	619713.8518	4188084.1760

2.2.6 Milk Thistle Monitoring

As detailed in the Restoration Management Plan (Jones and Stokes 2009), milk thistle monitoring will occur during the late spring. All milk thistle found in the project area will be mapped, and population numbers will be estimated.

During the spring 2011 monitoring, Nomad surveyed for milk thistle and other invasive plant[4] species including yellow star thistle (*Centaurea solstitialis*[*]) and perennial pepperweed (*Lepidium latifolium**). All invasive plants found in the project area were mapped, and population numbers were estimated.

2.2.7 Atriplex Monitoring

What was thought to be brittlescale (*Atriplex depressa*; California Native Plant Society List 1B.2) seed was collected on site in fall 2008 and summer 2009. Seeds were spread in bare areas near the locations of existing populations with slope and aspect similar to populations from which seed was collected. Based on the results of the initial site visit, it was determined that a different species of *Atriplex*, valley saltbush (*Atriplex fruticulosa*) was seeded on site. The areas where this species was seeded are doing well and no further monitoring of these areas is required.

On February 9, 2011, topsoil containing seeds of San Joaquin spearscale (*Atriplex joaquinana*) was translocated from the Vasco Road Widening Project to the Souza II site. The topsoil was distributed into two discrete sites: east and west (Figure 3). These sites were monitored for *Atriplex* plants on April 22, May 13, and May 26, 2011. The translocation areas were hand weeded on May 26, 2011.

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[3] GPS Coordinates are in datum NAD83 State Plane CA III feet.
[4] California Invasive Plant Council species with a level "high" rating, and any other species determined to threaten successful restoration of the native plant communities onsite.
[*] Denotes a non-native species that has an origin other than that of California

2.2.8 In-Stream Pool Monitoring

As detailed in the Restoration Management Plan (Jones and Stokes 2009), in-stream pool monitoring will occur during the rainy season. Three permanent photo stations (Photo Points B, D, and E; Figure 2) at the location of rock weirs were established prior to the onset of construction.

In-stream pool monitoring was conducted by Nomad during each of the site visits in winter and spring 2010/2011.

2.2.9 Grazing Monitoring

A portion of the site was grazed with 110 head of cattle (cow/calf operation) from March 24, 2011 to April 22, 2011. An electric fence was erected to exclude cattle from the western portion of the creek but allow them access to the grassland and wetlands on the east side of the study area (Figure 3). The goal of grazing was to reduce biomass and thatch buildup of Italian ryegrass (*Festuca perennis*[*]) and other non-native annual grasses on site. Cattle were excluded from the portion of the creek that is incised with steep banks because trampling can cause erosion along the channel and on the banks. Cattle had access to the eastern portion of the tributary and the wetlands on the eastern portion of the property (Figure 3). Grazing was limited to a one month window to prevent trampling of wetland bottoms and planted areas. The planting flags were removed in March 2011 prior to bringing cattle onto the site.

Grazing monitoring was completed on April 2 and 22, 2011. Monitoring activities included recording observations about cattle activity around the wetlands, evidence of creek erosion, grazing of desirable vegetation, biomass of non-native grasses, and other observations about the cattle on site.

2.3. Limitations

Based on the timing of the surveys, all plant species growing within the study area may not have been observed due to varying flowering phenologies and life forms, such as bulbs, biennials, and annuals. Other potentially dominant species within vegetation communities on site may be present during other times of the year. The present study is not floristic in nature. A floristic study not only requires every plant observed to be identified to a level necessary to determine their regulatory status, it also necessitates a sufficient number of site visits spaced throughout the growing season within the blooming periods of all plant species, including common taxa, to ensure a complete inventory is obtained (CNPS 2001, CDFG 2000, USFWS 2000). Additionally, certain plant species, especially annuals, may be absent in some years due to annual variations in temperature and rainfall, which influence germination and plant phenology. Colonization of new populations within an area may also occur from year to year.

[*] Denotes a nonnative species that has an origin other than that of California

Section 3. RESULTS AND DISCUSSION

This section provides the results of the monitoring activities. A summary table showing performance standards, results of monitoring, and recommendations is included in Section 4. Recommendations (Tables 12 and 13).

3.1.1 VEGETATION MONITORING

Transect Sampling
Percent survival[5] by transect is shown in Table 7. Percent survival by species for the ten transects is shown in Table 8. The collected data per transect and species is shown in Appendix A. Photos taken at the photo points are shown in Appendix C.

Table 7. Percent Survival by Transect for 2011

TRANSECT	TOTAL NUMBER OF PLANTS PLANTED	GOOD CONDITION	FAIR CONDITION	POOR CONDITION	DEAD OR MISSING	PERCENT SURVIVAL IN GOOD OR FAIR CONDITION
1	195	5	19	15	156	**12%**
2	132	17	12	5	98	**22%**
3	153	7	1	0	145	**5%**
4	63	2	0	0	61	**3%**
5	150	19	4	0	145	**15%**
6	87	20	3	2	62	**26%**
7	183	0	0	0	183	**0%**
8	132	1	5	0	126	**5%**
9	108	9	19	9	71	**26%**
10	66	0	5	0	61	**8%**
Average Percent Survival in Good or Fair Condition (2011)						**13%**
Average Percent Survival in Good or Fair Condition (2010)						**43%**

Overall, plants had 13 percent survival, which is well below the performance standard of at least 75 percent survival. Transects 2, 6 and 9 had highest percent survival (22%, 26% and 26%, respectively). Transects 2 is in a low point of the northern wetland where ponding occurred (Figure 2). Transect 6 was

[5] 'Percent survival' in this section refers to percent survival in good or fair condition.

near the southern wetland and was planted with alkali heath (*Frankenia salina*) which did well in this area. Transect 9 was in the created pond which also filled with water. Transects 4 and 7 had the lowest percent survival (3% and 0%). These transects were in upland areas that are overgrown with non-native Italian ryegrass*.

Plant survival decreased from 43% in 2010 to 13% in 2011. Many of the plants likely died in the summer of 2010 due to dry and hot conditions. At the January 2011 site visit, many of the plants were dead. Overall wetland transition areas and some wetland areas had low survival because they do not have wetland hydrology[6] and are overgrown by Italian ryegrass*.

Table 8. Percent Survival in Good or Fair Condition by Species

Species	Total Planted in 10 Transects	Good Condition (2011)	Fair Condition (2011)	Poor Condition (2011)	Dead or Missing (2011)	Percent Survival in Good or Fair Condition (2011)	Percent Survival in Good or Fair Condition (2010)
alkali heath (*Frankenia salina*)	216	16	2	2	196	**8%**	**56%**
baltic rush (*Juncus balticus*)	339	31	36	9	263	**20%**	**38%**
common rush (*Juncus effusus*)	268	0	0	0	268	**0%**	**52%**
gumplant (*Grindelia camporum*)	9	23	2	0	0	**+100%**	**100%**
iris-leaved rush (*Juncus xiphioides*)	186	4	8	6	168	**6%**	**47%**
narrowleaf milkweed (*Asclepias fascicularis*)	12	0	0	0	12	**0%**	**50%**
salt heliotrope (*Heliotropium curassavicum*)	51	1	0	0	50	**2%**	**39%**
spikerush (*Eleocharis macrostachya*)	204	5	20	14	165	**12%**	**21%**

All of the species except spikerush, gumplant, and baltic rush, had under 10% survival. Spikerush had 12% survivial and baltic rush had 20% survival. Spikerush and baltic rush were observed to be increasing in size and naturally recruiting and these would be good choices for replanting (Photo 4 in Appendix B).

[6] As defined by the Corps (Environmental Laboratory 1987) wetland hydrology is an area that is inundated either permanently or periodically at mean water depths <6.6 ft, or where the soil is saturated to the surface at some time during the growing season of the prevalent vegetation. The period of inunundation or soil saturation varies according to the hydrologic/soil moisture regime and occurs in both tidal and non-tidal situations.

