

Appendix A – USFWS and CNDDDB Species List

California Department of Fish and Game
Natural Diversity Database
Selected Elements by Scientific Name - Portrait
"Glenn" and "Butte" Counties

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1 <i>Accipiter gentilis</i> northern goshawk	ABNKC12060			G5	S3	SC
2 <i>Agelaius tricolor</i> tricolored blackbird	ABPBXB0020			G2G3	S2	SC
3 <i>Ambystoma californiense</i> California tiger salamander	AAAAA01180	Threatened		G2G3	S2S3	SC
4 <i>Antrozous pallidus</i> pallid bat	AMACC10010			G5	S3	SC
5 <i>Athene cunicularia</i> burrowing owl	ABNSB10010			G4	S2	SC
6 <i>Circus cyaneus</i> northern harrier	ABNKC11010			G5	S3	SC
7 <i>Cypseloides niger</i> black swift	ABNUA01010			G4	S2	SC
8 <i>Emys (=Clemmys) marmorata marmorata</i> northwestern pond turtle	ARAAD02031			G3G4T3	S3	SC
9 <i>Eumops perotis californicus</i> western mastiff bat	AMACD02011			G5T4	S3?	SC
10 <i>Lasionycteris noctivagans</i> silver-haired bat	AMACC02010			G5	S3S4	SC
11 <i>Martes americana humboldtensis</i> Humboldt marten	AMAJF01012			G5T2T3	S2S3	SC
12 <i>Martes pennanti (pacifica) DPS</i> Pacific fisher	AMAJF01021	Candidate		G5	S2S3	SC
13 <i>Pandion haliaetus</i> osprey	ABNKC01010			G5	S3	SC
14 <i>Phrynosoma coronatum (frontale population)</i> Coast (California) horned lizard	ARACF12022			G4G5	S3S4	SC
15 <i>Rana aurora draytonii</i> California red-legged frog	AAABH01022	Threatened		G4T2T3	S2S3	SC
16 <i>Rana boylei</i> foothill yellow-legged frog	AAABH01050			G3	S2S3	SC
17 <i>Rana cascadae</i> cascades frog	AAABH01060			G3G4	S3	SC
18 <i>Rana muscosa</i> mountain yellow-legged frog	AAABH01140	Endangered		G2	S2	SC
19 <i>Spea (=Scaphiopus) hammondi</i> western spadefoot	AAABF01030			G3	S3	SC
20 <i>Taxidea taxus</i> American badger	AMAJF04010			G5	S4	SC

California Department of Fish and Game
Natural Diversity Database
Selected Elements by Scientific Name - Portrait
"Ord Ferry 7.5 minute Quad"

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1 <i>Anthicus antiochensis</i> Antioch Dunes anthicid beetle	IICOL49020			G1	S1	
2 <i>Anthicus sacramento</i> Sacramento anthicid beetle	IICOL49010			G1	S1	
3 <i>Ardea alba</i> great egret	ABNGA05010			G5	S4	
4 <i>Ardea herodias</i> great blue heron	ABNGA04010			G5	S4	
5 <i>Buteo swainsoni</i> Swainson's hawk	ABNKC19070		Threatened	G5	S2	
6 <i>Carex vulpinoidea</i> fox sedge	PMCYP03EN0			G5	S2.2	2.2
7 <i>Coastal and Valley Freshwater Marsh</i>	CTT52410CA			G3	S2.1	
8 <i>Coccyzus americanus occidentalis</i> western yellow-billed cuckoo	ABNRB02022	Candidate	Endangered	G5T2	S1	
9 <i>Desmocerus californicus dimorphus</i> valley elderberry longhorn beetle	IICOL48011	Threatened		G3T2	S2	
10 <i>Great Valley Cottonwood Riparian Forest</i>	CTT61410CA			G2	S2.1	
11 <i>Great Valley Mixed Riparian Forest</i>	CTT61420CA			G2	S2.2	
12 <i>Great Valley Valley Oak Riparian Forest</i>	CTT61430CA			G1	S1.1	
13 <i>Great Valley Willow Scrub</i>	CTT63410CA			G3	S3.2	
14 <i>Hibiscus lasiocarpus</i> rose-mallow	PDMAL0H0Q0			G4	S2.2	2.2
15 <i>Pandion haliaetus</i> osprey	ABNKC01010			G5	S3	SC
16 <i>Riparia riparia</i> bank swallow	ABPAU08010		Threatened	G5	S2S3	
17 <i>Thamnophis gigas</i> giant garter snake	ARADB36150	Threatened	Threatened	G2G3	S2S3	
18 <i>Wolffia brasiliensis</i> Columbian watermeal	PMLEM03020			G5	S1.3	2.3

California Department of Fish and Game

Natural Diversity Database

Selected Elements by Scientific Name - Portrait

"Chico", "Foster-Island", "Glenn", "Hamilton City", "Llano Seco", "Nelson", "Nord", "Richardson Springs" 7.5 Minute USGS quads

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1 <i>Agelaius tricolor</i> tricolored blackbird	ABPBXB0020			G2G3	S2	SC
2 <i>Antrozous pallidus</i> pallid bat	AMACC10010			G5	S3	SC
3 <i>Ardea alba</i> great egret	ABNGA05010			G5	S4	
4 <i>Ardea herodias</i> great blue heron	ABNGA04010			G5	S4	
5 <i>Astragalus tener var. ferrisiae</i> Ferris' milk-vetch	PDFAB0F8R3			G1T1	S1.1	1B.1
6 <i>Athene cunicularia</i> burrowing owl	ABNSB10010			G4	S2	SC
7 <i>Branchinecta conservatio</i> Conservancy fairy shrimp	ICBRA03010	Endangered		G1	S1	
8 <i>Branchinecta lynchi</i> vernal pool fairy shrimp	ICBRA03030	Threatened		G3	S2S3	
9 <i>Buteo swainsoni</i> Swainson's hawk	ABNKC19070		Threatened	G5	S2	
10 <i>California macrophyllum</i> round-leaved filaree	PDGER01070			G3	S3.1	1B.1
11 <i>Carex vulpinoidea</i> fox sedge	PMCYP03EN0			G5	S2.2	2.2
12 <i>Castilleja rubicundula ssp. rubicundula</i> pink creamsacs	PDSCR0D482			G5T2	S2.2	1B.2
13 <i>Chamaesyce hooveri</i> Hoover's spurge	PDEUP0D150	Threatened		G2	S2.1	1B.2
14 <i>Clarkia gracilis ssp. albicaulis</i> white-stemmed clarkia	PDONA050J1			G5T2	S2.2?	1B.2
15 <i>Coastal and Valley Freshwater Marsh</i>	CTT52410CA			G3	S2.1	
16 <i>Coccyzus americanus occidentalis</i> western yellow-billed cuckoo	ABNRB02022	Candidate	Endangered	G5T2	S1	
17 <i>Delphinium recurvatum</i> recurved larkspur	PDRAN0B1J0			G2	S2.2	1B.2
18 <i>Desmocerus californicus dimorphus</i> valley elderberry longhorn beetle	IICOL48011	Threatened		G3T2	S2	
19 <i>Eumops perotis californicus</i> western mastiff bat	AMACD02011			G5T4	S3?	SC
20 <i>Fritillaria eastwoodiae</i> Butte County fritillary	PMLIL0V060			G3Q	S3.2	3.2
21 <i>Fritillaria pluriflora</i> adobe-lily	PMLIL0V0F0			G2	S2.2	1B.2
22 <i>Great Valley Cottonwood Riparian Forest</i>	CTT61410CA			G2	S2.1	
23 <i>Great Valley Mixed Riparian Forest</i>	CTT61420CA			G2	S2.2	
24 <i>Great Valley Valley Oak Riparian Forest</i>	CTT61430CA			G1	S1.1	

