

**California Regional Water Quality Control Board
San Francisco Bay Region**

**Tentative Order
Waste Discharge Requirements and Water Quality Certification for**

**U.S. Fish and Wildlife Service
Cullinan Ranch Restoration Project**

Findings

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter called the Water Board or the Board, finds that:

Purpose of the Order

1. The U.S. Fish & Wildlife Service (US FWS) submitted a Report of Waste Discharge/Application for 401 Certification on May 7, 2010 to restore the former Cullinan Ranch located in Napa and Solano Counties. The Cullinan Ranch Restoration Project (Project) will restore 1,575 acres of seasonal wetlands and uplands to tidal wetlands in the San Pablo baylands to benefit at-risk fish and wildlife species.
2. The U.S. National Wildlife Refuge System manages ecosystems to conserve and sometimes restore biological populations and their habitats. The San Pablo Bay National Wildlife Refuge (Refuge) is part of this system of hundreds of federal wildlife refuges charged with protecting, maintaining and creating habitat for species protected under the Federal Endangered Species Act. The purpose of the Project is to fulfill this federal mandate for the benefit of endangered and threatened salt marsh-dependent species. The property was purchased by the Refuge under the authority of the Endangered Species Act with the intent that it would be restored to support tidally influenced habitats.
3. The objective of the project is to increase suitable habitat for endangered species such as the salt marsh harvest mouse (*Reithrodontomys raviventris haliocoetes*), California clapper rail (*Rallus longirostris obsoletus*), soft bird-beak (*Cordylanthus mollis* spp.), the threatened species Delta smelt (*Hypomesus transpacificus*), and anadromous salmonids in the larger San Francisco Bay ecosystem. Specifically, the purpose of the Project is to:

- Restore historic wetlands in San Francisco Bay, particularly in the Napa River Estuary
- Restore habitat to recover federal- and state-listed special status species
- Provide habitat for a broad range of marsh-dependent birds, mammals, fish and other aquatic organisms, and migratory shorebirds and waterfowl
- Improve connectivity between habitats at the site and adjacent sites to enable wildlife movement
- Sustain the Napa River estuarine environment with minimal intervention
- Provide wildlife-sensitive public access and recreation
- Maintain existing levels of flood control
- Reduce mosquito breeding habitat
- Minimize long-term management needs, including invasive species management

Site Location and Description

4. The Cullinan Ranch Project is part of the San Pablo Bay National Wildlife Refuge (Figure 1, Attachment A) located on the northern shore of San Pablo Bay bordered by South and Dutchman sloughs to the north and Highway 37 to the south. Cullinan Ranch was historically part of a much larger complex of estuarine tidal marsh in the lower Napa River floodplain which included the adjacent Napa River wetlands complex, known as Napa Sonoma Restoration Project (NSRP), which is also being restored to tidal marsh under Board Orders R2-2004-0063 and R2-2007-0045. The latter Order amends the earlier one to cover the Napa Plant Site. A recent request to conduct additional work in Pond1 within NSRP managed by the California Department of Fish and Game (CDFG) was recently approved by Water Board staff. Figure 2 shows the existing conditions at the Cullinan Ranch site and the adjacent NSRP restored and managed ponds by CDFG. The Napa Sonoma wetland restoration projects surrounding Cullinan Ranch are shown in Figure 3.
5. Cullinan Ranch was diked and reclaimed for agriculture in the late 1800s and farmed for oats and hay through the 1980's. In 1987 a private proposal to develop the site into a residential community was defeated by several conservation groups. In 1991 the US FWS, under the authority of the Endangered Species Act, acquired the land and began to develop plans to restore it to tidal marsh. In 1994, the US FWS stopped pumping water off the site.

Existing Conditions:

6. The Cullinan Ranch site has subsided on average 5-6 feet below sea level. It is currently a mix of upland and seasonal freshwater wetlands including unvegetated drainage ditches, remnant non-tidal open water slough channels, and a relatively small amount of tidal marsh. The jurisdictional waters and wetlands were initially mapped in 2000 and the delineation and mapping were reconfirmed by the US Army Corps of Engineers (ACOE) on November 21, 2008. Approximately 1,370 acres are waters of the U.S. and in ACOE jurisdiction. Approximately 205 acres are upland. Table 1 provides a summary table of jurisdictional waters of the U. S.

Land Cover		Linear Feet	Acres	Percent
Open Water	Agricultural ditches	62,396	72.71	4.6%
	Remnant sloughs	13,439		
Coastal Salt Marsh		N/A	33.24	2.1%
Freshwater Marsh		N/A	1,264.36	80.3%
Upland		N/A	204.61	13.0%
Total			1,574.92	100%

Habitat Evolution

7. Long-term effects of the Project are beneficial, and include a substantial increase in tidal marsh area, as well as reduced predator access. Tidal marsh and mudflat habitats at the site would be substantially increased over time. Mudflats and shallow water intertidal habitats are important foraging and resting habitats for shorebirds and waterfowl in the San Pablo Bay region during spring and fall migration, and during over-wintering periods. Tidal sloughs are also used by many important fish species.
8. Tidal habitats would increase from approximately 33 acres currently existing in the project area to 1,549 acres. Restoration will occur primarily through the process of natural sedimentation. After breaching the levees bordering South and Dutchman Sloughs and Guadalcanal Village mitigation project at 5 locations, the site will be muted tidal and remain largely inundated. A minimum of 30 acres (with the possibility of an additional 50 acres if funding and sufficient clean material is available) will be restored immediately to tidal marsh elevations. The remaining area will gradually transform from subtidal to tidal marsh over several decades.
9. Tidal marsh elevations and tidal marsh habitat are predicted to dominate the project area within approximately 60 years after the reintroduction of tidal circulation. However, predictions of future conditions are based on estimates of approximate rates of sediment accumulation, channel formation, and colonization by tidal marsh vegetation at a relatively low rate of sea level rise. Consequently, the actual rate at which tidal wetland habitats would evolve is somewhat

speculative because of the uncertainties regarding the function and interaction of the parameters in a tidal system and the rate of climate change and associated sea level rise. At maturity, it is anticipated that the Project will consist of approximately 1,549 acres of tidal marsh habitat interspersed with channels and 26 acres of uplands and levees.

