# HORSESHOE POND RESTORATION PROJECT

## DELINEATION OF POTENTIAL JURISDICTIONAL WETLANDS AND WATERS OF THE UNITED STATES


PREPARED BY:
KRISTIN BYRD, LORRAINE PARSONS, AND DAVID PRESS
POINT REYES NATIONAL SEASHORE
POINT REYES STATION, CA
94956

CONTACT: LORRAINE PARSONS, WETLANDS ECOLOGIST
(415) 464-5193


July 2002

## INTRODUCTION

This report describes the methods and results of a delineation of the waters of the United States, including special aquatic sites such as wetlands, for the Horseshoe Pond Project Area (Project Area) in Point Reyes National Seashore, Marin County, California. The goal of the study was to map and describe areas within the Delineation Study Area (Study Area) under federal jurisdiction pursuant to Section 404 of the federal Clean Water Act and Section 10 of the Rivers and Harbor Act. The Study Area encompasses a larger area than the Project Area (Figure 1).

## PROJECT SUMMARY

Point Reyes National Seashore (PRNS) is proposing to restore the Project Area to a coastal lagoon/tidal estuary. The Project Area is located in the southwestern portion of PRNS, just north of Drakes Estero (Figure 1). Horseshoe Pond is actually a coastal lagoon that is closed to active tidal flushing due to the presence of a 350-meter-long dam. The dam, which consists of a concrete spillway and earthen levee, was constructed for livestock watering between 1943 and 1952 at the now decommissioned D Ranch. Information on historic conditions is scant, but, on the 1862 U.S. Coast Survey topographic map, the Horseshoe Pond is clearly marked as an estuary. The restoration project, which is scheduled to begin in fall 2002, would include removal of the existing dam and portions of the levee, recreation of the historic tidal inlet, rehabilitation of one of the quarry sites, and closeout of the ranch road that would be used for construction access.

Restoration of Horseshoe Pond would include partial removal of manmade features associated with the levee and spillway at the pond/beach interface. The levee/concrete spillway restricting the current outflow of the pond would be completely removed. The historic tidal inlet on the west side of the pond would also be recreated by removing a portion of the levee and deepening the remnant channel that is still present. Restoration of the historic channel will protect a cultural site threatened by the current outflow channel and help flush excess fine sediments from the west arm of Horseshoe Pond. Earthen material removed from the levee would be used to rehabilitate the quarry on the west side of the pond. Non-earthen material would be transported to the PRNS maintenance yard. Crews and equipment would access the dam and levee by way of a dirt road starting at D Ranch and continuing along the western side of Horseshoe Pond. Following completion of the project, this road, which is severely eroded, would be closed out.

Two sites have been identified as potential mitigation sites for the enhancement and creation of California red-legged frog habitat, pending issuance of a Biological Opinion by the U.S. Fish and Wildlife Service. The first site is located along the primary construction access road (Figure 1). The second is located east of the existing farm structures and is accessed by a second dirt road that begins at D Ranch and continues east across a drainage uphill of the western arm of the pond (Figure 1). Both once served as manure waste storage ponds for D Ranch.

