

Cabin Bar Ranch Water Bottling Facility Project

2019 Vegetation Monitoring Report

Prepared for:
CG Roxane, LLC
10 Pimentel Ct.
Novato, CA 94949

Prepared by:
Garcia and Associates (GANDA)
2601 Mission Street, Suite 600
San Francisco, CA 94110

March 2020



Table of Contents

1.0	Introduction	3
2.0	Methods	3
2.1	Assessment of Vegetation Health (Vegetation Cross-Section Method).....	3
2.2	Measurement of Riparian and Wetland Vegetation and Woody Riparian Species Regeneration (Greenline Method and Woody Species Regeneration).....	6
2.3	Monitoring Stations and Monitoring Regime	6
2.4	Groundwater Mitigation Monitoring and Reporting Plan (GMMRP)	7
2.4.1	Vegetation transects	7
2.4.2	Spring Fault Vegetation	7
2.4.3	Physical Habitat Conditions	7
2.4.4	Benthic Macroinvertebrate Surveys	7
3.0	Results.....	8
3.1	Assessment of Vegetation Health (Vegetation Cross-Section Method).....	9
3.2	Measurement of Riparian and Wetland Vegetation and Woody Riparian Species Regeneration (Greenline Method and Woody Species Regeneration).....	12
	Greenline (South bank)	12
	Greenline (North bank).....	13
3.3	Monitoring Stations and Monitoring Regime and Groundwater Mitigation Monitoring and Reporting Plan (GMMRP) transects	14
3.4	Groundwater Mitigation Monitoring and Reporting Plan (GMMRP)	18
3.4.1	Vegetation transects	18
3.4.2	Spring Fault Vegetation	18
3.4.3	Physical Habitat Conditions	26
3.4.4	Benthic Macroinvertebrates collected from Cabin Bar Ranch springs, Owens Valley, CA, November 20, 2016 and November 29, 2018.....	27
4.0	References	29

Figures

Figure 1: Vegetation Monitoring Transect Locations	5
Figure 2: Regeneration Tally for the Greenline – South Bank	13
Figure 3: Regeneration Tally for the Greenline – North Bank	14

Tables

Table 1: Definition of Wetland Indicator Status.....	8
--	---

Appendices

Appendix A: Photo-documentation

Appendix B: List of plants found at Cabin Bar Ranch

1.0 Introduction

Garcia and Associates (GANDA) is pleased to submit the following report describing vegetation monitoring conducted on the Cabin Bar Ranch in 2019. The purpose of the monitoring described in this report is to fulfill both the requirements described in mitigation measure BIO-4: Riparian and Wetland Monitoring and Adaptive Management Program (RWMAMP) of the Crystal Geyser Roxane Cabin Bar Ranch Water Bottling Facility Project Final EIR (PCR Services 2012) and the vegetation component of the Groundwater Mitigation Monitoring and Reporting Plan (GMMRP) (GeoSyntec Consultants and Garcia and Associates 2014).

The RWMAMP requires three sampling methods to inventory and monitor the vegetation resources in jurisdictional areas identified on portions of the Cabin Bar Ranch. These methods are: 1) the vegetation cross-section method that evaluates the health of vegetation across a riparian corridor; 2) the greenline method (Winward 2000) that provides a measurement of the streambed associated vegetation and/or wetlands; and 3) woody species regeneration that measures the density and age class structure of shrub and tree species that may be in the sampling area. In addition to these monitoring requirements, the GMMRP provides for vegetation monitoring at four transects and at four springs along the Spring Fault Line to determine if there are significant impacts from project groundwater pumping on the Cabin Bar Ranch to groundwater dependent habitats. In addition to vegetation monitoring at the four springs, the GMMRP requires aquatic organism sampling focused on benthic macroinvertebrates and monitoring of spring flow rate at each of the four springs.

This report presents habitat conditions during the baseline monitoring period (2014-2016) prior to groundwater pumping and the second-year post water extraction (fall 2018 and winter 2019).

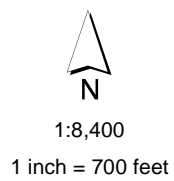
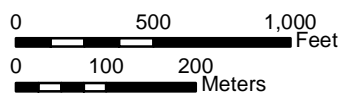
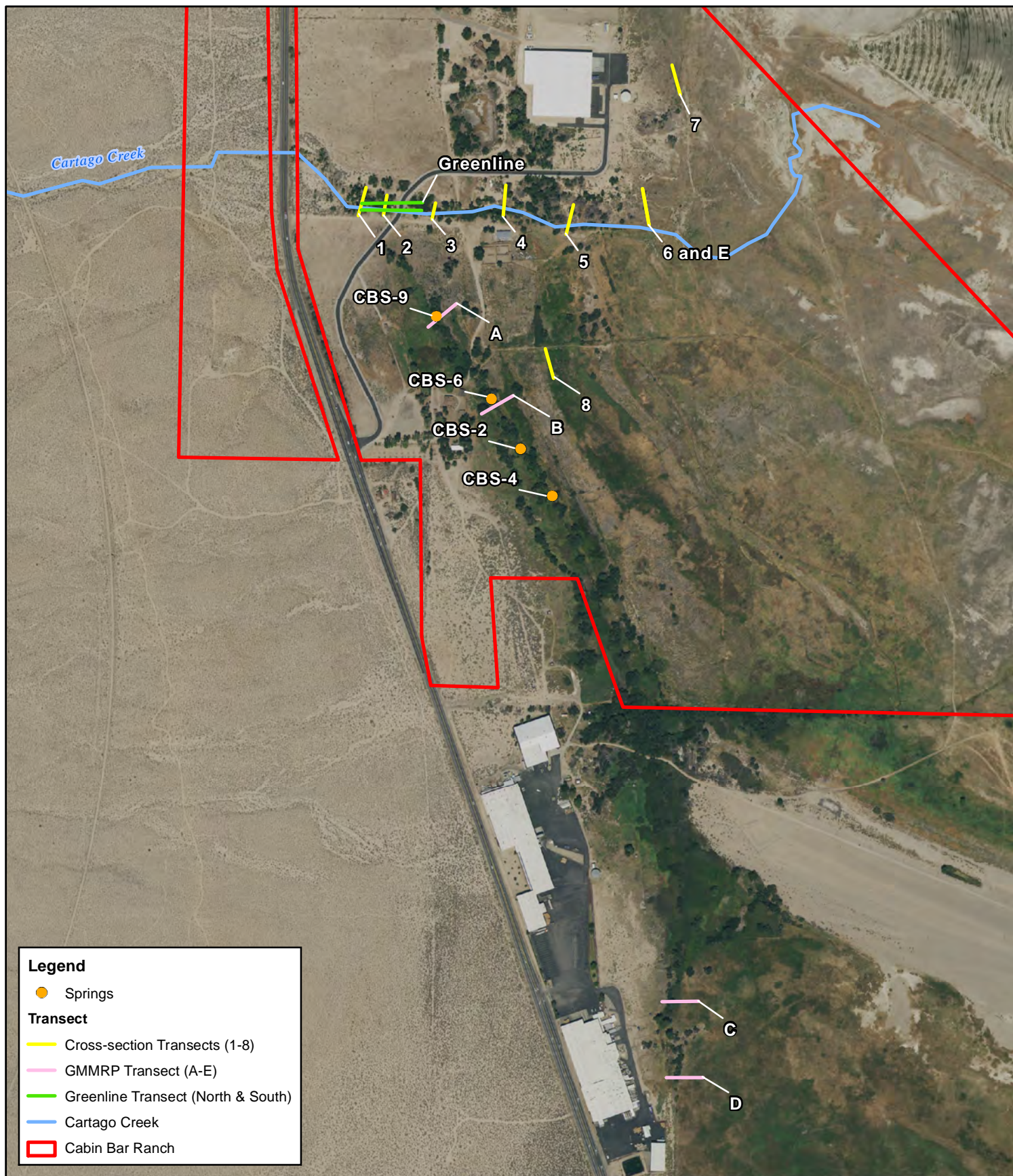
2.0 Methods

The following sections describe methods used by GANDA botanists while conducting baseline surveys on August 6, 2014 and October 12, 2016 for four springs located along the Spring Line Fault on Cabin Bar Ranch Property, the surveys conducted on August 5-7, 2014 to fulfill requirements for RWMAMP and GMMRP, and the second year post water extraction surveys on October 15 and 16, 2019.

2.1 Assessment of Vegetation Health (Vegetation Cross-Section Method)

To assess vegetation health, GANDA botanists established five transects perpendicular to U.S. Army Corps of Engineers (USACE), California Department of Fish and Wildlife (CDFW), and Regional Water Quality Control Board (RWQCB) jurisdiction associated with Cartago Creek and three monitoring transects within jurisdictional wetland areas elsewhere on the Cabin Bar Ranch (Figure 1; transects 1-8). The transect locations were selected to best represent the riparian and/or wetland communities being monitored. To the extent practicable, transects were long enough to span the observed riparian corridor and delineated wetland edge. Species composition and cover data were collected every 0.5 meter. Total cover was determined by dividing the number of points where vegetation cover was observed by the total number of

sample points on the transect. Composition data was determined by dividing the number of points where a particular plant species was observed by the total number of sample points where vegetation cover was observed on the transect. Photographs were also taken in the direction of the transect from the start and end points and are provided in Appendix A.