Project Description

10. The proposed project will consist of levee improvements, ditch blocking, internal site modifications, levee lowering, and construction of levee breaches to restore the hydrologic connection between the Cullinan Ranch site and adjacent sloughs. Restoration to tidal marsh would use both on-site and off-site material for ditch blocks, wetland creation, and to reinforce levees. Wetland creation may include beneficial reuse of clean dredged material suitable for wetland surface material to restore between 30 and 80 acres of salt marsh harvest mouse habitat at marsh plain elevation adjacent to a known source population of this endangered species. Some areas will be excavated to create channels and deep pools; these areas are intended to remain self-sustaining open water habitat, maintained by the daily tidal prism. If these channels or pools fill in with sediment, no maintenance (excavation/dredging) will be conducted. Construction may occur in several locations at once; however, all internal construction, and construction associated with the Highway 37 and Pond 1 levees will be completed before the site is breached.
11. The target habitat is coastal salt, or tidal, marsh. Some of the current 33 acres of existing coastal salt marsh along Dutchman and South sloughs may be lost or degraded during restoration as the tidal prism within this area increases, scouring the channels and altering sediment dispersal throughout the system. However, as sediment accumulates on the Cullinan Ranch site, the tidal prism within the system will stabilize, and erosion rates will decrease along these levees, allowing the formation of new tidal marsh fringe habitat. The potential loss of these habitats would be offset by the creation of a minimum of 30 acres of land at an elevation suitable for immediate tidal marsh habitat colonization. The creation of the tidal salt marsh would eventually improve habitat for special status and other salt marsh species.
12. The introduction of twice-daily tidal flows to the site will deposit sediments subsequently raising the site to tidal marsh elevations with salt-tolerant marsh vegetation and meandering slough channels. Tidal mudflats and marsh vegetation, including pickleweed and cordgrass, will provide vital tidal marsh habitat for the endangered species.
13. The Project will protect Highway 37 from flooding by constructing an approximately 3,500-foot-long buttress levee on the north side of Highway 37, extending from the western Guadalcanal Village levee westward and tying into

the Highway 37 embankment at the edge of the site adjoining the Mare Island off-ramp from Highway 37. The remaining approximately 12,100 feet of highway embankment will be armored to prevent wind-wave erosion.

Benefits of Wetland Restoration

14. The proposed project will make a large and valuable contribution to tidal wetland restoration in the San Francisco Bay region, which was recommended by the Baylands Ecosystem Habitat Goals Report (1999) and the Comprehensive Conservation and Management Plan (1993; updated 2007). Both studies encouraged the return of salt ponds and farmland to tidal marsh where feasible.
15. Restoring tidal wetland functions to former agricultural land will improve water quality in the San Francisco Bay Estuary by maximizing wetland ecotonal or edge habitat, and minimizing non-native vegetation (if appropriate management efforts are taken to control non-native species). Marsh systems that are tidally connected to the estuary improve water quality by filtering and fixing pollutants, in addition to protecting beneficial uses by providing the following: nursery habitat and protection from predation for native fish species, significant biological productivity to the estuarine system, and habitat for rare and endangered species. Successful restoration would also provide shallow-water habitat for migrating shorebirds and other water birds. In addition to habitat and water quality benefits, tidal marsh restoration will also help protect communities from floods, storms, and sea level rise.
16. The Project's goal to provide public access and recreation will help educate the public, achieve regional public access (e.g., the Bay Trail), and build public support for future phases of restoration.

Related Studies and Projects in the San Francisco Bay and Previous Board Orders

17. Other adjacent areas such as CDFG's Ponds 2, 2A and 3 to the north, and Pond 1 to the west, in addition to San Pablo Bay and Highway 37 to the south, and Caltrans' Guadalcanal Village mitigation project to the east, would be compatible with the proposed restoration at the Cullinan Ranch site. Once restoration begins, each of these adjacent restored areas will be either hydrologically connected to the Cullinan Ranch site or managed in conjunction with the Cullinan Ranch site as a contiguous wildlife habitat area.
18. In addition to the improvements on USFWS property, others funded as part of the USFWS project are also planned to CDFG's Pond 1 and the eastern Pond 1 levee (between Pond 1 and the Cullinan Ranch site). CDFG activities on its property will affect the Cullinan Ranch site, but those are covered under a separate letter recently approved for CDFG. Under the existing Orders for NSRP, three

breaches along Pond 3 across Dutchman Slough from the Cullinan site would be made in the same vicinity as three of the proposed Cullinan Ranch breaches.

19. The US FWS approved a Biological Opinion for Cullinan Ranch on May 7, 2010 which lays out conditions to protect biological species potentially affected by the Project. The National Marine Fisheries Service also sent a letter of approval on April 5, 2010 as long as certain measures described in this Order are followed to protect water quality for fish habitat. Both federal agencies support the overall restoration to tidal marsh as a major benefit to biological species.

Overview of the Restoration Activities

20. A conceptual diagram of the proposed project shows the eight primary restoration components (Figure 4) which will culminate with lowering and breaching the Dutchman and South Slough levees on the northern edge of the site. The components listed below are briefly summarized in Findings 21-28, and described in more detail in Attachment B(i), the FEIS/R (USFWS and CDFG 2009), and the amendment to CDFG RWQCB Orders R2-2004-0063 and R2-2007-0045. Attachment B(ii) contains the time line and the construction schedule.

- 1 – Block existing drainage ditches to promote redevelopment of the natural sloughs
- 2 – Improve the Pond 1 levee and install water control structures
- 3 – Protect Highway 37 from flooding and erosion
- 4 – Construct public access areas
- 5 – Pre-flood Cullinan Ranch site prior to breaching the levees
- 6 – Lower levees for near-term habitat creation
- 7 – Breach the levees along Dutchman and South Sloughs and Guadalcanal Village
- 8 – Long-term monitoring and management

21. **Component 1: Block Drainage Ditches Created for Agriculture to Redevelop the Natural Channel Network.** Some of the former agricultural channels may be blocked by depositing soil and loosely compacting short sections of the channels. These ditch blocks would be constructed of on-site soils retrieved from the existing internal berms, or material from the excavation of the channel at CDFG Pond 1, if there is sufficient material available after the improvements to the Pond 1 levee are complete. The ditch blocks can be constructed at any time when suitable excavated material is available and would be constructed prior to breaching.

