Cabin Bar Ranch Water Bottling Facility Project

Vegetation Monitoring Report

Prepared for:

Crystal Geyser Roxane, LLC

2330 Marinship Way, Suite 190

Sausalito, CA 94965

Prepared by:

Garcia and Associates (GANDA)

2601 Mission Street, Suite 600

San Francisco, CA 94110

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GANDA

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1.0 Introduction

Garcia and Associates (GANDA) is pleased to submit the following report describing vegetation monitoring conducted on the Cabin Bar Ranch. 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 to determine if there are significant impacts from project groundwater pumping on the Cabin Bar Ranch to groundwater dependent habitats.

2.0 Methods

GANDA botanists Mark Bibbo and Eliza Shepard established permanent transect locations and collected data on the Cabin Bar Ranch from August 5 to 7, 2014. The methodology employed for each monitoring type is described below.

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.

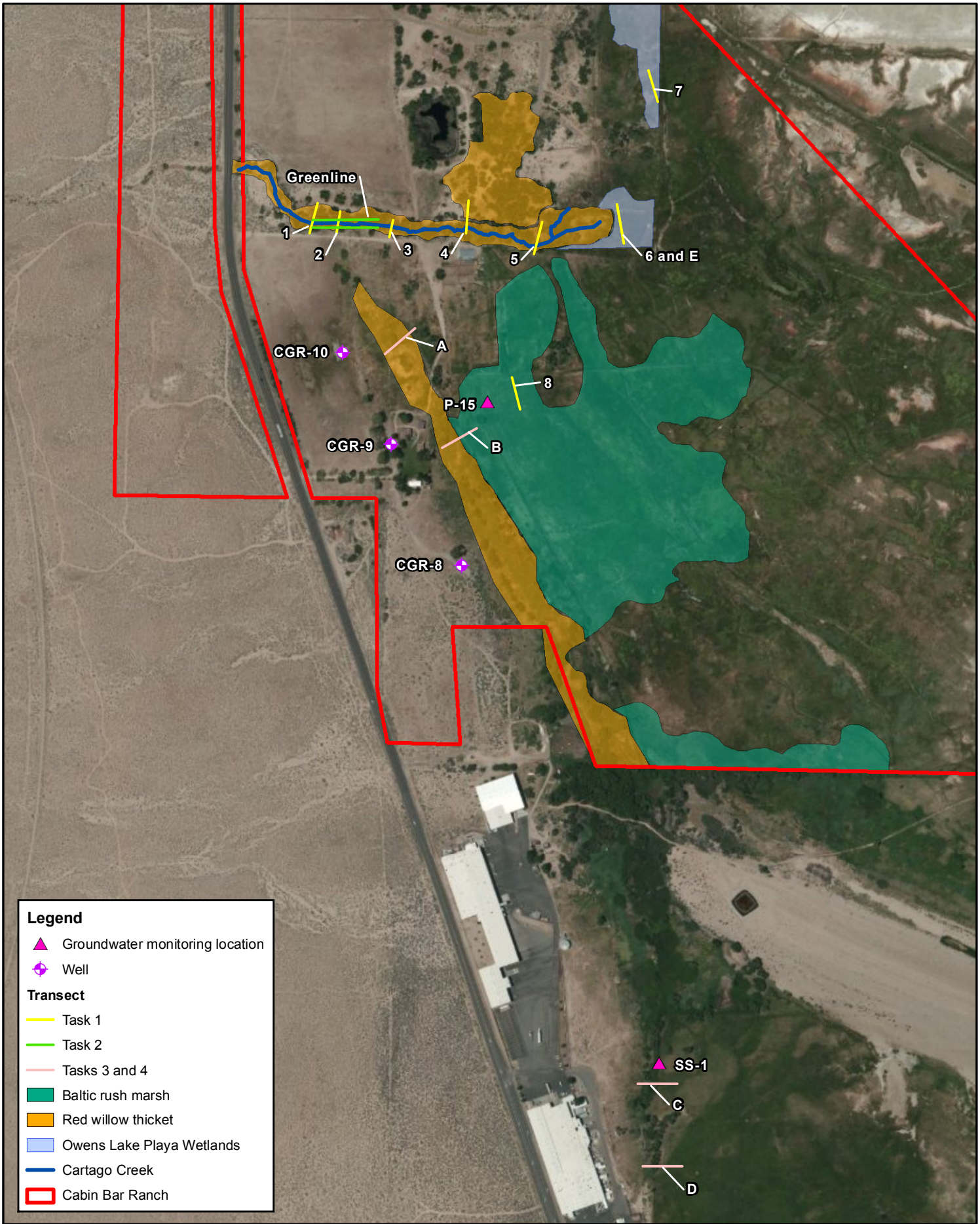

Figure 1. Vegetation Monitoring Transect Locations

Inyo County, CA

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

A team of two 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: 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) 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.

