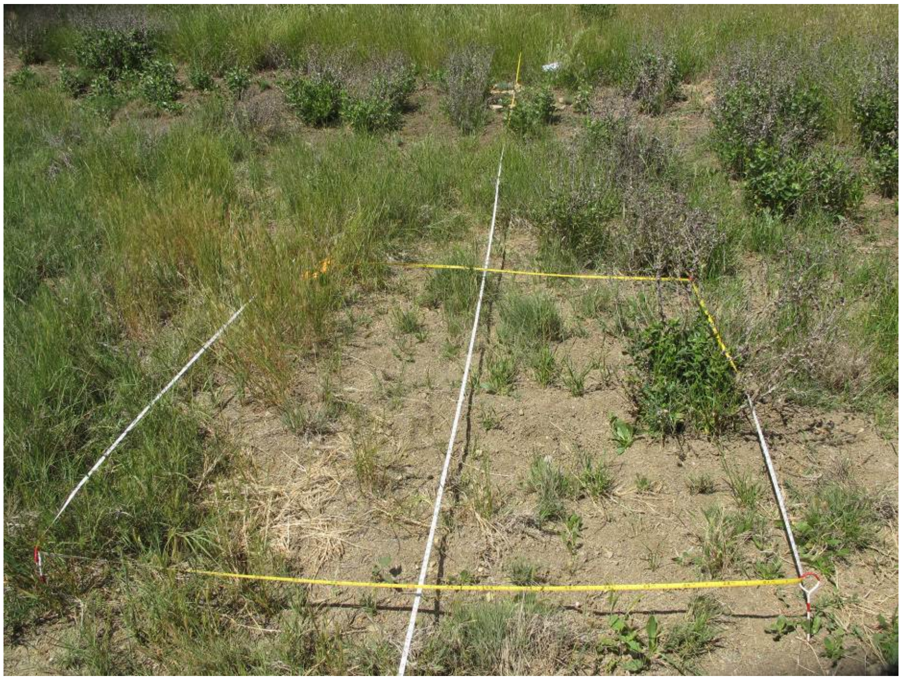
FOURTH ANNUAL RESTORATION MONITORING REPORT

LENTZNER SPRING RESTORATION PROJECT
CONTRA COSTA COUNTY, CALIFORNIA



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Prepared for

Abigail Fateman
East Contra Costa County
Habitat Conservancy
651 Pine Street
4th Floor, North Wing
Martinez, CA 94553

NOMAD ECOLOGY

(925) 228-1027
832 ESCOBAR STREET
MARTINEZ, CA 94553

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Section 1. INTRODUCTION

1.1. MONITORING SUMMARY

The Lentzner Spring wetland restoration project was completed in October 2008 as outlined in the *Lentzner Spring Restoration Management Plan* (Restoration Management Plan; ICF Jones and Stokes 2009a). The plan specifies annual monitoring methods and performance criteria by which the project's success will be evaluated.

This report presents the results of Year 4 monitoring conducted on May 10, 2012, which was carried out as detailed in the Restoration Management Plan (ICF Jones and Stokes 2009a) with some changes based on the recommendations in the 2010 monitoring report (Nomad Ecology 2010). This report provides: a summary of the restoration project; monitoring requirements and methodology; performance standards; monitoring results; and recommendations. Year 1 of monitoring was conducted by ICF Jones and Stokes (2009b).

The restoration project is nearing its Year 4-5 performance criterion of 60% cover of native wetland vegetation but has not yet reached 60%. Two of the four planted species, saltgrass (*Distichlis spicata*), and Great Valley gumweed (*Grindelia camporum*) are surviving and spreading. The other two planted species, alkali heath (*Frankenia salina*), and bulrush (*Scirpus* sp.), were not recorded within the transects in 2012. Transects 3 and 4 are showing characteristics of an alkali wetland. Transects 1 and 2 are supporting vegetation characteristic of alkali grasslands. Recommendations include planting wetland species in the areas of transects 3 and 4, continued monitoring, and weed control.