**Figure 1.
Monitor Locations**

Inyo County, CA

2.2 Measurement of Riparian and Wetland Vegetation and Woody Riparian Species Regeneration (Greenline Method and Woody Species Regeneration)

GANDA botanists carried out a modified “greenline” survey (Winward 2000) to evaluate the immediate riparian and wetland edge vegetation composition associated with jurisdictional areas. In a standard greenline survey, typically conducted in a perennial to intermittent creek setting, the greenline is identified by the line of riparian and wetland vegetation along the water’s edge. Due to the ephemeral nature of flows in Cartago Creek, understory wetland vegetation is completely lacking, and in this case the “greenline” was identified as the ordinary high water mark (OHWM). The OHWM is defined as the high flow water mark on the bank of the creek in a “normal” year and is the line that demarcates the federal jurisdiction over the creek. In the case of Cartago Creek, the OHWM was identified using physical indicators such as shelving on the bank, deposits of litter, a change in vegetation, and sediment sorting.

The beginning of the greenline transect was established at the crossing of the farthest uphill cross-section transect (transect 1 on Figure 1), on the south bank of Cartago Creek. A 100-meter long tape was pulled downstream along the OHWM of the creek, and then again from that point upstream along the north bank back to the starting point. Data on riparian and wetland plant species (obligate and facultative hydrophytes), percent canopy cover (calculated as the number of hits versus the total number possible) and understory was collected every 2 meters. Percent cover and species composition was calculated as described above for the cross-section method.

In addition to data collected on vegetation cover and composition, the botanists also recorded data on woody riparian species regeneration while surveying the greenline. Sampling took place at the same locations (i.e., every 2 meters). All woody plants rooted within a 1-meter radius were tallied based on age-class categories (sprout, young, mature, decadent and dead, as defined by Winward [2000]). Data were analyzed for age-class distribution and species composition as described above.

2.3 Monitoring Stations and Monitoring Regime

GANDA botanists established three monitoring stations to evaluate the relationship between increased pumping of groundwater and the health of riparian and wetland vegetation, as well as the role of rainfall, snowmelt runoff, and/or inputs from several natural springs. The “stations” were located as follows and illustrated on Figure 1) just downstream from the point where Cartago Creek’s bed and bank characteristics are lost due to sheet flow (transect “E”); 2) near CGR-9, a natural spring (transect “A”); and 3) south of Cabin Bar Ranch near the existing bottling facility (transect “C”). It should be noted that the start point for transect “E” is the same start point for transect number 6 in Section 2.1 above. Each station consisted of a 60-meter-long transect. Each transect was sampled with a meter square quadrat at 10-meter intervals for a total of 7 sampling points (0, 10, 20, 30, 40, 50, and 60 meters). Quadrat samples were placed so that the transect tape line bisected the quadrat. Within each quadrat, all plant species were recorded along with percent cover.

2.4 Groundwater Mitigation Monitoring and Reporting Plan (GMMRP)

2.4.1 Vegetation transects

As part of the GMMRP monitoring requirement, GANDA botanists surveyed transects B and D on Figure 1 following the same methodology described in Section 2.3 above. Data gathered from surveys at transects A and C were used to fulfill both the requirements described in BIO-4 for the RWMAMP, as well as the vegetation monitoring required as part of the GMMRP.

2.4.2 Spring Fault Vegetation

Vegetation surveys were conducted around four springs (CBS-2, CBS-4, CBS-6 and CBS-9) located along the Spring Line Fault on Cabin Bar Ranch property (Figure 1). The goal of the survey was to describe the vegetation species composition and structure of plant communities around each spring. The springs are described in order from northernmost to southernmost, and are referred to using a numbering system instituted by CG Roxane.

At each spring location, the vegetation was characterized by recording percent cover of individual species within a 28.3 m² circular plot (3-meter radius) with the spring flume as the center point. Vegetation cover was recorded as a visual estimate of foliar cover, recorded by species. Cover values were recorded as cover classes using the Daubenmire cover scale (Mueller-Dombois and Ellenberg 19741): 95 to 100% foliar cover equaled cover class 6, 75 to 95% foliar cover equaled cover class 5, etc. The cover class ranges are provided in Tables 1-4. Other species outside of the plot, but still within the riparian zone around the springs were also noted. Descriptions of each spring are provided below. Appendix A provides photo-documentation of the condition at each spring as well as the main collector ditch.

2.4.3 Physical Habitat Conditions

Physical habitat conditions were recorded at each of the four spring locations where 2-inch Baski cutthroat flumes have been installed. Spring observations included measurement of channel length, width, depth, and flow rate. Flow rates were determined using the water depth on the Baski flumes in accordance with manufacturer's specifications to calculate gallons per minute (GPM).

2.4.4 Benthic Macroinvertebrate Surveys

Benthic macroinvertebrate surveys were conducted on November 20, 2016 are compared with the second-year post water extraction surveys on October 15, 2019. The focus of the survey was to determine the types of species groups with an emphasis on determining if any rare or sensitive species were present. The survey also focused on determining presence of spring snails, and in particular Wong's springsnail (*Pyrgulopsis wongi*), which serve as an indicator species for purposes of determining current baseline condition. The survey methodology included the sampling of four springs (CBS-2, CBS-4, CBS-6, and CBS-9) using a 500-micron mesh dip net. At each spring a total of 20 sweep samples were collected with the dip net. All samples were elutriated and cleaned in the field, placed in jars, labeled, and preserved in 10% formalin. Samples were processed by Jon Lee, a qualified invertebrate taxonomist.

3.0 Results

The results are provided below. For the vegetation transects, each has a summary table of percent cover. For each species, the wetland indicator status is provided. Table 1 defines each wetland indicator category. The location of the permanent transects for each monitoring type are shown on Figure 1. Photographs of each transect from the start- and end-point locations are provided in Appendix A. A complete list of all plants encountered on the Cabin Bar Ranch and their wetland status is provided in Appendix B.

Table 1: Definition of Wetland Indicator Status

Indicator Category	Wetland Occurrence
Obligate wetland species (OBL)	Occurs almost always in wetlands (estimated >99% probability of occurring in a wetland)
Facultative wetland species (FACW)	Usually occurs in a wetland (estimated 67-99% probability of occurring in a wetland)
Facultative species (FAC)	Equally likely to occur in a wetland or a non-wetland (estimated 33-67% probability of occurring in a wetland)
Facultative upland species (FACU)	Usually occurs in non-wetlands (estimated 1-33% probability of occurring in a wetland)
Obligate upland species (UPL)	Occurs in wetlands in another region, but occurs almost always under natural conditions in non-wetlands in Region O (California) (estimated <1% probability of occurring in a wetland). Plants not listed in Reed 1988 are assumed to be obligate upland species (UPL)
(Reed 1988 and Lichvar et. al. 2014)	

3.1 Assessment of Vegetation Health (Vegetation Cross-Section Method)

Transect 1

Transect start coordinates: NAD 83, Zone 11, 4019379N, 407925E

Heading: 15 deg.; Length: 47.5m

Species	Percent cover		Difference 2019 minus 2014	Wetland Indicator Status
	2014	2019		
<i>Populus fremontii</i>	73	85	12	FACW
<i>Fraxinus velutina</i>	4	7	3	FAC
<i>Salix laevigata</i>	1	4	3	FACW
<i>Artemesia tridentata</i>	0	7	7	UPL
<i>Euthamia occidentalis</i>	0	1	1	FACW
<i>Juncus balticus</i>	0	6	6	FACW
<i>Salsola tragus</i>	0	3	3	FACU

Transect 2

Transect start coordinates: NAD 83, Zone 11, 4019379N, 407969E

Heading: 0 deg., Length: 33.5m

Species	Percent cover		Difference 2019 minus 2014	Wetland Indicator Status
	2014	2019		
<i>Fraxinus velutina</i>	67	54	-13	FACW
<i>Salix laevigata</i>	18	61	43	FACW
<i>Ericameria nauseosa</i>	13	0	-13	UPL
<i>Ambrosia dumosa</i>	0	9	9	UPL

Transect 3

Transect start coordinates: NAD 83, Zone 11, 4019375N, 408049E

Heading: 12 deg.; Length: 27m

Species	Percent cover		Difference 2019 minus 2014	Wetland Indicator Status
	2014	2019		
<i>Salix laevigata</i>	22	71	49	FACW
<i>Fraxinus velutina</i>	9	0	-9	FAC
<i>Populus fremontii</i>	0	24	24	FACW
<i>Juncus balticus</i>	0	2	2	FACW

<i>Euthamia occidentalis</i>	0	24	24	FACW
<i>Ambrosia acanthicarpa</i>	0	5	5	UPL

Transect 4

Transect start coordinates: NAD 83, Zone 11, 4019382N, 408165E

Heading: 5 deg.; Length: 50 m

Species	Percent cover		Difference 2019 minus 2014	Wetland Indicator Status
	2014	2019		
<i>Fraxinus velutina</i>	30	35	5	FAC
<i>Salix laevigata</i>	12	32	20	FACW
<i>Distichlis spicata</i>	14	35	21	FAC
<i>Ericameria nauseosa</i>	13	0	-13	UPL
<i>Salix laevigata</i>	12	0	-12	FACW
<i>Leymus triticoides</i>	4	0	-4	FAC
<i>Euthamia occidentalis</i>	0	8	8	FACW
<i>Ambrosia acanthicarpa</i>	0	11	11	UPL

