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1-23-0854 (CDFW)

September 12, 2024

EXHIBITS

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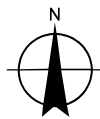
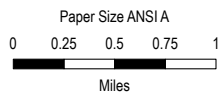
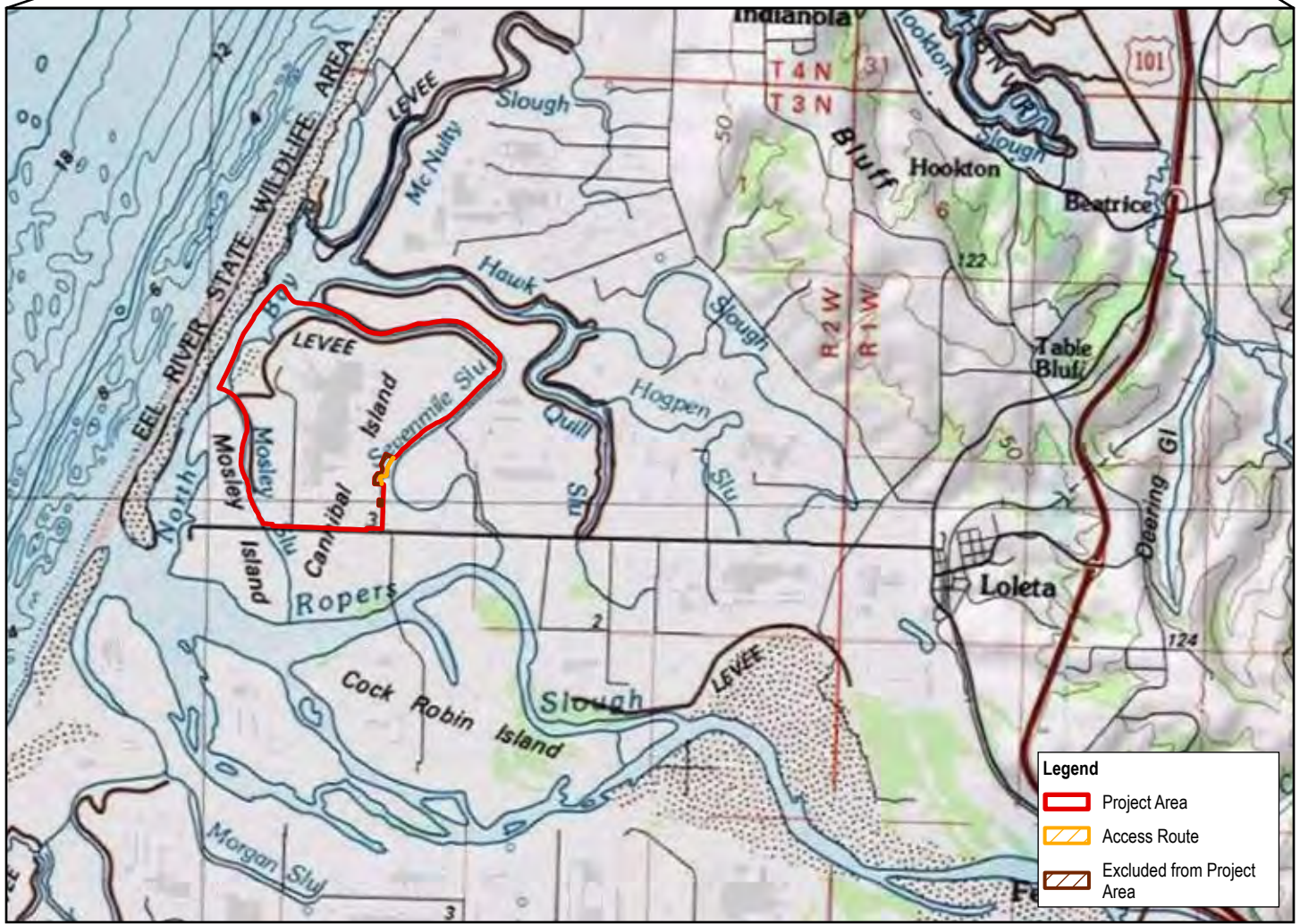
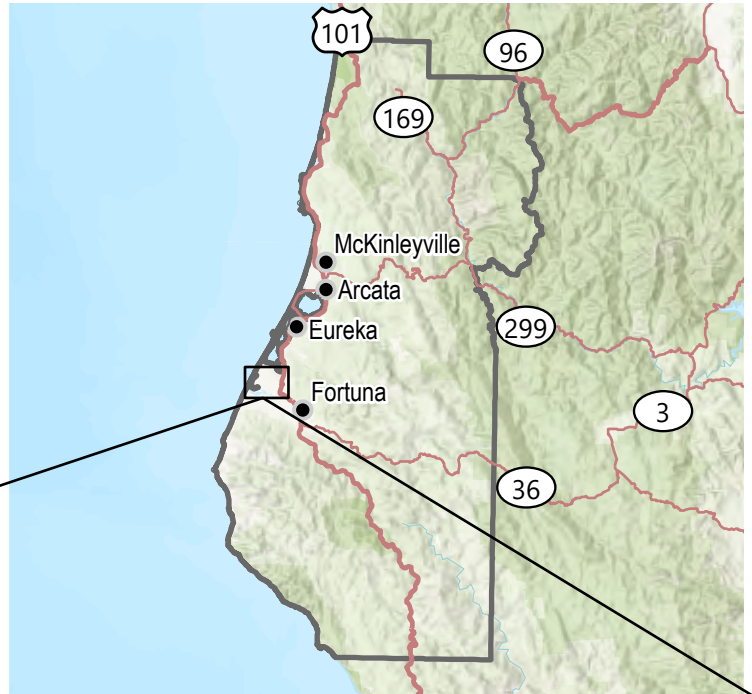
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CalTrout
Cannibal Island Restoration Project

Project No. 11206383
Revision No. -
Date 21 Nov 2022




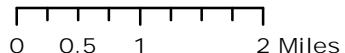


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Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California 1 FIPS 0401 Feet

Vicinity Map

Exhibit 1
1-23-0854 (CDFW)
Location & Vicinity Maps (pg. 1 of 3)

California Department of Fish and Wildlife
 Northern Region
EEL RIVER WILDLIFE AREA
SOUTH SPIT WILDLIFE AREA
 Humboldt County



 Wildlife Area	 U.S Highway	 
 National Wildlife Refuge	 Rivers/Creeks	

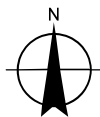
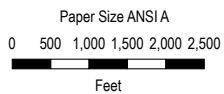
Disclaimer: Boundaries are approximate.
 Maps are intended for general purposes only.

Exhibit 1
 1-23-0854 (CDFW)
Location & Vicinity Maps (pg. 2 of 3)



Legend

- Project Area
- Access Route
- Excluded from Project Area



CalTrout
Cannibal Island Restoration Project
Project Area

Project No. 11206383
Revision No. -
Date Nov 2022

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

2. Project Description

2.1 Project Location and Setting

The 794-acre Project Area is located three miles west of the town of Loleta, California (Figure 2-1 – Vicinity Map). The Project Area is at the western-most extent of the Eel River delta and estuary approximately one mile inland and northeast of the Eel River mouth. The Eel River estuary includes approximately 24 square miles of agricultural lands, wetlands, and estuarine channels that receive runoff from 3,700 square miles of the Eel River Basin. It is one of the most significant estuaries along the California coast, with a mosaic of tidal flats, sloughs, and seasonal wetlands that support resident and migratory birds (Grassetti et al. 2011). The estuary also provides habitat that supports a variety of fish and aquatic species. Remnant slough channels and streams were historically highly interconnected throughout the estuary, but were disconnected through reclamation activities to support agricultural land use. Within this landscape, Cannibal Island is located in the northern portion of the Eel River estuary and is bounded by Sevenmile Slough on the north and east, North Bay Slough on the west and Mosley Slough on the southwest (Figure 2-2 – Project Area). North Bay and Sevenmile Slough exhibit an unrestricted tidal range (full tidal), open to Pacific Ocean tides without dampening of the range by water control structures (muted tide), along the entire western and northern Project Area boundaries. A water control structure and road crossing influence the tidal range in the portion of Sevenmile Slough along the eastern boundary of the Project Area. Cannibal Island Road bounds the Project Area to the south.

The Project Area is comprised of a diverse group of habitats including tidal mudflats, tidal slough channels, salt marshes, freshwater marshes, agricultural pastures, and ruderal. The northern and western portion of the Project Area (approximately 462 acres) is owned by California Department of Fish & Wildlife (CDFW) and managed as part of the of the Eel River Wildlife Area (ERWA) Cannibal Island Unit (APN 310-043-001, 310-033-004, and 310-021-003, 310-021-004). The remaining 332 acres are privately owned by Hansen (APN 310-043-003 and 310-051-001) and Pedrazzini (APN 310-043-004, -005, -006). Approximately 220 acres of the private property are held in Wetland Conservation Easements by the Natural Resources Conservation Service (NRCS) Wetlands Reserve Easement Program (WRP) (Figure 2-3 – Ownership Boundaries).

The Eel River estuary is characterized by cool, foggy summers and cool, rainy winters. Due to its proximity to the Pacific Ocean, the weather throughout the year in the Project Area is considered mild, with a relatively narrow temperature range. The intense maritime effect of the Pacific Ocean causes uniquely cool summers; based on climate data for Eureka (1981-2010), December is the coldest month, with an average maximum temperature of 55 °F (12.8 °C) and an average minimum temperature of 41 °F (4.8 °C). The warmest month of the year is August, which has an average maximum temperature of 64 °F (17.9 °C) and an average minimum temperature of 53 °F (11.6 °C). Most rainfall occurs from October to April. Fog and overcast conditions are common, especially during the evening and early morning hours.

Streamflow characteristics of the Lower Eel River basin reflect the regional climate. Local tributary streams respond quickly to precipitation in the surrounding hills as surface runoff enters the channels from the steep hillslope areas, whereas the area is prone to high winter floods resulting from upper basin winter rain and snowmelt events. High flows are limited to the wet season between October and April. Baseflow conditions prevail throughout the dry season. During the dry season, water levels within the Project Area are driven by daily tidal cycles.

Historically, much of the Project Area was comprised of estuarine tidal marsh and a network of tidal channels, which extended from the mouth of the Eel River to the base of Table Bluff. Beginning in the late 1800s the area was diked, isolated from tidal waters, and drained for agricultural purposes. A cultural resources investigation was completed for the Project Area by Roscoe & Associates (RA 2021), which provides a detailed account of the anthropogenic history of the area. In summary, in 1918, the Project Area became part of a Swamp Land Grant Patent deeded to the State of California. The Swamp Land Act of 1850 (9 Stat. 519) was a U.S. federal law that provided a mechanism for the transfer of federally held swamp lands to states who agreed to drain the land, turning it in to productive agricultural properties. After major land conversions had been completed, the area was dominated by dairy and cattle ranching, and farming for hay, beets, carrots, and corn among other crops. In 1968, the Fish and Game Commission adopted a portion of Cannibal Island into the 2,600-acre ERWA. In the 1980s, CDFW expanded the ERWA to today's current ownership.

The Project Area is generally isolated from estuary water levels by an earthen dike that was constructed for agricultural purposes during reclamation. Culverts with tide gates were installed through the dike to prevent saltwater inflow and allow drainage or rainfall runoff outflow. The dikes have reduced the frequency of riverine flood and tidal inundation and consequent sediment accumulation throughout the Project Area, and as a result, the interior land elevations have subsided up to three feet relative to the exterior land elevations exposed to riverine and tidal suspended sediments. The remaining tide gates on culverts no longer function resulting in muted tidal exchange and gradual conversion of the low interior lands from freshwater pasture to tidal salt marsh vegetation. Additionally, portions of the existing earthen perimeter dike have been severely eroded in several locations. The failed tide gates and degraded dike system have created vulnerabilities to adjacent agricultural lands and infrastructure, including Cannibal Island Road, owned and maintained by Humboldt County.

The resulting land conversions and loss of agricultural land uses prompted the acquisition of the Natural Resource Conservation Services (NRCS) Wetland Reserve Easements (WRE) on the Pedrazinni and Hansen properties. The purpose of the easement as defined by NRCS is to *restore, protect, manage, maintain, and enhance the functional values of wetlands and other lands, and for the conservation of natural values including fish and wildlife and their habitat, water quality improvement, flood water retention, groundwater recharge, open space, aesthetic values, and environmental education*. These easements are in perpetuity and restrict land uses other than those compatible with the easement purposes, which are subject to review and approval by NRCS on an annual basis through a Compatible Use Authorization (CUA). A CUA has been issued by NRCS to Hansen and Pedrazinni for seasonal cattle grazing.

Northwest of the Project Area and across North Bay, CDFW recently implemented components of the Ocean Ranch Restoration Project (ORRP) in Summer 2022 (GHD 2020). The ORRP proposes to restore estuarine function to improve fish and wildlife habitat, restore Sensitive Natural Communities, and improve public access. The Cannibal Island Restoration Project (CIRP) is designed to be compatible with the ORRP by improving estuarine habitat while minimizing impacts to adjacent agricultural lands.

Bordering the north and east of Sevenmile Slough, outside the Cannibal Island Project Area, are numerous privately-owned parcels used for agricultural purposes. These properties are protected from tidal waters by earthen dikes along Sevenmile Slough and water control structures (typically culverts with tide gates) (Figure 2-4 – Existing Dikes/Fill). This dike system is also actively eroding in select locations and overtopped during large flood events. Water control structures leak tidal water at numerous locations (Figure 2-5 – Areas of Tidal Flooding).

Cannibal Island Road borders the southern boundary of the Project Area. Private agricultural lands extend from Cannibal Island Road southward to the northern bank of the Eel River. Cannibal Island Road and the

northern portion of this property are low in elevation and currently experience tidal flooding during high seasonal tides that pass through the culverts (Figure 2-5). As previously described, the dikes around the Project Area, like most throughout the Eel River estuary, were constructed between the late 1800s and 1900s to reclaim land for agriculture purposes and are not flood control structures regulated by the United States Army Corps of Engineers. Most dikes were originally constructed with locally derived silt material placed with minimal compaction or engineered design. Two segments of the dike system have severely eroded to marsh elevation resulting in a breach. These two segments include a 600 ft segment in the northwest portion of the Project Area and a 50 ft segment in the western portion of the Project Area (Figure 2-4). A partially failed culvert with tide gate through the dike located on the northern portion of the Project Area has resulted in marsh plane erosion on the opposing side of Sevenmile Slough.

The CIRP proposes to modify and remove antiquated water control infrastructure (dikes, culverts, flood gates) to restore a natural tidal range to most of the Project Area. Full tidal range restoration is expected to promote recovery and maintenance of tidal marsh habitats that support native fish, invertebrates, wildlife, and plant species, while also enabling marsh elevations to keep pace with sea level rise. As mentioned previously, the lack of sediment deposition from fluvial and tidal sources, along with past land use, has resulted in subsidence, where the Project Area elevations are lower than those open to fluvial and tidal sediment sources. The failed tide gates and breaches have resulted in the conversion of low elevation agricultural lands, within the muted tidal range, to convert back to salt marsh and tidal mudflat. However, tidal mudflat and salt marsh exist at lower elevations within the Project Area compared to areas subject to the full tidal range. The muted tidal range reduces the duration of tidal inundation at a given elevation, resulting in a shift in habitat elevation range. Within the Project Area, salt marsh species are found between elevation 4 and 6 feet (NAVD88) whereas similar species will be found between 5 and 7 feet (NAVD88) in areas open to the full tidal range. As sea levels rise, the muted tidal range will also shift to higher elevations, and the lack of sediment accretion will result in the conversion of salt marsh to mudflat at lower elevations and the migration of salt marsh to higher elevations currently under agricultural use. Additional breaches or culvert failures will result in a more rapid succession of this process. Restoring fluvial and tidal sediment dynamics in combination with retreating dikes, establishing a setback levee and raising Cannibal Island Road will provide future resiliency for the salt marsh to migrate vertically through increased sediment deposition while maintaining the footprint of existing agricultural land use and improving ingress and egress to recreational and working lands.

Construction activities will include the removal of water control structures, excavation of slough channels to accelerate the formation of high-quality aquatic habitat for listed fish species, and placement of excavated fill in appropriate locations to mimic natural marsh topography (natural levees and hummocks or tidal marsh ridges) and enhance wetland vegetation diversity. Placement of ¼ ton rock will occur along a section of channel to provide inset channel grade control to manage the tidal prism. This grade control is anticipated to be beneficial to manage tidal prism until the site elevations increase to be representative of a system with full tidal amplitude, which is expected to occur over 10-20 years. The rock would be placed over a 20-foot-long section where a former road crossing is located and failing culvert is proposed for removal. A portion of excavated sediment will be re-used onsite to construct a setback levee intended to create space for tidal habitat to protect remaining agricultural lands and prevent off-site flood impacts. A portion of Cannibal Island Road will be raised to improve public safety and access to designated recreational areas.

Vehicle access to the Project Area is from two locations off Cannibal Island Road. In the southeastern portion of the Project Area, a private single-lane gravel driveway provides access to the Pedrazzini and Hansen residences. In the southwestern portion of the Project Area, a single-lane access road on CDFW property, referred to as Senestraro Lane, extends north from Cannibal Island Road approximately 0.75 miles, where it terminates at a failed culvert crossing near the abandoned residential structure.

CDFW allows public access for recreation and hunting on the CDFW parcels within the Project Area. An unofficial turnout at the intersection of former Senestraro Lane and Cannibal Island Road is currently used for parking, as Senestraro Lane is in poor condition and impassable most of the year. Up until 2009 CDFW administered a grazing lease on the CDFW parcels. Remnant stock-water facilities and fencing exist.

Infrastructure within and adjacent to the Project Area includes overhead utility poles, one groundwater well, and several residential properties (Figure 2-6 – Existing Infrastructure). The old Senestraro residence in the northeast portion of the Cannibal Island Unit is no longer accessible due to a failed culvert at a slough channel crossing; the abandoned two-story house on CDFW property will be demolished and removed during project implementation.

The parcels within and adjacent to the Project Area are zoned Agriculture Exclusive (AE) and the parcels owned by Hansen (APN 310-051-001 and 310-043-003) have Williamson Act contracts (2-7 – Land Use and Williamson Act Contracts). The agricultural buildings and residential structures associated with the Hansen and Pedrazzini parcels have been excluded from the Project Area (APE) as restoration activities will avoid these areas. Humboldt County General Plan land use for the Project Area is Natural Resources (NR/R) and Agriculture Exclusive (AE). The AE identified land use designates the primary uses of the land to be limited to the production of food, fiber, plants, timber, timber agriculturally related uses, and agriculture related recreation. Very low intensity residential uses may be allowed if they are incidental to the property and if they support agricultural activities or are necessary for the enhancement and protection of the natural resources of the area. The minimum parcel size is 60 acres, except divisions to 20 acres may be permitted where the parcel is subject to an agricultural preserve contract or agreement, such as the Williamson Act. The Project will restore natural processes and habitat within the NR/R designated area, enhance existing salt marsh habitat within AE zoned areas, and provide protection to the remaining AE zoned area within and around the Project Area.

2.2 Project Goals and Objectives

The primary goal of the Cannibal Island Restoration Project is to restore and expand natural estuarine functions and processes that promote recovery of habitat for native fish, invertebrates, wildlife, and plant species compatible with surrounding working lands and public access. To achieve this goal, the following objectives have been established by the Project partners:

1. Promote actions that are supported by sound and transparent technical information and consensus with landowners and land managers;
2. Restore natural functions and processes of tidal hydraulics, riverine inundation and sedimentation, tidal channel connectivity, and wetlands maintenance, by removing or modifying existing infrastructure;
3. Increase resiliency of existing agricultural lands to sea level rise by relocating or reestablishing drainage infrastructure compatible with adjacent public ownership and conservation easements;
4. Enhance native plant communities and promote expansion of rare plant habitat through control and treatment of dense-flowered cordgrass (*Spartina densiflora*) and replacement with native plant species;
5. Improve public access on the Cannibal Island Unit of the ERWA; and
6. Maintain opportunities for future reconnection of tidal slough channels outside the Project Area that are currently precluded by land ownership and natural physical constraints.

2.3 Project Overview

The Project will restore a landscape of mostly diked agricultural land to a mosaic of pasture and natural habitats, including estuarine and tidal slough channels, brackish ponds, and agricultural pastures. Restoration of the natural tidal inundation range and hydraulics as well as fluvial and tidal sediment deposition to restore wetland functions is critical to achieve Project objectives. Increased tidal exchange and connectivity between historical tidal wetland areas and North Bay will support a broader native plant, fish, wildlife, and benthic infauna diversity within estuarine and freshwater marsh habitats, and in wetland-upland ecotones. An improved tidal channel network will accommodate physical processes such as sediment transport and marsh plain sediment accretion.

To reduce vulnerability from projected sea level rise, and geomorphic and climactic changes, the Project will retreat the water control structures (dike, culverts, and flood gates) along North Bay to a setback levee along the edge of the subsided salt marsh and interface with agricultural lands. The setback levee will be constructed to provide space for salt marsh and improve access to operate and maintain water control structures that provide enhanced resiliency for adjacent agricultural lands and residences. The longevity of this Project depends upon the successful restoration of natural ecological processes and ability to maintain infrastructure that protects agricultural lands and residences from uncontrollable natural events within this dynamic, highly altered, and geologically unstable watershed. This Project will also define long-term management and maintenance activities to adapt to the changing landscape.

2.4 Project Components

The Project will restore the natural tidal range in much of the Project Area, enhancing tidal channels and salt marsh (Figure 2-8 – Project Components). Much of the existing dike network within the Project Area will be reconfigured or removed. A new setback levee will protect remaining agricultural lands at risk of future tidal inundation. Sediment excavated during construction will be reused within the Project Area and will not be hauled off-site. Project Actions are summarized in Table 2.1 and shown in Figure 2-8.

Table 2.1 Summary of Key Project Enhancements and Components

Component	Description
Demolish and Remove Abandoned Residential Structure	Remove existing abandoned two-story residential structure on CDFW property
Lower Dikes and Remove Culverts	Lower approximately 5,000 linear feet existing dikes and remove failed culverts on CDFW property that currently separate full- and muted-tidal areas
Restore and Enhance Tidal Wetlands, Tidal Channels, and Tidal Marsh Ridges	Reconnect full tidal exchange to approximately 500 acres of former tidal marsh habitat and construct inter-tidal lagoons with tidal marsh ridges and inter-tidal channels to create diverse sub-, inter- and supra-tidal habitats. Inset channel rock grade control will be placed along a 20-foot section of channel at the existing road cross along Senestraro Lane to provide passive management of the tidal prism.
Construct New Setback Levee	Construct new earthen setback levee approximately 6,000 linear feet in length equipped with up to two gated culverts to separate tidal wetlands from agricultural lands
Elevate Cannibal Island Road	Elevate approximately 2,500 feet of existing Cannibal Island Road and install up to four gated culverts

Component	Description
Place Excavated Sediment in Beneficial Reuse Sites	Relocate approximately 200,000 cubic yards, to be reused within the Project Area
Treat and Remove Dense-flowered Cordgrass (<i>Spartina densiflora</i>)	Control and treatment of dense-flowered cordgrass (<i>Spartina densiflora</i>) using mowing, grinding, excavation, flaming, and/or herbicide application methods to support current regional eradication efforts
Improve Public Access and Visitor Experience	Public access improvements include the following: <ul style="list-style-type: none"> – Convert existing turn-out at intersection of Cannibal Island Road with former Senestraro Lane into parking area with interpretive signs; – Establish footpath trail from parking area, north along Mosely Slough, approximately 2,000 linear feet
Management and Maintenance	Post-construction management to maintain Project objectives

2.4.1 Demolish and Remove Abandoned Residential Structure

The abandoned two-story house in the northwest portion of the Project Area on CDFW property will be demolished and removed. The structure has been severely damaged and is uninhabitable. Material from the demolished structure will be hauled offsite for disposal. Following demolition, the site will be restored to salt marsh.

2.4.2 Lower Existing Dikes

Sections of the existing perimeter dike will either be left intact or lowered to the surrounding marsh plain elevation. Sections of the perimeter dike left intact will be used to maintain upland refugia and roosting habitat for shorebirds and waterfowl and to provide wave refraction during flood events. Portions lowered to a marsh plain elevation will be recontoured with varying flat, gradual slopes to provide transitional habitat and offset impacts to wetlands impacted by construction of a new setback levee. Large wood will be placed along some sections of lowered dikes to provide high tide refugia for wildlife and a break from wind generated waves coming from the north. Existing failed culverts located within these lowered sections will be removed and disposed of offsite.

2.4.3 Restore and Enhance Tidal Wetlands, Channels and Tidal Marsh Ridges

The dendritic channel network and salt marsh within the Project Area were historically connected to North Bay prior to reclamation. Reclamation and the associated reduction in the tidal prism resulted in a significant reduction in hydraulic exchange and the tidal channel network was reconfigured by filling tidal channels and excavating linear ditches for drainage efficiency purposes. Portions of the Project Area that were diked and drained for agricultural purposes are now lower in elevation than surrounding salt marsh open to the full tidal elevation range, due in part to ground subsidence from tectonic activity and oxidation. The lack of frequent tidal and river flooding has also minimized sediment accretion in these disconnected areas. Portions of the Project Area outboard of the perimeter dike that have been exposed to full tidal exchange and frequent river flooding have elevated over time due to sediment deposition. Restored and enhanced tidal channels in other areas of the Eel River estuary and Humboldt Bay have been effectively

designed through local adaptation of tidal channel sizing relationships (depth and width) developed for San Francisco Bay by Phillip Williams and Associates (Williams et al., 2002; Phillips Williams and Associates and Faber 2002). The tidal channel sizing relationships utilize the diurnal tidal prism, defined as the volume of tidal water contained between Mean Lower Low Water (MLLW) and Mean Higher High Water (MHHW) datums, to establish tidal channel geometry. The San Francisco Bay relationships were developed using channel measurements from tidal marshes where the marsh plain surface elevations were near the elevation of MHHW, as is typical in areas exposed to the full tidal range. A large proportion of the marsh plain in the Project Area, however, is located several feet below MHHW associated with the full tidal range of the Eel River Estuary and North Bay. The restored full tidal range and subsided marsh elevations within the Project Area could result in an unstable channel geometry with increased erosive forces associated with the increased tidal prism.

To address the issues associated with the subsided marsh and restored full tidal range, a modified procedure to develop the restored tidal channel dimensions was adopted utilizing historical channel geometry and alignments of historical flow line elevations, as indicated by culvert flow lines, likely placed at the bottom of historical channels. The San Francisco Bay relationships were used to establish preliminary depth and width geometry, then proportionally scaled based on the historical flow line elevation and elevation of MHHW. The resulting cross section geometry, a five-point parabolic channel shape defined by two top of bank points located at MHHW, two bank toes, and a channel thalweg, was compared to historical tidal channels within the Project Area and showed a similar relationship for portions of the channel remaining below MHHW. To achieve the desired geometry within the subsided marsh elevations, a tidal marsh ridge is needed. The tidal marsh ridge utilizes excavated material on-site to fill the elevation between the existing subsided marsh and MHHW, then is graded with a gradually slope back to the subsided marsh plain. Restored and new channels will be established to increase tidal exchange to approximately 500 acres of restored tidal wetlands. The increased tidal range and high fluvial flows will overtop the tidal marsh ridges and increase deposition of fine sediments across the subsided marsh surfaces to allow the marsh to accrete sediment over time. Placement of ¼ ton rock will occur along a section of channel to provide grade control to manage the tidal prism. This grade control is anticipated to be beneficial to manage tidal prism until the site elevations increase to be representative of a system with full tidal amplitude, which is expected to occur over 10-20 years. The rock would be placed over a 20-foot-long section where a former road crossing is located and failing culvert is proposed for removal. This area is a suitable location for the inset channel grade control because it likely already contains compacted sediment (from previous infrastructure), and will be disturbed via the road crossing and culvert removal anyway.

Marsh areas will be graded to provide habitat variability and increased complexity, promoting sediment accretion in subsided areas through a network of inter-tidal lagoons separated by hummocks and tidal marsh ridges. The network of sloughs and terminal ponds will provide diverse sub-, inter- and supra-tidal habitats. New brackish water ponds for aquatic species will also form by utilizing existing depressions in the marsh plain. Tidal marsh ridges will be utilized to create new small terminal ponds and alongside channels to improve upon and diversify the existing channel network, providing low energy perennial ponding areas and natural accumulation of woody debris to create suitable habitat for tidewater goby and other aquatic species. The lagoons will passively evolve into inter-tidal salt marshes with sediment accretion from the Eel River over time, providing diverse habitats of mudflat, salt marsh, and subtidal channels. Wood habitat structures will be integrated into the final design in select locations to supplement the natural accumulation of woody debris on the landscape. Invasive species removal and revegetation with native wetland vegetation will occur as a part of the restoration work and ongoing site management.

2.4.4 New Setback Levee

A 6,000 ft setback levee will be constructed along the eastern edge of the salt marsh to protect the remaining agricultural lands and provide maintenance access for water control structures. New fencing will be installed on the east side of the setback levee to keep livestock from trampling the setback levee. The top surface of the setback levee will be constructed at approximately 11 ft elevation (NAVD88) and graveled for vehicle access. Onsite sediment will be used to construct the setback levee. This elevation will prevent tidal inundation onto agricultural lands while not altering Eel River floodplain flow-paths. The setback levee will include a series of drainage culverts equipped with flood gates (two gated culverts are proposed). The gates will prevent tidal inundation onto the agricultural land and will open when the inboard rainfall runoff water levels are higher relative to outboard, which will typically occur daily during and following rainfall events, providing drainage from adjacent agricultural land.

2.4.5 Elevate Cannibal Island Road

Cannibal Island Road within the Project Area routinely floods during winter months due to its low elevation that ranges from approximately 7 to 11 feet elevation (NAVD88). Given the high sediment loads during winter floods, the road shoulder and land adjacent to the road has elevated over time; however, the paved surface has not, as the sediments are scraped off the pavement following depositional events, thereby resulting in prolonged periods of ponded water over the roadway during winter months. The Project proposes to elevate approximately 2,500 linear feet of Cannibal Island Road between the Mosley Slough bridge approach and the driveway on the eastern side of the Project Area to an approximate elevation of 11 feet (NAVD88) matching the proposed set-back dike elevation and the existing road elevations at the western and eastern project limits. Elevating the road will enhance access to recreational facilities at the western end of Cannibal Island Road and improve emergency ingress and egress during winter storm events and prolonged wet weather, as well as prevent tidal inundation over the County Road and on agricultural lands to the south. The elevation of the roadway will not alter existing flood paths or increase peak flood elevations on adjacent properties. The elevated road prism will include a series of drainage culverts equipped with flood gates (four gated culverts are proposed). The gates will prevent tidal inundation onto the agricultural land to the south and will open when the water levels south of the road are higher relative to north of road which will typically occur daily during and following rainfall events, providing drainage from adjacent agricultural land. The elevated road width will be similar to the existing road width. New fencing is proposed along both sides of the portion of Cannibal Island Road to be elevated.

2.4.6 Beneficial Re-use of Sediment

Project construction requires approximately 200,000 cubic yards of balanced excavation and sediment placement. The Project will balance the cut and fill volume on-site through beneficial reuses. Excavated sediment will be reused on site and will not be hauled off-site for disposal. Proposed onsite reuses include construction of the new setback levee, and construction of tidal marsh ridges, hummocks, and marsh plain fill.

Sediment reuse will consider the salinity of excavated sediments. The majority of the sediments are comprised of silty fine sands, sandy silts, and clay, and are suitable for proposed construction activities. Laboratory analytical results indicate that soils within the existing muted marsh have relatively high electrical conductivity (EC), exchangeable sodium percentage (ESP), and sodium adsorption ratio (SAR) values, indicating that they are saline-sodic. In general, the salinity of the soil increases with depth. Reuse

of saline-sodic soils for agricultural purposes is not recommended due to the potential for soluble salts within the excavated material to leach into the soil and impede vegetative growth. Graded areas requiring immediate establishment of non-salt marsh vegetation will be capped with either low- or non-saline-sodic soils derived from the surficial soils within the Project Area.

2.4.7 Treatment of Dense-Flowered Cordgrass

Dense-flowered cordgrass (*Spartina densiflora*) will be treated within the Project Area during implementation, and follow-up treatment post-implementation is anticipated. The methods utilized to control dense-flowered cordgrass will be carried out using a series of treatments implemented over time based on season, weather, tides, labor availability, and other factors. Proposed treatment methods are generally consistent with those outlined in the Humboldt Bay Regional Spartina Eradication Plan (H.T. Harvey 2013). The descriptions of these methods below are derived, in part, from the Programmatic Final EIR for the Humboldt Bay Regional Spartina Eradication Plan (H.T. Harvey 2013 and GHD 2013).

Top Mowing

Top-mowing will involve cutting above-ground stems, leaves, and flowering stalks, typically using handheld gas-powered equipment (e.g., tri-bladed brushcutter, corded weedwhacker) or heavy equipment (e.g., Marshmaster outfitted with mowing attachment). Examples of handheld and heavy equipment are depicted on Image 2-1 – Representative Vegetation Removal Equipment. Biomass generated during and as a result of mowing will be left in place to decompose or to be washed away by the tide, tilled into the soil as mulch during grinding, and/or raked into piles and burned. This has been an acceptable practice that was analyzed in the Programmatic Environmental Impact Report (PEIR).

Mowing will be used to clear above ground vegetation in preparation for other treatments, such as grinding or herbicide application, or could be used as a seed suppression measure. In general, handheld equipment will be used to mow areas with low to moderate cordgrass density, limited access, or for seed suppression where handheld equipment can readily remove seedlings without compacting or disturbing too much soil. Heavy equipment will be used to treat larger areas, or areas supporting dense stands of dense-flowered cordgrass.



Image 2-1 – Representative Vegetation Removal Equipment. Handheld brushcutter/grinding method (left) used to remove above-ground vegetation. Marshmaster (right) used to mow larger areas and grind (via rototiller) dense-flowered cordgrass rhizomes. Photo credit: A. Pickart (USFWS 2017).

Grinding

Grinding involves the use of gas-powered hand tools (e.g., brushcutter), or heavy equipment (e.g., Marshmaster outfitted with a rototiller attachment), to target dense-flowered cordgrass rhizomes below the soil surface. After aboveground vegetation has been removed, the blades of the brushcutter or rototiller are advanced vertically or diagonally into the substrate to grind (macerate) the root crown and rhizomes into small fragments. Grinding depths typically extend three to six inches below the ground surface, with precise depths depending on site conditions and the maturity and density of the dense-flowered cordgrass stand. Follow-up treatments, which are less intensive than the initial grinding, are typically required to address re-sprouts that regenerate from rhizome fragments remaining in the soil.

Tilling

An alternative to grinding is tilling, where a mini-tiller may be used to macerate rhizomes. Mini-tillers, if utilized, are most advantageous when dense-flowered cordgrass cover is less than 50 percent (H.T. Harvey and GHD 2013).

Excavation

Excavation involves complete removal of the plant, including rhizomes, either by hand or using heavy equipment. Excavated material will subsequently be stockpiled and buried onsite or chipped onsite using brush cutters and used for mulch. In addition, dense-flowered cordgrass that is excavated during construction activities may also be buried with suitable cover (e.g., in high marsh or habitat ridge areas), as appropriate.

Flaming

Flaming is a form of weed control in which a flame is passed over a plant until it wilts, causing the fluid in the plant's cells to expand and rupture and ultimately killing the plant (H.T. Harvey and GHD 2013). Flaming will utilize handheld propane torches to deliver a small, controlled flame to a targeted plant. Since flaming is not an effective method to kill mature dense-flowered cordgrass plants, it will only be used to treat dense-flowered cordgrass seedlings under the Project.

Herbicide Application

Treatment of non-native plants can be achieved through the application of herbicide, typically sprayed on plant leaves during the active growing season. The herbicide Imazapyr, in conjunction with mechanical treatments (e.g., mowing, grinding), could be used to control dense-flowered cordgrass where other methods have proven ineffective, or where treatment costs will be substantially reduced. Herbicide applications will be performed by a Qualified Applicator, or under the supervision of a Qualified Applicator, in accordance with the manufacturer's recommendations for application. Herbicide will be applied by workers moving through the marsh on foot using backpack sprayers or wick applicators. Alternatively, herbicide may be applied from spray equipment mounted on boats, ATVs, drones or amphibious tracked vehicles.

2.4.8 Public Access Improvements

Access to the Project Area is currently limited. Properties that are privately owned by Hansen and Pedrazzini are managed for livestock grazing. Properties managed by CDFW allow public access but lack amenities and signage. A variety of minor public access improvements are proposed to direct visitors to

appropriate publicly accessible locations and to improve visitor experience and public access opportunities on CDFW property.

The existing turn-out at the intersection of Senestraro Lane with Cannibal Island Road will be converted to a trailhead parking lot. The parking lot will accommodate up to eight (8) parking stalls and include signage with trail maps to inform visitors of the areas dedicated for public access. A new trail will extend from the parking area approximately 2,000 feet north along Mosely Slough and will terminate at an impassible slough channel, providing an “out-and-back” user experience. Interpretative signs along the trail will inform users of the natural history of the Eel River estuary. The trail will be graded, surfaced with gravel and will be wide enough to serve as an accessway for vehicles and other equipment. No access for recreation is proposed outside of the CDFW portion of the Project Area.

Under current conditions, the lack of a formal parking area limits the number of visitors to the CDFW property. The proposed parking area will accommodate a potential increase in visitors. On average 5-8 visitors per day or 2,920 per year are anticipated with some fluctuation based on the seasonality of recreational and hunting opportunities.

2.5 Project Implementation

Construction activities will be conducted in compliance with applicable local, state, and federal requirements and in a manner that minimizes disturbance to adjacent properties and disruption to traffic. Minimal traffic control is expected for this Project due to the vast majority of the Project Area having no roads, is not drivable due to wetlands and topography, and the property owners limit vehicle use. Some limited traffic control in the form of temporary construction-related vehicle exclusions zones will likely be required for public safety. Offsite fill material will be required to elevate Cannibal Island Road, increasing traffic of haul trucks during project construction.

2.5.1 Construction Schedule and Duration

Project construction will be phased into one to two construction seasons based on available funding, site conditions, and sequencing for earthwork with construction water management and County Road construction. Each season will span approximately June through the end of October, as feasible with dry weather and allowable permitting windows. Construction will generally occur between the hours of 6:00 AM and 6:00 PM, Monday through Saturday. Construction during the weekends will be subject to approval by the landowners and construction manager. It is anticipated that between eight and ten construction workers will be present at any given time. The number of motor vehicles is anticipated to be up to 30 per day.

2.5.2 Construction Activities and Equipment

Multiple sediment reuse areas coupled with the extent of Project excavation are anticipated to necessitate multiple staging areas within the Project footprint. Each phase may include the equipment listed below (Table 2.2).

Table 2.2 Estimate of Equipment Needed for Project Construction

Equipment Type	Estimated Quantity
Excavators (Conventional and/or Amphibious)	3-5
Scrapers	1-2

Equipment Type	Estimated Quantity
Dozers	2-4
Loaders	1-3
Dump Trucks	4-8
Small Tractors	1-3
Compactors	1-2
Graders	1-2
Water Trucks	1-2
Pumps	2-4

2.5.3 Site Access, Stockpile, and Staging

Primary access to the Project Area during construction and operation will occur via Senestraro Lane off Cannibal Island Road. Cannibal Island Road is a two-lane paved County Road. Senestraro Lane is a single lane dirt road extending north from Cannibal Island Road and located on CDFW property. Access to the Project Area could also occur via the private Hansen property driveway on the eastern portion of the Project Area. Construction equipment and materials will be transported to the work areas via these ingress and egress locations. During construction activities at specific locations, unimproved roads on top of dikes, County Road and areas of pasture nearby, will be utilized for the duration of those specific work tasks. Construction equipment will not be stored in inundated areas or in sloughs. Construction staging and stockpile areas will occur at discrete locations within the Project Area. All areas disturbed by temporary staging and stockpiling will be de-compacted and naturalized as needed prior to Project completion.

2.5.4 Utilities and Public Services

There are no public water or sewer utilities within the Project Area. Pacific Gas & Electric (PG&E) supplies power to structures in the eastern portion of the Project Area including the agricultural structures, wells, and residences. There are overhead power poles along Cannibal Island Road and Senestraro Lane however the power/communication lines have been removed from the poles along Senestraro Lane. There are likely utility easements within the Project Area where the power poles exist. Utility poles, fencing and fence posts will be removed. The contractor will be responsible for supplying electrical power if needed for any construction activities via a portable generator. There are no anticipated changes to public services such as law enforcement and fire protection.

2.5.5 Surface Water and Groundwater Management

During excavation, management of surface water will be required through the construction period. Surface water management will be required to reduce nuisance water within the active work area. Inflow management will also reduce the moisture content in excavated soils and prevent aquatic and non-aquatic organisms from entering the construction area. Cofferdams will be used to isolate instream work areas that will be dewatered.

The cofferdam(s) will be either an aqua dam, or will be comprised of native material or washed gravel encased with an impermeable geotextile or visqueen liner in combination with ecology blocks and/or temporary sheet piles pushed into the subsurface. Cofferdam(s) will be installed during low tide, when the

least amount of water is within the work area(s). Once the cofferdam is securely installed and the work area is isolated, the isolated area would be seined (or similar) to relocate special status fish and other special status aquatic species to nearby suitable habitat; common species will be relocated to suitable habitat as is feasible. Once the area is free of special status species, surface water would be pumped or routed via gravity flow out of the active work area to an adjacent area to settle. Due to the expansive marsh plain, pumping surface water to an area of uplands to infiltrate is not feasible.

After initial surface dewatering, groundwater dewatering is expected to be necessary within work area(s) due to the low elevation of the marsh plain and high water table. Groundwater dewatering will involve pumping water out of the work area to a nearby area to infiltrate. As mentioned above, it is not feasible to pump water to areas of uplands for infiltration. Discharge of turbid water directly to receiving waters (i.e. Mosley Slough, Sevenmile Slough, or North Bay) will not occur. The cofferdam(s) will be removed on an incoming tide so that loose sediment is deposited on the marsh plain, as opposed to entrained into receiving waters.

Excavation of the tidal channel network to connect with North Bay will occur using excavators and dump trucks.

Equipment will use the remnant dikes to access the channel excavation area. A temporary road will be used to allow equipment access over the salt marsh, where an excavator will offload sediment to dump trucks for disposal throughout the Project Area. Portions of the channel may need to be excavated with an amphibious excavator. Silt curtains may be installed to limit the delivery of turbid water outside the immediate work area, if feasible.

2.5.6 Site Stabilization and Revegetation

Following construction, the contractor will demobilize and remove equipment, supplies, and construction materials. The disturbed areas above the salt marsh plain will be restored to pre-construction conditions or stabilized with a combination of native grass seed (broadcast or hydroseed), straw mulch, or other plantings/revegetation. If required, revegetation will include replanting and any potential compliance monitoring in support of mitigation required by resource agencies for impacts to regulated habitats, such as wetlands or Sensitive Natural Communities.

2.5.7 Management and Maintenance

Ongoing management may be necessary, such as:

- Setback Levee
 - Observations of physical character (as needed)
 - Mowing to discourage growth of woody vegetation and invasives species (as needed)
 - Repair from erosion or burrowing animal damage (as needed)
 - Grading and/or resurfacing portions of the access roads (as needed)
- Cleaning debris and sediment, drainage ditches, and flood gates (as needed)
- Removing invasive vegetation and re-planting native species (as needed)

The above maintenance activities will be prioritized and implemented based on the monitoring outcome. Specific monitoring activities would generally include observations of physical character of the site and plant species to determine whether Project objectives have been met. The frequency of monitoring will be

determined during Project permitting and will be subject to available funding. The impacts associated with the maintenance activities will be infrequent and short-term. In addition, they are anticipated to be no greater than the traditional maintenance historically performed on these lands under existing conditions.

