

**Table 1. Tidal Datums**

Tide Level	Water Surface Elevation at Each Tide Station (feet NAVD88)					
	Reference Stations			Sears Point Stations		
	Petaluma <sup>1</sup> NOS 941-5252	Hamilton NOS 941-5124	Chevron NOS 941-4863	TWL-1 Upstream	TWL-2 midpoint	TWL-3 San Pablo Bay
Highest observed water level (HOWL) <sup>1</sup>	--	--	8.64 (2/6/98)	7.95 (1/8/05)	7.49 (7/19/05; no data for 1/8/05)	8.89 (1/8/05)
MHHW (Mean higher high water)	6.28	6.25	6.04	5.87	6.16	6.36
MHW (Mean high water)	5.71	5.66	5.44	5.34	5.68	5.79
MTL (Mean tide level)	3.46	3.49	3.28	3.99	3.55	3.31
MLW (Mean low water)	1.22	1.30	1.12	2.40	1.75	1.26
MLLW (Mean lower low water)	0.22	0.21	-0.01	2.10	0.93	0.27
Lowest observed water level (LOWL) <sup>2</sup>	--	--	-2.16 (2/8/01)	1.90 (4/14/05)	0.76 (8/30/05)	-0.85 (6/22/05)
Range (ft)	6.26	6.04	6.05	3.77	5.23	6.09
Uncertainty (ft) <sup>3</sup>				0.08	0.13	0.11
Period of Field Data Collection	Jul 1977 – Apr 1979	Feb 2000 – Mar 2000	Jan 1995 – Dec 2002	12/8/2004 - 8/30/2005	12/9/04 - 2/25/05; 6/28/05 - 8/30/05	12/9/04 - 2/25/05; 6/16/05 - 8/30/05

Notes:

1. Petaluma River Entrance NOS benchmark sheet is reported in feet NGVD 29 relative to superseded tidal epoch of 1960-1978. VertCon used to convert to feet NAVD88 (2.65 ft) and updated to current tidal epoch of 1983-2001 (0.20ft).
2. Highest and lowest observed water levels spans the period of data collection only and does not represent the maximum and minimum tide levels possible.
3. Uncertainty derived from National Ocean Service (2003).

**Table 2. Elevations of Low Sections of Surrounding Roads, Rail, and Levees**

Location	Elevation, ft NAVD88		
	Min	Mean	Max
<b><u>Road Section</u></b>			
Highway 37 low section, 2,000ft east from Lakeville	+3.6	+4.1	+4.7
Lakeville low section, 2,700ft north from Highway 37 to North Parcel northern boundary	+3.7	+4.7	+8.9
Reclamation Road, 2,300ft south from Highway 37 to rail line	+1.2	+3.1	+3.9
Reclamation Road, 2,200ft east to Dickson Ranch crossing	+0.9	+2.0	+3.0
<b><u>SMART Rail Section</u></b>			
Low section, 5,600ft east from Reclamation Road to eastern end of northern Dickson Ranch field	+0.5	+3.4	+4.5
<b><u>Outboard Levee Section</u></b>			
Sonoma Baylands eastern levee, from SMART rail line south to San Pablo Bay	11	12	13
Sears Point levee, from Sonoma Baylands east and north to uplands near Highway 37	+9	+11	+13

**Table 3. List of special-status, culturally-significant, and invasive wildlife and plant species known or with moderate or high potential to occur on or in the vicinity of the Sears Point project site**

SPECIES <sup>1</sup>	STATUS & CULTURAL SIGNIFICANCE <sup>2</sup>	PREFERRED HABITAT <sup>3</sup>	RANGE <sup>4</sup>	PROJECT REGION OCCURRENCES <sup>5</sup>	PROJECT SITE OCCURRENCE		
					KNOWN	HIGH POT.	MOD. POT.
<b>Birds</b>							
<i>Agelaius tricolor</i> tricolored blackbird (nest colony)	FSC, CSSC	Nests in dense freshwater marsh and riparian scrub habitat.	Mostly restricted to cismontane California. Breeds primarily in the Central Valley; most individuals in Sonoma County and the San Francisco Bay area are wintering individuals.	CNDDDB nesting colony occurrence in pond just east of Lakeville Highway, ¼ mile north of North Parcel. Other occurrences along the lower Napa River.			C R
(foraging, wintering, or other use)		Nests in dense freshwater marsh and riparian scrub habitat.	Mostly restricted to cismontane California. Breeds primarily in the Central Valley; most individuals in Sonoma County and the San Francisco Bay area are wintering individuals.	CNDDDB nesting colony occurrence in pond just east of Lakeville Highway, ¼ mile north of North Parcel. Other occurrences along the lower Napa River. Species has been observed onsite (P. Baye).	C	R	
<i>Aquila chrysaetos</i> golden eagle	FSC CSSC	Mountainous areas, open hilly grasslands.	Breeds throughout North America; wintering population in California.	CH2MHill detected species on project site; four individuals detected in February 2005 including a likely pair (E. Strauss, H. Spautz, pers obs). Breeding pairs documented in southern Sonoma County near the project site.	C	R	
<i>Asio flammeus</i> short-eared owl	CSSC	Winters in tidal wetlands.	Occasionally still breeds in Northern California. Nesting pairs are found in fresh and salt swamplands, lowland meadows, and irrigated alfalfa fields.	139 individuals were observed at Grizzly Island Wildlife Area, Solano County, in the 1987 breeding season. Wintering individuals detected in March 1999 in Black John Slough marshes in Novato (H.Spautz pers obs).		R	C
<i>Athene cunicularia</i> western burrowing owl	FSC, CSSC	Nests in open, dry grasslands and scrublands; also nest in transition zone between high marsh and uplands and around the perimeters of cultivated fields. Uses mammal burrows for nest and roost sites.	Breeding population west of the Mississippi River, winters in California and Mexico. In California, 71% of the population in the Imperial Valley; fewer than 200 pairs breeding in the San Francisco Bay area. No documented breeding in Sonoma County since 1986. Wintering birds in North Bay east of Fairfield are not likely to breed locally (J. Barclay, pers. comm.).	At least three wintering/non-breeding individuals confirmed on site in 2005 and 2006 including several burrow sites. (S. Avent, W. Neale, H. Spautz, J. Vollmar, pers obs). CNDDDB occurrences along Lakeville Road on north edge of Leonard Ranch (burrow in side of levee) and another at upper Tubbs Island (burrow in the side of a ditch in an oat hay field) were likely also wintering individuals.	C	R	
<i>Circus cyaneus</i> northern harrier	CSSC	Breeds in open areas, particularly grasslands and adjacent to wetlands. Forages in grasslands, wetlands, and agricultural areas.	Occurs from annual grassland to lodgepole pine and alpine meadow habitats, < 3000 m in the Central Valley and Sierra Nevada, < 800 m in Northwestern California	Closest CNDDDB record is from Tassajara Valley, Contra Costa County, CA, but species has been detected foraging over the project site in winter 2005 (H. Spautz pers obs). Common year-round in the tidal marshes of San Pablo Bay.	C	R	
<i>Elanus leucurus</i> white-tailed kite	DFGFP, MNBMC	Lowland open habitats.	West of the Sierra Nevada, W. Oregon, Southern Texas and Coastal Mexico.	CNDDDB occurrences in Sonoma, Napa and Marin counties. Observed on project site in winter 2005 (H. Spautz pers obs). Commonly forage in pickleweed marshes of southern	C	R	

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					KNOWN	HIGH POT.	MOD. POT.
<i>Eremophila alpestris actica</i> California horned lark	CSSC	Winters and breeds in grasslands, preferring flat, dry, bare ground, including grazed areas, for nesting.	Year-round resident	No CNDDDB occurrences from Sonoma, but common documented breeder in Sonoma and Marin counties. Documented on site during breeding season.	C	R	
<i>Falco peregrinus</i> peregrine falcon	CE	Nesting sites are found near wetlands, lakes, rivers, or other water on cliffs, banks, and dunes mounds.	In California, very uncommon as a breeding resident, and uncommon as a migrant.	Three CNDDDB occurrences in adjacent Napa County (Calistoga quad, Monticello Dam quad, and Detert Reservoir quad). Species has been documented breeding under the Petaluma River Bridge in recent years and has been detected foraging at the Petaluma River Marsh and Black John Slough tidal marshes (H. Spautz pers obs).		R	C
<i>Geothlypis trichas simuosa</i> saltmarsh common yellowthroat	FSC CSSC	Dense fresh to salt marsh, primarily associated with tall plants such as <i>Typha</i> and <i>Scirpus</i> spp.	Year round resident subspecies breeds exclusively in the San Francisco Bay and lower Delta regions.	CNDDDB occurrences (breeding areas) at Tubbs Island, lower Sonoma Creek, lower Napa Slough, mouth of Tolay Creek. Additional documented breeding at Petaluma River Marsh and other marshes on the Petaluma River.		R	
<i>Laterallus jamaicensis coturniculus</i> California black rail	FSC, CT	Year round resident in tidal salt and brackish marsh, primarily uses channelized upper marsh with an open understory.	San Pablo Bay, Suisun Bay and lower Delta regions in California, Arizona.	CNDDDB occurrences and documented breeding sites (Spautz & Nur 2002) around the mouth of the Petaluma River, mouth of Gallinas Creek, Novato Creek Marsh, and Midshipman Point (Tubbs Island; locally abundant).		R	
<i>Melospiza melodia samuelis</i> San Pablo song sparrow	FSC CSSC	Wetland (tidal, muted, and non-tidal) and riparian habitat, primarily in areas with dense shrubby vegetation.	Year round resident subspecies occurs exclusively along the fringe of San Pablo Bay and rivers leading to it.	Common year-round resident in the region. Breeding populations documented at Tolay Creek and Petaluma River Mouth (Spautz et al 2003a). Numerous individuals (possible breeding pairs) documented in January 2005 on site in the irrigation ditch (H. Spautz).	C	R	
<i>Numenius americanus</i> long-billed curlew	FSC CSSC	Winters in the vicinity of wetland habitats around San Francisco Estuary.	Common breeder in the northeastern corner of California, uncommon-locally common along the coast and in the Central and Imperial valleys.	There are no CNDDDB records for this species in the region, but they are frequently present at the SW corner of the flooded pasture at Lakeville Hwy and north of Rte. 37. Large numbers were observed in Feb 2005.	C	R	
<i>Rallus longirostris obsoletus</i> California clapper rail	FE, CE	Tidal salt marsh bordering the San Francisco Bay, particularly in highly channelized areas with dense vegetation, especially <i>Spartina</i> spp. (cordgrass).	Year round resident subspecies occurs exclusively in the San Francisco Bay area.	CNDDDB occurrences around the mouths of the Petaluma River and Gallinas Creek; Recent maximum abundance in the southwestern Petaluma Marsh near Bahia/Green Point. Recent detections in Petaluma River Marsh and near Sonoma Baylands, but not Sonoma or Tolay Creek (J. Evens, pers. comm. 2004; H. Spautz, pers obs; G. Downard, pers comm).		R	