3.0 Results

The results of each transect are provided below with summary tables 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	Wetland Indicator Status
Populus fremontii	73	FACW
Fraxinus velutina	4	FAC
Salix laevigata	1	FACW

Transect 2

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

Heading: 0 deg., Length: 33.5m

Species	Percent cover	Wetland Indicator Status
Fraxinus velutina	67	FACW
Salix laevigata	18	FACW
Ericameria nauseosa	13	UPL

Transect 3

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

Heading: 12 deg.; Length: 27m

Species	Percent cover	Wetland Indicator Status
Salix laevigata	22	FACW
Fraxinus velutina	9	FAC

Transect 4

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

Heading: 5 deg.; Length: 50 m

Species	Percent cover	Wetland Indicator Status
Fraxinus velutina	30	FAC
Populus fremontii	15	FACW
Distichlis spicata	14	FAC
Ericameria nauseosa	13	UPL
Salix laevigata	12	FACW
Leymus triticoides	4	FAC

Transect 5

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

Heading: 14 deg.; Length: 50m

Species	Percent cover	Wetland Indicator Status
Salix laevigata	53	FACW
Fraxinus velutina	19	FAC
Ericameria nauseosa	4	UPL

Transect 6
Transect start coordinates: NAD 83, Zone 11, 4019424 N, 408392E
Heading: 170 deg.; Length: 50m

Species	Percent cover	Wetland Indicator Status
Thatch (*Juncus balticus*)*	95	FACW
Juncus balticus	4	FACW
Ericameria nauseosa	3	UPL
*Note: This transect passes through a portion of Baltic rush meadow that was largely dried up at the time of the survey in 2014. The thatch covering the soil was *Juncus balticus* thatch from previous years. The rhizomes of *Juncus balticus* under this thatch are potentially alive and likely to provide cover of live stems in a subsequent, wetter year, so this cover was recorded accordingly.		

Transect 7
Transect start coordinates: NAD 83, Zone 11, 4019626N, 408441E
Heading: 164 deg.; Length: 50 m

Species	Percent cover	Wetland Indicator Status
Juncus balticus	47	FACW
Thatch (*Juncus balticus*)	35	FACW
Distichlis spicata	19	FAC
Anemopsis californica	10	OBL

Transect 8
Transect start coordinates: NAD 83, Zone 11, 4019161 N, 408232E
Heading: 195 deg.; Length 50m

Species	Percent cover	Wetland Indicator Status
Carex praegracilis	58	FACW
Thatch (*Juncus balticus*)	38	FACW
Juncus balticus	25	FACW
Carex nebrascensis	11	OBL
Distichlis spicata	3	FAC
Asclepias fascicularis	3	FAC
Lactuca serriola	1	FAC

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
Salix laevigata	44	FACW
Fraxinus velutina	26	FAC
Populus fremontii	20	FACW
Rosa woodsii	2	FACU

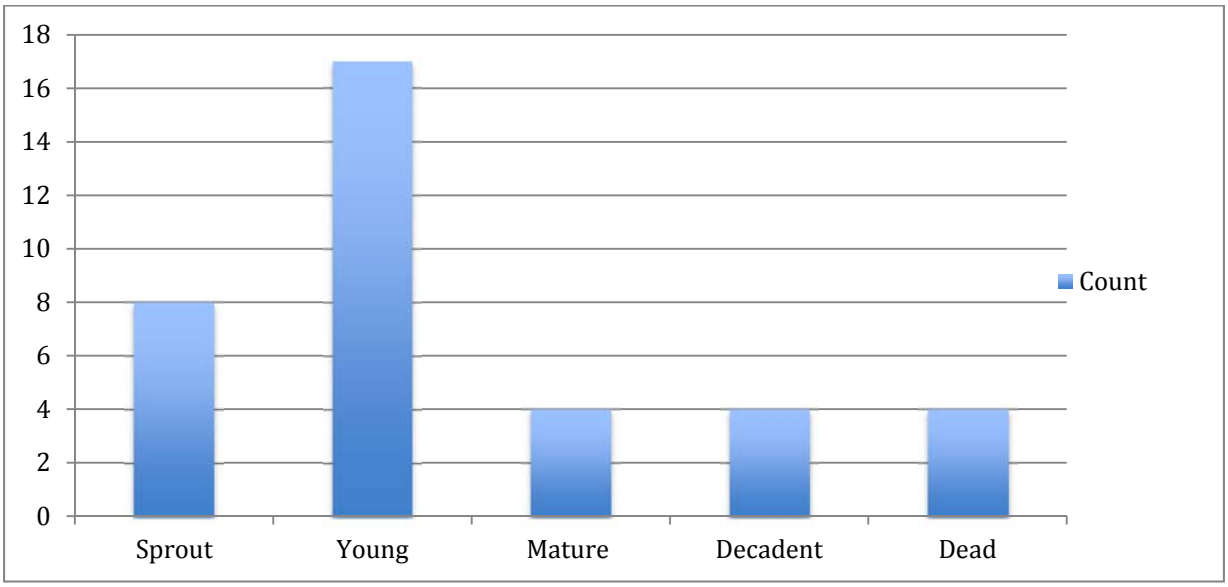

Figure 2: Regeneration Tally for the Greenline – South Bank

Greenline (North bank)

Species	Percent cover	Wetland Indicator Status
Salix laevigata	72	FACW
Populus fremontii	26	FACW
Fraxinus velutina	8	FAC