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Selected Elements by Scientific Name - Portrait

"Chico", "Foster-Island", "Glenn", "Hamilton City", "Llano Seco", "Nelson", "Nord", "Richardson Springs" 7.5 Minute USGS quads

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
25 <i>Great Valley Willow Scrub</i>	CTT63410CA			G3	S3.2	
26 <i>Haliaeetus leucocephalus</i> bald eagle	ABNKC10010	Threatened	Endangered	G5	S2	
27 <i>Hibiscus lasiocarpus</i> rose-mallow	PDMAL0H0Q0			G4	S2.2	2.2
28 <i>Imperata brevifolia</i> California satintail	PMPOA3D020			G2	S2.1	2.1
29 <i>Juncus leiospermus var. leiospermus</i> Red Bluff dwarf rush	PMJUN011L2			G2T2	S2.2	1B.1
30 <i>Lasionycteris noctivagans</i> silver-haired bat	AMACC02010			G5	S3S4	SC
31 <i>Lepidurus packardii</i> vernal pool tadpole shrimp	ICBRA10010	Endangered		G3	S2S3	
32 <i>Limnanthes floccosa ssp. californica</i> Butte County meadowfoam	PDLIM02042	Endangered	Endangered	G4T1	S1.1	1B.1
33 <i>Linderiella occidentalis</i> California linderiella	ICBRA06010			G3	S2S3	
34 <i>Northern Hardpan Vernal Pool</i>	CTT44110CA			G3	S3.1	
35 <i>Northern Volcanic Mud Flow Vernal Pool</i>	CTT44132CA			G1	S1.1	
36 <i>Oncorhynchus tshawytscha spring-run</i> spring-run chinook salmon	AFCHA0205A	Threatened	Threatened	G5T1Q	S1	
37 <i>Paronychia ahartii</i> Ahart's paronychia	PDCAR0L0V0			G2	S2.1	1B.1
38 <i>Rhynchospora californica</i> California beaked-rush	PMCYP0N060			G1	S1.1	1B.1
39 <i>Riparia riparia</i> bank swallow	ABPAU08010		Threatened	G5	S2S3	
40 <i>Sidalcea robusta</i> Butte County checkerbloom	PDMAL110P0			G2	S2.2	1B.2
41 <i>Spea (=Scaphiopus) hammondii</i> western spadefoot	AAABF01030			G3	S3	SC
42 <i>Taxidea taxus</i> American badger	AMAJF04010			G5	S4	SC
43 <i>Thamnophis gigas</i> giant garter snake	ARADB36150	Threatened	Threatened	G2G3	S2S3	
44 <i>Wolffia brasiliensis</i> Columbian watermeal	PMLEM03020			G5	S1.3	2.3

Appendix B – Surveyor Qualifications

Jamison Watts, M.S., Biological Sciences, has 12 years of experience working in northern California's Sierra Nevada, Cascade and Coastal Mountain Ranges, and the Sacramento Valley surveying for special-status species including valley elderberry longhorn beetle (VELB), western burrowing owl, Swainson's hawk, northern and California spotted owl, northern goshawk, peregrine falcon, bald eagle, marbled murrelet, western pond turtle, American marten, Pacific fisher, wolverine, northern flying squirrel, Sierra Nevada red fox, foothill and mountain yellow-legged frog, California red-legged frog, giant garter snake, vernal pool species, and anadromous fishes. He routinely performs pre-construction and protocol-level surveys for VELB, Swainson's hawk and western burrowing owl, as well as common raptors.

Brooks Taylor, B.S., Wildlife Biology, has 12 years of experience working in northern California and Colorado surveying/studying raptors, giant garter snake, valley elderberry longhorn beetle, salmonids, waterfowl and ungulates. Mr. Taylor has conducted a comprehensive field study of bald eagle nesting areas and activity centers, including determining range and use areas, prey base, and human influences on nesting bald eagles. He co-authored a draft management plan for bald eagle activity centers, which was used in implementing a bald eagle management plan for the Madison Ranger District of the Beaverhead National Forest in Montana. He routinely performs pre-construction and protocol-level surveys for VELB, Swainson's hawk and western burrowing owl, as well as common raptors.

Ryan Brown, B.S., Biological Sciences, is responsible for preparing wetland delineations, biological resource assessments, tree survey reports, and other environmental documents. Additionally, he has been instrumental in developing tree survey and mitigation protocol for loss of oak woodlands within the City of Oroville. He has over 7 years experience working within the Sacramento and Feather River watersheds. This work included studies pertaining to fishery evaluations of the Upper and Lower Feather River for FERC re-licensing of the Oroville Dam, and NMFS Biological Opinion for the Upper Feather River. Mr. Brown has performed extensive, multi-year investigations to evaluate salmonid habitat conditions and population dynamics. These included Chinook salmon spawning/escapement surveys, rotary screw trapping of emigrating juvenile Chinook salmon and steelhead, LOTEK radio-telemetry tagging and tracking of threatened spring-run Chinook salmon, and steelhead spawning surveys over 17 miles of river. He routinely performs pre-construction and protocol-level surveys for VELB, raptors, and reptiles and amphibians.

Elena Alfieri, B.S., Botany, conducts wetland delineations, performs valley elderberry longhorn beetle surveys (VELB), rare plant surveys, and habitat classification and mapping for Gallaway Consulting, Inc. Her work experience includes conducting botanical surveys for the USFS in the Truckee Ranger District and Jones and Stokes in Sacramento.