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					KNOWN	HIGH POT.	MOD. POT.
<b>Mammals</b>							
<i>Reithrodontomys raviventris halicoetes</i> salt marsh harvest mouse, northern subspecies	FE, CE	Tidal or non-tidal high salt marsh or brackish marsh around the San Francisco Estuary; seasonal dispersal or use of adjacent grasslands (non-breeding).	Restricted to saline emergent wetlands of the San Francisco Estuary and its tributaries.	CNDDDB occurrences at Tubbs Island and the mouth of Gallinas Creek. Pickleweed marshes in southern San Pablo Bay west of Mare Island support the largest known populations. Seasonal and tidal movements of the species from tidal marshes to adjacent diked baylands and levees on the project site are likely but permanent on-site populations are unlikely under existing conditions.		R	
<i>Sorex ornatus sinuosus</i> Suisun shrew	FSC, CSSC	High brackish tidal marshes along the northern shores of San Pablo and Suisun Bays.	Restricted to N. Suisun and San Pablo Bays. According to Rudd (1955a), occurs as far east as Grizzly Island and as far west as the mouth of Petaluma Creek. Brown and Rudd (1981) redefined the western range boundary as Sonoma Creek and Tubbs Island.	CNDDDB occurrences around Mare Island, Dutch Slough and South Slough (Cullinan Ranch). Current status and distribution of the species is poorly understood. Highly unlikely to occur on site under existing conditions (no suitable habitat).			R
<b>Amphibians</b>							
<i>Clemmys marmorata</i> Western pond turtle	FSC, CSSC	Warm water of ponds or slow-flowing stream or tidal sloughs, freshwater to fresh-brackish, with basking sites and emergent marsh vegetation.	Occurs in scattered sites throughout cismontane California and other western states; historically widespread around San Francisco Estuary tributaries, now common only in Suisun Marsh area.	Infrequent in freshwater to fresh-brackish reaches of Napa River, frequent in fresh-brackish sloughs and permanent ponds of Suisun Marsh. Moderately likely to occur in vegetated perennial stock ponds in region.			C R
<i>Rana aurora draytonii</i> California red-legged frog	FT, CSSC	Permanent or semi-permanent shallow water with emergent riparian or marsh habitat.	Historic range throughout much of California west of the Sierra-Cascade crest and along the Coast Ranges the entire length of the State <1200 m., now much reduced.	CNDDDB occurrence 1/3 mile north of North Parcel in drainage that passes under Lakeville Highway. Other occurrences 1-2 miles north of the intersection of Highway 37 and 121.	C	R	
<b>Terrestrial Invertebrates</b>							
<i>Speyeria callippe callippe</i> Callippe silverspot butterfly (sub-specific taxonomy remains TBR)	FE	Northern coastal scrub and grasslands with <i>Viola pedunculata</i> (host plant); adults usually found on east-facing slopes, males usually found on hilltops where they search for females.	Central British Columbia east to South Dakota and Manitoba, south to southern California, Nevada, Utah, and Colorado	One occurrence is documented 1.5 miles north of Lakeview Highway and Highway 37, 2 miles WNW of Sears Point (Highway 37 and Tolay Creek). There is another occurrence from the Benicia quad in Solano county. Both populations are within grassland habitats.		C R	

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<b>Fish</b>							
<i>Oncorhynchus mykiss irideus</i> steelhead Central Valley ESU	FT, CI	Streams, rivers, estuaries and marine habitat, depending on stage in life cycle. Juveniles may rear in shallow, vegetated sub-tidal waters.	Spawn in the upper Sacramento and San Joaquin Rivers and eastern tributaries to the Delta (Leidy 1984). Both adults and juveniles use San Pablo Bay as a migration corridor.	Juveniles rear to varying degrees in shallow, vegetated brackish waters. Whether CV steelhead find and use the Sears Point site depends on the hydrodynamics of San Pablo Bay that determine, in part, their outmigration patterns. At a minimum, a few CV steelhead will probably immigrate to the Sears Point site occasionally.			R
<i>Oncorhynchus mykiss irideus</i> steelhead Central California Coast ESU	FT, CI	Streams, rivers, estuaries and marine habitat, depending on stage in life cycle. Juveniles may rear in shallow, vegetated sub-tidal waters.	Known to spawn in the Napa River and its tributaries (Leidy 1984). Both adults and juveniles use San Pablo Bay as a migration corridor.	Juveniles may rear in shallow, vegetated sub-tidal waters. Given the proximity of CCC steelhead spawning grounds, juveniles are likely to find and utilize this site frequently, if briefly.		R	
<i>Oncorhynchus tshawytscha</i> Chinook salmon Sacramento winter-run	FE, CE, CI	Streams, rivers, estuaries and marine habitat, depending on stage in life cycle. Juveniles may rear in shallow, vegetated sub-tidal waters.	Spawns in the Sacramento River mainstem just below Shasta Dam. Both adults and juveniles use San Pablo Bay as a migration corridor.	Juveniles rear to varying degrees in brackish waters. Whether Chinook salmon find and use the Sears Point site depends on the hydrodynamics of San Pablo Bay that determine, in part, their outmigration patterns. At a minimum, a few chinook salmon will probably immigrate to the Sears Point site occasionally.			R
<i>Oncorhynchus tshawytscha</i> Chinook salmon Sacramento spring-run	FT, CT, CI	Streams, rivers, estuaries and marine habitat, depending on stage in life cycle. Juveniles may rear in shallow, vegetated sub-tidal waters.	Spawns in Sacramento River tributaries. Both adults and juveniles use San Pablo Bay as a migration corridor.	Juveniles rear to varying degrees in brackish waters. Whether Chinook salmon find and use the Sears Point site depends on the hydrodynamics of San Pablo Bay that determine, in part, their outmigration patterns. At a minimum, a few chinook salmon will probably immigrate to the Sears Point site occasionally.			R
<i>Oncorhynchus tshawytscha</i> Chinook salmon Sacramento late fall-run	FSC, CI	Streams, rivers, estuaries and marine habitat, depending on stage in life cycle. Juveniles may rear in shallow, vegetated sub-tidal waters.	Spawns in Sacramento River tributaries. Both adults and juveniles use San Pablo Bay as a migration corridor.	Juveniles rear to varying degrees in brackish waters. Whether Chinook salmon find and use the Sears Point site depends on the hydrodynamics of San Pablo Bay that determine, in part, their outmigration patterns. At a minimum, a few chinook salmon will probably immigrate to the Sears Point site occasionally.			R

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					KNOWN	HIGH POT.	MOD. POT.
<i>Hypomesus transpacificus</i> Delta smelt	FT, CT	Estuarine waters and upstream into rivers. Often found at salinities <2 ppt. Seldom found at higher salinities.	Primarily lives and spawns in the Sacramento–San Joaquin Delta and Suisun Bay. Spawning also believed to occur in the Napa River. Most commonly forages near water surface over or adjacent to deep-water habitat. Found in San Pablo Bay during high outflow periods.	This species was seen in 1995 at White Slough, 0.65 miles west of Highway 37 and Sonoma Blvd. (Highway 29). Given the proximity of the Napa River spawning population and the occasional movement of Delta smelt juveniles into San Pablo Bay, Delta smelt will probably be found at the Sears Point site occasionally. The site will probably not provide optimal habitat for any life-stage of this species.			R
<i>Acipenser transmontanus</i> White Sturgeon	CI	Streams, rivers, estuaries, and marine habitat, depending on stage in life cycle. Juveniles use shallow sub-tidal waters as rearing habitat.	Spawns in Sacramento River tributaries. Both adults and juveniles use San Pablo Bay as a migration corridor. Historically and currently important as a food item.	Sturgeon are benthic foragers in slow-moving waters. Juveniles use shallow sub-tidal waters of the Estuary as rearing habitat. Adults are iteroparous and may forage in and around San Pablo Bay on their way to/from spawning runs. The behavior of both life-stages is poorly understood; but both stages are expected to use the Sears Point site opportunistically and briefly.			R
<i>Acipenser medirostris</i> Green Sturgeon	FT*, CSSC	Streams, rivers, estuaries, and marine habitat, depending on stage in life cycle. Juveniles use shallow sub-tidal waters as rearing habitat.	Spawns in Sacramento River tributaries. Both adults and juveniles use San Pablo Bay as a migration corridor.	Sturgeon are benthic foragers in slow-moving waters. Juveniles use shallow sub-tidal waters of the Estuary as rearing habitat. Adults are iteroparous and may forage in and around San Pablo Bay on their way to/from spawning runs. The behavior of both life-stages is poorly understood; but both stages are expected to use the Sears Point site opportunistically and briefly.			R
<i>Pogonichthys macrolepidotus</i> Sacramento Splittail	CSSC, CI	Benthic foraging in slow-moving shallow brackish waters. Splittail migrate upstream to spawn in freshwater on flooded floodplains. Formerly found throughout edges of the Estuary.	Spawning occurs in shallow freshwater floodplain habitat primarily along the Sacramento and its tributaries, the Napa River, and the Petaluma River. Forages in the benthic zone of shallow, slow-moving waters such as Suisun Marsh.	The shallow flooded and intertidal habitats proposed for Sears Point are likely foraging habitats for splittail. There is some potential that spawning habitat will be restored as well.		R	

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					KNOWN	HIGH POT.	MOD. POT.
<b>Plants</b>							
<i>Blennosperma bakeri</i> Sonoma sunshine	FE, CE, CNPS 1B	Vernal pools and swales; 10-100 m.	Known only from central and southern Sonoma County.	Known occurrence approximately 5 miles north of the project site, ½ mile west of Hwy 121 (CNDDDB Occurrence 16). Presence of suitable habitat suggests that it may be quite feasible to support in restored or existing habitat. Unlikely to occur spontaneously.		R	
<i>Downingia pusilla</i> dwarf downingia	CNPS 2	Vernal pools and swales; 1-445m.	Central Valley and North SF Bay region.	CNPS occurrence(s) in Sears Point quad.			C R
<i>Eleocharis parvula</i> small spikerush	CNPS 4	Generally saline wet flats and marshes; 1-3,000m.	Scattered sites throughout California, other regions.	CNPS occurrence(s) in Sonoma County; recent large populations have established in diked bayland seasonal wetlands at Bahia (Novato, Marin Co.) and Cullinan Ranch (lower Napa River, Solano Co.).		R	
<i>Lasthenia conjugens</i> Contra Costa goldfields	FE, CNPS 1B	Vernal pools, vernal mesic grasslands; 0-470m.	Lower Delta region, widely scattered sites along the California coast.	CNPS and CNDDDB occurrences in Napa, Cuttings Wharf and Petaluma River quads. Presence of suitable habitat suggest that it may be quite feasible to support in restored or existing habitat. Unlikely to occur spontaneously.		R	
<i>Trifolium depauperatum</i> var. <i>hydrophilum</i> saline clover	CNPS 1B	Seasonally-saturated annual grasslands and vernal pool margins, often with subalkaline soils.	Central Coast Ranges and Lower Delta.	Known on project site in lowlands North or Rte. 37.	C	R	
<i>Viola pedunculata</i> johnny-jump-up	None; host plant for silverspot butterflies	Open grassy slopes and hillsides, chaparral, oak woodland; 0-1,000m.	Coast Ranges.	Known from general project region. Present in extensive, regionally significant stands on the project site.	C	R	
<i>Brodiaea</i> spp.	CI	Perennial or annual terrestrial grasslands	Widespread throughout coast ranges and Bay Area. Starchy bulbs used as food; traditionally maintained by manual (digging stick) cultivation and burning, rotational disturbance.	Several species known from the region.	C	R	
<i>Carex barbarae</i> White-root, Santa Barbara sedge	CI	Seasonally wet sites <900m.	SF Bay, North Coast Range, and other areas of California with suitable habitat. Traditionally important for basket fiber.	Suitable habitat, soils present on the project site (most occupied by creeping wildrye).		R	C
<i>Juncus balticus</i> Baltic rush	CI	Moist places, generally <2200m	California-Arkansas, E. North America, S. America and Eurasia. Traditionally important for basket fiber.	Common in the region.	C	R	
<i>Chlorogalum pomeridianum</i> soap-plant	CI	Perennial or annual terrestrial grasslands, gaps in scrub	Widespread throughout coast ranges and Bay Area. Used for medicinal remedies, fish poison, detergent, fiber.	Common in the region. Known to occur on site.	C	R	