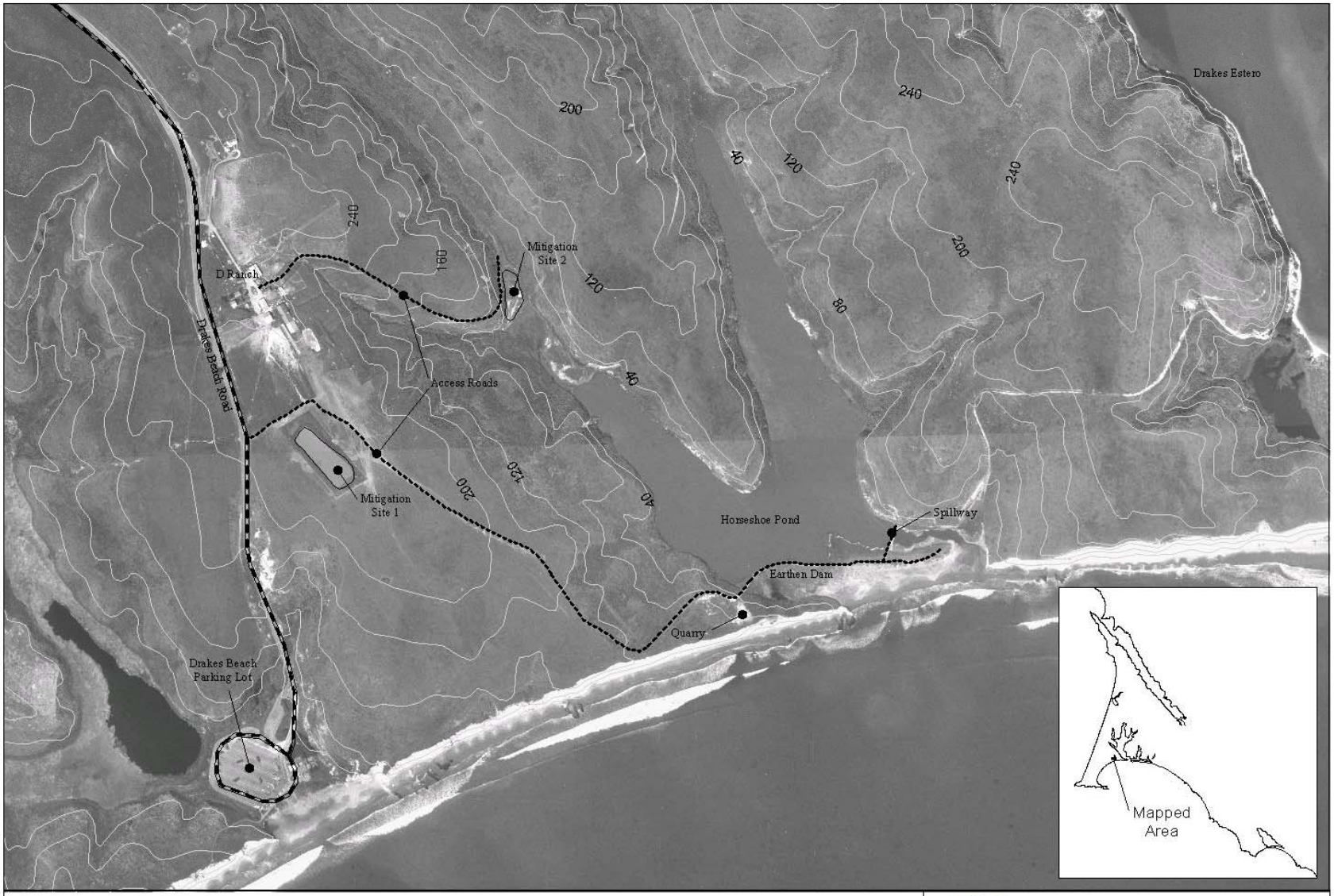


Figure 1. Horseshoe Pond Restoration Site.

**Point Reyes**
**National Seashore**

N

## METHODS

### Background Information on Jurisdiction of Federal and State Regulatory Agencies

*Section 404*

"Waters of the United States" has become the standard term used to classify all areas under federal jurisdiction pursuant to Section 404 of the Clean Water Act. The U.S. Army Corps of Engineers (Corps) has jurisdiction over a broad scope of waters, including territorial seas; coastal and inland "navigable" lake, rivers, and streams; tributaries to navigable waters; interstate waters; and other waters such as isolated lakes and intermittent streams that could conceivably play a role in interstate commerce. Isolated "waters" are defined as non-tidal areas that are not part of a tributary to interstate or navigable waters or that occur above the headwaters (average annual flow less than 5 cubic feet per second/cfs).

The Corps also has jurisdiction over special aquatic sites, such as vegetated shallows, mudflats, riffle and pool complexes, and wetlands that are both isolated from or adjacent to interstate and/or navigable waters and their tributaries. For delineation purposes, waters of the United States are commonly divided into "wetlands" and "other waters of the United States," which includes territorial seas, coastal and inland waters, lakes, rivers, and perennial, seasonal, and ephemeral/intermittent streams.

Under Section 404, the Corps has defined wetlands as:

> *Those areas that are inundated or saturated by surface or ground waters 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.* (33 CFR 328.3)

Riffle and pool complexes, another special aquatic site, are defined as "steep gradient sections of streams" in which "rapid movement of water over a coarse substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles" (40 CFR 230.45(a)).

*Section 10*

Predating Section 404, the Corps' jurisdiction was limited to "waters" subject to Section 10 of the Rivers and Harbor Act (1899). The Corps continues to oversee Section 10 jurisdictional waters, which are navigable waters that are subject to the ebb and flow of the tide, and/or those that are presently used, have been used in the past, or could be used for interstate transport or foreign commerce. Section 10 jurisdiction extends to mean high water (MHW) and includes tidal areas presently subject to tidal influence, as well as unfilled areas currently behind levees that were historically below MHW.

*Other Regulatory Agencies*

In addition to the Corps, there are several other regulatory agencies that have jurisdiction over aquatic habitats such as wetlands, bays, coastal areas, lakes, rivers, and streams. In California, these agencies include the CDFG, Regional Water Quality Control Board (RWQCB), the California Coastal Commission, and, in the San Francisco Bay area, the Bay Conservation and Development Commission (BCDC). In some senses, CDFG has a more limited jurisdiction than the Corps, focusing specifically on lakes, major tidal sloughs, rivers, and streams, where streams are defined as "....a body of water that flows at least periodically or intermittently through a bed or channel having banks...." CDFG also typically includes riparian areas adjacent to rivers and streams within its jurisdiction.

**Methodology for Delineating Corps Section 404 Jurisdiction**

In tidal areas, Section 404 jurisdiction, by definition, extends to the high tide line (HTL). Vegetated areas below the HTL are classified as wetlands, and non-vegetated areas are classified as "waters of the U.S." If adjacent or bordering, neighboring, or contiguous wetlands are present above the HTL, then Corps jurisdiction extends to the limit of the adjacent wetlands. In non-tidal areas, the Corps has jurisdiction over areas below the Ordinary High Water (OHW) mark in water features such as streams, rivers, and lakes and over unvegetated areas exhibiting at least two of three criteria used to delineate wetlands (i.e., hydric soils and hydrology) (see below).