- 22. Component 2: Improve the Pond 1 Levee and Install Water Control Structures.** This work will be addressed under CDFG's NSRP Order and its amendments. A request for this work was recently submitted by CDFG and approved by the Water Board staff. The following changes will be made to Pond 1: a channel and two water control structures will be added to flood Cullinan Ranch before the planned breaches; the existing levee will be reinforced and raised; the borrow ditch will be filled with material from the channel excavation; and the eastern slope will be flattened. Excess material generated from the channel construction will be used on the Cullinan Ranch site. Material to raise the levee would likely have to be imported because the excavated material from Pond 1 would not have the proper geotechnical and engineering characteristics.
- 23. Component 3: Protect Highway 37 from Flooding and Erosion.** Hydrologic studies determined that if the Cullinan Ranch site were restored without adequately protecting the embankment, the eastern portion of Highway 37 would likely be flooded during combined high tide and storm events and could undergo significant erosion. Tidal marsh restoration at the Cullinan Ranch site cannot be accomplished without protecting the Highway 37 embankment. The embankment will be protected by constructing an approximately 3,500-foot-long buttress levee on the north side of Highway 37, extending from the western Guadalcanal Village levee westward and tying into the Highway 37 embankment at the edge of the site adjoining the Mare Island off-ramp from Highway 37. The remaining approximately 12,100 feet of highway embankment will be armored to prevent wind-wave erosion. The buttress levee will be higher in elevation than the eastern section of Highway 37 that it is protecting. The buttress levee design will include a grassy swale below the highway shoulder to convey rainwater away from the embankment. Best management practices for preventing highway runoff from entering the restoration site and for treating it will be proposed by the US FWS and approved by Water Board staff.
- 24. Component 4: Construct Public Access Features.**
The Project would significantly improve public access. Although many of the public access improvements are located on CDFG property, the improvements will be constructed as part of this Project. The Project would add the following public access improvements:
- a. Acceleration and deceleration lanes from Highway 37 to provide safer vehicle access
 - b. A kayak launch site previously approved under CDFG Order R2-2004-0063 and amendments
 - c. A viewing platform with interpretive signs and benches
 - d. A 100-foot long fishing pier
 - e. Graded intertidal benches with pickleweed and other native tidal marsh plant species near an existing parking lot to provide interpretation opportunities

- f. Resurface 7,000 feet of the Pond 1 levee to improve the informal trail access previously approved under CDFG Order R2-2004-0063 and amendments

Some planned public access that is part of this Project and funded by USFWS will occur on or adjacent to the CDFG Pond 1 levee. CDFG has requested an amendment for some of the work under the existing NSRP Order (RWQCB Order R2-2004-0063 and amendments), and the remaining public access improvements located on USFWS property are included in this Order.

25. Component 5: Pre-flood Cullinan Ranch Site Prior to Breaching the Levees.

The site has lain fallow for over a decade, allowing the formation of ruderal upland vegetation and wetland habitats, primarily seasonal wetlands. To allow slow emigration of animals from the site, flooding would be phased before full tidal flow is restored. In the first phase, not more than one month prior to breaching, it would be slowly flooded in stages between October 1 and December 30 (when water naturally ponds in the site) using the water control structures installed in CDFG's Pond 1 levee for this project (as proposed by CDFG under orders R2-2004-0063 and 2007-0045). Once the Site is flooded to a minimum depth of one foot and animals have had an opportunity to emigrate, the levee between the site and South and Dutchman Sloughs would be breached as described in Component 7. Breaching must be completed between November 1 and January 30 to avoid migrating juvenile salmonids and comply with the National Marine Fisheries Service informal consultation dated April 5, 2010 and the US FWS Biological Opinion dated May 7, 2010. The Guadalcanal breach opening may also be opened at this time. This breach was constructed but not opened as part of the CalTrans Guadalcanal mitigation project. (Provision E.14)

Anaerobic conditions may form during the pre-flood period depending on the length of time water is held in Cullinan Ranch prior to breaching the outboard levees. Water quality monitoring will be conducted at the site and in the adjacent sloughs both before and after the site is flooded to assess pre- and post- breach conditions. Monitoring will include dissolved oxygen, temperature, salinity, pH, turbidity, mercury, methyl-mercury (in water, sediment, and/or biosentinel species), and other components included in this Order's Specifications, Effluent Limits, Provisions and the monitoring plan for Cullinan Ranch (see preliminary draft Monitoring Plan and Adaptive Management Plan in Attachment C). Breaches will be phased, if necessary, to protect receiving water quality. The levee will be breached on an incoming tide, to drive higher quality water into the site prior to the initial discharge. The volume of water within the site is small compared to winter flows and daily tidal exchange in this part of the Napa River Estuary. Any discharge into the sloughs from Cullinan Ranch site

during breaching should be quickly diluted and the water quality monitoring will determine this.

26. Component 6: Lower Levees for Near-term Habitat Creation. To ensure availability of habitat for salt marsh harvest mice in the near term, a minimum of 30 acres suitable for the immediate colonization by mid-to-high marsh vegetation will be created through levee lowering and grading along sections of the Dutchman and South Slough levees. The salt marsh harvest mouse habitat will be restored close to Guadalcanal Village and Pritchett Marsh where breeding source populations are likely, and proceed westward along Dutchman Slough. If sufficient clean material becomes available based on the Water Board's criteria for beneficial reuse of dredged sediments (San Francisco Bay Water Board Staff Report, 2000), and funding allows, then up to 50 additional acres of habitat suitable for marsh colonization will be created adjacent to Guadalcanal Village. All imported soils or sediment will meet screening criteria for wetland surface material as described in Specifications B.1(a) & (b), B.2 and B.3 of this Order. Areas within the site will be raised with imported and/or on-site soil. These actions are intended to improve marsh plain continuity, increase tidal circulation, reduce predator access, reduce the opportunities for invasive species to colonize the site, and increase the area suitable for near-term establishment of tidal marsh vegetation. All soils will be placed before breaching the site. Any dredged material will not be allowed to dry out for more than two construction seasons.

The gradual upland-wetland transition zone that occurs in natural settings will be restored along a portion of the northern levee, as well as along the buttress levee adjacent to Guadalcanal Village and the Pond 1 levee. The buttress levee will have a 10:1 (H:V) slope and the Pond 1 levee will be flattened to a 7:1 (H:V) slope. All of these areas will provide additional acreage suitable for near term establishment of tidal marsh vegetation.

Approximately 26,000 linear feet of the northern levee along Dutchman and South Sloughs will be lowered to MHHW, elevation 3.5 ft NGVD 1929 (approximately +6.2 feet MLLW). The material generated from levee lowering activities and breach construction will be placed on the southern (interior) side of the northern levee and used to flatten the levee slope.

27. Component 7: Breach Levees along Dutchman and South Sloughs, and Guadalcanal Village. To restore the tidal prism to the site up to four breaches would be constructed between Cullinan Ranch and Dutchman and South Sloughs and one between Cullinan Ranch and the Guadalcanal Village marsh mitigation site (Figure 3). Breach locations will be as close to historic channel mouths/alignments as practicable. South Slough and the lower portion of Dutchman Slough would serve as the primary channels for the property. Breaching would occur in the winter, but before January 30. Material from the breach construction would be placed on the interior levee slopes of Dutchman and South Slough and Guadalcanal Village levees to provide additional wetland

habitat. Breaches would be unarmored and allowed to widen naturally. The size of the breaches would initially result in a muted tidal prism within the site. Over time the breaches and sloughs would erode as the system reaches equilibrium.