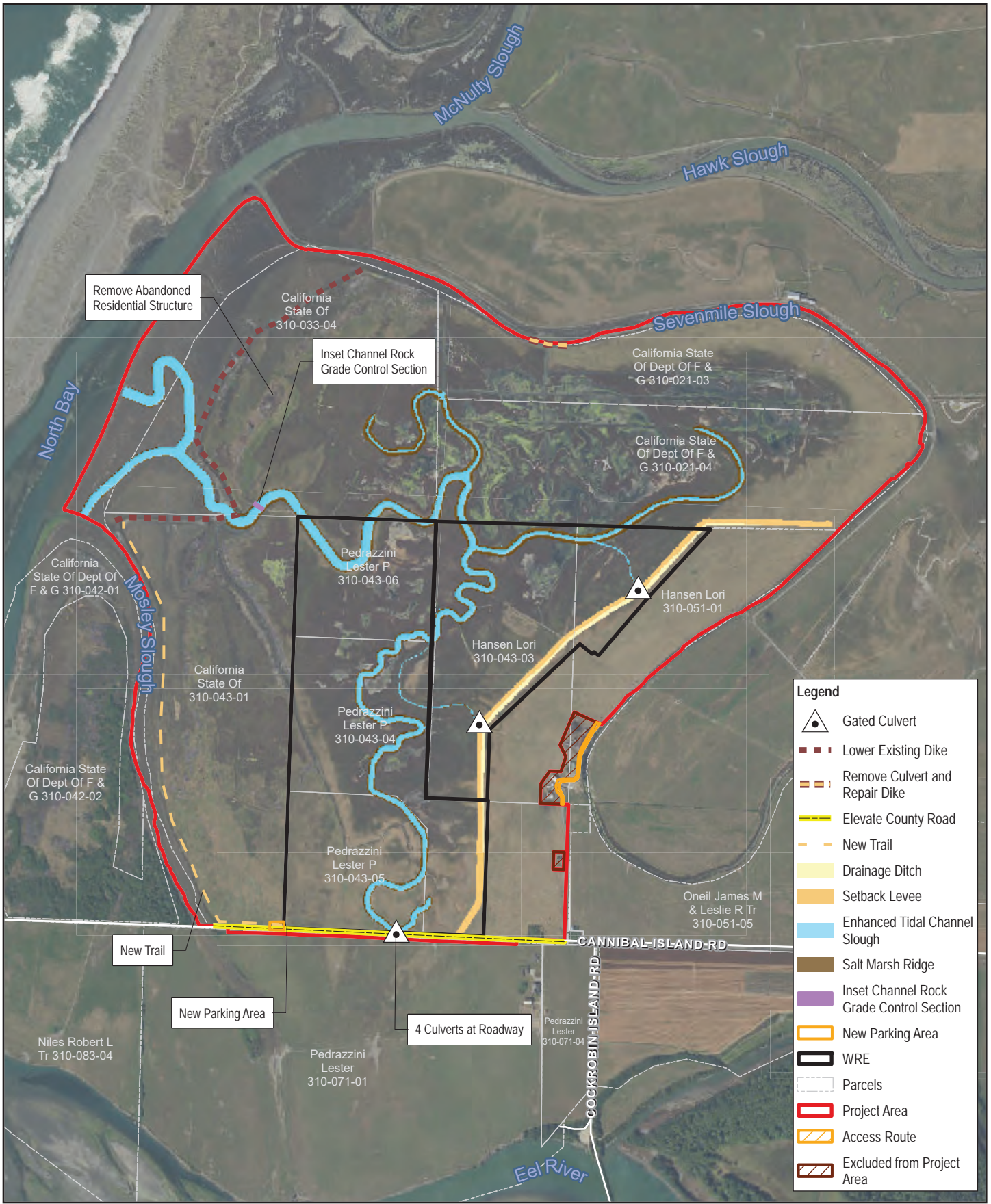
2.6 Required Permits and Approvals

The Project will likely require the following permits/approvals:

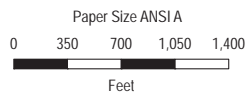
- CEQA – Statutory Exemption for Restoration Projects (SERP) pursuant to Public Resources Code § 21080.56
- County of Humboldt – Conditional Use Permit for activities not located on the WRE and Grading Permit
- California Coastal Commission – Coastal Development Permit (CDP) or Federal Consistency Determination (CD)
- California Department of Fish & Wildlife – Lake and Streambed Alteration Agreement (LSAA) and CESA compliance
- North Coast Regional Water Quality Control Board – Clean Water Act (CWA) Section 401 Water Quality Certification through Statewide Restoration General Order (SRGO) Notice of Intent (NOI)
- California State Historic Preservation Office – National Historic Preservation Act (NHPA) Section 106 Review
- U.S. Army Corps of Engineers – CWA Section 404 Permit. As part of the 404 permit the USACE will complete NEPA.
- NOAA Fisheries –Endangered Species Act (ESA) Programmatic Biological Opinion (PBO)
- USFWS – ESA Statewide Restoration PBO
- State Lands Commission – Lease

2.7 References

- GHD. 2020. California Department of Fish and Wildlife (Lead Agency), Ocean Ranch Restoration Project Final Environmental Impact Report SCH#2018062020. GHD Inc. Eureka, CA, USA.
- Grassetti Environmental Consulting (Grassetti). 2011. California State Coastal Conservancy, and Kammen Hydrology & Engineering, 2011, Final Environmental Impact report: Salt River Ecosystem Restoration Project. Grassetti Environmental Consulting, Berkley, California, USA.
- H.T. Harvey & Associates. 2013. Humboldt Bay Regional Spartina Eradication Plan.
- H.T. Harvey & Associates and GHD. 2013. Final Programmatic Environmental Impact Report for the Humboldt Bay Regional Spartina Eradication Plan.
- Roscoe & Associates. 2021. A Cultural Resources Investigation Report for the Cannibal Island Restoration Project Located in Loleta, Humboldt County, California



Legend	
	Gated Culvert
	Lower Existing Dike
	Remove Culvert and Repair Dike
	Elevate County Road
	New Trail
	Drainage Ditch
	Setback Levee
	Enhanced Tidal Channel Slough
	Salt Marsh Ridge
	Inset Channel Rock Grade Control Section
	New Parking Area
	WRE
	Parcels
	Project Area
	Access Route
	Excluded from Project Area



Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

CalTrout
Cannibal Island Restoration Project
Project Components

Project No. 11206383
Revision No. -
Date Aug 2023

Exhibit 3
1-23-0854 (CDFW)
Site Plan (pg. 1 of 1)



Photo 1—Drone footage from December 2021, looking southeast at Cannibal Island Road. Note flooding in road prism where the elevation has become lower relative to the edges of the pasture to the north and south of the road. Cannibal Island Road is proposed to be elevated in this area during Project implementation.



Photo 2—Drone footage from December 2021, looking east at muted tidal flooding that occurs within the interior of the existing levees, namely within the NRCS Wetland Reserve Easements (WRE). The small sliver of dry land in the furthest eastern extent of the Project Area is on private property that is proposed to be protected behind the new levee construction.

Exhibit 4
1-23-0854 (CDFW)
Site Photos (pg. 1 of 10)



Photo 3—Drone footage from December 2021, looking northwest at the large interior slough channel (unnamed) that extends eastward into the Project Area, and another smaller slough channel that runs south. The existing levee system (and areas that have failed and breached), can be seen in the distant northern portion where there are small slivers of dry land.



Photo 4—Drone footage from December 2021, looking northwest at the large interior slough channel (unnamed) and its confluence with North Bay (large water channel to the west). The confluence of Mosley Slough with North Bay is also captured (southernmost channel).

Exhibit 4
1-23-0854 (CDFW)
Site Photos (pg. 2 of 10)



Photo 5—View of Senestraro Lane and flooded pasture with small slough channel crossing under the road within Project Area, facing north from Senestraro Lane. This area is coastal salt and brackish marsh dominated by pickleweed that intergrades with non-native agricultural pasture.



Photo 6—View of small slough that runs through muted coastal salt and brackish marsh within Project Area, facing east from Senestraro Lane.

Exhibit 4
1-23-0854 (CDFW)
Site Photos (pg. 3 of 10)



Photo 7—View of large interior slough (unnamed), facing east from Senestraro Lane



Photo 8—View of failed road crossing on Senestraro Lane (looking northeast) and the large interior slough (unnamed) that now passes over it.



Photo 9—View of large interior slough (unnamed), facing southwest from failed road crossing along Senestraro Lane.



Photo 10—View of large interior slough (unnamed), facing northeast from failed road crossing along Senestraro Lane.

Exhibit 4
1-23-0854 (CDFW)
Site Photos (pg. 5 of 10)



Photo 11—View of the large levee and failed tide gate (obscured by woody debris). Photo taken from levee facing south.



Photo 12—Failed tide gate (outboard), facing west.



Photo 13—Failed culvert on inboard side of tide gate, facing southeast.



Photo 14—Rocked levees around the tide gate, facing southwest.



Photo 15—View of standing water to the east of large levee. Photo taken atop levee and facing north. The abandoned residential structure proposed for removal is in the background, and muted coastal brackish and salt marsh in the foreground.



Photo 16—View of dense-flowered cordgrass marsh intergraded with non-native agricultural pasture and muted coastal salt and brackish marsh within Project Area, facing east.

Exhibit 4
1-23-0854 (CDFW)
Site Photos (pg. 8 of 10)



Photo 17—View of Sevenmile Slough and muted coastal salt and brackish marsh dominated by salt grass flats at northern limits of the Project Area, facing east.



Photo 18—View of Sevenmile Slough with the confluence of the North Bay in the distance, facing northwest.



Photo 19—View of abandoned residential structure that is proposed to be demolished and removed from the non-native dominated ruderal habitat it was constructed in. This area will be reclaimed by full tidal influenced coastal salt and brackish marsh once the existing levees are graded to lower elevations.



Photo 20—Dense-flowered cordgrass dominated low marsh outside of the levees. This species will be eradicated from the Project Area during implementation, and controlled post-implementation.

Appendix C

Potential Management Actions, Impact Avoidance and Minimization Measures, and Best Management Practices

Table C-1 Potential Maintenance Actions and Best Management Practices to Reduce or Avoid Impacts

POTENTIAL MAINTENANCE ACTIONS ¹	LOCATION	WORK WINDOW ²	WORK DURATION	ANTICIPATED FREQUENCY ³	DESCRIPTION OF EQUIPMENT / METHODS	DESCRIPTION OF QUANTITIES ⁴ / MATERIAL PER YEAR	IMPACT AVOIDANCE & MINIMIZATION MEASURES ⁵ AND BEST MANAGEMENT PRACTICES ⁶
1 Implement site specific erosion control BMPs such as soil bioengineering and vegetative revegetations	Project-wide	June 15 – November 1	0-120 days	Moderate	Heavy equipment and hand crews	0-10 acres of erosion control BMPs using vegetation, soil bioengineering	Measures: - GPM-15: Revegetate Disturbed Areas BMPs: a, b, g, h, k, l a. Utilize onsite native soil to the extent practical b. Design techniques and standards shall be similar to those in project plans g. Avoid permanent placement of fill in wetlands h. Removal of vegetation will be limited to excavation areas k. Conduct pre-construction surveys performed by a qualified biologist l. Upon completion of ground disturbance activities and prior to the onset of the rainy season, all bare soil areas above 7.5 ft elevation shall be seeded in compliance with native seed mix.
2 Repair eroded sections of levee or dike and employ erosion control measures (protecting bare soil, stabilizing banks, armoring, geotechnical bank protection, dissipating concentrated flows)	Project-wide	June 15- November 1	0-120 days	Moderate	Heavy equipment and hand crews	0-1,000 cy of rock fill 0-10,000 cy of grading/excavation	BMPs: a, b, g, h, k, l a. Utilize onsite native soil to the extent practical b. Design techniques and standards shall be similar to those in project plans g. Avoid permanent placement of fill in wetlands h. Removal of vegetation will be limited to excavation areas k. Conduct pre-construction surveys performed by a qualified biologist l. Upon completion of ground disturbance activities and prior to the onset of the rainy season, all bare soil areas above 7.5 ft. elevation shall be seeded in compliance with native seed mix.
3 Remove channel obstructions if deemed necessary to maintain habitat and hydrologic function	Project-wide	June 15 – November 1	0-60 days	Frequent	Heavy equipment and hand crews	0-50 obstructions including debris jams, driftwood, sediment plugs (0-10,000 cy)	Measures: - IWW-1: Appropriate In-water Materials - IWW-2: In-water Vehicle Selection and Work Access - IWW-3: In-water Placement of Materials, Structures, and Operation of Equipment BMPs: c, d, k c. Chip debris and utilize for onsite mulch to the extent practical d. Dispose in uplands k. Conduct pre-construction surveys performed by a qualified biologist
4 Additional dike lowering or breaches	Northern Project boundary	June 15 – November 1	0-60 days	Infrequent	Heavy equipment for grading and excavation	0-5,000 cy of Excavation	BMPs: k k. Conduct pre-construction surveys performed by a qualified biologist
5 Excavate plugged culverts or associated drainage channels, and conduct maintenance on gated culverts Replace or enlarge culverts and gates as needed	Within 100 feet of existing culverts	June 15 – November 1	0-30 days	Moderate	Heavy equipment and hand crews	0-10 culverts 0-1,000 cy excavation/grading/crossing 0-500 cy rock fill/crossing	Measures: - IWW-1: Appropriate In-water Materials - IWW-2: In-water Vehicle Selection and Work Access - IWW-3: In-water Placement of Materials, Structures, and Operation of Equipment

POTENTIAL MAINTENANCE ACTIONS ¹	LOCATION	WORK WINDOW ²	WORK DURATION	ANTICIPATED FREQUENCY ³	DESCRIPTION OF EQUIPMENT / METHODS	DESCRIPTION OF QUANTITIES ⁴ / MATERIAL PER YEAR	IMPACT AVOIDANCE & MINIMIZATION MEASURES ⁵ AND BEST MANAGEMENT PRACTICES ⁶	
							BMPs: d, f, g, k d. Dispose in uplands f. Avoid removal of mature (>10 year) riparian vegetation g. Avoid permanent placement of fill in wetlands k. Conduct pre-construction surveys performed by a qualified biologist	
6	Raise height of dike or levee (including trail) without expanding footprint and/or filling wetlands	Existing dike, and levee locations only	June 15 - November 1	0-120 days	Infrequent	Heavy equipment for grading	0-9,000 lf of dike or levee	BMPs: k, l g. Avoid permanent placement of fill in wetlands k. Conduct pre-construction surveys performed by a qualified biologist l. Upon completion of ground disturbance activities and prior to the onset of the rainy season, all bare soil areas above 7.5 ft. elevation shall be seeded in compliance with native seed mix.
7	Maintain or repair (as-built) access roads and road atop dike and levee	Existing dike and levee locations and other access road ramps	June 15 - November 1	0-60 days	Moderate	Heavy equipment for grading and repairs	0-1,000 cy of road base 0-1,000 cy of grading	Measures: - WQHM-3: Erosion Control (and WQHM-2: Stormwater Pollution Prevention Plan) BMPs: d, k, l d. Dispose in uplands k. Conduct pre-construction surveys performed by a qualified biologist l. Upon completion of ground disturbance activities and prior to the onset of the rainy season, all bare soil areas above 7.5 ft. elevation shall be seeded in compliance with native seed mix.
8	Provide additional revegetation with native plants	Project-wide	Year-round	0-60 days	Moderate	Hand tools and possibly small augering devices/light equipment	0-5,000 plants	Measures - GPM-15: Revegetate Disturbed Areas - VHDR-3: Revegetation Materials and Methods - VHDR-4: Revegetation Erosion Control Materials and Methods BMP: k k. Conduct pre-construction surveys performed by a qualified biologist
9	Apply/place excavated sediment on Agricultural Lands	Agricultural lands east of the setback levee	April 1 - Nov. 30	0-120 days	Moderate	Heavy/farm equipment	0-100,000 cy of sediment	BMP: d d. Dispose in uplands
10	Mow, trim, thin or remove vegetation and/or invasive vegetation as necessary to maintain function per Project design plans	Atop dike and setback levee to retain access	Year-round, with the exception of the bird breeding and nesting season between March 15 and August 15.	0-120 days	Frequent	Herbicides, hand pruning tools and possibly chainsaws and brush cutter/mowing or other light equipment. Flash grazing may be utilized in conformance with the WRE program easement conditions.	0-10 acres Trees no larger than 6" dbh	Measure: - VHDR-2: Native and Invasive Vegetation Removal Materials and Methods - VHDR-6: General Herbicide Use - VHDR-7: Herbicide Application Planning - VHDR-8: Herbicide Application Reporting - Measure 5.5.1: NOAA Herbicide Use Protection Measures BMPs: c, k, l, m, n c. Chip debris and utilize for onsite mulch to the extent practical
		Removal of non-native species Project-Wide, i.e. dense-flowered cordgrass	Year-round exception of the bird breeding and nesting	0-120 days	Frequent		0-500 acres	

POTENTIAL MAINTENANCE ACTIONS ¹	LOCATION	WORK WINDOW ²	WORK DURATION	ANTICIPATED FREQUENCY ³	DESCRIPTION OF EQUIPMENT / METHODS	DESCRIPTION OF QUANTITIES ⁴ / MATERIAL PER YEAR	IMPACT AVOIDANCE & MINIMIZATION MEASURES ⁵ AND BEST MANAGEMENT PRACTICES ⁶
		season between March 15 and August 15.					k. Conduct pre-construction surveys performed by a qualified biologist l. Upon completion of ground disturbance activities and prior to the onset of the rainy season, all bare soil areas above 7.5 ft. elevation shall be seeded in compliance with native seed mix. m. Survey results must indicate that no nesting habitat for any bird species is present in the area n. Pre-construction rare plant surveys shall be conducted in suitable rare plant habitat

¹ Potential Maintenance Actions subject to NRCS WRE program easement.

² Work window subject to the agency requirements and expanded if necessary for "Emergency" conditions.

³ Anticipated Frequency categories include: Frequent (every 1-2 years), Moderate (every 2-5 years), Infrequent (every 5-15 years), and Rare (15+ years, or not at all)

⁴ Quantities given and a maximum, not-to-exceed value for any given year. Quantities beyond what is specified here would require additional regulatory review/approval

⁵ Impact Avoidance & Minimization Measures sourced from the Programmatic Biological Opinion (PBO) and State Restoration General Order (SRGO) used for the Project (see **Appendix B**)

⁶ BMP Notes

a – Utilize onsite native soil to the extent practical

b – Design techniques and standards shall be similar to those in project plans

c – Chip debris and utilize for onsite mulch to the extent practical

d – Dispose in uplands

e – Under the direction of a qualified biologist

f – Avoid removal of mature (>10 year) riparian vegetation

g – Avoid permanent placement of fill in wetlands

h – Removal of vegetation will be limited to excavation areas

i – Per local invasive removal plans (e.g. Spartina Eradication Plan)

j – Shall not block public access

k – Conduct pre-construction surveys performed by a qualified biologist

l – Upon completion of ground disturbance activities and prior to the onset of the rainy season, all bare soil areas above 7.5 ft elevation shall be seeded with either the agricultural or one-parameter wetland native seed mix as described in the Wetlands and Habitat Restoration Plan.

m – Survey results must indicate that no nesting habitat for any bird species is present in the area

n – Pre-construction rare plant surveys shall be conducted in suitable rare plant habitat



Cannibal Island Restoration Project

Avoidance and Minimization Measures for Certification Under the Statewide Restoration General Order (SRGO)

California Trout

27 September 2023



Exhibit 5
1-23-0854 (CDFW)
BMPs & AMMs (pg. 5 of 15)

Avoidance and Minimization Measures

Cannibal Island Restoration Project

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Exhibit 5
1-23-0854 (CDFW)
BMPs & AMMs (pg. 6 of 15)

1. Introduction

Statewide Restoration General Order (SRGO) Notice of Intent (NOI) Application Requirements

The following documentation supports the Projects Waste Discharge Requirements and Clean Water Act (CWA) Section 401 Certification through the State Water Resources Control Boards Final Statewide Restoration General Order (SRGO, hereafter “Order”) (WQ 2022-0048-DWQ). Information contained herein supports enrollment in the Order through submittal of a Notice of Intent (NOI), and addresses the following to fulfill pre-application requirements outlined in the Order Attachment B, Notice of Intent Form (SWRCB 2022):

In addition to relevant information discussed at the pre-application consultation, the NOI must include:

-Project design steps taken to first avoid, and then minimize, impacts to waters of the state.

See **Section 4**, Avoidance and Minimization Measures

-Applicable General Protection Measures (GPMs listed in the Final Order, Attachment A—Description and Eligibility) to be implemented for the project.

See **Section 5**, General Protection Measures

-Mitigation Measures (per CEQA considerations) to be implemented for the project.

The project is exempt from CEQA consideration through the California Department of Fish and Wildlife (CDFW) Statutory Exemption for Restoration Projects (SERP) (Public Resources Code § 21080.56).

-Proof of the Sacred Lands Search and proof of tribal notification (and opportunity to comment) regarding the proposed project.

See **Section 6**, Cultural Resources Investigation

2. Project Summary

The Cannibal Island Restoration Project (Project) is approximately 794 acres of agricultural bottoms and tidal saltmarsh in the Eel River Delta, three miles west of the town of Loleta, Humboldt County, CA. The Project Area is at the western-most extent of the Eel River delta and estuary approximately one mile inland and northeast of the Eel River mouth. The Project is within the Cannibal Island U.S. Geological Survey (USGS) 7.5-minute quadrangle, bounded by Cannibal Island Road to the south, the North Bay of the Eel River Delta and Mosley Slough to the west, and Sevenmile Slough to the north and northeast.

The northern and western portion of the Project Area (approximately 462 acres) is owned by California Department of Fish & Wildlife (CDFW) and managed as part of the of the Eel River Wildlife Area (ERWA) Cannibal Island Unit (APN 310-043-001, 310-033-004, and 310-021-003, 310-021-004). The remaining 332 acres are privately owned by Hansen (APN 310-043-003 and 310-051-001) and Pedrazzini (APN 310-043-004,-005, -006). Approximately 220 acres of the private property are held in Wetland Conservation Easements by the Natural Resources Conservation Service (NRCS) Wetlands Reserve Easement Program (WRP).

The Project will restore a landscape of mostly diked agricultural land to a mosaic of pasture and natural habitats, including estuarine and tidal slough channels, brackish ponds, freshwater ponds, and agricultural pastures. Restoration of the natural tidal inundation range and hydraulics as well as fluvial and tidal sediment deposition to restore wetland functions is critical to achieve Project objectives. Increased tidal exchange and connectivity between historical tidal wetland areas and North Bay will support broader native plant, fish, wildlife, and benthic infauna diversity within estuarine and freshwater marsh habitats, and in wetland-ecotones.

Improvement of tidal channel networks will accommodate physical processes such as sediment transport and marsh plain sediment accretion. The Project will enhance and reconnect full tidal exchange to approximately 500 acres of former tidal marsh habitat and construct inter-tidal lagoons with tidal marsh features.

The Project will enhance (widen and deepen) existing tidal slough channels within the limits of Project disturbance. Construction activities will include the removal of outdated water control structures, excavation of slough channels to accelerate the formation of high-quality aquatic habitat for listed fish species, and placement of excavated fill in appropriate locations to mimic natural marsh topography (natural levees and hummocks or tidal marsh ridges) and enhance wetland vegetation diversity through removal of invasive dense-flowered cordgrass. Excavated soils from the channels would be placed in low hummocks approximately 2-feet high adjacent to the channels. These hummocks are anticipated to retain wetland parameters as they will not exceed marsh plain elevation and would not constitute conversion to uplands. Placement of ¼ ton rock will occur along a section of channel to provide inset channel grade control to manage the tidal prism. This grade control is anticipated to be beneficial to manage tidal prism until the site elevations increase to be representative of a system with full tidal amplitude, which is expected to occur over 10-20 years. The rock would be placed over a 20-foot-long section where a former road crossing is located and failing culvert is proposed for removal. This area is a suitable location for the inset channel grade control because it likely already contains compacted sediment (from previous infrastructure), and will be disturbed via the road crossing and culvert removal anyway. Much of the existing dike network within the Project Area would be reconfigured or removed. A new setback levee will be constructed to protect agricultural land from tidal inundation as full amplitude is restored, including one newly constructed set-back levee in the eastern portion of the Project Area, and raising of Cannibal Island Road in the southern portion of the Project Area. Sediment excavated during construction would be beneficially reused within the Project Area and would not be hauled off-site.

See **Attachment 5 of the SRGO application package** for the Project Description and details of project activities and accompanying figures.

3. Summary of Construction Activities for Project

The following are general details of the proposed Project's construction, operation, and maintenance activities.

Construction Timing:

Project construction will be phased into one to two construction seasons based on available funding, site conditions, and sequencing for earthwork and County Road construction. Each season will span approximately June through the end of October, as feasible with dry weather and allowable permitting windows.

Construction Materials:

Multiple sediment reuse areas coupled with the extent of Project excavation are anticipated to necessitate multiple staging areas within the Project footprint.

Equipment Types anticipated for Project construction include:

- Excavators (Conventional and/or Amphibious)
- Scrapers
- Dozers
- Loaders
- Dump Trucks
- Small Tractors
- Compactors
- Graders

Water Trucks
Pumps

Site Access & Staging:

A temporary construction entrance shall be placed at the intersection of the Cannibal Island County Road and Senestraro Lane. Cannibal Island Road is a two-lane paved County road. Senestraro Lane is a single lane dirt road extending north from Cannibal Island Road and located on CDFW property. Plans include a public access parking lot near this intersection which will be used for construction staging. The CDFW access road (Senestraro Lane) will be the primary entrance and exit for construction activities within the site. Another temporary construction entrance will be placed at the intersection of Cannibal Island Road and the Hansen/Pedrazzini private driveway to provide a route along the eastern boundary of the Hansen residence and follow the perimeter dike to and past Sevenmile Slough as needed to access the eastern and northern portion of the site. Construction equipment and materials will be transported to the work areas via these ingress and egress locations.

See **Attachment 11 of the SRGO application package** for the Project 65% Design Plans

Construction Activities:

See **Attachment 5 of the SRGO application package** for details of Project construction activities, and **Attachment 5, Appendix A, Figure 2-8**, for the location of proposed Project activities.

Constructed Facilities (Natural and Artificial Infrastructure) and Operations and Maintenance to those Facilities:

Ongoing management and maintenance activities may be necessary to ensure the long-term hydraulic and ecological functions of the Project.

Maintenance actions are anticipated after the Project is constructed, and are described in the Project Operations and Maintenance Plan (**Attachment 9 of the SRGO application package**).

- Setback Levee
 - Observations of physical character (annually and following extreme storms)
 - Mowing to discourage growth of woody vegetation and invasives species (annually)
 - Repair from erosion or burrowing animal damage (as needed)
- Grading and/or resurfacing portions of the access roads (as needed)
- Cleaning debris and sediment from channels, drainage ditches and floodgates (as needed)
- Removing invasive vegetation and re-seeding with native seed mixes, as necessary

Surface Water and Groundwater Management

During excavation, management of surface water will be required through the construction period. Surface water management will be required to reduce nuisance water within the active work area. Inflow management will also reduce the moisture content in excavated soils and prevent aquatic and non-aquatic organisms from entering the construction area. Cofferdams will be used to isolate instream work areas that will be dewatered.

The cofferdam(s) will be either an aqua dam, or will be comprised of native material or washed gravel encased with an impermeable geotextile or visqueen liner in combination with ecology blocks and/or temporary sheet piles pushed into the subsurface. Cofferdam(s) will be installed during low tide, when the least amount of water is within the work area(s). Once the cofferdam is securely installed and the work area is isolated, the isolated area would be seined (or similar) to relocate special status fish and other special status aquatic species to nearby suitable habitat; common species will be relocated to suitable habitat as is feasible. Once the area is free of special status fish species, surface water would be pumped or routed via gravity flow out of the active

work area to an adjacent area to settle. Due to the expansive marsh plain, pumping surface water to an area of uplands to infiltrate is not feasible.

After initial surface dewatering, groundwater dewatering is expected to be necessary within work area(s) due to the low elevation of the marsh plain and high water table. Groundwater dewatering will involve pumping water out of the work area to a nearby area to infiltrate. As mentioned above, it is not feasible to pump water to areas of uplands for infiltration. Discharge of turbid water directly to receiving waters (i.e. Mosley Slough, Sevenmile Slough, or North Bay) will not occur. The cofferdam(s) will be removed on an incoming tide so that loose sediment is deposited on the marsh plain, as opposed to entrained into receiving waters.

Excavation of the tidal channel network to connect with North Bay will occur using excavators and dump trucks.

Equipment will use the remnant dikes to access the channel excavation area. A temporary road will be used to allow equipment access over the salt marsh, where an excavator will offload sediment to dump trucks for disposal throughout the Project Area. Portions of the channel may need to be excavated with an amphibious excavator. Silt curtains may be installed to limit the delivery of turbid water outside the immediate work area, if feasible.

4. Avoidance and Minimization Measures

The Project is receiving permits/approvals from various agencies for sensitive fish species documented or potentially present in the Project Area. Included in this document are General Protection Measures (GPM) applicable to the Project per SRGO Attachment A criteria. Additional avoidance and minimization measures for the Project include minimization measures required within the Programmatic Biological Opinions (PBO) administered by 1) the National Oceanic and Atmospheric Administration Restoration Center (NOAA RC) and U.S. Army USACE of Engineers (USACE) for covered salmonids (NMFS 2022), and 2) the United States Fish and Wildlife Service (USFWS) for Tidewater Goby (USFWS 2022). These documents are attached to the SRGO application package, and include extensive avoidance and minimization measures for protection of water quality.

A summary of avoidance and minimization measures is described below. The Contractor shall be responsible for the installation of piping, pumps, fish screens, erosion control measures, cofferdams, and the proposed culverts in collaboration with and under the direction of a qualified biologist and engineer.

Erosion Control Measures and Best Management Practices

The Contractor will employ Best Management Practices (BMPs) during construction including the following BMPs from the current California Stormwater BMP Handbook for Construction (CASQA 2022):

- EC-1: Scheduling
- EC-2: Preservation of Existing Vegetation
- NS-2: Dewatering Operations
- NS-9: Vehicle Equipment and Fueling
- NS-10: Vehicle & Equipment Maintenance
- WM-2: Material Use
- WM-4: Spill Prevention and Control

Additionally, the Contractor(s) will be responsible for minimizing erosion and preventing the transport of sediment to sensitive areas utilizing the following approaches:

- Installation of temporary fiber rolls, as needed.
- Silt fence surrounding newly constructed public access parking (proposed construction staging area).

- Seed mix applied to all disturbed areas above elevation 7.5 ft (revegetation design is included in the Project's design plans).
 - A variety of seed mixes will be applied to edges and slopes of newly constructed setback levee, Cannibal Island Road, the newly constructed parking lot, recreation trail, and temporarily disturbed access and staging areas, based on elevation.

Additional Erosion Control Measures include:

- Sufficient erosion control supplies will be always maintained on site, available for prompt use in areas susceptible to erosion during rain events;
- Disturbance of existing vegetation will be minimized to only that which is necessary to complete the work;
- The Contractor(s) will make adequate preparations, including training and providing equipment, to contain oil and/or other hazardous materials spills;
- Dewatering operations will be conducted where needed from the work location and stored or disposed of appropriately;
- Vehicle and equipment maintenance should be performed off-site whenever practical;
- Contractor(s) shall ensure that the site is prepared with BMPs prior to the onset of any storm;
- All erosion and sediment control measures shall be maintained in accordance with their respective BMP fact sheet until disturbed areas are stabilized;

This plan may not cover all the situations that arise during construction due to unanticipated field conditions.

Variations may be made to the plan in the field subject to the approval of or at the direction of the Project Manager.

Water Quality Control Measures

Avoidance and minimization measures to protect water quality include the following:

- Construction equipment shall not be stored in inundation areas or in sloughs.
- The Contractor(s) will ensure that any liquid fuel pumps used on-site (for dewatering, etc.) shall be placed on absorbent pads and containment implements. The Contractor(s) shall have spill containment materials located at the site, with operators trained in spill control procedures. All staging shall be within the limits of disturbance, and the Contractor(s) shall not unnecessarily disturb aquatic habitat and wetlands. At the close of construction, the Contractor(s) shall restore staging areas and temporary haul roads to pre-project conditions (de-compacted and naturalized as needed).
- Following implementation of a diversion system and isolation of the project reach, standing water remaining within the Project reach will be pumped to a sufficient level to allow a qualified biologist to relocate aquatic organisms. Given the Project area is primarily wetlands, following completion of relocation activities, the remaining water will be pumped to surrounding wetlands and allowed to infiltrate or into temporary holding/filter tanks and allowed to settle. Following dewatering and relocation, equipment will then be permitted within the channel.
- During excavation, management of surface water will be required through the construction period. Surface water management will be required to reduce nuisance water within the active work area. Inflow management will also reduce the moisture content in excavated soils and prevent aquatic and non-aquatic organisms from entering the construction area. Cofferdams will be used to isolate instream work areas that will be dewatered, and stream flow bypassed downstream.
- Following construction, the contractor will demobilize and remove equipment, supplies, and construction materials. The disturbed areas above the salt marsh plain will be restored to pre-

construction conditions or stabilized with a combination of native herb and grass seed (broadcast or hydroseed), straw mulch, or other plantings/revegetation.

5. General Protection Measures

All applicable GPMs that may be incorporated into the proposed Project are listed below, sourced from Attachment A of the Order (SWRCB 2022). There have been no GPMs specific to the proposed Project that cannot be implemented (there are some GPMs that do not apply to the proposed Project).

Sourced from Appendix A of the Order– General Protection Measures

General Protection Measures

GPM-1: Receipt and Copies of All Permits and Authorizations

Work will not begin until all necessary permits and authorizations have been received (e.g., USACE, USFWS, NMFS, State and Regional Boards, CDFW). The project proponent will ensure that a readily available copy of the applicable agency permits and authorizations (e.g., USFWS Biological Opinion, NMFS Biological Opinion, Section 404 permit, etc.) is maintained by the construction foreman/manager on the project site for the duration of project activities.

GPM-2: Construction Work Windows

Construction work windows may be required in order to avoid impacts to aquatic resources and associated beneficial uses during the wet season. Project proponents must also follow the applicable Regional Board's construction work windows, unless otherwise approved.

GPM-3: Construction Hours

Construction activities will generally be limited to daylight hours, to the extent feasible. If nighttime construction is necessary, including in tidally influenced waters where tides may limit daylight access and work schedules, all project lighting (e.g., staging areas, equipment storage sites, roadway, and construction footprint) will be selectively placed and directed onto the roadway or construction site and away from aquatic habitats. Light glare shields will be used to reduce the extent of illumination into aquatic habitats. If the work area is near surface waters, the lighting will be shielded so that it does not shine directly into the water.

GPM-4: Environmental Awareness Training

For projects occurring in aquatic resources (e.g., wetlands, riparian areas, etc.), prior to engaging existing or new personnel in construction activities, new construction personnel will participate in environmental awareness training conducted by an agency-approved biologist or resource specialist. 9 Construction personnel will be informed regarding the identification, potential presence, legal protections, avoidance and minimization measures, and applicable general protection measures for all aquatic resources with the potential to occur within or immediately adjacent to the project site. Construction personnel will be informed of the procedures to follow should aquatic resources be disturbed during construction activities. For projects where the agency-approved biologist or resource specialist is not regularly on the project site, training may be provided via online/web-based meeting with an interactive portion (e.g., web-based or in-person discussion) to be included during remote training sessions. For projects that may continue over an extended duration and require excessive training events, a training video developed under the supervision of the FWS-approved biologist or resource specialist may be used to train new personnel, as long as an FWS-approved biologist or resource specialist is available via phone to answer questions about the training or that may arise during construction.

GPM-5: Environmental Monitoring

As required in the NOA, a resource specialist will ensure that all applicable protective measures are implemented during project construction. The resource specialist will have authority to stop any work if they

determine that any permit requirement is not fully implemented. The resource specialist will prepare and maintain a monitoring log of construction site conditions and observations, which will be kept on file.

GPM-6: Work Area and Speed Limits

Construction work and materials staging will be restricted to designated work areas, routes, staging areas, temporary interior roads, or the limits of existing roadways. Prior to initiating construction or grading activities, brightly colored fencing or flagging or other practical means will be erected to demarcate the limits of the project activities, including the boundaries of designated staging areas; ingress and egress corridors; stockpile areas for spoils disposal, soil, and materials; and equipment exclusion zones. Flagging or fencing will be maintained in good repair for the duration of project activities. Vehicles will obey posted speed limits on public roadways and will limit speeds to 20 miles per hour (mph) within the project area on unpaved surfaces and unpaved roads (to reduce dust and soil erosion) or in areas where special status species have the potential to occur. Speeds greater than 20 mph may be permitted in the project area where special-status species are not expected to occur (e.g., within areas from which special-status species have been excluded) and where there is no risk of generating excessive dust (e.g., surfaces are paved, saturated, or have been treated with other measures to prevent dust).

GPM-7: Environmentally Sensitive Areas

Monitoring, flagging, or fencing will be used, where appropriate, to minimize disturbance to environmentally sensitive areas (e.g., waters and wetlands). If fencing is used:

- Fencing used must be approved by CDFW and/or USFWS for compatibility with species under their jurisdiction, as applicable, that may occur on site.
- The agency-approved biologist or resource specialist will determine the location of fencing prior to the start of construction (e.g., between active work area(s) and sensitive resources).
- Fencing will remain in place throughout the duration of the construction activities and will be inspected and maintained regularly by the agency approved biologist or resource specialist until completion of the project.
- Repairs to the fencing will be made within 24 hours of discovering any failure.
- Fencing will be removed when all construction equipment is removed from the site, the area is cleared of debris and trash, and the area is returned to natural conditions.

GPM-8: Prevent Spread of Invasive Exotic Plants

The spread or introduction of invasive exotic plant species by arriving vehicles, equipment, imported gravel, and other materials, will be avoided to the maximum extent possible. When practicable, invasive exotic plants in the project areas will be removed and properly disposed of in a manner that will not promote their spread. Equipment will be cleaned of any sediment or vegetation at designated wash stations before entering or leaving the project area to avoid spreading pathogens or exotic/invasive species. Isolated infestations of noxious weeds identified in the project area will be treated with approved eradication methods at an appropriate time to prevent further formation of seed and destroy viable plant parts and seed. Wash sites must be in confined areas that limit run-off to any surrounding habitat and on a flat grade. Upland areas will use rice straw or invasive species-free local slash/mulch for erosion control, while the remainder of the project area will use certified, weed-free erosion control materials. Mulch must be certified weed free. The project proponent will follow the guidelines in the CDFW's California Aquatic Invasive Species Management Plan (CDFW 2008) and Aquatic Invasive Species Disinfection/Decontamination Protocols (CDFW 2016), where relevant. Construction supervisors and managers will be educated on weed identification and the importance of controlling and preventing the spread of noxious weeds. The project proponent will follow any applicable local guidance to prevent the spread of invasive animal species. Construction supervisors and managers will be responsible for the implementation of appropriate protocols (e.g., disinfection of equipment and footwear) to prevent the spread of invasive animals.

GPM-9: Practices to Prevent Pathogen Contamination

The project proponent will review and implement restoration design considerations and best management practices as published by the Working Group for Phytophthoras in Native Habitats (www.calphytos.org), when there is a risk of introduction and spread of plant pathogens in site plantings. ([http://www.suddenoakdeath.org/welcome-to-calphytos-org-phytophthoras-in-native-habitats/resources/#restoration.](http://www.suddenoakdeath.org/welcome-to-calphytos-org-phytophthoras-in-native-habitats/resources/#restoration))

GPM-10: Equipment Maintenance and Materials Storage

Vehicle traffic will be confined to existing roads and the proposed access route(s). All machinery must be in good working condition, showing no signs of fuel or oil leaks. Oil, grease, or other fluids will be washed off at designated wash stations prior to equipment entering the construction site. Inspection and evaluation for the potential for fluid leakage will be performed daily during construction. Where possible, and where it would not result in greater impact to aquatic resources, no equipment refueling, or fuel storage will take place within 100 feet of a body of water. All fuel and chemical storage, servicing, and refueling will be done in an upland staging area or other suitable location (e.g., barges) with secondary containment to prevent spills from traveling to surface water or drains. Project proponents will establish staging areas for equipment storage and maintenance, construction materials, fuels, lubricants, solvents, and other possible contaminants in coordination with resource agencies. Staging areas will have a stabilized entrance and exit and will be located in upland areas to the extent possible and at least 100 feet from bodies of water unless site-specific circumstances do not provide such a setback or would result in further damage to sensitive resources, in which case the maximum setback possible will be used. Fluids will be stored in appropriate containers with covers and properly recycled or disposed of offsite. Machinery stored on site will have pans or absorbent mats placed underneath potential leak areas as a precautionary measure to further reduce the potential for impact from an unintended or previously undetectable leak.

GPM-11: Material Disposal

All refuse, debris, unused materials, and supplies that cannot reasonably be secured will be removed daily from the project work area and deposited at an appropriate disposal or storage site. All construction debris will be removed from the project work area immediately upon project completion. The Water Quality and Hazardous Materials measures (below) will be implemented as applicable to ensure proper handling and disposal of hazardous materials.

GPM-12: Fugitive Dust Reduction

To reduce dust, construction vehicles will be speed restricted as described in GPM-6, Work Area and Speed Limits when traveling on non-paved surfaces. Stockpiled materials susceptible to wind-blown dispersal will be covered with plastic sheeting or other suitable material to prevent movement of the material. During construction, water (e.g., trucks and portable pumps with hoses) or other approved methods will be used to control fugitive dust, as necessary. Dust suppression activities must not result in a discharge to waters of the state unless such discharges are approved by the State or Regional Board.

GPM-13: Trash Removed Daily

During project activities all trash will be properly contained within sealed containers and removed from the work site and disposed of as necessary to maintain a trash-free work area (e.g., trash containers will not be used beyond capacity and fully close/seal).

GPM-14: Project Cleanup after Completion

Work pads, temporary falsework, and other construction items will be removed from the 100-year floodplain by the end of the construction window. Removal of materials must not result in discharge to waterbodies.

GPM-15: Revegetate Disturbed Areas

All temporarily disturbed areas will be de-compacted and seeded/planted with an assemblage of native riparian, wetland, and/or upland plant species suitable for the area. The project proponent will develop a revegetation plan, including (as applicable) a schedule; plans for grading of disturbed areas to pre-project contours; planting palette with plant species native to the project area; invasive species management; performance standards;

success criteria; and maintenance requirements (e.g., watering, weeding, and replanting). Plants for revegetation will come primarily from active seeding and planting; natural recruitment may also be proposed if site conditions allow for natural recruitment to reestablish vegetation and avoid potential negative risks associated with erosion and impacts to water quality. Plants imported to the restoration areas will come from local stock, and to the extent possible, local nurseries. Only native plants (genera) will be used for restoration efforts. Certified weed-free native mixes and mulch will be used for restoration planting or seeding. Revegetation activities within and adjacent to Waters of the State will commence as soon as is practicable after construction activities at a site are complete.

6. Cultural Resources Investigation

A cultural resources study was conducted in 2020 for a majority of the Project area, with an addendum of the Project in 2022 to investigate a small area added to the Project south of the Cannibal Island Road (GHD 2020). The investigations included written correspondence regarding the investigation sent to the Native American Heritage Commission (NAHC) along with a request to search the Sacred Lands Inventory File. Proof of this correspondence is provided in **Attachment 10 of the SRGO application package**, Cannibal Island Restoration Project Cultural Resources Investigation Report and Addendum—these documents do not contain confidential information and are therefore attached, and no California Register of Historical Resources eligible historic resources or cultural resources were identified. Requirements for inadvertent discovery protocols will be incorporated into construction documents prior to bidding and ground disturbance. Inadvertent discovery protocols will include tribal notification.

7. Citations

California Stormwater Quality Association (CASQA). 2022. Construction BMP Handbook. Subscription. <https://www.casqa.org/resources/bmp-handbooks>

National Marine Fisheries Service (NMFS). 2022. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response. NOAA Restoration Center and U.S. Army Corps of Engineers. National Marine Fisheries Service, West Coast Region, USA.