Gumplant had over 100% indicating that it is successfully reproducing and likely becoming established on its own from surrounding seed sources. However gumplant is an upland species and is not an indicator of wetlands. Alkali heath plants that survived were large and spreading (Photo 5 in Appendix B).

Several of the plant species did not do well because they are not suited to the site. Common rush typically grows in slow moving creeks or shallow pools on the west side of the County and is not suitable for alkaline soils. Iris-leaved rush is known to grow in seasonal wetlands in alkali soils in the region but is not seen at Byron Airport or Vaquero Farms in seasonal wetlands, which are two good reference sites for the project. Spikerush and baltic rush did moderately well in the deeper portions of the wetlands but was also planted in wetland transition areas where it did not survive.

Quadrat Sampling

During the spring 2011 monitoring, percent absolute cover was measured in 6 2-meter-square quadrats randomly located along each of the ten transects (60 quadrats total). Table 9 shows the total absolute cover for native and non-native plant species for each transect. The collected data for each quadrat and transect is shown in Appendix A. Photos taken at the photo points are shown in Appendix C.

The performance standard requires that the total absolute cover of native wetland vegetation is at least 60% cover by year 3 and that total absolute cover of invasive species[7] is no more than 5% cover. No species considered an invasive plant species by Cal-IPC were recorded in the plots.

Table 9. Absolute Cover of Native and Non-Native Plant Species per Transect

Transect	Total Absolute Cover	Total Absolute Cover Native Plants	Total Absolute Cover Plants[8]	Total Absolute Cover Italian Ryegrass*
1	0.2	0.1	0.1	0
2	0.6	0.5	0.1	0
3	0	0	0	0
4	65	6	59	53
5	40	1	39	39
6	34	1	33	30
7	52	20	32	28
8	5	3	2	0
9	3	0.5	2.5	2
10	53	1	54	52
Average 2011	**25%**	**3%**	**22%**	**20%**

[7] Non-native invasive species = California Invasive Plant Council species with a level "high" rating, and any other species determined to threaten successful restoration of the native plant communities onsite
[8] Includes all non-native plants.

TRANSECT	TOTAL ABSOLUTE COVER	TOTAL ABSOLUTE COVER NATIVE PLANTS	TOTAL ABSOLUTE COVER PLANTS[8]	TOTAL ABSOLUTE COVER ITALIAN RYEGRASS*
Average 2010	**39%**	**13%**	**26%**	**17%**

The average total absolute cover of native plants is 3% which is below the performance standard of 60%. Most of the native cover within the plots is attributable to the native seeded grasses: blue wildrye (*Elymus glaucus* subsp. *glaucus*), meadow barley (*Hordeum brachyantherum*), and saltgrass (*Distichlis spicata*). Native planted species contributed very low overall cover due to low survival. The cover of native plants decreased from 2010 due to a decrease in cover of the seeded grasses blue wildrye, meadow barley, and saltgrass. These grasses did not persist in areas that were flooded during the winter. The highest cover of native plants is along transects that are in upland (T-4 and T-7) where the seeded grass species are continuing to do well.

Non-native plants comprised an average of 22% total absolute cover. Italian ryegrass* had an average total absolute cover of 20% and was the most abundant non-native species present on site. Transects 4, 5, 6, 7, and 10 had the highest total absolute cover of non-native plants and the highest absolute cover of Italian ryegrass*.

Total absolute cover (including both native and non-native plants) was very low (<10%) in the wetland areas and higher in the grassland areas (40-65%). The areas that were ponded had very little vegetation during the May sampling because the water had just dried (Photo 2 in Appendix B), and was still ponding in some areas (Photo 1 in Appendix B). During the August 12, 2011 site visit, the wetland areas were filled with annual weeds including rabbitfoot grass (*Polypogon monspeliensis**), pigweed amaranth (*Amaranthus albus**), Russian thistle (*Salsola tragus*), spiny cocklebur (*Xanthium spinosum**), and swamp grass (*Crypsis schoenoides**) (Photo 30 in Appendix B). Saltgrass and creeping wildrye were also doing well.

Overall, the plantings on site did not perform well and performance standards were not met. However, the site is improving more than the cover and percent survival suggest. Native plant species, including saltgrass, creeping wildrye (*Elymus triticoides*), and western sea-purslane (*Sesuvium verrucosum*) are colonizing the wetlands and forming large stands that will likely spread and provide high vegetative cover. Scattered baltic rush and spikerush have survived and are also expanding.

3.1.2 EROSION MONITORING

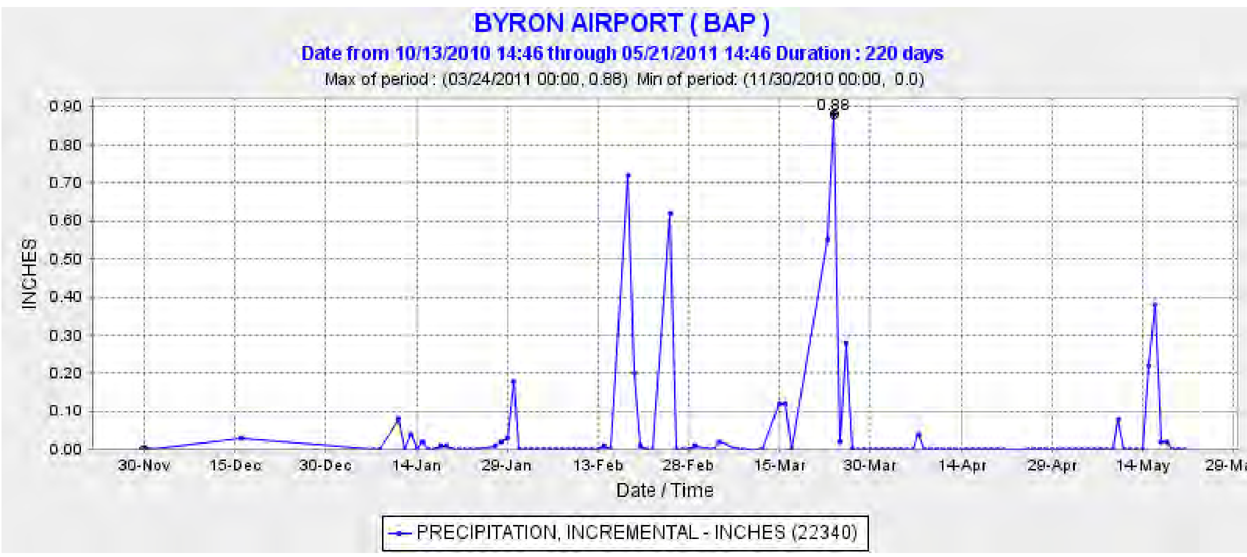
A large erosional feature, several feet wide and several feet deep, is present where the drainage joins the main unnamed tributary to Brushy Creek (Photo Point J in Appendix C). This erosional feature was present during Year 1 of monitoring and repaired in fall 2010 by placing straw bales and straw wattles in the gully. By the December 20, 2010 monitoring visit, the feature had eroded further with the sides of the headcut collapsing into the gully. The straw bales had silt pooled behind them which shows they captured some sediment out of flowing water before it flowed into the creek. The portion of the drainage above the sediment basin is not eroding, only the portion downstream of the sediment basin.

In some areas where the bank was laid back, the bank was well armored with dense stands of saltgrass and other vegetation (Photo 25 and 26 in Appendix B). In other areas where the bank was laid back, the banks were mostly bare of vegetation and erosion was occurring. Most of these areas contained rills that were several inches wide and a few inches deep and occurred every several feet (Photo Point I and K in Appendix C). At Photo Point I, these rills were present, as well as a gully one foot wide and one foot deep on the south bank. This pattern is repeated all along banks that were laid back in this area including at Photo Point K. These erosional features were present in Year 1 of monitoring as well as Year 2 and do not appear to be worsening over time. As saltgrass fills in on the banks, erosion will be reduced.