Transect 5

Transect start coordinates: NAD 83, Zone 11, 4019352N, 408269E

Heading: 14 deg.; Length: 50m

Species	Percent cover		Difference 2019 minus 2014	Wetland Indicator Status
	2014	2019		
<i>Salix laevigata</i>	53	44	-9	FACW
<i>Fraxinus velutina</i>	19	14	-5	FAC
<i>Ericameria nauseosa</i>	4	0	-4	UPL
<i>Distichlis spicata</i>	0	4	4	FAC
<i>Euthamia occidentalis</i>	0	7	7	FACW
<i>Ambrosia acanthicarpa</i>	0	45	45	UPL

Transect 6

Transect start coordinates: NAD 83, Zone 11, 4019424 N, 408392E

Heading: 170 deg.; Length: 50m

Species	Percent cover		Difference 2019 minus 2014	Wetland Indicator Status
	2014	2019		

Thatch	95	0	-95	
<i>Juncus balticus</i>	4	7	3	FACW
<i>Ericameria nauseosa</i>	3	0	-3	UPL
<i>Salsola tragus</i>	0	4	4	FACU
<i>Ambrosia acanthicarpa</i>	0	77	77	UPL
<i>Distichlis spicata</i>	0	6	6	FAC
<i>Euthamia occidentalis</i>	0	7	7	FACW
<i>Ambrosia dumosa</i>	0	8	8	UPL
<i>Xanthium strumarium</i>	0	2	2	FAC
<i>Lactuca serriola</i>	0	6	6	FACU
<i>Polypogon monspeliensis</i>	0	1	1	FACW
<i>Erigeron canadensis</i>	0	2	2	FACU

Transect 7

Transect start coordinates: NAD 83, Zone 11, 4019626N, 408441E

Heading: 164 deg.; Length: 50 m

Species	Percent cover		Difference 2019 minus 2014	Wetland Indicator Status
	2014	2019		
<i>Juncus balticus</i>	47	46	-1	FACW
Thatch	35	0	-35	
<i>Distichlis spicata</i>	19	45	26	FAC
<i>Anemopsis californica</i>	10	14	4	OBL
<i>Salsola tragus</i>	0	26	26	FACU
<i>Ericameria nauseosa</i>	0	20	20	UPL
<i>Ambrosia acanthicarpa</i>	0	17	17	UPL

Transect 8

Transect start coordinates: NAD 83, Zone 11, 4019161 N, 408232E

Heading: 195 deg.; Length 50m

Species	Percent cover		Difference 2019 minus 2014	Wetland Indicator Status
	2014	2019		
<i>Carex praegracilis</i>	58	67	9	FACW
Thatch	38	0	-38	
<i>Juncus balticus</i>	25	18	-7	FACW

<i>Carex nebrascensis</i>	11	30	19	OBL
<i>Distichlis spicata</i>	3	15	12	FAC
<i>Lactuca serriola</i>	1	7	6	FAC
<i>Anemopsis californica</i>	0	1	1	OBL
<i>Euthamia occidentalis</i>	0	14	14	FACW
<i>Rosa woodsii</i>	0	1	1	FACU

3.2 Measurement of Riparian and Wetland Vegetation and Woody Riparian Species Regeneration (Greenline Method and Woody Species Regeneration)

Results of the greenline transects are provided below in the tables labeled “south bank” and “north bank.” Results of the woody species regeneration tally are provided as charts illustrating the cumulative counts of individuals in each age class (Figures 2 and 3). Age class definitions follow those in Winward 2000 in which “sapling” is defined as one- to two-year-old tree, less than a quarter of its mature height; “young” is a three- to 10-year-old tree, a quarter to half its mature height; “mature” is a full height tree, with more than half the canopy alive; “decadent” is a mature tree with less than half the canopy alive; and “dead” is a tree with no canopy alive. A number of sapling-age individuals of ash and cottonwood were observed on the top of the banks outside of the greenline transect zone. Representative photographs of the greenline transects on both banks are provided in Appendix A.

Greenline (South bank)

Species	Percent cover		Wetland Indicator Status
	2014	2019	
<i>Salix laevigata</i>	44	80	FACW
<i>Fraxinus velutina</i>	26	15	FAC
<i>Populus fremontii</i>	20	18	FACW
<i>Rosa woodsii</i>	2	13	FACU

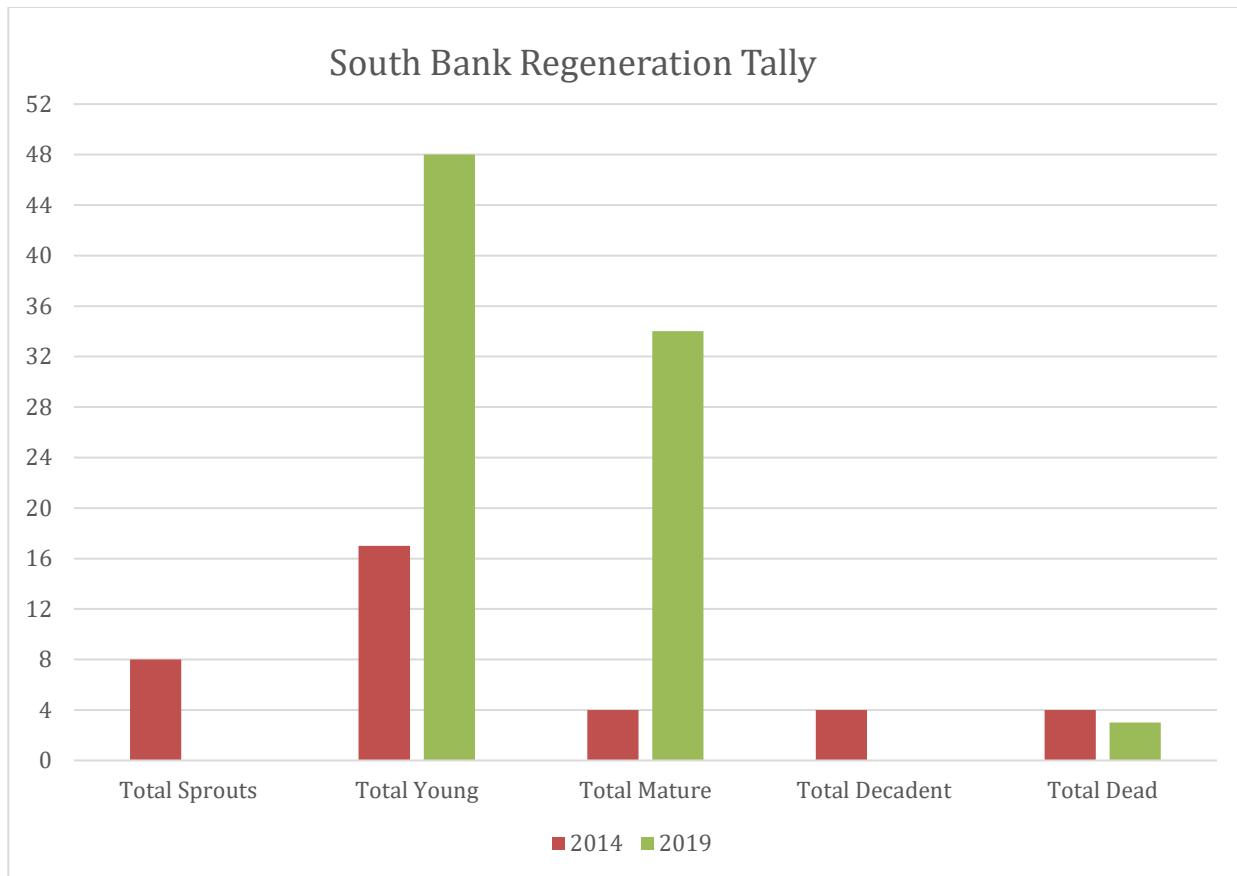


Figure 2: Regeneration Tally for the Greenline – South Bank

Greenline (North bank)

Species	Percent cover		Wetland Indicator Status
	2014	2019	
<i>Salix laevigata</i>	72	76	FACW
<i>Populus fremontii</i>	26	0	FACW
<i>Fraxinus velutina</i>	8	35	FAC