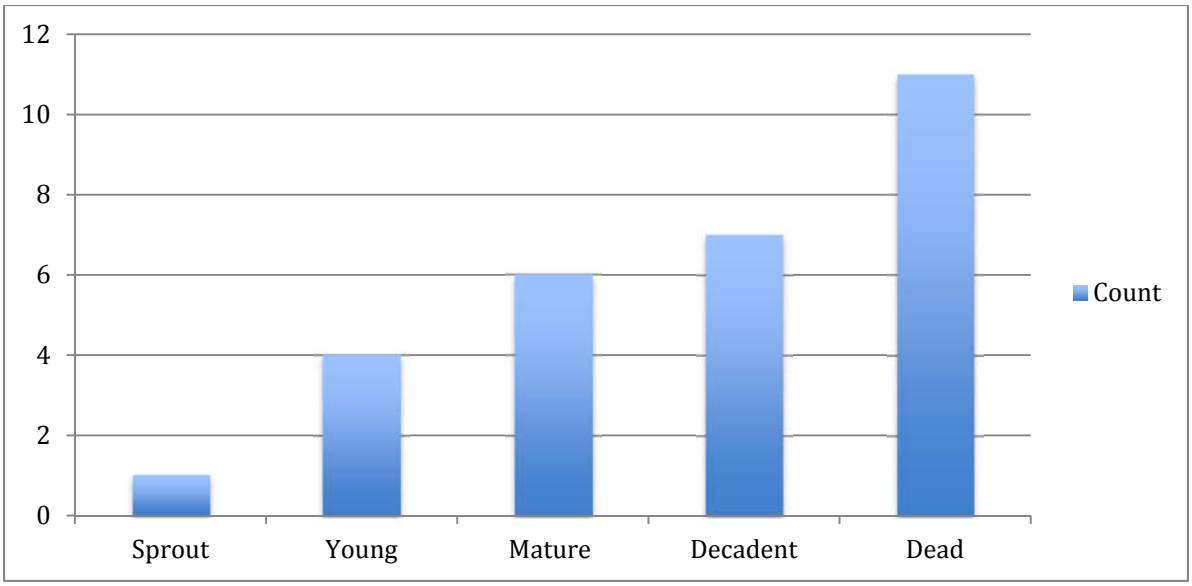

Figure 3: Regeneration Tally for the Greenline – North Bank

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"—will 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	Wetland Indicator Status
Schoenoplectus americanus	34	OBL
Carex praegracilis	20	FACW
Solanum americanum	9	FACU
Juncus balticus	4	FACW
Persicaria lapathifolia	2	OBL
Anemopsis californica	1	OBL
Euthamia occidentalis	1	FACW
Phragmites australis	0.1	FACW

Transect B

Transect start coordinates: NAD 83, Zone 11, 4019054N, 408127E
Heading: 60 deg. Length: 60m

Species	Percent cover	Wetland Indicator Status
Elymus triticoides	24	FAC

Species	Percent cover	Wetland Indicator Status
Rosa woodsii	16	FACU
Carex praegracilis	5	FACW
Juncus balticus	4	FACW
Lactuca serriola	4	FAC
Cichorium intybus	1	FACU
Anemopsis californica	0.1	OBL
Lotus corniculatus	0.1	FAC

Transect C

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

Heading: 90; Length: 60m

Species	Percent cover	Wetland Indicator Status
Elymus triticoides	24	FAC
Rosa woodsii	16	FACU
Carex praegracilis	5	FACW
Juncus balticus	4	FACW
Lactuca serriola	4	FAC
Cichorium intybus	1	FACU
Anemopsis californica	0.1	OBL
Lotus corniculatus	0.1	FAC

Transect D

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

Heading: 90; Length: 60m

Species	Percent cover	Wetland Indicator Status
Salix laevigata	22	FACW
Glycyrrhiza lepidota	12	FAC
Juncus balticus	8	FACW
Lotus corniculatus	1	FAC
Distichlis spicata	1	FAC
Leymus triticoides	0.1	FAC
Euthamia occidentalis	0.1	FACW
Carex praegracilis	0.1	FACW
Asclepias fascicularis	0.1	FAC

Transect E

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

Heading: 170 deg.; Length: 60m

Species	Percent cover	Wetland Indicator Status
Thatch (*Juncus balticus*)	91	FACW
Ericameria nauseosa	6	UPL
Juncus balticus	3	FACW

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.

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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 – 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

Transect 2 – Start

Transect 2 – End

Transect 3 – Start

Transect 3 – End

Transect 4 – Start

Transect 4 – End

Transect 5 – Start

Transect 5 – End

Transect 6 (and Transect E) – Start

Transect 6 (and Transect E) – End

Transect 7 – Start

Transect 7 – End

Transect 8 – Start

Transect 8 – End

Greenline Transect South bank – representative photo along transect

Greenline Transect North bank – representative photo along transect

Transect A – Start

Transect A – End

Transect B – Start

Transect B – End

Transect C – Start

Transect C – End

Transect D – Start

Transect D – End

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

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

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

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

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