Breaching could inadvertently remove existing fringe habitats, including marshes and uplands that have established along the levees that support waterways adjacent to the Cullinan Ranch site. In particular, habitats along Dutchman and South Sloughs, and Napa River may be impacted. The removal of these habitats could occur as the tidal prism within this area increases, scouring the channels and altering sediment dispersal throughout the system. In addition, seasonal wetland and upland habitats that have established on the Cullinan Ranch site would be permanently inundated. However, the replacement of predominantly seasonal with tidal wetlands will provide important tidal marsh functions including wildlife habitat and water quality improvement.

28. **Component 8: Long-Term Monitoring.** Monitoring will be conducted to document changes in tidal hydraulics, geomorphology, plant and wildlife species, water quality, and habitat types and functions as restoration progresses. The Cullinan Ranch Project would use the NSRP monitoring plan as a model. The preliminary draft Monitoring and Adaptive Management Plan (MAMP) is included in Attachment C. Initiation of long-term monitoring of the Site would occur immediately following the north levee breach. Before initiating project construction, a detailed long-term monitoring plan outlining the duration of monitoring and tasks to be completed over the duration of the monitoring period would be completed.

Project Phasing and Schedule

29. Construction phasing will depend on funding and attaining enough suitable material to raise the levee at Pond 1 and construct the buttress levee. Construction may begin in early fall 2010 and be completed by December 2012. Project construction is broken down into four main components for phasing purposes: interior site work, Highway 37 improvements, Pond 1 levee improvements, and levee lowering and breaching. The first three components may occur in any order or on parallel paths, but all work within the future tidal area (i.e., the first three components) must be completed prior to levee lowering and breaching. The most critical component is the protection of Highway 37, so resources will most likely be directed to the buttress levee first.

Laws, Regulations, and Policies

30. Basin Plan: The Porter Cologne Act (Section 13240) authorizes the Water Board to develop a Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) which is the Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes implementation

- programs to achieve water quality objectives. The Basin Plan was duly adopted by the Water Board and approved by the State Water Resources Control Board, U.S. EPA, and the Office of Administrative Law where required. The latest version can be found at the Water Board's website at http://www.waterboards.ca.gov/sanfranciscobay/basin_planning.shtml
31. The Basin Plan includes the following Beneficial Uses for the San Francisco Bay and the Napa River: Ocean, Commercial and Sport Fishing; Estuarine Habitat; Wildlife Habitat; Cold and Warm Freshwater Habitat; Fish Spawning and Migration; Preservation of Rare and Endangered Species; Shellfish Harvesting; Industrial Service Supply; Navigation; Water Contact Recreation; Non-contact Water Recreation; and Agricultural Supply.
32. This Project is consistent with the goals of the following components of the State Wetlands Policy: California Wetlands Conservation Policy (Executive Order W-59-93, signed August 23, 1993), which is incorporated in the Basin Plan, that includes ensuring "no overall loss" and achieving a "...long-term net gain in the quantity, quality, and permanence of wetland acreages and values..." "Senate Concurrent Resolution No. 28 states that "it is the intent of the legislature to preserve, protect, restore, and enhance California's wetlands and the multiple resources which depend on them for benefit of the people of the State." Section 13142.5 of the California Water Code requires that the "[h]ighest priority shall be given to improving or eliminating discharges that adversely affect ...wetlands, estuaries, and other biologically sensitive areas."

Consistency with Plans and Policies

33. Restoration of the Project site to tidal action is consistent with the following plans and policies:
- San Francisco Estuary Project Comprehensive Conservation and Management Plan
 - San Francisco Bay Plan
 - San Pablo Bay Comprehensive Conservation Plan (Draft)
 - CALFED Bay-Delta Program and Ecosystem Restoration Program Plan
 - San Francisco Bay Area Wetlands Ecosystem Goals Project
 - Ecosystem Restoration Program Plan
 - Salt Marsh Harvest Mouse Recovery Plan
 - Solano County General Plan
 - Napa County General Plan
 - Vallejo General Plan

US FWS will consult with both the Solano and Napa Mosquito Abatement Districts (MADs) regarding mosquito abatement control measures during design and construction.

34. **California Wetlands Portal.** It has been determined through regional, state, and national studies that tracking of mitigation/restoration projects must be improved to better assess the performance of these projects, following monitoring periods that last several years. In addition, to effectively carry out the State's No Net Loss Policy for wetlands, the State needs to closely track wetland losses, gains, and mitigation/restoration project success. Therefore, we require that the US FWS use the California Wetlands Standard Form to provide project information related to impacts and mitigation/restoration measures (see Provision E.10 of this Order). An electronic copy of the form and instructions can be downloaded at: <http://www.waterboards.ca.gov/sanfranciscobay/certs.shtml> . Project information concerning impacts and mitigation/restoration will be made available at the web link: <http://www.californiawetlands.net> .

CEQA

35. CEQA requires that project effects be analyzed to prevent significant avoidable impacts and to reduce or mitigate unavoidable impacts. All projects approved by State agencies must be in full compliance with CEQA. As lead agencies, US FWS and CDFG, certified a final environmental impact statement/report (EIS/R) in May 2009 that has been considered and relied upon in preparation of the Order. The Water Board, as a responsible agency under CEQA, finds that all environmental effects have been identified for project activities which it is required to approve, and that the proposed Project activities will not have significant adverse impacts on the environment with the following stipulations: (i) the final monitoring and adaptive management further described in this Order must meet Executive Officer approval (Attachment C – the draft Monitoring and Adaptive Management Plan will be finalized by the US FWS) and (ii) the CEQA mitigation presented in the final EIR will be carried out as conditioned (Attachment D contains the EIR's Mitigation and Monitoring Reporting Program).
36. The EIS/R prepared for the Cullinan Ranch Project includes specific impact analysis (Ducks Unlimited, April 2009 Final; April 2008 Draft). The EIS/R found that over a 60-year period the benefits from the Project would outweigh adverse environmental impacts, after CEQA mitigation measures are implemented and future monitoring and adaptive management are carried out.