Corps jurisdiction in vegetated areas that are either adjacent to or isolated from "waters" such as bays, lakes, rivers, and streams is determined by using the three criteria outlined in the Corps of Engineers Wetlands Delineation Manual (1987 Manual) (Environmental Laboratory 1987). Potential jurisdictional wetlands must meet all three criteria, which are presence of hydrophytic vegetation, hydric soils, and wetland hydrology. The soil, hydrology, and vegetation criteria used to make wetland determinations in non-tidal and/or isolated wetland areas are summarized below.

*Wetlands Criteria*

**Hydrology.** An area exhibits wetland hydrology characteristics if it is inundated or if the soil is saturated at a sufficient frequency and duration to support wetland vegetation during the growing season under normal circumstances. Areas that are only intermittently (< 5 percent of the growing season) inundated or saturated or never inundated or saturated are not wetlands. Evidence of wetland hydrology can include direct or primary indicators such as visible inundation or saturation, drift lines, water marks, sediment deposits, or drainage patterns; or indirect or secondary indicators such as oxidized/rhizome root channels, algal mats, matted vegetation, or water-stained leaves.

**Vegetation.** Plant species identified were assigned a wetland indicator status according to the *National List of Plant Species That Occur in Wetlands: California (Region 0)* (Reed 1988). This classification system is based on the estimated probability of occurrence of these plants in wetlands. Table 1 provides a summary of the classification system.

| Table 1. Plant Wetland Indicator Status Classification System (Reed 1988) | | |
|---|---|---|
| **Indicator Categories** | **Definition** | **Frequency of Occurrence in Wetlands** |
| OBL | Obligate, always found in wetlands | >99 percent |
| FACW | Facultative wetland, usually found in wetlands | 67-99 percent |
| FAC | Facultative, equal in wetlands or non-wetlands | 34-66 percent |
| FACU | Facultative upland, usually found in non-wetlands | 1-33 percent |
| UPL/NI | Upland/No Indicator, not found in local wetlands | <1 percent |

Plants with OBL, FACW, and FAC classifications are considered hydrophytic species. In using the routine wetland delineation method described in the 1987 *Manual*, the dominant plants in the area are listed. If more than 50 percent of the dominant species have a wetland indicator status of OBL, FACW, and/or FAC, the wetland vegetation criteria is satisfied.

**Soils.** An area exhibits a hydric soil characteristic if it is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor growth and regeneration of hydrophytic vegetation. The National Technical Committee for Hydric Soils has established several criteria for hydric soils, including histosols or organic soils; soils with aquic or periaquic moisture regimes; and soils that are ponded or that are frequently flooded for a long duration during the growing season. Long duration is defined as periods of inundation related to flooding from a single event that persist for 7 days to 1 month in length, and frequently flooded refers to events that occur with a 2-year recurrence interval. Soils meeting these criteria often display special characteristics, such as sulfidic odor, reducing soil conditions, gleying or low chroma and/or bright mottles, and iron and manganese concretions. Soil chroma is determined using a Munsell soil color chart (Kollmorgen Instruments Corporation 1994).

*"Waters of the US" Criteria*

As noted earlier, areas that are flooded or ponded for a sufficient duration to actually preclude vegetation from establishing can be subject to Section 404 jurisdiction as "other waters of the U.S." Non-tidal rivers, streams, and drainages with an average annual flow of greater than 5 cfs are classified as being "below the headwaters," and areas of these rivers, streams, and drainages that are below the OHW mark are considered Section 404 jurisdictional "other waters" of the U.S. These jurisdictional features often show evidence of an OHW and a discernible "bed and bank" and can include perennial, seasonal, and ephemeral/intermittent drainages. Streams or drainages with average annual flow less than 5 cfs are considered to be "above the headwaters" and are therefore delineated as an isolated water. Other potential isolated water features include lakes, ponds, and areas that have less than 5 percent vegetation cover, but still meet wetland hydrology and soil criteria or show evidence of an OHW mark.

The common definition of OHW relies principally on visual indicators of frequent flooding rather than on established stream gage data or any type of hydrologic analysis. The Corps defines OHW as the "line on the shore established by the fluctuations of water and indicated by

physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (CFR 328.3(e)).

Visual indicators can be difficult, if not impossible, to discern in shallowly entrenched systems with large floodplains (e.g., Laguna de Santa Rosa in Sonoma County) or in manipulated systems, such as those that have been subjected to mining or clearing activities or "improved" through levee construction or channelization. Determination of OHW in these types of systems must rely either entirely or to some degree on use of recorded hydrologic information such as stream gage data.