1.2. RESTORATION PROJECT SUMMARY

The Lentzner Spring wetland restoration project was initiated as a component of the East Contra Costa County Habitat Conservation Plan / Natural Community Conservation Plan (HCP/NCCP) (Jones and Stokes 2006). The restoration site is located in the Plan Acquisition Zone 2, in northeast Contra Costa County, on the Lentzner parcel adjacent to Black Diamond Mines (Figure 1). This project was completed by the East Contra Costa Habitat Conservancy (Conservancy) and the East Bay Regional Park District (EBRPD) in 2008. The goal of the project was to restore 0.15 acres of alkali seasonal wetlands. This includes one large 0.13 acre area downstream (north) of the spring and west of the unnamed drainage and one smaller 0.02 acre area upstream and east of the spring. For the restoration project, the site was cleared, grubbed, and graded to enhance hydrologic flow to support wetlands. The wetlands were planted with four species: saltgrass, alkali heath, Great Valley gumweed, and bulrush.

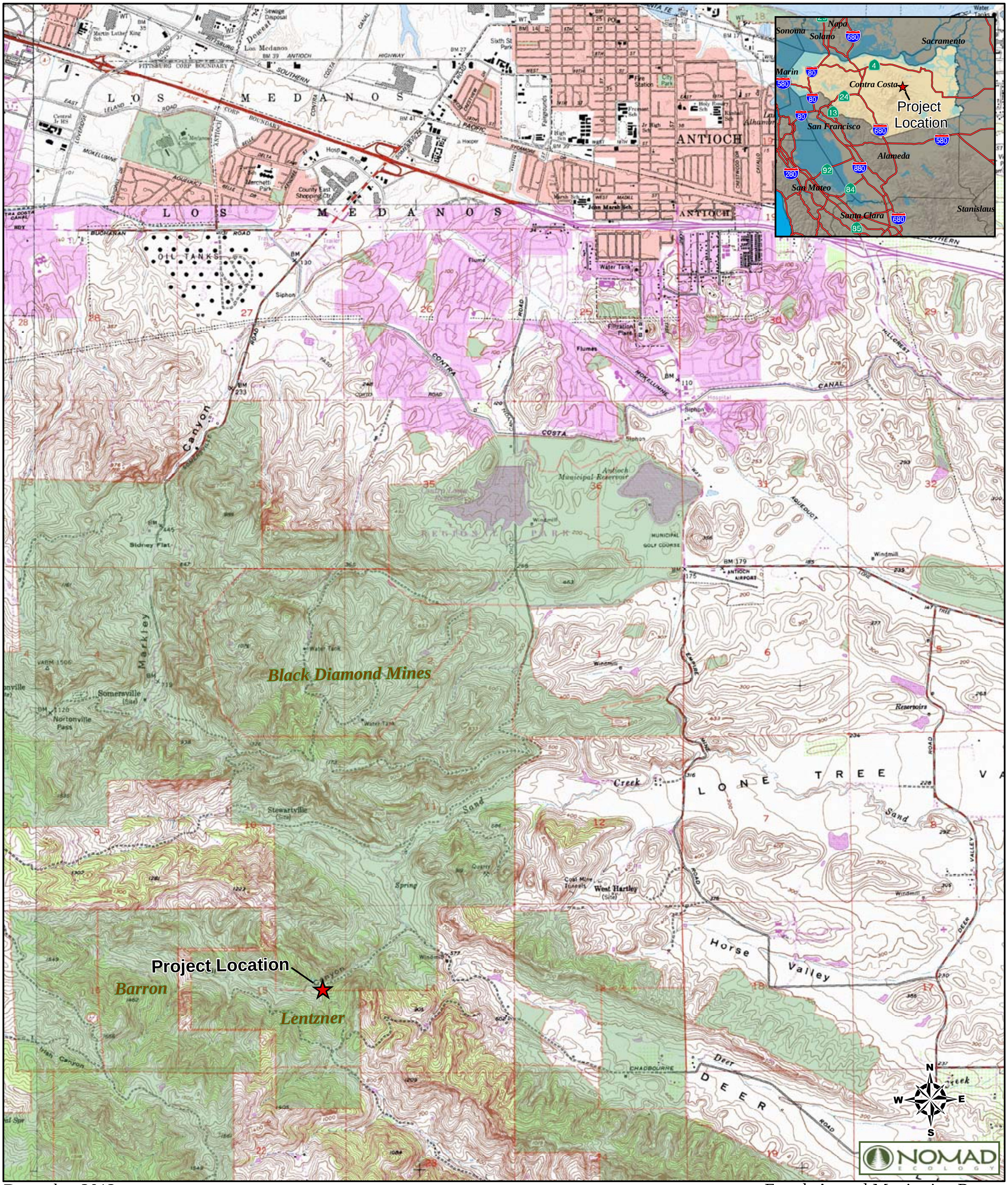
1.3. SETTING

The 320-acre Lentzner parcel is located in northeast Contra Costa County, approximately 5 miles south of Highway 4 in Antioch (Figure 1). It is located in the HCP/NCCP Acquisition Zone 2. On the Antioch South 7.5-minute USGS quadrangle, it lies in Township 01 North, Range 01 East of the Mount Diablo Baseline and Meridian. Black Diamond Mines Regional Preserve, owned and operated by the EBRPD, is adjacent to the Lentzner parcel, and the restoration site is just south of the property line between Lentzner and Black Diamond Mines. Access to the site is via unpaved roads from the Black Diamond Mines Regional Preserve office on Somersville Road or via the Stewartville Trail entrance on Frederickson Lane in Antioch. Both entrances have gates locked to vehicular traffic (ICF Jones and Stokes 2009a). The parcel lies on the boundary of the San Francisco Bay and San Joaquin Valley subregions of the California Floristic Province.

The Lentzner parcel is located in the northern half of the HCP/NCCP inventory area within the Mt. Diablo foothills. The entire parcel is designated as a high acquisition priority in the HCP/NCCP because of its proximity to surrounding open space, potential to provide habitat for covered species, and opportunities for stream and wetland restoration. Black Diamond Mines Regional Preserve is just north of the parcel, Clayton Ranch is one mile south of the property, and Roddy Ranch, a private deed-restricted open space area, is 0.5 miles to the west (ICF Jones and Stokes 2009a).