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					KNOWN	HIGH POT.	MOD. POT.
<i>Iris macrosiphon</i> iris	CI	Perennial terrestrial grassland, gaps in scrub	Common in perennial grassland, gaps in scrub and woodland interior Marin and Sonoma County. Used as a select fiber.	Occurs in the region.		C R	
<i>Nassella pulchra</i> purple needlegrass	CI; needlegrass community is a CDFG sensitive community.	Grasslands, oak woodlands; <1300m	Scattered sites in lower cismontane California; historic distribution and abundance greatly reduced. Fiber, textile plant.	Occurs in scattered upland sites in the region and on the project site.	C	R	
<i>Sagittaria</i> spp. ( <i>S.calycina</i> , <i>S. cuneata</i> ) arrowhead, wapato	CI	Freshwater, fresh-brackish, to alkaline perennial marsh. Fresh alkaline marsh.	Widespread but not abundant, in coast ranges and Central Valley; also outside California. Starchy tubers used for food, medicine.	Occurs in the project site vicinity.		C R	
<i>Salix lasiolepis</i> arroyo willow	CI	Abundant. Shores, marshes, meadows, springs, and bluffs.	California to Washington, Idaho, Texas and Mexico. Diverse cultural uses, including basketry, medicinal remedies, and ritualistic games.	Scattered stands in hillslope drainages in the region and on the project site.	C	R	
<i>Schoenoplectus acutus</i> var. <i>occidentalis</i> hardstem bulrush, tule	CI	Marshes, lakes and streambanks <2500 m.	California, except eastern deserts, temperate North America	Known from freshwater and brackish marshes in the region. Diverse cultural uses, including food, textiles, and packing.		R	
<i>Schoenoplectus californicus</i> California bulrush, tule	CI	Marshes <200 m.	San Francisco Bay and other regions of California with appropriate habitat to southern US and into South America and oceanic islands. Diverse cultural uses, including food, textiles, and packing.	Known from tidal marshes in the region.		R	
<i>Schoenoplectus maritimus</i> (incl. <i>S. robustus</i> ) alkali bulrush	CI	Marshes <2500 m.	Nearly world-wide distribution. Diverse cultural uses, including food, textiles, and packing.	Present in agricultural drainage ditches, other low areas in the region and on the project site. Also occurs in two landslide vernal pools on the site.	C	R	
<i>Tritelia</i> spp.	CI	Terrestrial grasslands	Widespread in coast ranges, Central Valley, Bay	A few species known from the region and project site.		R	
<i>Typha</i> spp. cattail	CI	Wetland habitats	Nearly world-wide distribution; throughout North America. Diverse cultural uses including basketry, caulking, tinder, insulation, dyes, and starch/flour.	Common in freshwater marshes in the region. Known to occur on site.	C	R	
<i>Acacia dealbata</i> silver wattle	CalEPPC	Woodland, riparian and scrub habitats	Occurs sporadically in the greater San Francisco Bay region and other parts of California	Regional occurrence unknown. Two trees recorded on the project site in an eroded gully in the lower hillslopes north of Highway 37.	C		
<i>Bellardia trixago</i> Mediterranean linseed	CalEPPC List B	Seasonally moist grasslands	Occurs in scattered areas throughout the greater San Francisco Bay region.	Known from the region. Occurs in moderate abundance within moist grasslands throughout the watershed.	C	R	

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SPECIES <sup>1</sup>	STATUS & CULTURAL SIGNIFICANCE <sup>2</sup>	PREFERRED HABITAT <sup>3</sup>	RANGE <sup>4</sup>	PROJECT REGION OCCURRENCES <sup>5</sup>	PROJECT SITE OCCURRENCE		
					KNOWN	HIGH POT.	MOD. POT.
<i>Brassica nigra</i> black mustard	CalEPPC List B	Grasslands, disturbed areas.	Occurs through the greater San Francisco Bay region and other areas of California	Scattered stands documented within hillslope grasslands and eroded gullies on project site. Dense stands around dairy complex.	C	R	
<i>Carduus pycnocephalus</i> Italian thistle	CalEPPC List B	Moist grassland and riparian areas	Occurs throughout most of lowland California.	Known from grasslands, riparia habitats, stream environments throughout region. Occurs widely but in low abundance on poject site in grassland, stream and riparian habitats.	C	R	
<i>Cynara cardunculus</i> wild artichoke, cardoon	CalEPPC List A-1, CDFA B	Disturbed places <500m; occurs in coastal grasslands and rangelands, also inland in disturbed grasslands and abandoned agricultural fields	Occurs throughout much of cismontane California and other western states.	Known from region and project site. Concentrated on hilltops in the upper northeast portion of the watershed and along stream floodplains below these hills on project site.	C		R
<i>Centaurea calcitrapa</i> purple starthistle	CalEPPC List B, CDFA B	Disturbed places, usually < 1000 m; common within coastal annual grasslands and rangelands	Occurs throughout much of California, particularly abundant in the SF Bay Area and north into Marin, Solano, Napa, and Sonoma Counties.	Common in the region and on project site. Concentrated on low alluvial fans near Highway 37 on the project site.	C	R	
<i>Centaurea solstitialis</i> yellow star-thistle	CalEPPC List A-1, CDFA C	Particularly invasive in coastal grasslands	Most widely distributed in the Sacramento and northern San Joaquin valleys, Inner North Coast Ranges, northern Sierra Nevada foothills, Cascade and Klamath ranges, and the central-western regions of the state (Hickman 1993).	Common in the region. Occurs on site, mostly on eroded slopes within gullies but also in a scattered hillslope areas. Widespread and increasing in diked baylands of the study area, including adjacent parcels.	C	R	
<i>Cirsium vulgare</i> bull thistle	CalEPPC List B	Coastal grasslands; fresh and brackish marsh edges	Widespread throughout California	Occurs in the region. Occurs in low abundance in widely scattered sites on the project site.	C	R	
<i>Eucalyptus globulus</i> blue gum	CalEPPC List A-1	Riparian areas, grasslands, and on moist slopes.	Thrives in Mediterranean-type climates. Most widely planted in central coast locations but found below 1,000 feet elevation in the north, central, and south coasts, and inland throughout the Central Valley	Occurs in the region and on the project site.	C		
<i>Foeniculum vulgare</i> fennel	CalEPPC List A-1	Seasonally moist grassland, scrub, and riparian habitats. Often in distrubed areas	Widespread throughout central and northern coastal California	Common in the project region. Dense stands occur along Highway 37 right-of-way bordering the site. Sporadic occurrences within grasslands and upper stream banks.	C	R	
<i>Genista monspessulana</i> French broom	CalEPPC List A-1	Shrub, woodland, and grassland habitats, often in distrubed areas such as road sides and trail sides	This plant occurs throughout the greater San Francisco region.	Common in the project region. One localized stand documented on the project site in an eroded gully in the lower hillslopes north of Rte 37.	C		

**Table 3. List of special-status, culturally-significant, and invasive wildlife and plant species known or with moderate or high potential to occur on or in the vicinity of the Sears Point project site**

SPECIES <sup>1</sup>	STATUS & CULTURAL SIGNIFICANCE <sup>2</sup>	PREFERRED HABITAT <sup>3</sup>	RANGE <sup>4</sup>	PROJECT REGION OCCURRENCES <sup>5</sup>	PROJECT SITE OCCURRENCE		
					KNOWN	HIGH POT.	MOD. POT.
<i>Mentha pulegium</i> pennyroyal	CalEPPC List A-2	Seasonal wetlands	This plant occurs throughout the greater San Francisco region.	Known from the region. Occurs in scattered areas on the project site primarily around seeps and the margins of bayland seasonal wetlands.	C	R	
<i>Rubus discolor</i> Himalayan blackberry	CalEPPC List A-1	Riparian habitats	This plant is widespread in throughout much of California	Common in the project region. One shrub found on a north-facing eroded slope in the central upper watershed.	C		R
<i>Taeniatherum caput-medusae</i> medusahead	CalEPPC List A-1	Grasslands	The plant is common in grasslands within the greater San Francisco Bay region and elsewhere in California where it is a serious invasive species.	Common is scattered to dense stands on clay soils in northern and northeastern areas of the watershed. Uncommon elsewhere on site.	C	R	
<i>Lepidium latifolium</i> broad-leaved pepperweed	CalEPPC List A-1, CDFA B	Brackish, saline or alkaline wetlands, unplanted agricultural fields with saline or alkaline conditions	The plant is well-established in the San Francisco Bay and Delta systems, where it forms monospecific stands.	Present in fringing tidal marshes and levees throughout the study area. Dense occurrences around the dairy complex. Sporadic occurrences in vernal pools and other seasonal wetlands.	C	R	

1. Scientific names corresponds to Hickman (1993), common names correspond to Hickman (1993) and Abrams (1940).

2. Special-status species listing status: FE = federally listed as endangered; FT = federally listed as threatened; FT\* = proposed for federal listing as threatened; FSC = federal species of concern; CE = state listed as endangered; CT = state listed as threatened; CR = state listed as rare; CSSC = state species of special concern; CI=Culturally and/or commercially important; DFGFP = California Department of Fish and Game fully protected species; MNBMC = migratory non-game bird of management concern; CNPS 1B = listed as rare, threatened, or endangered in California and elsewhere by the California Native Plant Society; CNPS 3 = listed as a species about which we need more information -- a review list - by the California Native Plant Society.

Invasive plant CALEPPC status: CalEPPC List A-1: Most Invasive Wildland Pest Plants; Widespread/ List A-2: Most Invasive Wildland Pest Plants; Regional/ List B: Wildland Pest Plants of Lesser Invasiveness CDFA List B: Noxious Weeds that are more widespread, and therefore more difficult to contain; agency allows county Agricultural Commissioners to decide if local eradication or containment is warranted. CDFA List C: Noxious Weeds that are so widespread that the agency does not endorse state or county-funded eradication/containment efforts except in nurseries or seed lots.

3. Habitat/Notes from CNPS (2005), Hickman (1993), CNDDDB (2005), Munz and Keck (1960), Abrams (1940).

4. Range information from Hickman (1993), CNPS (2005), CNDDDB (2005).

5. Regional occurrence data from CNPS (2005), CNDDDB (2005).

**Table 4. Alternatives Overview, Diked Baylands Landscape Unit**

Feature	Alternative within Diked Baylands Landscape Unit		
	1 Full Tidal	2 Muted Tidal	3 Non-Tidal
<b>Where to Find Information in This Plan</b>			
Design Overview	Figure 11		
Design Descriptions	Section 6.2	Section 6.3	Section 6.4
Design South of Rail	Figure 12		
Design Rail to 37	Figure 20	Figure 25	Figure 31
Design North of 37	Figure 23		
<b>Size</b>			
Total wetland acreage	1374 ac	1344 ac	1115 ac
South of Railroad, Tidal	957 acres		
Railroad to Hwy 37	Tidal, 365 acres	Muted tidal, 285 ac Non-tidal, 50 ac	Non-tidal, 106 ac
North of 37, Non-tidal	40 ac		
Maximum inundation elevation, Railroad to Hwy 37 (ft NAVD)	8	3	1
<b>Tidal Marsh Features</b>			
Breaches	4		
Pilot channels	68,000 linear feet 148 acres	51,000 linear feet 115 acres	51,000 linear feet 114 acres
Marsh nuclei	Greatest number	Lesser number	
Sidecast ridges	Greatest number	Lesser number	
Ditch blocks	22	15	
Habitat levees	Up to 4.8 mi	Up to 2.3 mi tidal edge; Up to 2.5 mi muted tidal edge	Up to 2.3 mi tidal edge
Hydrology crossing at railroad	Box culvert or bridge, unimpeded tides, full two-way flows (north ↔ south)	Culvert arrays (see muted marsh below)	Pump south into tidal marsh
<b>Muted Marsh Features</b>			
Inundation range	NA	1.5 to 2.5 feet with allowance for episodic higher water events	NA
Culverts	NA	2 culvert arrays beneath existing rail line: 20 drain-only pipes @ 3ft diameter with flap gates, invert 0'; 2 flood-drain open pipes @ 2ft diameter, invert -0.5'	NA