State Water Resource Control Board (SWRCB). 2022. Clean Water Act Section 401 – Certification and Wetlands Program, Statewide Restoration General Order. https://www.waterboards.ca.gov/water_issues/programs/cwa401/generalordersunderdev.html

U.S. Fish and Wildlife Service (USFWS). 2022. Programmatic Biological Opinion and Conference Opinion – California Statewide Programmatic Restoration Effort. U.S. Fish and Wildlife Service, Pacific Southwest Regional Office, Sacramento, California, USA.



Technical Memorandum

February 14, 2023

To	Darren Mierau, Project Manager, CalTrout	Contact No.	(707) 267-2207
From	Kerry McNamee, Environmental Planner, GHD	Email	kerry.mcnamee@ghd.com
Reviewed by and copied to	Jeremy Svehla, Project Engineer, GHD, and Misha Schwarz, Project Scientist, GHD	Project No.	11206383
Project Name	Cannibal Island Restoration Project		
Subject	Cannibal Island Restoration Project Agricultural Resource Assessment		

1. Introduction

This Technical Memorandum identifies and analyzes agricultural resources within the Cannibal Island Restoration Project (Project) that may be subject to regulation under the California Environmental Quality Act (CEQA), the Williamson Act, the Eel River Area Plan Local Coastal Program (ERAP) and the Coastal Act. The Project is located in low agricultural bottomland and tidal marsh habitats in Loleta, California on land zoned Agriculture Exclusive (**Appendix A, Figure 1—Vicinity Map**). This analysis includes review of various agricultural resource designations (i.e. Prime Farmland and Prime Agricultural Land) and a determination of whether all or parts of the Project Study Area (PSA) meet the agricultural designations in accordance with CEQA, Public Resources Code (PRC) 21060.1, Government Code 51201 (c), Humboldt County regulations, and the Coastal Act. Information from landowners on land management and productivity, guidance from the California Department of Conservation (DOC), the Natural Resources Conservation Service (NRCS) Soil Survey mapping units, and field investigations on soil productivity and mapped vegetation assemblages were utilized to determine whether portions of the PSA meet the Prime Farmland and/or Prime Agricultural Land designations. In total, the PSA contains no Prime Farmland, and approximately 44.4 acres of Prime Agricultural Land on the east side of Hansen parcels (APNs: 310-051-01, 310-043-03) and the Pedrazzini parcel (APN: 310-043-04).

1.1 Purpose of this Memorandum

This analysis will be used to determine the regulatory status of potential agricultural resources within the PSA in accordance with the agricultural designation definitions utilized in CEQA (and subsequent PRC 21060.1 and Gov. Code 51201 [c]), Humboldt County Zoning Code, the Humboldt County Williamson Act Advisory Committee, ERAP, and the Coastal Act. This analysis provides analysis and a determination of the acreage of land that is considered Prime Farmland by the NRCS (if any), acreage of land that meets the definition of Prime Agricultural Land, and analysis of whether implementation of the Project would convert Prime Farmland, Prime Agricultural Land, conflict with Humboldt County Zoning Code, Williamson Act Advisory Committee guidelines or the ERAP, or Coastal Act.

1.2 Project Description

The Project is located in agricultural bottomland and tidal marsh in the Eel River estuary in Loleta, Humboldt County, CA (**Appendix A, Figure 1**). The Project would seek to restore and expand natural estuarine functions and processes in the PSA to promote recovery of habitat for native fish, invertebrates,

Exhibit 6 1-23-0854 (CDFW) Agricultural Analysis (excerpt) (pg. 1 of 22)
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wildlife, and plant species compatible with surrounding working agricultural lands and public access. To achieve the Project goal, construction activities are anticipated to include modifications to the existing dikes/water control structures, raising of Cannibal Island Road, excavation of slough channels, and placement of fill that collectively would restore hydrologic connectivity to the Eel River estuary while reducing flood impacts in the eastern margin of the PSA and off-site. In addition, the Project includes construction of a set-back levee which will help protect agricultural lands in the eastern margin of the PSA from saltwater intrusion and sea level rise.

The historical diking and draining of coastal wetlands for ranching and agriculture in the Eel River estuary around the turn of the 20th century caused a loss of coastal salt marsh in the estuary. Under existing conditions, a large part of the PSA has reverted to tidal marsh due to failure of some levees and the tide gate, rising sea level, and ground subsidence. Some functional pasture remains in higher elevations, particularly on the east side of the PSA, and a small strip of pasture to the south of Cannibal Island Road. The area within the levees is subject to a muted tidal prism and contains estuarine marsh and tidal waters as well as pasture (see **Appendix A, Figure 2 – Existing Dikes/Fill**). Vegetation mapping including surveys for rare plants, Sensitive Natural Communities and Environmentally Sensitive Habitat Areas was conducted in the spring and summer of 2020. In general, salt tolerant vegetative species are well established in the central portion of the PSA, and fresh to brackish wetlands have established in the north, east and southern portions of the PSA in an area surrounded by pasture; see **Appendix A, Figure 3 – Vegetation Mapping/Soil Sample Locations** for an overview of habitat types within the PSA. See the technical memorandum on botanical resources for a discussion of habitat and vegetation types onsite (GHD 2022).

1.3 Project Location

The PSA is within the Cannibal Island U.S. Geological Survey (USGS) Quad in the Eel River estuary, approximately three miles west of the town of Loleta, CA. The PSA is bounded by agricultural land directly south of Cannibal Island Road, Mosley Slough and North Bay to the west, and Sevenmile Slough to the north and east (**Appendix A, Figure 1**). The Project is located within the Coastal Zone and is entirely within the jurisdiction of the California Coastal Commission (Humboldt County 2022). Zoning within the PSA is AE-60/W, F, R, T meaning it is zoned Agricultural Exclusive with a minimum lot area of 60 acres and the following combining zones: Streamside Management Areas and Wetlands (W), Flood Hazard Area (F), Recreation (R), and Manufactured Home (T). Three property owners own land comprising the PSA, including the California Department of Fish and Wildlife (CDFW), L. Pedrazzini and L. Hansen. Land uses have included seasonal grazing on the two private property holdings, and management for wildlife habitat on the CDFW-owned property. Portions of the private holdings are within the NRCS Wetland Reserve Easement (WRE) program, and the entirety of the Hansen properties are under Williamson Act contracts (see **Appendix A, Figure 4 – Land Use and Williamson Act Contracts**). The entire PSA is not irrigated. A nonfunctioning tide gate, partially failed culverts and eroded levee have created a muted uncontrolled tidal prism. Most of the PSA is not drained, is impacted by wave over wash, and is not fully protected from flooding from the Eel River (see **Appendix A, Figure 2**).

2. Regulatory Setting

The following policies or laws provide regulatory protections to agricultural resources. Relevant regulatory definitions are provided below.

2.1 California Environmental Quality Act (CEQA)

The CEQA checklist includes the following questions related to potential agricultural and forestry impacts (**bolded** text below relates to agricultural resources):

II. AGRICULTURE AND FORESTRY RESOURCES. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the **California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland**. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?

c) Conflict with existing zoning for, or cause rezoning of, forestland (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?

d) Result in the loss of forest land or conversion of forest land to non-forest use?

e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

The CEQA Handbook (CAEP 2022) provides the following guidance for agricultural land designations as follows (note that subdivision [b] is applicable to this Project as the Department of Conservation has not completed mapping in Humboldt County):

Public Resources Code Section 21060.1. AGRICULTURAL LAND

(a) "Agricultural land" means prime farmland, farmland of statewide importance, or unique farmland, as defined by the United States Department of Agriculture land inventory and monitoring criteria, as modified for California.

(b) In those areas of the state where lands have not been surveyed for the classifications specified in subdivision (a), "agricultural land" means land that meets the requirements of "prime agricultural land" as defined in paragraph (1), (2), (3), or (4) of subdivision (c) of Section 51201 of the Government Code.

Government Code Section 51201 (c)

"Prime agricultural land" means any of the following:

(1) All land that qualifies for rating as class I or class II in the Natural Resource Conservation Service land use capability classifications.

(2) Land which qualifies for rating 80 through 100 in the Storie Index Rating.

(3) Land which supports livestock used for the production of food and fiber and which has an annual carrying capacity equivalent to at least one animal unit per acre as defined by the United States Department of Agriculture.

(4) Land planted with fruit- or nut-bearing trees, vines, bushes, or crops which have a nonbearing period of less than five years and which will normally return during the commercial

bearing period on an annual basis from the production of unprocessed agricultural plant production not less than two hundred dollars (\$200) per acre.

The following fifth subdivision of GC 51201 (c) is not considered to meet the definition of “Prime Agricultural Land” in accordance with PRC 21060.1(b) above, however is applicable under the California Coastal Act and the ERAP and is described below. It is presented here for continuity of the government code.

(5) Land which has returned from the production of unprocessed agricultural plant products an annual gross value of not less than two hundred dollars (\$200) per acre for three of the previous five years.

2.2 California Coastal Act

The California Coastal Act (CCC 2022) refers to the definition of Prime Agricultural Land (Section 51201 (c)), provided above in Section 2.1. All five subdivisions are applicable under the Coastal Act, i.e. if lands meet one of the five subdivisions of Gov. Code 51201 (c) it is considered Prime Agricultural Land as described above.

Independent of agricultural designations, the following section from the Coastal Act provides guidance on when lands may be converted out of agricultural production.

Section 30241. *The maximum amount of prime agricultural land shall be maintained in agricultural production to assure the protection of the areas’ agricultural economy, and conflicts shall be minimized between agricultural and urban land uses through all of the following:*

- a. By establishing stable boundaries separating urban and rural areas, including, where necessary, clearly defined buffer areas to minimize conflicts between agricultural and urban land uses.*
- b. By limiting conversions of agricultural lands around the periphery of urban areas to the lands where the viability of existing agricultural use is already severely limited by conflicts with urban uses or where the conversion of the lands would complete a logical and viable neighborhood and contribute to the establishment of a stable limit to urban development.*
- c. By permitting the conversion of agricultural land surrounded by urban uses where the conversion of the land would be consistent with Section 30250 (which relates to the location of new development)*
- d. By developing available lands not suited for agriculture prior to the conversion of agricultural lands.*
- e. By assuring that public service and facility expansions and nonagricultural development do not impair agricultural viability, either through increased assessment costs or degraded air and water quality.*
- f. By assuring that all divisions of prime agricultural lands, except those conversion approved pursuant to subdivision (b), and all development adjacent to prime agricultural lands shall not diminish the productivity of prime agricultural lands.*

Section 30242 Lands suitable for agricultural use; conversion

All other lands suitable for agricultural use shall not be converted to nonagricultural uses unless (1) continued or renewed agricultural use is not feasible, or (2) such conversion would preserve prime agricultural land or concentrate development consistent with Section 30250 (which relates to the location of new development). Any such permitted conversion shall be compatible with continued agricultural use on surrounding lands.

2.3 Eel River Area Plan Local Coastal Program

The PSA is entirely within the state jurisdiction of the Coastal Zone, therefore the Coastal Act administered by the California Coastal Commission contains the regulations that the Project would need to adhere to. The ERAP is mentioned in this section in regard to its connection to the County's Conditional Use Permit, which is anticipated to be required. Both Sections 30241 and 30242 from the Coastal Act (Section 2.2) are also listed in the ERAP, however there is a slight difference in Section 30241 within the ERAP which does not include mention of conversion of agricultural land consistent with adjacent development patterns. The PSA is not located near development and thus it is moot. Both Sections 30241 and 30242 are listed below for continuity.

Section 3.34 Agriculture

Section 30241. *The maximum amount of prime agricultural land shall be maintained in agricultural production to assure the protection of the areas' agricultural economy and conflicts shall be minimized between agricultural and urban land uses through all of the following:*

- a. *By establishing stable boundaries separating urban and rural areas, including, where necessary, clearly defined buffer areas to minimize conflicts between agricultural and urban land uses.*
- b. *By limiting conversions of agricultural lands around the periphery of urban areas to the lands where the viability of existing agricultural use is already severely limited by conflicts with urban uses or where the conversion of the lands would complete a logical and viable neighborhood and contribute to a stable limit to urban development.*
- c. *By developing available lands not suited for agriculture prior to the conversion of agricultural lands.*
- d. *By assuring that public service and facility expansions and nonagricultural development do not impair agricultural viability, either through increased assessment costs or degraded air and water quality.*
- e. *By assuring that all divisions of prime agricultural lands, except those conversion approved pursuant to subdivision (b), and all development adjacent to prime agricultural lands shall not diminish the productivity of prime agricultural lands.*

Section 30242. *All other lands suitable for agricultural use shall not be converted to nonagricultural uses unless (1) continued or renewed agricultural use is not feasible, or (2) such conversion would preserve prime agricultural land or concentrate development with Section 30250 (which relates to the location of new development). Any such permitted conversion shall be compatible with continued agricultural use on surrounding lands.*

B. Compatible Uses

1. *The zoning of all agricultural lands shall not permit any use that would impair the economic viability of agricultural operations on such lands; and a **conditional use permit shall be required of any proposed use not directly a part of agricultural production of food or fiber on the parcel**; except that on parcels of 60 acres or larger, a second house for parents or children of the owner-operator shall be considered a direct part of agricultural production.*

Other uses considered compatible with agricultural operations include:

- a. **Management for watershed**
- b. **Management for fish and wildlife habitat**

Based upon these regulations, acquisition of the County Conditional Use Permit would not conflict with the ERAP because the proposed Project includes management for watershed function and for fish and wildlife habitat which is considered compatible with agricultural operations.

2.4 Humboldt County Zoning Code

The parcels within the PSA are zoned AE-60/W, F, R, T meaning they are zoned Agriculture Exclusive with a minimum lot area of 60 acres, and the following combining zones: Streamside Management Areas and Wetlands (W), Flood Hazard Area (F), Recreation (R), and Manufactured Home (T) (see **Appendix A, Figure 4**).

Excerpts of the Humboldt County Zoning Code (2022) that are applicable to the Project include the following:

313-7: AE: AGRICULTURE EXCLUSIVE

Uses Permitted with a Use Permit:

- Fish and wildlife management, watershed management, wetland restoration, coastal access facilities.

Therefore, a Conditional Use Permit is expected to be required.

2.5 Humboldt County Williamson Act Advisory Committee Guidelines

The Humboldt County Williamson Act Advisory Committee Guidelines (2016) include various classes of preserves which require either Prime Agricultural Land or Non-Prime Agricultural Land (which references subdivisions one through five of Government Code 51201 [c]) including:

Class A Prime Land Preserve and Contract. *In order to qualify for a Class A preserve and contract, land shall comply with the following requirements:*

- 3) **Prime Agricultural Land.** *The land within the preserve shall be prime agricultural land and shall qualify therefore pursuant to any of the following categories:*
 - i) *All land that qualifies for rating as class I or class II in the Natural Resource Conservation Service land use capability classifications.*
 - ii) *Land which qualifies for rating 80 through 100 in the Storie Index Rating.*
 - iii) *Land which supports livestock used for the production of food and fiber and which has an annual carrying capacity equivalent to at least one animal unit per acre as defined by the United States Department of Agriculture.*
 - iv) *Land planted with fruit- or nut-bearing trees, vines, bushes, or crops which have a nonbearing period of less than five years and which will normally return during the commercial bearing period on an annual basis from the production of unprocessed agricultural plant production not less than two hundred dollars (\$200) per acre.*
 - v) *Land which has returned from the production of unprocessed agricultural plant products an annual gross value of not less than two hundred dollars (\$200) per acre for three of the previous five years.*

B) Class B Grazing Land Preserve and Contract. *In order to qualify for a Class B preserve and contract, land shall comply with the following requirements:*

- 3) Non-Prime Agricultural Land. Land within the preserve shall be non-prime agricultural land of statewide or local significance.

C) **Class C Cropland Preserve and Contract**. In order to qualify for a Class C preserve and contract, land shall comply with the following requirements:

- 3) Prime or Non-Prime Agricultural Land. Land within the cropland preserve shall consist of prime land or tillable non-prime land of statewide or local significance.

D) **Class D Unique Farmland and Dairy Agricultural Preserve and Contract**

- 2) Prime Agricultural Land. The land within the preserve shall be prime agricultural land as defined in Section 51201(c) of the Government Code and Section 1A(3) of these Guidelines.
- 3) Non-Prime Agricultural Land of statewide or local significance which consists of tillable soils (see General Provisions, Sections 1.F(5) and 1F(6)).
 - i) The land is shown in an “agricultural” designation on the Humboldt County General Plan and is zoned for agricultural use.
 - ii) The income standard in Section 1F(7) would be met for each “ownership” unit (i.e. one or more parcels under the same ownership, or individual parcels under separate ownership) as it exists at time of entry into the Preserve and Contract.
 - iii) The proposed zoning and contract would prohibit any parcel divisions.
 - iv) Residential development rights beyond one single family residence for each ownership unit in the preserve would be conveyed to the County for the life of the Contract.
 - v) Not more than twenty five percent (25%) of the land area within the preserve is zoned Timberland Production Zone (TPZ).

F) **General Provisions**

- 5) “Non-prime agricultural lands of state or local significance” as used in these Guidelines shall mean lands, including grazing lands, which are not prime agricultural land as defined in Section 51201 (c) of the Government Code, that are designated for agricultural use in the General Plan, and which are in agricultural use, have present or future potential for significant agricultural production, or provide for compatible open space use consistent with the purposes of the Williamson Act.

2.6 NRCS Prime Farmland

The NRCS considers soil mapping units to contain Prime Farmland based on abiotic conditions detailed in USDA Code 7 Part 657—Prime and Unique Farmlands as listed below. Therefore, it is assumed that soil mapping units with the designation of Prime Farmland meet the following criteria:

Code of Federal Regulations – Section 657.5. Identification of important farmlands

a) *Prime farmlands –*

- 1) **General**. Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no

rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding.

- 2) **Specific Criteria.** Prime farmlands meet all the following criteria: Terms used in this section are defined in USDA publications: "Soil Taxonomy, Agricultura Handbook 436"; "Soil Survey Manual, Agriculture Handbook 18"; "Rainfall-erosion Losses From Cropland, Agriculture Handbook 282"; "Wind Erosion Forces in the United States and Their Use in Predicting Soil loss, Agriculture Handbook 346"; and "Saline and Alkali Soils, Agriculture Handbook 60."
- i) The soils have:
- (A) **Moisture.** Aquic, udic, ustic, or xeric moisture regimes and sufficient available water capacity within a depth of 40 inches (1 meter), or in the root zone (root zone is the part of the soil that is penetrated or can be penetrated by plant roots) if the root zone is less than 40 inches deep, to produce the commonly grown cultivated crops (cultivated crops include, but are not limited to, grain, forage, fiber, oilseed, sugar beets, sugarcane, vegetables, tobacco, orchard, vineyard, and bush fruit crops) adapted to the region in 7 or more years out of 10; or
 - (B) **Moisture.** Xeric or ustic moisture regimes in which the available water capacity is limited, but the area has a developed irrigation water supply that is dependable (a dependable water supply is one in which enough water is available for irrigation in 8 out of 10 years for the crops commonly grown) and of adequate quality; or,
 - (C) **Moisture.** Aridic or torric moisture regimes and the area has a developed irrigation water supply that is dependable and of adequate quality; and,
- ii) **Soil Temperature Range.** The soils have a temperature regime that is frigid, mesic, thermic, or hyperthermic (pergelic and cryic regimes are excluded). These are soils that, at a depth of 20 inches (50 cm), have a mean annual temperature higher than 32 °F (0 °C). In addition, the mean summer temperature at this depth in soils with an O horizon is higher than 47 °F (8 °C); in soils that have no O horizon, the mean summer temperature is higher than 59 °F (15 °C); and,
- iii) **Acid-Alkali Balance.** The soils have a pH between 4.5 and 8.4 in all horizons within a depth of 40 inches (1 meter) or in the root zone if the root zone is less than 40 inches deep; and,
- iv) **Water Table.** The soils either have no water table or have a water table that is maintained at a sufficient depth during the cropping season to allow cultivated crops common to the area to be grown; and,
- v) **Soil Sodium Content.** The soils can be managed so that, in all horizons within a depth of 40 inches (1 meter) or in the root zone if the root zone is less than 40 inches deep, during part of each year the conductivity of the saturation extract is less than 4 mmhos/cm and the exchangeable sodium percentage (ESP) is less than 15; and,
- vi) **Flooding.** The soils are not flooded frequently during the growing season (less often than once in 2 years); and,
- vii) **Erodibility.** The product of K (erodibility factor) × percent slope is less than 2.0, and the product of I (soils erodibility) × C (climatic factor) does not exceed 60; and
- viii) **Permeability.** The soils have a permeability rate of at least 0.06 inch (0.15 cm) per hour in the upper 20 inches (50 cm) and the mean annual soil temperature at a depth of 20 inches (50 cm)

is less than 59 °F (15 °C); the permeability rate is not a limiting factor if the mean annual soil temperature is 59 °F (15 °C) or higher; and,

- ix) **Rock Fragment Content.** Less than 10 percent of the surface layer (upper 6 inches) in these soils consists of rock fragments coarser than 3 inches (7.6 cm).

b) **Unique Farmland –**

- 1) **General.** Unique farmland is land other than prime farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality and/or high yields of a specific crop when treated and managed according to acceptable farming methods.
- 2) **Specific characteristics of unique farmland.**
 - i) Is used for a specific high-value food or fiber crop; (ii) Has a moisture supply that is adequate for the specific crop; the supply is from stored moisture, precipitation, or a developed-irrigation system; (iii) Combines favorable factors of soil quality, growing season, temperature, humidity, air drainage, elevation, aspect, or other conditions, such a nearness to market, that favor the growth of a specific food or fiber crop.
- 3) **Additional farmland of statewide importance.** This is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. Criteria for defining and delineating this land are to be determined by the appropriate State agency or agencies. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable. In some States, additional farmlands of statewide importance may include tracts of land that have been designated for agriculture by State law.
- 4) **Additional farmland of local importance.** In some local areas there is concern for certain additional farmlands for the production of food, feed, fiber, forage, and oilseed crops, even though these lands are not identified as having national or statewide importance. Where appropriate, these lands are to be identified by the local agency or agencies concerned. In places, additional farmlands of local importance may include tracts of land that have been designated for agriculture by local ordinance.

3. Methods

3.1 Desktop Analysis

As briefly mentioned in Section 2.1, the California Farmland Mapping and Monitoring Program (FMMP), which produces maps of Prime Farmland, Unique Farmland, and Farmland of Statewide Importance by County across California, has not yet produced maps for Humboldt County (DOC 2022). Therefore, in accordance with PRC Section 21060.1, which provides guidance for determining the agricultural designation of lands which haven't been mapped by the FMMP, subdivisions (1) through (4) of the Gov. Code Section 51201 (c) were utilized to determine whether Prime Agricultural Land is present in the PSA. Additionally, the NRCS Web Soil Survey soil report and spatial data was downloaded on 9/2/2020, and again on 10/26/2022 (**Appendix B**). The NRCS soil survey report provides classifications of soil profiles found within the PSA, and states which soil profile is considered Prime Farmland or not Prime Farmland,

including conditions that the farmland needs to be drained and irrigated to be considered Prime Farmland. See **Appendix A, Figure 5 – NRCS Soils** for NRCS soil mapping units and parcel boundaries.

3.2 Field Investigations

Field investigations were conducted in the summer and fall of 2020, and included soil sampling and laboratory fertility analysis of soils onsite and synthesizing previously collected vegetation data and NRCS soil data. Soil samples were collected at eight boring locations and two monitoring wells in 2020 at varying depths from zero to six feet (see **Appendix A, Figure 3** for soil sample locations, parcels numbers and habitat types). Soil samples are identified by the sampling location and the depth (F0 indicates 0-1 foot depth, F1 indicates 1-2 foot depth, etc.). Soil samples were analyzed for fertility and salinity data at the A&L Western Agricultural Laboratories on 11/23/20 (**Appendix C**). Vegetation was characterized using Rapid Assessment protocol and mapped according to the Manual of California Vegetation at the Alliance level (Sawyer et al., 2009; CNPS 2022) in the summer and fall of 2020. Please see the technical memorandum on botanical studies at the site for additional details (GHD 2022).

4. Results

4.1 NRCS Soil Survey Results

The following NRCS soil mapping units are present in the PSA, and are shown in **Appendix A, Figure 5**. The NRCS mapping likely does not represent current conditions as large areas within the PSA have converted to tidelands from saltwater inundation, particularly within the central portion of the PSA.

4.1.1 Water and Fluvents, 0 to 2 percent slopes (Soil Map Unit 100)

Water and fluvents occur on the western and northern sides of the PSA. The water and fluvents soil unit is not considered Prime Farmland, and it has a land capability classification of 5w. The parent material is alluvium derived from mixed sources. Water and fluvents soil occurs in point bars on channels, and at the base or toe of slopes. The soil consists of somewhat excessively drained gravelly fine sandy loam, underlain by extremely gravelly sandy loam. The water table is typically at the surface (at 0 inches). Water and fluvents soil is hydric and has low available water capacity, and salinity content ranging from non-saline to very slightly saline.

4.1.2 Weott, 0 to 2 percent slopes (Soil Map Unit 110)

Weott soils overlap the pasturelands on the eastern side of the PSA. The Weott soil unit is considered Prime Farmland if irrigated and drained, and it has a land capability classification of 5w. The parent material is alluvium derived from mixed sources. Weott soil occurs in backswamps, depressions, and flood-plain steps. The soil consists of very poorly drained silt loam with the soil surface 0-4 inches from the water table. Weott soil is hydric and has high available water capacity, and salinity content ranging from non-saline to very slightly saline. The Hydrologic Soil Group B/D indicates that the Weott soils onsite may have a moderate infiltration and water transmission rate if drained, but have a very slow rate of infiltration and transmission in their natural condition.

4.1.3 Swainslough-Occidental complex, 0 to 2 percent slopes (Soil Map Unit 117)

The Swainslough-Occidental complex of soils occurs in a low elevation area of transitional pasture on the south side of the PSA and a central portion of the PSA that has reverted to salt marsh and mudflat. The map unit composition consists of 70 percent Swainslough and similar soils, 20 percent Occidental and similar soils, and 10 percent minor components. The Swainslough-Occidental soil complex is not Prime

Farmland (capability classification 5w). The parent material is alluvium derived from mixed sources. Swainslough soil occurs in backswamps, depressions, flood-plain steps, and salt marshes. It consists of silty clay loam with the soil surface 0-4 inches from the water table. Swainslough soil is hydric, very poorly drained, and has high available water capacity. The soil salinity content ranges from non-saline to slightly saline. Occidental soil is a similar hydric silty clay loam that occurs in tidal marshes and salt marshes, and salinity content that ranges from slightly saline to strongly saline. With Hydrologic Soil Groups of C/D, the soils may have a slow infiltration and water transmission rate if drained, and have a very slow infiltration and water transmission rate in their natural state.

4.1.4 Arlynda, 0 to 2 percent slopes (Soil Map Unit 119)

Arlynda soils occur in an eastern lower elevation area of transitional pastureland and former pastureland that has reverted to salt marsh and mudflat. The map unit composition is as follows: 85 percent Arlynda and similar soils, and 15 percent minor components. Arlynda soil is Prime Farmland if irrigated and drained, and it has a capability classification of 5w. The parent material is alluvium derived from mixed sources. Arlynda soil occurs in meander scars, backswamps, depressions, and flood-plain steps. The soil consists of a top layer of slightly decomposed organic material (0-3 inches) above deep silty clay loam. Arlynda soil occurs 0-4 inches from the water table. Arlynda soil is hydric, very poorly drained, and has high available water capacity. Arlynda soil salinity ranges from non-saline to slightly saline. With a Hydrologic Soil Group of C/D, the soil may have a slow infiltration and water transmission rate if drained, and have a very slow infiltration and water transmission rate in their natural state.

4.1.5 Occidental, 0 to 2 percent slopes (Soil Map Unit 140)

Occidental soils overlap a large area of central salt marsh and mudflats in the PSA. The map unit composition is as follows: 90 percent Occidental and 10 percent minor components. Occidental soil is not considered Prime Farmland, and it has a capability classification of 7w. The parent material is alluvium derived from mixed sources. Occidental soil occurs in salt marshes. The soil consists of very poorly drained silty clay loam with a 0-3 inch peat top layer. The surface of Occidental soil occurs 0-4 inches from the water table. Occidental soil is hydric and has moderate available water capacity, and salinity content ranging from slightly saline to strongly saline. With a Hydrologic Soil Group of C/D, the soil may have a slow infiltration and water transmission rate if drained, and have a very slow infiltration and water transmission rate in their natural state.

4.1.6 Wigi, 0 to 2 percent slopes (Soil Map Unit 142)

Wigi soils overlap an area that has mostly reverted to salt marsh. The map unit composition is as follows: 90 percent Wigi, occasionally flooded, and similar soils, and 10 percent minor components. Wigi soil is not considered Prime Farmland, and it has a capability classification of 7s. The parent material is alluvium derived from mixed sources. Wigi soil occurs in salt marshes. Wigi soil consists of a thin peat organic horizon (0-1 inches) and an A horizon of silt loam (1-7 inches), above a deep layer of silty clay loam. Wigi soil is very poorly drained and occurs 0-6 inches from the water table. Wigi soil is hydric, has high available water capacity, and can be strongly saline. With a Hydrologic Soil Group of C/D, the soil may have a slow infiltration and water transmission rate if drained, and have a very slow infiltration and water transmission rate in their natural state.

4.1.7 Samoa-Clambeach complex, 0 to 50 percent slopes (Soil Map Unit 155)

The Samoa-Clambeach soil complex occurs on a small area of elevated sandy soil on the western side of the PSA. The map unit composition is as follows: 65 percent Samoa and similar soils, 30 percent Clambeach and similar soils, and 5 percent minor components. These soils are not considered Prime Farmland, and have a capability classifications of 6e and 5w, respectively. The parent material is eolian and

marine sand derived from mixed sources. Samoa soil occurs in dunes, and Clambeach soil occurs in deflation basins. Samoa soil consists of a thin organic horizon of slightly decomposed plant material (0-1 inches) above deep sand. Samoa soil is typically more than 80 inches from the water table. Samoa soil is non-hydric and has low water capacity. With a Hydrologic Soil Group of A, Samoa soil has a high infiltration and water transmission rate. In contrast, Clambeach soil consists of sand and may be hydric, with the soil surface occurring 0-4 inches from the water table. The soil salinity content ranges from non-saline to very slightly saline. With a Hydrologic Soil Group of A/D, Clambeach soils may have a very high infiltration and water transmission rate if drained, and have a very slow infiltration and water transmission rate in their natural state (NRCS 2020).

4.2 Field Mapping and Wetland Delineation

Vegetation mapping by GHD in 2020 and 2022 showed a total of 208.7 acres of pasture grass within the PSA, primarily characterized by non-native creeping bentgrass (*Agrostis stolonifera*) (Table 4-1). The PSA contained 395.8 acres of salt marsh, including vegetation characterized by pickleweed (*Salicornia pacifica*), gum plant (*Grindelia stricta*), salt grass (*Distichlis spicata*), and invasive dense-flowered cordgrass (*Spartina densiflora*). The PSA also contained 26.2 acres of fresh to brackish wetlands primarily characterized by salt rush (*Juncus lescurii*), 52.9 acres of coastal brambles and other vegetation along levees, roadsides, and other development, and 110.1 acres of muted or fully tidal waters. The 208.7 acres of pasture grass mapped onsite has agricultural value (see Appendix A, Figure 3).

Table 4-1. Acres of Habitat and Vegetation Types within the PSA

Habitat Type	Habitat Type Area (acres)	Vegetation Mapping Unit	Vegetation Unit Area (acres)
Pasture	208.7	Non-native pasture grass	208.7
Salt marsh	395.8	Pickleweed salt marsh	287.7
		Gum plant patches	28.7
		Salt grass flats	17.8
		Dense-flowered cordgrass	61.6
Fresh to brackish wetland	26.2	Salt rush swales	26.2
Other	53.3	Coastal brambles	2.9
		Coastal willow thickets	0.4
		Pale spike rush marsh	0.15
		Non-native vegetation/developed	49.8
Waters	110.1	Eelgrass beds	0.6
		Mudflats	93.4
		Subtidal	16.1

4.3 Soil Sample Analysis

Laboratory analysis of soil samples collected within the PSA (Appendix C) showed variable salinities (Table 4-2). Soil samples collected along upland berms and levees (B-1, B-3, B-4, and B-5) were not saline, and samples taken within the salt marsh (B-6, B-8, and B-11) reliably exceeded the salinity thresholds of Electrical Conductivity (EC) >4 mmhos/cm (a.k.a. dS/m) and the exchangeable sodium percentage (ESP) of 15. The laboratory analysis results for samples B-7 and B-7A show that inboard elevations below seven feet NAVD88 have become saline, which (based upon preliminary analysis and anecdotal observations) coincides with areas that are prone to periodic flooding during overflow events and king tides. The MW-1 sample, near the upper edge of fresh to brackish marsh characterized by salt rush, showed salinity below the designated thresholds but is considered somewhat high for agricultural soil (Appendix C). Although the MW-3 sample, located in pasture to the south near Cannibal Island Road, is above seven feet NAVD88 and showed salinity below the designated thresholds, its salinity level is considered somewhat high for agricultural soil. See Appendix A, Figure 3 for the location of soil samples.

Table 4-2. Soil Salinity Analysis

Sample ID	EC	SAR	ESP	Saline? (EC>4)	Location	NRCS Soil	NRCS Potential Prime Soil
MW1F0 ¹	2.3	6.2	7.3	No (somewhat high for agriculture)	Fresh to brackish salt rush swale/ pasture transition	Weott	Prime if Irrigated
MW3F0	2.5	8.3	9.9	No (high for agriculture)	Southern pasture	Swainslough-Occidental	No
B1F1 ²	1.1	9.1	10.8	No	Southwest berm	Weott	Prime if Irrigated
B1F3 ³	1.0	6.8	8.1	No	Southwest berm	Weott	Prime if Irrigated
B3F0so	0.3	1.9	1.5	No	Levee near culvert	Clambeach/ Occidental	No
B4F2	0.9	4.6	5.2	No	West levee	Occidental	No
B5F3	0.2	1.6	1.1	No	Northwest levee	Occidental	No
B6F0	13.1	14.6	16.8	Yes	Southern salt marsh	Swainslough-Occidental	No
B7F0	13.1	11.9	14.0	Yes	East saltmarsh/ pasture boundary	Arlynda	Prime if Irrigated
B7AF0	14.1	12.0	14.1	Yes	East transitional pasture	Arlynda	Prime if Irrigated
B8F1	35.1	11.9	14.0	Yes	Central salt marsh	Wigi	No
B8F4 ⁴	34.1	10.8	12.8	Yes	Central salt marsh	Wigi	No
B11F1	17.7	13.7	15.9	Yes	Northeast mudflat/salt marsh	Occidental	No
B11F3	18.1	12.6	14.7	Yes	Northeast mudflat/salt marsh	Occidental	No
B11F5 ⁵	24.5	10.3	12.2	Yes	Northeast Mudflat/salt marsh	Occidental	No

1. F0 = 0'-1' below ground surface
2. F1= 1'-2' below surface
3. F2= 2'-3' below surface
4. F4= 3'-4' below surface
5. F5= 4'-5' below surface

5. Agricultural Designations (CEQA Impact Analysis [a])

As mentioned in Section 1.4, the PSA is not irrigated for commercial agricultural use (i.e., personal gardens may be watered periodically, however pasture lands are not irrigated). Drainage occurs naturally through existing swales that exit into the North Bay through partially failed culverts and most of the PSA is not drained.

As mentioned in Section 2.1, CEQA impact analysis question (a) asks if the Project would: *Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?* The FMMP, which produces maps of Prime Farmland, Unique Farmland, and Farmland of Statewide Importance for counties across California, has not yet produced maps for Humboldt

County (DOC 2022). Therefore, in accordance with PRC Section 21060.1, which provides guidance for determining the agricultural designation of lands which haven't been mapped by the FMMP, subdivisions (1) through (4) of the Gov. Code Section 51201 (c) were utilized to determine whether Prime Agricultural Land is present in the PSA (with regard to question (a)/Prime Farmland). Additionally, NRCS Prime Farmland designations based on soil mapping units were utilized to address CEQA impact analysis question (a). See **Table 5-1** (below) for an overview of agricultural land designations of all parcels within the PSA. See **Appendix A, Figure 6 – Agricultural Land Designations and Encumbrances**, for area deemed to be Prime Agricultural land.

5.1 Prime Farmland Calculation

For the purposes of this Tech Memo, Prime Farmland is an NRCS term, and was utilized in this analysis to provide a determination of whether this federal agricultural designation is present or absent within the PSA for CEQA purposes. There are seven soil types present within the PSA: Water and Fluvents, Weott, Swainslough-Occidental complex, Arlyda, Occidental, Wigi, and Samoa-Clambeach complex (see Section 4.1 for additional information). The Water and Fluvents, Swainslough-Occidental complex, Occidental, Wigi and Samoa-Clambeach complex soil units are all not considered Prime Farmland. The Weott and Arlynda soils are considered Prime Farmland if irrigated and drained. However, no portions of the PSA are irrigated, and most of the PSA is not "drained," except for some of the eastern portion of the PSA, which is partially drained by remnant lateral drainage ditches. Therefore, no Prime Farmland is present in the PSA.

5.2 Prime Agricultural Land

Per Section 21060.1, given the absence of FMMP data (i.e. State-level Prime Farmland, Unique Farmland and Farmland of Statewide Importance designations), subdivisions (1) through (4) of Gov. Code Section 51201 (c) were utilized to determine whether Prime Agricultural Land (as it related to Prime Farmland/CEQA impact question [a]) is present in the PSA. As listed in Section 2.1 of this Tech Memo, Gov. Code Section 51201 (c) lists the following:

Government Code Section 51201 (c)

"Prime agricultural land" means any of the following:

- (1) All land that qualifies for rating as class I or class II in the Natural Resource Conservation Service land use capability classifications.*
- (2) Land which qualifies for rating 80 through 100 in the Storie Index Rating.*
- (3) Land which supports livestock used for the production of food and fiber and which has an annual carrying capacity equivalent to at least one animal unit per acre as defined by the United States Department of Agriculture.*
- (4) Land planted with fruit- or nut-bearing trees, vines, bushes, or crops which have a nonbearing period of less than five years and which will normally return during the commercial bearing period on an annual basis from the production of unprocessed agricultural plant production not less than two hundred dollars (\$200) per acre.*

Therefore, Prime Agricultural Land can be defined by having a Land Capability Classification (LCC) of 1 or 2, or a Storie Index 80 to 100, or by economic value of agricultural products.

None of the NRCS soil mapping units onsite meet the LCC criteria of 1 or 2, rather all soil types contain LCCs ranging from 5w to 7. The California Revised Storie Index was calculated for the area (see **Appendix B**) and no soils were within the Grade 1 rating (which corresponds to the 81 through 100 of the original Storie Index Rating) are present within the PSA. Thus the PSA does not meet the first or second criteria.

Per the third criteria, an area of pasture may be considered Prime Agricultural Land if it has an annual carrying capacity equivalent to at least one animal unit per acre. The two privately owned properties graze livestock seasonally, however CDFW does not graze animals within their property and it has not been legally grazed since 2009. Determining the precise boundaries of pasture capable of supporting one animal unit per acre is complex because portions of the site only supports livestock seasonally, and forage quality varies widely based on vegetation, salinity, and flood conditions (which typically occur in the west, central and northern portions of the PSA) and conditions are changing over time. Based upon existing conditions, the portions of the PSA that can support one animal unit per acre (on average) include the eastern portion of APNs 310-043-04 (L. Pedrazzini) and the eastern portions of 310-051-001 and 310-043-003 (L. Hansen) and therefore can be considered Prime Agricultural Land.

Per the fourth criteria, the PSA was not planted with fruit- or nut-bearing trees, vines, bushes or crops which normally return at least \$200 per year during the commercial bearing period. However, the PSA does produce hay, which if harvested could be considered a crop. Similarly to the paragraph above, the eastern portions of APNs 310-043-004 (L. Pedrazzini) and 310-051-001 and 310-043-003 (L. Hansen) contain the conditions most suitable for hay productions (as well as grazing) due to the suitable vegetation, lower salinity levels and less frequent flooding. Therefore, the eastern portions of the above referenced parcels also meet the fourth subdivision of Gov. Code 51201 (c) and can be considered Prime Agricultural Land. See **Appendix A, Figure 6** for the locations of areas considered Prime Agricultural Land. Prime Agricultural Lands were drawn on the 8-foot contour line (NAVD88).

Table 5-1. Overview of Parcels and Agricultural Land Designations

Parcel	Prime Farmland by NRCS?	NRCS Mapping Unit?	Prime Agricultural Land by Gov Code 51201(c) & PCR 21060.1?	Prime Agricultural Land by CA Coastal Act?
CDFW - 310-033-004	No	110, 140 & 155	No	No
CDFW - 310-043-001	No	100, 110, 117 & 142	No	No
CDFW - 310-021-003	No	100, 110 & 140	No	No
CDFW - 310-021-004	No	100, 110 & 140	No	No
L. Pedrazzini - 310-043-006	No	100, 117, 140 & 142	No	No
L. Pedrazzini - 310-043-004	No	117 & 142	Yes: east only	Yes: east only
L. Pedrazzini - 310-043-005	No	110 & 117	No	No
L. Hansen - 310-043-003	No	110, 117, 119 & 140	Yes: east only	Yes: east only
L. Hansen - 310-051-001	No	110, 110, 119 & 140	Yes: east only	Yes: east only

Project components would not occur within Prime Agricultural Land areas. The Project components closest to Prime Agricultural Land includes the installation of the set-back dike and raising of Cannibal Island Road to approximately 11 feet (NAVD 88) which matches the elevation of the proposed set-back dike adjacent to it. Minimal earthwork would occur on unsurveyed (likely) Prime Agricultural land south of Cannibal Island Road to elevate Cannibal Island Road. This area is being impacted from salt water during high tides from the north. The road raising would control salt water on this parcel and would result in higher production in the current salt water impacted areas. The fill would terminate at the existing fence or slightly south of the existing fence (in that case the fence would be moved slightly to the south). This sliver of fill is considered insignificant, and conditions would be improved. Therefore, no conversion of Prime Agricultural Land that would result in a loss agricultural production would occur.

Further, implementation of the tidal slough channels, estuarine enhancements, installation of gated culverts, and proposed set-back levee would occur west of the Prime Agricultural Land. The set-back levee would provide protection to Prime Agricultural Land from potential flooding, thereby improving the potential for productivity within Prime Agricultural Land.

6. County Zoning or Williamson Act Conflict Analysis (CEQA Impact Analysis [b])

6.1 Humboldt County Zoning

The parcels within the PSA are zoned AE-60/W, F, R, T meaning they are zoned Agriculture Exclusive with a minimum lot area of 60 acres, and contain the following combining zones: Streamside Management Areas and Wetlands (W), Flood Hazard Area (F), Recreation (R), and Manufactured Home (T), see **Appendix A, Figure 4**. As stated in Section 2.4 (Humboldt County Zoning Code), land uses including “fish and wildlife management, watershed management, and wetland restoration” are conditionally permitted activities within the AE zoning. Within the PSA, all AE-zoned lands west of the proposed set-back levee would be managed for fish and wildlife, watershed function and wetlands restoration and therefore would be conditionally permitted. Therefore, pending successful acquisition of a Conditional Use Permit from Humboldt County, no conflict with Humboldt County Zoning Code would occur from implementation of the Project. The Conditional Use Permit would need to adhere to ERAP guidelines, which is discussed in Section 7.1 below.

6.2 Williamson Act Agricultural Preserves

Two parcels (APNs 310-043-003 and 310-051-001), owned by L. Hansen, are designated as Williamson Act Agricultural Preserves (#144 and #132) (**Appendix A, Figure 4**). The Humboldt County Williamson Act Guidelines state that “*the majority of the land area of any property under contract must be devoted to agricultural pursuits consistent with the purpose of the preserve in which the property is located.*” As previously mentioned, the western portions of the two parcels regularly flood and only seasonally support agricultural production (i.e. grazing). The proposed Project would restore tidal marsh within these areas located west of the proposed set-back levee, and thereby reduce potential flooding in lands east of the proposed set back levee (see **Appendix A, Figure 6**). The acreage within each parcel/Williamson Act contract and in total that would continue to be grazed after Project implementation is shown in **Table 6-1** below.