Appendix C – Valley Elderberry Longhorn Beetle Survey Results

Elderberry Survey of M&T Chico Ranch Action Area for Proposed Action – 2005 and 2006							
Shrub ID	Location	Number of Stems			Exit Holes on Shrub	Surveyor	Date
		1-3"	3-5"	>5"	Y/N		
E01	Upland	6	0	1	Y	JW	8/12/2005
E02	Upland	10	4	2	Y	JW	8/12/2005
E03	Upland	3	6	4	Y	JW	8/12/2005
E04	Riparian	0	1	3	Y	JW	8/12/2005
E05	Riparian	0	5	0	Y	JW	8/12/2005
E06	Riparian	2	1	0	Y	JW	8/12/2005
E07	Riparian	2	0	0	Y	JW	8/12/2005
E08	Riparian	2	0	0	N	JW	8/12/2005
E09	Riparian	20	10	8	Y	BT/RB	10/4/2005
E10	Riparian	3	0	0	N	BT/RB	10/4/2005
E11	Riparian	0	1	1	Y	BT/RB	10/4/2005
E12	Riparian	1	1	1	N	BT/RB	10/4/2005
E13	Riparian	1	0	0	N	BT/RB	10/4/2005
E14	Riparian	1	1	0	N	BT/RB	10/4/2005
E15	Riparian	1	1	2	N	BT/RB	10/4/2005
E16	Riparian	0	3	0	N	BT/RB	10/4/2005
E17	Riparian	3	0	1	N	BT/RB	10/4/2005
E18	Riparian	0	0	1	Y	BT/RB	10/4/2005
E19	Riparian	0	0	2	Y	BT/RB	10/4/2005
E20	Riparian	0	2	1	N	BT/RB	10/4/2005
E21	Riparian	0	0	1	N	BT/RB	10/4/2005
E22	Riparian	0	0	1	N	BT/RB	10/4/2005
E23	Riparian	0	0	1	N	BT/RB	10/4/2005
E24	Riparian	0	0	1	Y	BT/RB	10/4/2005
E25	Riparian	0	0	2	Y	BT/RB	10/4/2005
E26	Riparian	0	0	0	N	BT/RB	10/4/2005
E27	Riparian	4	2	1	Y	BT/RB	10/4/2005
E28	Riparian	0	0	3	N	BT/RB	10/4/2005
E29	Riparian	0	1	0	N	BT/RB	10/4/2005
E30	Riparian	15	0	0	Y	BT/RB	10/4/2005
E31	Riparian	8	0	0	N	JW/EA	6/15/2006
E32	Riparian	12	0	0	Y	JW/EA	6/15/2006
E33	Riparian	9	0	0	N	JW/EA	6/15/2006
E34	Riparian	8	0	0	N	JW/EA	6/15/2006
E35	Riparian	6	0	0	N	JW/EA	6/15/2006
E36	Riparian	7	0	0	Y	JW/EA	6/15/2006
E37	Riparian	0	0	2	Y	JW/EA	6/15/2006
E38	Riparian	3	0	0	N	JW/EA	6/15/2006
E39	Riparian	5	2	0	Y	JW/EA	6/15/2006
E40	Riparian	3	0	0	N	JW/EA	6/15/2006

Elderberry Survey of M&T Chico Ranch Action Area for Proposed Action – 2005 and 2006							
		Number of Stems			Exit Holes on Shrub		
E41	Riparian	0	1	0	N	JW/EA	6/15/2006
E42	Riparian	1	1	0	N	JW/EA	6/15/2006
E43	Riparian	7	3	1	Y	JW/EA	6/15/2006
E44	Riparian	1	0	0	N	JW/EA	6/15/2006
E45	Riparian	2	0	0	N	JW/EA	6/15/2006
E46	Riparian	1	0	0	N	JW/EA	6/15/2006
E47	Riparian	1	1	0	N	JW/EA	6/15/2006
E48	Riparian	2	1	0	N	JW/EA	6/15/2006
E49	Riparian	3	2	0	Y	JW/EA	6/15/2006
E50	Riparian	2	0	0	N	JW/EA	6/15/2006
E51	Riparian	21	10	2	Y	JW/EA	6/15/2006
E52	Riparian	1	0	0	N	JW/EA	6/15/2006
E53	Riparian	3	0	0	N	JW/EA	6/15/2006
E60	Riparian	2	0	0	N	JW/EA	6/15/2006
E61	Riparian	2	0	0	N	JW/EA	6/15/2006

**M&T CHICO RANCH/LLANO SECO RANCHO
RIPARIAN VEGETATION AND NATIVE GRASSLAND
MITIGATION PLAN**

**MAINTENANCE OF CHANNEL ALIGNMENT
RIVER MILE 192.5**

RIPARIAN VEGETATION MITIGATION BACKGROUND

Status in the Proposed Action Area

Valley-foothill riparian habitat includes all successional stages of woody vegetation, commonly dominated by willow (*Salix* spp.), Fremont cottonwood (*Populus fremontii*), valley oak (*Quercus lobata*), or western sycamore (*Platanus racemosa*), within the active and historical floodplains of low-gradient reaches of streams and rivers generally below an elevation of 300 feet.

Valley-foothill riparian vegetation at the revetment site is composed of mature native and nonnative trees occurring as an isolated patch between agricultural fields and the river's edge. This vegetation is located along the adjacent bank of the proposed longitudinal stone toe and tree revetment. Approximately 250 linear feet of remnant riparian vegetation occurs along the most highly eroded area. This stand of riparian vegetation is located on the top of a nearly vertical bank approximately 12 to 15 feet from the water surface.

Riparian forest in the Proposed Action Area has a tall overstory of deciduous broadleaf trees comprised primarily of valley oak. Other native riparian forest species include Fremont cottonwood, box elder (*Acer negundo*), Oregon ash (*Fraxinus latifolia*), and western sycamore. Understory species in the riparian forest community include poison oak (*Toxicodendron diversilobum*), and native California blackberry (*Rubus ursinus*), wild grape (*Vitis californica*), blue elderberry (*Sambucus mexicana*) and saplings of tree species.

The distribution and extent of this habitat-type in the Pine, Rock, and Big Chico Creeks Ecological Management Unit in the early 1990s was 900 acres (CALFED 2000). There are 33.64 acres of this habitat-type in the Proposed Action Area.

Project Effects

The Project would potentially remove 1.73 acres of valley foothill riparian habitat. In addition to temporarily removing riparian nesting habitat resulting from revetment construction, the removal of riparian habitat would temporarily discontinue recruitment of instream woody material (IWM) and shaded riverine aquatic cover (SRA), which contribute to essential fish habitat (EFH). Brush revetment and riparian restoration would offset these effects by increasing the IWM to greater than pre-project levels and mitigating temporary loss of SRA. Additional SRA habitat would also be created by planting approximately 0.35 acres of riparian habitat adjacent to the revetment. However, loss of valley-foothill riparian habitat would be mitigated by replacing lost habitat at a ratio of 2:1 (two acres restored for every acre removed).

Conservation Measures

The following measures are consistent with conservation measures provided in the MSCS and NCCP Determination:

- Avoid or minimize disturbance to existing riparian habitat.
- Restore or enhance 3.46 acres of valley-foothill riparian habitat for a restoration ratio of 2:1. Restoration would be conducted along the river bank where construction disturbance occurred between the bank and the revetment itself and in on the Llano Seco Rancho.
- The M&T Chico Ranch, the Llano Seco Rancho and the Sacramento River National Wildlife Refuge Complex (SNWRC) will work cooperatively to develop a plan of planting, maintenance, and management of the valley-foothill riparian restoration area. To accomplish restoration native species will be planted and species would be actively maintained and monitored for four years. Over time, habitat management and natural processes would control the species composition and overall structure of the plant communities.
- To the extent practicable, include project design features that allow for onsite reestablishment and long-term maintenance of riparian vegetation following project construction.
- Avoid or minimize construction activities during the breeding period of evaluated species that could be affected by these actions.
- Avoid or minimize direct disturbance to populations and individuals of evaluated plant species.
- Establish and protect additional populations of evaluated plant species in suitable nearby habitat areas before implementing construction activities that could affect existing populations or individuals.
- To the extent practicable, remove or exclude evaluated amphibian and reptile species from construction corridors before construction is initiated.

Valley Foothill Riparian Habitat Restoration

Valley-foothill riparian habitat within the Proposed Action Area that will be removed consists of 1.73 acres located within the Capay Unit of the SNWRC and is located along the Sacramento River adjacent to the proposed rock toe revetment. As mitigation for the removal of 1.73 acres of riparian habitat, a total of 3.46 acres of riparian habitat will be restored off-site on the Llano Seco Rancho. An additional 0.35 acres of SRA habitat riparian habitat will be created on the Capay Unit of the SNWRC between the rock toe revetment and the river bank (assumes 10-foot wide strip of habitat for the entire 1,520-foot length of the revetment). Restoration of valley-foothill riparian habitat will include plantings of valley oak, cottonwood, sycamore, alder, ash, California grape, wild rose, buttonbush, and various species of willows. Additionally, non-native invasive species will be selectively removed for three years to increase the likelihood of successful primary and secondary succession. The restoration will be implemented by the M&T Chico Ranch and the Llano Seco Rancho.