**Methodology for Delineating Corps Section 10 Jurisdiction**

MHW is typically determined from the nearest tide level station and then surveyed in the field from a benchmark of known elevation. The nearest tide level station to the Study Area is the Drakes Bay water level station maintained by the National Oceanic and Atmospheric Administration (NOAA) Field and Operations Division (NOAA Station 9415020) at the top of Drakes Bay, approximately 4.6-km from the Study Area. MHW for Drakes Bay is 2.26-ft. in the elevation datum National Geodetic Vertical Datum of 1929 (NGVD29) (Bergquist 1978). MHW for the Study Area was converted to the North American Vertical Datum of 1988 (NAVD88) using VERTCON, a conversion program maintained by NOAA's National Geodetic Survey over the internet. MHW in NAVD88 is 4.88-ft at the Horseshoe Pond Study Area.

As no benchmark occurs near the Study Area, MHW was mapped within the Study Area using elevations from LIDAR data collected in April 1998 (Appendix A). LIDAR (LIght Detection And Ranging) was designed and developed by the Observational Sciences Branch of NASA at the Wallops Flight Facility in Virginia. The instrument, originally designed for mapping ice sheets in Greenland, is called the Airborne Topographic Mapper or ATM. ATM LIDAR data were collected in partnership with the National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center, the NASA Wallops Flight Facility, the U. S. Geological Survey (USGS) Center for Coastal and Regional Marine Geology, and the NOAA Aircraft Operations Center. Raw elevation measurements have been determined to be vertically accurate to within 15 cm.

LIDAR elevations in NAVD88 are plotted in 5-m grids in the coastal margin of Horseshoe Pond, including the entire beach, dune and berm regions and extending approximately 70-m into Horseshoe Pond and 330-m offshore into Drakes Bay. LIDAR data were filtered from the data set to include elevations 0.5-ft above and 0.5-ft. below MHW, creating a MHW "band"in the southern portion of the Study Area (Appendix A).

**Literature Review Activities**

Prior to conducting the wetland delineation, available reference material relevant to the Study Area was reviewed. References included the U.S. Fish and Wildlife Survey National Wetlands Inventory Map, Drakes Bay quadrangle (FWS 1985), and the Marin County Soil Survey (SCS 1985).

**Field Survey Activities**

A wetland delineation of the Study Area was conducted by biologists Lorraine Parsons, Kristin Byrd, and David Press on July 19 and August 16, 2001. Wetland data points were collected, and vegetation, soil, and hydrology characteristics were recorded on standard Corps delineation data sheets. Data sheets are provided in Appendix B. A list of plant species observed in the Study Area was also compiled; this list is provided in Appendix C. Data points and some of the potential jurisdictional wetland boundaries were recorded with a Trimble GPS, and geographic data were mapped using ArcView software. A map depicting the location of potential jurisdictional Section 404 waters and Section 10 waters was prepared and is provided as Attachment A.

## SITE DESCRIPTION

Most restoration activities will occur along the oceanward shoreline of the Study Area (Figure 1). A levee extends along this shoreline, separating the pond from Drakes Beach. A concrete spillway is present on the eastern end of the levee, which crosses the pond outlet to the ocean. A portion of the historic roadway that crossed in front of Horseshoe Pond washed out in the mid-1980s, necessitating the construction of the concrete spillway facility in 1988. High tide and storm events extend up to the current spillway location, and have been observed spilling into the main body of the pond. In January 2002, an additional portion of the dam was washed out adjacent to the spillway facility. While some interaction between the pond and ocean was probably present during extreme tide or storm events, destruction of a portion of the dam means that increased interaction will probably occur during lesser tide or storm events. In addition, some type of groundwater connection probably exists, as well. Salinities within the pond often exceed 1 ppt, particularly during summer months during low water years, when salinities can reach 13 ppt.

A variety of habitats are present in the Study Area, including non-native annual grassland, coastal freshwater and brackish marsh, coastal salt marsh, and coastal dune and scrub. Coastal salt marsh occurs exclusively on the oceanward side of the levee, with coastal dune and scrub the predominant vegetation on the levee itself and on the dune swales between the beach and levee. Smalls pockets of coastal brackish and freshwater marsh fringe the pondward side of the levee and are bordered on the upland side by non-native annual grassland. Non-native annual grassland is the predominant vegetation community along the construction access roads, although the access road for one of the potential mitigation sites crosses some drainages dominated by seasonal wetland or freshwater marsh vegetation. A list of plant species observed during the wetland delineation is located in Appendix C.

Formation of the soils found in the Study Area was influenced strongly by the steep topography and eolian deposition of sand from ocean beaches (SCS 1985). Some clay is present, but for the most part, the soil texture is sand or sandy loam. The soil series present in the Study Area include: Tocaloma-McMullin complex, 30-50% slope; Humaquepts, seeped; Sirdrak sand, 2-15% slope; and Tomales-Sobega complex, 9-15% slope (SCS 1985) (Figure 2). Only the Humaquepts, seeped, series is considered a hydric soil (NRCS 2001).

According to the National Wetlands Inventory Map (FWS 1985, Drakes Bay quadrangle), several wetlands and waters are located within the Study Area (Figure 3). The mapped wetlands and their classifications are as follows:

- Horseshoe Pond: lacustrine limnetic, unconsolidated bottom, permanently flooded, diked/impounded

- Ocean-side (Oceanward) shoreline of Horseshoe Pond: estuarine intertidal, emergent, irregularly flooded


Figure 2. Soil Types in the vicinity of the Horseshoe Restoration Project Area (SCS 1985).