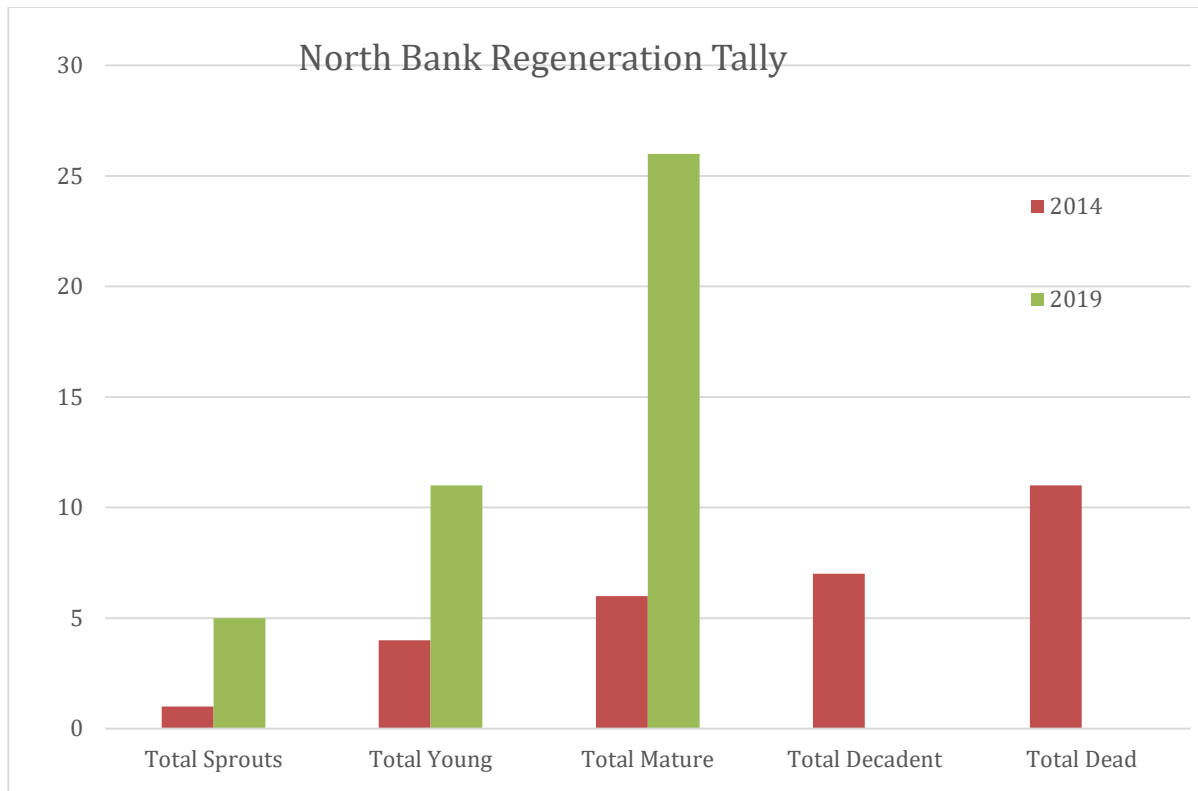


Figure 3: Regeneration Tally for the Greenline – North Bank

3.3 Monitoring Stations and Monitoring Regime and Groundwater Mitigation Monitoring and Reporting Plan (GMMRP) transects

Results for Monitoring Stations and Monitoring Regime transects are presented together with the GMMRP transect. Two of the transects established as Monitoring Stations—transects “A” and “C”—also serve as data points for the GMMRP transects. All five of these transects, labeled as transects “A” through “E” on Figure 1 were monitored using the same methodology described above.

Transect A

Transect start coordinates: NAD 83, Zone 11, 4019197N, 408042E

Heading: 50 deg.; Length: 60m

Species	Percent cover		Difference 2019 minus 2014	Wetland Indicator Status
	2014	2019		
<i>Anemopsis californica</i>	1	3	2	OBL
<i>Carex praegracilis</i>	20	1	-19	FACW
<i>Distichlis spicata</i>	0	2	2	FAC
<i>Elymus triticoides</i>	0	4	4	FAC

<i>Euthamia occidentalis</i>	1	10	9	FACW
<i>Juncus balticus</i>	4	2	-2	FACW
<i>Lactuca serriola</i>	0	2	2	FACU
<i>Persicaria amphibia</i>	0	1	1	OBL
<i>Persicaria lapathifolia</i>	2	0	-2	OBL
<i>Phragmites australis</i>	<1	0	<-1	FACW
<i>Salix laevigata</i>	0	13	13	FACW
<i>Salsola tragus</i>	0	5	5	FACU
<i>Schoenoplectus americanus</i>	34	0	-34	OBL
<i>Solanum americanum</i>	9	0	-9	FACU
<i>Solidago velutina</i> ssp. <i>Californica</i>	0	13	13	UPL
<i>Xanthium strumarium</i>	0	1	1	FAC
<i>Thatch</i>	0	35		
<i>Bare Ground</i>	0	5		
Net change of Facultative and Obligate species			-27	

Transect B

Transect start coordinates: NAD 83, Zone 11, 4019054N, 408127E

Heading: 60 deg. Length: 60m

Species	Percent cover		Difference 2019 minus 2014	Wetland Indicator Status
	2014	2019		
<i>Anemopsis californica</i>	0.1	21	19.9	OBL
<i>Carex praegracilis</i>	5	1	-4	FACW
<i>Cichorium intybus</i>	1	0	-1	FACU
<i>Elymus triticoides</i>	24	0	-24	FAC
<i>Epilobium ciliatum</i>	0	0.3	0.3	FACU
<i>Euthamia occidentalis</i>	0	20	20	FACW
<i>Juncus balticus</i>	4	0	-4	FACW
<i>Lactuca serriola</i>	4	0	-4	FAC
<i>Lotus corniculatus</i>	0.1	0	-0.1	FAC
<i>Persicaria lapathifolia</i>	0	0.4	0.4	
<i>Phragmites australis</i>	0	3	3	FACW
<i>Polypogon monspeliensis</i>	0	1	1	FACW
<i>Rosa woodsii</i>	16	0	-16	FACU

<i>Salix laevigata</i>	0	36	36	FACW
<i>Schoenoplectus americanus</i>	0	14	14	OBL
<i>Thatch</i>	0	24		
Net change of Facultative and Obligate species			+43	
Net change of Facultative and Obligate species on transects A and B			+15.4	

Transect C

Transect start coordinates: NAD 83, Zone 11, 4018092N, 408425E

Heading: 90; Length: 60m

Species	Percent cover		Difference	Wetland Indicator Status
	2014	2019	2019 minus 2014	
<i>Anemopsis californica</i>	0.1	1	1	OBL
<i>Carex praegracilis</i>	5	19	14	FACW
<i>Cichorium intybus</i>	1	0	-1	FACU
<i>Elymus elymoides</i>	0	2	2	FACU
<i>Elymus triticoides</i>	24	29	5	FAC
<i>Encelia frutescens</i>	0	1	1	UPL
<i>Ericameria nauseosa</i>	0	5	5	UPL
<i>Ericameria teretifolia</i>	0	1	1	UPL
<i>Euthamia occidentalis</i>	0	4	4	FACW
<i>Juncus balticus</i>	4	0	-4	FACW
<i>Lactuca serriola</i>	4	0	-4	FAC
<i>Lotus corniculatus</i>	0.1	10	10	FAC
<i>Plantago major</i>	0	0.1	0.1	FAC
<i>Polypogon monspeliensis</i>	0	0.4	0.4	FACW
<i>Rosa woodsii</i>	16	9	-7	FACU
<i>Rumex crispus</i>	0	0.3	0.3	FAC
<i>Salsola tragus</i>	0	1	1	FACU
<i>Xanthium strumarium</i>	0	3	3	FAC
<i>thatch</i>	0	4		
Net change of Facultative and Obligate species			32	

Transect D

Transect start coordinates: NAD 83, Zone 11, 4017967N, 408433E

Heading: 90; Length: 60m

Species	Percent cover		Difference	Wetland Indicator Status
	2014	2019	2019 minus 2014	
<i>Asclepias fascicularis</i>	0.1	0	-0.1	FAC
<i>Brickellia longifolia</i>	0	4		UPL
<i>Carex praegracilis</i>	0.1	12	11.9	FACW
<i>Distichlis spicata</i>	1	11	10	FAC
<i>Elymus triticoides</i>	0	6	6	FAC
<i>Encelia frutescens</i>	0	3		UPL
<i>Euthamia occidentalis</i>	0.1	1	0.9	FACW
<i>Glycyrrhiza lepidota</i>	12	3	-9	FAC
<i>Juncus balticus</i>	8	20	12	FACW
<i>Leymus triticoides</i>	0.1	0	-0.1	FAC
<i>Lotus corniculatus</i>	1	6	5	FAC
<i>Polypogon monspeliensis</i>	0	15	15	FACW
<i>Salix laevigata</i>	22	21	-1	FACW
<i>Xanthium strumarium</i>	0	6	6	FAC
Thatch	0	4		
Net change of Facultative and Obligate species			57	

Transect E

Transect start coordinates: NAD 83, Zone 11, 4019424N, 408392E

Heading: 170 deg.; Length: 60m

Species	Percent cover		Difference	Wetland Indicator Status
	2014	2019 – no data	2019 minus 2014	
<i>Distichlis spicata</i>	0	n/a	n/a	FAC
<i>Ericameria nauseosa</i>	6	n/a	n/a	UPL
<i>Grayia spinosa</i>	0	n/a	n/a	NL
<i>Heliotropium curassavicum</i>	0	n/a	n/a	FACU
<i>Salsola tragus</i>	0	n/a	n/a	FACU
<i>Juncus balticus</i>	3	n/a	n/a	FACW
Thatch	91	n/a	n/a	
Sand/bare ground	0	n/a	n/a	

3.4 Groundwater Mitigation Monitoring and Reporting Plan (GMMRP)

3.4.1 Vegetation transects

As part of the GMMRP monitoring requirement, GANDA botanists surveyed transects B and D on Figure 1 following the same methodology described in Section 2.3 above. Data gathered from surveys at transects A and C were used to fulfill both the requirements described in BIO-4 for the RWMAMP, as well as the vegetation monitoring required as part of the GMMRP. Results of these surveys are presented above in section 3.3.

3.4.2 Spring Fault Vegetation

CBS-9

CBS-9 is the northernmost spring. The spring originates from the ground under a cover of red willow (*Salix laevigata*). The spring flume is located at the edge of the red willow thicket above the water (Photos 1a and 1b in Appendix A). From the flume the water flows through a small hand dug ditch 40 cm wide into the main collector ditch approximately 15 m east. Vegetation surrounding the hand dug ditch is dominated by herbaceous species such as American bulrush, water smartweed, water parsnip and cut-leaved speedwell. A full list of plant species around CBS-9 is presented in Table 1, with vegetative cover given for those species within a 28.3 m² circular plot around the spring flume.