The project occurs in Oil Canyon Creek Watershed, a small tributary of Sand Creek. Sand Creek (with a sub-basin size of 9,600 acres) captures flow from the project site and drains east to Marsh Creek in Brentwood. The Marsh Creek Watershed is the second largest watershed in Contra Costa County, totaling more than 60,000 acres (ICF Jones and Stokes 2009a).

The restoration project is located on Lentzner's valley floor, and includes an unnamed spring contained in a spring-box, and a tributary to Oil Canyon Creek. The site is located directly adjacent to the confluence of the tributary and Oil Canyon Creek. The entire project site is 0.88 acres (ICF Jones and Stokes 2009a).



December 2012

Fourth Annual Monitoring Report

Legend

★ Project Location

Figure 1

Location of the Project

Lentzner Springs Restoration Project

Contra Costa County Department of Conservation and Development

1:48,000

0 2,000 4,000 Feet

Sources: USGS, California Spatial Information Library, Contra Costa County, Bay Area Open Space Council. Projection: State Plane NAD 83 Feet.

Contra Costa County, California

December 2012

Fourth Annual Monitoring Report

Legend

- Transect Start and End Locations*
- Transect Location and Number

*S=Transect Start. E=Transect End.

Figure 2

Transect Locations

Lentzner Springs Restoration Project

Contra Costa County Department of Conservation and Development

1:600

0 25 50 Feet

Aerial photography (2009) provided by Contra Costa County Department of Information Technology. Transect locations as recorded during June 2010 site visit. Projection:NAD 83 SP CA Zone III.

Contra Costa County, California

Section 2. MONITORING METHODS

The 2012 monitoring followed the monitoring methods and applied the performance criteria described in the Management Plan (ICF Jones and Stokes 2009a). Modifications to the monitoring methods were implemented based on the recommendations of the 2010 monitoring report, where feasible. Due to the inaccessibility of the site in the winter and early spring due to poor road conditions, wetland mapping, hydrology monitoring, and erosion monitoring were not conducted. A brief description of the methods and criteria follows.