**Table 4 (cont). Alternatives Overview, Diked Baylands Landscape Unit**

Feature	Alternative within Diked Baylands Landscape Unit		
	1 Full Tidal	2 Muted Tidal	3 Non-Tidal
<b>Non-Tidal Diked Marsh Features</b>			
<b>A) North of Highway 37</b>			
Connection west	Via culvert 24 under Lakeville Highway and extended ditch on Site between culvert and existing ditch. Culvert 24 may need to be enlarged		
Connection north	Option 1: Berm and pump from 82-acre catchment to maintain lands north of wetlands drained and to allow Project control of water levels in wetland Option 2: Retain existing open connection to 82-acre catchment, not allowing Project to control water levels in wetland		
Connection east	Most flow captured by Ditch 2 to each and routed south under Highway 37		
Connection south	Culverts 4, 5, 6, and 67 under Highway 37		
Surface soils	Remove manure-infused surface soils		
Shallow depressions	Grade new depressions after remove soil		
<b>B) South of Highway 37</b>			
Modified agricultural practices	NA	NA	Limit timing of discing in 106-acre northwest portion; possible periodic one-season fallowing
Brackish sump pond	NA	NA	At southeast corner near pump station at culvert 17
Agricultural ditch maintenance	NA	NA	Spread excavated soils <0.5' thick
Storm water flow to pumps	New ditch south side of Hwy 37 collecting inflow from Culverts 4, 5, 6 and 67	Culverts 4 and 5 drain through seasonal wetlands to pump at Reclamation Road; culverts 6 and 67 drain into muted tidal marsh with auxiliary pump at rail	Existing agricultural ditches maintained; two pumps relocated to rail line at culverts 3/15 and 17
Berm at Highway 37/Reclamation Road corner	NA	Berm separates 50 acres of existing seasonal wetlands from remaining restored muted tidal marsh	NA
<b>General Features</b>			
<b>A) Type of Wetlands at Natural Wetland-Upland Interface in Portion of Site Between Highway 37 and Rail Line</b>			
Wetland type	Tidal marsh	Muted marsh	Non-tidal marsh
<b>B) New Flood Control Levee Top Elevations (ft NAVD)</b>			
Parallel to rail line, south (bayward) side	12		
Parallel to rail line, north (Highway 37) side	12	6	NA
Along Reclamation Road and Highway 37	12	6	NA

**Table 4 (cont). Alternatives Overview, Diked Baylands Landscape Unit**

Feature	Alternative within Diked Baylands Landscape Unit		
	1 Full Tidal	2 Muted Tidal	3 Non-Tidal
<b>C) Stormwater Runoff</b>			
Drainage achieved via gravity and/or pumping?	Mix of gravity and pumps		
Direction of stormwater discharge	West to Petaluma River pump and south to Sears Point pump		
Size of gravity-drained contributing watershed	463 ac	493 ac	0 ac
Size of pump-drained contributing watershed	771 ac	821 ac	1,674 ac
Number of pumps	1 primary pump	1 primary pump, 1 reserve pump	2 primary pumps
Location of and access to stormwater pump	Just south of Highway 37 at culvert 4; access via new flood control levee along Reclamation Road	Primary pump along Reclamation Road south segment from Hwy 37; reserve pump further east along Reclamation Road at rail line culvert 3/15	Reclamation Road eastern reach at rail line at culvert 3/15 and second station at culvert 17; access via existing Reclamation Road extended east
<b>D) Bay Trail</b>			
Connection from Sonoma Baylands to Refuge Headquarters	Parallel to Reclamation Road and Highway 37 atop new flood control levee	Similar to Alternative 1 but with new lower levee away from Hwy 37/Lakeville intersection	Along path at edge of Reclamation Road and Highway 37
East from Refuge Headquarters	Across existing uplands to overlook and crossing to flood control levee		
Parallel to rail line	Along railroad flood control levee (preliminary pending Bay Trail Study findings)		
<b>Operations and Maintenance</b>			
<b>A) South of Highway 37</b>			
Settlement of new flood control levees, rail line	Settlement expected with subsequent lifts as part of design		
Settlement of new flood control levees, Reclamation Road and Highway 37	Settlement expected with subsequent lifts as part of design		NA
Levee erosion	Early erosion possible until vegetation is well established; use of habitat levees intended to minimize erosion		
Stormwater pump	Regular O&M required, 1 pump	Regular O&M required, 2 pumps	
Culverts under rail line	Large concrete box culvert will require minor regular maintenance	Culvert array and connecting channel require regular maintenance	NA
Culverts under Highway 37 and Lakeville Highway	Regular maintenance required		

**Table 4 (cont). Alternatives Overview, Diked Baylands Landscape Unit**

Feature	Alternative within Diked Baylands Landscape Unit		
	1 Full Tidal	2 Muted Tidal	3 Non-Tidal
Ditches	New ditch immediately south of Hwy 37 will require periodic maintenance, ~2,500ft total length	New and existing ditches south of Hwy 37 will require periodic maintenance, ~4,500ft total length	Existing ditches south of Hwy 37 will require periodic maintenance, ~14,000ft total length
Vegetation management	Wetland-upland transition zone may require early maintenance	Required for non-tidal component and possibly for muted tidal	Required; incorporated into retained agricultural activities
<b>B) North of Highway 37</b>			
Ditches	New and existing ditches will require periodic maintenance		
Vegetation management	Required; could be included as an element in watershed grazing plan		

**Table 5. Expected noxious (high local impact threat) invasive non-native plants in restored tidal marsh habitats at Sears Point**

<b>Common name</b>	<b>Botanical name</b>	<b>Growth form</b>	<b>Local status (2007)</b>	<b>Potential habitats on site</b>
<b>A) Maximum likelihood</b>				
<b>Australian bentgrass</b>	<i>Agrostis avenacea</i>	Perennial bunchgrass	Locally abundant adjacent to site	Tidal marsh edge/high tide line
<b>Stinkweed</b>	<i>Dittrichia graveolens</i>	Annual erect forb; resinous	Rapid invasions adjacent to site	Tidal marsh edge/high tide line, levees, roadsides, disturbed ground
<b>Perennial (broadleaf) pepperweed</b>	<i>Lepidium latifolium</i>	Perennial, clonal, erect forb	Established on site and in adjacent tidal marshes	Upper intertidal marsh zone, tidal marsh edge, levees
<b>Hybrid Atlantic smooth / Pacific cordgrass</b>	<i>Spartina alterniflora</i> x <i>foliosa</i>	Perennial, clonal and erect coarse grass	Currently rare in San Pablo Bay; active regional control program	Low to high intertidal marsh zones
<b>B) Low likelihood</b>				
<b>Russian wheatgrass</b>	<i>Elytrigia pontica</i>	Perennial bunchgrass	Rare in San Pablo Bay (Mare Island)	Levees, high tide line
<b>Chilean cordgrass</b>	<i>Spartina densiflora</i>	Perennial evergreen bunchgrass	Rare in San Pablo Bay (San Rafael)	High tidal marsh zone
<b>C) Other expected wetland weeds with potential abundance in restored tidal marsh habitats at Sears Point (low to moderate local impact threat)</b>				
<b>Wild asparagus</b>	<i>Asparagus officinalis</i>	Perennial, short-creeping, erect forb	Present but scarce in brackish Tolay Creek marshes	High brackish marsh zone
<b>Australian saltbush</b>	<i>Atriplex semibaccata</i>	Perennial taprooted prostrate forb	Present but scarce, levees around site	Levees, high tide line
<b>Brass-buttons</b>	<i>Cotula coronopifolia</i>	Perennial, low-growing forb	Present throughout region's tidal marshes; short-lived abundance	High marsh zone
<b>Goosefoot</b>	<i>Chenopodium chenopodioides</i> , <i>C. macrospermum</i> var. <i>halophyllum</i>	Erect to spreading annual forb	Recent reports of significant increase restored salt marsh of Napa salt ponds	High marsh zone, drift-lines
<b>Bird's-foot trefoil</b>	<i>Lotus corniculatus</i>	Perennial taprooted low-growing forb	Widespread in diked baylands;	High marsh zone and ecotone
<b>Common reed</b> (non-native genetic strains only; native populations may occur)	<i>Phragmites australis</i>	Perennial clonal tall grass	Infrequent to rare (Sonoma Baylands), but increasing regionally	High brackish marsh zone (growth restricted in salt marsh)
<b>Rabbit's-foot grass</b>	<i>Polygomon monspeliensis</i>	Annual bunchgrass	Present throughout region's tidal marshes; short-lived abundance	Disturbed patches or depressions in high marsh

**Table 6  
Preliminary Construction Cost Estimates, Diked Baylands Landscape Unit  
Sears Point Restoration Project**

Item	Full Tidal, Raised Rail		Muted Tidal		Non-Tidal	
	Low	High	Low	High	Low	High
<b>Phase I Construction General</b>						
mobilization and demobilization, bonds, post-construction surveys		\$685,000		\$595,000		\$535,000
<b>Levee Earthwork South of/Underneath Rail Line</b>						
Fully raise RR						
w/ erosion levees	\$4,085,691					
w/ habitat levees		\$5,048,438				
Muted or no tides north of RR						
w/ erosion levees			\$5,232,152		\$5,232,152	
w/ habitat levees				\$6,081,704		\$6,081,704
<b>Railroad Base Costs</b>						
Remove and stockpile rail/ties, construct at-grade crossings, construct track w/ existing materials, new ballast/subballast, foundation pilings)		\$2,390,831				
<b>Culverts/Bridges</b>						
Box culverts or bridge, full tidal <sup>1</sup>		\$2,400,000				
Culverts bored through rail bed, muted tidal				\$1,940,000		
<b>Levee Earthwork North of Rail Line</b>						
Full tidal (to +12 ft NAVD)						
w/ erosion levees	\$1,820,298					
w/ habitat levees		\$2,117,567				
Muted tidal (to +6 ft NAVD)						
w/ erosion levees			\$745,368			
w/ habitat levees				\$1,329,368		
<b>Tidal Marsh Restoration Features</b>						
Sidecast ridges, mounds, ditch blocks						
south of rail line		\$142,700		\$142,700		\$142,700
north of rail line		\$71,350				
<b>Muted Marsh Restoration Features</b>						
Subtidal ponds and channels						
north of rail line				\$1,600,000		
<b>Seasonal Wetland Enhancement Features</b>						
Brackish sump pond, marshy grassland areas, low berms, new ditch, riparian excavations, raised levee near Reclamation Road						
north of rail line						\$293,200
<b>Utility Relocation and Connection</b>						
Relocate PG&E poles, stormwater pumps, culverts, ditches, access road to pumps						
south of rail line		\$180,000		\$180,000		\$180,000
north of rail line		\$494,800		\$927,200		\$866,500
<b>Bay Trail</b>						
Assumes construction of all optional trail segments		\$950,000		\$1,154,000		\$1,154,000
<b>Site Remediation Oversight</b>						
Soil excavation oversight		\$36,000		\$36,000		\$36,000
<b>Miscellaneous items</b>						
Common to all alternatives (soil removal and grading north of Highway 37; new ditch north of Highway 37, north of Highway 37 berm/pump, prevegetation south of rail line)		\$656,100		\$656,100		\$656,100
<b>Restoring Tidal Action</b>						
Breaches, dredging of Tolay Creek, dredging to Petaluma River Navigation Channel		\$2,220,400		\$2,220,400		\$2,220,400
<b>Indirect Capital Costs</b>						
response to comments, plans + specs development, construction quality testing, construction management, project management		\$940,000		\$940,000		\$940,000
<b>CONSTRUCTION TOTALS</b>	<b>\$17,073,170</b>	<b>\$18,333,186</b>	<b>\$16,368,920</b>	<b>\$17,802,472</b>	<b>\$12,256,052</b>	<b>\$13,105,604</b>
<b>20% Contingency</b>	<b>\$3,414,634</b>	<b>\$3,666,637</b>	<b>\$3,273,784</b>	<b>\$3,560,494</b>	<b>\$2,451,210</b>	<b>\$2,621,121</b>
<b>COST ESTIMATE TOTALS</b>	<b>\$20,487,804</b>	<b>\$21,999,823</b>	<b>\$19,642,703</b>	<b>\$21,362,966</b>	<b>\$14,707,262</b>	<b>\$15,726,724</b>