Water Quality Issues under CEQA for Cullinan Ranch: D.O., pH, turbidity, and mercury

37. Potential water quality impacts, their applicable proposed mitigation measures, and whether the impact duration is ongoing or only during the construction phase were found to be insignificant with the exceptions of dissolved oxygen and pH which could be adversely impacted by the Project. In addition to these, the Water Board has found that wetland restoration projects can contribute to elevated mercury and methyl-mercury levels in biota and thus requires mercury monitoring

of either sediment, water, and/or biosentinels. Dissolved oxygen, pH, turbidity, and mercury will be monitored along with other standard water quality measurements to protect water quality and these are discussed below. Construction will be timed to minimize adverse impacts to water quality in South and Dutchman Sloughs. Levee breaching will occur on a rising tide to allow mixing of water within the site before discharge to adjoining sloughs. The initial turbidity associated with construction would be carried into Cullinan Ranch on the incoming tide. (Provision E.14)

Dissolved Oxygen and pH

38. Dissolved oxygen and pH will be monitored inside the Project site after it is pre-flooded and before it is breached. If levels harmful to aquatic life occur, the following management measures may be taken to minimize any potential threats to the receiving water: (a) breach after a major rain event; (b) add more water through the Pond 1 levee water control structures; (c) lower some levee sections before breaching, to allow water from the adjacent sloughs to overtop into the site. A combination of these approaches could also be used. The Technical Advisory Committee used for this Project can help formulate a management response, if the need arises.
39. Before breaching the South and Dutchman Slough levees, the Cullinan Ranch Site will be slowly pre-flooded, in stages, using water from CDFG Pond 1 delivered through the new water control structures. The goal would be to pre-flood the site between October 1 and December 31, not more than one month prior to breaching, to a minimum water depth of 12 inches. The water delivered from Pond 1 would likely be brackish, and the combined depth of water and slight brackish character would begin to kill the existing vegetation within the site. There would be no discharge from the Cullinan Ranch Site back into Pond 1. (Provision E.14)
40. The decaying vegetation may deplete dissolved oxygen (DO) in the standing water, and may also lower pH relative to the incoming water pH levels. The degree of depletion will depend on a number of factors including: rates of precipitation and vegetation decay, daily temperatures, amount of wind-induced mixing of the standing water, and time the standing water remains in the site. For example, should the weather be unusually hot and/or dry during the pre-flood phase, DO concentrations are likely to be lower than they would be during the typically wet, windy, cool winter weather.
41. To avoid potential impacts from reduced DO and pH in the water, the levees will be breached on an incoming rising tide. This would allow the standing water from the pre-flooding phase to mix with water from the sloughs prior to discharge back into the sloughs on the low tide. The total estimated water volume in the site as a result of the pre-flood phase would be 820 acre-feet. The total capacity of the site at mean tide is estimated to be 5,050 acre-feet. Thus, even if DO concentrations were completely depressed (to 0 mg/L) the estimated DO

- concentration in the discharge would be reduced no more than 0.7 mg/L. Based on recent monitoring for the Napa River Unit of the Napa-Sonoma Marshes Wildlife Area, DO concentrations in the local sloughs and Napa River in the winter range from 8 to 10 mg/L, sometimes reaching 11 to 12 mg/L (CDFG 2009). Thus, the DO concentrations in the site, once the incoming water has mixed with the water from the sloughs, would still be well above the minimum threshold of 5.0 mg/L that has been the standard for recent permits in this area. The potential impact of the discharge from the site would be further reduced because the initial discharge (i.e., from the first breach) would be relatively small and the breaches would widen over time.
42. The site is expected to sufficiently fill with water within two to three weeks to encourage wildlife migration from the site. Once the site has been shallowly filled with water, DO concentrations are expected to remain at or above 5 mg/L throughout the remainder of the breaching period, and thereafter. The deep water in the site and the low water temperatures during the winter would help maintain acceptable DO concentrations until all breaches are constructed and effective tidal exchange occurs. Experience with the ponds in the Napa River Unit of the Napa-Sonoma Marshes Wildlife Area indicate that DO levels have never dropped below 5 mg/L, even in the summer.

Turbidity

43. The timed breaching process, combined with sequential installation of the breaches would also reduce potential concerns associated with suspended sediments (increased turbidity) resulting from breach construction. Breaching on an incoming tide would reduce turbidity effects to the sloughs because the incoming water would move suspended sediments resulting from the breach construction into the site, where they are expected to disperse and settle out. Ambient turbidity in the lower Napa River system varies widely, depending on water flow, water depth, and wind, among other factors. High run-off during the winter months creates high levels of turbidity in the river and tributary sloughs. High turbidity may be present year-round in the shallower sloughs and near-bank areas, because wind-driven circulation resuspends in-place sediments. This effect was noted during turbidity monitoring for the Napa Plant Site and the Napa River.

Mercury Methylation

44. Mercury occurs naturally in the San Francisco Bay environment and has been introduced as a contaminant in various chemical forms from a variety of anthropogenic sources. Total levels of mercury in ambient San Francisco Bay sediments are elevated above naturally occurring background levels. Although mercury often resides in forms that are not hazardous, it can be transformed through natural processes into toxic methylmercury. Natural accretion processes in salt marshes continually supply fresh layers of mercury-contaminated sediments that release mercury in a form that can become biologically available to

mercury-methylating bacteria and subsequently bioaccumulate in the food chain. The resulting concentration of methylmercury depends on numerous variables, including: redox potential, salinity, pH, vegetation, sulfur (including sulfate derived from gypsum layers in pond bottoms), dissolved organic carbon, nitrogen, and seasonal variations in each of the identified variables.

45. The Water Board's Basin Plan (2006) which includes a TMDL for Mercury¹ states that wetlands may contribute substantially to methylmercury production and subsequent biological exposure to mercury within the Bay. Wetland restoration projects can, therefore, increase levels of methylmercury. Monitoring can evaluate whether this is occurring, and inform management decisions regarding what types of restoration discourage methylmercury production. Natural sedimentation occurring via sediments brought in by the tides and creeks may also provide a source of mercury that may be methylated in the site.
46. Breaching levees at the Cullinan Ranch Site could contribute methyl-mercury to the environment, even though the site does not have high levels of existing total mercury. The US FWS Biological Opinion and the 401 application state that restoring Cullinan Ranch is unlikely to produce high levels of mercury for the following reasons:
 - mercury levels in the Napa River are below those considered impaired by the US EPA (USGS 2000);
 - the site is likely to be flooded once initially and remain under water for many years. UC Davis studies show lower levels in fish in permanently flooded sites than in sites that undergo repeated wetting and drying (Slotton 2008) indicating that a site remaining under water for a relatively long time may have low methyl-mercury levels; and
 - preliminary results from a US ACOE study of mercury in the nearby Hamilton Restoration project also found levels to be lower in permanently flooded areas compared to sites that alternate between wet and dry cycles (Best 2005).

Given the possibility that mercury may be released from the site, the US FWS will show how habitats and species at the restored site will be monitored and how methylmercury can be minimized in a final Monitoring and Adaptive Management Plan (MAMP) subject to Executive Officer's approval. Monitoring and the MAMP are further described in Provisions E.1-7.

47. The Project will monitor mercury and methyl-mercury concentrations in sediment, water, and/or methylmercury bioaccumulation in appropriate biosentinel species (e.g., water birds, fish, resident marsh birds, or brine flies). The US FWS will collect data at least annually in conformance with the Napa Plant Site sampling plan for mercury and methyl-mercury but may be required to add additional sampling for different habitat types (e.g., subtidal, intertidal, marsh

http://www.waterboards.ca.gov/sanfranciscobay/basin_planning.shtml¹

plain, sloughs or open water, etc.), or present a plan acceptable to the Executive Officer showing how the proposed sampling will adequately protect waters of the state from increases in methyl-mercury.