2.1. PERFORMANCE CRITERIA

Performance criteria for the alkali wetland are based on survivorship and health of individual plants during the three years following implementation, as listed in Table 1. After individual survivorship performance criteria are met, monitoring will measure and evaluate absolute cover of native wetland vegetation annually for two additional years (Table 1).

Table 1. 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	% of plants surviving	At least 70% survival in Good or Fair condition
3 (and subsequent years if necessary)	% of plants surviving	At least 65% survival in Good or Fair condition
4 – 5 (and subsequent years if necessary)	Total absolute cover of native wetland vegetation	At least 60% cover

2.2. MONITORING METHODS

Nomad botanists Heath Bartosh and Erin McDermott conducted Year 4 monitoring activities on May 10, 2012. Monitoring activities are to occur during the early to mid-spring, after or during the end of the rainy season.

The monitoring protocol was modified in as was recommended in the 2010 report (Nomad Ecology 2010). The quadrat size increased from 1 meter by ½ meter to 2 meters by 2 meters. In addition to plant survivorship, percent cover of every species in the quadrats was recorded. Recording the percent cover will give a better picture of success than percent survival. There are no records, as-built plans, or flagging of the original restoration planting so the current percent survival is only an estimate based on the number of dead plants observed during the monitoring. It is likely that there were dead plants that were not visible which would cause the estimated percent survival to be higher than the true percent survival. Additionally photo-monitoring points were established at the ends of all transects to help qualify change over time.

Transects were established in 2009 during the first year of monitoring (ICF Jones and Stokes 2009a). Three of the transects were placed in the larger wetland area, and one transect was placed in the smaller wetland area (Figure 2). The transects were positioned across the alkali wetlands in order to capture the hydrologic gradient. For the larger wetland, the transects started at the boundary with the grassland, and ran down-slope toward the unnamed tributary. These transects ended at the down-slope edge of the planted area. In the smaller wetland area, the transect was placed across the center of wetland (Figure 2).

The end points of each transect were permanently marked using ½-inch diameter rebar pounded into the ground and marked with fluorescent pink marking tape. Transect end points were also recorded with a sub-meter precision GPS unit. The length of each transect was recorded, and the number of quadrats sampled on each transect was equal to 10% of the length of the transect. The quadrats were oriented across the transect at each randomly chosen start point, such that the transect bisected the quadrat into two equal sections.

Plant survivorship of the planted species and percent cover of all species was measured in each quadrat. For plant survivorship the monitor counted and visually estimated the health of each planted specimen rooted in the quadrat. The condition (vigor) of surviving plants was evaluated on the basis of leaf color and size, as well as the presence of herbivore damage, disease symptoms, insect infestation, and other indictors of health, 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 herbivore damage, disease, insect infestation, or other indicators of poor health.
- Fair Condition—Most leaves show healthy color and size, and/or 25–75% of plant's aboveground growth is affected by herbivore damage, disease, insect infestation, or other indicators of poor health.
- Poor Condition—Few or some leaves show healthy color and size, and/or more than >75% of plant's aboveground growth is affected by herbivore damage, disease, insect infestation, or other indicators of poor health.
- Dead—All aboveground plant parts exhibit no live growth.

To obtain percent cover the monitor recorded every species in the quadrat and visually estimated their percent of cover in that quadrat.

In addition to the quadrat monitoring, a qualitative assessment of the site was also recorded. This included general observations on the status of the wetlands and the survivorship of plants outside of the quadrats.

Photographs were taken as part of the qualitative assessment of the site. Photographs of each transect are located in Appendix A.

2.3. DATA ANALYSIS

In each quadrat, the number and condition of each targeted species was recorded. Data were compiled for each quadrat and for the site as a whole. All plants were assumed to have been alive at the start of the project, and survivorship was based on 100% survival at the time of project initiation. The survivorship for the site as a whole was compared to the performance criteria in Table 1.

In each quadrat all species were recorded and their percent cover estimated. This information improves the ability to detect wetland characteristics versus upland characteristics.

Data analysis and plant survivorship calculations were limited by data collection methodology which is detailed below in Limitations.