Railroad Upgrade Costs<sup>2</sup> \$1,262,600 \$1,262,600

Bypass Railroad Track<sup>3,4</sup> \$50,000,000 \$50,000,000

**NOTES:**

- Estimates for both a bridge and a culvert structure were similar enough to justify use of the same cost.
- Costs negotiable with SMART.
- If Alt 1 is implemented without rail operation, costs as shown apply. If Alt 1 is implemented when rail is in operation, then the bypass track (cost estimate provided by SMART) would need to be constructed.
- If Alt 3 is implemented initially with future phasing of Alt 1, would require construction of a second flood control levee to +12 north of the rail line and a smaller bypass track.
- Operations and maintenance costs not included

**Table 7. Alternative Comparison Matrix for Diked Baylands Landscape Unit**

Opportunities, Constraints and Design Objectives	Alternatives			
	1 - Full Tidal	2 - Muted Tidal	3 - Non Tidal	No Action
<b>PART 1) OPPORTUNITIES AND CONSTRAINTS (Report Chapter 5)</b>				
<b>Part 1A) Key Factors (Report Section 5.1)</b>				
<b>Ecological Resources (Report Section 5.1.1)</b>				
Special-status species <u>south of RR</u>	Would restore about 960 acres of tidal marsh. Primary benefits to California clapper rail and black rail habitat with salt marsh harvest mouse habitat over time. Secondary benefits to northern harrier, saltmarsh common yellowthroat, San Pablo song sparrow, long-billed curlew, all fish species	Same as Alternative 1	Same as Alternative 1	No preservation, creation or enhancement of habitat for special status species
Special-status species <u>RR to Highway 37</u>	Would restore greatest number of acres of tidal wetlands north of rail line (approx. 365 acres) and extensively integrate winter freshwater inflows. Same species benefits as for south of RR plus rare plants along wetland-upland transition	Would restore 285 acres to muted tides. Benefit black rail, salt marsh harvest mouse. Could favor California red-legged frog in wetter years. Secondary benefits to tricolored blackbird, white-tailed kite, saltmarsh common yellowthroat, San Pablo song sparrow, and small spikerush	Would create 106-acre wetlands priority area around existing farmed seasonal wetlands with modified ongoing agriculture. Primary benefits to saline clover, small spikerush, long-billed curlew, northern harrier	No preservation, creation or enhancement of habitat for special status species
Special-status species <u>north of Highway 37</u>	Would enhance about 40 acres of diked seasonal wetlands. Benefits saline clover, northern harrier, long-billed curlew, and small spikerush	Same as Alternative 1	Same as Alternative 1	No preservation, creation or enhancement of habitat for special status species
Preserving existing seasonal wetlands <u>RR to Highway 37</u>	Most existing seasonal wetlands north of the rail line would be replaced by tidal marsh	Some existing seasonal wetlands north of rail line would be preserved and some replaced by muted tidal marsh; would create highly diverse system; would have long-term maintenance needs	California red-legged frog and vernal pool species would benefit through preservation and enhancement	Existing resources would be preserved, but not enhanced
<b>Topography (Report Section 5.1.2)</b>				
Need for dredge materials	None	None	None	None
Restoration/reconnection of upland-marsh edge ecotone at natural geomorphic position	Yes, tidal marsh would connect with alluvial fan between rail and Hwy 37	Yes, brackish marsh would connect with alluvial fan between rail and Hwy 37	None	No change from current conditions
Creation of new upland-marsh edge ecotone along new levee slopes	4.8 miles of full tidal ecotone	2.4 miles of full tidal ecotone, 2.4 miles of muted tidal ecotone	2.4 miles of full ecotone	No new levees, thus, no new upland-marsh edge created

**Table 7. Alternative Comparison Matrix for Diked Baylands Landscape Unit**

Opportunities, Constraints and Design Objectives	Alternatives			
	1 - Full Tidal	2 - Muted Tidal	3 - Non Tidal	No Action
<b>Flood Protection (Report Section 5.1.3)</b>				
Levees	See 5.1.4, Infrastructure, below.	See 5.1.4, Infrastructure, below.	See 5.1.4, Infrastructure, below.	See 5.1.4, Infrastructure, below.
Stormwater pumping	Gravity-drained watershed of 463 acres; ongoing pumping of stormwater runoff for 771 acres is least catchment area to pump for all alternatives, leading to lowest relative O&M costs over the long term	Gravity-drained watershed of 493 acres; ongoing pumping of stormwater runoff for 821 acres. Plus reserve pump in muted tidal marsh in the event that culvert arrays cannot drain major storm runoff. O&M costs over long term intermediate relative to Alternatives 1 and 3	Gravity-drained watershed of 0 acres; ongoing pumping of stormwater runoff for 1,674 acres is greatest catchment area to pump for all alternatives (except no action), leading to highest O&M costs over the long term	Same as existing conditions; regular and ongoing and maximum pumping volumes
Water-control structures (tidegates, flaggates, screw gates, weirs, etc.)	Structure needed for diked baylands N of Highway 37; structures not needed south of Highway 37	Major structures would be required under the rail line; structure for diked baylands N of Highway 37	Structure for diked baylands N of Highway 37	Need to maintain existing water control structures
Storm water conveyance ditches/channels	Rain water would be collected in all tidal marsh south of Hwy 37; existing or reconfigured ditches would be utilized north of Hwy 37; about 2,500 ft of ditch will have to be maintained	Rain water would be collected in part of tidal marsh south of rail line; existing and reconfigured from the rail line to Hwy 37; existing or reconfigured N of Hwy 37; about 4,500 ft of ditch will have to be maintained	Rain water would be collected in part of tidal marsh south of rail line; existing or reconfigured N of rail line and N of Hwy 37; about 14,000 ft of ditch will have to be maintained	Need to maintain all existing agricultural drainage ditches
<b>Infrastructure (Report Section 5.1.4)</b>				
Rail line flood protection	Raise rail line entire length of Site; raised line extends west off Site 2, 100 ft to meet rail slope requirements. Design height +12ft NAVD88	Construct new flood protection levee south of and parallel to rail line entire length of site. Design height +12 ft NAVD88	Same as Alternative 2	No change from current conditions
Rail line alignment	No change from existing	Same as Alternative 1	Same as Alternative 1	No change from current conditions
Rail line maintenance access	Access road provided along south side of tracks	No change from current conditions	Improved from current conditions through extension of Reclamation Road to relocated pump station at culvert 17	No change from current conditions
Highway 37 and Reclamation Road flood protection	5,900 ft of new levee from Reclamation Road junction with rail line north and east to Sears Point Ranch facility on Highway 37. Design height +12 ft NAVD88	5,600 ft of new levee from Reclamation Road junction with rail line north and east to Sears Point Ranch facility on Highway 37. Design height +6 ft NAVD88	No change from current conditions	No change from current conditions
Stormwater runoff pump stations	One relocated pump station, at southeast corner of Highway 37/Lakeville Highway intersection	One relocated primary pump station along Reclamation Road south of Highway 37. Second relocated "reserve" pump station located along Reclamation Road adjacent to rail line at culvert 3/15	Two relocated pump stations on extended Reclamation Road adjacent to rail line, one at culvert 3/15 and second at culvert 17	No change from current conditions

**Table 7. Alternative Comparison Matrix for Diked Baylands Landscape Unit**

Opportunities, Constraints and Design Objectives	Alternatives			
	1 - Full Tidal	2 - Muted Tidal	3 - Non Tidal	No Action
<b><i>Invasive Pest Species (Report Section 5.1.5)</i></b>				
Wetland plants	Tidal, muted, and diked seasonal wetland non-native invasive plant species will be monitored, pre-emptive plantings employed in some instances, and controlled where invasions occur.	Same as Alternative 1	Same as Alternative 1	No change from current conditions; could be done independently
<b><i>Public Access, Bay Trail, and Facilities (Report Section 5.1.6)</i></b>				
Bay Trail length	Up to about 5 miles of trail possible	Up to about 6 miles of trail possible	Same as Alternative 2	No new Bay Trail
Potential alignment	Trail spine would follow Reclamation Road and Highway 37 corridors and possibly along south side of rail line	Same as Alternative 1 plus possible trail north side of rail line	Same as Alternative 2	No change from current conditions
<b>Part 1B) Additional Considerations (Report Section 5.2)</b>				
<b><i>Cultural Resources (Report Section 5.2.1)</i></b>				
Preservation of existing resources	Dickson Ranch buildings' potential historic value would be impacted and they could require relocation	Same as Alternative 1	Same as Alternative 1	No change from current conditions
Outreach education opportunities	Several	Same as Alternative 1	Same as Alternative 1	No change from current conditions; could be done independently
<b><i>Adjacent Properties and Land Uses (Report Section 5.2.2)</i></b>				
Tolay Creek	Alternative 1 would add largest volume of tidal prism to undersized Tolay Creek, relative to Alternatives 2 and 3	Alternative 2 would add less tidal prism to undersized Tolay Creek than Alternative 1	Alternative 3 would add less tidal prism to undersized Tolay Creek than Alternative 2	No change from current conditions
Sonoma Baylands	Alternative 1 could provide connectivity to Sonoma Baylands	Same as Alternative 1	Same as Alternative 1	No change from current conditions
Paradise Vineyards	Provide small relocated pump station at culvert 53; possible Bay Trail linkage with future proposed winery	Same as Alternative 1	Same as Alternative 1	No change from current conditions
Infineon Raceway	Would not impact the raceway	Would not impact the raceway	Would not impact the raceway	No change from current conditions
Silva property	To provide ongoing stormwater drainage for Silva property, two options: (1) construct berm and a pump, or (2) operate pump station south of Highway 37 for Silva property drainage, adversely affecting 40 acres of seasonal wetlands enhancement north of Highway 37	Same approach as Alternative 1 but adverse effects to additional 50 acres of seasonal wetlands enhancement south of Highway 37	Same approach as Alternative 1 but adverse effects to additional 106 acres of seasonal wetlands enhancement south of Highway 37	No change from current conditions
North Parcel/Leonard Ranch	Seasonal wetlands north Highway 37 would connect to North Parcel under Lakeville Highway	Same as Alternative 1	Same as Alternative 1	No change from current conditions
<b><i>Utility Corridors (Report Section 5.2.3)</i></b>				
Alignment	Reroute existing utility lines south of Highway 37; maintain alignment across Tolay Creek to Lower Tubbs Island	Same as Alternative 1	Reroute existing utility lines south of rail line only; maintain alignment across Tolay Creek to Lower Tubbs Island	No change from current conditions

**Table 7. Alternative Comparison Matrix for Diked Baylands Landscape Unit**

Opportunities, Constraints and Design Objectives	Alternatives			
	1 - Full Tidal	2 - Muted Tidal	3 - Non Tidal	No Action
Fiber optic cable in RR bed	Accommodations must be made to preserve the fiber optic cable located within and parallel to the rail line.	Same as Alternative 1	Same as Alternative 1	No change from current conditions
Two PG&E towers south of Highway 37	Will be outside restoration area, so no change from current conditions	Same as Alternative 1	Same as Alternative 1	No change from current conditions
<b>Future Sea-Level Rise (Report Section 5.2.4)</b>				
Mitigating measures for sea-level rise	Flood protection levees provide for 0.5ft of sea level rise over 50-year planning horizon	Same as Alternative 1	Same as Alternative 1	No mitigation measures would be implemented; existing outboard levees would require periodic increases in height
<b>Hunting Activities (Report Section 5.2.5)</b>				
Black Point Sports Club	Existing game bird hunting would cease; the project includes potential for new hunting and fishing opportunities in site vicinity	Same as Alternative 1	Same as Alternative 1	No change from current conditions
<b>Contaminated Soil Remediation (Report Section 5.2.6)</b>				
Integration into restoration	Corrective Action Plan places excavated soils into core of flood protection levee along rail line; minimum 3-foot cover	Same as Alternative 1	Same as Alternative 1	No remediation would occur
<b>Mercury Methylation (Report Section 6.2.7)</b>				
Potential for mercury methylation	Largest area exposed to tidal marsh restoration, represents the greatest relative potential for mercury methylation	North of rail muted tidal marsh may presents similar opportunity for mercury methylation as would tidal marsh	Less wetland area restored that could create opportunity for mercury methylation, relative to Alternatives 1 and 2	Project would not contribute new mercury methylation beyond current conditions
<b>Mosquito Production (Report Section 5.2.8)</b>				
Mosquitoes	Presents least need for regular mosquito control	Control needs may be more that Alternative 1, but depends on design and management	Control needs likely more than Alternatives 1 or 2, but depends on design and management	Same as current needs, which are likely greater than under any restoration alternative due to removal of drainage ditches
<b>Agricultural Conversion (Report Section 5.2.9)</b>				
Farming	Farming would be discontinued south of Highway 37; this alternative represents the greatest net loss of agricultural land	Same as Alternative 1	Farming would be retained between Highway 37 and rail line, with modified practices to enhance seasonal wetlands; 106-acre wetland priority area would be limited to one crop annually	Retain ongoing farming
Ranching	Ranching would be discontinued south of Highway 37 in lands restored to tidal action; adjacent upland uses would undergo improved rangeland practices to improve wetland compatibility	Same as Alternative 1	Retain ongoing ranching on all existing rangeland acreage with modifications to practices to enhance ecological outcomes.	Retain ongoing ranching with modifications to practices to enhance ecological outcomes.