Table 6-1. Williamson Act Parcels under Existing and Proposed Conditions

Parcel/Williamson Act Preserve	Existing Acreage - Seasonal Grazing	Proposed Acreage - Year Round Grazing	Percentage of Lands to Remain Grazed
310-043-003/#144	81	20	25%
310-051-001/#132	63	46	73%
Total of both contracts	144	66	46%

As shown, 73% of property within the -001 parcel would remain grazeable, and 25% of parcel -003 would remain grazeable. Although the majority of parcel -003 would not be grazed, the productivity within the remaining grazeable area would increase and the resiliency to future flooding would increase via the set-back levee.

According to vegetation mapping, areas at and below six feet (NAVD 88) contain pickleweed salt marsh habitat which is not of forage quality to livestock. The 59-acre area under Williamson Act contracts located east of the proposed set-back levee currently contains 2.9 acres (5%) pickleweed salt marsh or salt rush swale habitat and 52.5 acres (89%) pasture grass (the remaining 3.6 acres [6%] is coastal willows or developed areas). Following Project implementation, due to a lack of tidal influence it is anticipated that this

area would be entirely pasture grass, except for areas which contain coastal willow thickets or are developed, amounting to 55.4 acres and would be grazeable year-round. Although modest, this change in vegetation would therefore result in an increase in productivity.

Additionally, the proposed set back levee would increase the resiliency of agricultural lands east of it which would preserve (and likely increase) grazing productivity in the present and into the future. Therefore, although less than the majority of the property under Williamson Act contracts would be grazed following Project implementation, the productivity on remaining grazing lands would be preserved and improved via a shift in vegetation assemblages. This preservation and increase in productivity is a result of the set-back levee and tidal marsh creation, making them complementary components of agricultural pursuits. Thus, the majority of property under Williamson Act contracts (tidal marsh and grazing land) would be utilized for agricultural pursuits and conforms to Humboldt County Williamson Act guidelines. Therefore, a less than significant impact would occur on Williamson Act contract lands during both construction and operation of the Project.

This conclusion is additionally and independently supported by the fact that the Williamson Act specifically defines "agricultural land" to include, among other items, "a wildlife habitat area, a saltpond, a managed wetland, or a submerged area." (Gov. Code, Section 51205.) The Williamson Act also names three factors for determining whether a use is compatible with a contract, namely that:

- (1) The use will not significantly compromise the long-term productive agricultural capability of the subject contracted parcel or parcels or on other contracted lands in agricultural preserves.
- (2) The use will not significantly displace or impair current or reasonably foreseeable agricultural operations on the subject contracted parcel or parcels or on other contracted lands in agricultural preserves. Uses that significantly displace agricultural operations on the subject contracted parcel or parcels may be deemed compatible if they relate directly to the production of commercial agricultural products on the subject contracted parcel or parcels or neighbouring lands, including activities such as harvesting, processing, or shipping.
- (3) The use will not result in the significant removal of adjacent contracted land from agricultural or open-space use. (Gov. Code, Section 51238.1.)

7. Other Potential Conversion (CEQA Impact Analysis [e])

7.1 Eel River Area Plan (for Conditional Use Permit)

The Project would require a Conditional Use Permit and would therefore need to adhere to the ERAP. The sections of the ERAP that apply to the Project include Sections 30241 and 30242 as well as "Compatible Uses", which are listed verbatim in Section 2.3 of this Assessment. To summarize, Section 30241 states the "maximum amount of prime agricultural land shall be maintained in agricultural production..." and provides implementation examples. The ERAP defines Prime Agricultural Land based on the adopted definition of Prime Agricultural Land by the State of California. Therefore, Prime Agricultural Land is considered to be land that meets any of the five subdivisions in Gov. Code 51201 (c). As mentioned above in Section 5 (Agricultural Designations and CEQA Impact Analysis [a]), the eastern portions of APNs 310-043-004 (L. Pedrazzini) and the eastern portions of APNs 310-051-001 and 310-043-003 (L. Hansen) meet subdivisions (3) and (4) of the Government Code and can be considered Prime Agricultural Land under the ERAP. The Project does not conflict with Section 30241 because the Project would not disturb, modify or convert any Prime Agricultural Land within the PSA that will result in a loss of production loss, and therefore the maximum amount of Prime Agricultural Land would be maintained in agricultural production.

Section 30242 of the ERAP is in regard to all other agricultural lands, and states that "all other lands suitable for agriculture use shall not be converted to non-agricultural uses unless (1) continued or renewed agricultural use is not feasible, or (2) such conversion would preserve prime agricultural land..."

Implementation of the Project would result in a set-back levee and the conversion of 673 acres of AE-zoned

lands to tidal marsh habitat. Although this area regularly floods and is of poor grazing quality, it can be considered agricultural lands for the purpose of this analysis. Conversion of these agricultural lands to non-agricultural use meets both subsections (1) and (2) of Section 30242 because continued or renewed agricultural use is not feasible in this area as is demonstrated by the routine flooding and establishment of salt marsh vegetation (thus lower productivity for grazing, see **Appendix A, Figure 3**), and because the conversion and installation of the set-back levee would preserve adjacent Prime Agricultural Land.

Further, the proposed Project would not conflict with the ERAP because "management for watershed, and management for fish and wildlife habitat" are considered compatible with agricultural operations under the ERAP. Therefore, implementation of Project would not conflict with Sections 30241, 30242 or "Compatible Uses" as listed in the ERAP.

7.2 California Coastal Act (for Coastal Development Permit)

The PSA is under the State's jurisdiction within the Coastal Zone, therefore a Coastal Development Permit issued by the California Coastal Commission in accordance with the Coastal Act would be obtained by the Project applicant. Similarly to the ERAP, the Coastal Act considers Prime Agricultural Land to be land that meets any of the five subdivisions in Gov. Code 51201 (c) and all lands shown as Prime Agricultural Land in **Appendix A, Figure 6** are also considered Prime Agricultural Land under the Coastal Act. Similarly to the ERAP, Sections 30241 and 30242 of the Coastal Act would apply to the Project, and for the same reasons stated above in Section 7.1 the Project would not conflict with the Coastal Act. Specifically, the maximum amount of Prime Agricultural Land would be maintained in agricultural production (Section 30241), and the conversion of other agricultural lands would be done so because renewed agriculture is not feasible in said location and the conversion would preserve the adjacent Prime Agricultural Land (Section 30242). These Prime Agricultural Lands would remain in agricultural production following Project implementation and the agricultural productivity in these areas is expected to increase as they would be protected by a setback levee which would alleviate flooding and salinity intrusion in the eastern portion of the PSA. Therefore, implementation of the Project would not conflict with the Coastal Act.

7.3 Wetland Reserve Easement

Within the PSA, two Wetland Reserve Easements (WREs) exist totalling 219 acres. These are perpetual conservation easements that seek to protect and restore wetland habitat while allowing limited livestock grazing in suitable habitat types. Implementation of the Project would convert wetlands that were previously degraded due to agricultural uses and would remove grazing from within the WREs which are allowable under the WRE program. Therefore, construction and operation would not conflict with the WREs within the PSA.

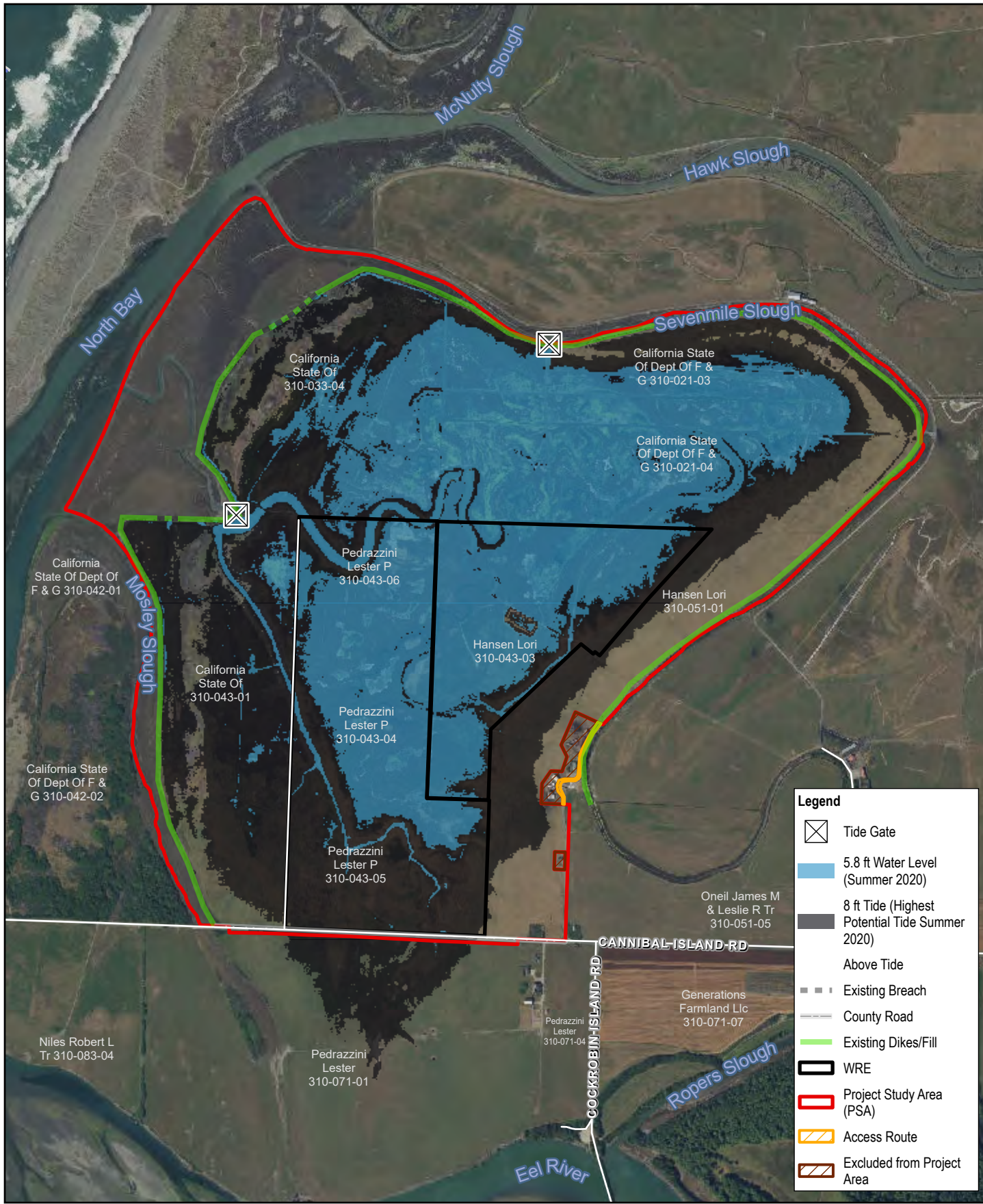
8. Conclusion

The purpose of this evaluation was to identify which portions of the PSA lands contain protected agricultural designations to inform development of Project Alternatives and/or potential mitigation under CEQA or regulatory permits. No Prime Farmland exists within the PSA (utilizing NRCS designations and soil parameters, which was confirmed by field investigations of soil quality). Approximately 44.4 acres of Prime Agricultural Land exists within PSA, located within the eastern portions of L. Pedrazzini and L. Hansen properties (see **Appendix A, Figure 6**). Under the Project, these areas would not be converted out of Prime Agricultural Land, rather the agricultural productivity is anticipated to increase in these areas due to the installation of a complementary set-back levee which would reduce flooding and saltwater impaction to these Prime Agricultural Lands. Collectively, the majority of grazeable acreage under Williamson Act contracts would decrease following Project implementation, however the installation of the set-back levee and tidal marsh restoration would increase the resiliency of agricultural productivity on remaining grazeable lands, are considered complementary to agricultural production. Therefore, the majority of property under

Williamson Act contracts (tidal marsh and grazing land) would be utilized for agricultural pursuits and conforms to Humboldt County Williamson Act guidelines. With acquisition of a Conditional Use Permit from Humboldt County and a Coastal Development Permit from the California Coastal Commission, no conflict with existing zoning, the ERAP or Coastal Act would occur from Project implementation.

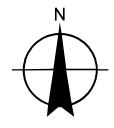
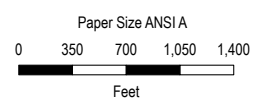
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Legend

- Tide Gate
- 5.8 ft Water Level (Summer 2020)
- 8 ft Tide (Highest Potential Tide Summer 2020)
- Above Tide
- Existing Breach
- County Road
- Existing Dikes/Fill
- WRE
- Project Study Area (PSA)
- Access Route
- Excluded from Project Area



Map Projection: Lambert Conformal Conic
 Horizontal Datum: North American 1983
 Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

CalTrout
 Cannibal Island Restoration Project

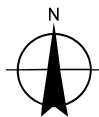
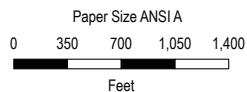
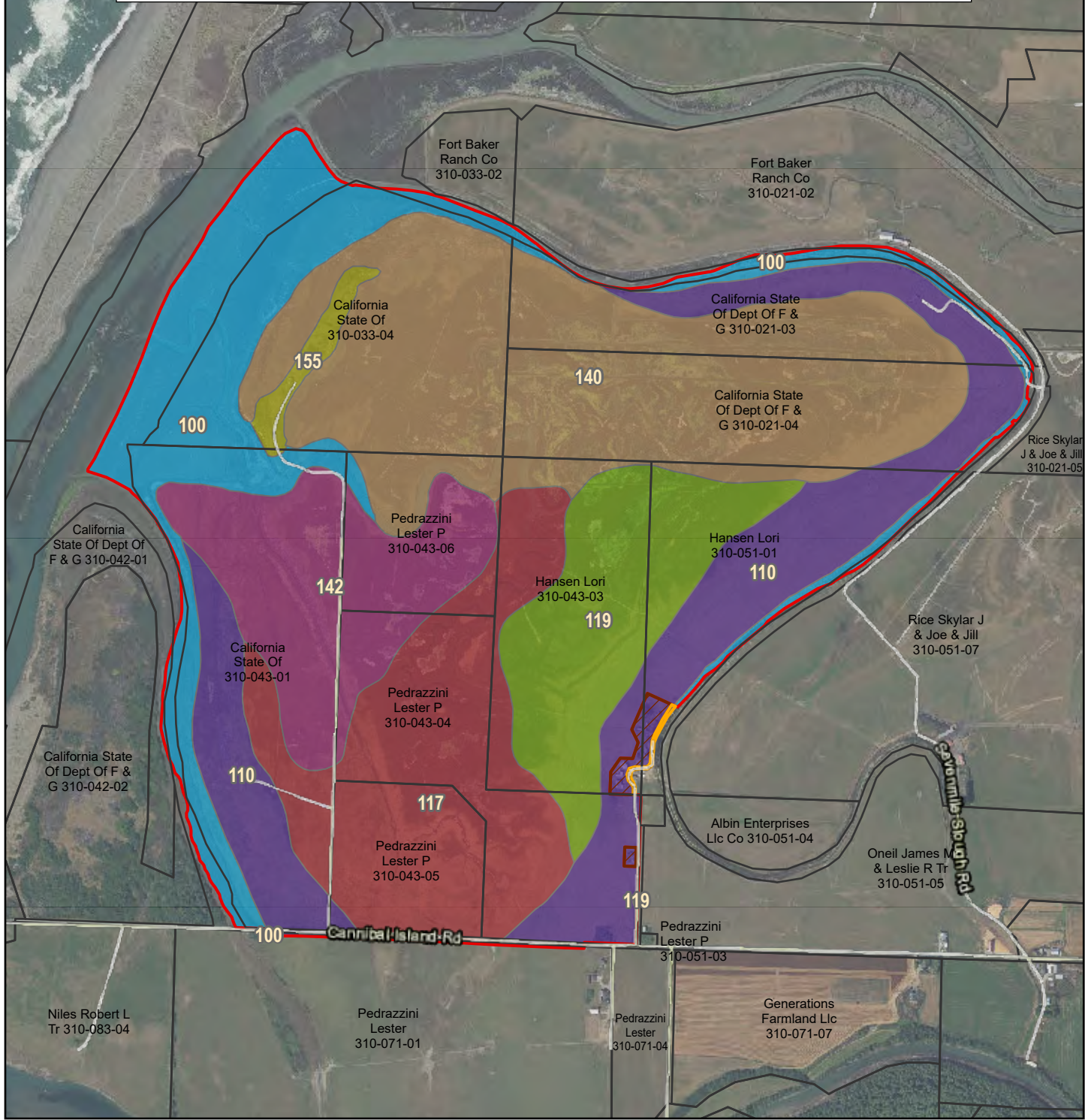
Project No. 11206383
 Revision No. -
 Date Feb 2023

Existing Dikes / Fill

Exhibit 6
 1-23-0854 (CDFW)
Agricultural Analysis (excerpt) (pg. 20 of 22)

Legend

Project Study Area (PSA)	Soil Map Unit	119 - Arlynda, 0-2% slopes
Access Route	100 - Water and Fluvents, 0-2% slopes	140 - Occidental, 0-2% slopes
Excluded from Project Area	110 - Weott, 0-2% slopes	142 - Wigi, 0-2% slopes
Approx. Parcel Boundaries	117 - Swainslough-Occidental complex, 0-2% slopes	155 - Samoa-Clambeach complex, 0-50% slopes



Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

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Cannibal Island Restoration Project

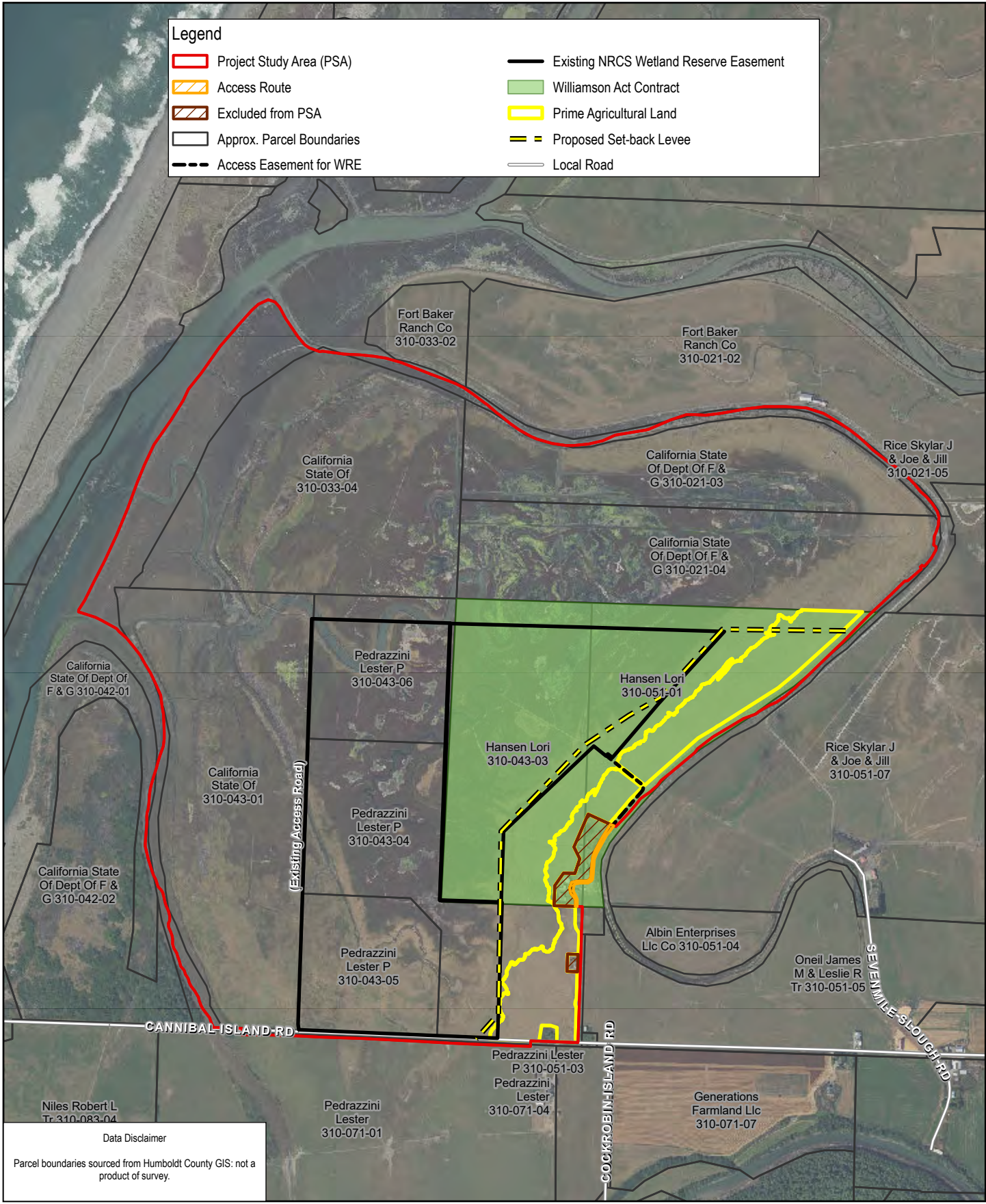
NRCS Soils

Project No. 11206383
Revision No. -
Date 14 Feb 2023

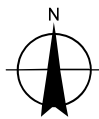
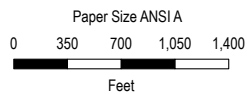
Exhibit 6
1-23-0854 (CDFW)
Agricultural Analysis (excerpt) (pg. 21 of 22)

Legend

- Project Study Area (PSA)
- Access Route
- Excluded from PSA
- Approx. Parcel Boundaries
- Access Easement for WRE
- Existing NRCS Wetland Reserve Easement
- Williamson Act Contract
- Prime Agricultural Land
- Proposed Set-back Levee
- Local Road



Data Disclaimer
Parcel boundaries sourced from Humboldt County GIS: not a product of survey.



Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

CalTrout
Cannibal Island Restoration Project
Agricultural Land Designations and Encumbrances

Project No. 11206383
Revision No. -
Date 30 Jan 2023

Exhibit 6
1-23-0854 (CDFW)
Agricultural Analysis (excerpt) (pg. 22 of 22)



Cannibal Island Restoration Project

Upland/Wetland Delineation Report

June 2022

1. Introduction

GHD prepared this Upland/Wetland Delineation Report (report) and accompanying appendices on behalf of CalTrout in support of the Cannibal Island Restoration Project, Loleta, CA (**Appendix A, Figure 1—Vicinity Map**). This report supports the project’s environmental documentation, permitting, and construction planning as deemed appropriate. The proposed Project Area includes much of Cannibal Island north of Cannibal Island Road (with a small strip of pasture just to the south of Cannibal Island Road) up to the water’s edge at Seven Mile Slough and Mosley Slough (**Figure 1**). A private residence on the east side has been excluded from the Project Area. This report was largely completed in 2020 after the initial field investigations for the Project were conducted, and has been updated to include findings from a separate investigation in 2022 to assess wetland resources in an area that was included in the Project Study Boundary after the 2020 studies were completed as a result of potential raising and widening of Cannibal Island Road. This report is subject to, and must be read in conjunction with, the limitations set out in Section 5, Special Terms and Conditions, and the assumptions and qualifications contained throughout the report.

1.1 Site History

The Cannibal Island Restoration Project is located in agricultural bottoms and tidal saltmarsh in the Eel River Delta in Loleta, Humboldt County, CA. The Cannibal Island Restoration Project will seek to restore and expand natural estuarine functions and processes in the Project Area to promote recovery of habitat for native fish, invertebrates, wildlife and plant species compatible with surrounding working lands and public access. To achieve the project goal, construction activities are anticipated to include modifications to the existing dikes/water control structures, excavation of slough channels and placement of fill that combined will restore connectivity to the estuary while preventing off-site flood impacts.

The historical diking and draining of coastal wetlands for ranching and agriculture in the Eel River Delta caused a major loss of coastal salt marsh in the estuary around the turn of the 20th Century. As the levees have failed and the ground has compacted and subsided, Cannibal Island has largely reverted to tidal marsh. Some functional pasture remains on the east side of the Project Area, and in a small strip to the south of Cannibal Island Road. The area within the levees is subject to a muted tidal prism, and contains estuarine marsh and waters as well as pasture. Uplands have been delineated in areas of historical fill and along the remaining upland pasture within this predominantly wetland project area.

1.2 Regulatory Background

1.2.1 Federal Regulations

Waters of the United States

The Code of Federal Regulations (CFR), 40 CFR § 230.3 states, “The term waters of the United States means:

- (1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
- (2) All interstate waters including interstate wetlands;
- (3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
 - (i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
 - (ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
 - (iii) Which are used or could be used for industrial purposes by industries in interstate commerce;
- (4) All impoundments of waters otherwise defined as waters of the United States under this definition;
- (5) Tributaries of waters identified in paragraphs (s)(1) through (4) of this section;
- (6) The territorial sea;
- (7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (s)(1) through (6) of this section; waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States” (40 CFR § 230.3).

Section 404 Waters

In tidal environments, Section 404 waters are those waters which extend up to the High Tide Line (HTL) or the landward extent of adjacent wetlands (33 CFR § 328.4). The HTL may be determined by hydrologic data, a tide gauge, or by direct observations of physical features such as vegetation, detritus, or other physical markings indicating the typical high tide extent (33 CFR § 328.3). The HTL does not include atypical storm surges (33 CFR § 328.3). In the Eel River Estuary, previous studies have established the high tide line and tidal wetland boundaries correspond with the 9-foot elevation contour (NAVD 88) (Winzler & Kelly et al. 2011).

Wetlands Definition

40 CFR § 230.3 continues and defines, “The term wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas” (40 CFR § 230.3).

Wetlands Delineation Manual

In addition, the 1987 Corps of Engineers- Wetlands Delineation Manual states, “If hydrophytic vegetation is being maintained only because of man-induced wetland hydrology that would no longer exist if the activity (e.g., irrigation) were to be terminated, the area should not be considered a wetland,” (USACE 1987).

1.2.2 State Regulations

The State Water Resources Control Board's (SWRCB) April 2019 *Procedures for Discharges of Dredged or Fill Material to Waters of the State* declares the following:

An area is wetland if, under normal circumstances, (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area's vegetation is dominated by hydrophytes or the area lacks vegetation.

The Water Code defines "waters of the state" broadly to include "any surface water or groundwater, including saline waters, within the boundaries of the state." "Waters of the state" includes all "waters of the U.S." The following wetlands are waters of the state:

1. *Natural wetlands,*
2. *Wetlands created by modification of a surface water of the state, and*
3. *Artificial wetlands that meet any of the following criteria:*
 - a. *Approved by an agency as compensatory mitigation for impacts to other waters of the state, except where the approving agency explicitly identifies the mitigation as being of limited duration;*
 - b. *Specifically identified in a water quality control plan as a wetland or other water of the state;*
 - c. *Resulted from historic human activity, is not subject to ongoing operation and maintenance, and has become a relatively permanent part of the natural landscape; or*
 - d. *Greater than or equal to one acre in size, unless the artificial wetland was constructed, and is currently used and maintained, primarily for one or more of the following purposes (i.e., the following artificial wetlands are not waters of the state unless they also satisfy the criteria set forth in 2, 3a, or 3b):*
 - i. *Industrial or municipal wastewater treatment or disposal,*
 - ii. *Settling of sediment,*
 - iii. *Detention, retention, infiltration, or treatment of stormwater runoff and other pollutants or runoff subject to regulation under a municipal, construction, or industrial stormwater permitting program,*
 - iv. *Treatment of surface waters,*
 - v. *Agricultural crop irrigation or stock watering,*
 - vi. *Fire suppression,*
 - vii. *Industrial processing or cooling,*
 - viii. *Active surface mining – even if the site is managed for interim wetlands functions and values,*
 - ix. *Log storage,*
 - x. *Treatment, storage, or distribution of recycled water, or*
 - xi. *Maximizing groundwater recharge (this does not include wetlands that have incidental groundwater recharge benefits); or*
 - xii. *Fields flooded for rice growing.*

All artificial wetlands that are less than an acre in size and do not satisfy the criteria set forth in 2, 3.a, 3.b, or 3.c are not waters of the state. If an aquatic feature meets the wetland definition, the burden is on the applicant to demonstrate that the wetland is not a water of the state. (SWRCB 2019).

The April 2020 *Implementation Guidance for the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* further clarifies, "Human activity can

cause changes to the surrounding landscape (e.g., grading activities, road construction, direct hydromodification) such that wetlands form where wetlands did not previously exist. Where such artificial wetlands are now a relatively permanent part of the natural landscape, and are not subject to ongoing operation and maintenance, they are waters of the state. By requiring that the wetlands are relatively permanent, the framework excludes wetlands that are temporary or transitory. That they are part of the natural landscape also indicates the relative permanence of the wetlands and suggests that the wetland is self-sustaining without ongoing operation and maintenance activities, and provides similar ecosystem services as natural wetlands. By way of example, this category of wetlands includes situations where water flow is permanently redirected as the result of human activity, such as grading in another area, such that new wetlands form in areas that were previously dry. These wetlands may not be natural wetlands because they result from human activity and they were not formed by modifying a water of the state (rather they were an indirect result), but nevertheless they take on the function of natural wetlands such that they should be considered waters of the state. This category would not include artificial wetlands constructed for specific purposes listed in section II.3.d because the artificial wetland would likely require ongoing maintenance such that they would not be deemed “relatively permanent,” and/or the artificial wetland is not part of the “natural landscape” (SWRCB 2020). Of the state’s documents from 2019 and 2020 neither of them address ditches.

1.2.3 California Coastal Commission

The California Coastal Act Section 30121 defines wetlands as “[L]ands within the coastal zone which may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens” (CCC 2011).

The Coastal Commission’s “one-parameter definition” is outlined in the California Code of Regulations, Title 14 Section 13577 where it states, “Wetland shall be defined as land where the water table is at, near, or above the land surface long enough to promote the formation of hydric soils or to support the growth of hydrophytes, and shall also include those types of wetlands where vegetation is lacking and soil is poorly developed or absent as a result of frequent and drastic fluctuations of surface water levels, wave action, water flow, turbidity or high concentrations of salts or other substances in the substrate. Such wetlands can be recognized by the presence of surface water or saturated substrate at some time during each year and their location within, or adjacent to, vegetated wetlands or deep-water habitats” (14 CCR §13577) (CCC 2011).

California Code of Regulations Title 14 Section 30233, “limits the filling of wetlands to identified high priority uses, including certain boating facilities, public recreational piers, restoration, nature study, and incidental public services (such as burying cables or pipes). Any wetland fill must be avoided unless there is no feasible less environmentally damaging alternative, and authorized fill must be fully mitigated” (14 CCR §30233) (CCC 2011).

Federal Geographic Data Committee (FGDC) Wetland Classification Standard

The Classification of Wetlands and Deepwater Habitats of the United States (FGDC 2013), based on Cowardin et al. (1979), states that wetlands must have at least one of the three wetland attributes: predominantly hydrophytic vegetation, predominantly hydric soil, and hydrology. However, they state that all available information should be used, and all three attributes should be considered if they are present (FGDC 2013).

1.3 Summary

GHD conducted the upland/wetland delineation fieldwork on July 17th, August 14th, and August 19th 2020. Following the initial wetland study, the Project Study Boundary was expanded following the original surveys in 2022 to include raising and widening approximately 2,800 feet of Cannibal Island Road at the southern edge of the Project Area, which was investigated for wetland one and three-parameter wetlands and uplands on May 19, 2022 and June 03, 2022. The delineation in its entirety was conducted within the approximately 794.8-acre Project Area, as shown in **Appendix A, Figure 2—Wetland Delineation Overview**. The vast majority of the Project Area is regularly flooded and composed of jurisdictional wetlands and other waters of the U.S./State (**Appendix A, Figure Set 2—Wetland Delineation**). Wetlands and other waters within the Project Area include Palustrine Emergent Wetlands, Estuarine Emergent Wetlands, Estuarine Subtidal Waters, Estuarine Intertidal Unconsolidated Shore, and Estuarine Intertidal Aquatic Beds. Levees and other higher-elevation areas of the Project Area were investigated for potential uplands, defined herein as areas that do not meet Army Corps of Engineers (USACE 2020a) three-parameters wetland definition based on hydrophytic vegetation, hydric soils, and wetland hydrology. Due to the location of the Project Area within the Coastal Zone boundary, the areas that did not meet the USACE three-parameter wetland definition were also investigated to determine whether they meet California Coastal Commission (CCC) one-parameter wetland definition.

Delineators sampled a total of thirty-six paired sample plots, placed eighteen wetland-upland boundary sample points, and placed 72 intermediate boundary points within the Project Area. The wetland delineation determined that, in addition to levees bounded by elevation contours, nine potential upland areas that do not meet the USACE three-parameter wetland definition occur within the Project Area, covering a total of 16.93 acres. Uplands consisted of levees, historical fill and concrete foundations, pasture, a public access road, and a semi-natural berm. Three of the areas mapped as uplands were dominated by hydrophytic vegetation (FAC or FACW), and these two-parameter uplands may be considered one-parameter wetlands subject to CCC jurisdiction (**Table 1—Feature Summary**).

Results of the 2020 and 2022 investigations are provided in **Appendix A, Figure Set 2**. Datasheets documenting conditions observed during the 2020 investigation are included in **Appendix B**, and a complete species list with the Western Mountains Valleys and Coast Region wetland indicator status of all plants documented during the delineation efforts in both 2020 and 2022 is provided in **Appendix C**. Photographs of the site are included in **Appendix D**.

Table 1. Feature Summary

Feature Type	Area (acres)	Jurisdiction
3-Parameter Wetlands	777.89	USACE, RWQCB, CCC
3-Parameter Uplands	11.15	None
2-Parameter Uplands	5.78	Potential CCC Wetlands

2. Methodology

2.1 Wetland delineation approach

GHD Soil Scientist Misha Schwarz and GHD Botanist Kelsey McDonald conducted the first wetland delineation on July 17th, August 14th, and August 19th 2020 with CDFW Environmental Scientist Michael van Hattem on the latter two dates. The Project Study Boundary (PSB) was expanded, following the original surveys in 2022 to include approximately 2,800 feet of road (Cannibal Island Road) at the southern edge of the Project Area to be raised and widened, by GHD Botanist Kolby Lundgren and Misha Schwarz. The area encompassed by the expanded PSB was visited on May 19, 2022 and June 3, 2022 to determine where the wetland boundary lay on either side of Cannibal Island Road. To define a wetland, the USACE requires that vegetation, soil, and hydrology (three parameters) all show wetland attributes (USACE 1987; USACE 2010). The CCC requires only one parameter of the three to be present in order to define the site as a wetland (14 CCR 13577). The wetland delineation used USACE criteria from the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region* (USACE 2010). The current standard field forms provided by the USACE (2010) were used to collect vegetation, soils, and hydrology data.

Vegetation, soil, and hydrology data were collected in transects across the upland/wetland boundary with two plots (upland/wetland) per transect. The naming convention used on datasheets to designate upland or wetland plots associated with a transect is -U or -W, respectively.

One-parameter and three-parameter wetland/upland boundaries and plots were mapped in the 2020 field investigations with a Trimble Geo 7X Handheld Global Positioning System (GPS) with the Global Navigation Satellite System (GNSS) capability, which was attached to an external antenna to establish sub-meter accuracy. Wetland/upland boundary intermediate GPS points were mapped in the 2022 field investigations with an EOS Arrow 100 Submeter Global Positioning System (GPS) with Global Navigation Satellite System (GNSS). The wetland/upland boundary was recorded with the GPS unit as needed to map the wetland's spatial extent. Data were post-processed using GPS Pathfinder office, which referenced UNAVCO base stations. The wetland/upland boundary intermediate GPS points were collected without recording soils, vegetation, or hydrology data, as appropriate to record the wetland's spatial extent. The points were then connected in the office using ArcMap software for figure creation.

During the delineation mapping, each upland area was designated with a number (e.g., "U01"), and the paired wetland points were also labeled with their respective upland number. **Appendix B** contains all datasheets recorded during the delineation. Levee transects were denoted by the levee area (e.g., "L01").

2.2 Botanical methodology

Vegetation data collection consisted of listing the dominant species in the herbaceous, shrub, and tree layer within a standard-sized plot determined by the strata layer. The species' wetland indicator status for the Western Mountains, Valleys, and Coast Region was then denoted in the respective column, using the standard reference: *National Wetland Plant List for Western Mountains, Valleys, and Coast Region* (USACE 2020b). This list classifies species based on the probability that they are found in wetlands (USACE 1987), ranging from Obligate (almost always in wetlands) [OBL], Facultative/Wet (67% to 99% in wetlands) [FACW], Facultative (34% to 66% in wetlands) [FAC],

Facultative/Up (1% to 33% in wetlands) [FACU], or Uplands (less than 1% in wetlands) [UP]. Species that do not appear on the list are considered to be in the upland category (Lichvar et al. 2016). Standard procedures for documenting hydrophytic vegetation indicators were used per the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (USACE 2010). A complete list of plants documented at the site with respective wetland indicator status from both 2020 and 2022 field investigations is included in **Appendix C**.

2.3 Soils methodology

Hydric soils were defined based on the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (USACE 2010) procedures in combination with the Natural Resources Conservation Service's (NRCS) definitions presented in *Field Indicators of Hydric Soils in the United States* (USDA/NRCS 2018). Soil pits were dug to an approximate depth of 12 to 16 inches. Data on soil color, texture, and redoximorphic features were recorded. Any observed redoximorphic features (iron concentrations) were noted along with their percentage within the soil matrix, and care was taken to distinguish chromas of 1 and 2 indicative of an iron-depleted soil within 12 inches of the soil surface (USACE 2010; USDA/NRCS 2018).

The *Munsell Soil Color Book* (COLOR, M. 2000) was used to describe the soil colors for the entire depth of the test pit. Moist, natural soil aggregate (ped) surfaces, which had not been crushed, were used to determine the soil's color. Soils with low chroma were verified as being hydric or upland with *Field Indicators of Hydric Soils in the United States* (Version 8.2, 2018).

2.3.1 Existing Soils Information

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) identifies five hydric soil units, one primarily non-hydric complex, and water within the Project Area (map in **Appendix A, Figure 3—Soil Map Units** and report in **Appendix E**). A brief map unit description, as generated by the NRCS, is provided for each soil unit below (NRCS 2020). The information provided in the 2020 NRCS report remains accurate for the 2022 expanded PSB. While the soil units are informative, the mapping scales are usually too broad to characterize the small scale of the Project Area features accurately.

Weott, 0 to 2 percent slopes

The map unit composition is as follows: 85 percent Weott and 15 percent minor components. Weott soil is considered prime farmland if irrigated and drained, and it has a capability classification of 5w. The parent material is alluvium derived from mixed sources. Weott soil occurs in backswamps, depressions, and flood-plain steps. The soil consists of very poorly drained silt loam 0-4 inches from the water table. Weott soil is hydric and has high available water capacity, ranging from non-saline to very slightly saline.

Swainslough-Occidental complex, 0 to 2 percent slopes

The map unit composition is as follows: 70 percent Swainslough and similar soils, 20 percent Occidental and similar soils, and 10 percent minor components. Swainslough soils are not prime farmland (capability classification 5w). The parent material is alluvium derived from mixed sources. Swainslough soil occurs in backswamps, depressions, flood-plain steps, and salt marshes. It consists of silty clay loam 0-4 inches from the water table. Swainslough soil is hydric, very poorly

drained, and has high available water capacity. The soil ranges from non-saline to slightly saline. Occidental soil is a similar hydric silty clay loam that occurs in tidal marshes and salt marshes, and it ranges from slightly saline to strongly saline (see description below).

Arlynda, 0 to 2 percent slopes

The map unit composition is as follows: 85 percent Arlynda and similar soils, and 15 percent minor components. Arlynda soil is prime farmland if irrigated/drained (capability classification 5w). The parent material is alluvium derived from mixed sources. Arlynda soil occurs in meander scars, backswamps, depressions, and flood-plain steps. The soil consists of a top layer of slightly decomposed organic material (0-3 inches) above deep silty clay loam. Arlynda soil occurs 0-4 inches from the water table. Arlynda soil is hydric, very poorly drained, and has high available water capacity. Arlynda soil ranges from non-saline to slightly saline.

Occidental, 0 to 2 percent slopes

The map unit composition is as follows: 90 percent Occidental and 10 percent minor components. Occidental soil is not considered prime farmland, and it has a capability classification of 7w. The parent material is alluvium derived from mixed sources. Occidental soil occurs in salt marshes. The soil consist of very poorly drained silty clay loam with a 0-3 inch peat top layer. Occidental soil occurs 0-4 inches from the water table. Occidental soil is hydric and has moderate available water capacity, ranging from slightly saline to strongly saline.

Wigi, 0 to 2 percent slopes

The map unit composition is as follows: 90 percent Wigi, occasionally flooded, and similar soils, and 10 percent minor components. Wigi soil is not considered prime farmland, and it has a capability classification of 7s. The parent material is alluvium derived from mixed sources. Wigi soil occurs in salt marshes. Wigi soil consists of a thin peat organic horizon (0-1 inches) and an A horizon of silt loam (1-7 inches), above a deep layer of silty clay loam. Wigi soil is very poorly drained and occurs 0-6 inches from the water table. Wigi soil is hydric, has high available water capacity, and can be strongly saline.

Samoa-Clambeach complex, 0 to 50 percent slopes

The map unit composition is as follows: 65 percent Samoa and similar soils, 30 percent Clambeach and similar soils, and 5 percent minor components. These soils are not considered prime farmland, and have a capability classifications of 6e and 5w, respectively. The parent material is eolian and marine sand derived from mixed sources. Samoa soil occurs in dunes, and Clambeach soil occurs in deflation basins. Samoa soil consists of a thin organic horizon of slightly decomposed plant material (0-1 inches) above deep sand. Samoa soil is typically more than 80 inches from the water table. Samoa soil is non-hydric and has low water capacity. In contrast, Clambeach soil consists of sand and may be hydric, occurring 0-4 inches from the water table. The soils range from non-saline to very slightly saline (NRCS 2020).

2.4 Hydrology methodology

GHD performed the 2020 delineation in late summer, during the dry season. The 2022 delineation was performed in the spring, while hydrology was still apparent. A NRCS Wetlands (WETS) Climate Table is provided for both 2020 and 2022 for the Woodley Island Station in Eureka, CA in **Appendix F**. Aerial photography and preliminary field visits in the spring of 2020 were used to inform potential

areas for investigation during fieldwork (particularly upland areas). The National Wetland Inventory Mapper was referenced before conducting fieldwork and is included in **Appendix A, Figure 4—National Wetland Inventory** (NWI 2020). The flood hazard map is also included in **Appendix A, Figure 5—FEMA Flood Map**. Wetland hydrology indicators, such as drainage patterns, material deposits, soil saturation, high water table, topographic position, or surface water presence, were recorded in the field.

The site is hydrologically connected to the Eel River Estuary via a failing tidegate, and intermittently connected via overwash at an area of levee failure on the northwest side of the Project Area. The previously determined High Tide Line at the 9 feet NAVD 88 elevation contour (created from 2009 - 2011 CA Coastal Conservancy Coastal Lidar Project) was used as the upper wetland boundary of tidal waters on the outboard side of the levees. Based on upland/wetlands transects and changes in vegetation, GPS points were taken at the wetland/upland boundary on the inboard side of the levees to determine their elevation within the muted system. Field observations and GPS data showed upland/wetland boundaries along the levees within the muted tidal system, corresponding with the 10-foot NAVD 88 contour line. The 9-foot elevation contour was used to trace the outboard side of uplands on the top of the levees, and the 10-foot contour was primarily used to trace uplands/wetlands boundaries on the inboard side of the levees. The 9 to 10-foot elevation riprap around the failing tidegate was also classified as upland based on a lack of wetland characteristics.