Recommendations to control erosion at these locations are made in Section 4.

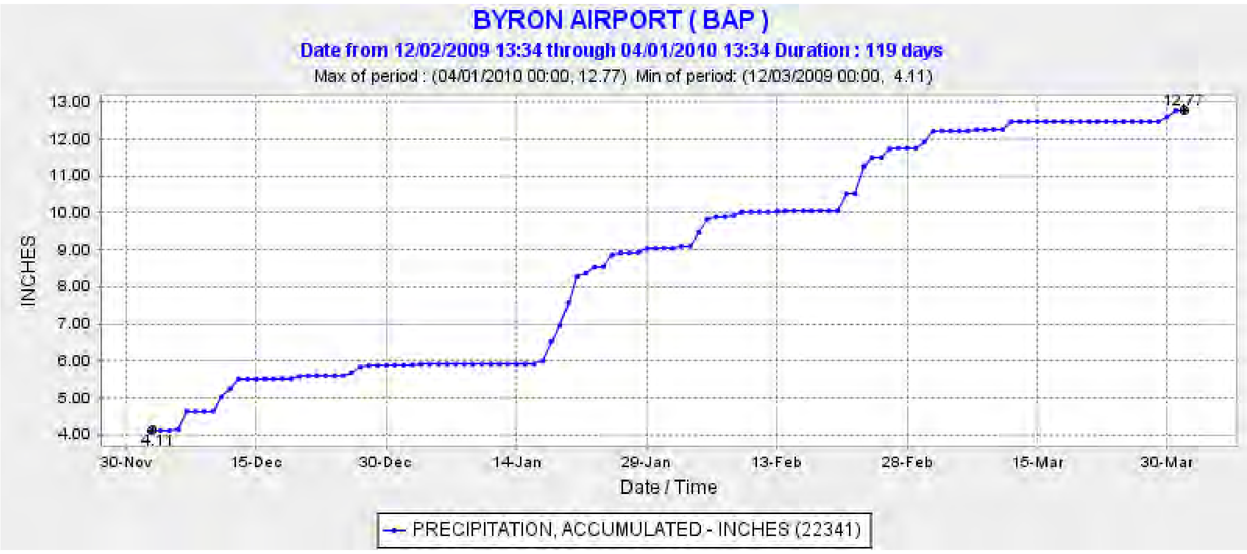
3.1.3 Wetland and Pond Acreage Monitoring

A major storm event occurred on March 24, 2011 with rainfall totals of 0.88 inches as reported by the Byron Airport weather station (Figure 4) which resulted in a high volume of water on site. The storm resulted in accumulated precipitation for the season of 12.77 inches (Figure 5). Large amounts of water came down the tributary resulting in it overflowing its banks (Photo 31 in Appendix B). Wetlands on site filled and overflowed their banks (Photo 33 in Appendix B).



Source: Department of Water Resources California Data Exchange Center.

Figure 4. Incremental precipitation data from the Byron Airport Weather Station from 11/13/10 to 5/21/11.



Source: Department of Water Resources California Data Exchange Center.

Figure 5. Accumulated precipitation data from the Byron Airport Weather Station from 12/2/10 to 4/1/10.

John Kopchik monitored the site on March 25, 2011 after the major storm event. Wetland and pond acreage monitoring occurred on April 2, 2011 after the major storm event and again on May 12, 2011. On the April 2, 2011 date, all areas of ponding water were mapped. On May 12, 2011 areas were mapped that appeared to have ponded for a sufficient duration to be considered wetland. Evidence of ponding included matted vegetation, deep cow hoofprints, presence of wetland vegetation, and elevation gradients. Wetlands are shown in Figure 3. The total acreage of wetlands mapped in the project area is 2.38 acres. This calculation does not include the creek or the pre-existing seasonal wetlands on the west side of the property.

Several areas that were intended to be wetlands did not fill with water even after the major storm. These areas will not become wetlands without further modifications to introduce wetland hydrology to these areas, such as lowering the elevation grade.

3.1.4 Hydrologic Connectivity Monitoring

Hydrologic connectivity monitoring occurred at all site visits in 2011 (Photo points L, M, and N in Appendix C).

On March 25, 2011 after the large storm, water flooded the site, resulting in the wetlands and pond filling. Water overtopped the northern wetland at the northeast corner and flowed off the property. Water also flowed over the constructed overflow and into the northern wetland complex (Photo 32 in Appendix B). Debris on the margins of the tributary channel and wetland berms indicate how high the water flowed and that it overtopped the channel berms in several places (Photos 31 and 33 in Appendix B).

With the exception of the major storm detailed above, water did not flow over the constructed overflow into the northern wetland complex. Water was not observed flowing over the constructed overflow and into the southern wetland complex at any time in 2011 including on April 2, 2011 immediately following the major storm.

3.1.5 Depth and Duration of Inundation Monitoring

Table 10 and Figure 6 show the results of the monthly depth gage monitoring. Table 11 and Figure 7 show the results of the monthly depth gage monitoring at Souza I for comparison.

Table 10. Depth Gage Data in Decimal Feet

Depth Gage	12/20/10	1/21/11	2/21/11	3/21/11	4/2/11	4/22/11	5/12/11
DG-1 (northern wetland)	0	0	0	0.69	**3.00**	1.98	0.58
DG-2 (northern wetland)	0	0	0.79	0.15	**3.00**	2.46	1.08
DG-3 (kidney-shaped wetland)	0.81	0.68	1.30	**1.33**	1.17	0.50	0
DG-4 (southern wetland)	0.38	0.57	0.82	1.05	**2.33**	1.83	1.46
DG-5 (third pool)	0	0	0	0	0	0	0
DG-6 (pond)	0.56	0.20	0.65	0.65	**1.92**	1.13	0
Byron Airport (Reference Site)	0.58	0.85	1.05	1.10	**1.30**	0.65	0.20

Table 11. Depth Gage Data for Souza I Pond in Decimal Feet

Depth Gage	12/23/10	1/20/11	2/17/11	3/17/11	4/23/11	5/22/11
DG-1 (northern wetland)	0	0	0	0.3	**0.8**	0.16
DG-2 (northern wetland)	0.3	0.3	0.24	1.3	**1.8**	1.2
DG-3 (kidney-shaped wetland)	1.3	1.3	1.24	2.3	**2.8**	2.2