Table 1: Vegetation at spring, CBS-9				
Scientific name	Common name	Wetland Indicator	2016 Cover Class*	2019 Cover Class*
Tree cover			3	3
<i>Salix laevigata</i>	red willow	FACW	3	3
Herb cover			5	5
<i>Schoenoplectus americanus</i>	American bulrush	OBL	3	3
<i>Veronica serpyllifolia</i> var. <i>humifusa</i>	thyme-leaved speedwell	FACW	1	2
<i>Berula erecta</i>	cut-leaf water parsnip	OBL	1	2
<i>Persicaria lapathifolium</i>	water smartweed	OBL	2	3
<i>Phragmites australis</i>	common reed	FACW	1	-
<i>Asclepias fascicularis</i>	narrow-leaved milkweed	FAC	1	-
<i>Euthamia occidentalis</i>	Western goldentop	FACW	1	2
<i>Typha latifolia</i>	cattail	OBL	1	-

<i>Mimulus guttatus</i>	seep-spring monkeyflower	OBL	2	-
<i>Anemopsis californica</i>	yerba mansa	OBL	1	-
<i>Salsola tragus</i>	Russian thistle	NL	1	-
<i>Ludwigia peploides</i>	floating water primrose	OBL	1	-
<i>Cirsium vulgare</i>	bull thistle	FAC	1	-
<i>Carex praegracilis</i>	slender sedge	FACW	-	-
<i>Epilobium ciliatum</i>	willow herb	FACW	-	-
<i>Nasturtium officinale</i>	Watercress	OBL	-	3
<i>Typha angustifolia</i>	narrowleaf cattail	OBL	-	1
<i>Juncus balticus</i>	Baltic rush	FACW	-	2
<i>Cyperus eragrostis</i>	tall flatsedge	FACW	-	2
<i>Solidago velutina</i> ssp. <i>californica</i>	California goldenrod	UPL	-	3
<i>Oenanthe sarmentosa</i>	water parsley	OBL	-	3
<i>Juncus phaeocephalus</i>	brownheaded rush	FACW	-	1
<i>Vitis</i> sp.	grape	UPL	-	1
Total Vegetation Cover			6	6
Other species outside of plot				
<i>Rumex crispus</i>	curly dock	FAC	x	-
<i>Apocynum cannabinum</i>	Indian hemp	FAC	x	-
<i>Epilobium ciliatum</i>	willow herb	FACW	x	-
<i>Carex praegracilis</i>	slender sedge	FACW	x	x
<i>Juncus balticus</i>	Baltic rush	OBL	x	-
<i>Solanum americanum</i>	American black nightshade	FACU	x	-
<i>Distichlis spicata</i>	Desert saltgrass	FAC	-	-
<i>Phragmites australis</i>	common reed	FACW	-	x
<i>Typha angustifolia</i>	narrowleaf cattail	OBL	-	x
<i>Vitis</i> sp.	grape	UPL	-	x

*Foliar cover is recorded as a cover class using Daubenmire cover classes (Mueller-Dombois & Ellenberg 1974).

Cover class	Range of Cover
6	95-100
5	75-95
4	50-75
3	25-50
2	5-25
1	0-5

CBS-6

The spring, CBS-6, originates in a sump pond that is located in the shade of a mature red willow (Photos 2a and 2b in Appendix A). The pond is approximately 2.5 meters in diameter and five square meters in area, and approximately 40 cm deep with a soft muddy bottom. The spring flume is directly adjacent to the pond. From the flume the water flows into the main collector ditch approximately 15 m to the east through a small hand dug ditch 30 cm wide. Vegetation surrounding the hand dug ditch is dominated by herbaceous species including western goldentop, field mint, willow herb, common reed and water smartweed. A full list of plant species around CBS-6 is presented in Table 2, with vegetative cover given for those species within a 28.3 m² circular plot around the spring flume.

Table 2: Vegetation at spring, CBS-6				
Scientific name	Common name	Wetland Indicator	2016 Cover Class*	2019 Cover Class*
Tree cover			3	2
<i>Salix laevigata</i>	red willow	FACW	3	2
<i>Fraxinus velutina</i>	velvet ash	FAC	-	1
Herb cover			5	5
<i>Euthamia occidentalis</i>	Western goldentop	FACW	3	2
<i>Mentha arvensis</i>	field mint	FACW	3	3
<i>Epilobium ciliatum</i>	willow herb	FACW	2	-
<i>Phragmites australis</i>	common reed	FACW	2	3
<i>Persicaria lapathifolium</i>	water smartweed	OBL	2	-
<i>Anemopsis californica</i>	yerba mansa	OBL	2	2
<i>Nasturium officinale</i>	watercress	OBL	2	2
<i>Carex praegracilis</i>	slender sedge	FACW	2	2
<i>Schoenoplectus americanus</i>	American bulrush	OBL	2	2
<i>Distichlis spicata</i>	Desert saltgrass	FAC	-	-
<i>Plantago lanceolata</i>	English plantain	FAC	-	-

<i>Juncus balticus</i>	Baltic rush	FACW	-	2
<i>Polypogon monspeliensis</i>	rabbitsfoot grass	FACW	-	2
<i>Lactuca serriola</i>	Prickly lettuce	FACU	-	1
<i>Elymus tritcoides</i>	creeping wildrye	FAC	-	2
Shrub cover			-	2
<i>Rosa woodsii</i>	wood rose	FACU	-	2
Total Vegetation Cover			6	6
Other species outside of plot				
<i>Berula erecta</i>	cut-leaf water parsnip	OBL	X	-
<i>Cirsium vulgare</i>	bull thistle	FAC	X	-
<i>Cyperus eragrostis</i>	tall flatsedge	FACW	X	-
<i>Eleaganus angustifolia</i>	Russian olive	FAC	X	-
<i>Elymus tritcoides</i>	creeping wildrye	FAC	X	X
<i>Equisetum arvense</i>	common horsetail	FAC	X	-
<i>Fraxinus velutina</i>	velvet ash	FACW	X	-
<i>Juncus balticus</i>	Baltic rush	OBL	X	-
<i>Rosa woodsii</i>	wood rose	FACU	X	X
<i>Veronica serpyllifolia</i> var. <i>humifusa</i>	thyme-leaved speedwell	FACW	X	-
<i>Vitis girdiana</i>	Southern California grape	FAC	X	-
<i>Salsola tragus</i>	Russian thistle	NL	-	-
<i>Lactuca serriola</i>	Prickly lettuce	FACU	-	-
<i>Anemopsis californica</i>	yerba mansa	OBL	-	X
<i>Euthamia occidentalis</i>	Western goldentop	FACW	-	X
<i>Salix exigua</i>	sandbar willow	FACW	-	X
<i>Salix laevigata</i>	red willow	FACW	-	X
<i>Phragmites australis</i>	common reed	FACW	-	X
*Foliar cover is recorded as a cover class using Daubenmire cover classes (Mueller-Dombois & Ellenberg 1974).				
Cover class	Range of Cover			
6	95-100			
5	75-95			
4	50-75			
3	25-50			
2	5-25			
1	0-5			

CBS-2

The spring, CBS-2, originates under a dense stand of common reed. The spring flume is surrounded by cement bags and was installed in a clearing in the reed cover (Photos 3a and 3b in Appendix A). Vegetation surrounding the hand-dug ditch is dominated by herbaceous species including common reed, willow herb and water smartweed. A full list of plant species around CBS-2 is presented in Table 3, with vegetative cover given for those species within a 28.3 m2 circular plot around the spring flume.

Table 3: Vegetation at spring, CBS-2				
Scientific name	Common name	Wetland Indicator	2016 Cover Class*	2018 Cover Class*
Tree cover			3	4
<i>Salix laevigata</i>	red willow	FACW	3	4
<i>Eleagnus angustifolia</i>	Russian olive	FAC	1	-
<i>Fraxinus velutina</i>	velvet ash	FAC	-	3
Shrub cover			3	3
<i>Rosa woodsii</i>	Wood rose	FACU	3	3
<i>Salix exigua</i>	sandbar willow	FACW	2	3
<i>Fraxinus velutina</i>	velvet ash	FAC	1	-
Herb cover			3	3
<i>Phragmites australis</i>	common reed	FACW	3	3
<i>Epilobium ciliatum</i>	willow herb	FACW	2	2
<i>Persicaria lapathifolium</i>	water smartweed	OBL	2	2
<i>Berula erecta</i>	cut-leaf water parsnip	OBL	1	2
<i>Mentha arvensis</i>	field mint	FACW	1	-
<i>Anemopsis californica</i>	yerba mansa	OBL	1	-
<i>Equisetum arvense</i>	common horsetail	FAC	1	-
<i>Schoenoplectus americanus</i>	American bulrush	OBL	1	2
<i>Carex praegracilis</i>	slender sedge	FACW	-	-
<i>Solidago velutina</i> ssp. <i>californica</i>	California goldenrod	UPL	-	3
<i>Cirsium vulgare</i>	bull thistle	FAC	-	1
<i>Nasturium officinale</i>	watercress	OBL	-	2
Total Vegetation Cover			6	5
Other species outside of plot				

<i>Veronica serpyllifolia</i> var. <i>humifusa</i>	thyme-leaved speedwell	FACW	X	-
<i>Euthamia occidentalis</i>	Western goldentop	FACW	-	-
<i>Elymus triticoides</i>	creeping wildrye	FAC	-	x
<i>Anemopsis californica</i>	yerba mansa	OBL	-	x
<i>Carex praegracilis</i>	slender sedge	FACW	-	x
<i>Euthamia occidentalis</i>	Western goldentop	FACW	-	x
<i>Phragmites australis</i>	common reed	FACW	-	x
<i>Rosa woodsii</i>	Wood rose	FACU	-	x
*Foliar cover is recorded as a cover class using Daubenmire cover classes (Mueller-Dombois & Ellenberg 1974).				
Cover class	Range of Cover			
6	95-100			
5	75-95			
4	50-75			
3	25-50			
2	5-25			
1	0-5			

CBS-4

The spring, CBS-4, originates under a dense stand of American bulrush behind the spring flume. In 2016, the spring flume was surrounded by sand bags that have degraded and broken down. Vegetation surrounding the spring showed signs of grazing and was dominated by herbaceous species such as American bulrush, common reed and willow herb. A full list of plant species around CBS-4 is presented in Table 4, with vegetative cover given for those species within a 28.3 m² circular plot around the spring flume.