Soil Types

Study Area

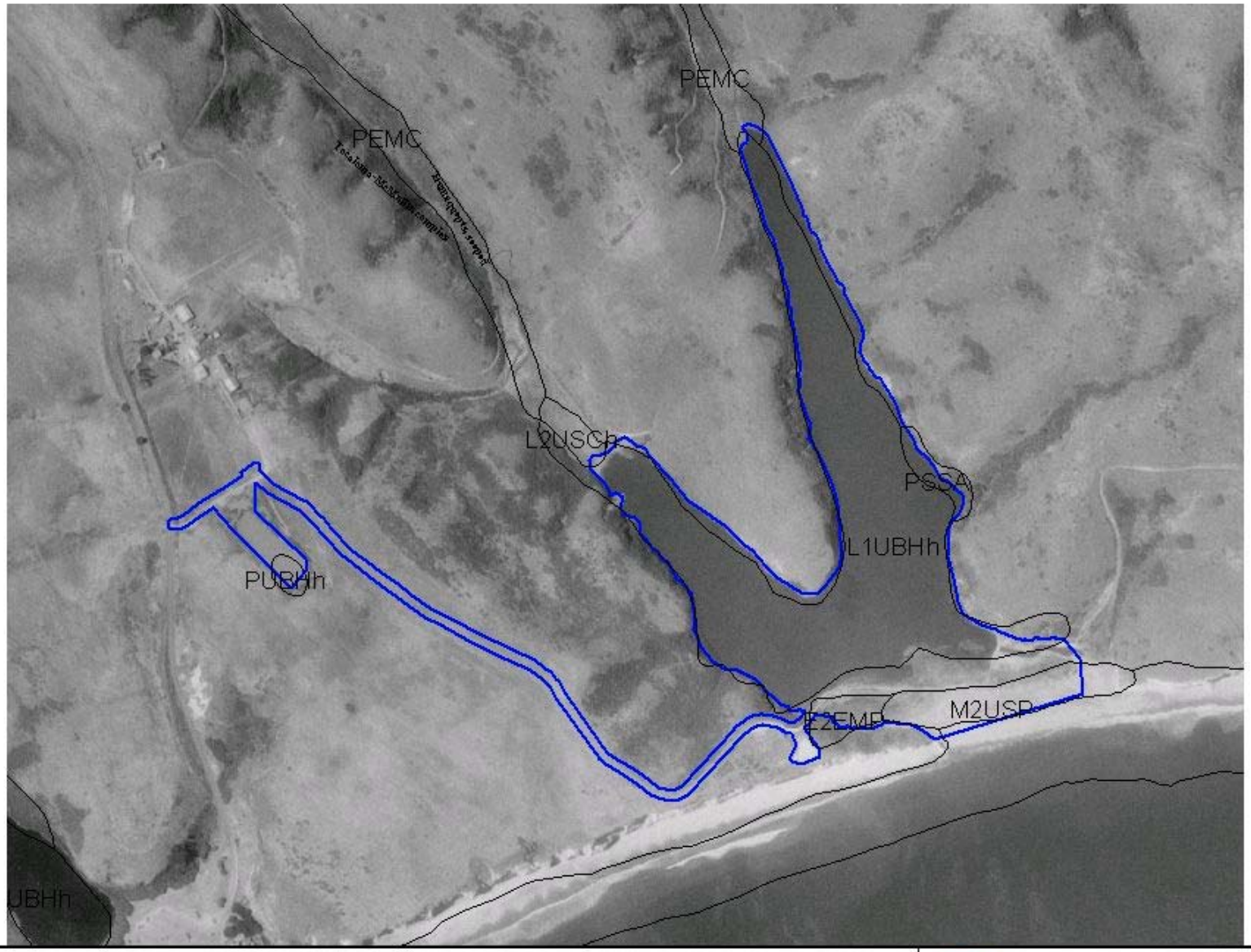


Figure 3. National Wetlands Inventory (US FWS 1985) showing wetland types in the vicinity of the Horseshoe Restoration Project Study Area.

NWI Wetlands Study Area

**Point Reyes National Seashore**

N

0 200 400 600 800 1000 Feet

- Ocean-side (Oceanward) shoreline of Horseshoe Pond: marine intertidal, unconsolidated shore, irregularly flooded

- Northwest shore of Horseshoe Pond: lacustrine littoral, unconsolidated shore, seasonally flooded, diked/impounded

- Drainage north of Horseshoe Pond: palustrine emergent, seasonally flooded

- Waste pond: palustrine, unconsolidated bottom, permanently flooded, diked/impounded