2.4. 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 its 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 2009, 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.

As-built plans of the original planting effort nor are were planting flags available to determine survivorship of the original restoration effort. Therefore, data analysis was limited by the assumption that dead plants would be visible and recorded, and accounted for in plant survivorship calculations. Realistically, dead plants often dry up and disappear and are not countable. Therefore plant survival calculations may be skewed toward higher plant survivorship because dead plants were not counted. The correct way to calculate percent survival is to have detailed planting plans or As-Built Plans that show the exact locations of plants, so that dead and missing plants are accounted for. Another option is to have planting flags in place, which would demonstrate where plants are missing.

Another limitation is the placement of transects may not capture plant mortality. In the 2009 monitoring report, it is reported that no bulrush survived, however the percent survival is calculated to be 94% based on data collected (ICF Jones and Stokes 2009a). No dead bulrush were recorded in the sampling quadrats placed along the transects and so this species' mortality was not accounted for in percent survivorship calculations.

Section 3. RESULTS AND DISCUSSION

3.1. QUADRAT SAMPLING

The results from the fourth year of monitoring survivorship are presented in Table 2. The site as a whole had 93% survival based on data totaled from all quadrats. The overall survivorship for the restoration project due to the lack of original planting data as discussed in above sections.

Table 2. Percent Survival by Transect

Transect Number	Quadrat Number	Location along Transect (feet)	Species[1]	Number of Plants of each Condition			
				Good	Fair	Poor	Dead
1	Q1	22	DISP	1	-	-	-
			GRCA	72	-	-	-
	Q2	-	-	-	-	-	-
2	Q3	6	GRCA	7	-	-	-
	Q4	16	DISP	1	-	-	-
			GRCA	1	-	-	-
3	Q5	10	GRCA	2	-	-	3
	Q6	20	DISP	-	-	6	-
			GRCA	6	-	-	-
	Q7	26	DISP	-	18	-	-
			GRCA	4	-	-	-
	Q8	53	DISP	3	5	2	-
			GRCA	2	-	-	-
4	Q9	18	DISP	9	2	-	-
			GRCA	19	-	-	-
Subtotal DISP				14	25	8	0
Subtotal GRCA				113	0	0	3
Totals				127	25	8	3
Average Percent Survival in Good or Fair Condition							**93%**

[1]DISP = saltgrass (*Distichlis spicata*), GRCA = Great Valley gumweed (*Grindelia camporum*)

The most common species in the sample quadrats was Great Valley gumweed. There were 116 Great Valley gumweed individuals counted, with 113 (97.5%) in good condition and 3 (2.5%) dead. Great Valley gumweed increased from 2 individuals in 2010 to 107 individuals in 2011 to 116 individuals in 2012, showing an overall increase in gumweed establishment. There were a total of 47 saltgrass individuals in the quadrats, with 14 (30%) in good condition, 25 (53%) in fair condition, and 8 (17%) in poor condition. Saltgrass increased from 31 individuals in 2010 to 79 individuals in 2011 and decreased to 47 individuals in 2012. Although the absolute number of saltgrass individuals counted in the quadrats decreased from 2011 to 2012, the plants along transect 3 are healthy and vigorous, forming large clumps with increased cover. Alkali heath decreased from 6 individuals in 2010 to 0 individuals in 2011 and 2012. However, alkali head was present in limited abundance outside of established transects. There was no bulrush present in any year following planting.

Some transects are trending towards alkali wetland with a relatively high abundance of saltgrass, while others are trending toward alkali grassland with Great Valley gumweed well-represented. The greatest abundance of Great Valley gumweed was seen in transect 1, indicating the continued development of an alkali grassland environment. Saltgrass is most abundant in transects 3 and 4 and has a wetland indicator status of FAC (Facultative), meaning it is "equally likely to occur in wetlands or non-wetlands". Though it is not uncommon in the Byron area for saltgrass to grow in upland sites, the trend toward increasing saltgrass cover in transect 3 in addition to the occurrence of saltmarsh sand-spurrey (*Spergularia marina*; OBL) and FACW species such as dwarf peppergrass (*Lepidium latipes* var. *latipes*) and meadow barley (*Hordeum brachyantherum* var. *brachyantherum*) indicates an alkali wetland environment. Table 3 shows percent cover of all species recorded in the plots along transects and table 4 depicts change in percent cover of species by transect from 2011 to 2012. The wetland indicators used to evaluate wetland characteristics of each transect are are OBL (obligate wetland), FACW (facultative wetland), and FAC (facultative). Based on table 3 the highest cover of wetland plants are FAC which indicates that these wetlands have weak hydrology.