Restoration in the Proposed Action Area

Approximately 0.35 acres of SRA will be created on the Capay Unit of the SNWRC between the rock toe revetment and the river bank (assumes 10-foot wide strip of habitat for the entire 1,520-foot length of the revetment). Habitat creation would begin during spring 2008. **Figure 1** shows the vicinity of the riparian habitat restoration locations and **Figure 2** shows the location of the SRA habitat restoration.

Off-Site Restoration

Approximately 3.46 acres of valley-foothill riparian habitat will be created or restored on the Llano Seco Rancho on the east bank of Sacramento River approximately 8 miles downstream of the Proposed Action Area in the area depicted in **Figure 3** or on the Llano Seco Rancho in the vicinity of the area depicted. A conservation easement or fee title could be obtained as a substitute for creating valley-foothill riparian habitat. If a conservation easement or fee title is obtained to satisfy the mitigation requirement then riparian habitat will be restored by selectively removing non-native invasive species for three years. Figure 1 shows the vicinity of riparian habitat restoration locations and Figure 3 shows the location of the off-site valley-foothill riparian habitat restoration on the Llano Seco Rancho.

Habitat Creation Planting Methodologies

Prior to planting riparian vegetation species, the restoration area will be prepared by removing all existing vegetation by mechanical treatments (e.g., discing) or approved herbicidal treatments.

Valley-foothill riparian habitat will be created by planting seeds, plugs, cuttings, and containerized saplings, of local ecotypes. Prior to planting all vegetation within approximately 3 feet of the individual plant location would be removed to avoid competition for nutrients. Shrub cuttings, including arroyo, black, and sandbar willows (*Salix lasiolepis*, *S. gooddingii*, and *S. exigua*) of 0.5 to 1.5 inches in diameter and 3 to 6 feet in length will be planted in individual augered holes at depths of at least two-thirds to three quarters of the length of the cuttings. Containerized saplings will be placed into individual augered holes that are as deep as the container plus approximately four inches, and approximately twice the diameter of the container. After digging the hole and prior to placing the sapling in the hole, a small amount of prepared soil would be placed into the hole and saturated with water. Immediately prior to placing the sapling in the hole, the container would be removed and the sapling placed in the hole. The area surrounding the root ball would then be backfilled with prepared soil and saturated with water. Mulch would be placed around the tree to inhibit weed growth, retain water and help protect against frost. Herbaceous species will be broadcast seeded or planted as plugs between tree and shrub stems. Plant stock of local ecotypes will be obtained from a local native plant nursery. **Table 1** lists plant propagation methods (container, cutting, plug, drilling) used for each species. Container plants are raised from seeds or cuttings collected from the Sacramento River floodplain and have been propagated by CSU Chico, Floral Native Nursery, and Hedgerow Farms for planting as seedlings. Willow and cottonwood cuttings refer to branches approximately 1" in diameter that are cut from mature cottonwood and willow trees and planted directly into soil. Cuttings are taken no more than 5 days prior to planting and soaked for 24 hours before being planted. Phase 1 overstory and understory plants will be hand planted during

fall of Year 1. Phase 2 understory grass seed will be directly seeded with a rangeland drill during fall of Year 2.

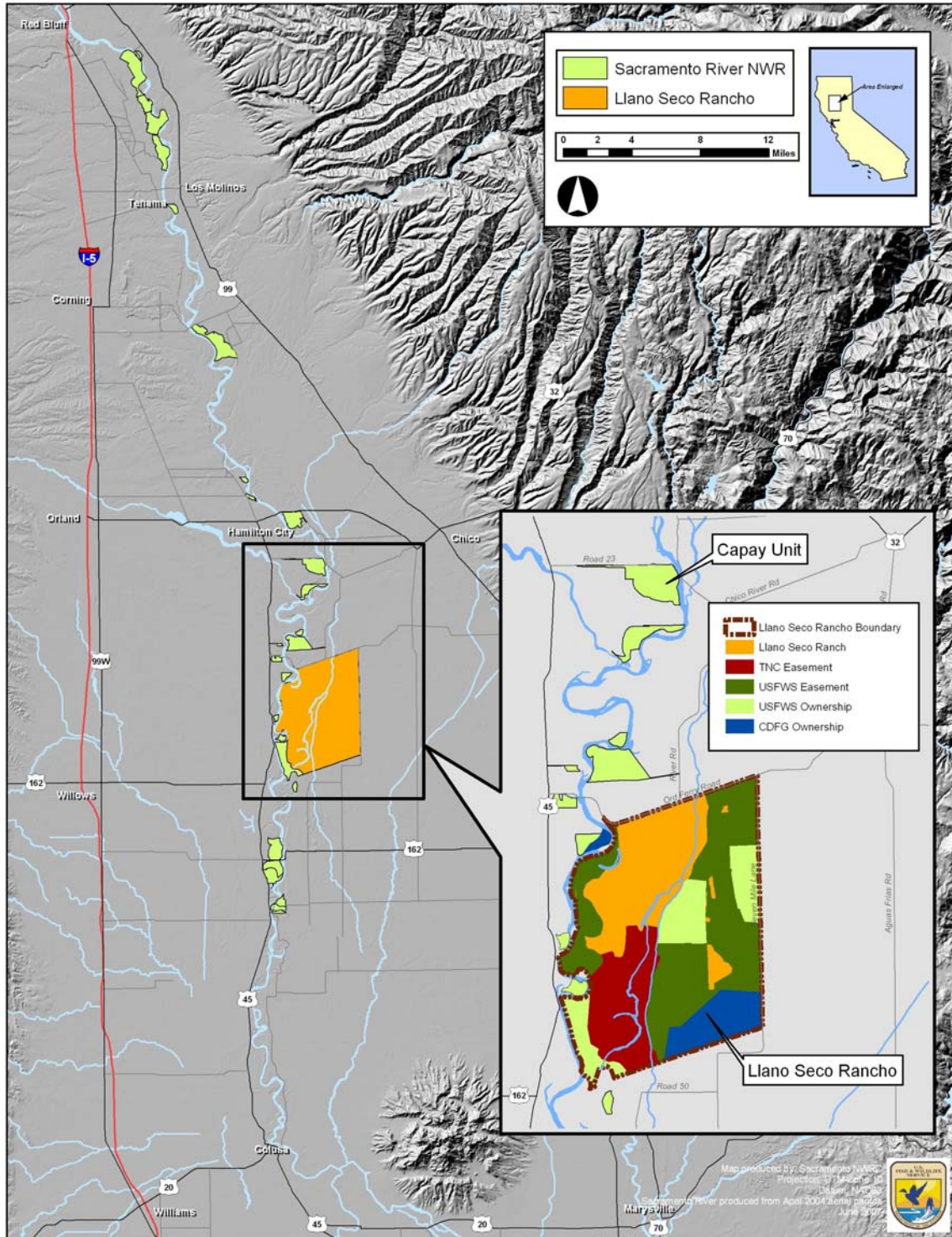


Figure 1: Riparian habitat restoration vicinity.