3. Results

GHD performed the majority of the delineation on July 17th, August 14th, and August 19th 2020. Weather conditions were partly cloudy to sunny with no precipitation. NOAA weather data from the Eureka Forecast Office at Woodley Island weather station recorded no precipitation within 14-days prior to the first survey, and less than 0.1 inches in the 14 days prior to the later surveys (**Appendix F**) (NCEI 2020). The expanded Project Study Boundary was visited on May 19th and June 3rd 2022 to determine where the wetland boundary lay on either side of Cannibal Island Road. Weather conditions were partly cloudy with light wind. NOAA weather data from the Eureka Forecast Office at Woodley Island weather station recorded 1.03 inches of precipitation within within 14-days prior to the first survey, and 0.31 inches of precipitation prior to the second survey (**Appendix F**) (NCEI 2020). The Project Area is primarily composed of three-parameter, potential USACE jurisdictional wetlands and other waters classified as Estuarine Intertidal Emergent (E2EM1), Palustrine Emergent (PEM1), Estuarine Intertidal Unconsolidated Shore (E2US) using Cowardin nomenclature from the *Classification of Wetlands and Deepwater Habitats of the United States* (FGDC 2013). Potential USACE three-parameter wetlands comprise the majority of the Project Area (777.89 out of 794.82 acres). Levees over 10 feet elevation (NAVD 88) on the inboard side provide a substantial area of potential uplands (7.41 acres). Additionally, nine potential upland areas covering 9.52 acres do not meet USACE three-parameter wetland definition, leading to a total upland area of 16.93 acres (**Table 2—USACE Upland Determinations within the Project Area**). Three of the potential uplands are considered two-parameter uplands because plots passed the Dominance Test for hydrophytic vegetation. Two parameter uplands, which cover a total of 5.78 acres, might be considered CCC one-parameter wetlands based on the presence of hydrophytic vegetation (FAC or wetter). Two-parameter uplands were mapped based on topographic position, upland soils, lack of any primary hydrology indicators, and the lack of more than one secondary indicator. Four levee sampling points were also described to show the inner upland/wetland boundary. **Appendix A, Figure Set 2** shows the results of the upland/wetland delineation.

Additionally, the expanded Project Study Boundary was investigated to determine where the wetland boundary lay on either side of Cannibal Island Road. Four areas were assessed for wetland parameters to the south of the property fence line running along the south edge of the road. The areas were within the southernmost edge of the Project Study Boundary and the fenceline, in an area of grazing pasture comprised of a mix of native and non-native vegetation. The areas received a rapid assessment of site conditions, including characterization of soil and vegetation in an effort to determine if they would qualify as upland plots. Complete USACE data forms were not collected for these sites. Hydrology was clearly present in the form of ponded water in two areas within the expanded Project Area with saturated soils surrounding them. Local residents described the area as being flooded in the winter with at least 1 foot of water ponding on the road surface for weeks at a time, extending into the pasture on either side of the road (potential three-parameter wetlands mapped on north side of the road in 2020). Each of the four areas were relatively homogenous in soil characteristics, with silty hydric soils comprised of a 70% 2.5Y 3/2 matrix and 30% 7.5YR 4/6 redox concentrations on ped faces starting at 1" depth and continuing at least 14 inches (depth of soil pits). These features were observed throughout the soil column and across all four plots. Vegetation was assessed for dominance of hydrophytes, of which all four sites had greater than 50% dominance of FAC or wetter vegetation. Dominant species observed at these sites included: white clover (*Trifolium repens*) (FAC), English plantain (*Plantago lanceolata*) (FACU), spiny fruit buttercup (*Ranunculus muricatus*) (FACW), perennial rye grass (*Festuca perennis*) (FAC), common velvet grass (*Holcus lanatus*) (FAC), and Kentucky blue grass (*Poa pratensis*) (FAC). The areas of ponded water contained pale spike-rush (*Eleocharis macrostachya*) (OBL) and silverweed (*Potentilla ansarina*) (OBL), with the edges densely occupied by marsh meadow-foxtail (*Alopecurus geniculatus*) (OBL). The landform in this area is a river floodplain that is influenced annually by both tide water flooding in from the north of Cannibal Island Road and silt deposition from the Eel River to the south. As such, this area was mapped as a three-parameter wetland per USACE definition (USACE 1987; USACE 2010), and the road surface to edge of pavement mapped as potential three-parameter uplands (**Appendix A, Figure Set 2**).

3.1 Three-Parameter Uplands

Potential three-parameter uplands occur on levees, islands of historical fill, remnant sand dunes, a public use road, and areas developed for historical ranch use. Three-parameter uplands did not contain wetland soils, hydrological indicators, or pass the Dominance Test for hydrophytic vegetation. Potential three-parameter uplands covered a total of 11.15 acres, including 7.41 acres of levee and 3.74 acres of other uplands.

Upland 1

Upland 1 is an area of historical legal fill and a poured concrete foundation associated with previous ranch structures on the southwestern side of the study area that covers a total of 0.05 acres. Vegetation in upland 1 around the concrete slab was dominated by invasive wild radish (*Raphanus sativus*) (UPL) and Queen Anne's lace (*Daucus carota*) (FACU). The wetlands area surrounding the Upland 1 mound consisted of wet pasture strongly dominated by creeping bentgrass (*Agrostis stolonifera*) (FAC). Soils in the U1T1-U pit consisted of a single horizon of very gravelly sandy loam that appeared to be fill sourced from dredge material. The upland soil had a matrix color of 2.5Y 3/2. No redoximorphic features or hydrological indicators were observed in soils associated with Upland 1.

Upland 2

Upland 2 consisted of a 0.80-acre mound north of the dilapidated house. This area roughly coincides with the Samoa-Clambeach sand dune soil complex, and may have been a pre-existing relic dune feature prior to historical development and possible filling. The mound may also have been created or enhanced as a cattle refuge from surrounding lowlands. Upland 2 was dominated by wild radish, Poison hemlock (*Conium maculatum*), and other weedy species. The surrounding low-lying wetlands contained a variety of hydrophytic pasture grasses and some fresh to brackish wetland plants. Soils in the U2T1-U pit consisted of two fill horizons. The top layer (0-7 inches) consisted of loam fill with a matrix color of 10YR 2/2. The second horizon (7-16 inches) consisted of gravelly loam with a 10YR 2/2 matrix color with mixed riverine spoils and woody debris. Soils in the U2T2 pit consisted of three horizons. The top horizon (0-3 inches) consisted of silt loam with a matrix color of 2.5Y 4/2. The second horizon (3-10 inches) consisted of silt loam with a matrix color of 2.5Y 3/2. The lower horizon (10-16 inches) consisted of sandy loam with a matrix color of 2.5Y3/2. No redoximorphic features or hydrological indicators were observed in Upland 2.

Upland 3

Upland 3 consisted of 0.25 acres of a likely filled mound north of Upland 2, and was similarly characterized by wild radish and other weedy species. The surrounding wetlands were primarily characterized by creeping bentgrass and other hydrophytic species. Soil in the U3T1-U consisted of a horizon of silt loam (0-3 inches) with a matrix color of 10YR 2/2 above a horizon of sandy loam with a matrix color of 2.5Y 3/2. No redoximorphic features or hydrological indicators were observed in the upland pit.

Upland 4

Upland 4 is the northwesternmost likely filled mound, and it covers 0.85 acres. It was primarily vegetated by wild radish. The surrounding wetland's vegetation was strongly hydrophytic, with Pacific silverweed (*Potentilla anserina*) among the dominant species. Soil in the U4T1-U pit consisted of three horizons: a top layer of loam (0-3 inches) with a matrix color of 10YR 3/2; a layer of silt loam (3-10 inches) with a matrix color of 2.5Y 3/2; and a layer of sandy loam (10-14 inches) with a matrix color of 2.5Y 3/2. No redoximorphic features or hydrological indicators were observed.

Upland 12

Upland 12 is an island of historical fill created as pond or water holding area near the current ranch on the eastern side of the Project Area. The fill was vegetated by weedy species such as perennial rye grass (*Festuca perennis*) and California burclover (*Medicago polymorpha*). The surrounding wetland area consisted of saltmarsh dominated by pickleweed (*Salicornia pacifica*). Soil in the U012T1-U pit was topped by layer of fill (0-8 inches) characterized by extremely gravelly sandy loam and a matrix color of 2.5Y 3/2, above a layer of gravelly sandy loam with the same matrix color. No redoximorphic features or hydrology indicators were observed.

Poured Concrete/Floating Concrete Pad

An area of poured concrete and a floating concrete pad that appear to have been historically used as a barn occurs within a wet pasture on the northeastern corner of the Project Area. The footprint of the concrete was recorded by GPS. No other data was recorded because of the lack of natural soils and vegetation.

Levees

Levees stretch around the western and northern sides of the Project Area, and the peaks of the levees range from approximately 9 to 13 feet in elevation (NAVD 88). The upland/wetland boundary on the inboard side of the levees roughly corresponded with the 10-foot contour line, a foot higher than the tidal influence area on the outboard side. The levees and failing tidegate hold water within the Project Area, likely increasing the period of inundation from the muted tides and precipitation during the rainy season. Uplands on the levee bounded by the 10 foot contour on the inboard side and the 9 foot contour on the outboard side cover a total of 7.36 acres. Additionally, 0.05 acres of the 9 to 10-foot elevation riprap around the failing tidegate was added to upland acreage based on a lack of wetland characteristics. In total, 7.41 acres of upland levees were mapped within the Project Area. The uplands on levees were primarily dominated by California blackberry (*Rubus ursinus*) (FACU) at the peak, with Pacific aster (*Symphotrichum chilense*) (FAC), wild radish (UPL), Queen Anne’s lace (FACU), and a variety of non-native grasses around the edges. One of the three upland levee datapoints, L010T1-U, passed the Dominance Test (FAC or wetter) for hydrophytic vegetation, with two facultative dominant species as well as upland wild radish, but it did not pass the Prevalence Index (PI>3). Overall, the vegetation on the upland portion of the levees was not hydrophytic. Wetlands at the lower levee edge (within wetlands) often consisted of gumplant patches or other brackish marsh species. Soils within the levee uplands consisted of silt with a matrix color of 2.5Y 3/2 to 2.5Y 3/3 with no redoximorphic features, or redoximorphic features at 9 inches or deeper (which would not meet the relevant soil indicator). No hydrological indicators occurred within upland levees. Please see Wetland Determination Data Forms in **Appendix B** for details.

Public Use Road

The expanded Project Study Boundary surveyed in May and June of 2022 extended the southernmost boundary of the original Project Area further south, across Cannibal Island Road and approximately 30 feet south of the fenceline bordering the edge of the road into active grazing pasture. Three-parameter wetlands were observed in this pasture to the south of the road, extending the boundary of the wetlands already mapped to the north of the road. The paved surface of this road is a three-parameter upland boundary due to lack of vegetation, soils, and hydrology (concrete/gravel surface).

Table 2 USACE Upland Determinations within the Project Area

Upland Name	Upland Parameters	Area (acres)
Upland 1	3	0.05
Upland 2	3	0.80
Upland 3	3	0.25
Upland 4	3	0.85
Upland 10	2	1.27
Upland 11	2	2.01
Upland 12	3	0.40
Upland 13	2	2.50

Upland Name	Upland Parameters	Area (acres)
Concrete Pad	3	0.10
Levees	3	7.41
Public Use Road	3	1.29
Total Upland Area		16.93

3.2 Potential CCC One-Parameter Wetlands

Two-parameter uplands, which may be considered one-parameter wetlands by the CCC, are discussed below. The following areas did not have wetland soils or hydrology, but they passed the Dominance Test for hydrophytic vegetation (FAC or wetter). GHD recommends that the CCC considers areas dominated by Facultative species with no other wetland indicators to be uplands. Facultative (FAC) species are defined as equally likely to occur in wetlands and uplands (34-66 percent occurring in wetlands). As USFWS Regional Wetland Coordinator Ralph Tiner stated in a published review of the concept of a *hydrophyte*, "These [FAC] species, by definition, have a broad ecological amplitude with no affinity for wetlands or nonwetlands and, therefore, are not indicative of either" (Tiner 1991). Facultative plants are equally likely to act as hydrophytes growing in saturated conditions as non-hydrophytes growing in dry conditions. Without any evidence of hydric soil or hydrology, FAC plants should not be considered sufficient to indicate the presence of wetlands. Upland soils and the lack of hydrological indicators provide evidence that they are not growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content, and therefore the plants are not acting as hydrophytes. Based on the principle that FAC-dominated uplands do not qualify as wetlands, Upland 11 and Upland 13 should not be considered wetlands, while Upland 10 might be considered a one-parameter wetland with a predominance of FACW species (66-99 percent probability of occurring in wetlands).

Upland 10

Upland 10 is a 1.27-acre low berm that may be a semi-natural feature that formed near the levee breach. The vegetation is dominated by a mixture of native giant scouring rush (*Equisetum hymale* ssp. *affine*) (FACW) and a mixture of non-native grasses. The vegetation passed the Dominance Test and the Prevalence Index for hydrophytic vegetation. Soil pits at U10T1-U and U10T2-U showed upland characteristics. The soil at U10T1-U contained layers of silt loam (0-3 inches, 3-10 inches) with a matrix color of 10YR 3/2 and a layer of loamy sand with the same matrix color (10-16 inches). The soil at U10T2-U contained a top horizon (0-8 inches) of silt loam with a matrix color of 2.5Y 3/3 above a layer of loamy sand (8-16 inches) with the same matrix color. No redoximorphic features or hydrological indicators were observed in Upland 10. However, based on the dominant hydrophytic (FACW) vegetation, the location might be considered a one-parameter wetland.

Upland 11

Upland 11 is a 2.01-acre area with the remnants of a former ranch house on the west side of the Project Area. The vegetation is primarily dominated by a mixture of wild radish (UPL), English plantain (*Plantago lanceolata*) (FACU) and facultative non-native grasses including purple velvetgrass (*Holcus lanatus*) and creeping bentgrass. The vegetation passed the Dominance Test in two out of three plots in Upland 11 due to the number of facultative dominant species. The soil consisted of two horizons of silt loam with matrix colors of 2.5Y 3/2.5 to 2.5Y 3/3 (0-9/10 inches)

above sandy loam with a matrix color of 2.5Y 3/2.5 to 2.5Y 3/3 (9/10-16 inches). Please see datasheets U11T1-U, U11T2-U, and U11T3-U for soil details. Upland 11 did not show redoximorphic features or wetland hydrology indicators. Large woody debris accumulated on the eastern side of Upland 11 indicates that the area may be subject to overwash during intense storm surge or extreme high tide events. Upland 11 consists of an elevated fill berm with non-hydric soils that may be occasionally subject to flooding/overwash, and it contains a mixture of upland and hydrophytic vegetation. Upland 11 coincides with NRCS-mapped Samoa-Clambeach sand dune soil complex, and the house may have been built upon a relic dune feature. Based on landform position, soil, and the prevalence of upland plants, it is recommended that this area is considered upland despite passing the Dominance Test.

Upland 13

Upland 13 is a 2.50-acre pasture area extending north from a privately owned residential and operational ranching property (excluded from Project Area). Vegetation is dominated by perennial ryegrass and creeping bentgrass, which are non-native facultative pasture grasses. Upland 13 is distinguished from surrounding wet pasture by its elevated landform position and lack of hydric soil and hydrology indicators. Soils consisted of silt loam with a matrix color of 2.5Y 3/2. Upland pits (U13T1-U, U13T2-U, and U13T3-U) showed redoximorphic concentrations starting at 8-9 inches. Because the soils in Upland 13 did not show 5 percent or more redoximorphic concentrations within 8 inches of the surface, they do not meet the applicable hydric soil indicator F6—Redox Dark Surface. No wetland hydrology was observed in Upland 13. Upland 13 may be considered a one-parameter wetland based on dominant FAC pasture grasses, but it is recommended that this area is considered upland because FAC species are not a reliable indicator of wetlands on their own.

3.3 Wetlands within the Project Area

3.3.1 Estuarine Intertidal Emergent Wetlands

Estuarine Intertidal Emergent Wetlands with persistent vegetation (code E2EM1) within the Project Area include hundreds of acres of northern coastal saltmarsh and brackish marsh dominated by native pickleweed (*Salicornia pacifica*), invasive dense-flowered cordgrass (*Spartina densiflora*) marsh, gum plant (*Grindelia stricta*), salt rush (*Juncus lescurii*), and salt grass (*Distichlis spicata*). Estuarine intertidal areas are regularly flooded and exposed by the tides and extend from the marine environment upstream and inland to areas of low ocean-derived salts (FGDC 2013). Much of the area previously mapped as Palustrine by the National Wetlands Inventory (NWI) (**Appendix A, Figure 4**) is now converted to Estuarine Intertidal Emergent Wetlands.

3.3.2 Palustrine Emergent Wetlands

Palustrine emergent wetlands with persistent vegetation (PEM1) also comprise a major portion of the Project Area. Palustrine emergent wetlands within the Project Area are primarily dominated by creeping bentgrass and other hydrophytic pasture grasses. Palustrine emergent wetlands primarily occur as grazed pasture, especially on the eastern side of the Project Area and in a small strip to the south of Cannibal Island Road, and as an intermediate band of lower salinity and less frequent inundation between brackish/salt marsh and uplands throughout the Project Area.

3.4 Other Waters within the Project Area

3.4.1 Estuarine Subtidal

Estuarine subtidal sloughs with unconsolidated mud bottom (E1UB3) and estuarine subtidal aquatic beds (E1AB1 and E1AB3) occur within the Project Area. Subtidal sloughs outside of the levees are subject to full tidal range. Within the levees, slough channels are subject to muted tidal influence via the failing tidegate.

3.4.2 Estuarine Intertidal Unconsolidated Shore and Aquatic Beds

Estuarine Intertidal channels and flats with mud substrate (E2US3) and algal beds (E2AB1) occur within the muted tidal estuary at approximately 4-5 foot elevation (NAVD88). Outside of the levee, intertidal mudflats and algal beds appear to occur within a wider elevation range (within ~2 feet to 6 feet elevation NAVD88 contour range).

Table 3. Delineation Sampling Point Locations

Transect Point	Latitude	Longitude
U1T1	40.647043	-124.296290
L1T1	40.647793	-124.297721
U2T1	40.657052	-124.294438
U2T2	40.657375	-124.294240
U3T1	40.658210	-124.293228
U4T1	40.658851	-124.292203
L010	40.654227	-124.295363
L011	40.658432	-124.294853
L012	40.656913	-124.296094
U10T1	40.656737	-124.295663
U10T2	40.656633	-124.295999
U11T1	40.654725	-124.295395
U11T2	40.655092	-124.295601
U11T3	40.656249	-124.295067
U12T1	40.651114	-124.285000
U13T1	40.649292	-124.282704
U13T2	40.650301	-124.281196
U13T3	40.651313	-124.279592

4. Conclusions

The upland/wetland delineation for the Cannibal Island Restoration project, primarily completed on August 19th, 2020 with an assessment of a small additional area on May 19, 2022 and on June 3, 2022, determined the extent of uplands within the Project Area. Three-parameter wetlands and other waters cover approximately 777.89 acres out of the 794.82-acre Project Area. Uplands were delineated within the Project Area based on a lack of hydrophytic vegetation, soils, and hydrology. Uplands that did not have any of the three wetland attributes have been designated as three-

parameter uplands. Potential uplands cover a total of 16.93 acres. Three-parameter uplands cover 11.15 acres, including upland levees. Two-parameter uplands (Uplands 10, 11, and 13) contained upland soil and lacked hydrology indicators, but they were characterized by FAC or wetter vegetation. Two-parameter uplands covered 5.78 acres of the Project Area, and the CCC may consider these to be one-parameter wetlands subject to CCC jurisdiction. However, we request that the CCC considers the two uplands dominated by FAC species (Upland 11 and 13, totalling 4.50 acres) to be non-jurisdictional uplands based on the lack of reliable wetland indicators, resulting in a total potential CCC-upland area of 15.65 acres. The wetland delineation results are provided in map format in **Figure 2** and associated insets in **Appendix A**. Field datasheets are contained in **Appendix B**.

5. Special Terms and Conditions

5.1 Purpose of this Report

GHD prepared this report for CalTrout, and CalTrout may only use and rely on this report for the purpose agreed upon between GHD and CalTrout, as set out in the scope and contract for work effort reported herein. GHD Inc. is not liable for any action arising out of the reliance of any third party on the information contained within this report. GHD otherwise disclaims responsibility to any entity other than CalTrout arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

5.1 Scope and Limitations

This report does not authorize any individuals to develop, fill, or alter the delineated wetlands. Verification of the delineation by jurisdictional agencies is necessary prior to the use of this report for planning and development purposes. A USACE, agency-approved, delineation map, and a jurisdictional approval letter are required to signify confirmation of delineation results. In situations where a field investigation determines that no jurisdictional wetlands occur, jurisdictional concurrence with these findings is recommended.

The delineation conclusions were based on the information available during the period of the investigation, which took place in July-August 2020 and May-June 2022. The opinions, conclusions, and any recommendations in this report are based on conditions encountered and information reviewed by the date of preparation of the report. Site conditions may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change unless contracted to do so.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions, and any recommendations in this report are based on the information obtained from and testing undertaken at or in connection with specific sample points. Conditions at other locations of the site may be different from the conditions found at the specific sample points.

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 Grid: NAD 1983 StatePlane California 1 FIPS 0401 Feet



CalTrout
 Cannibal Island Restoration Project

Project No. 11206383
 Revision No. -
 Date Jun 2022

Wetland Delineation Overview

FIGURE 2

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 11209183_002_WetDet_Overview_RevF
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Data source: Upland, 12/16/2020, updated Jun 8 2022 APE, 6/3/2022; NAIP 2018.
 Created by: jclark

Exhibit 7
 1-23-0854 (CDFW)
Wetland Delineation Report (excerpt) (pg. 20 of 21)



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CalTrout
 Cannibal Island Restoration Project

Project No. 11206383
 Revision No. -
 Date Jun 2022

National Wetland Inventory

FIGURE 4

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Data source: APE, GHD, Jun 2022, World_Transportation, Esri, HERE, GeoTechnologies, Inc, USA Wetlands. This work is licensed under the Esri Master License Agreement. View Summary View Terms of Use Important Note: This item requires an ArcGIS Online organizational subscription or an ArcGIS Developer account and does not consume credits. To access this item, you'll need to do one of the following: Sign in with an account that is a member of an organizational subscription Sign in with a developer account Register an application and use your application's credentials. If you don't have an account, you can sign up for a free trial of ArcGIS or a free ArcGIS Developer account.
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Exhibit 7
 1-23-0854 (CDFW)
Wetland Delineation Report (excerpt) (pg. 21 of 21)



Wetlands & Habitat Restoration Plan

Cannibal Island Restoration Project

CalTrout

September 26, 2023

➔ **The Power of Commitment**



Exhibit 8
1-23-0854 (CDFW)
Wetlands and Habitat Restoration Plan (excerpt)
(pg. 1 of 28)

1. Introduction

This Wetland & Habitat Restoration Plan (WHRP) has been prepared for the Cannibal Island Restoration Project (“Project”) for the U.S. Army Corps of Engineers (USACE), the North Coast Regional Water Quality Control Board (NCRWQCB), and the California Coastal Commission (CCC). This WHRP summarizes the findings from various environmental studies that documented existing wetlands, Sensitive Natural Communities (SNC), sensitive plant species, and sensitive wildlife species (and associated habitat), within the Project Area. This WHRP summarizes potential temporary impacts within the Project Area, and documents that the Project will not result in a loss of wetlands or other regulated waters. Sensitive resources potentially considered Environmentally Sensitive Habitat Areas (ESHA) under the Coastal Act § 30107.5 and 30121 are pursuant to agency determination.

The Project is exempt from California Environmental Quality Act (CEQA) consideration through the California Department of Fish and Wildlife (CDFW) Statutory Exemption for Restoration Projects (SERP) (Public Resources Code § 21080.56). Due to the nature and extent of the restoration, the Project team is seeking approval for environmental compliance through various permitting pathways recently developed in an effort to streamline implementation of restoration projects. The Project’s permitting pathways are summarized in **Table 1.4-1**.

1.1 Project Location

The Project Area is located three miles west of the town of Loleta, California in the Eel River estuary, within the Cannibal Island USGS 7.5-minute quadrangle (**Appendix A, Figure 1**). The 794-acre Project Area is at the western-most extent of the Eel River delta and estuary approximately 1 mile inland and northeast of the Eel River mouth. Cannibal Island is located in the northern portion of the Eel River estuary and is bounded by Sevenmile Slough on the north and east, North Bay Slough on the west and Mosley Slough on the southwest (**Appendix A, Figure 2**).

The northern and western portion of the Project Area (approximately 462 acres) is owned by CDFW and managed as part of the of the Eel River Wildlife Area (ERWA) Cannibal Island Unit (APNs 310-043-001, 310-033-004, and 310-021-003, 310-021-004). The remaining 332 acres are privately owned by Hansen (APNs 310-043-003 and 310-051-001) and Pedrazzini (APNs 310-043-004, -005, -006). Approximately 220 acres of the private property are held in Wetland Conservation Easements by the Natural Resources Conservation Service (NRCS) Wetlands Reserve Easement Program (WRP) (**Appendix A, Figure 3**).

1.2 Project Purpose & Need

The Project Area is hydrologically connected to the Eel River estuary, which is a mosaic of open water, dune, and wetland habitats that connects and drains the Eel River watershed into the Pacific Ocean. The estuary supports hundreds of thousands of resident and migratory waterfowl, as well as numerous aquatic species (including those considered state and federally sensitive). The watershed as a whole has sustained habitat and water quality degradation from a variety of historic and modern-day activities, including conversion of diverse coastal wetland habitats to agricultural land, as is the case within the Project Area. This degradation has affected habitat quality for numerous species of flora and fauna, whose health and vitality are tied to a complex trophic web that extends from the mouth of the Eel River to the headwaters.

The purpose of the Project is to return full tidal amplitude (natural tidal inundation range and hydraulics) to a historic slough network and restore function and connectivity of historic tidal wetlands to North Bay. The Project will enhance and establish full tidal exchange to approximately 500 acres of former tidal marsh habitat including construction of tidal channels and tidal marsh features (hummocks). Restoration will support broader native plant, fish, wildlife, and benthic infauna diversity within estuarine and freshwater marsh habitats, and in wetland ecotones. Improvement to the tidal channel networks will accommodate physical processes such as sediment transport and marsh plain sediment accretion that will promote the marsh’s ability to keep pace with sea level rise.

1.3 Project Description

The proposed Project will enhance (widen and deepen) existing tidal slough channels within the limits of Project disturbance (**Appendix A, Figure 4**). Construction activities will include the removal of outdated water control structures, excavation of slough channels to accelerate the formation of high-quality aquatic habitat for listed fish species, and placement of excavated fill in appropriate locations to mimic natural marsh topography (natural levees and hummocks or tidal marsh ridges), and enhance wetland vegetation diversity through controlled treatment of invasive dense-flowered cordgrass (*Spartina densiflora*). Excavated soils from the channels will be placed in low hummocks approximately 2-feet high adjacent to the channels. These hummocks are anticipated to retain wetland parameters as they will not exceed marsh plain elevation, and will not constitute conversion to uplands. Placement of ¼ ton rock will occur along a section of channel to provide inset channel grade control to manage the tidal prism. This grade control is anticipated to be beneficial to manage tidal prism until the site elevations increase to be representative of a system with full tidal amplitude, which is expected to occur over 10-20 years. The rock would be placed over a 20-foot-long section where a former road crossing is located and failing culvert is proposed for removal. This area is a suitable location for the inset channel grade control because it likely already contains compacted sediment (from previous infrastructure), and will be disturbed via the road crossing and culvert removal anyway. Much of the existing dike network within the Project Area will be reconfigured or removed. New setback levees will be constructed to protect agricultural land from tidal inundation as full amplitude is restored, including one newly constructed setback levee in the eastern portion of the Project Area. Raising of Cannibal Island Road in the southern portion of the Project Area is also proposed. Sediment excavated during construction will be beneficially reused within the Project Area and will not be hauled off-site.

1.4 Project and Regulatory Background

This is a restoration Project that is exempt from the requirements of CEQA pursuant to SERP (Public Resources Code § 21080.56). No National Environmental Policy Act (NEPA) compliance is required as there is no federal nexus with the Project above and beyond the permits displayed in Table 1.4-1.

The Project Area includes wetlands within the jurisdiction of the USACE, the NCRWQCB, State Lands Commission and the CCC. Required permits and approvals are listed in **Table 1.4-1**.

Table 1.4-1 Permits Required for Project

Permit	Agency
Clean Water Act (CWA) Section 404— Nationwide Permit (NWP) 27	USACE
Endangered Species Act (ESA) Section 7— Salmonids	National Oceanic & Atmospheric Administration Restoration Center (NOAA RC) Programmatic Biological Opinion (PBO)
ESA Section 7—Tidewater Goby	U.S. Fish and Wildlife Service (USFWS) PBO
CWA Section 401—Statewide Restoration General Order (SRGO)	NCRWQCB
Coastal Development Permit (CDP)	CCC
Conditional Use Permit	County of Humboldt—Planning Department
Encroachment Permit	County of Humboldt—Public Works Department
Lake and Streambed Alteration Agreement (LSAA) and California Endangered Species Act (CESA) Compliance	CDFW
Lease	California State Lands Commission

2. Baseline Information

2.1 Studies within the Project Area

Several environmental studies were conducted to assess baseline environmental conditions within the Project Area, and include the following:

- Upland/Wetland Delineation Report (GHD 2022a, **Appendix B**)
- Special Status Plants and Sensitive Natural Communities/ESHA Mapping (GHD 2022b, **Appendix C**)
- Baseline Conditions Aquatic, Terrestrial and Avian Species Memo (GHD 2022c, **Appendix D**)

These studies evaluate the potential for special status plants, wildlife species, SNCs, ESHA, or aquatic resources to occur, and document the existence and condition thereof as observed in the Project Area, along with a general analysis of potential impact. All species, vegetation communities, and aquatic resources identified in the Project Area are listed in these studies. The accompanying data collected from these studies has been used to inform post-construction conditions based on proposed Project design components and modelling, and are summarized in the following technical analyses:

- Wetlands Fill Analysis (GHD 2023a, **Appendix E**)
- Habitat Conversion Analysis (GHD 2023b, **Appendix F**)

The following subsections summarize the findings of the studies and analyses, including location and extent of existing special status plants, wildlife species (and associated habitat), SNCs, ESHA, or aquatic resources in the Project Area, and discuss anticipated temporary impacts that may result from implementation of the Project.

2.1.1 Environmental Sensitive Habitat Areas

The Project Area is within the California Coastal Zone, with primary permitting jurisdiction by the California Coastal Commission (CCC) for a Coastal Development Permit. Environmentally Sensitive Habitat Areas (ESHAs) are defined by the Coastal Commission as follows (CCC 2022):

“Environmentally sensitive area means any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.” (Pub. Resources Code, § 30107.5)

The CCC’s designation of ESHA generally includes vegetation alliances listed in CDFW’s California Sensitive Natural Communities List with a S1- S3 ranking. The CCC’s ESHA category is broadly defined, and it also includes habitat for special-status species, wetlands, riparian areas, and other areas that provide important ecosystem functions (CCC 2013). While there is not a specific list of habitats considered to be ESHA for the State or County, the CCC through the Coastal Act and counties or municipalities through the Local Coastal Program (LCP) are the jurisdictional agencies that exert authority in identifying and protecting ESHA during project activities.

Sensitive resources within the Project Area may be considered ESHA pending agency determination.

2.1.1.1 Eel River Area Plan of the Humboldt County Local Coastal Program

Permitting within the Coastal Zone for Humboldt County occurs in compliance with the Eel River Area Plan (HCPD 2014). The Eel River Area Plan (enacted 1982) uses the California Coastal Act definition of wetlands, and states “No land use or development shall be permitted in areas adjacent to coastal wetlands, called Wetland Buffer Areas, which degrade the wetland or detract from the natural resource value” (p.47). The Eel River Area Plan provides specific examples of ESHA within the County coastal zone (p. 44):

1. *Environmentally sensitive habitats within the Eel River Planning Area include:*

a. *Rivers, creek, and associated riparian habitats;*

- b. Estuaries, sloughs, and wetlands;
- c. Rookeries for herons and egrets;
- d. Harbor seal pupping areas;
- e. Critical habitats for rare or endangered species listed on State or Federal Lists.

2.2 Existing Jurisdictional Wetlands in the Project Area

GHD completed a wetland delineation in 2020 to determine the extent of aquatic resources, including wetlands and Other Waters of the U.S./State (“Other Waters”), within the Project Area, with a follow up delineation in 2022 for an area of the Project that was expanded (**Appendix B**). To define a wetland, the USACE requires that vegetation, soil, and hydrology (three parameters) all show wetland attributes (USACE 1987; USACE 2010). In addition, the CCC requires only one wetland parameter to be present (hydric soils, wetlands vegetation, or wetlands hydrology) for a habitat to qualify as a wetland (i.e., one-parameter wetlands). The Classification of Wetlands and Deepwater Habitats of the United States (FGDC 2013), based on Cowardin et al. (1979), states that wetlands must have at least one of the three wetland attributes: predominantly hydrophytic vegetation, predominantly hydric soil, and hydrology. However, they state that all available information should be used, and all three attributes should be considered if they are present (FGDC 2013). The wetland delineation used USACE criteria from the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (USACE 2010).

The delineation in its entirety was conducted within the approximately 794-acre Project Area. The vast majority of the Project Area is regularly flooded and comprised of jurisdictional wetlands and Other Waters (**Appendix A, Figure 5**). Wetlands and Other Waters within the Project Area include Palustrine Emergent Wetlands, Estuarine Emergent Wetlands, Estuarine Subtidal Waters, Estuarine Intertidal Unconsolidated Shore, and Estuarine Intertidal Aquatic Beds. Levees and other higher-elevation areas of the Project Area were investigated for potential uplands, defined herein as areas that do not meet Army Corps of Engineers (USACE 2020) three-parameters wetland definition based on hydrophytic vegetation, hydric soils, and wetland hydrology. Due to the location of the Project Area within the Coastal Zone boundary, the areas that did not meet the USACE three-parameter wetland definition were also investigated to determine whether they meet CCC one-parameter wetland definition.

The wetland delineation determined potential upland areas that do not meet the USACE three-parameter wetland definition, covering a total of 16.93 acres. Uplands consisted of levees, historical fill and concrete foundations, pasture, a public access road, and a semi-natural berm. Three of the areas mapped as uplands were dominated by hydrophytic vegetation (FAC or FACW), and therefore these two-parameter uplands may be considered one-parameter wetlands subject to CCC jurisdiction (**Table 2.2-1**).

Results of the 2020 and 2022 investigations and datasheets documenting conditions observed during the investigations are included in **Appendix B** (GHD 2022a).

Table 2.2-1. Jurisdictional Wetlands in Project Area

Feature Type	Area (acres)	Jurisdiction
3-Parameter Wetlands	777.89	USACE, RWQCB, CCC
3-Parameter Uplands	11.15	None
2-Parameter Uplands	5.78	Potential CCC Wetlands

Three-parameter Wetlands within the Project Area

Several distinct wetland types were identified in the Project Area based on results from the wetland delineation (**Appendix B**) and vegetation mapping (**Appendix C**). **Table 2.2-2** summarizes the wetland types mapped in the Project Area during the wetland delineation and the vegetation communities associated with those wetland types

(GHD 2022b, **Appendix C**). Two categories are a mix of upland and wetland types (Agricultural Pasture, Ruderal) because most uplands were associated with levees, non-native agricultural pasture, and areas dominated by non-native vegetation (but were not functioning as grazing pasture). Some of these areas were characterized as a certain vegetation type, but contained both uplands and wetlands (i.e., non-native pasture that contained both uplands and wetlands).

Table 2.2-2. Wetland Types and Corresponding Vegetation Communities

Cowardin Wetland Type¹	Vegetation Mapping Unit²	Area (acres)	Total Area (acres)
Estuarine Subtidal Aquatic Bed (E1AB3)	Eelgrass Beds	0.6	16.7
Estuarine Subtidal (E1UB)	Subtidal Sloughs (Unvegetated)	16.1	
Estuarine Intertidal Aquatic Bed/ Unconsolidated Shore (E2AB1/E2US3)	Mudflats/Estuarine Intertidal Shore	93.4	93.4
Estuarine Intertidal Emergent Wetland (E2EM1)	Pickleweed Salt Marsh	287.7	360.4
	Gum Plant Patches	28.7	
	Salt Rush Swales	26.2	
	Salt Grass Flats	17.8	
Estuarine Intertidal Emergent Wetland (E2EM1)	Dense-Flowered Cordgrass	61.6	61.6
Upland and Palustrine Emergent Vegetation (PEM1)	Non-Native Pasture	208.7	208.9
	Pale spike rush marsh	0.15	
Palustrine Scrub Shrub (PSS3)	Coastal Willow Thickets	0.4	0.4
Upland and Palustrine Emergent Vegetation (PEM1)	Non-native Vegetation (not functioning as pasture)	43.0	43.0
Upland	Coastal Brambles	2.9	2.9
Upland	Developed (pervious/impervious surfaces)	7.9	7.9
<p>1. Cowardin wetland types are based on Cowardin nomenclature from the <i>Classification of Wetlands and Deepwater Habitats of the United States</i> (FGDC 2013).</p> <p>2. Vegetation was characterized in the botanical studies of the Project Area, and mapped into discrete vegetation units based on Rapid Assessment protocol (CNPS 2022a) and mapped according to CNPS <i>The Manual of California Vegetation Online</i> (Sawyer et. al. 2009) at the Alliance level.</p>			

Potential CCC One-Parameter Wetlands

Two-parameter uplands, which may be considered one-parameter wetlands by the CCC, did not have wetland soils or hydrology, but they passed the Dominance Test for hydrophytic vegetation (facultative or wetter). GHD recommends that the CCC considers areas dominated by facultative species with no other wetland indicators to be uplands. Facultative (FAC) species are defined as equally likely to occur in wetlands and uplands (34-66 percent occurring in

wetlands) (Lichvar & Gillrich 2011). Facultative plants are equally likely to act as hydrophytes growing in saturated conditions as non-hydrophytes growing in dry conditions. The Environmental Protection Agency (EPA) and USACE define wetlands as “Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (40 CFR 232.2).” Without any evidence of hydric soil or hydrology, facultative plants on their own should not be considered sufficient to indicate the presence of wetlands. Upland soils and the lack of hydrological indicators provide evidence that plants are not growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content, and therefore the plants are not acting as hydrophytes. Based on the principle that FAC-dominated uplands do not qualify as wetlands, Upland-11 and Upland-13 should not be considered wetlands (dominated by FAC species), while Upland-10 might be considered a one-parameter wetland with a predominance of FACW species (66-99 percent probability of occurring in wetlands) (Lichvar & Gillrich 2011). See **Appendix B** for the full delineation report, and associated appendices for datasheets.

2.3 Existing Sensitive Vegetation Communities

There is one SNC located outside of wetlands within the Project Area. All other SNCs are within three-parameter wetlands, but will be discussed individually in the sections that follow.

Sensitive Natural Communities

Protocol-level botanical surveys and vegetation characterization and mapping occurred in 2020-2022 (GHD 2022b). Potentially sensitive vegetation was mapped at the Alliance level (**Appendix A, Figure 6**) and are summarized in **Table 2.3-1**.

Sensitive Natural Communities characterized within the Project Area include Northern Coastal Salt Marsh (an SNC as defined by Holland 1986) which occurs within and outside the muted tidal prism, and include the following sensitive vegetation alliances (defined according to Sawyer et al. 2009, CNPS 2022a):

- Low marsh dominated by pickleweed (G4 S3),
- High marsh dominated by gum plant (G2 S2), and
- Brackish marsh dominated by salt rush (G3 S2).

Additionally, 0.6 acres of eel grass beds (GNR S3) are anchored in subtidal slough bottom near McNulty Slough, to the west and outside of the existing dike. Coastal brambles dominated by California blackberry (*Rubus ursinus*), which may be classified as a SNC (G4 S3), occur along and adjacent to upland dikes. Because coastal brambles occur as linear features along existing dikes and contain a substantial proportion of non-native species, we recommend that this alliance not be considered a protected SNC in this context. A discrete patch of coastal willow thickets (G4 S3) dominated by *Salix hookeriana* is at the far east boundary of the Project Area bordering Sevenmile Slough.

Table 2.3-1. Acreage of Existing Sensitive Natural Communities within the Project Area

Vegetation Mapping Unit	Global and State Rank ¹	Area (acres)
Pickleweed salt marsh	G4 S3	287.7
Gum plant patches	G2 S2	28.7
Salt rush swales	G3 S2	26.2
Eelgrass beds	GNR S3	0.6
Coastal brambles ²	G4 S3	2.9
Coastal willow thickets	G4 S3	0.4

1. Sensitive natural communities are those listed as Sensitive in CNDDDB. These vegetation alliances are ranked 1 through 5 based on NatureServe's (2022) methodology, with those alliances ranked globally (G) or state-wide (S) with status of 1 through 3 considered to be critically imperiled, imperiled, or vulnerable, respectively (NatureServe 2022). Some species or communities may have a GNR designation (globally not rated) but are considered sensitive within the state (have a State ranking of 1 through 3).
2. Coastal brambles Alliance SNC is not recommended for SNC protection given the pattern of presence (legacy of disturbance) and high occurrence of non-native species intermixed with individuals.

2.4 Existing Sensitive Plant Species

Floristic surveys were conducted in 2020 and 2022 (GHD 2022b, **Appendix C**). Three California Rare Plant Rank (CRPR) special status plant species (CRPR 1 or 2) were observed during floristic surveys of the Project Area: Lyngbye's sedge (*Carex lyngbyei*, CRPR 2B.2), Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *humboldtiensis*, CRPR 1B.2), and Point Reyes bird's beak (*Chloropyron maritimum* ssp. *palustre*, CRPR 1B.2). Additionally, seacoast angelica (*Angelica lucida*, CRPR 4.2), a limited distribution plant, was widespread in the Project Area (**Appendix A, Figure 7**). Special status species and their estimated population size in the Project Area are summarized in **Table 2.4-1**. No federal special status plant species were detected in the Project Area.

Lyngbye's sedge (*Carex lyngbyei*), CRPR 2B.2

Lyngbye's sedge is a rare perennial rhizomatous sedge that occurs in coastal salt marshes and brackish marshes along the Pacific Coast of North America from California to Alaska, as well as in Greenland and Iceland (CNPS 2022b). Although NatureServe ranks the sedge as secure throughout its range (Global Rank G5), it is considered vulnerable in California (State Rank S3). CNPS ranks the sedge as rare or endangered in California, where it is threatened by non-native species, habitat disturbance, and grazing (CNPS 2022b). Lyngbye's sedge occurred in dense patches along sloughs on the outside of the dike and sparsely scattered among invasive dense-flowered cordgrass on the outside of the dikes. The densest populations of Lyngbye's sedge can be found along the slough outside the dikes where brackish water exits the failed culvert. Lyngbye's sedge occurred along external sloughs and was not found within the muted tidal prism.

Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *humboldtiensis*), CRPR 1B.2

Humboldt Bay owl's clover is a rare hemi-parasitic annual herb endemic to the North Coast of California (Baldwin et al. 2012). NatureServe ranks the sub-taxon as imperiled throughout its range (G4T2 S2), and CNPS ranks it as rare or endangered in California and elsewhere (CNPS 2022b). Humboldt Bay owl's clover was widespread in high marsh on the outside of the dikes, and some can be found on the interior around the dike breach. A total of 5,000-10,000 plants were estimated by roughly counting and visually estimating the number of individuals. Less than 100 of these were inside the dikes at the breach.

Point Reyes bird's beak (*Chloropyron maritimum* ssp. *palustre*), CRPR 1B.2

Point Reyes bird's beak is a rare annual hemi-parasitic herb that occurs in coastal salt marshes from Central California to Southern Oregon (Baldwin et al. 2012). Point Reyes bird's beak typically occurs in diverse mixed high marsh habitats (USFWS 2022). A total of 7,000-10,000 plants occurred around the outside of the dikes and around the breach. Less than 100 were inside the dikes around the breach where over-wash regularly occurs. Populations of Point Reyes bird's beak overlapped with Humboldt Bay owl's clover, occupying native high marsh habitat outside the dikes.