Table 3. Percent Cover of Species

		Native Plant Species											Non-Native Plant Species																		Summary						
Transect Number	Quad Number	*Crassula connata*	*Croton setigerus*	*Distichlis spicata*	*Grindelia camporum*	*Hordeum brachyantherum* var. *brachyantherum*	*Lepidium latipes*	*Lepidium nitidum*	*Malvella leprosa*	*Spergularia marina*	*Xanthium strumarium*		*Bromus diandrus*	*Bromus hordeaceous*	*Capsella bursa-pastoris*	*Centaurea solstitialis*	*Cerastium glomeratum*	*Convolvulus arvensis*	*Festuca perennis*	*Galium murale*	*Geranium molle*	*Helminthotheca echioides*	*Hordeum marinum* subsp. *gussoneanum*	*Hordeum marinum* subsp. *leporinum*	*Lactuca serriola*	*Medicago polymorpha*	*Parapholis incurva*	*Polygonum aviculare* subsp. *depressum*	*Trifolium hirtum*		Total Absolute Percent Cover	Total Absolute Cover Native Plants	Total Absolute Cover Non-Native Plants	Total Relative Cover of Wetland Plants	Total Absolute Cover Wetland Plants	Total Relative Cover Native Wetland Plants	Total Absolute Cover of Native Wetland Plants
		FAC	None	FAC	None	FACW	FACW	FAC	FACU	OBL	FAC		None	FACU	FACU	None	FACU	None	FAC	None	None	FACU	FAC	FACU	FACU	FACU	FAC	FACW	None								
T1	1	0.2	0	1	3	0	0	0	0.2	0	0		0	0.2	0	0	0	0	4	0	0	0	0.2	0	0	0.2	0	0	0.2		9.2	4.4	4.8	58.7	5.4	13.0	1.2
																														AVG	9.2	4.4	4.8	58.7	5.4	13.0	1.2
T2	1	0	0.2	0	20	0	0	0	0	0	0		0.2	0.2	0.2	0.2	0	4	1	0	0	0	0	0.2	0	0	0	0	0		26.2	20.2	6.0	3.8	1.0	0.0	0.0
T2	2			0.2	0.2								2	2				25	1			0.2		2	0.2						32.8	0.4	32.4	3.7	1.2	0.6	0.2
																														AVG	29.5	10.3	19.2	3.7	1.1	0.3	0.1
T3	1				40								0.2	4			0.2		1	0.2				0.2				0.2			46.0	40.0	6.0	2.6	1.2	0.0	0.0
T3	2			15	3	2							0.2	0.2	0.2				4					2	0.2			0.2			27.0	20.0	7.0	78.5	21.2	63.0	17.0
T3	3			12	0.2	12	0.2	0.2		1									0.2						0.2			0.2			26.2	25.6	0.6	98.5	25.8	96.9	25.4
T3	4			20	0.2	3	0.2	0.2		1															0.2		0.2	0.2			25.2	24.6	0.6	98.4	24.8	96.8	24.4
																														AVG	31.1	27.6	3.6	69.5	18.3	64.2	16.7
T4	1			4	2	0.2					0.2			0.2					1		0.2		0.2	2		0.2					10.2	6.4	3.8	54.9	5.6	43.1	4.4
																														AVG	10.2	6.4	3.8	54.9	5.6	43.1	4.4

* Indicates a species with an origin other than that of California
Cover values of <1 are treated as 0.2 for calculation purposes

Table 4. Change in Absolute Cover of Species by Transect from 2011 to 2012

AVERAGE COVER BY TRANSECT	TRANSECT 1	TRANSECT 2	TRANSECT 3	TRANSECT 4
2011	**17.85%**	**57.8%**	**27.33%**	**8%**
2012	**9.2%**	**29.5%**	**31.05%**	**10%**
Change in Average Cover	**-8.65**	**-28.3**	**3.72**	**2**