Table 4: Vegetation at spring, CBS-4				
Scientific name	Common name	Wetland Indicator	2016 Cover Class*	2019 Cover Class*
Tree cover			3	3
<i>Salix laevigata</i>	red willow	FACW	3	3
<i>Fraxinus velutina</i>	velvet ash	FAC	2	2
Shrub cover			3	3
<i>Rosa woodsia</i>	Wood rose	FACU	3	3
Herb cover			4	3
<i>Schoenoplectus americanus</i>	American bulrush	OBL	3	4
<i>Phragmites australis</i>	common reed	FACW	2	2
<i>Epilobium ciliatum</i>	willow herb	FACW	2	2

<i>Carex nebrascensis</i>	Nebraska sedge	OBL	2	-
<i>Euthamia occidentalis</i>	Western goldentop	FACW	1	-
<i>Berula erecta</i>	cut-leaf water parsnip	OBL	1	-
<i>Persicaria lapathifolium</i>	water smartweed	OBL	1	-
<i>Mentha arvensis</i>	field mint	FACW	1	-
<i>Equisetum arvense</i>	common horsetail	FAC	1	-
<i>Typha angustifolia</i>	cattail	OBL	1	-
<i>Typha latifolia</i>	cattail	OBL	-	-
<i>Solidago velutina</i> ssp. <i>californica</i>	California goldenrod	UPL	-	3
<i>Cirsium vulgare</i>	bull thistle	FAC	-	1
Total Vegetation Cover			5	6
Other species outside of plot				
<i>Anemopsis californica</i>	yerba mansa	OBL	X	-
<i>Veronica serpyllifolia</i> var. <i>humifusa</i>	thyme-leaved speedwell	FACW	X	-
<i>Fraxinus velutina</i>	velvet ash	FAC	-	X
<i>Carex praegracilis</i>	slender sedge	FACW	-	-
<i>Epilobium ciliatum</i>	willow herb	FACW	-	X
<i>Euthamia occidentalis</i>	Western goldentop	FACW	-	X
<i>Schoenoplectus americanus</i>	American bulrush	OBL	-	X
<i>Rosa woodsia</i>	Wood rose	FACU	-	X
*Foliar cover is recorded as a cover class using Daubenmire cover classes (Mueller-Dombois & Ellenberg 1974).				
Cover class	Range of Cover			
6	95-100			
5	75-95			
4	50-75			
3	25-50			
2	5-25			
1	0-5			

Main Collector Ditch

The “Main Collector Ditch” runs in a northwesterly to southeasterly orientation to the east of the springs along the Spring Line Fault. When originally dug (perhaps in the 1980’s), the ditch was likely excavated to a width of approximately 2.5 meters wide and 2.5 meters deep. The exact current width of the ditch was difficult to measure as a result of the willow and reed vegetation that had grown over the banks and within the ditch. For most of the length of the ditch within the survey area, the ditch had standing water along its length averaging 30 to 60 cm deep and at the northern end was completely dry. Dense vegetation cover on the banks and tops of the ditch was dominated by common reed, American bulrush and cattails, with scattered red willow and Russian olive growing throughout the length of the ditch. The dense vegetation was growing into the ditch and formed a nearly continuous cover over the water surface in the ditch for most of its length. Photos 5 and 6 in Appendix A provides an illustration of a typical segment of the main collector ditch.

This was not resurveyed in 2019.

3.4.3 Physical Habitat Conditions

Physical Habitat Conditions at Cabin Bar Ranch Springs (CBS-2, 4, 6, 9) on January 13, 2017 and February 7, 2020.

	CBS-2	CBS-4	CBS-6	CBS-9
Channel Length (m)	3	5.5	14	14
Channel Depth (cm)	2	2	2	5
Channel Width (m)	0.2	0.25	0.3	0.4
2019 Flow Measurements				
Front Gauge (mm)	0.22	0.21	0.26	0.25
Back Gauge (mm)	0.13	0.15	0.11	0.28
Flow Rate (gpm)	22.2	20.2	31.8	28.6
2016 Flow Measurements				
Front Gauge (mm)	9	5	18	16
Back Gauge (mm)	4	3	10	6
Flow Rate (gpm)	0.4	0.17	2.0	1.5

The following observations were recorded at each spring location:

CBS-2

CBS-2 is located adjacent to the main collector ditch and originates in an area of vegetation. The spring water flows approximately 3 m before joining with the main collection ditch. The channel width is approximately 20 cm wide by 2 cm deep. The flow rate was measured at approximately 0.4 gpm in 2016 and 22.2 gpm in 2019.

CBS-4

CBS-4 originates in a broad area of vegetation located directly behind the spring flume. The channel is approximately 5 m long from the edge of the flume to the main collection ditch. The channel is 25 cm wide by 2 cm deep. The flow rate was measured at approximately 0.17 gpm in 2016 and 20.2 gpm in 2019.

CBS-6

CBS-6 is located adjacent to the horse stables at the caretaker residence. The spring forms an imperfect 4 by 4 m pond located beneath a large willow tree. Spring water flows 14 m from the flume down a 30 cm wide by 2 cm deep channel to the collector ditch. The flow rate was measured at 2 gpm in 2016 and 31.8 gpm in 2019.

CBS-9

CBS-9 is the northernmost spring on the Cabin Bar Ranch. The spring originates under a dense canopy of red willow. From the flume the water flows through a channel approximately 14 m long, 40 cm wide and 5 cm deep. The flow rate was measured at 1.5 gpm in 2016 and 28.6 gpm in 2019.

3.4.4 Benthic Macroinvertebrates collected from Cabin Bar Ranch springs, Owens Valley, CA, November 20, 2016 and October 15, 2019.

Qualitative dip-net samples, 500 micron mesh, 500 organism subsample.

For Garcia and Associates

Determined by Jon Lee Consulting jlee@humboldt1.com

Higher Classification	Family	Genus/species	Common Name	CBS-2 10/15/19	CBS-4 10/15/19	CBS-6 10/15/19	CBS-9 10/15/19	CBS-2 11/20/16	CBS-6 11/20/16
Platyhelminthes: Turbellaria		<i>Turbellaria</i>	flat worms	18		15	7	1	1
Nemertea: Enopla	Tetrastemmatida	<i>Prostoma</i>		4	1	13			8
Mollusca: Bivalvia	Sphaeriidae	<i>Pisidium</i>	finger nail clams	427	596	452	8	623	174
Mollusca: Gastropoda	Lymnaeidae	<i>Lymnaea</i>	freshwater snails		3				
Mollusca: Gastropoda	Physidae	<i>Physa</i>	tadpole snails					3	61
Mollusca: Gastropoda	Physidae	<i>Physa</i>	tadpole snails	3	2			8	195
Annelida: Oligochaeta				31	33	120	24		
Arthropoda: Malacostraca	Hyalellidae	<i>Hyalella</i>							5
Arthropoda: Ostracoda				5	3	1	51		
Insecta: Ephemeroptera	Baetidae	<i>Callibaetis</i>	mayflies						1
Insecta: Trichoptera	Limnephilidae	(too small to ID)	caddisflies						1
Insecta: Odonata	Aeshnidae	<i>Anax junius</i>	dragonflies						3
Insecta: Odonata	Cordulegastridae	<i>Cordulegaster dorsalis</i>	Pacific spiketail	9					
Insecta: Odonata	Coenagrionidae	<i>Argia</i>	dragonflies						1
Insecta: Coleoptera	Dytiscidae	<i>Agabus</i>	predaceous diving					1	5
Insecta: Coleoptera	Dytiscidae	<i>Laccophilus</i>	water beetles				1		
Insecta: Coleoptera	Dytiscidae	<i>Sanfilippodytes</i>	predaceous diving		3				1
Insecta: Coleoptera	Hydraenidae	<i>Ochthebius</i>	minute moss beetles						1
Insecta: Coleoptera	Scirtidae	<i>Cyphon</i>	marsh beetles		1				
Insecta: Diptera	Ceratopogonida	<i>Bezzia/Palpomysia</i>	no-se-um midges		1				1
Insecta: Diptera	Ceratopogonida	<i>Dasyhelea</i>	no-se-um midges						7
Insecta: Diptera	Chironomidae	<i>Chironomus</i>	midges				1		17