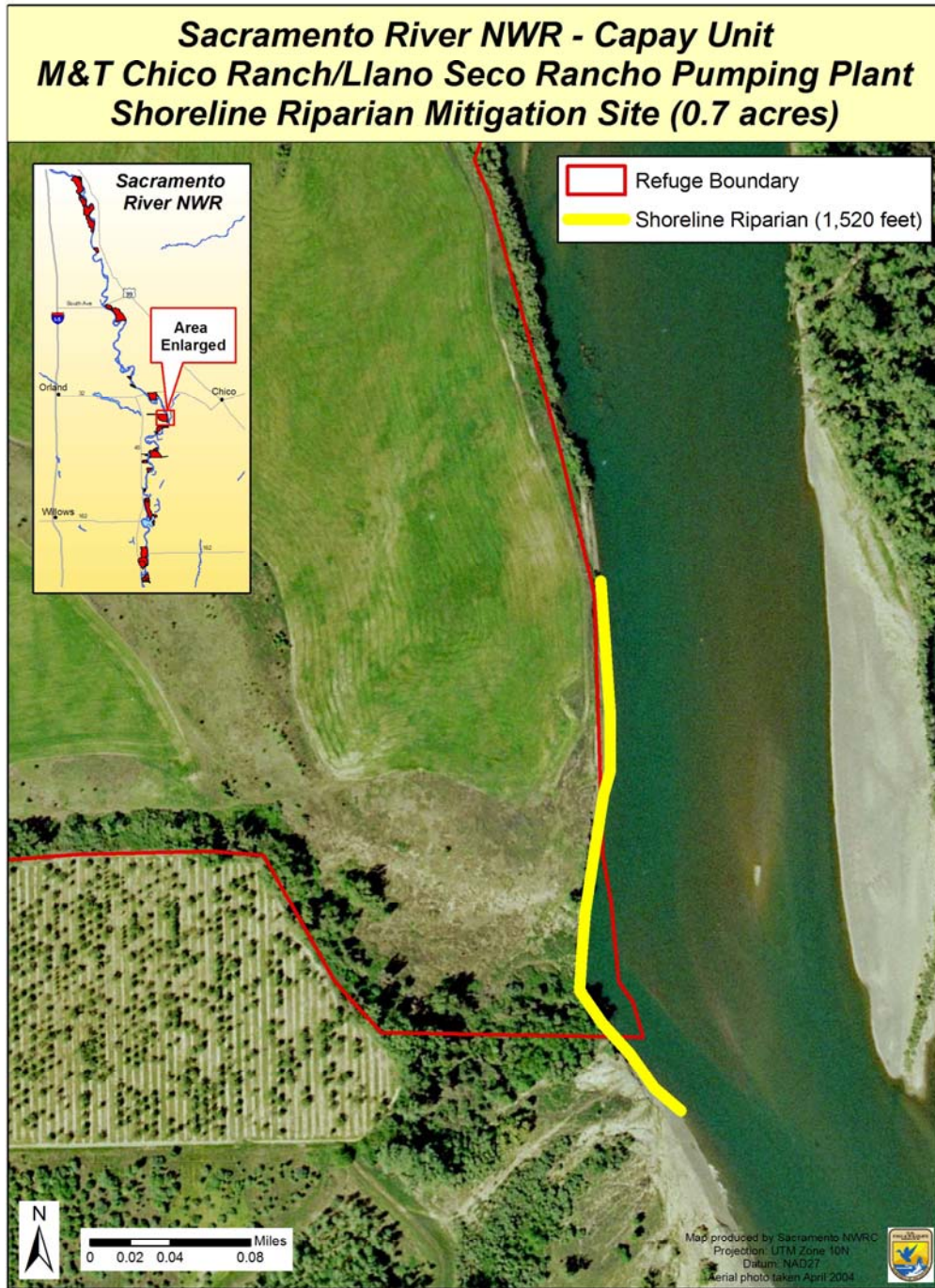


Figure 2: SRA habitat mitigation location within the Proposed Action Area



Figure 3: Valley-foothill riparian habitat off-site restoration location within the Llano Seco Rancho.

Table 1: Representative valley-foothill riparian vegetation plant species utilized for restoration of lost habitat by vegetation zone.

Shoreline Plant Community		Cottonwood–Willow–Sycamore–Alder Riparian			
	Acres	0.35			
Vegetation Structure/Form	Plant	Species	Frequency	Total	Propagation
Overstory	Fremont cottonwood	<i>Populus fremontii</i>	15%	28	cutting
	Western sycamore	<i>Platanus racemosa</i>	15%	28	container
Midstory	Arroyo willow	<i>Salix lasiolepis</i>	30%	55	cutting
	Sandbar willow	<i>Salix exigua</i>	30%	55	cutting
	White alder	<i>Alnus rhombifolia</i>	10%	18	cutting
Total			100%	184	
Sedges	Santa Barbara sedge	<i>Carex barbarae</i>	herbaceous	185	plug

Riparian Floodplain Community		Valley Oak-Elderberry Riparian Woodland			
	Acres	3.46			
	Canopy Density (plants/acre)	264			
	Herbaceous Density	112			
	Number of Locations	1,056			
Vegetation Structure/Form	Plant	Species	Frequency	Total	Propagation
Overstory	Valley oak	<i>Quercus lobata</i>	20%	211	container
	Western sycamore	<i>Platanus racemosa</i>	18%	190	container
Midstory	Mule fat	<i>Baccharis salicifolia</i>	5%	53	cutting
	Box elder	<i>Acer negundo</i>	5%	52	container
	Elderberry	<i>Sambucus mexicanus</i>	35%	370	cutting
Understory	Coyote brush	<i>Baccharus pilularis</i>	5%	53	cutting
	California rose	<i>Rosa californica</i>	5%	53	container
	California blackberry	<i>Rubus ursinus</i>	7%	74	container
Total			100%	1,056	
Grasses	Deergrass	<i>Muhlenbergia rigens</i>	25%	264	plug
	Creeping ryegrass	<i>Leymus triticoides</i>	15%	158	plug
Forbs	Mugwort	<i>Artemisia douglasiana</i>	18%	190	container
	California goldenrod	<i>Solidago californica</i>	15%	158	container
	Hoary nettle	<i>Urtica dioecia</i>	8%	84	container
	Evening primrose	<i>Oenothera hookerii</i>	7%	74	container
Vines	California pipevine	<i>Aristolochia californica</i>	4%	42	container
	Clematis	<i>Clematis ligusticifolia</i>	4%	42	container
	California grape	<i>Vitis californica</i>	4%	42	container
Total			100%	1,054	

The following specific planting procedures will be utilized to help increase chances of sapling and larger tree survival:

1. Plant materials should be kept in the shade prior to planting.
2. Any roots showing tendencies to circle the root ball should be cut vertically to prevent root girdling.
3. Soil should be packed firmly around the root mass while the plant is pulled slightly up resulting in the root collar being even with the surrounding terrain to avoid "j" rooting and air pockets (National Tree Trust 1997).