Other Water Quality Issues

48. Mosquito abatement: The proposed tidal wetlands at Cullinan ranch should have fewer mosquitoes than the current seasonal wetlands. The site is in the jurisdiction of the Napa and Solano County Mosquito Abatement Districts. The US FWS will coordinate with those Districts during design, implementation, and operation phases of the Project to mitigate for any increases in potential mosquito breeding habitat.
49. Bay Mud: The Water Board has found previously that if fine-grained dredged material (Bay Mud) is allowed to dry out on the surface, the following adverse effects on wetland environments can occur: it can harden, which makes it a poor substrate for wetland biota; it can develop deep cracks that harbor mosquitoes and increase the chances of acidification; and it can cause metals, including mercury, to become soluble, thereby increasing their potential to leach out when the site is re-flooded.
50. The Cullinan Ranch Restoration Project may need to import dredged sediment to provide suitable habitat for salt marsh harvest mouse habitat and it may not be able to shape and form that habitat without drying it to some degree. Partial drying should occur over not more than two construction seasons. The US FWS will consult with the Technical Advisory Committee for this Project and provide documentation to Water Board staff demonstrating that the net benefit of drying dredged bay mud will outweigh any harm to the environment (See Provision E.7).
51. Invasive cordgrass was inadvertently introduced into San Francisco Bay tidal marshes in the 1970's (predominantly *Spartina alterniflora* and *S. densiflora*) and threatens the existence of the native cordgrass (*S. foliosa*) upon which many tidal marsh species depend. To mitigate for potential impacts from cordgrass, the US FWS is cooperating with the Invasive Spartina Project to eradicate invasive cordgrass and protect the native tidal marsh species (see Provision E.13). In particular, the US FWS collaborated with the Invasive Spartina Project to identify the following "Best Practices" which have been incorporated into the Project:
 - a. No Spartina is proposed to be planted in the Project Area. If circumstances arise where Spartina will be planted in the Project Area, the plantings will be genetically verified to be *Spartina foliosa*.
 - b. The Project Area should be monitored annually for the presence of non-native or hybrid Spartina. In addition to field identification, representative samples of any found Spartina should be genetically analyzed to verify absence of *S. alterniflora* or *S. densiflora* genetic markers. Any found non-native or hybrid

- Spartina plants should be removed or killed before their first season of flowering and seed set.
- c. One measure of the Project's success in achieving the Project Objective regarding management of "the spread of non-native invasive species" is that there is no non-native or hybrid Spartina found in the Project Area.
 - d. The Project will not initiate connection of ponds with tidal flows (full or muted) at locations where *S. alterniflora* or *S. alterniflora* x *S. foliosa* seed or propagules are likely to get into the Project Area.
 - e. The Project will take care to not introduce non-native Spartina seed or propagules into the Project Area on contaminated excavators, dredges, or other equipment. The Project will require that all equipment be cleaned prior to entry into an intertidal part of the Project Area if it has been in contact with non-native Spartina plants, seeds, or roots.
 - f. The Project will make sure that any dredged materials brought to the Project Area do not contain non-native Spartina seed or fragments.
 - g. Variations to the above best practices may be appropriate based on site-specific conditions and scientific analysis. Proposed variations should be developed with assistance or review from the Invasive Spartina Project. Additionally, the US FWS will discuss any proposed variations with nearby marsh owners/managers, who could be affected by the actions of the Project.

Sources of Material

52. **Sources of Fill Material** will include excavated sediment from on-site breaches, borrow ditches, and levees. Imported fill material, consisting of either dredged sediments or upland soil, shall be determined to be acceptable for use based on criteria approved by Water Board staff, per Specifications B.1 and B.2 and Provisions E.34-35. If upland material is imported, the US FWS must submit a Quality Assurance Program Plan for sampling and analysis which includes proposed acceptance criteria for the Executive Officer's approval prior to placement of the imported material within the Project site.
53. No dredging is proposed for the project. Any dredged sediment brought to the site from other projects must be tested in accordance with existing Water Board regulatory standards and meet wetland surface material standards described in Specification B.1 of this Order². Thus, none of the potential excavated or imported dredged materials should have the potential to release pollutants to the Bay.
54. While no discharge of material is planned from the site, there is the potential – particularly during construction – for discharge material to enter waters of the

² California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB). 2000. Draft Staff Report Summary Report –Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines.

state while the project carries out the objectives of enhancing wildlife habitat, reinforcing levees, temporarily stockpiling excavated material, improving safety and public access, improving site access during and after construction, and constructing temporary construction-related roads.

55. Potential discharged material sources include: (1) native soils from onsite borrow areas, toe drains, existing stockpiles of material from the Pond 1 excavation under the CDFG order, tidal channel excavation, levee breaches, and levee lowering, (2) imported riprap, and (3) pre-breach imported clean soil to increase the elevation of 30 acres, with the possibility of an additional 50 acres, to expedite wetland creation if funding is available. Table 2 lists the volume of discharged materials to be used.

Table 2. Proposed Discharge of Material to Waters of the U.S.	
Type(s) of Material to be Discharged	Volume (CY)
Native soils from onsite borrow areas, toe drains, Pond 1 levee stockpile, tidal channel excavation, levee breaches, and levee lowering, to be used for ecotone, ditch blocking, levee reinforcement, temporary road construction, 660 feet of the deceleration lane, and buttress levee construction	1. Interior Site Grading: 94,800
	2. Lower perimeter levees: 110,500
	3. Levee breaches: 61,000
	4. Deceleration lane: 8,100
	5. Buttress levee: 101,600
	376,000
Imported riprap for Highway 37 armoring	36,000
Imported material to elevate up to 50 additional acres of land to expedite marsh restoration if funding is available	405,000
TOTAL	817,000

56. To assure that the hydrology is proceeding as expected to achieve the habitat goals within 60 years, the MAMP (Attachment C) and SMP (Attachment E) outlines the targets and performance criteria that are expected to be met within the time frame. No penalties will be imposed for a failure to achieve the interim and final habitat goals, but an investigation of the causes will be undertaken by the Discharger and other agencies including the Water Board, the Corps, and BCDC and management modifications will be made as necessary.