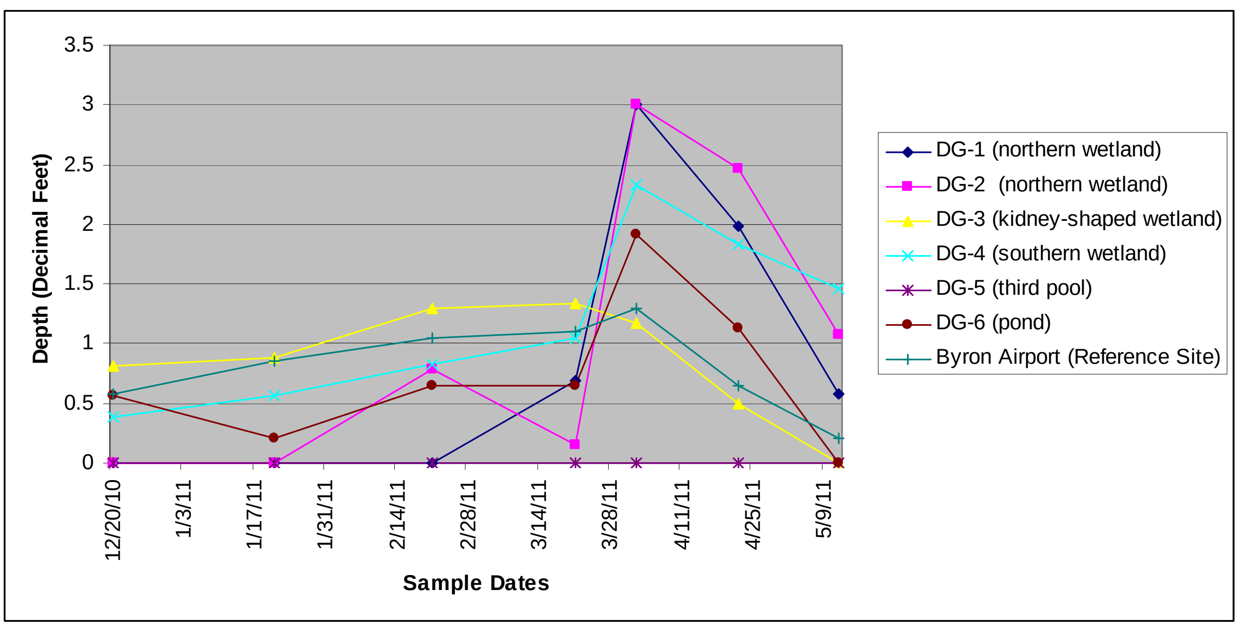


Figure 6. Depth of Water at each of the Sample Dates at Souza II.

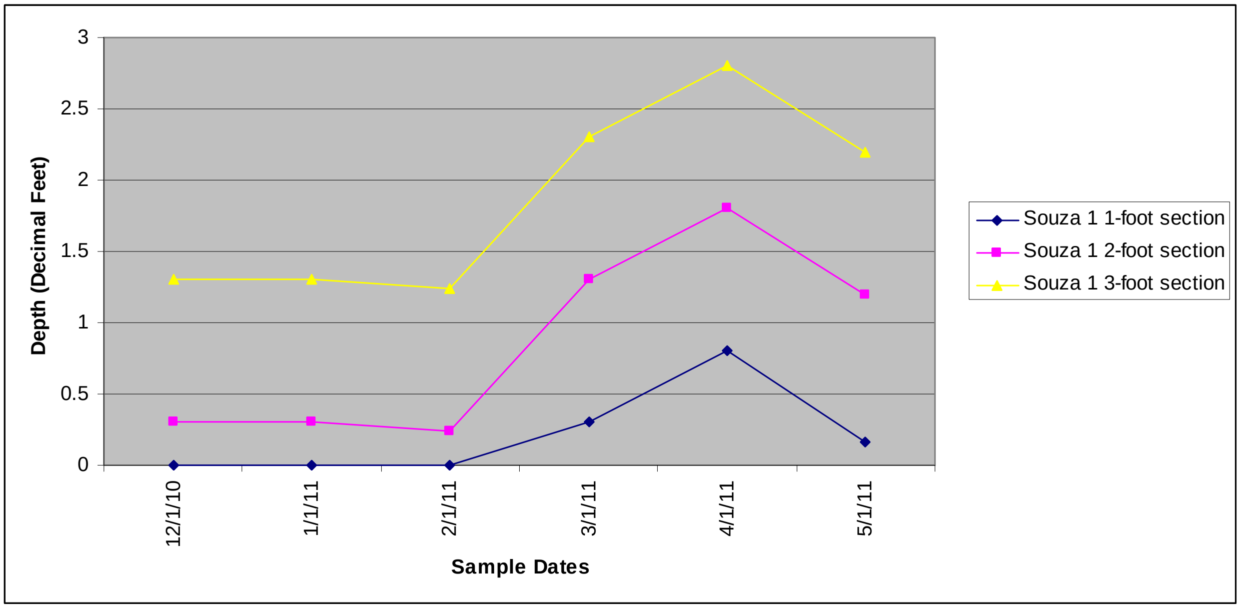


Figure 7. Depth of Water at each of the Sample Dates at Souza I.

The kidney-shaped wetland (DG-3) and the Byron Airport pond, which are both naturally occurring, show similar behavior. Both filled early in the season, by December 20, 2011 and stayed the same depth throughout the winter through early April. They did not increase greatly in depth after the major storms in late March, likely because they are shallow pools which overtopped their banks when they reached their maximum depth.

The southern wetland (DG-4) also ponded early in the season, but it increased greatly in depth after the storms in late March. This wetland also increased greatly in size after the storms and adjacent upland areas were submerged under several inches of water (Photo Point C in Appendix C). The southern wetland stayed ponded at depth into the summer. This is similar in behavior to the Souza I pond which also ponded early in the season, increased greatly in depth after the storms in late March, and remained ponded late into the spring. One difference to note is at Souza I, the pond had much deeper water (1.25 feet) in December than any of the features on Souza II.

The northern wetland (DG-1 and DG-2) did not pond water until later in the winter (March and February 2011). The depth in this pond increased dramatically after the storms at the end of March and then decreased quickly into April and May. This wetland contained a water level of 3 feet in the late winter and was dry by mid-summer.

The “third pool” (DG-5) did not contain water at any of the monitoring dates. It contained standing water during the storm but not one week after. This area is upland.

The constructed pond (DG-6) filled with water by December, then began to dry down, and then increased in depth with the rains. The pond dried early in the season and did not contain any standing water in mid-May (Photo Point G in Appendix C). The pond had very silty turbid water throughout the season.

In summary, the northern wetland, southern wetland, and Byron Airport reference wetland were inundated from late January 2010 to late May 2011. The kidney shaped wetland was inundated from December 2010 to late February 2011.The pond was inundated mid-February to mid-April.

3.1.6 MILK THISTLE MONITORING

The entire project was surveyed for milk thistle and other invasive weeds. A few scattered milk thistle plants were present on site. Milk thistle patches were present outside of the project area to the north, just west of where Armstrong Road turns the corner (Photo 28 in Appendix B).

Perennial pepperweed (*Lepidium latifolium**) was detected in two locations: near the kidney-shaped wetland and at the north end of the property on May 13, 2011. Stinkwort (*Dittrichia graveolens**) was detected in the pond on August 12, 2011. Crews controlled these three weed infestation.

3.1.7 ATRIPLEX MONITORING

The Atriplex translocation sites were monitored on May 13, 2011. In the west transplant site, seven San Joaquin spearscale (*Atriplex joaquinana*) and two crownscale (*Atriplex coronata* var. *coronata*) were observed. In the east transplant site, 17 San Joaquin spearscale and 1 crownscale were observed. Many of the individuals were flowering and presumably producing seed (Photos 14 and 15 in Appendix B).

The transplant site contained weeds including annual yellow sweet clover (*Melilotus indica**), tocalote (*Centaurea melitensis*), and black mustard (*Brassica nigra**) (Photo 16 in Appendix B). Weeds were hand pulled, bagged, and removed from the site on May 26, 2011. Grasses were not weeded.

3.1.8 IN-STREAM POOL MONITORING

Water ponded behind the rock weirs that are in the channel (Photo 29 in Appendix B, Photo Point B in Appendix C).

3.1.9 GRAZING MONITORING

Cattle were kept onsite for approximately one month from March 24, 2011 to April 22, 2011. The cattle reduced the biomass of Italian ryegrass* on site as determined by visual assessment (Photo 20, 21, and 22 in Appendix B). Italian ryegrass* had a second flush of growth in mid-May after cattle were removed (Photo 20 in Appendix B). Timing of cattle grazing was such that the wetlands were ponded from the major storm. Cattle trampled the margins of the wetlands but did not go into the wetlands (Photo 13 in Appendix B). Wetland plants that were submerged were protected from cattle trampling or herbivory. Saltgrass on the margins was able to withstand some cattle trampling (Photo 18 in Appendix B). The margins of the pond were badly trampled by cattle resulting in a muddy area that was devoid of vegetation (Photo 19 in Appendix B). In addition, the cattle caused some erosion and damaged vegetation on the banks of the creek where they accessed the creek (Photo 23 and 24 in Appendix B) particularly in the vicinity of the electric fence.