The species distribution of the created valley-foothill riparian habitat is dependent on the inundation frequency (distance from the water) with semi-aquatic herbaceous and shrub species

such as sedges and willows in a zone closest to the water and less hydrophilic species such as valley oaks in a floodplain zone less prone to frequent inundation farther from the water. The species compositions on each of the mitigation sites (the Capay Unit of the SRNWR and the Llano Seco Rancho) would vary based on inundation frequency. Additionally, because river water surface elevations and the lateral extent of the water's edge are dependent on flow and site-specific geomorphology, the width of each vegetation zone and the elevations at which each vegetation zone begin and end also are site-specific, and would be determined prior to planting. Table 1 describes typical species in each vegetation zone.

Vegetation Planting Timeline

Plantings will occur during the spring (March through May) or during the fall (Late September through November) while the plants are still dormant. When seedlings are planted during late fall, the ground should have adequate moisture and soil temperature should not be below 45 degrees Fahrenheit. Plants may be mulched to help protect from freezing in the winter months (Rogue Valley Council of Governments 2004). Phase 1 overstory and understory plants will be hand planted during fall of Year 1. Phase 2 understory grass seed will be directly seeded with a rangeland drill during fall of Year 2.

Weed Control

Methods: This site has annual rye grass (*Lolium perenne*), Johnson grass (*Sorghum halepense*), morning glory (*Calystegia* sp.), chickweed (*Cerastium* sp), and other problematic weeds that will inhibit native plant growth if unchecked. Control efforts will concentrate on controlling these noxious weeds. Aggressive control by mowing, disking, and glyphosate application will control these weeds.

Standards: The height and vigor of weeds on restoration sites has a direct effect on the growth and survival of the cultivated riparian plants. The objective of this vegetation plan is to optimize growth of the riparian species past a point where they can compete effectively with the exotic plants because larger riparian plants less affected by weeds. Specifically, after the site has been planted, weeds should be treated (sprayed with herbicides on the planting strips and mowed in between the planting strips) prior to flowering, and should be continued for the three years.

The standards for weed control are listed as follows:

- First year after planting: Weed height within the rows and planting strips is kept to less than 6." Weed stem density within the strips should be less than 10/m².
- Second year after planting: Weed height within the planting rows and strips is kept to less than 6,"which should allow directly seeded native grasses to begin to dominate the site and compete with the non-native weeds.
- Third year after planting: Weed height within the planting rows and strips is kept to less than 6," which should allow directly seeded native grass to dominate the site and compete with the non-native weeds.
- Herbicide Use: Herbicide applications will be prescribed by a state-licensed PCA (pest control advisor) and applied by state-licensed applicators. Herbicide use will be reported

monthly to the County as required by state and county law. Weed control will be conducted year round.

During years subsequent to the first year of planting (i.e., 2009 through 2012), replanting of trees, shrubs, and herbaceous understory species will occur as needed to reach a survival goal of 60 percent after 5 years for the shoreline community and 80 percent for the riparian floodplain community. Specifically, if individual plants do not survive, larger individuals, which are more likely to persist, will be planted in place of those individuals. Consequently, if adequate survival and recruitment is occurring, little subsequent planting would be conducted. **Table 2** shows the timeline of riparian vegetation restoration.

Table 2: Timeline for Riparian Vegetation Restoration/Mitigation Tasks

Task	2008				2009				2010				2011				2012			
	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su	F
Prepare Area		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓
Transplant Trees		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓
Transplant shrubs		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓
Transplant vines		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓
Seed		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓
Plant Plugs		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓
Remove Non-Native Vegetation (mowing/sp raying)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Irrigate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Monitor & Report					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note: Planting during years subsequent to 2008 would occur only to replace plants that did not survive from year-to-year if deemed necessary to maintain performance standards.

Site-Specific Vegetation Distribution

The distribution of individual species within each restoration site (on- and off-site) would be site specific and specific to each community at the Llano Seco Rancho site. However, the plant layout at each site would mimic natural riparian habitat to the extent possible by distributing plant species in clusters with adequate spacing for root development. The density of plants in each community is listed in Table 1, above. The specific distribution of the plants in each community depends on site specific conditions and will be determined during planting.

Habitat Restoration on a Conservation Easement/Fee Title

If lands available for restoration within the Llano Seco Rancho already contain riparian habitat, the existing riparian habitat would be restored by removing non-native species and planting native species, as necessary. Native species will be planted as described in *Habitat Planting Methodologies*, above. Additionally, if native species are planted, monitoring and habitat maintenance would occur on the timeline presented in Table 2, above. If no planting of native vegetation is required, then riparian habitat will be restored by selectively removing non-native invasive species for 3 years.

Care and Handling of Plant Materials

The Contractor will handle all materials professionally to ensure that plants and related materials are not damaged during shipping, handling, and storage. All plants and related supplies will be stored in such a manner as to prevent damage from sunlight, moisture, or contact with vehicles, equipment, and tools. Plants that have become wet, moldy, or otherwise damaged in transit or in storage will not be acceptable for mitigation plantings and will be required to be replaced.

Irrigation

Generally, it is recommended that irrigation be provided for the first three to five years after planting to ensure plant viability. The planting sites will be irrigated using trucked watering, spray, or surface drip irrigation systems, depending on the site specific conditions. The plantings should be irrigated regularly (i.e., twice a week) through the first and second spring and summer following planting, at least once every other week during year three, and at least one each month from April through August during years four and five. Irrigation frequency may be modified, however, in response to season, frequency and amount of precipitation, and based on observations of overall plant health. Irrigation methods should encourage root growth to a depth that will provide adequate soil moisture to maintain plants without irrigation. Over-watering could encourage shallow rooting and dependence on irrigation for continued survival (City of Sacramento 2003).

If riparian restoration occurs on levee slopes, all methods of irrigation will conform to the following State Reclamation Board criteria:

- Surface low pressure drip irrigation systems may be used on either the landside or waterside levee slope.
- Any water applied to vegetation on the levee slope by any means must be controlled to prevent erosion of the levee slope.

Monitoring

The M&T Chico Ranch, Llano Seco Rancho and the USFWS SRNWR are responsible for overseeing implementation of planting and monitoring of revegetation on the SRNWR and Llano Seco Rancho. As part of the monitoring requirements, the M&T Chico Ranch, Llano Seco Rancho and the SRNWR will be required to report to state resource agencies regarding the success of the plantings and any need for remedial actions. USFWS SRNWR, as the federal lead agency for the channel maintenance project is responsible for ensuring that the monitoring reports also are provided to the National Marine Fisheries Service to satisfy the terms and conditions of the incidental take permit for the project. The following metrics will be used to monitor the riparian habitat created:

- **Percent survival:** The number of established trees and shrubs that were planted during the initial planting will be determined during each of the five years in the monitoring timeline (Table 2).
- **Plant vigor:** During each of the 5 monitoring years, 25 percent of the plantings in each mitigation area will be randomly selected and measured to determine canopy size,

stem diameter at stem midpoint (diameter at breast height [dbh] for trees 4 feet and taller), and height. Plant vigor will be rated as excellent, good, fair, or poor.

- **Percent Linear Closure:** After the fifth year of monitoring (2013) the percent linear closure will serve as the performance standard for the plantings in the created habitat area (s). Percent linear closure will be determined by measuring the percent of drainage length that is beneath the riparian species canopy.
- **Photographic Documentation:** Photographic documentation sampling points will be identified and established for the mitigation areas to provide a visual record of plant growth and canopy closure after planting. Sampling points will be established before mitigation is implemented, and locations will be identified in the first-year monitoring report.