It is Hereby Ordered pursuant to the provisions of Division 7 of the California Water Code and regulations, and guidelines adopted thereunder, that the US FWS, its agents, successors, and assigns shall comply with the following:

A. PROHIBITIONS

1. Discharges of water, material, or wastes which are not otherwise authorized by the Order are prohibited.
2. The direct discharge of wastes to surface waters or surface drainage courses is prohibited, except as authorized by this Order.
3. It is prohibited to import dredged material or upland soils without first following the testing and screening protocols described in Specifications B.1 and B.2, below, and obtaining Water Board staff approval. Movement of on-site material is allowed.
4. The activities subject to these requirements shall not cause a condition of pollution or nuisance as defined in Sections 13050(i) and (m), respectively, of the California Water Code.

B. SPECIFICATIONS

1. Dredged Material Screening Procedures. Water Board staff shall review and approve data characterizing the quality of all dredged material (Bay sediments) proposed for use as fill prior to placement at the project site (See Findings 52-53). Sediment characterization shall follow the protocols specified in:
 - (i) The Dredge Materials Management Office (DMMO) guidance document, “Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region” (Corps Public Notice 01-01, or most current version), with the exception that the water column bioassay simulating in-bay unconfined aquatic disposal shall be replaced with the modified effluent elutriate test, as described in Attachment B of the Inland Testing Manual, for both water column toxicity and chemistry (DMMO suite of metals only); and,
 - (ii) Water Board May 2000 staff report, “Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines,” or most current revised version.

Modifications to these procedures may be approved on a case-by-case basis pending the US FWS’s ability to demonstrate that the dredged material is unlikely to adversely impact beneficial uses. Only surface quality material as defined in

the Water Board May 2000 staff report listed above will be used for the Cullinan Ranch Restoration Project.

2. Imported Upland Soil Screening Procedures: Imported soil from upland borrow sites must be determined to be suitable based on the procedures and screening guidelines contained in a Quality Assurance Project Plan approved by the Executive Officer (See Provision E.34--35).
3. Appropriate soil erosion measures shall be undertaken and maintained to prevent discharge of sediment to surface waters or surface water drainage courses.

C. EFFLUENT LIMITS

1. All pond waters discharging to the Bay or Sloughs shall meet the following limits:

Constituent	Instantaneous	Monthly	Instantaneous	Units
	Maximum	Average	Minimum	
Salinity	<100	<50		ppt
Dissolved Oxygen ¹			5.0	mg/L
pH ²		8.5	6.5	

¹ This limitation applies when receiving waters contain at least 5.0 mg/L of dissolved oxygen. In cases where receiving waters do not meet the Basin Plan objective, discharges must be at or above the dissolved oxygen level in the receiving water.

² The Discharger may determine compliance with the pH limitation at the point of discharge or in the receiving water.

2. Pond waters discharging to the Bay or Sloughs shall not exceed the natural temperature of the receiving waters by 20°F, or more.

D. RECEIVING WATER LIMITATIONS

For the following Receiving Water Limitations, the Project Boundary shall be defined as the limit of the receiving waters at mean lower-low water level, which is the topographic contour representing an elevation of 0 ft. NAVD88.

The Project activities shall not cause:

- a. Floating, suspended, or deposited macroscopic particulate matter or foam at any place more than 100 feet from the Project Boundary or point of discharge, which persists for longer than 24 hours;
- b. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;
- c. The temperature of any cold or warm freshwater habitat to be increased by more than 5 degrees Fahrenheit above natural receiving water temperature,

unless a qualified biologist can demonstrate that such alteration in temperature does not adversely affect beneficial uses;

17. Visible, floating, suspended, or deposited oil or other products of petroleum origin; and
18. Toxic or other deleterious substances to be present in concentrations or quantities which will cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or which render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

2. The discharge of waters shall not cause the following limits to be exceeded in waters of the State at any one place within 1 foot of the water surface:

- a. Dissolved Oxygen: 5.0 mg/L, minimum
When natural factors cause lesser concentrations, then these activities shall not cause further reduction in the concentration of dissolved oxygen.
- b. Dissolved Sulfide: 0.1 mg/L, maximum
- c. pH: Variation from normal ambient pH by more than 0.5 pH units
- d. Un-ionized Ammonia: 0.025 mg/L as N, annual median; and
0.16 mg/L as N, maximum
- e. Nutrients: Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

3. Turbidity of the waters of the State, at any place more than 100 feet from the Project Boundary or point of discharge, shall not increase by more than the following for more than 24 hours, to the extent practical:

Receiving Waters Background	Incremental Increase
< 50 NTU	5 NTU maximum
≥ 50 NTU	10% of background, maximum

4. The discharge shall not cause a violation of any particular water quality standard for receiving waters adopted by the Water Board or the State Water Board as required by both the State's Porter-Cologne Water Quality Control Act and the federal Clean Water Act and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to Section 303 of the Clean Water Act, or amendments thereto, the Water Board will revise and modify this Order in accordance with such more stringent standards.

E. PROVISIONS

Monitoring and Reporting

1. **Biennial Technical Monitoring Reports & Memos:** The US FWS shall submit biennial technical monitoring reports (every other year) with biennial memos in the intervening years. The monitoring periods shall cover 15 years for each phase beginning with the collection of baseline data before the breaches, and continuing after construction and restoration are initiated. The biennial technical monitoring reports shall: (i) analyze all physical and biological data collected to date, and contain appropriate figures, graphs, and photos; (ii) assess progress toward target habitats acres and functions; and (iii) make recommendations for future monitoring and assessment. The biennial memos shall notify the Water Board of any sampling occurring during that period and any problems, and shall provide appropriate photos. Technical monitoring reports shall be due at the end of Year 2, 4, 6, 8, 10, 12, and 14 following each phase and biennial memos shall be due in the intervening years (see schedule below). A final report for the Project shall be submitted in Year 15 after implementation of that Project.

Due Date, Memos: March 31 of Year 1, 3, 5, 7, 9, 11, 13.

Due Date, Biennial Technical Reports: March 31 of Year 2, 4, 6, 8, 10, 12, 14.

Due Date, Final Report: March 31, Year 15.

2. All required reports and documents submitted after Board approval of this Order will be subject to Executive Officer approval. No penalties will be imposed for failure to achieve performance standards since this is a restoration (not compensatory mitigation) project.
3. **Monitoring: (a) Self Monitoring Program.** The US FWS shall follow the Self Monitoring Program (SMP) in Attachment E and include SMP reports with the biennial reports. The SMP table presents the major monitoring elements for the site. Water quality monitoring related to construction will follow best management practices to avoid impacts to waters of the state (See Provision E.25). Water quality monitoring related to breaching levees will be required immediately before the breach and over approximately 10 monitoring events or until background levels are achieved, at which time the US FWS can notify the Water Board that the water quality provision for that breach has been met. If additional monitoring is conducted to show that the Project is not causing harm to the area (e.g., if ambient monitoring shows that similar water quality levels occur naturally in the area), or if the literature shows that water quality values are not likely to cause problems, then the US FWS can request approval from the Water Board to cease water quality monitoring. Data should be posted to the California Wetlands portal (see Provision E.10 below) according to the above schedule in Provision E.1.
4. **Monitoring: (b) Landscape, Habitat, and Biological Species Monitoring Plan:** To show progress toward achieving target habitats, monitoring will be required.