Survival of the plantings was low enough that the benefits of grazing (reducing Italian ryegrass* thatch and biomass) outweighed the impacts of grazing (trampled vegetation at the margin of wetlands and some bank erosion). The depth of the water in the wetlands resulted in excluding the cattle from the wetlands which reduced trampling of plantings. In the future, more of the creek should be fenced off to exclude cattle. If the wetlands are planted again in the future or desirable plant species spread or colonize, they should also be fenced off the exclude cattle.

Section 4. RECOMMENDATIONS

The results of monitoring and recommendations are summarized in Table 12 and 13 below. Details of the recommendations are discussed below.

Table 12. Summary of Results and Recommendations for Restoration Activities

MONITORING ACTIVITY	PERFORMANCE CRITERIA	RESULTS	RECOMMENDATIONS
Vegetation Monitoring	See Table 13	See Table 13	See Table 13
	Ensure 8.5 acres of seasonal wetlands have been restored.	2.3 acres of wetland (seasonal and pond) were present in Spring 2011. The wetland mapping did not include existing wetlands on the northwest side of the project.	Reduce acreage goals of restoration project or plan for additional excavation.
Erosion Monitoring	Qualitative assessment including photo-documentation before and annually for five years after restoration activity determines that erosion along the Brushy Creek tributary onsite has been reduced.	Large erosional feature is present. Small rills and gullys present on laid back banks.	Fix large erosional feature. Continue to plant saltgrass on the banks where bank has been laid back.
Wetland and Pond Acreage Monitoring	Wetland acreage onsite has increased by 8.3 acres and pond acreage onsite has increased by 0.18 acres by five years following restoration construction.	2.3 acres of wetland (seasonal and pond) were present in Spring 2011. The wetland mapping did not include existing wetlands on the northwest side of the project.	Reduce acreage goals of restoration project or plan for additional excavation and planting.
Hydrologic Connectivity Monitoring	Qualitative assessment based on photo-documentation before and annually for five years after restoration activity determines that the Brushy Creek tributary is hydrologically connected with its floodplain and adjacent wetland complexes	Creek overflowed banks and onto floodplain during storm in March 2011.	Continue monitoring in 2012 to determine if this happens annually or only in year's with above-average rainfall.
Depth and Duration of Inundation Monitoring	The depth and duration of inundation at the newly created pond is not significantly different than the reference pools (at $\alpha \leq 0.05$ or 95% confidence) over a five-year monitoring period.	Wetlands on site pooled at the same depth as (or deeper than) the reference pool and for a similar duration.	Continue monitoring in 2012 to determine if this happens annually or only in year's with above-average rainfall.
	No performance standard.		
Milk Thistle Monitoring	No milk thistle is present five years after restoration	Only a few scattered milk thistle were present on site and these were controlled.	Continue monitoring for and controlling milk thistle.

MONITORING ACTIVITY	PERFORMANCE CRITERIA	RESULTS	RECOMMENDATIONS
Atriplex Monitoring	No performance standard.	San Joaquin Spearscale and Crownscale are present in the soil translocation areas.	Continue annual monitoring to see if species persist.
In-stream Pool Monitoring	Qualitative assessment based photo-documentation before and annually for five years after restoration activity determines that pools have formed behind rock weirs along the Brushy Creek Tributary.	Pools have formed behind rock weirs along the Brushy Creek Tributary.	Continue scheduled annual monitoring.
Photo point Monitoring	See performance criteria for Erosion Monitoring, Hydrologic Connectivity Monitoring, and In-stream Pool Monitoring for these specific photo points. No performance standards for general photo points.	Photo point monitoring completed.	Continue scheduled annual monitoring.

Table 13. Summary of Results and Recommendations for Restoration Plantings

PERFORMANCE PERIOD		TARGET VALUE	RESULTS	RECOMMENDATIONS
1	% of plants surviving	At least 75% survival in Good or Fair condition	43% survival in good or fair condition	NA
2 (and subsequent years if necessary)	% of plants surviving	At least 70% survival in Good or Fair condition	13% survival in good or fair condition	Replant with alkali wetland plant palette in Fall 2012.
3 - 5	Total absolute cover of native wetland vegetation	At least 60% cover	3% cover in Year 2. Not likely to meet target value Year 3-5.	Replant with alkali wetland plant palette in Fall 2012. Revise performance standard based on cover measurement of reference sites.
1 – 5	Total absolute cover of non-native invasive species*	No more than 5% cover	Non-native invasive species had less than 1 percent cover.	Continue scheduled annual monitoring and control invasive weeds.

* Non-native invasive species = California Invasive Plant Council species with a level "high" rating, and any other species determined to threaten successful restoration of the native plant communities onsite.

Acreage of Wetlands

Several areas that were intended to be Wetland and Wetland Transition on the planting plan did not exhibit wetland hydrology even after the series of storms at the end of March 2011. These areas will not become wetlands without further modifications to introduce wetland hydrology, such as lowering the elevation or increasing the water holding capacity of the soil. The areas that exhibited wetland hydrology are shown in Figure 3. All other areas are considered to be upland and will likely remain upland unless the hydrology is modified with the exception of the pre-existing seasonal wetlands on the west side of the site. It is recommended that the Conservancy re-evaluate goals for the site and decide if the wetland acreage that has been achieved meets project goals.

Hydrologic Monitoring

Monthly hydrologic monitoring conducted in 2010 and 2011 demonstrated where water ponds on site and where it does not. The series of storms at the end of March 2011 resulted in the wetland features ponding and then remaining submerged until summer. In a year with more typical rainfall, the ponds and wetlands would likely fill more slowly. Observing the exact locations in the wetlands that pond water first and remained wet the longest, as well as the areas that pond less water would be useful for determining the location of plantings in Fall 2012.

Atriplex Monitoring

In the soil transplant sites, 24 San Joaquin spearscale and three crownscale were observed. These sites should be monitored in spring 2012 to determine if individuals of these annual species are persisting on site.

Additional Planting in Fall 2011

Small scale planting should take place in the northern and southern wetland in fall 2011. Saltgrass (*Distichlis spicata*), saltmarsh bulrush (*Bolboschoenus maritimus* subsp. *paludosus*), and mexican rush (*Juncus mexicanus*) should be collected on site and in the vicinity and planted as plugs. Planting locations should be chosen to test plant survival at different inundation depths. The southern wetland currently has very little vegetation in it, and the goal is to establish wetland vegetation. Planting approximately 60 saltgrass plants, 18 saltmarsh bulrush, and 18 mexican rush is recommended.

Additional Planting in Fall 2012 or Fall 2013

After the hydrology of the site is better understood, a planting plan should be prepared for additional plantings in Fall 2012 or Fall 2013 if additional vegetation cover is desired. The original plantings had low survival likely because some of the species were not appropriate plant species for the site and appropriate species were planted in upland areas. The site has alkaline soils. The site dries in the summer since there is no spring or seep water source and the only source of water appears to be rainfall runoff. Plant species typical of alkaline seasonal wetlands in the region would be appropriate for the site and likely would do well. These species include alkali weed (*Cressa truxillensis*), mexican rush (*Juncus mexicanus*), toad rush (*Juncus bufonius*), alkali heath, iodine bush (*Allenrolfia occidentalis*), saltmarsh bulrush, and saltgrass (*Distichlis spicata*), among others. Spikerush, baltic rush, and alkali heath were observed to be spreading on site. Toad rush is present in the silt detention pond above the erosional feature. Spikerush should be replanted in the lowest areas that pond water for the longest period of time.

In order to plant in fall 2012, plant material would need to be ordered this fall 2011.Planting could be postponed until Fall 2013 to allow for collection of propagules in summer though fall 2012. Many of the plant species can be collected as rhizome or root cuttings. The propagation of iodine bush is not well understood so would require some experimentation.