Seacoast angelica (*Angelica lucida*), CRPR 4.2

Seacoast angelica is a limited distribution plant (CRPR 4). Although it is considered vulnerable in California (S3), it is secure throughout its global range (G5). Seacoast angelica was widespread on dikes, berms, and other higher-elevation microhabitats throughout the Project Area. The population is estimated to be approximately 1000 plants throughout the Project Area, all located on or within the dikes.

Table 2.4-1 Special Status Plant Species in Project Area

Common Name	Scientific Name	CNPS Rare Plant Rank (CRPR) ¹	Population Estimate	Population Area (acres)
Humboldt Bay Owl's Clover	<i>Castilleja ambigua</i> ssp. <i>humboldtiensis</i>	1B.2	5,000-10,000	1.44
Point Reyes Bird's Beak	<i>Chloropyron maritimum</i> ssp. <i>palustre</i>	1B.2	7,000-10,000	2.03
Lyngbye's Sedge	<i>Carex lyngbyei</i>	2B.2	Not Estimated	0.542
Seacoast angelica	<i>Angelica lucida</i>	4.2	~1000	Widespread, Not Calculated.

1. California Rare Plant Ranking (CRPR) rare plants are those on the California Native Plant Society's (CNPS) Lists 1 and 2. Plant species on CNPS Lists 1 and 2 are considered eligible for state listing as Endangered or Threatened pursuant to the California Fish and Game Code, and CDFW has oversight of these special status plant species as a Trustee Agency. Plants on CNPS Lists 3 and 4 do not have formal protection under CEQA but may merit consideration in certain circumstances.

2.5 Existing Sensitive Wildlife & Habitat

The Project Area is within the Eel River estuary and includes approximately 24 square miles of delta lands, wetlands, and estuarine channels that receive runoff from 3,700 square miles of the Eel River Basin. It is one of the most significant estuaries along the California coast, with a mosaic of tidal flats, sloughs, marshes, and seasonal wetlands that support resident and migratory birds (Grassetti et al. 2011).

Native northern coastal salt marsh, eelgrass beds, mudflats, and sloughs are habitat types classified in the Project Area that comprise portions of the three-parameter wetlands delineated in the Project Area (see **Section 2.2**, and the Project Upland/Wetland Delineation Report, GHD 2022a, **Appendix B**). Several of these provide important habitat features for special status wildlife species. A fisheries sampling survey was conducted in the Project Area across four sampling events in 2020 (Loomis 2020), and a reconnaissance field survey was conducted in the Project Area by a qualified Wildlife Biologist in 2021 (GHD 2022c, **Appendix D**). An assessment of wildlife species potential to be inhabiting the Project Area was based on data collected across all biological studies in the Project Area (fisheries sampling, wetland delineation, and vegetation mapping) in addition to field surveys. The potential to occur assessment is embedded in the wildlife report (GHD 2022c, **Appendix D**). A summary of species observed in the Project Area across wildlife surveys is included in **Table 2.5-1**.

Table 2.5-1. Sensitive Wildlife Species Detected in Project Area

Scientific Name	Common Name	FESA	CESA	GRank ²	SRank ²	Other Status	Habitat Requirements ¹	Detections in Project Area
<i>Ardea alba</i>	Great Egret	None	None	G5	S4	CDF_S-Sensitive IUCN_LC-Least Concern	Colonial nester in large trees. Rookery sites located near marshes, tide-flats, irrigated pastures, and margins of rivers and lakes.	Over a dozen individuals observed on-site including during October 2020 soil sampling field work and the May 2021 field survey.

Scientific Name	Common Name	FESA	CESA	GRank ²	SRank ²	Other Status	Habitat Requirements ¹	Detections in Project Area
<i>Ardea herodias</i>	Great Blue Heron	None	None	G5	S4	CDF_S-Sensitive IUCN_LC-Least Concern	Colonial nester in tall trees, cliffsides, and sequestered spots on marshes. Rookery sites in close proximity to foraging areas: marshes, lake margins, tide-flats, rivers and streams, wet meadows.	Several individuals observed on-site including during October 2020 soil sampling field work and the May 2021 field survey.
<i>Circus hudsonius</i>	Northern Harrier	None	None	G5	S3	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern	Coastal salt & freshwater marsh. Nest and forage in grasslands, from salt grass in desert sink to mountain cienagas. Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas.	Several individuals observed on-site during both October 2020 soil sampling field work and the May 2021 field survey.
<i>Elanus leucurus</i>	White-tailed Kite	None	None	G5	S3S4	BLM_S-Sensitive CDFW_FP-Fully Protected IUCN_LC-Least Concern	Rolling foothills and valley margins with scattered oaks & river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	Observed on-site during both October 2020 soil sampling field work and the May 2021 field survey.
<i>Rana aurora</i>	Northern Red-legged Frog	None	None	G4	S3	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern USFS_S-Sensitive	Humid forests, woodlands, grasslands, and streamsides in northwestern California, usually near dense riparian cover. Generally, near permanent water, but can be found	There are two records from Cannibal Island, including a record of 28 egg masses within the Project Area in 2009, and a record of 72

Scientific Name	Common Name	FESA	CESA	GRank ²	SRank ²	Other Status	Habitat Requirements ¹	Detections in Project Area
							far from water, in damp woods and meadows, during non-breeding season.	egg masses in 2009 mapped at the western edge of the Project Area within Mosley Slough (CDFW 2021a).
<i>Eucyclogobius newberryi</i>	Tidewater Goby	FE	None	G3	S3	AFS_EN-Endangered IUCN_VU-Vulnerable	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River. Found in shallow lagoons and lower stream reaches, they need fairly still but not stagnant water and high oxygen levels.	Known to occur in the Project Area as recently as 2020 based on CDFW fish sampling efforts (recorded three out of the four sampling days; Loomis 2020). The Project Area overlaps designated critical habitat (USFWS 2021).

Footnotes:

¹ General habitat, and microhabitat column information, reprinted from CNDDDB.

² Rankings from CNDDDB.

Column Header Categories and Abbreviations:

FESA: Listing status under the federal Endangered Species Act (FESA)

FE = Federal Endangered; FT = Federal Threatened; FC = Federal Candidate; FD = Federally Delisted

CESA: Listing status under the California state Endangered Species Act (CESA)

SE = State Endangered; ST = State Threatened.

GRank: Global Rank from NatureServe's Heritage Methodology (NatureServe 2022)

SRank: State Rank from NatureServe's Heritage Methodology (NatureServe 2022)

Other Statuses (other federal or state listings may include):

AFS_EN (American Fisheries Society Threatened): "a taxon that is in imminent danger of becoming endangered throughout all or a significant portion of its range" (Jelks et al. 2008).

BLM_S (Bureau of Land Management Sensitive): "(1) species listed or proposed for listing under the Endangered Species Act (ESA), and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA, which are designated as Bureau sensitive by the State Director(s). All Federal candidate species, proposed species, and delisted species in the 5 years following delisting will be conserved as Bureau sensitive species." (CDFW 2021b);

CDF_S: (California Department of Forestry and Fire Protection Sensitive): "those species that warrant special protection during timber operations" (CDFW 2021b);

CDFW_FP (CDFW Fully Protected Animal): "This classification was the State of California's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish, amphibians and reptiles, birds and mammals. Most of the species on these lists have subsequently been listed under the state and/or federal endangered species acts." (CDFW 2021b);

Scientific Name	Common Name	FESA	CESA	GRank ²	SRank ²	Other Status	Habitat Requirements ¹	Detections in Project Area
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CDFW_SSC (CDFW Species of Special Concern): "It is the goal and responsibility of the Department of Fish and Wildlife to maintain viable populations of all native species. To this end, the Department has designated certain vertebrate species as 'Species of Special Concern' because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. The goal of designating species as 'Species of Special Concern' is to halt or reverse their decline by calling attention to their plight and addressing the issues of concern early enough to secure their long-term viability" (CDFW 2021b);

IUCN_LC (International Union for Conservation of Nature Least Concern): "when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened" (IUCN 2012);

IUCN_VU (International Union for Conservation of Nature Vulnerable): "when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable..., and it is therefore considered to be facing a high risk of extinction in the wild" (IUCN 2012).

Habitat Supporting Sensitive Wildlife

Habitat that supports federally listed species is also considered in environmental review. Critical habitat for Tidewater Goby is present within the Project Area. Critical habitat and Essential Fish Habitat (EFH) are present adjacent to the Project Area for several species. Critical habitat and EFH are described below. See **Table 2.5-2** for a summary of species and the location of habitat within or adjacent to Project Area.

Critical Habitat

The ESA of 1973 (16 USC 1531 et seq.) establishes a national policy that all federal departments and agencies provide for the conservation of threatened and endangered species and their ecosystems. Critical habitat is defined by the ESA as a specific geographic area containing features essential for the conservation of an endangered or threatened species. Under Section 7 of the ESA, critical habitat should be evaluated if designated for federally listed species that may be present.

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (16 U.S.C. 1801 et seq.) provides the federal government with the authority to manage fisheries in the U.S. Exclusive Economic Zone (EEZ) (from state waters which end three nautical miles offshore to a distance of 200 nautical miles). In addition, the Act mandates inter-agency cooperation in achieving protection, conservation, and enhancement of Essential Fish Habitat (EFH). The Act defines EFH as "Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."

EFH is designated for species managed in Fisheries Management Plans (FMP) under the MSFCMA. Under the MSFCMA, the Eel River Delta (including the North Bay, Mosley Slough, and Sevenmile Slough) is designated as EFH within the Pacific Coast Salmon Fisheries Management Plan (FMP) (Chinook, Coho, and Pink Salmon; NOAA Fisheries 2021a).

The Pacific Coast Salmon FMP (as amended) was created to manage commercial and recreational salmon fisheries along the west coast of the U.S. In addition, the plan designates Habitat Areas of Particular Concern (HAPC) including complex channels and floodplains, thermal refugia, spawning habitat, estuaries, and marine and estuarine submerged aquatic vegetation (NOAA Fisheries 2021b). Some of these HAPCs are present in the North Bay and Mosley Slough (adjacent to the Project Area), and Sevenmile Slough (adjacent and within the Project Area). The North Bay, Mosley Slough, and Sevenmile Slough are part of the Eel River estuary and contain floodplains and estuarine submerged aquatic vegetation.

The North Bay of the Eel River Delta which borders the Project Area on the western side is designated within the Coastal Pelagic Species FMP and within the Pacific Coast Ground Fish FMP (85 species).

The Coastal Pelagic Species FMP (as amended) was created to promote efficient, sustainable, and profitable fishery practices and to prohibit the harvest of krill species. No HAPCs for the Coastal Pelagic Species FMP have been designated.

The Pacific Coast Groundfish FMP (as amended) prohibits activities such as bottom trawling and dredging that could result in long-term damage to the ocean floor. In addition, the plan designates HAPC including estuaries, canopy kelp, seagrass (i.e., eelgrass), rocky reefs, and areas of interest (NOAA Fisheries 2021b). Two of these HAPCs are present in the North Bay and Mosley Slough (adjacent to the Project Area), and Sevenmile Slough (adjacent and within the Project Area). Specifically, the North Bay, Mosley Slough, and Sevenmile Slough are part of the Eel River estuary, and eelgrass has been documented as present in the Project Area.

Table 2.5-2. Critical Habitat/EFH within or Adjacent to Project Area & Associated Species

Species	Critical Habitat Present in Project Area	Critical Habitat Present Adjacent to Project Area	EFH Present in Project Area	EFH Present Adjacent to Project Area	Location Within or Adjacent to Project Area
Tidewater Goby	Yes	No	No	No	Critical Habitat: Within the Project Area, part of the Eel River North Area Subunit-4a and includes approximately 16 acres (78 FR 8746).
Green Sturgeon (southern DPS)	No	Yes	No	No	Critical Habitat: Coastal waters directly adjacent to the Project Area. However, the Eel River estuary is excluded from designation.
Coho Salmon (SONCC ESU)	No	Yes	No	Yes	Critical Habitat/EFH: Eel River Delta including the North Bay, Mosely Slough, and Sevenmile Slough at the boundaries of the Project Area.
Steelhead (northern California DPS)	No	Yes	No	No	Critical Habitat: Eel River Delta including the North Bay, Mosely Slough, and Sevenmile Slough at the boundaries of the Project Area.
Chinook Salmon (Coastal California ESU)	No	Yes	No	Yes	Critical Habitat/EFH: Eel River Delta including the North Bay and Sevenmile Slough at the boundaries of the Project Area.

2.6 Summary of Existing Habitat Value and Function

The Project Area is within the Eel River watershed in the Eel River estuary, part of the Salt River-Eel River Hydrologic Unit (HUC10: 1801010511). The vegetation in the north and western portions of the Project Area is primarily comprised of herbaceous halophytic (salt-tolerant) and hydrophytic vegetation that are characteristic of coastal salt and brackish marsh, and brackish pasture. Vegetation in the eastern and southern portion of the Project Area contains freshwater pasture species. Very few shrubs are growing within the Project Area. Much of the Project Area has been grazed pastureland for over a century but has increasingly converted to saltwater wetlands and hydrophytic vegetation less suitable for grazing. The entirety of the Project Area is within the Coastal Zone. The wetland delineation of the Project Area identified a total of 777.89 acres of three-parameter wetlands, and 5.78 acres of two-parameter uplands

that may be considered one-parameter wetlands pending jurisdictional agency review. Thirteen discrete vegetation communities are described in the Project Area, of which six were identified as SNC (state rank of S1-S3). A total of 110 plant species are documented in the Project Area, of which 57 (51%) are native species and 53 (48%) are non-native. Three state listed special status plant species (CRPR List 1 and 2) are within the Project Area, and one CRPR List 4 species.

A total of 31 mammal and bird species, and 13 fish species are documented in the Project Area. No special status mammals were observed during the May 2021 wildlife survey. A total of 26 avian species, including several state special status species as well as common, protected migratory birds, were observed in or flying over the Project Area during the May 2021 field survey. Numerous small unidentified fish were observed within some of the areas of standing water within the Project Area during the May 2021 field survey. CDFW conducted fish sampling within the Project Area across four sampling days in 2020. These sample efforts were primarily aimed at documenting the fish assemblages within the Project Area, waters within the interior of the levee system, while some sampling occurred on the exterior side of the main tide gate. Sampling methods included fine-meshed seines and baited minnow traps. Numerous (55) Tidewater Gobies were captured across three of the 2020 sampling days. No salmonids were captured during 2020 sampling efforts. No special status amphibians were observed during the May 2021 field survey; however, there are two records of Northern Red-legged Frog from Cannibal Island, including a record of 28 egg masses within the Project Area in 2009, and a record of 72 egg masses in 2009 mapped at the western edge of the Project Area within Mosley Slough (CDFW 2021a).

3. Project Impact Analyses

The data collected and organized from Project studies has been used to inform post-construction conditions based on proposed Project design components, and are summarized in the following sections. Results are transcribed from the following technical analyses:

- Wetlands Fill Analysis (GHD 2023a, **Appendix E**)
- Habitat Conversion Analysis (GHD 2023b, **Appendix F**)

3.1 Project Impacts to Jurisdictional Wetlands

The nature of direct temporary and permanent impacts are entirely for the purpose of habitat restoration and improvement. Based on the current design, the Project will permanently impact approximately 4.61 acres of three-parameter jurisdictional wetlands to (1) construct the proposed setback levee, (2) increase the footprint of the roadway prism to raise Cannibal Island Road, (3) construct a new parking lot for public recreational access, and (4) due to placement of rock riprap along a 20-foot segment of channel at the existing road crossing in the interior of Cannibal Island at Senestraro Lane (**Appendix A, Figure 8**). The Project will establish approximately 7.48 acres of three-parameter wetlands from existing uplands within the Project Area at the time of construction. The designed Project topography is variable via the tidal ridges and hummocks, to accrete sediment in a heterogeneous manner which will result in a mosaic of habitat features including intertidal mudflat, low, medium and high salt marsh habitat, and freshwater-brackish marsh habitat. See the Wetlands Fill Analysis for details regarding methods and results of the analysis (GHD 2023a, **Appendix E**).

Temporary impacts include the placement of materials such as large woody debris, root wads, and erosion control materials, all of which occur below the High Tide Line (HTL) mark. All erosion control materials will be organic, i.e., no plastic or non-compostable materials will be utilized. Other temporary impacts include construction and use of staging areas, temporary access roads, and disturbed edges of the elevated road prism and the newly constructed parking lot.

Under existing conditions, the Project Area is generally isolated from estuary water levels by an earthen dike that was constructed for agricultural purposes during reclamation. The earthen dike is located at the perimeter of the Project Area. Culverts with tide gates were installed through the dike to prevent saltwater inflow and allow drainage or rainfall runoff outflow. The dikes have reduced the frequency of riverine flood and tidal inundation and consequent sediment

accumulation throughout the Project Area, and as a result the interior land elevations have subsided up to three feet relative to the exterior land elevations exposed to riverine and tidal suspended sediments. Following Project implementation, full tidal range will be restored to the Project Area which is expected to promote recovery and maintenance of tidal marsh habitats that support native fish, invertebrates, wildlife, and plant species while enabling marsh elevations to keep pace with sea level rise. Although there will be temporary and permanent impacts, the functional improvement of the tidal marsh will increase substantially through the transition from muted tidal inundation to restored full tidal inundation. Impacts to wetlands will result in a less than significant impact.

3.1.1 Conversion of Vegetation Types

A Habitat Conversion Analysis (GHD 2023b, **Appendix F**) used field surveys, ground elevations, and modelling of surface water levels within the Project Area to estimate the Project’s existing tidal conditions relative to proposed conditions. This analysis helped evaluate how habitat types may transition in the Project Area once full tidal influence is restored. The following habitat elevation ranges (NAVD88) were used for proposed conditions and compared to existing habitat mapping (**Appendix A, Figure 9**):

- <2.5 ft – aquatic (subtidal channel and sloughs)
- 2.5-6 ft – intertidal channel and mudflats
- 6-8 ft – coastal salt marsh and brackish marsh
- >8 ft – generally no change in habitat, depending on the location and extent of existing habitat.

The majority of the Project Area is comprised of three-parameter wetlands. As summarized in **Section 2.2**, only 11.15 acres within the Project Area are three-parameter uplands, which consist primarily of the tops of the existing perimeter dike, concrete pads, or raised ground around areas that were historically developed. Sensitive and non-sensitive vegetation assemblages are components of the various wetland types. These vegetation assemblages and wetland types host habitat for, and presence of, both sensitive and non-sensitive plant and wildlife species. Only one SNC exists outside of three-parameter wetlands (Coastal brambles SNC).

The intent of the conversion analysis was to crosswalk the existing mapped vegetation assemblages with broad habitat groupings to better document and assess the potential shifts to these habitat types and individual species following Project implementation. **Table 3.1-1** provides a crosswalk between the vegetation communities characterized during botanical surveys and the broader habitat category they fit within. These broad groupings were estimated based on the topography and habitat relationship established for unmuted areas. **Table 3.1-2** summarizes the existing broad habitat groupings and how they are predicted to shift post-construction.

Table 3.1-1. Broad Habitat Types and Associated Wetland Types/Vegetation Communities

Broad Habitat Type for Use in Conversion Analysis ¹	Cowardin Wetland Type ²	Vegetation Mapping Unit ³	Area (acres)	Total Area (acres)
Aquatic (Subtidal Channel and Sloughs)	Estuarine Subtidal Aquatic Bed (E1AB3)	Eelgrass Beds	0.6	16.7
	Estuarine Subtidal (E1UB)	Subtidal Sloughs (Unvegetated)	16.1	
Intertidal Channel and Mudflats	Estuarine Intertidal Aquatic Bed/ Unconsolidated Shore (E2AB1/E2US3)	Mudflats/Estuarine Intertidal Shore	93.4	93.4
Coastal Salt Marsh and Brackish Marsh	Estuarine Intertidal Emergent Wetland (E2EM1)	Pickleweed Salt Marsh	287.7	360.4
		Gum Plant Patches	28.7	
		Salt Rush Swales	26.2	
		Salt Grass Flats	17.8	

Broad Habitat Type for Use in Conversion Analysis ¹	Cowardin Wetland Type ²	Vegetation Mapping Unit ³	Area (acres)	Total Area (acres)
Dense-flowered Cordgrass Marsh	Estuarine Intertidal Emergent Wetland (E2EM1)	Dense-Flowered Cordgrass	61.6	61.6
Agricultural Pasture	Upland and Palustrine Emergent Vegetation (PEM1)	Non-Native Pasture	208.7	208.9
		Pale spike rush marsh	0.15	
Coastal Willow Thickets	Palustrine Scrub Shrub (PSS3)	Coastal Willow Thickets	0.4	0.4
Ruderal	Upland and Palustrine Emergent Vegetation (PEM1)	Non-native Vegetation (not functioning as pasture)	43.0	43.0
Coastal Brambles	Upland	Coastal Brambles	2.9	2.9
Ruderal	Upland	Developed (pervious/impervious surfaces)	7.9	7.9

1. Broad habitat groupings were used to assist in analyses to predict shifts in vegetation as a result of full tidal influence. The full analysis is provided in the Habitat Conversion Analysis (GHD 2023b, **Attachment F**).

2. Cowardin wetland types are based on Cowardin nomenclature from the *Classification of Wetlands and Deepwater Habitats of the United States* (FGDC 2013).

3. Vegetation was characterized in the botanical studies of the Project Area, and mapped into discrete vegetation units based on Rapid Assessment protocol (CNPS 2022a) and mapped according to CNPS *The Manual of California Vegetation Online* (Sawyer et. al. 2009) at the Alliance level.

Table 3.1-2. Existing Habitats and Proposed Conversions Post-Construction

Habitat Type	Existing Area (acres)	Proposed Area (acres)	Change in Habitat (acres) ¹
Agricultural Pasture	208.7	90.4	-118.3
Aquatic (Subtidal Channel and Sloughs)	16.7	30.4	13.7
Coastal Grassland	0	25.0	25.0
Coastal Salt Marsh and Brackish Marsh (Full)	89.3	315.3	226.0
Coastal Salt Marsh and Brackish Marsh (Muted)	332.8	0	-332.8
Coastal Brambles	2.9	1.9	-1.1
Coastal Willow Thickets	0.4	0.4	0.0
Developed	6.8	2.6	-4.2
Intertidal Channel and Mudflats (Full)	4.6	319.3	314.7
Intertidal Channel and Mudflats (Muted)	88.7	0	-88.7
Ruderal	43.0	10.1	-32.9
Uncategorized ²	1.1	0.1	-1.0
Total	795.2	795.2	0.0

1. Red text denotes a negative change in area calculations (i.e., a net loss of that habitat type).

Habitat Type	Existing Area (acres)	Proposed Area (acres)	Change in Habitat (acres) ¹
2. Uncategorized Habitat Type includes small areas that were left over from digitization of field data into the geospatial data collection software that don't include any habitat types.			

Based on modelling of elevation and topographic changes (**Appendix A, Figure 10**), vegetation is hypothesized to change as follows when the area is opened to full tidal influence:

- Reduction of dense-flowered cordgrass marsh
- Increase in Subtidal Channel and Sloughs,
- Increase in full tidal Intertidal Channel and Mudflat,
- Increase in full tidal Coastal Salt Marsh and Brackish Marsh and associated rare plants,
- Reduction in muted tidal habitats,
- Reduction in habitats dominated by non-native species (Agricultural Pasture and Ruderal), and restoration of this habitat type to full tidal Coastal Salt Marsh and Brackish Marsh; and,
- Reduction in uplands and Coastal Brambles (dominated by Coastal Brambles intermixed with upland non-native species).

It is expected that the Project will result in a loss of muted tidal habitats (muted Coastal Salt Marsh and Brackish Marsh, and muted Intertidal Channel and Mudflats), which do not host the density of sensitive plant species detected in the Project Area. Additionally, dense-flowered cordgrass marsh was mapped primarily outside of the dikes, in areas of full tidal influence. Dense-flowered cordgrass will be treated during Project implementation, thereby opening the habitat up to be restored to full tidal influence. The proposed Project will restore full tidal influence to a variety of habitat types, and based on modelled changes in topography and elevation in relation to tidal fluctuations within the Project Area, will result in a net increase of full tidal Subtidal Channels and Sloughs (+13.7 acres), Intertidal Channel and Mudflats (+314.7), and Coastal Salt Marsh and Brackish Marsh (+226 acres).

Full tidal range restoration is expected to promote recovery and maintenance of tidal marsh habitats that support native fish, invertebrates, wildlife, and plant species, while also enabling marsh elevations to keep pace with sea level rise. Notably, 60.1 acres of Dense-flowered Cordgrass Marsh, 90.4 acres of Agricultural Pasture primarily dominated by non-native grasses, and 10.1 acres of Ruderal comprised of upland non-native species, will be restored to Coastal Salt Marsh and Brackish Marsh, thereby expanding this valuable habitat type, and shrinking low quality habitat types. Additionally, a net increase (13.7 acres) of Subtidal Channels and Sloughs will create more habitat for existing eelgrass populations to expand and provide additional fish habitat.

3.1.2 No Net Loss of Wetlands

A goal of the Project, from a regulatory standpoint, is no net loss of wetlands. Both the state and the federal government have no-net-loss (functional) wetlands mandates (although some restoration projects are approved by regulatory agencies that contain a loss of wetlands). The Project will result in no net loss of wetlands.

In the Project Area, all wetland areas proposed to be excavated would remain wetlands (slough excavation) and tidal marsh ridges and marsh plain hummocks would not be built taller than elevation 7.5 feet (NAVD88), therefore would also remain wetlands. Excess excavated soils not used for hummocks would be placed in areas of discrete wetland fill, including the created setback levee, raising of Cannibal Island Road, and construction of the new parking lot.

The planting plan and seed mix to revegetate disturbed areas from construction will include vegetation appropriate to the ecology of the planting site, and will contain species that would naturally colonize these areas.

3.2 Project Impacts to Rare Plant Populations

A portion of the slough channel connecting the interior of Cannibal Island with North Bay will be graded to support restoration of the dendritic channel network that once connected the interior salt marsh of Cannibal Island with tidal influence from North Bay. This grading, in addition to treatment of dense-flowered cordgrass, will impact areas of Humboldt Bay owl's clover, Lyngbye's sedge, Point Reyes bird's beak, and seacoast angelica (**Appendix A, Figure 11.1 and 11.2**). As mentioned in **Section 2.4**, seacoast angelica is a CRPR 4 species, which does not typically require mitigation but should be avoided, where possible. As dikes in the west of the Project Area are graded and lowered, a small area of Humboldt Bay owl's clover, Lyngbye's sedge, Point Reyes bird's beak, and seacoast angelica will be impacted (**Appendix A, Figure 11.3, and Table 3.2-1**). Small, discrete populations of Humboldt Bay owl's clover will be impacted by grading of the existing dike, and discrete populations of seacoast angelica will be impacted by spreading excavated soils in the interior marsh plain to provide habitat variability and increased complexity (**Appendix A, Figure 11.4, and Table 3.2-1**).

The proposed Project condition will increase full tidal Coastal Salt Marsh and Brackish Marsh by 226 acres (**Appendix A, Figure 10**), thereby restoring habitat for Humboldt Bay owl's clover, Lyngbye's sedge, and Point Reyes bird's beak. Seacoast angelica populations will be affected by the grading of upland dikes they are currently inhabiting. Although individual plants will be impacted by grading of the dikes, the population in the Project Area is not likely to be substantially affected. Additionally, the proposed setback levee will provide new habitat for seacoast angelica. Treatment of dense-flowered cordgrass will open the area currently inhabited by this invasive species to native species replacement.

Table 3.2-1. Project Impacts to Rare Plant Populations

Scientific Name	Common Name	Listing Status	Approximate Number of Individuals	Population Area (acres)	Area Affected by Project (acres / square feet)	Area of Habitat Restored by Project (acres or linear feet) ¹
<i>Angelica lucida</i>	sea-watch	CRPR 4.2	~1000	Widespread, not calculated.	N/A	226 acres
<i>Carex lyngbyei</i>	Lyngbye's sedge	CRPR 2B.2	Not estimated	0.54	0.24 / 10,365	~24,000 feet*
<i>Castilleja ambigua</i> ssp. <i>humboldtiensis</i>	Humboldt Bay's owl-clover	CRPR 1B.2	5,000-10,000	1.44	0.23 / 10,012	226 acres
<i>Chloropyron maritimum</i> ssp. <i>palustre</i>	Point Reyes bird's beak	CRPR 1B.2	7,000-10,000	2.03	0.16 / 6,804	226 acres
<i>Zostera maritima</i>	Eelgrass	EFH	unknown	0.6	None	13.7 acres

1. The areas shown in this column reflect the potential habitat zones that these species may naturally recruit to and establish within, but are not limited to this extent.

*Approximation of linear feet of slough channel that will be influenced by a full tidal regime, including both existing and created channels.

Note: California Rare Plant Ranking (CRPR) lists 1A, 1B and 2 and are considered eligible for state listing as Endangered or Threatened pursuant to the California Fish and Game Code.

EFH = Essential Fish Habitat

3.3 Project Impacts to Sensitive Wildlife Species

The Project is seeking ESA Section 7 coverage through Programmatic Biological Opinions for listed fish species, administered by 1) the NOAA Restoration Center and USACE for salmonids and green sturgeon (NMFS 2022), and 2) the USFWS for Tidewater Goby (USFWS 2022). Numerous avoidance and minimization measures required within the PBOs will be implemented for the Project pre-construction, during construction, and post-construction. These measures are broad enough to protect all wildlife species potentially present in the Project Area during construction, and also include specific and stringent fish handling and relocation measures to minimize impacts to listed fish species. No CESA listed species were observed in the Project Area during surveys. CDFW will file a memo under Fish and Game Code § 1001 authority for CESA compliance during construction and monitoring.

4. Maintenance and Monitoring Approach

The Project is designed to be self-mitigating. Following initial construction, the restoration area is expected to be self-maintaining and dynamic over the long term. The restoration of tidal influence will restore floodplain habitat. An Operations and Maintenance Plan (OMP) has been developed to provide an outline for maintaining Project infrastructure to ensure success (GHD 2023c, **Appendix G**).

The Project will restore full tidal amplitude to currently muted tidal habitats over a substantial portion of the Project Area. It is anticipated that existing vegetation communities will shift in response to the restoration of a full tidal regime. During Project construction, vegetation disturbance will be avoided and minimized to the extent practicable. Treatment of non-native dense-flowered cordgrass is a component of the Project, which will occur prior to, during, and after Project construction. Disturbed areas above 7.5 ft NAVD88 will be revegetated with plant species appropriate to the site, and the area below 7.5 ft NAVD88 is anticipated to revegetate passively. Disturbance to existing grades and native vegetation shall be limited to the actual site of the Project, necessary access routes, and staging areas.

The Project occurs in a setting where marsh plain inundation occurs on a regular basis. Channels will be constructed to accommodate higher volumes and flows between the restoration area and the Eel River estuary. Channel and habitat evolution is expected and desired, specifically to promote channel complexity and natural estuarine processes preferred by listed species. Immediately following construction, the creation of tidal ridges and marsh plain hummocks and additional slough channel is anticipated. Over time, it is anticipated that these areas would adjust in response to tidal influence, sediment deposition and routing, and scour. The post-construction habitats east of the new setback levee and on the inboard side of the existing dikes are anticipated to evolve with sediment deposition associated with the increased tidal range and exposure to higher sediment loads throughout the year, culminating in the restoration of approximately 500 acres of unmuted salt and brackish marsh and intertidal channel and mudflats. For this reason, holding the Project accountable to maintain static habitat type outcomes would not be applicable and could limit more meaningful ecological outcomes (dynamic and complex habitat). As discussed above in **Section 3.1.3**, there will be no net loss of wetlands or Other Waters, just conversion from one wetland type to another (and associated vegetation community conversion), with the goal of increasing native vegetation communities that will support a diversity of native wildlife.

California Trout and CDFW desire to achieve success of revegetated areas for an initial period of survival; however, constraining plant survival to habitat type would be at odds with Project objectives, which include a self-maintaining and dynamic system complex enough to benefit anadromous salmonids and other aquatic species.

4.1 Revegetation

Native seed mix will be applied to all disturbed areas above 7.5 feet (NAVD 88). There will be three seed mixes for three distinct areas (**Table 4.1-1**):

1. East edge of newly constructed setback levee and ditch, and south edge of raised road prism on Cannibal Island Road. These areas are remaining grazing pasture, and will be treated with a seed mix compatible for the use (“Organic Pasture Seed Mix”).
2. West edge of newly constructed setback levee, north edge of raised road prism, all staging areas, temporary access roads, and slopes of the recreation trail:
 - a. between elevation 7.5 – 9 ft. (“High Marsh Ecotone Seed Mix”).
 - b. above elevation 9 ft. (“Freshwater Seed Mix”).

Table 4.1-1 Seed Mix for Revegetation of Disturbed Areas Above 7.5 feet (NAVD88)

Scientific Name	Common Name	WMVC Indicator Status ¹	Unit
Organic Pasture Seed Mix			
<i>Trifolium alexandrinum</i>	berseem clover	UPL	seed
<i>Lotus corniculatus</i>	birdsfeet trefoil	FAC	seed
<i>Trifolium pratense</i>	barduro red clover	FACU	seed
<i>Trifolium repens</i>	white clover (ladino type)	FAC	seed
<i>Trifolium fragiferum</i>	Salina clover	FAC	seed
<i>Hordeum brachyantherum</i>	meadow barley	FACW	seed
High Marsh Ecotone Seed Mix			
<i>Deschampsia cespitosa</i> ssp. <i>cespitosa</i>	tufted hairgrass	FACW	seed
<i>Elymus X triticum</i>	regreen hybrid wheatgrass	--	seed
<i>Hordeum brachyantherum</i>	meadow barley	FACW	seed
<i>Festuca rubra</i>	red fescue	FAC	seed
<i>Elymus glaucus</i>	blue wild rye	FACU	seed
<i>Atriplex prostrata</i>	fat hen	FAC	seed
<i>Grindelia stricta</i>	gumweed	FACW	seed
<i>Limonium californicum</i>	marsh rosemary	OBL	seed
<i>Bolboschoenus maritimus</i> ssp. <i>paludosus</i>	alkali bulrush	FACW	seed
Freshwater Seed Mix			
<i>Bromus sitchensis</i> ssp. <i>carinatus</i>	California brome	UPL	seed
<i>Deschampsia cespitosa</i> ssp. <i>cespitosa</i>	tufted hairgrass	FACW	seed
<i>Elymus glaucus</i>	blue wild rye	FACU	seed
<i>Elymus X Triticum</i>	regreen hybrid wheatgrass	--	seed
<i>Festuca rubra</i>	red fescue	FAC	seed
<i>Hordeum brachyantherum</i>	meadow barley	FACW	seed
<i>Scirpus microcarpus</i>	panicled bulrush	FACW	seed

1. The suggested planting lists follow along with the most current reference, *National USACE 2020 Wetland Plant List* as defined by the USACE 2020 Western Valleys, Mountain, and Coasts (WMVC) designation.

4.2 Monitoring

The result of restoration is a net increase of full tidal subtidal channels and sloughs, intertidal channel and mudflats, and coastal salt marsh and brackish marsh. The Project will enhance native plant communities and promote expansion of rare plant habitat through the treatment and control of non-native dense-flowered cordgrass.

Pre- and post-Project photo monitoring in accordance with CDFW photo-monitoring guidelines will occur prior to Project implementation and at least once in the year following implementation, via drone imagery and/or established photo points. Post-project photo monitoring would demonstrate that the Project Area achieved Project objectives (restoration of full tidal influence). Pre-project photo monitoring will be submitted to the NCRWQCB, CCC, USACE, NOAA RC, and USFWS field office with as-built design plans, and post-Project photo monitoring will include captioned photographs with comparative pre- and post-Project imagery with text highlighting observed changes within the Project Area. The photo monitoring report will be submitted to agencies within 18 months following Project completion. Voluntary monitoring will be ongoing post-implementation and as funding allows, and may include fisheries sampling, vegetation sampling, hydrology monitoring, and/or additional photogrammetry and drone monitoring. These voluntary monitoring events are not proposed as conditions of permit agreements and are described in the Operations and Management Plan (Appendix G).

Pre-project photo documentation of general site conditions is included in **Appendix H**.

4.2.1 Invasive Species Management

Ground disturbance and creation of new tidal areas could result in the expansion of dense flowered cordgrass, which could affect the expansion of native communities and SNCs in wetlands. Control of dense-flowered cordgrass in the Project Area using mowing, grinding, excavation, herbicide application, and/or flaming methods will occur prior to construction, during construction, and post-construction, as funding allows, to support current regional eradication efforts. Continued control of new invasive plant populations during the maintenance period of the Project will ensure that newly created tidal habitat will not be invaded. See the Operations and Maintenance Plan (**Appendix G**) for a description of proposed maintenance of dense-flowered cordgrass, and monitoring triggers.

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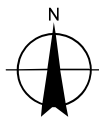
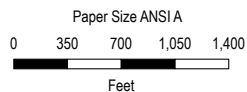
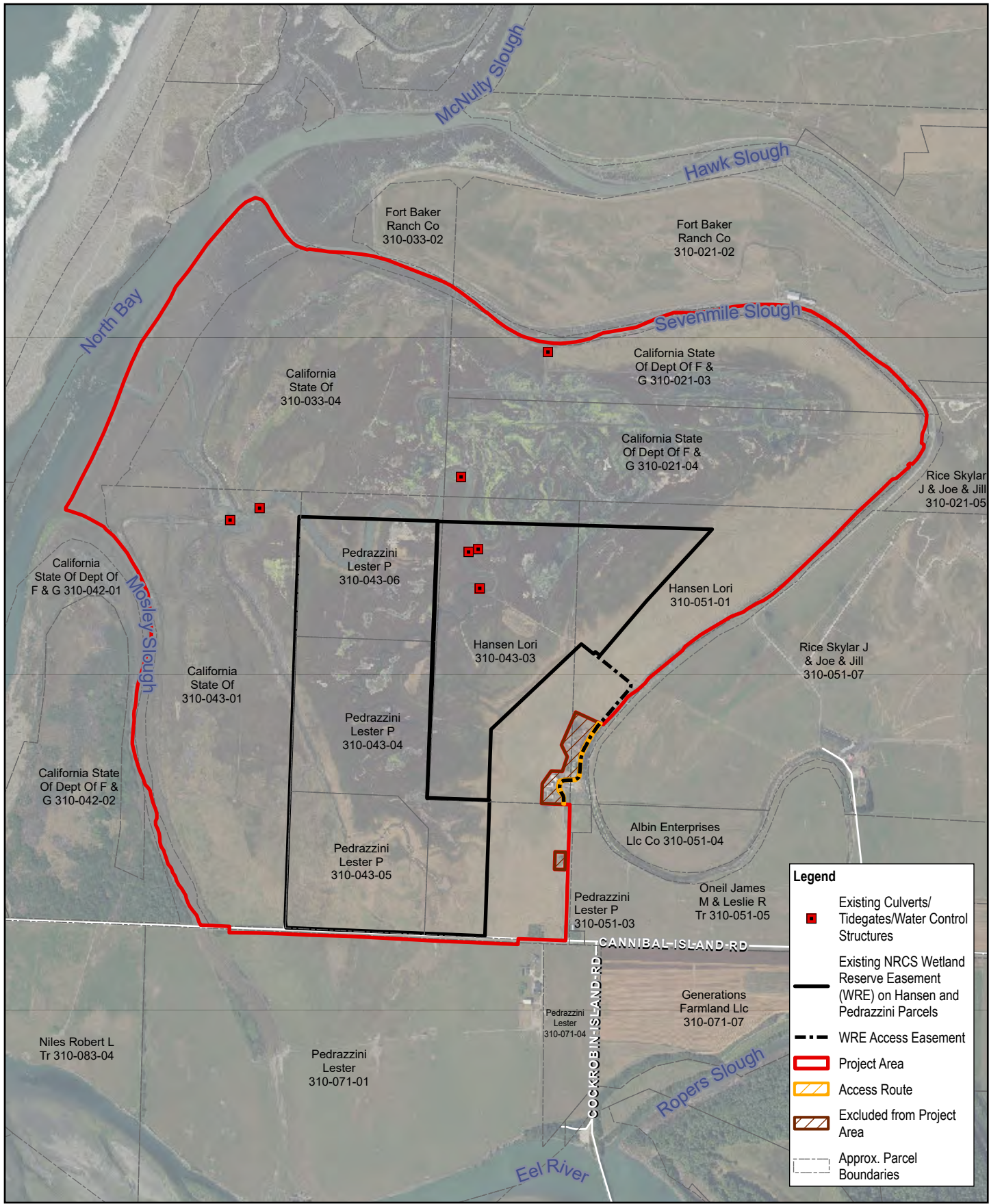
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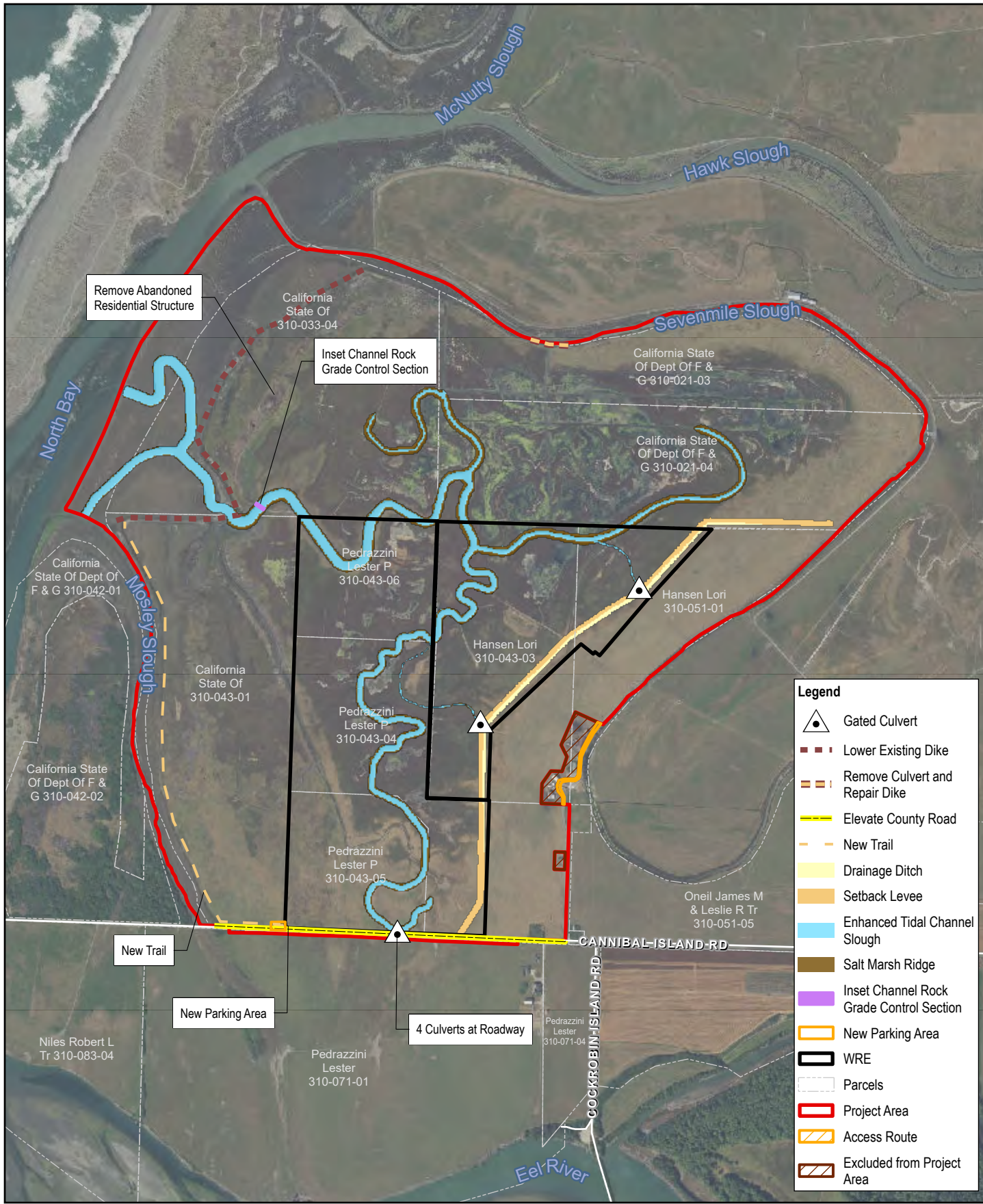