Performance Standards

Mitigation would be considered successful if the shoreline communities on the SRNWR and the Llano Seco Rancho maintained 60 percent survival and the riparian floodplain community on the Llano Seco Rancho maintained 80 percent survival after five years.

Budget

The cost estimate, including current costs from implementation of riparian habitat mitigation through completion of monitoring year five is approximately \$21,000.

Grassland Mitigation Background

Status in the Proposed Action Area

Grassland habitat includes vegetation communities dominated by native and non-native annual and perennial grasses and forbs, including non-irrigated and irrigated pastures. Grassland habitat borders the work area, staging and storage area, and a portion of the access roads.

The distribution and extent of this habitat type in the Pine, Rock, and Big Chico creeks Ecological Management Unit in the early 1990s was 37,600 acres (CALFED 2000). There are 5.23 acres of this habitat-type in the Proposed Action Area.

Project Effects

The Project would potentially remove 1.75 acres of Grassland habitat where it occurs adjacent to and within the proposed staging and storage area, and within the rock to revetment work area. The temporary loss of grassland to provide access/staging for heavy machinery for bank revetment would temporarily reduce habitat value within the site. However, removed grassland would be restored at a ratio of 1:1 at an area within the Capay Unit and additional 6.8 acres of native grassland will be restored at the Rio Vista Unit of Sacramento River National Wildlife Refuge (SRNWR).

Conservation Measures

The following measures are consistent with conservation measures provided in the MSCS and NCCP Determination:

- Restore or enhance 1.75 acres of Grassland habitat for a mitigation ratio of 1:1 on site. Restore and additional 6.8 acres of native grassland at the Rio Vista Unit of SRNWR.
- The M&T Chico Ranch, Llano Seco Rancho, and the SNWRC will work cooperatively to develop a plan for restoring grassland habitat. To accomplish restoration, native species would be planted and actively maintained and monitored for 3 years. Over time, habitat management and natural processes would control the species composition and overall structure of the plant communities.
- Avoid or minimize construction activities during the breeding period of evaluated species that could be affected by these actions.
- Avoid or minimize direct disturbance to populations and individuals of evaluated plant species.
- Establish and protect additional populations of evaluated plant species in suitable nearby habitat before implementing construction activities that could affect existing populations or individuals.
- Restore area with native grasses after construction is completed in the fall.

Capay Unit Native Grassland Restoration Description

The restoration area consists of 1.75 acres located within the Capay Unit and is located along the Sacramento River within the Proposed Action Area. Much of the area impacted consists of native grasses and forbes. **Figure 4** shows the vicinity of the grassland restoration areas. **Figure 5** shows the location of the grassland restoration area in the Proposed Action Area within the Capay Unit of the SRNWR. Yellow star-thistle (*Centaurea solstitialis*) and Johnson-grass (*Sorghum halepense*) are currently the primary invasive species threat and the targets for weed control for this project. The 1.75 acre grassland restoration project utilizes a combination of prescribed fire, mechanical treatments, approved herbicide applications, and native grass seeding to control these invasive species and establish native grassland at this site. The project has a re-vegetation component, which includes seeding native species and local ecotypes of blue wildrye (*Elymus glaucus*), creeping wildrye (*Leymus triticoides*), and mugwort (*Artemisia douglasiana*). Control of invasive species will increase re-vegetation success. The restoration will be implemented by the SNWRC staff, as shown in **Table 3**.

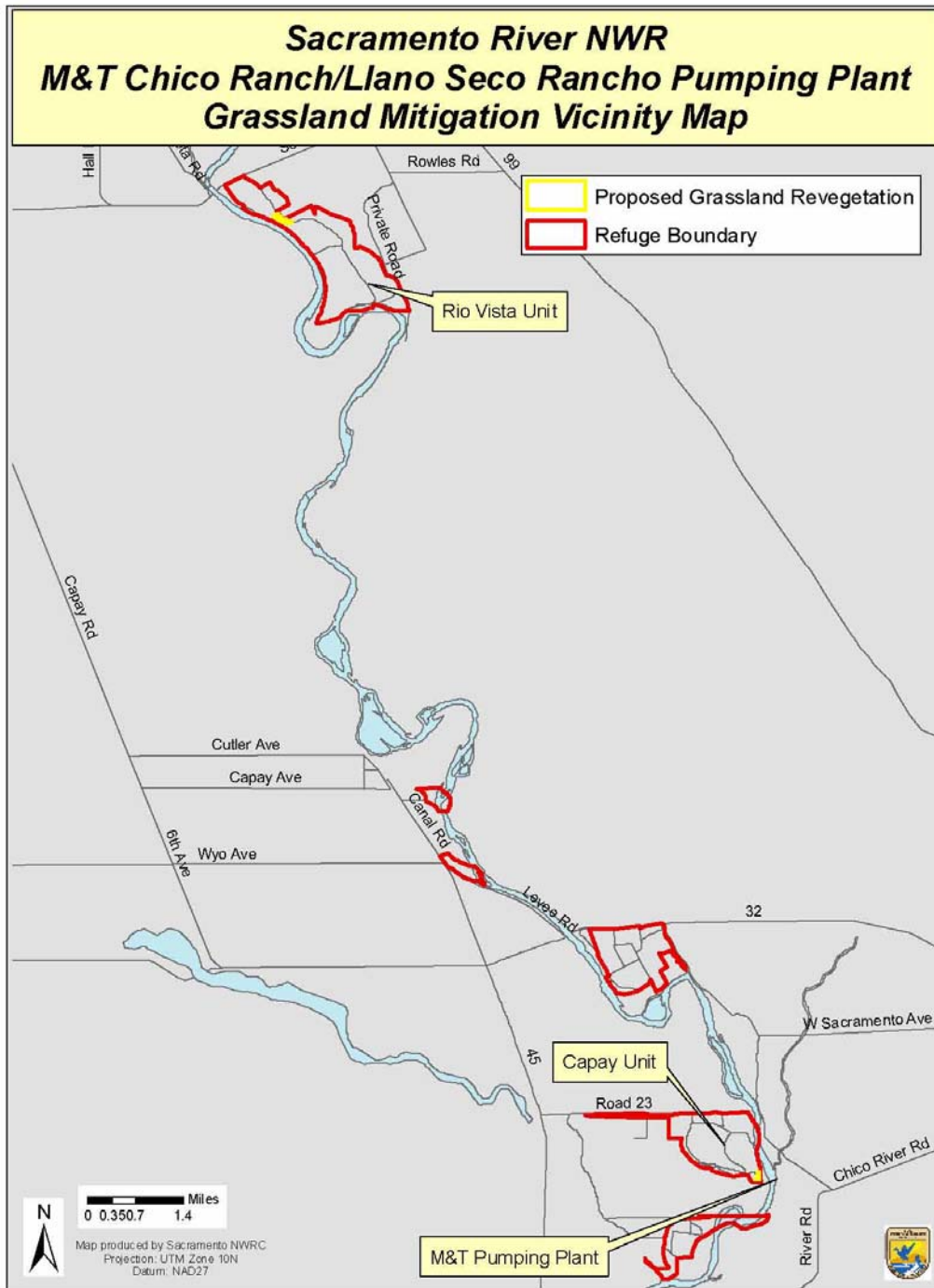


Figure 4: Grassland restoration vicinity.



Figure 5: Grassland restoration location within the Proposed Action Area.