Vegetation Monitoring Protocol Modification

After the areas are replanted, the location of transects should be relocated so that they are in areas that have wetland hydrology. Currently, many of the transects are in areas that do not have wetland hydrology. These areas will most likely never meet performance standards so continuing to sample them will reduce the overall success of the site.

Performance Standard Revision

The performance standard for vegetation cover monitoring in the quadrats should be revised to use relative cover instead of absolute cover. An absolute cover of 60% is very high and does not take into account that naturally-occurring alkali wetland communities in the region often have areas of bare soil and low cover of vegetation. Alkaline wetland and scalds characteristically have low vegetative cover but high relative cover of native plant species. The performance standard that requires that “the total *absolute* cover of native *wetland* vegetation is at least 60% cover by the year 3” should be revised to read “the total *relative* cover of native vegetation is at least 60% cover by the year 3”.

Continued Grazing

Grazing in 2011 reduced the cover of Italian ryegrass* thatch and standing material on site with little damage to native plants and native wetlands. This is because the deep water in the wetlands kept the cattle out of the wetlands. Grazing should occur in 2012 at a similar time of year for a similar length of time. The timing of grazing will be adjusted based on the depth of water in the wetlands. The cattle-exclusion fencing should be extended to exclude the cattle from a larger portion of the tributary since they were causing some erosion to the creek banks particularly in the vicinity of the fence. Additional fencing could be used as necessary to keep cattle out of the wetlands.

Erosion Control

In some areas where the bank was laid back, the banks are unvegetated and erosion is occurring. We recommend continued planting of saltgrass plugs to armor the banks. In winter 2010/2011, saltgrass was planted on select banks. In these areas, the saltgrass is doing well and erosion is decreased. In addition, straw wattles should be placed along the tops of the banks where work occurred to slow water flow across the banks and direct it to areas that are vegetated.

The large erosional feature should be stabilized. It is likely that heavy equipment may be needed to accomplish this objective.

Section 5. REFERENCES

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APPENDIX A VEGETATION MONITORING DATA

Table 14. Percent Survival in Good or Fair Condition for each Species by Transect

Transect		*Juncus xiphioides*	*Juncus effusus*	*Juncus balticus*	*Eleocharis macrostachya*	*Frankenia salina*	*Heliotropium curassavicum*	*Asclepias fasculatum*	*Grindelia camphorum*	Average
1	Good	1	0	1	3	0	0	0	0	
	Fair	0	0	2	17	0	0	0	0	
	Poor	2	0	1	12	0	0	0	0	
	Dead or Missing	33	88	16	1	9	9	0	0	
	Total Planted	36	88	20	33	9	9			
	Percent Survival in Good or Fair Condition	3	-	15	61	-	-	-	-	12
2	Good	0	0	15	2	0	0	0	0	
	Fair	1	0	11	0	0	0	0	0	
	Poor	0	0	4	1	0	0	0	0	
	Dead or Missing	32	30	0	27	12	3	0	0	
	Total Planted	33	30	30	30	12	3	0	0	
	Percent Survival in Good or Fair Condition	3	-	87	7	-	-	-	-	21
3	Good	0	0	7	0	0	0	0	0	
	Fair	0	0	1	0	0	0	0	0	
	Poor	0	0	0	0	0	0	0	0	
	Dead or Missing	9	25	42	33	27	3	6	0	
	Total Planted	9	25	50	33	27	3	6	0	

Transect		*Juncus xiphioides*	*Juncus effusus*	*Juncus balticus*	*Eleocharis macrostachya*	*Frankenia salina*	*Heliotropium curassavicum*	*Asclepias fasculatum*	*Grindelia camphorum*	Average
	Percent Survival in Good or Fair Condition	-	-	16	-	-	-	-	-	5
4	Good	0	0	0	0	0	0	0	2	
	Fair	0	0	0	0	0	0	0	0	
	Poor	0	0	0	0	0	0	0	0	
	Dead or Missing	3	15	9	3	24	3	3	1	
	Total Planted	3	15	9	3	24	3	3	3	
	Percent Survival in Good or Fair Condition	-	-	-	-	-	-	-	67	3
5	Good	0	0	0	0	0	0	0	19	
	Fair	0	0	2	0	0	0	0	2	
	Poor	0	0	0	0	0	0	0	0	
	Dead or Missing	12	22	57	24	24	6	0	0	
	Total Planted	12	22	59	24	24	6		3	
	Percent Survival in Good or Fair Condition	-	-	3	-	-	-	-	700	15
6	Good	0	0	2	0	16	0	0	2	
	Fair	0	0	1	0	2	0	0	0	
	Poor	0	0	0	0	2	0	0	0	
	Dead or Missing	3	12	12	6	25	0	3	1	

Transect		*Juncus xiphioides*	*Juncus effusus*	*Juncus balticus*	*Eleocharis macrostachya*	*Frankenia salina*	*Heliotropium curassavicum*	*Asclepias fasculatum*	*Grindelia camphorum*	Average
	Total Planted	3	12	15	6	45		3	3	
	Percent Survival in Good or Fair Condition	-	-	20	-	40	-	-	67	26
7	Good	0	0	0	0	0	0	0	0	
	Fair	0	0	0	0	0	0	0	0	
	Poor	0	0	0	0	0	0	0	0	
	Dead or Missing	9	22	63	18	72	9	0	0	
	Total Planted	9	22	63	18	72	9	0	0	
	Percent Survival in Good or Fair Condition	-	-	-	-	-	-	-	-	0
8	Good	0	0	0	0	0	1	0	0	
	Fair	0	0	5	0	0	0	0	0	
	Poor	0	0	0	0	0	0	0	0	
	Dead or Missing	39	45	25	12	0	5	0	0	
	Total Planted	39	45	30	12	0	6	0	0	
	Percent Survival in Good or Fair Condition	-	-	17	-	-	17	-	-	5
9	Good	3	0	6	0	0	0	0	0	
	Fair	7	0	9	3	0	0	0	0	
	Poor	4	0	4	1	0	0	0	0	

Transect		*Juncus xiphioides*	*Juncus effusus*	*Juncus balticus*	*Eleocharis macrostachya*	*Frankenia salina*	*Heliotropium curassavicum*	*Asclepias fasculatum*	*Grindelia camphorum*	Average
	Dead or Missing	7	0	38	26	0	0	0	0	
	Total Planted	21	0	57	30	0	0	0	0	
	Percent Survival in Good or Fair Condition	48	-	26	10	-	-	-	-	26
10	Good	0	0	0	0	0	0	0	0	
	Fair	0	0	5	0	0	0	0	0	
	Poor	0	0	0	0	0	0	0	0	
	Dead or Missing	21	9	1	15	3	12	0	0	
	Total Planted	21	9	6	15	3	12			
	Percent Survival in Good or Fair Condition	-	-	83	-	-	-	-	-	8