**Table 7. Alternative Comparison Matrix for Diked Baylands Landscape Unit**

Opportunities, Constraints and Design Objectives	Alternatives			
	1 - Full Tidal	2 - Muted Tidal	3 - Non Tidal	No Action
<b>Highway 37 and Lakeville Widening (Report Section 5.2.10)</b>				
Future plans	Major proposed facilities (i.e., levees) will remain out of the right-of-ways and required setbacks	Same as Alternative 1	Same as Alternative 1	No new facilities would be constructed
<b>Refuge Headquarters Access Road (Report Section 5.2.11)</b>				
Construct new access road	This road has been removed from consideration as part of the project due to potential wetlands impacts; it could be considered as a stand-alone project independent of the restoration project	Same as Alternative 1	Same as Alternative 1	The access road could be considered as a stand-alone project independent of the restoration project
<b>Part 2) DESIGN GOALS (Report Section 6.1)</b>				
<b>Support Special Status Species Recovery (Report Section 6.1.1)</b>				
	See 5.1.1, Ecological Resources, above; would provide most habitat for California clapper rail, black rail, salt marsh harvest mouse; uplands restoration would provide California red-legged frog	See 5.1.1, Ecological Resources, above; would provide large amount of habitat for California clapper rail, black rail, salt marsh harvest mouse; uplands restoration would provide California red-legged frog	See 5.1.1, Ecological Resources, above; would provide least relative amount of habitat for California clapper rail, black rail, salt marsh harvest mouse; non-tidal wetlands, uplands restoration would provide California red-legged frog	See 5.1.1, Ecological Resources, above
<b>Support Other Species (Report Section 6.1.2)</b>				
	See 5.1.1, Ecological Resources, above; greatest amount of aquatic habitat creation; restoration, enhancement and management would support a wide variety of aquatic and terrestrial species	See 5.1.1, Ecological Resources, above; intermediate relative amount of aquatic habitat creation; restoration, enhancement and management would support a wide variety of aquatic and terrestrial species	See 5.1.1, Ecological Resources, above; least relative amount of aquatic habitat creation; restoration, enhancement and management would support a wide variety of aquatic and terrestrial species	See 5.1.1, Ecological Resources, above
<b>Maximize Extent of Tidal Action (Report Section 6.1.3)</b>				
	Achieves maximum amount of full tidal action -- about 1320 acres	Achieves intermediate amount of overall tidal action -- 957 acres of full tidal and 285 acres of muted tidal	Achieves least amount of full tidal action -- about 957 acres	No change from current conditions; no new tidal restoration would occur
<b>Establish Wetlands-Compatible Agriculture and Rangeland Practices where These Lands Uses Are Ongoing (Report Section 6.1.4)</b>				
	Incorporates ranching practices improvements on adjacent uplands	Same as Alternative 1	Establishes suite of agricultural practices to improve compatibility of ongoing agriculture with seasonal wetlands	No change from current conditions
<b>Promote Long-Term Persistence (Report Section 6.1.5)</b>				
	Implementation of this alternative would result in a site with robust long-term persistence and least O&M	Would require greater O&M than Alternative 1 to maintain target conditions	Would require the greatest relative amount of O&M to maintain target conditions	No change from current conditions
<b>Protect and Restore Culturally Significant Plants (Report Section 6.1.6)</b>				
	Would allow for restoration of site-suitable culturally significant plants on site	Same as Alternative 1	Same as Alternative 1	No change from current conditions
<b>Maintain Existing Public Safety (Report Section 6.1.7)</b>				
	Would improve tidal flood protection levels by constructing modern flood protection levee	Same as Alternative 1	Same as Alternative 1	No change from current conditions

**Table 7. Alternative Comparison Matrix for Diked Baylands Landscape Unit**

Opportunities, Constraints and Design Objectives	Alternatives			
	1 - Full Tidal	2 - Muted Tidal	3 - Non Tidal	No Action
<b>Minimize Operations and Maintenance (Report Section 6.1.8)</b>				
Storm water pumps	Fewest number of pumps and/or smallest pumps needed, which would translate to the lowest relative operations and management cost	Medium number and/or size of pumps, would translate to intermediate relative operations and management cost	Large relative number and/or size of pumps, would translate to large relative cost	Maximum number and size of pumps (i.e., status quo); would be maximum relative O&M cost
Water control structures	Need is minimal, but structures will be necessary for seasonal wetlands north of Highway 37	Need is potentially significant depending on design and desire for adaptive management of unit between rail line and Highway 37	Draws upon existing infrastructure in most places, so most similar to No Action alternative	Large number of existing culverts and ag drainage ditches requiring ongoing maintenance
Levees	4.8 miles of levee; habitat levee slopes expected to generate minimum maintenance needs	Same as Alternative 1 though 2.4 miles of levee north of rail line may require less maintenance than levees south of rail as they would not be exposed to full tidal action	2.4 miles of levee; habitat levee slopes expected to generate minimum maintenance needs	4.2 miles of existing levee with steep slopes and borrow ditches have high maintenance needs; highest cost of all options
Vegetation	Wetland-upland transition focus; otherwise maintenance limited to seasonal wetlands north of Highway 37	Wetland-upland transition focus; limited to moderate degree of maintenance within muted marsh, maintenance of seasonal wetlands north of Highway 37	Ongoing agriculture south of Highway 37 provides vegetation management; seasonal wetlands north of Highway 37 will require some maintenance	Crops and grazing continue
<b>Provide Recreational Opportunities (Report Section 6.1.9)</b>				
Recreational opportunities	Would provide public access and recreational opportunities in a manner that is compatible with natural resources protection	Same as Alternative 1	Same as Alternative 1	No change from current conditions

**Table 8. Annotated List of Natural Resources of Management Interest within the Watershed Unit of the Sears Point Property.**

Resource	Management Focus <sup>1</sup>	Notes
<b><i>Special-Status Wildlife</i></b>		
California Red-legged Frog	A	Adult CRLF occur on the site, no evidence of breeding; construction of CRLF breeding ponds, riparian enhancements, control of bullfrogs proposed to establish a breeding CRLF population.
Myrtle's Silverspot Butterfly	B	May occur on site; Johnny-jump-up (host plant for larval feeding) is widespread in upper watershed; plant populations to be managed through general grazing management as described in the Grazing Management Plan.
Western Burrowing Owl	B	Wintering owls occur on site, no evidence of nesting; concrete debris provide burrow sites; grassland habitat to be managed through general grazing management as described in the Grazing Management Plan.
San Pablo Song Sparrow	B	Inhabits coyote brush scrub and emergent marsh habitats along San Pablo Bay margin; may utilize watershed especially if willow and scrub riparian habitats in stream lower reaches are improved.
Tricolored Blackbird	B	Not known from site; nests in dense emergent marsh and riparian scrub habitat; may utilize bay and stream marsh and scrub habitats once restored.
Foraging Raptors	B	Various foraging raptors occur in the watershed including golden eagles and marsh hawks; grassland habitat to be managed through general grazing management as described in the Grazing Management Plan.
<b><i>Special-Status Plants</i></b>		
Saline Clover	A	Occurs in lower watershed; habitat improved by heavier grazing; to be maintained through site-wide grazing management and placement of nutrient tubs to encourage heavier local grazing.
Johnny-jump-up	B	Dense stands on thin soils throughout upper watershed; stands to be managed through general grazing management as described in the Grazing Management Plan.
<b><i>Stream Corridors</i></b>		
Eroding Gullies	A	Most stream corridors on the site are experiencing intense head-cutting and side bank erosion; willow planting and livestock exclusion in proposed test areas may slow erosion.
Willow Riparian Stands	A	Current willow stands are small and widely scattered; limited livestock exclusion fencing, planting of willows and riparian shrubs are proposed to enhance stream corridor and wildlife habitat.
Floodplain Marshes	A	Floodplain marshes occur along the mid-reaches of larger streams in the northern watershed; to be managed as part of watershed-wide grazing management and some livestock exclusion.
Perennial/Seasonal Scour Pools	A	Scour pools occur along mid-reaches of larger streams, important for aquatic wildlife; to be managed as part of watershed-wide grazing management and some livestock exclusion.
Floodplain Terraces	B	Raised terraces bordering active stream floodplains; support several native plants not found elsewhere on site; to be managed through general grazing management as described in the Grazing Management Plan.
Actively Accreting Alluvial Fans	B	Accreting sand and gravel fans at the transition from steeper hill slopes to lower alluvial terrain; fans support a broad mix of native and non-native plants; to be managed as part of watershed-wide grazing management.
Floodplain Vernal Pools	B	Scattered vernal pools occur along stream reaches in off-channel scour areas and where two streams conjoin; to be managed through general grazing management as described in the Grazing Management Plan.

**Table 8. Annotated List of Natural Resources of Management Interest within the Watershed Unit of the Sears Point Property.**

<b>Resource</b>	<b>Management Focus<sup>1</sup></b>	<b>Notes</b>
Seasonally Saturated Annual Grasslands	B	Seasonally-saturated annual grasslands occur throughout much of the lower watershed, watered by flow from the stream corridors and direct rainfall; to be managed as part of watershed-wide grazing management.
<b><i>Grassland Seasonal Wetlands</i></b>		
Vernal Pools	B	Scattered vernal pools occur within the grasslands in low areas behind landslides and within potential sag ponds; to be managed through general grazing management as described in the Grazing Management Plan.
Seeps	B	Scattered seeps occur in the grasslands, primarily in the upper hill slopes; to be managed through general grazing management of as described in the Grazing Management Plan.
Alkali Seasonal Wetlands	B	Scattered alkali seasonal wetlands in the lower watershed below the historic baylands margin; to be managed through general grazing management of as described in the Grazing Management Plan.
Seasonally Saturated Annual Grasslands	B	Seasonally-saturated annual grasslands occur throughout much of the lower watershed, watered by flow from the stream corridors and direct rainfall; to be managed as part of watershed-wide grazing management.
<b><i>Upland Habitats</i></b>		
Annual Grasslands	B	Predominant upland habitat; provides habitat for a numerous common and special-status species including burrowing owl, sheltering CRLF, and foraging raptors; to be managed as part of watershed-wide grazing management.
Native Wildflower Fields	B	Stands of native wildflowers occur on weathered convex slopes, primarily in the upper watershed; to be managed through general grazing management of as described in the Grazing Management Plan.
Purple Needlegrass Stands	B	Purple needlegrass stands occur in scattered areas in the mid to upper watershed; to be managed through general grazing management of as described in the Grazing Management Plan.
Coastal Prairie Stands	B	Coastal prairie stands occur within the mid and upper watershed in areas with seasonally elevated moisture, such as seep margins and the toe of slopes; to be managed as part of watershed-wide grazing management.
<b><i>Invasive Wildlife Species</i></b>		
Bullfrogs	A	Adults occur along the larger stream corridors, no evidence of breeding; adults prey upon CRLF and other native aquatic wildlife; Silva property provides source population.
Breeding Mosquitoes	A	Mosquitoes can carry West Nile Virus and other pathogens of concern; mosquito larvae where found in low numbers in streams and ponds on site.
<b><i>Noxious Weeds</i></b>		
Artichoke Thistle	A	Dense stands occur along ridge tops, south-facing slopes on heavy clay soils in northern watershed; aerial herbicide treatments have greatly reduced stands; future aerial/manual treatments recommended.
Purple Star-thistle	A	Low to moderate density stands are widespread throughout lower hill slopes; recent aerial herbicide treatments have reduced stands; future herbicide treatments to be applied manually.
Yellow Star-thistle	A	Scattered stands on eroded slopes adjacent to stream corridors and in limited areas within the grasslands; potential for widespread infestation if not carefully managed; herbicide treatments recommended.