Table 5 shows the percent cover of all plant species, native and non-native, by cover value type (absolute[1] and relative[2]) in each transect. This table provides an overview of the wetland conditions by transect and is not to indicate whether performance standards are being met but to demonstrate overall cover by wetland plant species. Based on absolute cover values wetland vegetative cover is low in all transects and does not provide a meaningful evaluation of wetland species dominance. In comparison, relative cover values provide a more robust look at wetland plant cover despite the alkalinity of the substrate at the restoration site which keeps cover values low naturally. By this metric transects 3 and 4 appear to support greater than 50% cover of wetland plants while transect 2 clearly does not. Although transect 1 has greater than 50% relative cover the majority of the cover percentage comprises Italian ryegrass*, a FAC wetland species, which commonly grows in uplands.

Table 5. Percent Cover of All Wetland Plants by Cover Value Type

COVER VALUE TYPE	TRANSECT 1	TRANSECT 2	TRANSECT 3	TRANSECT 4
Absolute	5.4%	1.1%	18.3%	5.6%
Relative	58.7%	3.7%	69.5%	54.9%

Table 6 depicts the percent cover by wetland indicator status only for native plant species, which evaluates the target value of the performance criteria. Using absolute cover, as directed by the performance criteria, none of the transects are close to meeting 60% absolute cover at this time and we do not expect them to as alkaline wetlands of this type are typically characterized by very low vegetative cover. However, by using relative cover, which is a much better assessment of vegetative cover for alkaline wetlands in the region, transects 3 and 4 are either currently wetland or trending wetland at this time. These two transects are closest to the channel that brings water downstream from the upper watershed as well as the spring located within the restoration area.

[1] *Absolute cover* refers to the actual percentage of the ground (surface of the plot) that is covered by a species or group of species.
[2] *Relative cover* refers to the amount of the surface of the plot sampled that is covered by a group of species as compared to (relative to) the amount of surface of the plot or stand covered by all species.

Table 6. Percent Cover of Native Wetland Plants by Cover Value Type

WETLAND INDICATOR STATUS	TRANSECT 1	TRANSECT 2	TRANSECT 3	TRANSECT 4
Absolute	1.2%	0.1%	16.7%	4.4%
Meets Current Performance Standard	**No**	**No**	**No**	**No**
Relative	13%	0.3%	64.2%	43.1%
Meets Modified Performance Standard	**No**	**No**	**Yes**	**No**

3.2. QUALITATIVE ASSESSMENT

Of the planted species there was an overall increase in Great Valley gumweed and an overall decrease in saltgrass from 2011 counts. However, qualitatively it appeared that individuals of saltgrass were larger and had greater cover than in previous years. Alkali heath and bulrush continue to be absent from transects. The health of the saltgrass and Great Valley gumweed was good with most plants showing vigorous growth. The presence of saltmarsh sand-spurrey (*Spergularia marina*) and the relatively high abundance of meadow barley recorded in transect 3 indicates that this areas has alkali wetland characteristics.

No bulrush individuals planted on the site were alive during the 2009, 2010, 2011, or 2012 monitoring. The data collection methodology and performance standard calculations do not capture the bulrush mortality, which suggests the methodology is flawed. This is discussed in Section 2.4 Limitations

This year's report presents the first assessment of total absolute cover and total relative cover of native wetland vegetation (Table 6). Previous year's monitoring reports evaluated total absolute cover and total relative cover of all plant species, native and non-native, to give a perspective of overall wetland characteristics (Table 4). Establishing alkali wetland was one of the main objectives of the restoration project. It appears at this time the objective is nearing achievement in the areas represented by transect 3 and 4. The transect data support a trend toward the establishment of alkali wetland from 2010 where no data indicated alkali wetland characteristics to 2012 where there are data to support a wetland trend along both transects 3 and 4.