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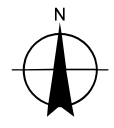
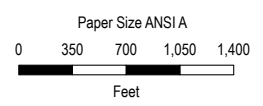
CalTrout
 Cannibal Island Restoration Project
Ownership Boundaries

Project No. 11206383
 Revision No. -
 Date Nov 2022

Exhibit 8
 1-23-0854 (CDFW)
Wetlands and Habitat Restoration Plan (excerpt)
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- Legend**
- Gated Culvert
 - Lower Existing Dike
 - Remove Culvert and Repair Dike
 - Elevate County Road
 - New Trail
 - Drainage Ditch
 - Setback Levee
 - Enhanced Tidal Channel Slough
 - Salt Marsh Ridge
 - Inset Channel Rock Grade Control Section
 - New Parking Area
 - WRE
 - Parcels
 - Project Area
 - Access Route
 - Excluded from Project Area

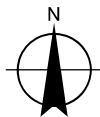
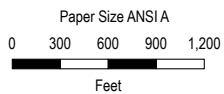
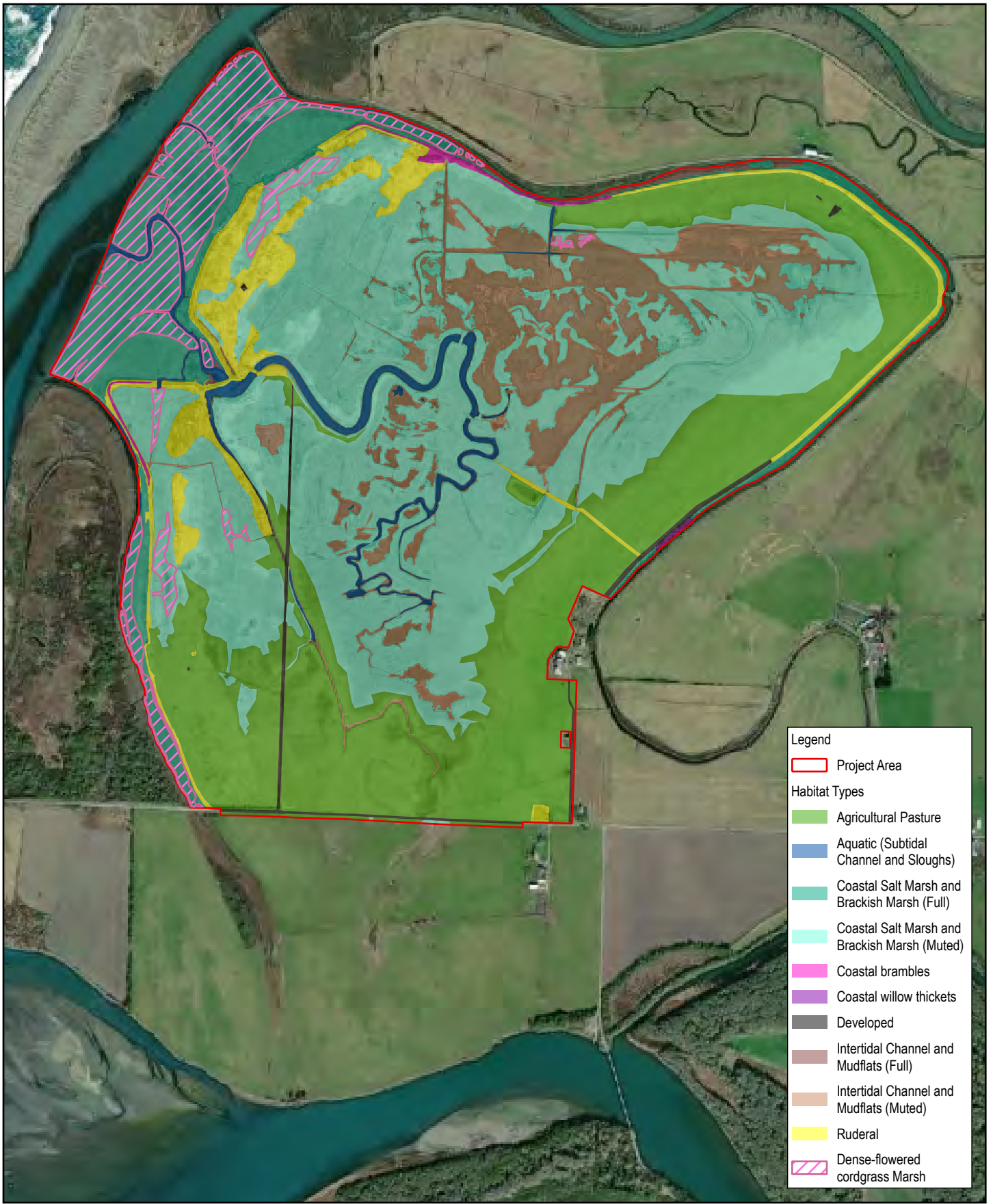


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CalTrout
Cannibal Island Restoration Project
Project Area and Components

Project No. 11206383
Revision No. -
Date Aug 2023

Exhibit 8
1-23-0854 (CDFW)
Wetlands and Habitat Restoration Plan (excerpt)
(pg. 26 of 28)



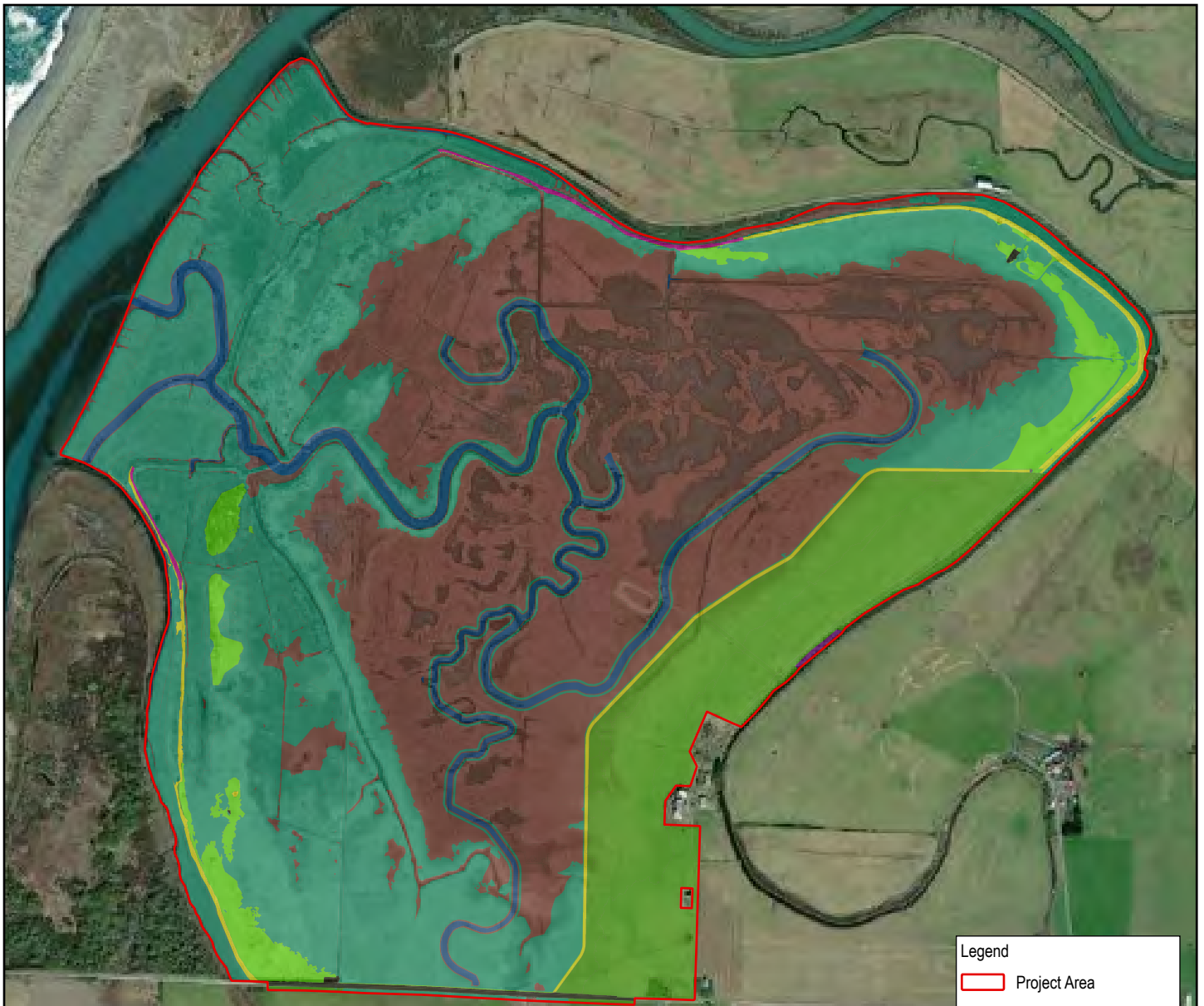
CalTrout
Cannibal Island Restoration Project

Existing Habitat

Project No. 11206383
Revision No. -
Date 27 Apr 2023

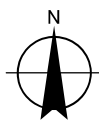
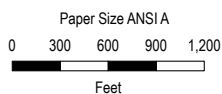
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Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

Exhibit 8
1-23-0854 (CDFW)
Wetlands and Habitat Restoration Plan (excerpt)
(pg. 27 of 28)



Legend	
	Project Area
Habitat Types	
	Agricultural Pasture
	Aquatic (Subtidal Channel and Sloughs)
	Coastal Brambles
	Coastal Grassland
	Coastal Salt Marsh and Brackish Marsh (Full)
	Coastal Willow Thickets
	Developed
	Intertidal Channel and Mudflats (Full)
	Ruderal
	Dense-flowered cordgrass Marsh (Complete Removal)

Habitat	Existing	Proposed	Change
Agricultural Pasture	208.7	90.1	(118.7)
Aquatic (Subtidal Channel and Sloughs)	16.7	30.4	13.7
Coastal Brambles	2.9	1.9	(1.1)
Coastal Grassland	0.0	25.0	25.0
Coastal Salt Marsh and Brackish Marsh (Full)	89.3	315.3	226.0
Coastal Salt Marsh and Brackish Marsh (Muted)	332.8	0.0	(332.8)
Coastal Willow Thickets	0.4	0.4	0.0
Developed	6.8	2.6	(4.2)
Intertidal Channel and Mudflats (Full)	4.6	319.3	314.7
Intertidal Channel and Mudflats (Muted)	88.7	0.0	(88.7)
Ruderal	43.0	10.1	(32.9)
Uncategorized	1.1	0.1	(1.0)
Total	795.2	795.2	0.0



Map Projection: Lambert Conformal Conic
 Horizontal Datum: North American 1983
 Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

CalTrout
 Cannibal Island Restoration Project
 Habitat Post-Construction in Proposed Project

Project No. 11206383
 Revision No. -
 Date 03 May 2023

Exhibit 8
 1-23-0854 (CDFW)
Wetlands and Habitat Restoration Plan (excerpt)
 (pg. 28 of 28)



Technical Memorandum

November 2022

To: CalTrout Ref. No.: 11206383

From: Kolby Lundgren, GHD Botanist Tel: 707-267-2214

REVIEWED: Jeremy Svehla (GHD Project Manager)

Misha Schwarz

Subject: Special Status Plants and Sensitive Natural Communities/ESHA Mapping for Cannibal Island Restoration Project Study Area_Rev1

1. Introduction

1.1 Summary

This Technical Memorandum reports the results of botanical studies for the Cannibal Island Restoration Project in Loleta, CA. Botanical studies consisted of seasonally appropriate floristic surveys for special status plants, vegetation mapping, and assessment of Sensitive Natural Communities (SNC) and Environmentally Sensitive Habitat Areas (ESHA). GHD conducted surveys for special status plant species and vegetation mapping during the spring and summer of 2020. The Project Study Boundary was expanded following the original surveys in 2020 to include raising and widening approximately 2,800 feet of Cannibal Island Road at the southern edge of the Project Area. Seasonally appropriate floristic surveys for special status plants, vegetation mapping, and assessment of vegetation communities for potential delineation of SNC and/or ESHA were conducted in the spring and summer of 2022 to comprehensively evaluate botanical resources in the expanded Project Area. The following report was largely prepared by former GHD Botanist Kelsey McDonald to document findings from the botanical resource assessment completed in 2020 for much of the Project Area, prior to the expansion of the Project Area.

1.2 Project Description

The Cannibal Island Restoration Project is located in agricultural bottoms and tidal saltmarsh in the Eel River Delta in Loleta, Humboldt County, CA (**Appendix A, Figure 1—Vicinity Map**). The Cannibal Island Restoration Project will seek to restore and expand natural estuarine functions and processes in the Project Area to promote recovery of habitat for native fish, invertebrates, wildlife and plant species compatible with surrounding working lands and public access. To achieve the project goal, construction activities are anticipated to include modifications to the existing dikes/water control structures, excavation of slough channels, placement of fill that combined will restore connectivity to the estuary while preventing off-site flood impacts and raising of Cannibal Island Road.



The historical diking and draining of coastal wetlands for ranching and agriculture in the Eel River Delta caused a major loss of coastal salt marsh in the estuary around the turn of the 20th Century. As the levees have failed and the ground has compacted and subsided, Cannibal Island has largely reverted to tidal marsh. Some functional pasture remains on the east side of the Project Area, and a small strip just to the south of Cannibal Island Road. The area within the levees is subject to a muted tidal prism and contains estuarine marsh and waters as well as pasture. The Project Area also includes the salt marsh area surrounding the levees that is subject to full tidal influence.

1.3 Location

The Project Area is within the Cannibal Island Quad in the Eel River delta, west of the town of Loleta, CA. The Project Area is bounded by Cannibal Island Road to the south (and a small strip of functional pasture just south of the road), McNulty Slough to the west, and Sevenmile Slough to the northeast (**Appendix A, Figure 2—Project Area**). The Project is located within the Coastal Zone and is under the permitting jurisdiction of the California Coastal Commission.

2. Regulatory Setting

2.1 Federally Protected Plant Species

Special status plant species under federal jurisdiction include those listed as endangered, threatened, or as candidate species by the Fish and Wildlife Service (USFWS) under the Federal Endangered Species Act (FESA).

2.2 State Protected Plant Species

Special status plant species under California Department of Fish and Wildlife (CDFW) jurisdiction include the following:

- Endangered, Threatened, or Candidate plant species listed under the California Endangered Species Act (CESA),
- Plants listed as Rare under California Native Plant Protection Act (Fish & G. Code, § 1900 et seq.) and,
- California Rare Plant Ranking (CRPR) rare plants on the California Native Plant Society's (CNPS 2022a) Lists 1 and 2.

Plant species on CNPS Lists 1 and 2 are considered eligible for state listing as Endangered or Threatened pursuant to the California Fish and Game Code, and CDFW has oversight of these special status plant species as a trustee agency. Such species are considered during the CEQA process because they meet the definition of Threatened or Endangered under Sections 2062 and 2067 of the California Fish and Game Code. Plants on CNPS Lists 3 and 4 do not have formal protection under CEQA, but may merit consideration in certain circumstances. CDFW publishes and periodically updates lists of special status species which include all taxa of concern that are tracked by CDFW. Additionally, locally significant plants (CEQA



Guidelines, § 15125, subd. (c)), or as designated in local or regional plans, policies, or ordinances) are considered special status plant species (CDFW 2018).

2.3 Sensitive Natural Communities

Natural vegetation communities listed as Sensitive in the California Natural Diversity Database (CNDDDB) and on the California Sensitive Natural Communities List are to be addressed within the CEQA review process (CDFW 2022a). Sensitive Natural Communities (SNC) are primarily classified at the Alliance level according to *A Manual of California Vegetation, Online Edition* (CNPS 2022b), which is based on the older classification manual, *A Manual of California Vegetation* (Sawyer et al. 2009). Legacy SNC are listed in CNDDDB according to the Holland classification system (1986), and Holland types may be used when a current Alliance-level classification does not exist (CDFW 2022a). CDFW considers alliances with a NatureServe State Rank of S1 to S3 to be SNC, and therefore these alliances are considered during the CEQA process (CDFW 2022a).

2.4 Environmentally Sensitive Habitat Areas

The Project Area is within the California Coastal Zone, with primary permitting jurisdiction by the California Coastal Commission for a Coastal Development Permit. Environmentally Sensitive Habitat Areas (ESHAs) are defined by the Coastal Commission as follows (CCC 2022):

“Environmentally sensitive area means any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.” (Pub. Resources Code, § 30107.5)

The Coastal Commission’s designation of ESHA generally includes vegetation alliances listed in CDFW’s California Sensitive Natural Communities List with an S1- S3 ranking. The Coastal Commission’s ESHA category is broadly defined, and it also includes habitat for special-status species, wetlands, riparian areas, and other areas that provide important ecosystem functions (CCC 2013). While there is not a specific list of habitats considered to be ESHA for the State or County, the Coastal Commission through the Coastal Act and counties or municipalities through the Local Coastal Program (LCP) are the jurisdictional agencies that exert authority in identifying and protecting ESHA during project activities.

2.5 Eel River Area Plan of the Humboldt County Local Coastal Program

The County of Humboldt will be issuing a Conditional Use Permit for project activities. Regulations for Sensitive Habitat Areas under county jurisdiction (advisory) is under the Eel River Area Plan (HCPD 2014). The Eel River Area Plan (enacted 1982) uses the California Coastal Act definition of wetlands, and states “No land use or development shall be permitted in areas adjacent to coastal wetlands, called Wetland Buffer Areas, which degrade the wetland or detract from the natural resource value” (p.47). The local coastal plan provides specific examples of ESHA within the County coastal zone (p. 44):

1. Environmentally sensitive habitats within the Eel River Planning Area include:

a. Rivers, creek, and associated riparian habitats;



- b. Estuaries, sloughs, and wetlands;
- c. Rookeries for herons and egrets;
- d. Harbor seal pupping areas;
- e. Critical habitats for rare or endangered species listed on State or Federal Lists.

2.6 California Coastal Act

Article 5 of the California Coastal Act (CCC 2022) discusses regulation that pertains to Land Resources and the permissible use of ESHA:

Section 30240. Environmentally sensitive habitat areas; adjacent developments

(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.

(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

(Amended by Ch. 285, Stats. 1991.)

3. Approach

3.1 Pre-Survey Investigations

A scoping list of special status plant species and habitats with recorded occurrences in the project vicinity was compiled by consulting the *California Natural Diversity Database* (CNDDDB) (CDFW 2022b), the *CNPS Inventory of Rare and Endangered Vascular Plants* (CNPS 2022a), and U.S. Fish and Wildlife Service IPaC (USFWS 2022). The CNDDDB database was consulted for rare plant occurrences documented in the project vicinity (**Appendix B**).

The scoping list includes special status plants with documented occurrences on the Cannibal Island USGS quadrangle and surrounding quadrangles. The scoping list also contains other taxa that may occur in the project area whose habitat is suitable if the project is within or near the known range of the species. Due to the proximity of the Cannibal Island quadrangle to the coast, the assessment area was defined as the four USGS 7.5' minute quadrangles centered around Cannibal Island (Eureka, Fields Landing, Ferndale, and Fortuna). The query yielded 35 special status plant species (California Rare Plant Rank (CRPR) 1 or 2), which were reviewed for their potential to occur in habitats within the Project Area. Of the species identified during scoping, three high-potential species are known to occur onsite: Lyngbye's sedge (*Carex lyngbyei*, CRPR 2B.2), Humboldt Bay owl's clover (*Castilleja ambigua* var. *humboldtiensis*, CRPR 1B.2), and Point Reyes bird's beak (*Chloropyron maritimum* ssp. *palustre*, CRPR 1B.2). Two have a moderate probability of occurring within the study area (dwarf alkali grass, *Puccinellia pumila*; and western sand-spurrey, *Spergularia canadensis* var. *occidentalis*) but were not observed onsite in both the 2020 and 2022 investigations. CNDDDB documented one SNC, Northern Coastal Salt Marsh (classified according to Holland 1986) within the scoping area (CDFW 2022b).



3.2 Survey Procedures and Mapping Methods

GHD Botanist Kelsey McDonald conducted seasonally appropriate floristic surveys for special status plants and evaluated the area for SNC per CDFW (2022a) and ESHA per the California Coastal Commission (2013) protocols and definitions in the spring and summer of 2020. Kelsey is a CNPS Certified Consulting Botanist with over six years of experience conducting special status plant surveys. To assess the expanded project area (south side of project area), GHD Botanist Kolby Lundgren conducted seasonally appropriate floristic surveys in the spring and summer of 2022 for special status plants and evaluated the area for SNC per CDFW (2022a) and ESHA per the California Coastal Commission (2013) protocols and definitions. The special status plant surveys in 2020 and 2022 followed *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* by the California Natural Resource Agency (CDFW 2018) and *General Rare Plant Survey Guidelines by the Endangered Species Recovery Program* (USFWS 2002). Kolby holds a Bachelor's Degree in Botany and has over six years of experience conducting floristic surveys in coastal Northern California. All plants encountered were identified to the lowest taxonomic level necessary for rare plant identification. Nomenclature follows *The Jepson Manual* (Baldwin et al 2012). The special status plant survey was conducted by walking the site looking for the presence of target species and habitats identified on the scoping list, as well as presence of any other incidental sensitive-listed plant species (See **Appendix A, Figure 3—Rare Plants** for special status plant species locations and population extent). A comprehensive list of species observed within the project area for surveys conducted in both 2020 and 2022 is provided (**Appendix C**). GHD Botanist Kelsey McDonald conducted approximately 40 hours of field surveys, including two spring surveys in May and five summer visits between July and September, 2020. Vegetation was characterized using Rapid Assessment protocol (**Appendix D**) and mapped according to CNPS the Manual of California Vegetation at the Alliance level (**Appendix A, Figure 4—Sensitive Vegetation and Habitats**) (Sawyer et al. 2009, CNPS 2022b) in the summer and fall of 2020, and spring of 2022, with accompanying habitat photo-documentation (**Appendix E**). One additional natural community was characterized using Rapid Assessment protocol (**Appendix D**) and mapped according to the Manual of California Vegetation at the Alliance level in the spring of 2022 with accompanying habitat photo-documentation (**Appendix E**).

3.3 Elevation Data Collection and Analysis

Understanding the elevation range of vegetation types within the muted tidal prism compared to the adjacent marsh exposed to full tidal influence is of interest to managers predicting how vegetation might be altered by opening the site to full tidal influence. Elevation data for 2020 surveys was collected in the field using a Trimble Geo 7X Handheld Global Positioning System (GPS) with the Global Navigation Satellite System (GNSS) capability to define vegetation transition locations to be used in mapping and collecting characteristic central elevations within and outside the levees (**Table 4.2.1**). Elevation data for the 2022 surveys was calculated using different methodology than the rest of the project area. Elevation data was calculated from 2018-2019 Ca Wildfire LiDAR data and projected to 2225. Raster values were extracted to several points in each polygon. Mean elevations with standard deviation were calculated within and outside the levees for each vegetation type classified in both 2020 and 2022 surveys (**Figure 4.2**). Comparing mean elevations of vegetation types within and outside the levees may provide a reasonable hypothesis predicting how vegetation is likely to shift at the site when exposed to full tidal influence.



4. Results

4.1 Special Status Plants

During surveys conducted in 2020, three special status plant species (CRPR 1 or 2) were observed during floristic surveys of the project area: Lyngbye's sedge (*Carex lyngbyei*, CRPR 2B.2), Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *humboldtiensis*, CRPR 1B.2), and Point Reyes bird's beak (*Chloropyron maritimum* ssp. *palustre*, CRPR 1B.2) (**Appendix A, Figure 3—Rare Plants**). Additionally, seacoast angelica (*Angelica lucida*, CRPR 4.2), a limited distribution plant, was widespread in the project area (**Table 4.1**). Seasonally appropriate surveys for special status plants were conducted in 2020 and 2022. No new special status plant species populations were detected during the 2022 surveys. Spring surveys were conducted in May to observe Humboldt Bay owl's clover in bloom and summer surveys were conducted between July and September when Point Reyes bird's beak was in bloom for both 2020 and 2022 surveys.

Special Status Plant Species Present On-site

Lyngbye's sedge (*Carex lyngbyei*)

CRPR 2B.2, Present within Project Area

Lyngbye's sedge is a perennial rhizomatous sedge that occurs in coastal salt marshes and brackish marshes along the Pacific Coast of North America from California to Alaska, as well as in Greenland and Iceland (CNPS 2022a). Although NatureServe ranks the sedge as secure throughout its range (Global Rank G5), it is considered vulnerable in California (Stat Rank S3). CNPS ranks the sedge as rare or endangered in California, where it is threatened by non-native species, habitat disturbance, and grazing (CNPS 2022a). Lyngbye's sedge occurred in dense patches along sloughs on the outside of the levee and sparsely scattered among invasive dense-flowered cordgrass (*Spartina densiflora*) on the outside of the levees. Non-native dense-flowered cordgrass (*Spartina densiflora*) has widely invaded coastal marshes in Humboldt Bay (USFWS 2022). Dense-flowered cordgrass has established dominance in many lower marsh areas outside of the levees and has invaded areas within the levees with relatively high tidal influence near the levee breach and failed culvert. The densest populations of Lyngbye's sedge can be found along the slough outside the levees where brackish water exits the failed culvert. Lyngbye's sedge occurred around 5.5-6 feet elevation (NAVD88) along external sloughs and was not found within the muted tidal prism. Lyngbye's sedge may be disturbed by work on the external levees and failed culvert, dredging the slough, or hydrological changes as a result of removing the failed culvert.

Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *humboldtiensis*)

CRPR 1B.2, Present within Project Area

Humboldt Bay owl's clover is a hemiparasitic annual herb endemic to the North Coast of California (Baldwin et al. 2012). NatureServe ranks the subtaxon as imperiled throughout its range (G4T2 S2), and CNPS ranks it as rare or endangered in California and elsewhere (CNPS 2022a). Humboldt Bay owl's clover was widespread in high marsh on the outside of the levees, and some can be found on the interior around the levee breach. A total of 5,000-10,000 plants were estimated by roughly counting and visually estimating the number of individuals. Less than 100 of these were inside the levees at the breach. Humboldt Bay owl's clover may be



threatened by development and non-native plants (CNPS 2022a) such as dense-flowered cordgrass. Annual plant populations have the potential to shift and fluctuate from year to year. Humboldt Bay owl’s clover may be impacted by work on the exterior levee or dredging. Opening the area to full tidal influence may create additional tidal marsh habitat on the interior of the levees and allow natural dispersal to occur, and the overall effect on the rare plant population is uncertain. Although dense-flowered cordgrass primarily occurs in lower marsh at the study site, it also has the potential to invade high mixed marsh that supports Humboldt Bay owl’s clover (USFWS 2022). Dense-flowered cordgrass may rapidly disperse and invade new potential habitat at the site once full tidal influence is restored, and this has the potential to prevent the establishment of native high marsh habitat for Humboldt Bay owl’s clover.

Point Reyes bird’s beak (*Chloropyron maritimum ssp. palustre*)

CRPR 1B.2, Present within Project Area

Point Reyes bird’s beak is a rare annual hemiparasitic herb that occurs in coastal salt marshes from Central California to Southern Oregon (Baldwin et al. 2012). Point Reyes bird’s beak typically occurs in diverse mixed high marsh habitats (USFWS 2022). A total of ~7,000-10,000 plants occurred around the outside of the levees and around the breach. Less than 100 were in inside the levees around the breach where over-wash regularly occurs. Annual plant populations have the potential to shift and fluctuate from year to year. The rare salt marsh plant was once common within its habitat and has been greatly reduced by development (CNPS 2022). Point Reyes bird’s beak may also be threatened by invasive dense-flowered cordgrass (USFWS 2022), trampling, hydrological alterations, and cattle grazing (CNPS 2022a). Populations of Point Reyes bird’s beak overlapped with Humboldt Bay owl’s clover, occupying native high marsh habitat outside the levees. Point Reyes bird’s beak (and by proxy, co-occurring Humboldt Bay owl’s clover) occurred around 7 feet elevation (NAVD88). Point Reyes bird’s beak may also be affected by work around the levees and other Project-related activities, but has the potential to expand following restoration of full tidal influence. Dense-flowered cordgrass is also a threat to Point Reyes salty bird’s beak habitat.

Seacoast angelica (*Angelica lucida*)

CRPR 4.2, Present within Project Area

Seacoast angelica is a limited distribution plant (CRPR 4), not formally protected under CEQA. Although it is considered vulnerable in California (S3), it is secure throughout its global range (G5). Seacoast angelica was widespread on levees, berms, and other high-elevation microhabitats throughout the Project Area. The population is estimated to be ~1000 plants throughout the project area, all located on or within the levees. Although individual plants are likely to be directly affected by work on the levee, and may be affected by changes in hydrology, the population is not likely to be substantially affected.

Table 4.1 Rare Plants Observed in the Cannibal Island Restoration area

Common Name	Scientific Name	CNPS Rare Plant Rank	Population Estimate	Population Area (acres)
Humboldt Bay Owl’s Clover	<i>Castilleja ambigua ssp. humboldtiensis</i>	1B.2	5,000-10,000	1.44



Point Reyes Bird's Beak	<i>Chloropyron maritimum</i> ssp. <i>palustre</i>	1B.2	7,000-10,000	2.03
Lyngbye's Sedge	<i>Carex lyngbyei</i>	2B.2	Not Estimated	0.542
Seacoast angelica	<i>Angelica lucida</i>	4.2	~1000	Widespread, Not Calculated.

4.2 Vegetation Mapping and Assessment

The project area contains Sensitive Natural Communities (SNC) and Environmentally Sensitive Habitat Areas (ESHA). Potentially sensitive vegetation, and invasive dense-flowered cordgrass marsh were mapped at the Alliance level (Sawyer et al. 2009, CNPS 2022b). Vegetation alliances observed in the expanded project area are limited to Alliances that are not considered Sensitive.

4.2.1 Vegetation Alliances within the Project Area

Pickleweed salt marsh

Salicornia pacifica Alliance (G4 S3)

Pickleweed (*Salicornia pacifica*) dominates much of the subsided former pasture that was historically diked and drained for agriculture. The Pickleweed Alliance is a SNC, with a State Rank of S3. Pickleweed-associated species included salt grass (*Distichlis spicata*), fat hen (*Atriplex prostrata*), and saltmarsh dodder (*Cuscuta salina*). Northern Coastal Salt Marsh dominated by pickleweed covers 287.7 acres of the Cannibal Island Restoration project area. Pickleweed primarily dominates lower elevation areas around 6 feet (NAVD88) within the muted tidal prism and is primarily found at 7 feet elevation (NAVD88) outside the levees.

Gum plant patches

Grindelia stricta Alliance (G2 S2)

Gum plant (*Grindelia stricta* var. *stricta*) dominates a great deal of diverse high marsh at the site, both within and outside the levees. Gum plant is often associated with tufted hairgrass (*Deschampsia cespitosa*). At gum plant's upper extent, it also associated with yarrow (*Achillea millefolium*), bird's foot trefoil (*Lotus corniculatus*), and Pacific aster (*Symphotrichum chilense*). At the lower elevation areas of gumplant dominance, it also associated with pickleweed, salt grass, and salt rush (*Juncus lescurii*). Gum plant dominates 28.7 acres of the Project Area. Gum plant was primarily found around 7 feet elevation (NAVD88) within the muted tidal prism, and at 8 feet (NAVD88) outside the levees.

Salt rush swales

Juncus lescurii Alliance (G3 S2)

Salt rush (*Juncus lescurii*) dominates 26.2 acres of brackish marsh at the site. Salt rush swales are a SNC with a State Rank of S2. Salt rush was often associated with Pacific silverweed (*Potentilla anserina* ssp. *pacifica*) and creeping bentgrass (*Agrostis stolonifera*, Cal-IPC Limited). It often appeared to occupy a



transition zone between pasture grass dominated by creeping bentgrass and pickleweed or mixed salt marsh at an elevation around 7-8 feet (NAVD88) within the levees, and did not dominate areas outside the levees.

Salt grass flats

Distichlis spicata Alliance (GNR S4)

Salt grass (*Distichlis spicata*) dominated 17.8 acres of Northern Coastal Salt Marsh at the site. Although the Alliance is not rated as a SNC (State Rank S4), it represents one alliance that can occur within the Northern Coastal Salt Marsh CDFW legacy SNC (Holland 1986). Salt grass was often associated with marsh jaumea (*Jaumea carnosa*) and pickleweed (*Salicornia pacifica*). Salt grass dominance appeared to occur in slightly higher elevation in salt marsh compared to pickleweed dominance, but analysis of elevations collected in the field showed similar overlapping elevation ranges around 6 feet NAVD88 within the levees, and 7 feet in areas of full tidal influence (Table 4.2, Figure 4.2).

Eelgrass beds

Zostera marina Alliance (GNR S3)

Eelgrass beds were observed at low tide rooted within the subtidal zone outside of the failed culvert near the confluence with McNulty Slough. Eelgrass beds are a SNC (State Rank S3), and they are also regulated by the National Marine Fisheries Service as Essential Fish Habitat (NOAA 2014). Eelgrass was sparse within the Project Area. The area occupied by eelgrass was roughly mapped based on field observations as covering approximately 0.6 acres.

Coastal brambles

Rubus ursinus Alliance (G4 S3)

Coastal brambles dominated by California blackberry (*Rubus ursinus*) occurred primarily on upland levees and extended into marginal palustrine wetlands on the interior side of the levees. California blackberry often associated with Pacific aster and weedy upland species such as wild radish (*Raphanus sativus*) (Cal-IPC Limited). California blackberry primarily occurred around 8 feet elevation (NAVD88) on the interior side of the levees, and 9 feet elevation (NAVD88) on the exterior side. Coastal brambles occupied approximately 2.9 acres of the Project Area.

Pale spike rush marsh

Eleocharis macrostachya Alliance (G4 S4)

Pale spike rush (*Eleocharis macrostachya*) marsh was identified to the south of Cannibal Island Road in two discrete patches trending toward the middle of the southernmost boundary of the Study Area covering approximately 0.15 acres, where pale spike rush was dominant in the herb layer with Pacific silverweed (*Potentilla ansarina*, botanical synonymy *Argentina egedii*). The areas were inundated with pooled surface water observed at the time of surveys in early May 2022. These areas were surrounded by Non-native Pasture congruent with the characterization of the wet Non-native Pasture mapped to the north of Cannibal Island Road. The areas at the margin and outside of the spike rush marsh were dominated by predominantly non-native facultative species. The two sites combined had a max elevation of 6.7 feet and a minimum



elevation of 5.3 feet (NAVD88). The entire area south of Cannibal Island Road is classified as Palustrine Emergent Wetland with persistent vegetation (PEM1), with three-parameter uplands on the gravel edge and surface of Cannibal Island Road. Please see the Wetland/Upland Delineation Report for details. Due to its size (0.15 acre), this community was included in in Table 4.2.1 comparing mean elevation of vegetation communities but not included in the whisker chart shown in Figure 4.2. This community does not comprise a significant portion of the Project Area that will be directly influenced by project activities.

Dense-flowered cordgrass marsh

Spartina densiflora Semi-natural Alliance (Cal-IPC High)

Invasive dense-flowered cordgrass (*Spartina densiflora*, Cal-IPC High) dominates a great deal of the lower salt marsh on the outside of the levees near McNulty Slough, and it has invaded muted salt marsh areas near the levee breach and the northern failed culvert. The average elevation of invaded salt marsh within the muted tidal prism was around 6 feet elevation (NAVD 88) and around 7 feet elevation (NAVD88) outside of the levees. Dense-flowered cordgrass marsh covers approximately 61.6 acres of the Project Area.

Non-native Pasture

Agrostis stolonifera Semi-natural Alliance

Much of the remaining 208.7 acres is pasture characterized by non-native creeping bentgrass (*Agrostis stolonifera*), which spans from areas with lesser saltwater infiltration around 6.5 to 7 feet elevation to uplands around 10 feet (NAVD88). The non-native pasture was differentiated from other non-native dominated and developed areas like roads and levees that also contained creeping bentgrass and other pasture grasses but did not function as pasture. The vast majority of this area was wet pasture (dominated by facultative species) is classified as Palustrine Emergent Wetland with persistent vegetation (PEM1) with some three-parameter uplands at higher elevation areas. Please see the Wetland/Upland Delineation Report for details.

Non-Native Vegetation/Developed

Many weedy uplands and marginal wetland areas occur around access roads, levees, artificial berms, and remnants of former agricultural development, covering a total of 49.8 acres. These areas are predominantly characterized by evidence of previous anthropogenic disturbance and the presence of many weedy non-native species such as wild radish (*Raphanus sativus*), Queen Anne's lace (*Daucus carota*), and poison hemlock (*Conium maculatum*). Pacific aster, a native species, was also fairly widespread in this vegetation type. Creeping bentgrass and other non-native grasses also occurred in this habitat, but these areas are not functional for use as pasture.

Mudflats/Intertidal Estuarine Shore

Mudflats were barren or covered by algal beds with no vascular vegetation, and these areas may provide valuable foraging habitat for shorebirds. The upper edge of mudflats occurred around 5.5-6 feet elevation (NAVD88) within the muted tidal prism, and around 6.5-7 feet elevation outside the levees. The lower limit of mudflats within the levees appeared to be around 4-foot elevation. The elevation range of mudflat and intertidal unconsolidated shore was much greater outside of the levees, where they are exposed to the full



tidal range, compared to the muted environment inside the levees. Mudflats covered approximately 93.4 acres of the project area.

Subtidal Sloughs

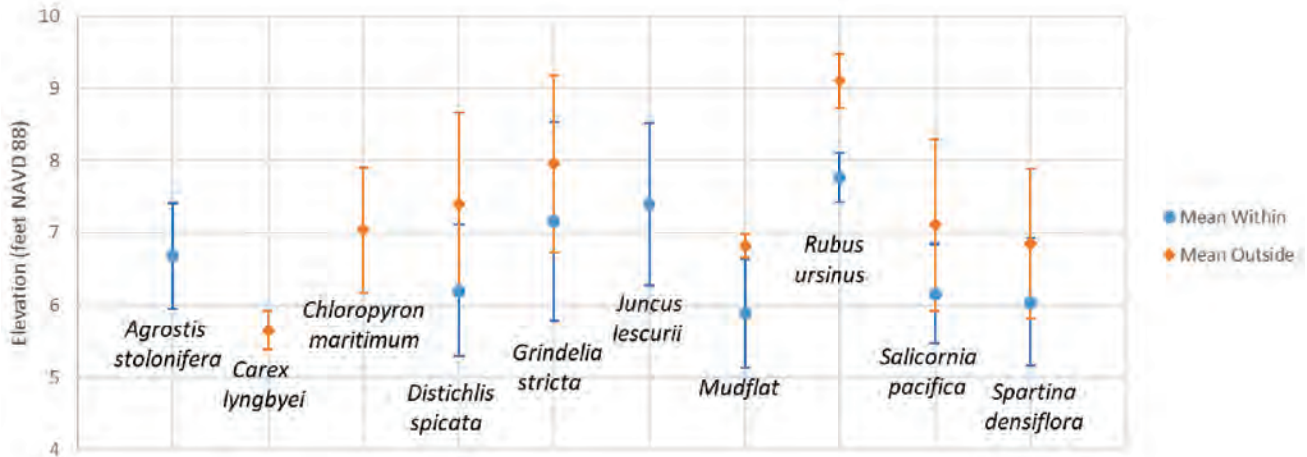
Subtidal sloughs, defined by the 4-foot NAVD88 elevation contour based on observations in the field and aerial imagery, cover approximately 16.1 acres. Subtidal sloughs appear to have an unvegetated mud bottom within the levees. Eelgrass occurs in the subtidal slough outside the failed culvert on the outer limits of the Project Boundary (see *Eelgrass beds* above). Many sloughs within the levees appear to hold water throughout the tidal cycle throughout the year, based on personal observations at low-low tide during the dry season.

Table 4.2.1 Acreage of Vegetation Types within the Project Area (Elevations in NAVD 88)

Vegetation Mapping Unit	Area (acres)	Mean Elevation (ft) Within Levees ± Std	Mean Elevation (ft) outside Levees ± Std
Pickleweed salt marsh	287.7	6.16 ± 0.69	7.11 ± 1.19
Gum plant patches	28.7	7.16 ± 1.37	7.96 ± 1.26
Salt rush swales	26.2	7.39 ± 1.12	-
Salt grass flats	17.8	6.21 ± 1.37	7.40 ± 1.26
Eelgrass beds	0.6	-	-
Coastal brambles	2.9	7.77 ± 0.34	9.10 ± 0.38
Dense-flowered cordgrass	61.6	6.05 ± 0.88	6.85 ± 1.03
Mudflats	93.4	5.89 ± 0.75	6.82 ± 0.17
Subtidal	16.1	-	-
Pale spike rush marsh	0.15	6.21 ± 0.64	-
Non-native pasture	208.7	6.68 ± 0.73 (<i>Agrostis stolonifera</i> pasture only)	-
Non-Native Vegetation/Developed	49.8	-	-



Figure 4.2 Mean Elevations of Vegetation Types Within and Outside Levees (+/- Standard Deviation)



4.2.2 Sensitive Natural Communities

The Cannibal Island Restoration Project Area contains several SNC. Northern Coastal Salt Marsh (a SNC as defined by Holland 1986) occurs within and outside the muted tidal prism, and includes the following vegetation alliances (defined according to Sawyer et al. 2009, CNPS 2022b):

- 255.5 acres dominated by pickleweed (G4 S3),
- 17.6 acres dominated by salt grass (GNR S4),
- 28.5 acres of high marsh dominated by gum plant (G2 S2), and
- 26.6 acres of brackish marsh dominated by salt rush (G3 S2).

Additionally, 0.6 acres of eel grass beds (GNR S3) can be found anchored in subtidal slough bottom near McNulty Slough. Coastal brambles dominated by California blackberry, which may be classified as a SNC (G4 S3), occur along and adjacent to upland levees. Because coastal brambles occur as linear features along disturbed man-made levees and contain a substantial proportion of non-native species, it is recommended that this alliance is not considered a protected SNC in this context. Additional SNC were not identified in the expanded project area surveyed on 5/16/2022.

4.2.3 Upland Environmentally Sensitive Habitat Areas

The project area was assessed for upland ESHA, of which only one falls within the potential upland boundary: Coastal brambles dominated by California blackberry (*Rubus ursinus*, S3). CDFW considers alliances with a NatureServe State Rank of S1 to S3 to be SNC, and therefore these alliances are considered during the CEQA process (CDFW 2022a). This habitat occurred primarily on upland levees and extended into marginal palustrine wetlands on the interior side of the levees and associated with Pacific aster and weedy upland species such as wild radish (*Raphanus sativus*) (Cal-IPC Limited). While this



community is considered Sensitive by CDFW (2022a), it is currently listed as S4 (not sensitive) according to the CNPS online edition of *A Manual of California Vegetation* (CNPS 2022b) database.

4.2.4 Habitat and Wetland Types

Several sensitive vegetation communities comprise the potential Cowardin type three-parameter wetlands that were delineated in the Project Area (see Aquatic Delineation Report for full details, GHD 2022). These communities provide quality habitat for a variety of wildlife. Northern Coastal Salt Marsh onsite provides high-value habitat for avifauna, invertebrates, and diverse plant species including rare Humboldt Bay owl’s clover, Point Reyes bird’s beak, and Lyngbye’s sedge. Mudflats provide high-value foraging habitat for shorebirds. Subtidal sloughs have the potential to support the growth of eelgrass and provide high-value habitat for salmonids, the tidewater goby, and other aquatic species. Habitats within the Project Area have been classified according to Cowardin wetland types (Federal Geographic Data Committee 2013) and by vegetation alliances in **Table 4.2.3**.