**Table 8. Annotated List of Natural Resources of Management Interest within the Watershed Unit of the Sears Point Property.**

Resource	Management Focus <sup>1</sup>	Notes
Himalayan Blackberry	<b>A</b>	A few scattered individuals occur on slopes adjacent to stream corridors in upper watershed; limited infestation could be easily eradicated and is recommended.
French Broom	<b>A</b>	One stand occurs on site, within an eroded stream channel east of the corrals and just north of Highway 37; limited infestation could be easily eradicated and is recommended.
Silver Wattle	<b>A</b>	One stand occurs on site, in the same eroded channel with French broom; limited infestation could be easily eradicated and is recommended.
Blue Gum	<b>A</b>	Scattered trees in diked baylands; this non-native tree is out of place in the baylands but does provide habitat for nesting raptors and monarch butterflies.
Medusahead	B	Dense stands on heavy clay soils in the northeast watershed, small scattered stands elsewhere difficult to control except through intensive controlled grazing and prescribed burns, neither of which are currently proposed.
Perennial Pepperweed	B	Scattered stands and individuals occur around the dairy complex and within seasonal wetlands; this weed has invaded marshes along San Pablo Bay over the past decade causing significant environmental degradation.
Fennel	B	Dense stands occur along the Highway 37 right-of-way east of the dairy complex; grazing appears to limit spreading onto the site; no specific management proposed.
Black Mustard	B	Scattered stands occur within the mid to upper watershed; no specific management proposed.
Italian Thistle	B	Widespread, low-density stands occur throughout much of the watershed; no specific management proposed.
Pennyroyal	B	Scattered dense stands occur around the margins of seeps and other seasonally wet areas; no specific management proposed.
Mediterranean Linseed	B	Widespread, low-density stands occur in the seasonally moist areas throughout mid and upper hill slopes; no specific management proposed.
Bull Thistle	B	Scattered, low-density stands occur in the seasonally moist areas throughout mid and upper hill slopes; no specific management proposed.
Yellow Glandweed	B	Widespread, moderate to high-density stands occur in the seasonally moist areas throughout mid and upper hill slopes; no specific management proposed.
Bristly Ox-tongue	B	Limited stands occur in scattered areas along stream edges and in seasonally wet areas throughout the watershed; no specific management proposed.
Milk Thistle	B	Small, scattered stands occur in seasonally moist areas within the watershed; no specific management proposed.

1. Management Focus: **A (Bold)** = Resource to be managed through specific direct actions; B (non-bold) = Resource to be managed indirectly through watershed-wide grazing management as described in the Grazing Management Plan, no other management proposed.

**Table 9. Primary Environmental Regulations Pertaining to Implementation of Plan Watershed Tasks.**

<b>Regulation</b>	<b>Responsible Agency</b>	<b>Regulated Resource(s)</b>	<b>Permit and Mitigation Requirements</b>	<b>Actions that Will Trigger Permit and Mitigation Requirements</b>
Section 404 of the Clean Water Act	U.S. Army Corps of Engineers	Jurisdictional wetlands and streams	Wetland Fill Permit required for impacting jurisdictional wetlands. Nationwide Permit for smaller wetland fill. Individual Permit for larger wetland fill. Typical mitigation requires avoidance measures to minimize impacts to existing wetlands and creation of new wetlands on or off site at a 2:1 creation to impact ratio.	Any grading or excavation within stream corridors, seasonal wetlands, seeps, or diked baylands would require a Section 404 permit. Development of new livestock watering sites in existing seeps may require COE consultation; fence construction across streams not likely to require permit if post holes are dug by hand.
Section 401 of the Clean Water Act	State Resources Control Board	Jurisdictional wetlands and streams; water quality	Water Quality Certification required for impacting jurisdictional wetlands or potential impacts to water quality from upland runoff of sediments from a construction project. Typical mitigation requires creation of new wetlands on or off site at a 2:1 creation to impact ratio. Typical mitigation requires avoidance measures to minimize impacts to existing wetlands or water quality and creation of new wetlands on or off site at a 2:1 creation to impact ratio.	Any other actions that impact jurisdictional wetlands or water quality may require consultation and possibly Section 401 certification including development of new livestock watering sites in existing seeps, fence construction across streams, and construction of CRLF breeding ponds. The Regional Water Quality Control Board is generally more stringent than COE in the Bay Area region.
Federal Endangered Species Act	U.S. Fish and Wildlife Service	Federal-listed Threatened or Endangered Species	Biological Opinion required for potential impacts to federally-listed threatened or endangered species. Can be achieved through either Section 7 or Section 10 consultation. Section 7 consultation, which is conducted via another federal agency issuing a permit (such as the Corps for wetland impacts), is the simpler methods. Section 10 consultation requires preparation of a site specific Habitat Conservation Plan for which it is difficult to gain approval. Mitigation for 'take' of listed species includes avoidance measures as possible and preservation/creation of replacement habitat for the species.	Any actions with the potential to impact California red-legged frog, Callippe silverspot butterfly (both federally listed species), or their potential habitats would require consultation with USFWS; fence construction across streams, riparian plantings, and construction of CRLF breeding ponds may require consultation.
State Endangered Species Act	California Department of Fish and Game	State-listed Threatened or Endangered Species	Take authorization required for potential impacts to state-listed threatened or endangered species. Mitigation for 'take' of listed species includes avoidance measures as possible and preservation/creation of replacement habitat for the species.	No state-listed species are known or likely to occur in the watershed.

<b>Regulation</b>	<b>Responsible Agency</b>	<b>Regulated Resource(s)</b>	<b>Permit and Mitigation Requirements</b>	<b>Actions that Will Trigger Permit and Mitigation Requirements</b>
Section 1600 Streambed Protection	California Department of Fish and Game	Creeks and Associated Riparian Woodlands and Wetlands	Streambed Alteration Agreement required for impacts to any creeks with defined beds or banks including small ephemeral creeks.	Any actions that impact a stream corridor may require consultation with CDFG and possibly a Streambed Alteration Agreement including fence construction across streams, and riparian plantings. CDFG tends to be very stringent in the Bay Area region.
California Environmental Quality Act (CEQA)	Designated Lead Agency (Federal, State or Local Government Agency)	All Environmental Aspects	Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report required for environmental impacts that trigger CEQA review. Mitigation is determined through the CEQA process and is usually consistent with mitigation required under other environmental permits.	It is unlikely that the proposed watershed management and enhancement activities will require CEQA review; if required, all should qualify for a Neg Dec.
Clean Air Act	Sonoma County Air Quality Management District	Air Quality	The County AQMD would need to be consulted and a permit obtained for any prescribed burns.	Prescribed burns.
Local Riparian Habitat Protection Ordinance	Sonoma County Planning Department	Riparian Woodlands and Forests	County permit required for potential direct or indirect impacts to riparian habitats. Indirect impacts occur within a buffer zone 50' from the edge of riparian habitat. Mitigation involves avoidance or reduction of impact if possible and protection/creation of replacement habitat if avoidance is not possible.	None of the proposed actions are expected to require a County permit.

**Table 10. Matrix comparing proposed management and enhancement activities and the objectives, special-status species, and sensitive habitats targeted by each activity**

Activity	Targeted Objectives	Targeted Special-status Species	Targeted Sensitive Habitats
CRLF Breeding Recovery and Habitat Enhancement	<ul style="list-style-type: none"> <li>• Conserve and enhance special-status species</li> <li>• Conserve and enhance stream corridor habitats</li> <li>• Manage annual grasslands as habitat and range</li> <li>• Eradicate or control invasive species</li> </ul>	<ul style="list-style-type: none"> <li>• California red-legged frog</li> </ul>	<ul style="list-style-type: none"> <li>• Stream Aquatic Habitats</li> </ul>
Riparian Woodland and Enhancement and Stream Channel Erosion Control	<ul style="list-style-type: none"> <li>• Conserve and enhance special-status species</li> <li>• Conserve and enhance stream corridor habitats</li> <li>• Control stream channel erosion</li> </ul>	<ul style="list-style-type: none"> <li>• San Pablo song sparrow</li> <li>• Foraging raptors</li> </ul>	<ul style="list-style-type: none"> <li>• Riparian Woodlands</li> </ul>
Upland and Seasonal Wetland Management and Enhancement	<ul style="list-style-type: none"> <li>• Conserve and enhance special-status species</li> <li>• Conserve and enhance stream corridor habitats</li> <li>• Conserve and enhance seasonal wetlands</li> <li>• Conserve and enhance sensitive upland habitats</li> <li>• Manage annual grassland as habitat and range</li> <li>• Eradicate or control invasive species</li> </ul>	<ul style="list-style-type: none"> <li>• Western burrowing owl</li> <li>• Callippe silverspot butterfly</li> <li>• Johnny-jump-up</li> <li>• Saline clover</li> <li>• Foraging raptors</li> </ul>	<ul style="list-style-type: none"> <li>• Vernal pools</li> <li>• Seeps</li> <li>• Alkali seasonal wetlands</li> <li>• Seasonally-saturated grasslands</li> <li>• Wildflower fields</li> <li>• Purple needlegrass stands</li> <li>• Coastal prairie stands</li> <li>• Stream lower reach floodplains</li> <li>• Alluvial fans</li> </ul>

**Table 11. Recommended Approaches to Monitoring the Success of Objectives and Tasks for the Management and Enhancement of the Sears Point Property Watershed.**

<b>OBJECTIVES</b>	<b>TASKS</b>	<b>TASK DESCRIPTIONS</b>	<b>MONITORING APPROACHES</b>
Objective 1: Construct and Manage Suitable CRLF Breeding Ponds (CP)	Task CP-1:	Identify Pond Construction Sites	Ponds will be constructed according to specific design standards that ensure sufficient depth and duration of ponding and protection of the ponds from excessive livestock impacts. Monitoring protocols should be developed in conjunction with design of the ponds depending on the intended function and source of funding. Monitoring should focus on adult CRLF and bullfrog detection through night spotlight surveys, and assessment of pond vegetation and ponding duration. Establish photo monitoring points to visually track changes in vegetation and pond conditions. Ponds constructed to provide mitigation will have much more rigorous monitoring.
	Task CP-2:	Prepare Pond Construction Plans	
	Task CP-3:	Obtain Permits/Approvals	
	Task CP-4:	Construct Ponds	Conduct on-going fence monitoring to ensure fence is kept in good repair (by ranch lessee and SLT land manager).
	Task CP-5:	Install Cattle Exclusion Fencing Around Constructed Ponds in Open Pastures	
	Task NW-5:	Prevent Herbicide Drift from Upland Weed Control	
Objective 2: Eradicate or Control Bullfrogs on and adjacent to the Site (BC)	Task BC-1:	Identify Nearby Ponds that Support Bullfrog Breeding	Conduct on-site night spotlight surveys to census bullfrogs along stream courses and constructed ponds targeted for control. Accurately census number and location of bullfrogs to document changes in abundance and use patterns. Surveys can be conducted twice annually, once in mid winter and once in late summer.
	Task BC-2:	Contact Landowners and Develop Off-site Control Measures	
	Task BC-3:	Identify On-site Control Measures if Off-site Control is not Feasible	Develop monitoring approaches for off-site locations consistent with individual site conditions.
	Task BC-4:	Implement Bullfrog Control Measures	
Objective 3: Conserve and Enhance CRLF Riparian Sheltering Habitat (SH)	Task SH-1:	Survey and Document Baseline Conditions	Work with volunteer property monitors to establish baseline conditions on site.
	Task SH-2:	Identify Specific Planting and Fence Construction Areas	Conduct on-going fence monitoring to ensure fence is kept in good repair (by ranch lessee and SLT land manager).
	Task SH-3:	Install Cattle Exclusion Fencing Around Targeted Stream Reach	