Table 15. Quadrat Sampling Data

			NATIVE SPECIES																		NON-NATIVE SPECIES																								OTHER							
Transect Number	Quad Number	Location along Transect	*Centromadia pungens pungens*	*Cressa truxillensis*	*Croton setigerus*	*Cyperus eragrostis*	*Distichlis spicata*	*Eleocharis*	*Elymus glaucus*	*Frankenia salina*	*Grindelia camporum*	*Hordeum brachyantherum*	*Juncus balticus*	*Juncus bufonius*	*Juncus effusus*	*Juncus xiphioides*	*Lupinus cf succulentus*	*Malvella leprosa*	*Nassela pulchrca*	*Plantago elongata*	*Avena sp.*	*Bromus hordeaceous*	*Bromus madritensis*	*Chenopodium album*	*Convolvulus arvensis*	*Cotula coronopifolia*	*Cynodon dactylon*	*Erodium cicutarium*	*Erodium moschatum*	*Hirschfeldia incana*	*Hordeum (sterile wheat)*	*Hordeum marinum gussoneanum*	*Hordeum murinum leporinum*	*Lactuca serriola*	*Lolium multiflorum*	*Medicago polymorpha*	*Melilotus sp.*	*Rumex*	*Parapholis incurva*	*Polygonum arenastrum*	*Polypogon monspeliensis*	*Sonchus asper*	*Veronica persica*	*Urtica urens*	*Water*	*Bare Ground*	*Dead Vegetation*	*mud*	*Boulder*	Total Absolute Percent Cover	Total Absolute Cover Native Plants	Total Absolute Cover Other
T1	a	2																																											66	32	2			0	0	100
T1	b	4						0.5																														0.5							50	49	0.5			1	0.5	99.5
T1	c	8																																											5	93	2			0	0	100
T1	e	12																																											1	98	1			0	0	100
T1	f	22																																												98	2			0	0	100
T1	g	24																																												97	3			0	0	100
Average for T1																																																		0.167	0.08	99.9
T2	a	2											0.5																																98	2	0.5			0.5	0.5	101
T2	b	4											0.5																																	99	0.5			0.5	0.5	99.5
T2	c	6						0.5					0.5																																	99	1			1	1	100
T2	e	10					0.5						0.5																																	99				1	1	99
T2	f	12																																												70	30			0	0	100
T2	g	18																								0.5																				70	30			0.5	0	100
Average for T2																																																		0.583	0.5	99.8
T3	a	6																																											50	49	1			0	0	100
T3	b	8																																												99	1			0	0	100
T3	c	16																																												99	1			0	0	100
T3	e	22																																												96	4			0	0	100
T3	f	26																																												2	98			0	0	100
T3	g	28																																												98	2			0	0	100
Average for T3																																																		0	0	100
T4	a	0																																	20	20														40	0	0
T4	b	4					0.5																										0.5		65	5	5													76	0.5	0
T4	c	12					15																												65															80	15	0
T4	e	16					15				0.5																						0.5		65															81	15.5	0
T4	f	18					0.5																										2		75															77.5	0.5	0
T4	g	28					2																										1		30														70	33	2	0
Average for T4																																																		64.58	5.58	0
T5	a	0																																	30	15														45	0	0
T5	b	6																																	20	20														40	0	0
T5	c	10																																	20	20														40	0	0
T5	e	18										1																					0.5		30	15														46.5	1	0
T5	f	20										5																							20	3														28	5	0
T5	g	28									1	1																				0.5			35	5						0.5								43	2	0
Average for T5																																																		40.42	1.33	0
T6	a	4							1																							35	5		40															81	1	0
T6	b	6																															25		55															80	0	0
T6	c	16		0.5					0.5	0.5																						15			5															21.5	1.5	0
T6	e	20					0.5		1			1																							18													82		20.5	2.5	0
T6	f	26								0.5																																			85			15		0.5	0.5	85
T6	g	28																																											25			75h		0	0	25
Average for T6																																																		33.92	0.92	18.3
T7	a	4																															0.5		60															60.5	0	0
T7	b	10							1			0.5																					2		70															73.5	1.5	0
T7	c	18							10			10							0.5			1						0.5					3		20	1														46	20.5	0
T7	e	20							5			30																					5		5	2														47	35	0
T7	f	22							20			1							1														1		10	1														34	22	0
T7	g	24									40	1							1														0.5		5	1														48.5	42	0
Average for T7																																																		51.58	20.2	0
T8	a	4										5																				2			0.5				2											9.5	5	0
T8	b	8					1					1																				0.5			0.5				0.5											3.5	2	0
T8	c	10					0.5					1																				0.5			0.5															2.5	1.5	0
T8	e	14					0.5					5																				0.5							0.5											6.5	5.5	0
T8	f	24					0.5																									0.5					0.5		0.5											2	0.5	0
T8	g	26										1																				1							1											3	1	0
Average for T8																																																		4.5	2.58	0
T9	a	2														1						0.5										1			8											90				10.5	1	90
T9	b	8											0.5																						0.5			0.5								99				1.5	0.5	99
T9	c	10																																				0.5								99				0.5	0	99
T9	e	20																																												100				0	0	100
T9	f	22																0.5																												99				0.5	0.5	99
T9	g	28											0.5					0.5																	5											99				6	1	99
Average for T9																																																		3.167	0.5	97.7
T10	a	4																																	0.5													99		0.5	0	0
T10	b	8												0.5																					60															60.5	0.5	0
T10	c	16																															3		80															83	0	0
T10	e	22																															0.5		80															80.5	0	0
T10	f	24																			0.5														75															75.5	0	0
T10	g	28										5									0.5														15															20.5	5	0
Average for T10																																																		53.42	0.92	0
Average for all Transects																																																		**25**	**3**	**42**

APPENDIX B PHOTOGRAPHS

Photo 1. Transect 1. Facing south showing standing water. May 12, 2011.

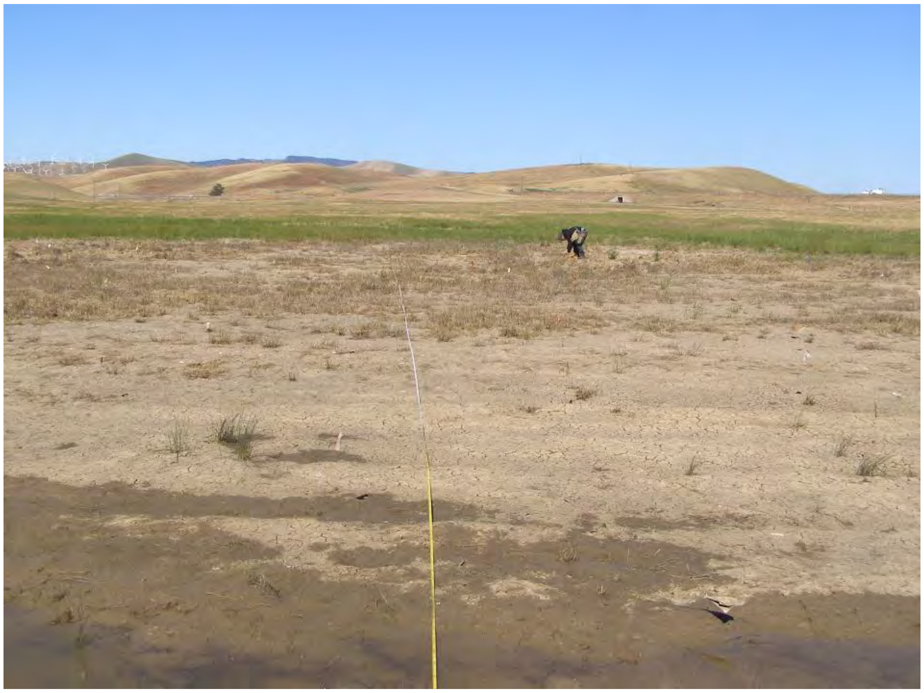

Photo 2. Transect 2. Facing west. May 12, 2011.


Photo 3. Transect 3. Facing west. May 12, 2011.


Photo 4. Transect 3: Showing healthy Baltic rush (*Juncus balticus*). May 12, 2011.

Photo 5. Transect 4. Showing healthy alkali heath (*Frankenia salina*). May 12, 2011.

Photo 6. Transect 5 facing east. May 12, 2011.