Table 3. Timeline for Grassland Restoration/Mitigation Tasks at the Capay Unit

Task	2007		2008				2009				2010		
	Su	F	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su
Burning		✓											
Discing and Floating		✓	✓										
Herbicide Application				✓		✓	✓	✓					
Drill Seed							✓						
Plant Plugs													
Monitor & Report			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Rio Vista Unit Native Grassland Restoration Description

The restoration area consists of 6.8 acres located within the Rio Vista Unit of the SRNWR and is located along the Sacramento River. Figure 4 shows the vicinity of the grassland restoration areas. **Figure 6** shows the location of the grassland restoration area in the Rio Vista Unit of the SRNWR. Yellow star-thistle and Johnson-grass are currently the primary invasive species threat and the targets for weed control for this project. The early detection of and a rapid response to outbreaks of these invasive plant species is critical to preventing their spread. However, with many important native plant species located along the river, this approach must be balanced with new and innovative methods of control. The 6.8 acre grassland restoration project utilizes a combination of prescribed fire, mechanical treatments, approved herbicide applications, and native grass seeding to control these invasive species and restore native grassland at this site. The project has a re-vegetation component, which includes seeding native species and local ecotypes of blue wildrye, creeping wildrye, and mugwort. Control of invasive species will increase re-vegetation success. The restoration will be implemented by the SNWRC staff as shown in **Table 4**. **Table 5** shows the seed types and total amount of native grass seed to be used in grassland restoration activities.

Table 4. Timeline for Grassland Restoration/Mitigation Tasks at the Rio Vista Unit

Task	2005		2006				2007				2008		
	Su	F	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su
Burning		✓											
Discing and Floating			✓	✓	✓								
Herbicide Application				✓		✓	✓	✓	✓	✓		✓	
Drill Seed											✓		
Plant Plugs											✓		
Monitor & Report			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 5. Native Seed for 8.5 acres

Name	Ecotype	Total pounds
<i>Oenothera hookerii</i>	Tehama County	1.5
<i>Grindelia camporum</i>	Yolo Basin	3
<i>Elumus glaucus</i>	Llano Seco	80
<i>Leymus triticoides</i>	Yolo Basin	10
<i>Artemisia douglasiana</i>	Tehama County	15
<i>Muhlenbergia rigens</i>	Deer Grass Plugs (local)	500

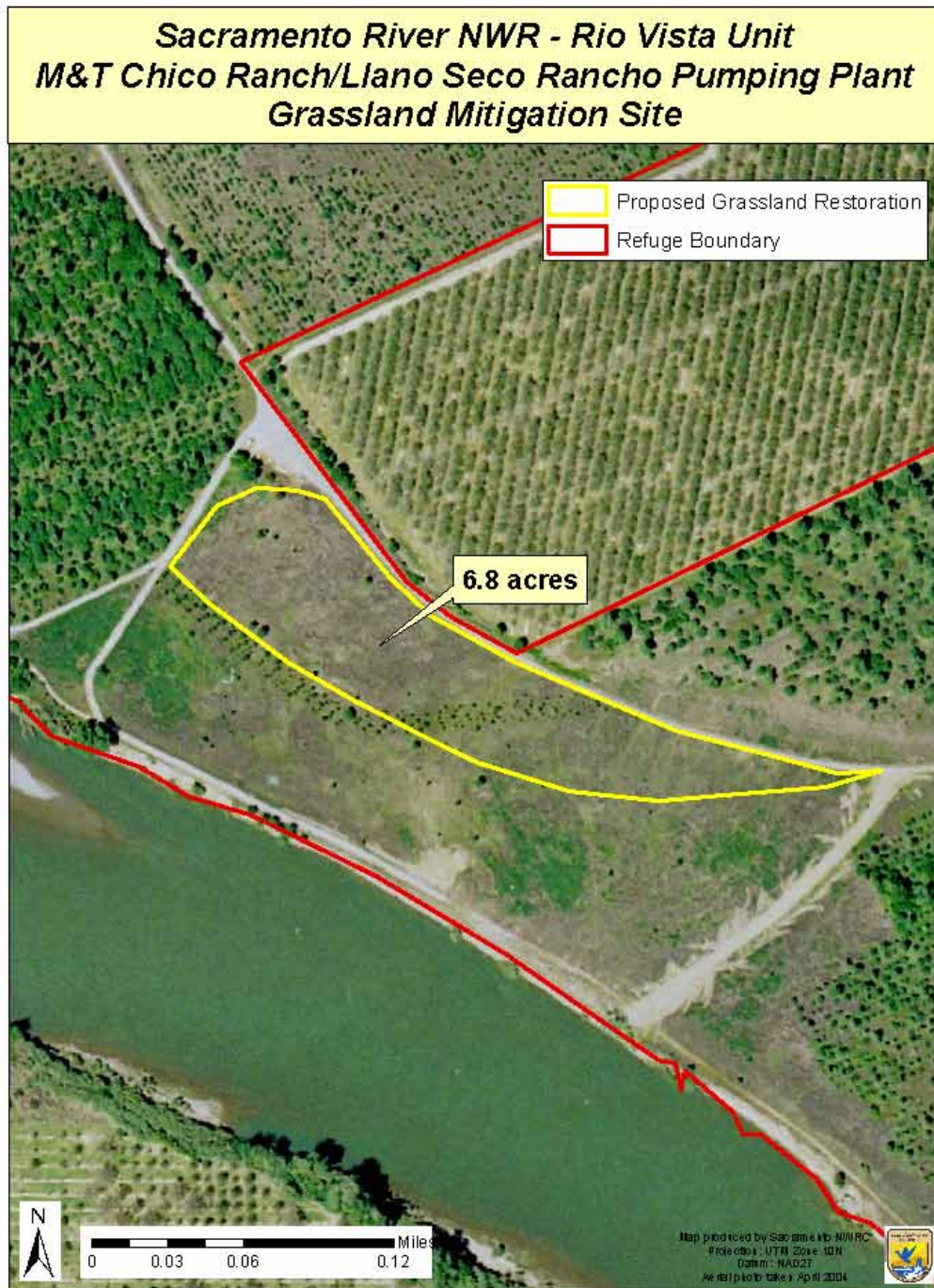


Figure 6: Grassland restoration location within the Rio Vista Unit of the Sacramento River National Wildlife Refuge.

Budget

Various phases of the Rio Vista project implementation have already occurred. The following cost estimates include current matching funds as well as costs to assist in project completion (see **Table 6**).

Table 6. M&T / Llano Seco Pumping Plant Grassland Mitigation Project Budget

Revegetation (seeding)	\$700.00
Materials (herbicide & seed)	\$3,000.00
Monitoring & Report (refuge)	\$1,500.00
Labor (burn, discing & herbicide)	\$3,000.00
Total Costs For Implementation	\$8,200.00

References

- CALFED. 2000. Multi-Species Conservation Strategy Final Programmatic EIS/EIR Technical Appendix. Available at <http://calwater.ca.gov>.
- City of Sacramento. 2003. Sacramento River Water Treatment Plant Fish Screen Replacement Project. Amendment to the Tree Removal and Revegetation Plan. Prepared by Surface Water Resources, Inc.
- National Tree Trust. 1997. National Tree Trust Partner Handbook.
- Rogue Valley Council of Governments. 2004. Bear Creek Watershed Riparian Planting Program. Draft. October 2004. Available at <http://rvcog.org>.