## POTENTIAL JURISDICTIONAL AREAS

### Potential Jurisdictional Section 404 Wetlands and "Other Waters"

*Dam, Levee and Vicinity*

Potential jurisdictional tidal wetlands and "other waters" occurred on the oceanward and pondward side of the levee and dam below the High Tide Line (Appendix A). On the oceanward portion of the levee road, tidal areas were delineated by presence of a distinct wrack-line, which was approximately 25-ft south of the levee road and basically separated the back dunes from the beach. Tidal waters were found in the lagoon outlet that connects the pond to the ocean during spill-over and extreme tide and storm events. Also, unvegetated flats where vegetation cover was less than 5 percent were also classified as waters. Tidal wetlands occurred in areas where vegetation cover below the High Tide Line exceeded 5 percent. Dominant plant species within tidal wetlands were composed of typical coastal salt marsh, brackish marsh, and freshwater marsh species such as *Distichlis spicata* (salt grass - FACW), *Scirpus pungens* (common threesquare - OBL), *Cotula coronopifolia* (brass buttons - FACW+), *Polypogon monspeliensis* (annual beard grass - FACW+), *Potentilla anserina* (cinquefoil-OBL), *Rumex crispus* (curly dock - FACW-), *Juncus lesueurii* (rush), *Salicornia virginica* (pickleweed - OBL), *Atriplex triangularis* (spearscale - FACW), *Jaumea carnosa* (jaumea - OBL), and *Trifolium variegatum* (clover - FACW-).

The portion of the beach inland of the High Tide Line is dominated primarily by upland grasses and herbs and some shrubs, including *Aira caryophylla* (silver European hairgrass - NI), *Rumex acetosella* (sheep sorrel - FAC-), *Bromus hordeaceus* (brome - NI), *Baccharis pilularis* (coyote brush - NI), *Sonchus asper* (prickly sow thistle - FAC), *Holcus lanatus* (common velvet grass - FAC), *Bromus carinatus* (California brome - NI), *Cardionema ramosissima* (NI), and *Grindelia hirsutula* (gumplant - NI). Most of this area could not be considered as potential jurisdictional wetlands, as there were no hydrology indicators and the sand substrate lacked mottles. The dominant vegetation also did not meet the wetland vegetation criteria (Appendix A, data points 2A and 2B). However, one depressional area inland of the High Tide Line was determined to be a potential jurisdictional adjacent wetland. Dominant plants in this area included *Juncus* sp., common velvet grass (FAC), cinquefoil (OBL), *Lotus corniculatus* (bird's foot trefoil - FAC), and some *Sonchus oleraceus* (common sow thistle - NI*). Wetland hydrology was evidenced by the presence of a drainage pattern, while the low chroma (2) soils had some mottles.

On the pondward side of the levee road, the portion of Horseshoe Pond and its shoreline that fell within the Study Area was classified as potential jurisdictional tidal water. While tidal exchange does not occur daily, extreme high tide and storm tides do penetrate into the pond interior, particularly since failure of the concrete spillway. Most of the pond's shoreline abuts steep slopes. Water from the hills runs directly into the pond via numerous drainages, and little level terrain is present along the shore to produce hydrologic conditions needed for wetland formation. As a result, only sparse small patches or clumps of wetland vegetation, including *Scirpus pungens* (common threesquare - OBL) and *Scirpus californicus* (OBL), are present on the pond's edge, and these patches account for less than 5 percent of the pond's total area.

Potential tidal wetlands did occur in a fringe along the pondward side of the levee and dam structure. The soils in this area are primarily Humaquepts, seeped. These soils are poorly drained clay or clay loams, with sandy loam on the surface. In the data points, although there were no mottles, the soil had a chroma of 1 and was gleyed. Closer to the pond (Appendix A, data point 3A), the soils were saturated; further out, soils were moist (Appendix A, data point 3B) and likely saturated for periods of 14 to 18 days in the winter. Dominant vegetation included *Eleocharis macrostachya* (spikerush - OBL), common threesquare (OBL), *Digitaria sanguinalis* (FACU), rush (FACW), and salt grass (FACW). The border between the wetland and upland areas was marked by a change in soil from clay loam to a lighter sand (chroma 2) that lacked mottles. Vegetation in this upland area included *Plantago lanceolata* (English plantain - FAC-), common velvet grass (FAC), sheep sorrel (FAC-), and *Juncus* sp. (Appendix A, datapoint 3C). Based on the change in soil type and corresponding change in vegetation, the border of the wetland was determined to be the upland edge of common velvet grass.

*Construction Access Road*

Potential jurisdictional isolated wetlands and "other waters" were restricted to the western end of the construction access road. On the northern side of the road, a drainage swale exists that drains run-off from a field just south of D Ranch. The swale was dominated by *Lolium multiflorum* (Italian ryegrass-FAC), with some *Hordeum murinum* ssp. *glaucum* (barley - NI) present, as well. Observed hydrology indicators included primary indicators such as drainage pattern, as well as secondary indicators such as water-stained leaves and matted vegetation (Appendix A, data point 6A). The soil, a loamy sand, had a low chroma (1.5), although no mottles were observed. The boundary between wetland and upland was defined by a topographic break and increasing dominance of upland herbs and forbs. Across the road from the drainage swale is a depressional feature that has formed at the base of a berm built for a nearby former manure waste pond. This feature exhibited wetland hydrology indicators such as sediment deposits and water-stained leaves (Appendix A, data point 8A). Soils were again a loamy sand with a chroma of 1.5 and lacked mottles. Dominant vegetation included spearscale (FACW), annual beard grass (FACW+), Italian ryegrass (FAC), and barley (NI). The wetland boundary was clearly defined by the steep slopes of the depressional area.