Higher Classification	Family	Genus/species	Common Name	CBS-2 10/15/19	CBS-4 10/15/19	CBS-6 10/15/19	CBS-9 10/15/19	CBS-2 11/20/16	CBS-6 11/20/16
Insecta: Diptera	Chironomidae	<i>Phaenopsectra</i>	midges					1	
Insecta: Diptera	Chironomidae	<i>Micropsectra</i>	midges					1	43
Insecta: Diptera	Chironomidae	<i>Limnophyes</i>	midges			1			1
Insecta: Diptera	Chironomidae	<i>Metriocnemus</i>	midges					1	
Insecta: Diptera	Chironomidae	<i>Alotanypus</i>	midges	1				5	27
Insecta: Diptera	Chironomidae	<i>Zavrelimyia</i>	midges					1	1
Insecta: Diptera	Chironomidae	<i>Chaetocladius</i>	midges						
Insecta: Diptera	Chironomidae	<i>Corynoneura</i>	midges						
Insecta: Diptera	Chironomidae	<i>Ptychoptera</i>	crane flies		1				
Insecta: Diptera	Chironomidae	<i>Tipula</i>	crane flies	2	1				
Insecta: Diptera	Chironomidae	<i>Thienemanniella</i>	midges						
Insecta: Diptera	Chironomidae	<i>Trichoclinocera</i>	midges						
Insecta: Diptera	Culicidae	<i>Culex</i>	mosquitoes						7
Insecta: Diptera	Culicidae	<i>Culiseta inornata</i>	mosquitoes					1	22
Taxa Richness				9	11	6	6	11	22
Percent change in taxa richness between 2016 and 2019. Average decline is 45%.				-18%		-72%			

4.0 References

- GeoSyntec, Inc. and GANDA 2014 (June). *Groundwater Mitigation Monitoring and Reporting Plan, Cabin Bar Ranch, U.S. Highway 395, Olancha, CA*. Prepared for Crystal Geyser Roxane, LLC.
- Lichvar, R.W., M. Butterwick, N.C. Melvin, and W.N. Kirchner. 2014. *The National Wetland Plant List: 2014 update of wetland ratings*. Phytoneuron 2014-41: 1–42.
- Mueller-Dombois, D. & Ellenberg, H. 1974. *Aims and Methods of Vegetation Ecology*. New York: Wiley and Sons.
- PCR Services 2012. (November). *Crystal Geyser Roxane Cabin Bar Ranch Water Bottling Facility Project Final EIR, Inyo County*. Prepared for Inyo County Planning Department.
- Reed, P.B., Jr. 1988. *National List of Plant Species that Occur in Wetlands*. U.S. Fish and Wildlife Service, Washington, DC.
- Winward, Alma H. 2000. *Monitoring the vegetation resources in riparian areas*. Gen. Tech. Rep. RMRS-GTR-47. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Appendix A: Photo-documentation



Transect 1 – Start – 2014 above-2019 below. For all photographs in this appendix, transect “Start” photographs are taken from the start of the transect viewing across the transect area. The “End” photographs are taken from the opposite end of the transect and view back into the transect area toward the “start” side.





Transect 1 – End
2014 above-2019 below





Transect 2 – Start
2014 above-2019 below





Transect 2 – End
2014 above-2019 below





Transect 3 – Start
2014 above-2019 below





Transect 3 – End
2014 above-2019 below





Transect 4 – Start
2014 above-2019 below.





Transect 4 – End
2014 above-2019 below





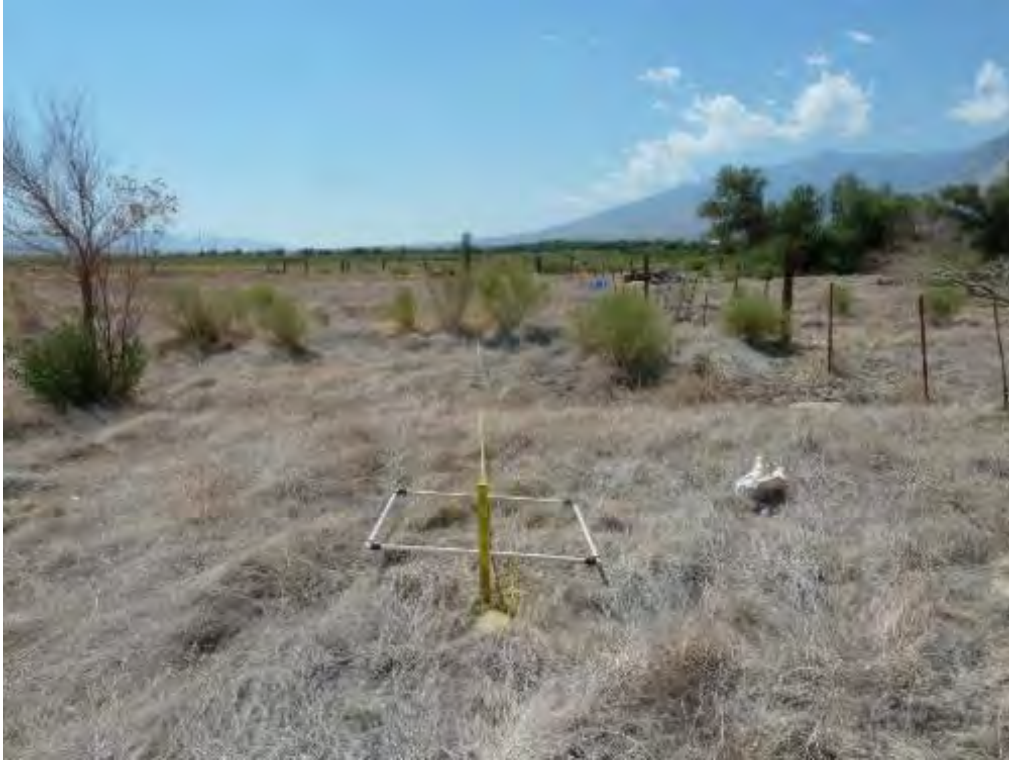
Transect 5 – Start
2014 above-2019 below





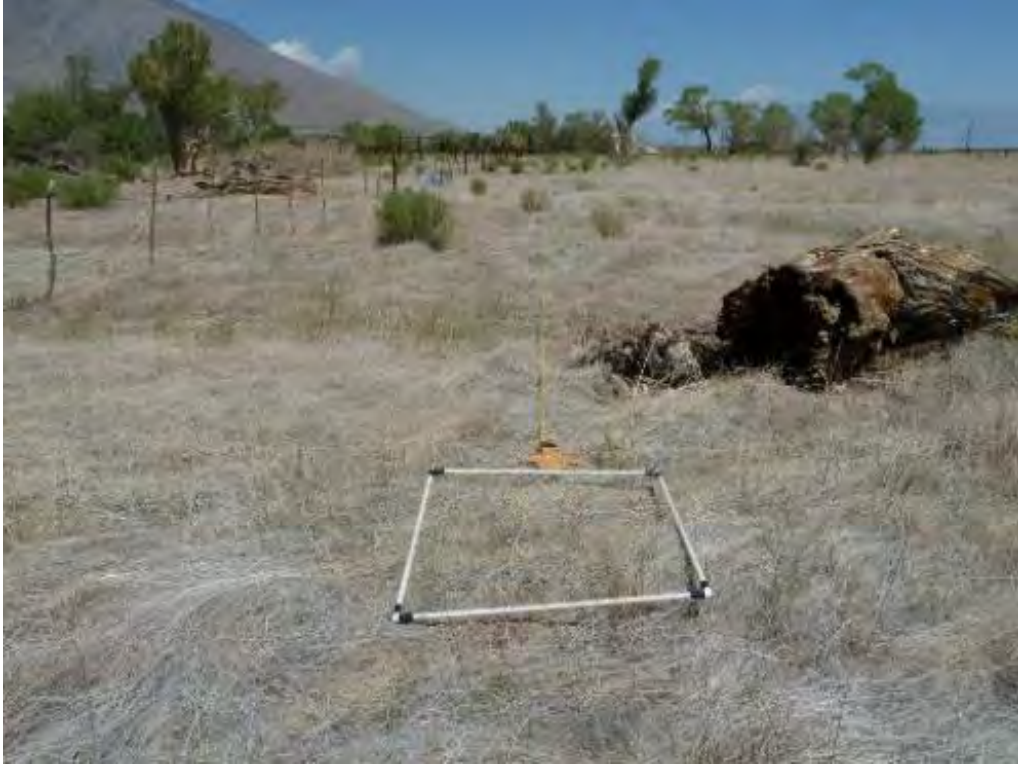
Transect 5 – End
2014 above-2019 below





**Transect 6 (and Transect E)
Start 2014 above-2019 below**





**Transect 6 (and Transect E)
End 2014 above-2019 below**





Transect 7 – Start
2014 above-2019 below





Transect 7 – End
2014 above-2019 below





Transect 8 – Start
2014 above-2019 below





Transect 8 – End
2014 above-2019 below





**Greenline Transect South bank – representative photo along transect
2014 above-2019 below**





**Greenline Transect North bank – representative photo along transect
2014 above-2019 below**





Transect A – Start
2014 above-2019 below





Transect A – End
2014 above-2019 below





Transect B – Start
2014 above-2019 below





Transect B – End
2014 above-2019 below





Transect C – Start
2014 above-2019 below





Transect C –End
2014 above-2019 below





Transect D – Start
2014 above- 2019 below





Transect D – End
2014 above- 2019 below



Spring fault line Spring Photos



Photo 1a: 2016 Site Photo



Photo 1b: 2019 Site Photo

Photos 1a and 1b: CBS-9 – the spring water originates beneath the large red willow in the center of the photo. Water flows through a thirty cm wide hand-dug ditch for a distance of fifteen meters to the main collector ditch.



Photo 2a: 2016 Site Photo



Photo 2b: 2019 Site Photo

Photos 2a and 2b: CBS-6 - the spring daylights into a small pond (2.5 m in diameter, 5 square meters in area) at the base of a large red willow. The water then flows through the flume, then 11 meters along a small hand-dug feeder ditch to the main collector ditch.