In addition, transect 4 has hydrological features that are present indicate alluvial sedimentation. Within transects 3 and 4 there was indication that water sheet flowed across the site but did not pond. These indicators include drift lines and matted vegetation. Therefore we expect that the areas that include transect 3 and 4 will continue to develop into wetlands, though they may require supplemental planting of wetland adapted native species.

Transects 1 and 2 continue to exhibit upland characteristics based on the current monitoring data. Within transects 1 and 2 the slope is steep and it is presumed that runoff is rapid. Observations in the field further suggest that the topography on site is too steep to support wetlands at this location that hold water for a duration characteristic of even a seasonal wetland. Although there is no evidence that the areas within transects 1 and 2 are currently wetland in character continued monitoring during year 5 will yield more data revealing whether this area will transition to wetland or not.

A noteworthy change is a modification in the 2012 U.S. Army Corps of Engineer NWPL Final Draft Ratings. Salt grass changed from FACW to FAC and Great Valley gumweed changed from FACU to having no indicator status. Furthermore, in 2011 transect 2 had high cover of non-native Italian ryegrass

(*Festuca perennis*[*]; FAC) which inflated the Percent Cover by Wetland Indicator Status value (see Table 3) as compared to 2012 where the gumweed (*Grindelia camporum*; no status) cover had doubled from the previous year.

Outside of the restoration area, the vegetation is weedy and dominated by Italian ryegrass (*Festuca perennis**) and other non-native grass species. However, based on maintenance logs provided by Thunder Mountain Great Valley gumweed and purple needlegrass (*Stipa pulchra*) are also doing well in the upland areas of the restoration site. This suggests that continued weeding and line trimming is necessary to allow these species to further establish on site.

[*] Denotes a non-native species that has an origin other than that of California

Section 4. RECOMMENDATIONS

4.1. PLANTING

Over the past years, results of monitoring have indicated that the Lentzner restoration is progressing toward becoming wetlands as is evidenced by the transition of the areas within transect 3 and 4 to alkali wetland. However, we recommend planting the areas of transect 3 and 4 with wetland adapted native plants such as saltgrass, meadow barley, and dwarf peppergrass (*Lepidium latipes*). Saltgrass and meadow barley may be sourced from downstream of the restoration site. This planting can be executed in the fall of 2013.

4.2. SITE MAINTENANCE

As detailed above, non-native weedy species are present in abundance outside of the project area. In addition to weed species within the restoration exclosure, thistles such as milk thistle (*Silybum marianum**) and Italian thistle (*Carduus pycnocephalus**) are abundant in the area to the west of the exclosure. These weeds should continue to be controlled so they do not become established within the restoration area. Within parts of the restoration area, the non-native annual grasses are tall (>2') and dense and have the potential to impact the further development of alkaline wetlands. To abate this issue the upland area should be line trimmed every July or August after seed set. The site should continue to be maintained during spring and summer months. Maintenance should include removal of non-native invasive species, including annual grasses, in the restoration area. Removal of non-native invasive species should be done by hand prior to line trimming the annual grasses.

4.3. PERFORMANCE STANDARDS MODIFICATIONS

Due to the low absolute cover values recorded at the restoration site we recommend changing the performance standard target of 60% absolute cover of native wetland species to 60% relative cover of native wetland species. In this region, alkali wetlands are typically characterized by low vegetative cover and rarely exhibit 60% absolute cover of native wetland species. These wetland types have an abundance of bare ground, with a very elevated pH, most commonly referred to as alkaline scalds.

Section 5. REFERENCES

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APPENDIX A MONITORING PHOTOGRAPHS

Photo 1. Transect 1. May 10, 2012.

Photo 2. Transect 2. May 10, 2012.


Photo 3. Transect 2. May 10, 2012.


Photo 4. Transect 2. May 10, 2012.

Photo 5. Transect 2. May 10, 2012.

Photo 6. Transect 3. May 10, 2012.


Photo 7. Transect 3. May 10, 2012.


Photo 8. Transect 3. May 10, 2012.

Photo 9. Transect 3. May 10, 2012.

Photo 10. Transect 4. May 10, 2012.

Photo 11. Transect 4. May 10, 2012.

Photo 12. Transect 4. May 10, 2012.