Some drainage features exist further south along the access road leading from D Ranch to the Horseshoe Pond levee. However, while topography suggested that some run-off must occur during rainy periods, neither wetland hydrology nor hydric soils were observed (Appendix A, data points 9, 10). Marginal wetland vegetation was present; Italian ryegrass (FAC) dominated along with *Bromus hordeaceus* (brome - NI). At data point 10, the steep gradient of the drainage channel and the sandy soils likely prevented ponding or ground saturation.

*Potential California Red-Legged Frog Mitigation Site 1: Former Manure Waste Pond and Construction Access*

Just south of D Ranch is an abandoned waste pond that may be used as a mitigation site for impacts to California red-legged frogs. The soil type in this area is classified as predominantly

Sirdrak sand, 2 to 15 percent slope, somewhat excessively drained. The former manure waste pond and construction access areas include potential isolated wetlands and isolated waters. Potential isolated wetlands in the construction access area are comprised of the isolated wetlands discussed above under *Construction Access Road* (Appendix A, data points 6A and 8A). As for the manure waste pond itself, which has not been maintained since 1999, the northern half of the waste pond was classified as a potential jurisdictional isolated wetland, because, at the time the delineation was performed, vegetation exceeded 5 percent cover, while the southern half was classified as a potential jurisdictional isolated "waters," because vegetation cover was less than 5 percent. The vegetated portion was dominated by Italian ryegrass (FAC) and annual beard grass (FACW+) (Appendix A, data point 7). Matted vegetation and some algal mats were present, and soils had a chroma of 1. Boundary for the potential jurisdictional feature was determined by the presence of an Ordinary High Water (OHW).

*Potential California Red-Legged Frog Mitigation Site 2: Former Manure Waste Pond and Construction Access*

A former waste pond exists on the north end of the western arm of Horseshoe Pond, which has been chosen as a second potential mitigation site for California red-legged frogs. Within this area is a potential jurisdictional isolated wetland, characterized by a seasonal six-inch-wide drainage pattern with matted vegetation (Appendix A, data point 11A). Dominant vegetation consists of Italian ryegrass (FAC) and curly dock (FACW-). Annual beard grass (FACW+) is present in the upper drainage. The soils in the former waste pond have a loamy sand texture and a chroma of 2, with a hard panne present 3 inches from the surface, which contributes to prolonged soil saturation and possible ponding in the winter.

Directly adjacent to the former waste pond is a seasonal drainage to Horseshoe Pond. This drainage, characterized by data point 12, is considered a potential jurisdictional adjacent wetland. The soils at this point were a low chroma (2) sandy loam with abundant, bright mottles and were still moist on the August survey date. Vegetation included *Oenanthe sarmentosa* (OBL), rush (FACW), Italian ryegrass (FAC), spearscale (FACW), annual beard grass (FACW+), and common threesquare (OBL). The drainage is distinguished by an Ordinary High Water mark; width of the drainage is about 8 feet wide on average.

A potential jurisdictional isolated wetland was identified along the construction access to the former waste pond, near the D Ranch barns, uphill of Horseshoe Pond. The drainage near the barn is a seep marked by a topographic break in the slope, with gleyed soils at a depth of 3 to 4 inches (Appendix A, data point 13A); it is dominated by *Rorippa nasturtium-aquaticum* (watercress - OBL) and Italian ryegrass (FAC).

**Potential Jurisdictional Section 10 Waters**

Based on the LIDAR data, potential jurisdictional Section 10 Waters in the Study Area occurred only along the beach area oceanward of Horseshoe Pond and did not extend into the existing channel or into Horseshoe Pond itself.

## POTENTIAL JURISDICTION OF THE CORPS OF ENGINEERS

Following is a list of potential jurisdictional areas found within the Study Area and their respective areas:

| **Wetland/Water Type in Delineation Study Area** | **Area in Acres** |
|---|---|
| ***Section 404 Wetlands and "Other Waters"*** | |
| Tidal Waters | 6.45 |
| Tidal Wetlands | 3.03 |
| Adjacent Wetlands | 0.95 |
| Isolated Waters | 0.36 |
| Isolated Wetlands | 0.55 |
| ***Section 10 Waters*** | 0.41 |

A qualitative map indicating presence of potential jurisdictional wetlands and waters is provided in Attachment A. Datasheets for the sampling locations are provided in Appendix B.

## REFERENCES


Bergquist, J. R. 1978. Depositional history and fault-related studies, Bolinas Lagoon, California. United States Geological Survey.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Department of the Army, Waterways Experiment Station, Vicksburg, MS 39180-0631.

Kollmorgen Instruments Corporation. 1994. Munsell Soil Color Charts. Windsor, New York.

Reed, P.B., Jr. 1988. National list of plant species that occur in wetlands: California (Region 0). U.S. Fish and Wildlife Service Biological Report 88 (26.10).

U.S. Fish and Wildlife Service (FWS). 1985. National wetland inventory maps. Drakes Bay quadrangle. U.S. Fish and Wildlife Service, Corvallis, OR.