Photo 3a: 2016 Site Photo



Photo 3b: 2019 Site Photo

Photos 3a and 3b: CBS 2 – The spring originates underneath dense common reed just to the right of the flume (surrounded by cement bags).



Photo 4a: 2016 Site Photo



Photo 4b: 2019 Site Photo

Photos 4a and 4b: CBS 4 - The spring originates in grazed American bulrush behind the flume (surrounded by degraded sand bags in the center of the photo).



Photo 5: Main Collector Ditch –2014 The ditch runs in a northwesterly to southeasterly orientation to the east of the springs along the Spring Line Fault. The ditch averages 4 meters wide and has standing water along its length averaging 40 cm deep and dry at the northern end. Vegetation (predominantly common reed, bulrush, cattails, with scattered red willow and Russian olive) is growing into the water within the ditch and covering the water surface



Photo 6: Main Collector Ditch –2014 Vegetation (predominantly common reed, bulrush and cattails with scattered red willow and Russian olive) is growing into the water within the ditch and covering the water surface

Appendix B: List of Plant Species Encountered on the Cabin Bar Ranch and their wetland status

Scientific Name	Common Name	Wetland Indicator Status
FERNS AND FERN ALLIES		
Equisataceae	Horsetail family	
<i>Equisetum arvense</i>	common horsetail	FAC
ANGIOSPERMS (DICOTYLEDONS)		
Amaranthaceae	Amaranth Family	
<i>Nitrophila occidentalis</i>	borax weed	FACW
Apiaceae	Carrot Family	
<i>Berula erecta</i>	cut-leaf water parsnip	OBL
Asclepiadaceae	Milkweed Family	
<i>Apocynum cannabinum</i>	indian hemp	FAC
<i>Asclepias fascicularis</i>	narrow –leaf milkweed	FAC
<i>Asclepias speciosa</i>	showy milkweed	FAC
Asteraceae	Sunflower Family	
<i>Acamptopappus sphaerocephalus</i> var. <i>hirtellus</i>	rayless goldenhead	UPL
<i>Ambrosia acanthiaca</i>	annual bur-sage	UPL
<i>Ambrosia dumosa</i>	burro weed	UPL
<i>Ambrosia salsola</i>	cheeseweed	UPL
<i>Artemisia tridentata</i>	big sagebrush	UPL
<i>Cichorium intybus</i>	chichory	FACU
<i>Cirsium vulgare</i>	bull thistle	FACU
<i>Encelia actonii</i>	Acton encelia	UPL
<i>Ericameria nauseosa</i>	rubber rabbitbrush	UPL
<i>Ericameria teretifolia</i>	green rabbitbrush	UPL
<i>Erigeron canadensis</i>	Canadian horseweed	FACU
<i>Euthamia occidentalis</i>	western goldentop	FACW
<i>Gutierrezia microcephala</i>	threadleaf snakeweed	UPL
<i>Helianthus annuus</i>	common sunflower	FACU
<i>Lactuca serriola</i>	prickly lettuce	FAC
<i>Malacothrix glabrata</i>	Desert dandelion	UPL
<i>Pyrrocoma racemosa</i>	clustered goldenweed	FAC
<i>Sonchus asper</i>	spiny sowthistle	FACU

<i>Solidago lepida</i>	Western Canada goldenrod	FAC
<i>Stephanomeria pauciflora</i>	wire lettuce	UPL
<i>Symphyotrichum ascendens</i>	western aster	FAC
<i>Taraxacum officinale</i>	common dandelion	FACU
<i>Xanthium strumarium</i>	cocklebur	FAC
Boraginaceae	Borage Family	
<i>Cryptantha circucissa</i>	western forget-me-not	UPL
<i>Heliotropium curassavicum</i>	heliotrope	FACU
<i>Plagiobothrys cusickii</i>	Cusick's popcornflower	UPL
<i>Plagiobothrys parishii</i>	Parish's popcornflower	OBL
<i>Tiquilia nuttallii</i>	Nuttall's coldenia	UPL
Brassicaceae	Mustard Family	
<i>Descurainia pinnata</i>	western tansy-mustard	UPL
<i>Descurainia sophia</i>	flix weed	UPL
<i>Lepidium fremontii</i>	desert alyssum	UPL
<i>Nasturium officinale</i>	watercress	OBL
<i>Plagiobothrys parishii</i>	Parish's popcornflower	OBL
<i>Sisymbrium altissimum</i>	tall tumbledustard	FACU
Chenopodiaceae	Goosefoot Family	
<i>Atriplex canescens</i>	four-wing saltbrush	UPL
<i>Atriplex polycarpa</i>	allscale	FACU
<i>Atriplex prostrata</i>	fat hen	FACW
<i>Bassia hyssopifolia</i>	fivehorn smotherweed	FAC
<i>Chenopodium album</i>	lambsquarters	FACU
<i>Chenopodium murale</i>	nettleleaf goosefoot	FACU
<i>Halogeton glomeratus</i>	saltlover	UPL
<i>Salsola tragus</i>	Russian thistle	FACU
Eleagnaceae	Oleaster Family	
<i>Eleagnus angustifolia</i>	Russian olive	FAC
Fabaceae	Legume Family	
<i>Gleditsia triacanthos</i>	honeylocust	FAC
<i>Glycyrrhiza lepidota</i>	American licorice	FAC
<i>Lotus corniculatus</i>	birdsfoot trefoil	FAC
<i>Medicago polymorpha</i>	burclover	FACU
<i>Melilotus indicus</i>	yellow sweetclover	FACU

<i>Trifolium fragiferum</i>	strawberry clover	FACU
<i>Trifolium wormskioldii</i>	cow clover	FACW
Frankeniaceae	Frankenia Family	
<i>Frankenia salina</i>	alkali heath	FACW
Geraniaceae	Geranium Family	
<i>Erodium cicutarium</i>	red-stemmed filaree	UPL
Lamiaceae	Mint Family	
<i>Mentha arvensis</i>	field mint	FACW
Loasaceae	Blazing Star Family	
<i>Mentzelia albicaulis</i>	white stemmed blazing star	UPL
Malvaceae	Mallow Family	
<i>Sidalcea covillei</i>	Owen's Valley checkerbloom	FACU
Oleaceae	Olive Family	
<i>Fraxinus velutina</i>	velvet ash	FAC
Onagraceae	Evening Primrose Family	
<i>Epilobium ciliatum</i>	willow herb	FACW
Phrymaceae	Hopseed Family	
<i>Mimulus guttatus</i>	seep-spring monkeyflower	OBL
Plantaginaceae	Plantain Family	
<i>Plantago major</i>	Great plantain	FAC
<i>Veronica serpyllifolia</i> var. <i>humifusa</i>	Thyme-leaved speedwell	FACW
Polygonaceae	Buckwheat Family	
<i>Eriogonum mohavensis</i>	Mojave buckwheat	UPL
<i>Eriogonum pusillum</i>	yellow turbans	UPL
<i>Persicaria amphibian</i>	water smartweed	OBL
<i>Persicaria lapathifolia</i>	willow weed	OBL
<i>Rumex crispus</i>	dock	FAC

Rosaceae	Rose Family	
<i>Potentilla gracilis</i>	slender cinquefoil	FAC
<i>Rosa woodsii</i>	wild rose	FACU
Salicaceae	Willow Family	
<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont's cottonwood	FACW
<i>Salix exigua</i>	sandbar willow	FACW
<i>Salix laevigata</i>	red willow	FACW
Saururaceae	Lizard's-Tail Family	
<i>Anemopsis californica</i>	yerba mansa	OBL
Solanaceae	Nightshade family	
<i>Solanum americanum</i>	American black nightshade	FACU
ANGIOSPERMS (MONOCOTYLEDONS)		
Scientific Name	Common Name	
Cyperaceae	Sedge Family	
<i>Carex nebrascensis</i>	Nebraska sedge	OBL
<i>Carex praegracilis</i>	slender sedge	FACW
<i>Cyperus eragrostis</i>	tall flatsedge	FACW
<i>Schoenoplectus americanus</i>	American bulrush	OBL
<i>Scirpus microcarpus</i>	small-fruited bulrush	OBL
Juncaceae	Rush Family	
<i>Juncus balticus</i>	Baltic rush	FACW
<i>Juncus bufonius</i>	toad rush	FACW
Poaceae	Grass Family	
<i>Bromus diandrus</i>	ripgut brome	UPL
<i>Bromus madritensis</i> ssp. <i>rubens</i>	red brome	UPL
<i>Bromus tectorum</i>	cheat grass	UPL
<i>Distichlis spicata</i>	saltgrass	FAC
<i>Elymus cinereus</i>	Great Basin wild rye	FAC
<i>Elymus elymoides</i>	squirreltail	FACU
<i>Elymus glaucus</i>	blue wildrye	FACU

<i>Elymus triticoides</i>	creeping wildrye	FAC
<i>Festuca arundinacea</i>	tall fescue	FACW
<i>Holcus lanatus</i>	velvetgrass	FAC
<i>Hordeum jubatum</i>	foxtail barley	FAC
<i>Phragmites australis</i>	common reed	FACW
<i>Polypogon monspeliensis</i>	rabbitsfoot grass	FACW
<i>Schismus arabicus</i>	schismus	UPL
<i>Sporobolus airoides</i>	Alkali sacaton	FAC
Typhaceae	Cattail family	
<i>Typha latifolia</i>	broadleaf cattail	OBL