OBJECTIVES	TASKS	TASK DESCRIPTIONS	MONITORING APPROACHES
	Task SH-4:	Obtain, Plant, and Maintain Willows in Targeted Areas	Conduct periodic monitoring spring through fall to check on survival and growth of planted willow canes. Establish photo monitoring points to visually track willow establishment and growth. Establish permanent transects and conduct line-intercept sampling through willow planting areas for more quantitative monitoring data and year-to-year comparison.
	Task NW-5:	Prevent Herbicide Drift from Upland Weed Control	No specific monitoring identified other than general oversight of herbicide application by qualified SLT staff member.
Objective 4: Implement Riparian Enhancement and Erosion Control Plan (RE)	Task RE-1:	Survey and Document Baseline Conditions	Work with volunteer property monitors to establish baseline conditions on site.
	Task RE-2:	Identify Specific Planting and Fence Construction Areas	
	Task RE-3:	Install Cattle Restriction Fencing across Stream Channels	Conduct on-going fence monitoring to ensure fence is kept in good repair (by ranch lessee and SLT land manager).
	Task RE-4:	Obtain, Plant, and Maintain Willows and Shrubs in Targeted Areas	Conduct periodic monitoring spring through fall to check on survival and growth of planted willow canes and riparian shrubs. Establish photo monitoring points to visually track riparian establishment and growth. Establish permanent transects and conduct line-intercept sampling through planting areas for more quantitative monitoring data and year-to-year comparison.
	Task GP-3:	Repair Existing Fences and Install New Pasture Fences as Proposed	
	Task GP-4:	Implement Prescribed Grazing Practices	
Task NW-5:	Prevent Herbicide Drift from Upland Weed Control	No specific monitoring identified other than general oversight of herbicide application by qualified SLT staff member.	
Objective 5: Develop and Implement Grazing Management Plan (GM)	Task GP-1:	Prepare Grazing Management Plan	General rangeland monitoring should be conducted to determine if the grazing lessee is grazing in a manner that is consistent with the Grazing Management Plan. A professional consultant or trained MHLT staff member should conduct one or two annual inspection tours to qualitatively assess grass height, potential over or under grazing, and areas of excessive impact. Residual dry matter (RDM) sampling could be used to provide more quantitative information on grass density at the end of the grazing season but an experienced rangeland consultant can usually make a visual assessment
	Task GP-2:	Implement Changes to Infrastructure	
	Task GP-3:	Install Proposed Additional Watering Sites to Manage Cattle	
	Task GP-4:	Implement Prescribed Grazing Practices	

OBJECTIVES	TASKS	TASK DESCRIPTIONS	MONITORING APPROACHES
			<p>much more quickly and thoroughly.</p> <p>No specific monitoring of grasslands or seasonal wetlands is proposed in this plan. However, SLT should consider developing a plan for long-term monitoring of the wildflower fields, Johnny-jump-up stands, and purple needlegrass stands in the central upper hillslopes. The monitoring would best be conducted as part of a stratified grazing regime that test different grazing regimes on the distribution and abundance of these resources. Little is known about the use of prescribed grazing to conserve and enhance these sensitive habitats in the North Bay region and the Sears Point property offers an excellent site for such research. Research could be conducted by a Ph.D. or Master's student from U.C. Berkeley, U.C. Davis, or another university. Research could also be conduct by SLT staff or a hired consultant using conservation grant funds.</p> <p>Conduct on-going fence monitoring to ensure fence is kept in good repair (by ranch lessee and SLT land manager).</p>
Objective 6: Implement Noxious Weed Control Plan (NW)	Task NW-1:	Conduct Additional Noxious Weed Surveys and Mapping	Conduct annual or biannual monitoring for occurrences of new noxious weeds.
	Task NW-2:	Conduct Aerial Spraying of Artichoke Thistle Stands	Establish photopoints to document changes in extent and density of treated areas. For a more thorough assessment, obtain and compare aerial photos at five-year intervals to assess watershed-wide changes in the extent of artichoke thistle stands.
	Task NW-3:	Conduct Manual Spraying of Purple Star-thistle and Yellow Star-thistle	Establish photopoints to document changes in extent and density of treated areas. For more quantitative monitoring, establish 10-20 large permanent plots (100m <sup>2</sup> ), mapped using a professional GPS unit, and conduct annual, bi-annual, or five-year surveys of weed density and distribution.
	Task NW-4:	Conduct Manual Removal of French Broom and Silver Wattle Stands	Conduct annual site visits to assess weed re-growth in treated areas. Establish photopoints to document changes in extent and density of treated areas.
	Task NW-5:	Prevent Herbicide Drift from Upland Weed Control	No specific monitoring identified other than general oversight of herbicide application by qualified SLT staff member.
	Task GM-4:	Implement Prescribed Grazing Practices	See Objective 5.

**Table 12. Summary of Watershed Management and Enhancement Programs, Objectives, and Tasks, including Estimated Costs for the Sears Point Project Site.**

ACTIVITY	EST. COST	LABOR SOURCES
<b>PROGRAM 1: CRLF BREEDING RECOVERY AND HABITAT ENHANCEMENT</b>	<b>\$145.6K</b>	
<b>Objective 1: Construct and Manage Suitable CRLF Breeding Ponds (CP)</b>	<b>\$51.6K</b>	
<i>Task CP-1: Identify Pond Construction Sites</i>	\$2K	SLT Staff Member, Restoration Ecologist, Pond Designer
<i>Task CP-2: Prepare Pond Construction Plans</i>	\$4.6K	Pond Designer/NRCS Staff, SLT/Restoration Ecologist Input
<i>Task CP-3: Obtain Permits/ Approvals</i>	\$10K	SLT Staff Member and/or Permit Consultant
<i>Task CP-4: Construct Ponds</i>	\$30K	Equipment Operator, SLT/Restoration Ecologist Oversight
<i>Task CP-5: Install Cattle Exclusion Fencing Around Constructed Ponds</i>	\$0K	Fencing Contractor w/ SLT Staff Oversight
<i>Task NW-5: Prevent Herbicide Drift from Upland Weed Control</i>	\$5K	SLT Staff to Advise on Sensitive Areas; 5-Year Period
<b>Objective 2: Eradicate or Control Bullfrogs on and adjacent to the Site (BC)</b>	<b>\$40K</b>	
<i>Task BC-1: Identify Nearby Ponds that Support Bullfrog Breeding</i>	\$3K	SLT Staff/Consultant via Air Photo Review and Site Visits
<i>Task BC-2: Contact Landowners and Develop Off-site Control Measures</i>	\$4K	SLT Staff and CRLF Consulting Biologist
<i>Task BC-3: Identify On-site Control Measures if Off-site Control not Feasible</i>	\$3K	SLT Staff and CRLF Consulting Biologist
<i>Task BC-4: Implement Bullfrog Control Measures</i>	\$30K	SLT Staff and CRLF Consulting Biologist
<b>Objective 3: Conserve and Enhance CRLF Riparian Sheltering Habitat (SH)</b>	<b>\$48K</b>	
<i>Task SH-1: Survey and Document Baseline Conditions</i>	--	SLT Staff and volunteer monitors
<i>Task SH-2: Identify Specific Planting and Fence Construction Areas</i>	\$4K	Fencing Contractor, SLT Staff, and Consulting Biologist
<i>Task SH-3: Install Cattle Exclusion Fencing Around Targeted Stream Reach</i>	\$22K	Fencing Contractor w/ SLT Staff Oversight
<i>Task SH-4: Obtain, Plant, and Maintain Willows in Targeted Areas</i>	\$20K	Qualified Restoration Ecologist w/SLT Staff Assistance
<i>Task NW-5: Prevent Herbicide Drift from Upland Weed Control</i>	\$0K	SLT Staff to Advise on Sensitive Areas; Cost Covered Above
<b>PROGRAM 2: RIPARIAN WOODLAND ENHANCEMENT AND STREAM CHANNEL EROSION CONTROL</b>	<b>\$100K</b>	
<b>Objective 4: Implement Riparian Enhancement/Erosion Control Plan (RE)</b>	<b>\$100K</b>	
<i>Task RE-1: Survey and Document Baseline Conditions</i>	--	SLT Staff and volunteer monitors
<i>Task RE-2: Identify Specific Planting and Fence Construction Areas</i>	\$5K	Fencing Contractor, SLT Staff, and Consulting Biologist
<i>Task RE-3: Install Cattle Restriction Fencing across Stream Channels</i>	\$15K	Fencing Contractor w/ SLT Staff Oversight
<i>Task RE-4: Obtain, Plant, and Maintain Willows/Shrubs in Targeted Areas</i>	\$40K	Qualified Restoration Ecologist w/ SLT Staff Assistance
<i>Task GP-3: Implement Changes to Infrastructure</i>	\$30K	New Fence by Fence Contractor; Repair by Ranch Lessee
<i>Task GP-4: Implement Prescribed Grazing Practices</i>	\$10K	Implemented by Grazing Lessee w/ SLT Staff Oversight
<i>Task NW-5: Prevent Herbicide Drift from Upland Weed Control</i>	\$0K	SLT Staff to Advise on Sensitive Areas; Cost Covered Above

**Table 12. Summary of Watershed Management and Enhancement Programs, Objectives, and Tasks, including Estimated Costs for the Sears Point Project Site.**

<b>ACTIVITY</b>	<b>EST. COST</b>	<b>LABOR SOURCES</b>
<b>PROGRAM 3: UPLAND AND SEASONAL WETLAND MANAGEMENT AND ENHANCEMENT</b>	<b>\$136K</b>	
<b>Objective 5: Develop and Implement Grazing Management Plan (GP)</b>	<b>\$60K</b>	
<i>Task GP-1: Prepare Grazing Management Plan</i>	\$25K	Certified Range Manager, Input from SLT Staff and Biologist
<i>Task GP-2: Implement Changes to Infrastructure</i>	\$5K	New Fence by Fence Contractor; Repair by Ranch Lessee
<i>Task GP-3: Install Watering Sites to Manage Cattle</i>	\$20K	Contractor or Ranch Lessee w/ SLT Oversight
<i>Task GP-4: Install Proposed Additional Watering Sites to Manage Cattle</i>	\$10K	Grazing Lessee w/ SLT Staff Oversight (5 Year Staff Cost)
<b>Objective 6: Implement Noxious Weed Control Plan (NW)</b>	<b>\$76K</b>	
<i>Task NW-1: Conduct Additional Noxious Weed Surveys and Mapping</i>	\$6K	Consulting Botanist w/ SLT Oversight
<i>Task NW-2: Conduct Aerial Spraying of Artichoke Thistle Stands</i>	\$30K	Licensed Herbicide Applicator; Assumes \$10K/year for 3 Years
<i>Task NW-3: Conduct Manual Spraying of Weeds in Zone B-E</i>	\$30K	Consulting Invasive Weed Specialist and/or SLT Staff
<i>Task NW-4: Conduct Manual Removal of French Broom and Silver Wattle</i>	\$10K	Consulting Invasive Weed Specialist and/or SLT Staff
<i>Task NW-5: Prevent Herbicide Drift from Upland Weed Control</i>	\$0K	SLT Staff to Advise on Sensitive Areas; Cost Covered Above
<i>Task GP-4: Implement Prescribed Grazing Practices</i>	\$0K	Grazing Lessee w/ SLT Staff Oversight (5 Year Staff Cost)