U.S. Natural Resources Conservation Service (NRCS). 2001. NRCS Hydric Soil Series list by State. www.statlab.iastate.edu/solls/hydric/ca.html. Website visited 9/10/01.

U.S. Soil Conservation Service (SCS). 1985 Soil Survey of Marin County, California. U.S. Department of Agriculture. Soil Conservation Service.

# Appendix A

See Corps Map Appendix A as separate pdf

# Appendix B

Field Notes not in digital format

# Appendix C

List of plant species observed during the wetland delineation within Horseshoe Pond Project Area.

| Family | Full Species Name | Common Name | Wetland Status |
|---|---|---|---|
| Aizoaceae | *Carpobrotus edulis* | fig-marigold | NI |
| Apiaceae | *Conium maculatum* | poison hemlock | FAC |
| | *Oenanthe sarmentosa* | water parsley | OBL |
| Asteraceae | *Achillea millefolium* | yarrow | FACU |
| | *Ambrosia chamissonis* | beach-bur | |
| | *Anthemis cotula* | mayweed | FACU |
| | *Baccharis pilularis* | coyote brush | |
| | *Carduus pycnocephalus* | Italian thistle | |
| | *Cirsium vulgare* | bull thistle | FAC |
| | *Cotula coronopifolia* | brass buttons | FACW+ |
| | *Gnaphalium luteo-album* | everlasting | FACW- |
| | *Grindelia hirsutula* | gum plant | FACW |
| | *Hypochaeris radicata* | rough cat's ear | FACU* |
| | *Jaumea carnosa* | jaumea | OBL |
| | *Madia sativa* | coast tarweed | |
| | *Sonchus asper* | prickly sow thistle | FAC |
| | *Sonchus oleraceus* | common sow thistle | NI* |
| Brassicaceae | *Cakile maritima* | sea rocket | FACW |
| | *Raphanus sativus* | wild radish | UPL |
| | *Rorippa nasturtium-aquaticum* | watercress | OBL |
| Caryophyllaceae | *Cardionema ramosissimum* | | |
| | *Silene gallica* | catchfly | |
| | *Spergularia rubra* | sand-spurry | FAC- |
| | *Stellaria* sp. | chickweed | |
| Chenopodiaceae | *Atriplex triangularis* | spearscale | FACW |
| | *Salicornia virginica* | pickleweed | OBL |
| Cucurbitaceae | *Marah* sp. | man-root | |
| Cyperaceae | *Eleocharis macrostachya* | spike rush | OBL |
| | *Scirpus californicus* | | OBL |
| | *Scirpus pungens* | common threesquare | OBL |

| Family | Full Species Name | Common Name | Wetland Status |
|---|---|---|---|
| Fabaceae | *Astragalus pycnostachyus* var. *pycnostachyus* | marsh milkvetch | OBL |
| | *Lotus corniculatus* | bird's foot trefoil | FAC |
| | *Lupinus arboreus* | yellow bush lupine | |
| | *Lupinus variicolor* | lupine | |
| | *Trifolium fragiferum* | strawberry clover | NI* |
| | *Trifolium repens* | white clover | FAC |
| | *Trifolium variegatum* | clover | FACW- |
| Iridaceae | *Iris* sp. | iris | |
| Juncaceae | *Juncus balticus* | rush | FACW+ |
| | *Juncus lesueurii* | rush | FACW |
| Malvaceae | *Malva* sp. | mallow | |
| Plantaginaceae | *Plantago lanceolata* | English plantain | FAC- |
| Poaceae | *Aira caryophyllea* | silver European hairgrass | NI |
| | *Ammophila arenaria* | European beach grass | FACU |
| | *Bromus carinatus* | California brome | |
| | *Bromus diandrus* | ripgut brome | |
| | *Bromus hordeaceus* | brome | FACU- |
| | *Cynosurus echinatus* | hedgehog dogtail | |
| | *Deschampsia cespitosa* | tufted hairgrass | FACW |
| | *Digitaria sanguinalis* | | FACU |
| | *Distichlis spicata* | salt grass | FACW |
| | *Festuca arundinacea* | tall fescue | FAC- |
| | *Holcus lanatus* | common velvet grass | FAC |
| | *Hordeum brachyantherum* | barley | FACW |
| | *Hordeum marinum* ssp. *gussonianum* | Mediterranean barley | FAC+ |
| | *Hordeum murinum* ssp. *glaucum* | barley | |
| | *Leymus triticoides* | | FAC+ |
| | *Lolium multiflorum* | Italian ryegrass | |
| | *Phalaris* sp. | | |
| | *Polypogon monspeliensis* | annual beard grass | FACW+ |

| Family | Full Species Name | Common Name | Wetland Status |
|---|---|---|---|
| | *Vulpia* sp. | | |
| Polygonaceae | *Rumex acetosella* | sheep sorrel | FAC- |
| | *Rumex crispus* | curly dock | FACW- |
| | *Rumex pulcher* | fiddle dock | FAC+ |
| Rosaceae | *Potentilla anserina* ssp. *pacifica* | cinquefoil | OBL |
| | *Rubus ursinus* | California blackberry | FAC+ |