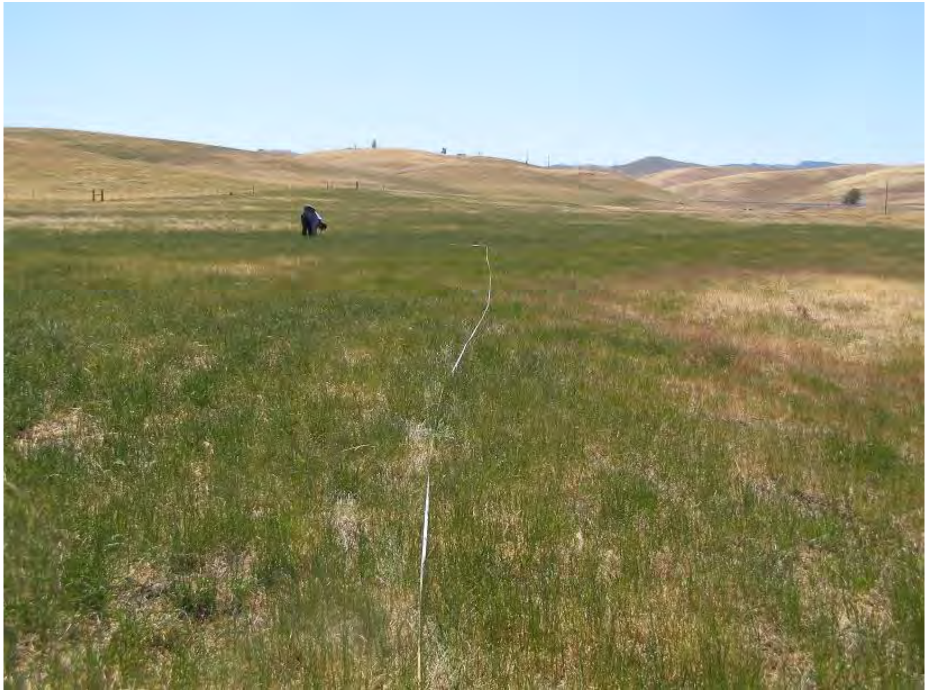

Photo 7. Transect 7. Showing high cover of Italian ryegrass*. May 12, 2011.

Photo 8. Transect 8. May 12, 2011

Photo 9. Transect 9 in the pond facing southeast. May 12, 2011

Photo 10. Transect 10. May 12, 2011

Photo 11. Depth gage 3 in the kidney-shaped wetland. May 12, 2011

Photo 12. Depth gage 5. May 21, 2011.

Photo 13. Showing depth gage 2 in the northern wetland and cattle trampling along the margin. May 12, 2011.

Photo 14. San Joaquin saltbush (*Atriplex joaquiniana)* seedling in the soil transplant site. May 12, 2011.

Photo 15. Crownscale (*Atriplex coronata* var *coronata)* seedling n the soil transplant site. May 12, 2011.

Photo 16. View of the soil translocation site. May 12, 2011.

Photo 17. Alkaline soil and evidence of ponding water. The southern wetland is in the background. May 12, 2011.

Photo 18. Salt grass (*Distichlis spicata*) on the margins of the northern wetland tolerated cattle trampling. May 12, 2011.

Photo 19. Cattle trampling on the edge of the pond. May 12, 2011.

Photo 20. Italian ryegrass* had a second flush of growth after cattle were removed from the site. May 12, 2011.

Photo 21. Comparing grazed grassland (right) to ungrazed grassland (left). The ungrazed grassland has higher above ground biomass. May 12, 2011.

Photo 22. Ungrazed grassland. May 12, 2011.

Photo 23. Tributary at the boundary of the cattle exclusion fence. Cattle trampled the banks of the tributary at this location. May 12, 2011.

Photo 24. Erosion on the banks of the tributary caused by cattle. May 12, 2011.

Photo 25. Laid back bank vegetated with saltgrass and blue wildrye. May 12, 2011.

Photo 26. Vegetated bank. May 12, 2011.

Photo 27. Head cut erosion. May 12, 2011.

Photo 28. Milk thistle (*Silybum marianum*) growing on adjacent property.

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Photo 29. Ponding behind rock weirs. May 12, 2011.

Photo 30. Annual weeds in the northern wetland. May 24, 2011.

Photo 31. The tributary overtopping its banks after the major storm event. March 25, 2011. Photo by John Kopchik.

Photo 32. The tributary overtopping its banks and flowing into northern wetland complex at the engineered hydrologic connection. March 25, 2011. Photo by John Kopchik.

Photo 33. The northern wetland spilling over its berm and flowing into roadside ditch. March 25, 2011.
Photo by John Kopchik.

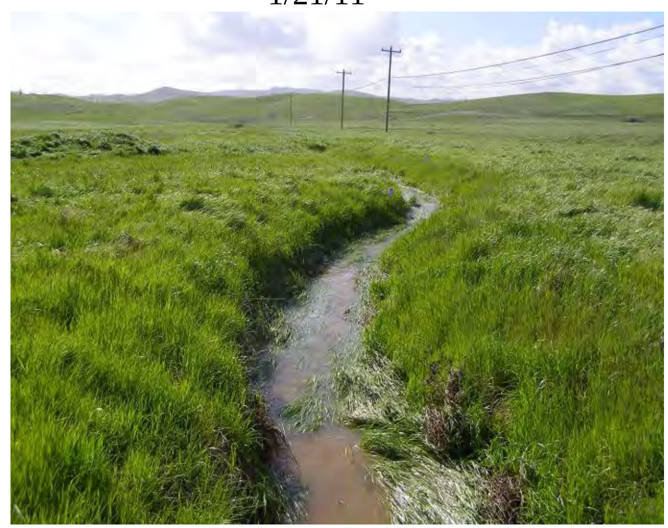
APPENDIX C PHOTO POINT PHOTOS

Photo Point A: Looking upstream from Armstrong Rd

12/20/10

1/21/11

2/21/11



3/21/11


4/21/11


5/21/11


8/12/11

Photo Point B: Souza: Old creek crossing

12/20/10 Downstream

12/20/10 Upstream

1/21/11 Downstream

1/21/11 Upstream

2/21/11 Downstream

2/21/11 Upstream

3/21/11 Downstream

3/21/11 Upstream


4/2/11 Downstream


4/2/11 Upstream


4/21/11 Downstream


4/21/11 Upstream


5/21/11 Downstream


5/21/11 Upstream


8/12/11 Downstream


8/12/11 Upstream

Photo Point C: Large wetland south of creek along Armstrong Rd

12/20/10

1/21/11

2/21/11

3/21/11

4/2/11

4/21/11

5/21/11

8/12/11

Photo Point D: Souza II: West end of creek at rock weir

12/20/10

1/21/11

2/21/11

4/21/11

5/21/11

8/12/11

Photo Point E: Souza II: west end of property at creek looking downstream

12/20/10

1/21/11

2/21/11

4/21/11


5/21/11


8/12/11

Photo Point F: Looking upstream at swale to Vasco Rd

12/20/10

1/21/11

2/21/11

3/21/11

4/21/11

8/12/11

Photo Point G: Souza II: Pond

12/20/10

1/21/11

2/21/11

3/21/11


4/2/11


4/21/11


5/21/11


8/12/11

Photo Point H: Souza II: Large wetland on the N side of creek

12/20/10

1/21/11

2/21/11

3/21/11


4/2/11


4/21/11


5/21/11


8/12/11

Photo Point I: Souza II: erosion monitoring

12/20/10

1/21/11

2/21/11

3/21/11


4/2/11


4/21/11


5/21/11


8/12/11

Photo Point J: Souza II: Erosion monitoring

12/20/10

1/21/11

2/21/11

3/21/11

4/2/11

4/21/11

5/21/11

8/12/11

Photo Point K; Souza II: Erosion monitoring

12/20/10

1/21/11

5/21/11

8/12/11

Photo Point L: Souza II: Hydrologic connectivity monitoring

12/20/10 Upstream

1/21/11 Downstream

2/21/11 Upstream

4/21/11 Downstream

4/21/11 Upstream

5/21/11 Downstream

5/21/11 Upstream


8/12/11 Downstream


8/12/11 Upstream

Photo Point M: Souza II: Hydrologic connectivity monitoring

12/20/10

1/21/11

2/21/11

3/21/11

4/21/11

5/21/11

8/12/11

Photo Point N: Souza II: Hydrologic connectivity monitoring

12/20/10

1/21/11

2/21/11

3/21/11


4/21/11


5/21/11


8/12/11