Table 4.2.3 Habitat, Wetland Types, and Corresponding Vegetation Alliances

Habitat Type	Cowardin Wetland Type	Vegetation Mapping Unit	Area (acres)
Northern Coastal Salt Marsh	Estuarine Intertidal Emergent Wetland (E2EM1)	Pickleweed Salt Marsh	360.4
		Gum Plant Patches	
		Salt Rush Swales	
		Salt Grass Flats	
Non-native Salt Marsh	Estuarine Intertidal Emergent Wetland (E2EM1)	Dense-Flowered Cordgrass	61.6
Eelgrass Beds	Estuarine Subtidal Aquatic Bed (E1AB3)	Eelgrass Beds	0.6
Coastal Brambles	Upland and Palustrine Scrub Shrub (PSS3)	Coastal Brambles	2.9
Intertidal Mudflats and Algal Mats	Estuarine Intertidal Aquatic Bed/ Unconsolidated Shore (E2AB1/E2US3)	Mudflats/Estuarine Intertidal Shore	93.4
Subtidal Sloughs	Estuarine Subtidal (E1UB)	Subtidal	16.1
Non-native Pasture	Upland and Palustrine Emergent Vegetation (PEM1)	Remaining Non-Native/Pale spike rush marsh/Undefined	209

5. Conclusion

The Cannibal Island Restoration Project Area contains three rare salt marsh plants (**Appendix A, Figure 3**), Sensitive Natural Communities (SNC), one potential upland ESHA, and potential Cowardin type three-parameter wetlands (**Appendix A, Figure 4**). Rare Humboldt Bay owl’s clover (CRPR 1B.2), Point Reyes bird’s beak (CRPR 1B.2), and Lyngbye’s sedge (CRPR 2B.2) primarily occur outside of the levees in areas



of full tidal influence in Northern Coastal Salt Marsh. A small number of Humboldt Bay owl's clover and Point Reyes bird's beak were observed at the levee breach, where regular over-wash likely occurs. Northern Coastal Salt Marsh dominated by native species covers 360.4 acres of the Project Area. A total of 61.6 acres of salt marsh have been invaded by dense-flowered cordgrass, primarily in low marsh outside the levees and around current openings to tidal influence. Sensitive Natural Communities occur within and outside the levees. The elevations of vegetation types that occurred both inside and outside the levees were generally shifted downward by approximately one foot within muted tidal prism. Vegetation is expected to shift upward in elevation with restored tidal influence. Vegetation is hypothesized to change as follows if the area is opened to full tidal influence:

- Increase in mudflat and intertidal unvegetated area
- Shift salt marsh upward by 1 foot elevation (GIS could be used to predict area change)
- Reduction in non-native pasture
- Reduction in uplands and coastal brambles

Restoring tidal influence is likely to increase potential habitat for rare plants. However, dense-flowered cordgrass invasion currently appears to be limited by tidal dispersal, with invasion occurring in areas within the levees that receive more tidal influence (near the over-wash and failed culverts). Removing the failed culvert is likely to accelerate invasion by dense-flowered cordgrass, and control of this highly invasive plant is highly recommended to maintain native salt marsh habitat. Elevation data appears to be highly localized, and tidal influence varies within the site. The degree of tidal influence may also vary throughout the site after removing the failed culvert, and vegetation may shift by less than 1 foot in areas that remain somewhat sheltered from direct tidal influence. Results should not be extrapolated beyond project area because elevation ranges of vegetation types appear to vary based on site conditions. Rare plant surveys are recommended in the season prior to potential impacts. Monitoring special status species and vegetation changes are recommended post-project to increase understanding for future restoration and management.



6. References

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Appendices

A. Map Figures

Figure 1. Vicinity Map

Figure 2. Location Map

Figure 3. Rare Plant Map

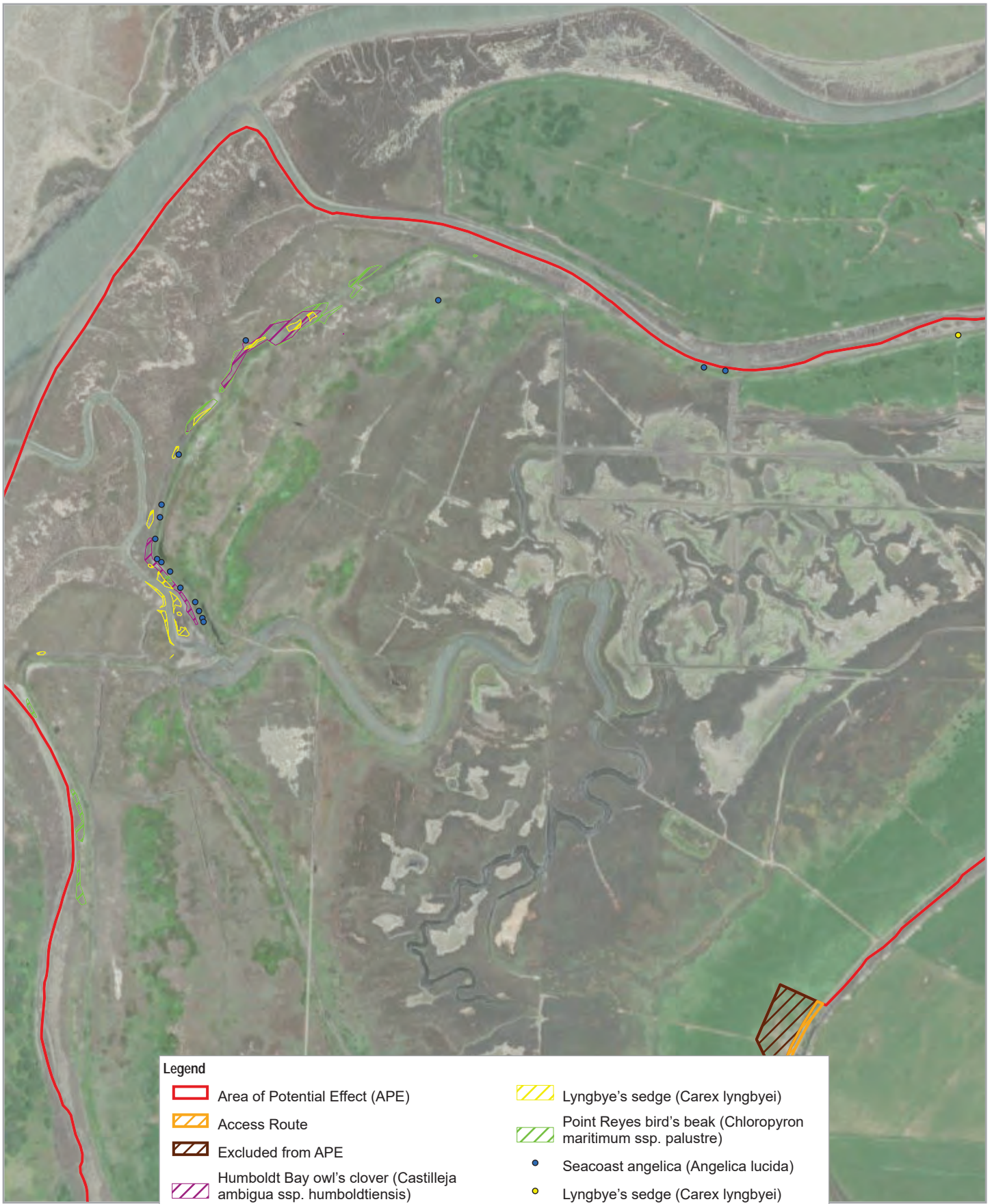
Figure 4. Sensitive Vegetation and Habitats Map

B. Scoping Table

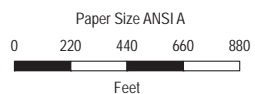
C. Plant Species Observed

D. Rapid Assessment Data Sheets

E. Photo Index



Legend	
Area of Potential Effect (APE)	Lyngbye's sedge (<i>Carex lyngbyei</i>)
Access Route	Point Reyes bird's beak (<i>Chloropyron maritimum ssp. palustre</i>)
Excluded from APE	Seacoast angelica (<i>Angelica lucida</i>)
Humboldt Bay owl's clover (<i>Castilleja ambigua ssp. humboldtiensis</i>)	Lyngbye's sedge (<i>Carex lyngbyei</i>)



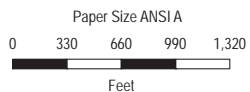
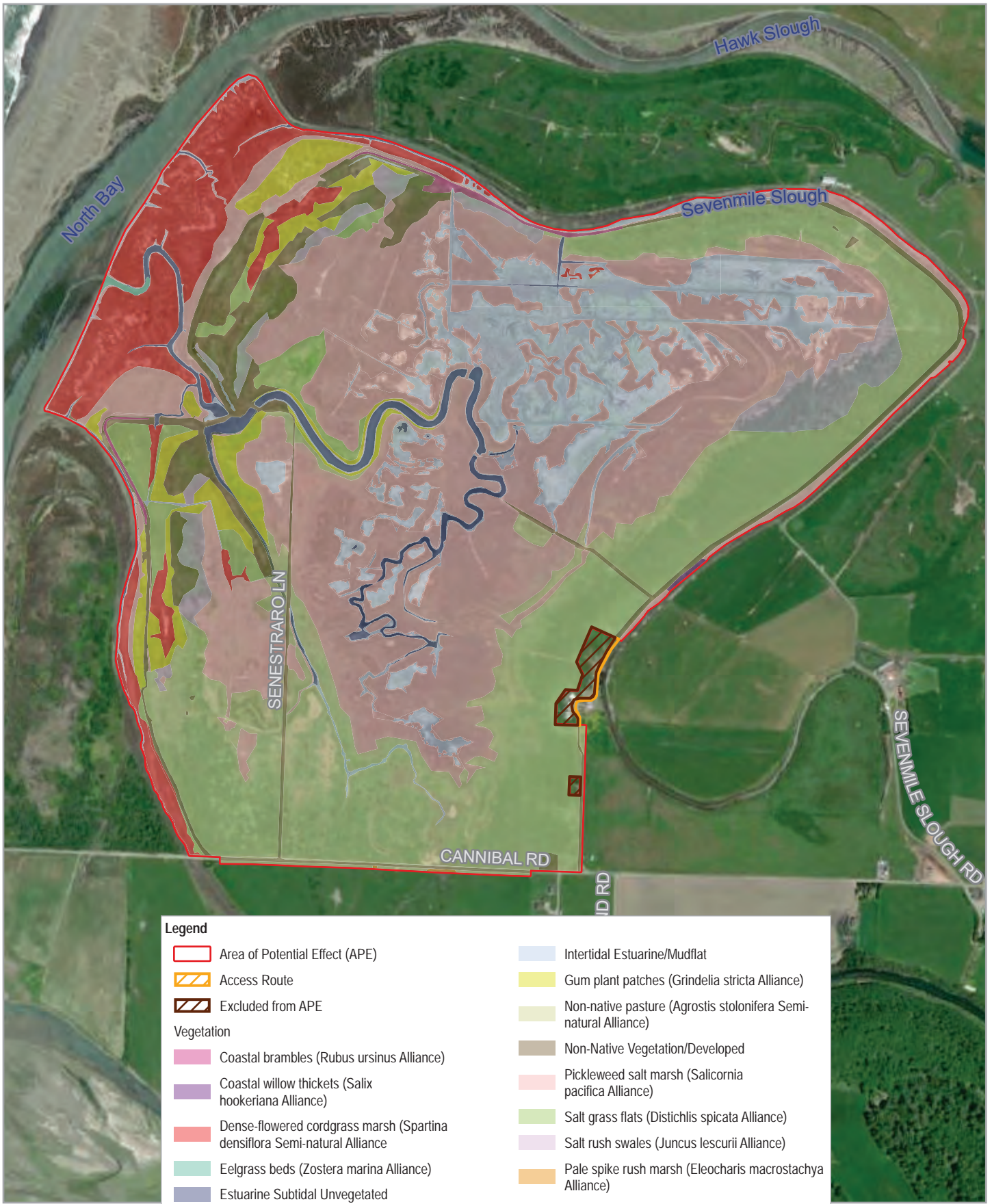
CalTrout
Cannibal Island Restoration Project

Rare Plants

Project No. 11206383
Revision No. 1
Date Oct 2022

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

<p>Exhibit 9 1-23-0854 (CDFW) ESHA Report (excerpt) (pg. 17 of 18)</p>
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CalTrout
Cannibal Island Restoration Project
Sensitive Vegetation and Habitats

Project No. 11206383
Revision No. -
Date Jun 2022

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

Exhibit 9
1-23-0854 (CDFW)
ESHA Report (excerpt) (pg. 18 of 18)



Cannibal Island Restoration Project

Operations and Maintenance Plan

California Trout

September 27, 2023

→ The Power of Commitment



Exhibit 10
1-23-0854 (CDFW)
Operation and Maintenance Plan (excerpt)
(pg. 1 of 13)

1. Introduction

This Operations and Maintenance Plan (Plan) has been developed for the Cannibal Island Restoration Project (Project). The core Project objective is to restore and expand natural estuarine functions and processes that promote recovery of habitat for native fish, invertebrates, wildlife, and plant species compatible with surrounding working agricultural lands. This will be carried out via strategic lowering of dikes along the northern portion of the Project Area, restoring existing slough channel connectivity and historical geometry. Additionally, the Project will improve native flora and fauna via the focused removal of invasive vegetation (particularly dense-flowered cordgrass [*Spartina densiflora*]), provide public access via a 2,000-foot trail and parking lot, and benefit agricultural lands via the installation of an approximately 6,000-foot setback levee and elevating the existing Cannibal Island Road which will protect approximately 54 acres of existing agricultural lands along the eastern extents of the Project Area, and over 50 acres beyond the southern extent, from tidal inundation. Flood gates (culverts equipped with flood gates) are proposed in conjunction with the setback levee to manage flood drainage from the eastern agricultural lands.

To maintain the Project, post construction operations and maintenance actions are anticipated to include dense-flowered cordgrass control efforts, levee and dike management, flood gate maintenance, and trail and parking lot maintenance. These efforts are anticipated to occur following Project construction and continue for the minimum life of the Project, which is typically 20-25 years, to meet long-term Project goals. Portions of the Project are within the Natural Resources Conservation Services (NRCS) Agricultural Conservation Easement Program - Wetland Reserve Easement (ACEP-WRE) program (hereafter referred to as “WRE program”). Maintenance activities may also be required by the ACEP-WRE program beyond the scope of the Project. This Plan does not propose operations and maintenance actions of agricultural lands located outside of the WRE area because those areas are the responsibility of individual landowners. This Plan does include maintenance actions of the setback levee installed as a Project component to protect agricultural lands.

The Plan is limited in scope to the specific aspects discussed. While every attempt is made to be comprehensive in scope, every possible condition or need cannot be foreseen. Monitoring and maintenance actions described in this Plan are covered in the regulatory permits obtained for the Project. However, new, expanded, or unforeseen impacts to regulated habitats, waters, or wetlands may require modifications to permits or new permits in the future. The operations and maintenance activities defined in this Plan are intended to commence upon completion of Project construction.

1.1 Project Location

The Project Area is located three miles west of the town of Loleta, California in the Eel River estuary, within the Cannibal Island USGS 7.5-minute quadrangle (**Appendix A, Figure 1**). The 794-acre Project Area is at the western-most extent of the Eel River delta and estuary approximately one mile inland and northeast of the Eel River mouth. Cannibal Island is located in the northern portion of the Eel River estuary and is bounded by Sevenmile Slough on the north and east, North Bay Slough on the west and Mosley Slough on the southwest (**Appendix A, Figure 2**).

The northern and western portion of the Project Area (approximately 462 acres) is owned by California Department of Fish & Wildlife (CDFW) and managed as part of the of the Eel River Wildlife Area (ERWA) Cannibal Island Unit (Assessor Parcel Numbers 310-043-001, 310-033-004, 310-021-003, and 310-021-004). The remaining 332 acres are privately owned by Hansen (APNs 310-043-003 and 310-051-001) and Pedrazzini (APNs 310-043-004,-005, and -006). Approximately 220 acres of the private property are held in the WRE program by the NRCS (**Appendix A, Figure 3**).

1.2 Project Description

The proposed Project will enhance (widen and deepen) existing tidal slough channels within the limits of Project disturbance to historical geometry (**Appendix A, Figure 4**). Construction activities will include the removal of outdated water control and conveyance structures, excavation of slough channels to accelerate the formation of high-quality aquatic habitat for listed fish species, and placement of excavated fill in appropriate locations to mimic natural marsh topography (natural levees and hummocks or tidal marsh ridges) and enhance wetland vegetation diversity through removal of invasive dense-flowered cordgrass. Excavated soils from the channels would be placed in low hummocks approximately 2-feet high adjacent to the channels. These hummocks are anticipated to retain wetland parameters as they will not exceed marsh plain elevation and would not constitute conversion to uplands. Much of the existing dike network within the Project Area would be reconfigured or removed. A new setback levee will be constructed to protect agricultural land from tidal inundation as full amplitude is restored, including one newly constructed set-back levee in the eastern portion of the Project Area, and elevating the grade of Cannibal Island Road in the southern portion of the Project Area. Sediment excavated during construction would be beneficially reused within the Project Area and would not be hauled off-site.

1.3 Project and Regulatory Background

This is a restoration Project that is exempt from the requirements of CEQA pursuant to the Statutory Exemption for Restoration Projects (SERP) (Public Resources Code § 21080.56). No National Environmental Policy Act (NEPA) compliance is required because there is no federal nexus with the Project outside of the Clean Water Act and Endangered Species Act where each jurisdictional agency carries out NEPA for their respective actions.

The Project Area includes wetlands within the jurisdiction of the U.S. Army Corps of Engineers (USACE), the North Coast Regional Water Quality Control Board (NCRWQCB), and the California Coastal Commission (CCC), endangered or threatened species habitat within the jurisdiction of the National Marine Fisheries Service (NMFS; also known as the National Oceanic & Atmospheric Administration Restoration Center [NOAA RC]), and the U.S. Fish and Wildlife Service (USFWS), and contains lands regulated by the Humboldt County Planning and Building Department. Required permits and approvals are listed in **Table 1-1**.

Table 1-1 *Permits Required for the Project*

Permit	Agency
Clean Water Act (CWA) Section 404 — Nationwide Permit (NWP) 27	USACE
Endangered Species Act (ESA) Section 7 — Salmonids	NMFS (also known as NOAA RC) Programmatic Biological Opinion (PBO)
ESA Section 7—Tidewater Goby	USFWS PBO
CWA Section 401—Statewide Restoration General Order (SRGO)	NCRWQCB
Individual Coastal Development Permit (CDP)	CCC
Conditional Use Permit	Humboldt County Planning and Building Department
Lake and Streambed Alteration Agreement (LSAA) and California Endangered Species Act (CESA) Compliance	CDFW
Encroachment Permit	Humboldt County Public Works
Lease	State Lands Commission

1.4 Responsible Parties

The CDFW is responsible for monitoring Project components that occur on their property, and Project-related infrastructure that may span parcel boundaries, such as the setback levee, flood gates, and potentially the fence along the setback levee. CDFW will implement or oversee implementation of the maintenance actions described in this Plan. Private landowners may communicate with CDFW regarding potential maintenance needs they observe, however it is not their responsibility to carry out monitoring or maintenance activities of Project components. Based on needs and available resources, each landowner may choose to collaborate with various partners to assist with the monitoring and maintenance .

The WRE program that exists within the Project Area allows for periodic maintenance activities to be planned and implemented under a Compatible Use Authorization (CUA) between the NRCS and landowners. All monitoring and maintenance activities described in this Plan that is within the WRE program area will be completed in accordance with the NRCS CUA process. The eastern boundary of the WRE program across all parcels aligns with the approximate location of the setback levee, therefore the lands to remain under the WRE program will predominantly convert to tidal marsh (see **Appendix A, Figure 3**).

NRCS has a unique monitoring responsibility on the Project Area lands protected by its perpetual conservation easements. All WRE program easements are required by policy to be monitored annually in accordance with the Common Provisions Manual (440-CPM-527-P). Prior to the end of each federal fiscal year, monitoring information collected must be entered into NRCS' easement business tool, and a copy of the completed Annual Monitoring Worksheet (form NRCS-CPA-1251) must be retained for the duration of the easement enrollment according to federal records management requirements. NRCS monitors the easements it administers to ensure the following: that the integrity of the easements is being maintained, the goals and objectives for which the easements were purchased are being met, to identify management or maintenance actions needed, and to maintain a relationship with the landowner and, where applicable, other conservation partners. Monitoring ensures the terms and conditions of the easement deeds are being met and program objectives are being achieved in accordance with statutory and regulatory authorities and requirements. Additionally, the annual reporting allows the easement condition status to be determined in the easement business tool and reported as appropriate in the agency's annual accountability reporting.

2. Overview of Project Components and Long-Term Management Needs

This Plan was developed to support post-construction ongoing management and maintenance activities that may be necessary to support the long-term functions of the Project and operational needs to protect land. NRCS monitoring is primarily focused on easement compliance and will include a review of restoration objectives, management plans, vegetation, and hydrology. Monitoring is primarily focused on whether the Project component is safely and effectively carrying out its intent as designed, or whether repair or replacement is necessary. Maintenance activities will be prioritized and implemented based on both NRCS monitoring outcomes and the monitoring described herein which would generally include observations of physical character to determine whether the Project component is functioning as designed. The impacts associated with the anticipated operational and maintenance activities would be infrequent and short-term in nature. In addition, they are anticipated to be no greater than the traditional maintenance historically performed on these lands under existing conditions and far less than the impacts associated with Project construction as described in Project permitting documentation. Maintenance actions would be implemented in accordance with avoidance measures (listed in **Appendix B**), and best management practices (listed in **Appendix C**).

2.1 Description of Project Components to be Maintained

This section summarizes the functions and potential maintenance needs for the Project components. Following construction, long-term maintenance will be required to ensure that the Project functions as intended. Maintenance needs will be primarily limited to management of dense-flowered cordgrass, the setback levee, gated culverts, trail, parking lot and fencing. Cannibal Island Road will continue to be routinely maintained by the County. See **Appendix A, Figure 4** for locations of Project components described below.

2.1.1 Dense-flowered Cordgrass Management

Vegetation management would include the as-needed removal of invasive vegetation. Through the Regional Eradication Program, which operates in various locations throughout the Eel River estuary, dense-flowered cordgrass is currently being treated using a variety of methods including top-mowing, grinding, tilling, excavation, flaming and application of herbicide. Proposed treatment methods are generally consistent with those outlined in the Humboldt Bay Regional Spartina Eradication Plan (H.T. Harvey 2013). Per the Project's PBO issued by NOAA RC, only U.S. Environmental Protection Agency aquatically approved herbicide may be utilized within 25 feet of a wetland or waterway (see PBO Measure VHDR-6 – General Herbicide Use). Dense-flowered cordgrass control is a planned component of the Project and will occur throughout the documented infested areas during construction, which are located along the western extent of the Project Area. It is possible that focused control techniques of dense-flowered cordgrass would occur in the documented infestation areas prior to construction to prevent the spread of this highly invasive species during construction.

Following construction, qualitative monitoring is recommended at least annually to document and treat dense-flowered cordgrass infestations early with the goal of managing dense-flowered cordgrass before it gets out of control and functionally displaces native vegetation communities. Long-term follow up treatment and maintenance of dense-flowered cordgrass is anticipated. The methods utilized to control dense-flowered cordgrass (listed above) include a series of treatments implemented over time based on seasonality, weather, tides, labor availability, and other factors. The proposed treatment methods are consistent with those outlined in PBO Measures VHDR-6 – General Herbicide Use, VHDR-7 – Herbicide Application Planning, VHDR-8 – Herbicide Application Reporting, and Measure 5.5.1 – NOAA Herbicide Use Protection Measures (see **Appendix B** for the full list of PBO and SRGO avoidance measures). Vegetation management will occur on an as-needed basis and pending available funding.

2.1.2 Setback Levee

An approximate 6,000-foot-long setback levee will be located on the eastern side of the proposed marsh system (located centrally) to protect agricultural lands from tidal inundation. The top of the setback levee would contain a gravel surface to provide site access for vehicles and/or equipment. The setback levee is designed to operate without extensive maintenance.

Monitoring will be qualitative and will include visual inspections performed annually and after major storm and high tide events. Monitoring will look for evidence of obvious flooding and erosion or erosion resulting from wind generated waves. Maintenance of the setback levee will be triggered by observations of the physical character of the levee and dike during monitoring events. If necessary, the setback levee will be mowed annually to discourage growth of woody and invasive vegetation. Repair from erosion or burrowing animals would occur on an as-needed basis. Grading and/or re-graveling portions of the setback levee will occur as necessary .

2.1.3 Flood Gates

The Project proposes six new culverts through the proposed setback levee and Cannibal Island Road, all equipped with flood gates. Up to two flood gates will be installed under the setback levee, and up to four installed under the elevated portion of Cannibal Island Road. The culverts would vary in size and be equipped with side and/or top hinge gates. The gates would prevent tidal and flood inundation landward and would open when the inboard water levels (located east of the gate) are higher relative to outboard (located west of the gate) which would typically occur daily during and following rainfall events, enabling drainage from adjacent agricultural land to the east.

The new flood gates and associated drainage ditches (located on the outboard, west side, of the setback levee) will be monitored annually and following extreme storms to ensure proper functioning. The culvert and ditch elevations will be compared to the elevations on the Record Drawings. If needed, debris and sediment would be removed from culverts and/or ditches consistent with the CUA process to maintain the design function. Sediment removed would be reused throughout the Project Area as part of ongoing agricultural operations or placed in subsided tidal lagoons to increase the pace of salt marsh accretion. Sediment reuse on wetland areas would only occur if wetland function would be unimpacted and the purpose of the reuse is to promote habitat restoration and/or sea level rise resiliency for habitat diversity purposes.

2.1.4 Tidal Wetlands (Channels and Tidal Ridges)

The Project area west of the setback levee will include enhancement of former tidal channels. The re-established channels and connection to the Eel River estuary will increase the tidal prism within the Project Area. The increased tidal prism would increase sediment transport throughout the system and provide habitat variability and increased complexity, promoting sediment accretion in subsided areas through a network of inter-tidal mudflats and habitat ridges. The mudflats would passively evolve into inter-tidal salt marshes with sediment accretion from the Eel River over time. The tidal wetland system of channels, ridges and mudflats have been designed in equilibrium with the restored tidal prism.

2.1.5 Trail

The Project proposes approximately 2,000 feet of publicly accessible trail located atop an existing dike on the west side of the Project Area. The trail will be graded, surfaced with gravel and will be wide enough to serve as an accessway for vehicles and other equipment. The trail will be located adjacent to Mosley Slough, and drainage in this location will remain unchanged. Monitoring of the trail would occur annually or after extreme storms and include visual observation. Anticipated routine maintenance includes vegetation trimming, removal or mowing. Grading and/or re-graveling portions of the trail would occur as necessary .

2.1.6 Parking Lot

A parking lot is proposed under the Project to provide parking for trail users. The parking lot will be gravelled and therefore will manage stormwater onsite due to its permeability. Monitoring of the parking lot will occur annually or after extreme storm events to observe areas of potential damage, instability or unsafe conditions. Grading and/or re-graveling portions of the parking lot would occur as necessary .

2.1.7 Fencing

Fencing on the eastern side of the setback levee and along both sides of the County Road adjacent to the elevated portions of Cannibal Island Road would occur under the Project. Monitoring of the fencing will occur annually or after extreme storm events to observe areas of potential damage, instability, or unsafe conditions. Repairs of the fencing will occur following extreme storm events, if damage occurs and as funding allows, or once approximately every 10-15 years.

3. Monitoring

In general, the tidal marsh restoration portion of the Project is expected to be self-maintaining and dynamic over the long term, and marsh plain habitat is expected to be restored. The result of restoration is a net increase of full tidal subtidal channels and sloughs, intertidal channel and mudflats, and coastal salt marsh and brackish marsh. The Project will enhance native plant communities and promote expansion of rare plant habitat through the treatment and control of non-native dense-flowered cordgrass.

Given the current Project partnerships and nature of maintenance activities this Plan has defined three types of post-construction monitoring including 1) NRCS Performance Monitoring in Easement Areas, 2) Non-regulatory Performance Monitoring, and 3) Maintenance Monitoring. Non-regulatory performance monitoring will occur throughout the restored portions of the Project Area and will be used to track Project evolution and efficacy beyond the scope of regulatory monitoring. Maintenance monitoring will occur throughout the entire Project Area to ensure the long-term operation of the Project is successful, consistent with the overall goals of the Project. Post-construction regulatory monitoring, which includes the monitoring that is required under Project permits primarily associated with documentation of wetland re-establishment, is not included in this Plan. Regulatory monitoring (required under Project permits) is described in the Wetlands & Habitat Restoration Plan. Each of the three types of monitoring are further described below.

3.1 NRCS Performance Monitoring in Easement Areas

Performance monitoring will be conducted annually by NRCS for areas under the WRE program in accordance with existing statute, regulation, and policy. Data will be collected using the Annual Monitoring Worksheet (form NRCS-CPA-1251) (link to information below). Performance monitoring is intended to observe, document and track the outcomes of the Project site restoration and its long-term stewardship. Monitoring results will contribute to informing Project performance and efficacy. Performance monitoring activities will include onsite monitoring and review of conservation planning documents. The Annual Monitoring Worksheet can be found here: [https://www.nrcs.usda.gov/sites/default/files/2022-10/NRCS-CPA-1251%20Annual%20Monitoring%20Worksheet%20%2810-18%29 Revised 12-18 for WV.pdf](https://www.nrcs.usda.gov/sites/default/files/2022-10/NRCS-CPA-1251%20Annual%20Monitoring%20Worksheet%20%2810-18%29%20Revised%2012-18%20for%20WV.pdf)

3.2 Non-Regulatory Performance Monitoring

Voluntary monitoring (that is not required by regulatory agencies) may take place to observe, document and track the outcomes of the Project beyond what is required in regulatory permits (which is discussed in the Wetlands & Habitat Restoration Plan). It is expected that the Project would be monitored for up to five years following construction, or as funding is available. Non-regulatory monitoring may include the following:

- Topography – Topographical surveys would be conducted at the five- and ten-year marks, or as funding is available. The topographical surveys would monitor the geomorphic evolution of the restoration components within the Project site. At a minimum, topographic changes would be monitored at established (monumented) channel cross-sections and longitudinal (thalweg) profile surveys. Topographic surveys would be conducted with a Total Station or GPS system. Photo-points would be established at each monumented cross-section at a minimum.
- Surface Water Hydrology – As funding is available, surface water level loggers would be installed within the downstream portion of channels that do not completely dry out during low tide, and discharge estimates would be determined.
- Fish Monitoring – The purpose of fish monitoring will be to characterize the fish assemblage and document species presence and distribution throughout the restored Project Area. Monitoring fish use of the restoration area is expected to occur for five years after the tidal restoration project is complete, with annual reports provided in each year in which monitoring occurs. Monitoring may occur on a

monthly basis to determine seasonal trends in habitat use and occupancy, but may be limited to quarterly monitoring (spring, summer, fall, winter) based on funding and staff constraints. Monitoring techniques will rely on seining (beach and/or pole) and trapping (fyke, channel net, minnow traps). As funding and equipment become available, other methods including eDNA/water samples and passive integrated transponder (PIT) and/or acoustic tags may be utilized to determine presence and occupancy of select species. Sampling will occur at 5-15 sites throughout the Project Area and locations will be stratified by habitat type to characterize fish assemblages in a variety of habitats (i.e., channels of varying size, intertidal mud pans, deep water habitats etc.). Fish monitoring will be conducted in compliance with all avoidance and minimization measures required within the NOAA and USFWS PBOs and all other pertinent permits.

- Water Quality – Water quality measurements would be taken concurrently at each fish monitoring location for a duration of up to five years or as funding is available. Data measurement may include temperature, salinity and dissolved oxygen sampling. A series of water quality data loggers may be deployed following Project implementation that would record pH, conductivity, and temperature. The locations of the water quality data loggers would be determined following Project implementation.
- Photographic Monitoring – Photo monitoring points will be established at key locations that can be revisited over the course of the restoration project to document conditions before and after construction. Photo monitoring points will be selected to provide coverage of the project extent and representation of the major project elements. The GPS coordinates and bearing for each photo point will be recorded. Photos will be taken annually for five years beginning just prior to construction.
- If monitoring occurs, a monitoring report would be developed annually when data is collected and would include monitoring data from the pertinent categories mentioned above. It would be made available to funders, regulatory agencies and/or other entities as requested. Year one would begin following construction of the Project. Due to the Project potentially being constructed over two seasons, the temporal label of “Year one”, “Year two”, may be staggered throughout the Project Area.

3.3 Maintenance Monitoring

Maintenance monitoring will assess the above-described Project components and will be used to inform the timing and extent of maintenance actions. Maintenance monitoring will be completed by CDFW throughout the Project Area. In addition, the NRCS will monitor easement areas as part of its annual monitoring and site inspection. Neighboring landowners are anticipated to take an active role in maintenance monitoring of their properties adjacent to the restored Project Area as part of their ongoing land stewardship and to protect their interest in the integrity and success of the Project. Maintenance monitoring is intended to support decision making and justification to conduct maintenance actions. The monitoring and maintenance activities defined in this Plan would commence upon completion of Project construction and would be monitored for the minimum Project life and consistent with typical CDFW Wildlife Area maintenance. Areas within the WRE program would be monitored as required by the WRE program. Described below are the proposed maintenance monitoring methods and frequencies with corresponding maintenance triggers and actions.

4. Maintenance Monitoring, Triggers and Actions

This section defines the maintenance monitoring (type and frequency), triggers, and corresponding actions that support achievement of the Project goals. The maintenance monitoring is focused primarily on visual observations to assess and document physically observable trends. Some observations may result in the need to increase monitoring frequency, while others may result in the need to take action. This will be determined

through the evaluation of visual triggers. Maintenance triggers define the specific point or a range of values where monitoring data indicate that the Project may be developing along an unexpected or unfavorable trajectory and where maintenance actions are necessary to ensure that the Project goals are achieved.

Once a maintenance trigger is activated, there are a range of possible maintenance options. For example, 1) it may be determined that no maintenance action is indicated or that additional (or modified) monitoring may be required to make a decision on whether or not maintenance action is required, or 2) monitoring results indicate that a maintenance action is required. Once maintenance needs are identified, potential actions identified in Table 4-1 will be implemented as funding is available. Parameters required for potential maintenance actions are included in **Appendix C (Table C-1)** and include location, work window, work duration, anticipated frequency, equipment and methods to be used, quantities and materials, and impact avoidance measures. Impact avoidance measures are consistent with the accepted best management practices under the Project's SERP documentation and anticipated regulatory requirements under the Project's permits.

Potential maintenance actions listed in Table 4-1 are not intended to be an exhaustive list. Rather, they represent a likely range of options given the current knowledge of the system and anticipated maintenance actions. Actual actions may deviate from this list given unforeseen monitoring results and/or site performance and would be implemented under required permits (as applicable). Additionally, the details on the timing and degree of each of these actions are equally dependent upon the monitoring results. For significant maintenance actions that may have implications for adjacent landowners, such landowners will be consulted. In addition, where appropriate, regulatory agencies and NRCS may be consulted to ensure compliance with existing permits and WREs.

Table 4-1 Summary of Potential Maintenance Actions Resulting from Maintenance Monitoring

Project Component	Monitoring Method & Frequency	Maintenance Trigger	Potential Maintenance Actions ¹ (Subject to NRCS Wetland Reserve Easement)
Dense-flowered Cordgrass Management	Visual inspection annually (at a minimum) of vegetation composition relative to past year and trends. Visual inspection to occur at specific locations to be determined by landowners and/or NRCS.	Invasive vegetation dominates observed area, and the actual or potential spread threatens critical native habitat.	Weed management/and or invasive species control via US EPA aquatically approved herbicide (within 25 feet of a wetland or waterway), in accordance with PBO Measure VHDR-6 – General Herbicide Use, and top-mowing or grinding techniques. Increased frequency of monitoring until infestation is under control.
Setback Levee	Visual inspection annually and following extreme events to observe evidence of obvious flooding, erosion, settling or cracking of the setback levee, to ensure that these potential actions are not compromising the stability of the levee, designed intent of the levee to protect adjacent agricultural land, or use of the levee as an accessway.	Evidence of erosion, cracking, slumping, or animal borrowing holes. Woody vegetation establishment.	Repair eroded sections and employ erosion control measures (protecting bare soil, stabilizing banks, dissipating concentrated flows). Raise or lower height of setback levee. Maintain or repair road surface atop levee. Remove woody and/or weedy vegetation via mowing or hand tools.
Gated Culverts	Visual inspection annually and following extreme events to observe evidence of obvious changes compromising flood gates or drainage channel function from design intent or as-built conditions.	Gate flap is not operating correctly (i.e., not fully closing, lodged open). Culverts and drainage channels are partially obstructed, fully plugged, damaged or are not conveying flow as designed.	Replace or repair damaged flood gates. Remove debris from obstructed flood gates. Excavate plugged culverts, or replace or enlarge culverts as needed. Implement site specific erosion control BMPs to protect culvert functions while minimizing channel and wetland habitat benefits such as revegetating bare or eroding areas near culverts.
Tidal Wetlands (Channels and Habitat Ridges)	Visual inspection annually and following extreme events, supplemented as needed with topo/bathy survey cross-sections and longitudinal profiles to observe change in channel geometry, marsh plain elevation, tidal ridge geometry and vegetation cover.	Channel geometry has been reduced or enlarged compared to as-built conditions. Erosion of tidal ridge. Increase or decrease in tidal circulation relative to design conditions. Vegetation composition varies from analogous estuarine habitats,	Follow up assessment of rates/causes of erosion or sedimentation, evaluation of effects relating to structure and function of tidal wetland. Remove sediment / debris jams. Apply erosion control fabrics, coconut fiber rolls, or other BMPs to redirect or reduce the energy of flows over erosion area. Regrade tidal channels, ridges and mudflats to improve tidal wetland function.

Project Component	Monitoring Method & Frequency	Maintenance Trigger	Potential Maintenance Actions ¹ (Subject to NRCS Wetland Reserve Easement)
Trail	Visual inspection annually and following extreme events to observe evidence of obvious flooding, erosion, settling or cracking of the trail surface to ensure that these potential actions are not compromising the trail stability, design or safety for use as a public accessway.	Evidence of trail erosion, cracking, slumping, or animal borrowing holes. Woody vegetation establishment. Gravel missing from overwash events and presence of bare soil.	Repair eroded sections and employ erosion control measures (protection of bare soil, bank stabilization, dissipation of concentrated flows). Remove woody and/or weedy vegetation via mowing or hand tools. Maintain or repair trail surface atop via placement of gravel or other finishing product.
Parking Lot	Visual inspection annually and following extreme events to observe evidence of obvious flooding, cracking or loss of gravel from the parking lot to determine whether these potential actions are compromising function and safety of the parking lot.	Evidence of parking lot flooding, cracking, or substantial loss of gravel/finishing agent. Establishment of woody or herbaceous vegetation. Pooling of water.	Repair areas of parking lot where cracking or settlement has occurred. Replace gravel. Removal of woody or herbaceous vegetation. Grading of parking lot to remove depressions which cause water to pool.
Fencing	Visual inspection annually and following extreme events to observe evidence of downed fence lines or posts, vegetation caught on fence lines, burrowing or other obvious pathway under fences which could compromise the fence integrity.	Evidence of a downed fence line or post, vegetation hung on fence line. Evidence of potential fence post failure (such as animal burrow adjacent to the fence post).	Repair or replace fence line or post. Removal of vegetation hung on fence line. Filling in of burrow or hole that could lead to fence post failure.

¹ – See Table C-1 in Appendix C for specific maintenance actions and corresponding impact avoidance measures

4.1 Emergency Repairs

Unique circumstances may arise that require emergency maintenance actions. The threshold for determining if these actions should occur include these questions:

- Does the delay threaten human life or safety?
- Does the delay threaten property or risk other imminent liabilities?
- Would the delay trigger endangered species or other environmental enforcement actions?
- Emergency actions are also those actions that meet the CEQA definition of emergency:

Section 21060.3. EMERGENCY

“Emergency” means a sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services. “Emergency” includes such occurrences as fire, flood, earthquake, or other soil or geologic movements, as well as such occurrences as riot, accident, or sabotage.

CEQA Emergency Project Exemptions (Section 15269)

The following emergency projects are exempt from the requirements of CEQA.

- Projects to maintain, repair, restore, demolish, or replace property or facilities damaged or destroyed as a result of a disaster in a disaster-stricken area in which a state of emergency has been proclaimed by the Governor pursuant to the California Emergency Services Act, commencing with Section 8550 of the Government Code. This includes projects that will remove, destroy, or significantly alter an historical resource when that resource represents an imminent threat to the public of bodily harm or of damage to adjacent property or when the project has received a determination by the State Office of Historic Preservation pursuant to Section 5028(b) of Public Resources Code*
- Emergency repairs to publicly or privately owned service facilities necessary to maintain service essential to the public health, safety or welfare. Emergency repairs include those that require a reasonable amount of planning to address an anticipated emergency.*
- Specific actions necessary to prevent or mitigate an emergency. This does not include long-term projects undertaken for the purpose of preventing or mitigating a situation that has a low probability of occurrence in the short-term but this exclusion does not apply (i) if the anticipated period of time to conduct an environmental review of such a long-term project would create a risk to public health, safety or welfare, or (ii) if activities (such as fire or catastrophic risk mitigation or modifications to improve facility integrity) are proposed for existing facilities in response to an emergency at a similar existing facility.*
- Projects undertaken, carried out, or approved by a public agency to maintain, repair, or restore an existing highway damaged by fire, flood, storm, earthquake, land subsidence, gradual earth movement, or landslide, provided that the project is within the existing right of way of that highway and is initiated within one year of the damage occurring. This exemption does not apply to highways designated as official state scenic highways, nor any project undertaken, carried out, or approved by a public agency to expand or widen a highway damaged by fire, flood, storm, earthquake, land subsidence, gradual earth movement, or landslide.*
- Seismic work on highways and bridges pursuant to Section 180.2 of the Streets and Highways Code, Section 180 et Seq.*

If an emergency occurs within a wetland or tidal slough channel, this would be considered under the jurisdiction of the U.S. Army Corps of Engineers (USACE), which defines an emergency separately from CEQA and states:

An emergency situation is present where there is a clear, sudden, unexpected, and imminent threat to life or property demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property or

essential public services (i.e., a situation that could potentially result in an unacceptable hazard to life or a significant loss of property if corrective action requiring a permit is not undertaken immediately).

Emergency actions / repairs shall be implemented on an as-needed basis using the best judgement of the property owners. If repair of maintenance activities are needed in response to an emergency or to avoid an emergency, regulatory agencies should be contacted as soon possible for emergency permit authorization steps.

5. Reporting and Documentation

Reporting and documentation for each of the three types of post-construction monitoring is summarized below.

5.1.1 NRCS WRE Performance

For areas under easement, outcomes from performance monitoring will be documented by NRCS in accordance with the Annual Monitoring Worksheet (form NRCS-CPA-1251). Reporting associated with performance monitoring will be shared with property owners and any other party identified in the specific funding agreement, if any.

5.1.2 Non-regulatory Performance

Non-regulatory performance monitoring will be conducted on a voluntary basis for up to five years following construction, or as funding is available. If monitoring occurs, a monitoring report would be developed annually when data is collected and would include monitoring data from the pertinent categories mentioned above. It would be made available to funders, regulatory agencies and/or other entities as requested.

Regulatory monitoring, i.e. monitoring that is required by permits, will be conducted in accordance with Project permits and is anticipated to be required annually for five years.

5.1.3 Maintenance

CDFW will carry out maintenance activities that are typical of and consistent with CDFW Wildlife Area maintenance plans. Significant maintenance actions, i.e., maintenance activities that differ from typical CDFW Wildlife Area maintenance activities, would be annually documented by CDFW. If significant maintenance activities are performed, documentation will include pre- and post-maintenance photographs with captions, identification of maintenance action location(s), and a description of the maintenance action taken, referencing potential maintenance actions included in **Appendix C, Table C-1**. Reporting will include documentation of conformity with criteria in **Appendix C, Table C-1**, including work window, work duration, description of equipment and methods, materials used, and avoidance measures implemented. Documentation of significant maintenance activities will be retained by CDFW for record keeping and shared with jurisdictional agencies to the extent required under Project permits.