Appropriate baseline data shall be gathered before construction begins to show the evolution from pre- to post-project restoration. General methods, locations, and sampling procedures are provided in the draft Monitoring and Adaptive Management Plan (MAMP) (Attachment C) which is modeled after the monitoring plans for CDFG's NSRP and the Napa Plant Site. The final Monitoring Plan will list:

- (a) target habitat goals and ranges for the site; and
- (b) parameters to be monitored including procedures and locations for assuring that the beneficial uses of water and habitat will be protected and/or improved.

The final Landscape, Habitat, and Biological Species Monitoring Plan shall include the following as shown in the SMP table and report (Attachment E) and in the Monitoring and Adaptive Management Plan (Attachment C): water quality; mercury monitoring of water, sediment, or biosentinel species in accordance with regional programs, if available; landscape mapping; physical and/or hydrogeomorphic development (i.e., channel and marsh development, tidal circulation); vegetation mapping; highly invasive (detrimental) species which should include plants and introduced predators; specific target species monitored (endangered species) or groups such as birds, fish, mammals.

Due Date for Final Monitoring and Adaptive Management Plan: December 31, 2010.

5. **Mercury Monitoring:** Biosentinels and/or sediment and water will be monitored to ensure that baseline (i.e., pre-restoration) or ambient samples (i.e., reference site) do not exceed agreed upon triggers to prevent increases in methyl-mercury. Biosentinels shall be chosen from the appropriate existing and target habitats. For example, if at the time of the first breach, the site has equal amounts of subtidal and intertidal habitats, then appropriate species that use those habitats should be selected as biosentinels. In addition, each habitat type should have 3-5 samples (not composited).

Appropriate species and habitats include: Mississippi silversides (*Menidia audens*) for the subtidal areas; longjaw mudsuckers (*Gillichthys mirabilis*) for intertidal mudflats and channels; and Alameda song sparrows (*Melospiza melodia pusillula*) for the tidal marsh plain. Other species can be selected if they are common, reside primarily in the habitat, and are not a threatened population.

The US FWS can propose a different sampling plan which will be subject to Executive Officer approval. Triggers and the final sampling plan will be subject to Executive Officer approval and triggers should be suggested by the technical advisory committee (see Findings 38, 49, 50; and Provision 7 below) and approved by the Water Board.

Due Date for Mercury Sampling Plan: 60 days before construction starts

6. **Aerial or satellite photos** (such as those readily available on Google Maps, or IKONOS images using multispectral satellite imagery) shall be reviewed annually to ensure that habitat evolution is occurring without any associated significant adverse or unforeseen events, such as excessive scour or erosion, sedimentation, or establishment of highly invasive plants. Collecting and comparing annual satellite photos will depend on the availability of free imagery and is meant only for rough non-technical comparisons, not quantitative GIS analysis. If necessary and feasible, more detailed analysis of aerial or satellite photos shall be conducted every other year to allow measurements of channel widths, vegetation zones, and other important features listed in the MAMP (Attachment C). If habitat targets are not met by the end of the 15-year monitoring periods, the Technical Advisory Committee (see Provision 7 below) shall determine whether aerial or satellite photos should continue for a specified period, such as every 5 years, until the target habitats are achieved, or whether the Project has successfully provided adequate wetland habitat benefits to justify discontinuing monitoring.
7. **A Technical Advisory Committee (TAC)** shall be organized and convened through a public process by the US FWS and shall, at a minimum, invite representatives from CDFG, the Water Board, BCDC, California Coastal Conservancy, the Corps, and the National Marine Fisheries Service. The purpose of this committee shall be to assess progress of the restoration project by reviewing monitoring data, and to suggest adaptive management strategies. Results of the data analysis shall be presented to the TAC annually, or biennially, for discussion and comment. The TAC can include members of the Napa-Sonoma Marsh Restoration Group, the Wetland Monitoring Group of the San Francisco Bay Regional Wetland Monitoring Program, the San Francisco Bay Joint Venture, or any other appropriate forum for advice and review. The TAC should also advise on the acceptability of keeping dredged sediments wet, the net benefit of drying dredged sediment to establish the salt marsh harvest mouse habitat, mercury triggers (see Findings 38, 49, 50), and any other appropriate issues.
8. At the end of the monitoring period, the wetland restoration site shall be assessed for wetland functionality using a method approved by the Executive Officer.
9. The US FWS shall be responsible for all monitoring and reporting requirements at the site. US FWS should coordinate with the Wetland Regional Monitoring Program run by the San Francisco Estuary Institute (SFEI) or any other regional entity that conducts regional wetland monitoring in the San Francisco Bay Region.
10. **California Wetlands Portal.** The US FWS is required to use the California Wetlands Standard Form to provide project information describing impacts and restoration measures within 21 days from the date of this order. An electronic copy of the form can be downloaded at: <http://www.waterboards.ca.gov/sanfranciscobay/certs.shtml>. The completed California Wetlands form shall be submitted electronically to

habitatdata@waterboards.ca.gov or as a hard copy to both: 1) The Water Board, 1515 Clay Street, Suite 1400, Oakland, CA 94612, to the attention of California Wetlands Portal; and 2) San Francisco Estuary Institute, 7770 Pardee Lane, Oakland, CA 94621-1424, to the attention of Mike May. Project information concerning impacts and restoration will be made available at the web link: <http://www.californiawetlands.net> . (See Finding 34.)

Due Date for California Wetlands Form: 21 days after the date of this order.

11. **Submitting monitoring reports by uploading them to California Wetlands Portal.** Monitoring reports shall be submitted either by uploading them to the California Wetlands Portal website at <http://www.californiawetlands.net/tracker/ba/list>, via email, or via mail. The Water Board project manager will be notified if monitoring reports are uploaded to the California Wetlands Portal.
12. In addition to uploading the California Wetlands form and monitoring reports to <http://www.californiawetlands.net/tracker/>, the Discharger shall also send monitoring data and reports to the Water Board as one hard copy and one electronic copy. In the case of large files, the electronic copy shall be sent on a CD or DVD or placed on an FTP site.
13. **Aggressive non-native plant species** that threaten sensitive native tidal marsh communities, including those listed under Tier I (and to a lesser extent Tier II) of the Water Board's "Invasive Non-Native Plant Species to Avoid in Wetlands Projects in the San Francisco Bay Region" (2006) should be kept off site to the extent feasible. [http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stream_and_wetland_protection.shtml] under "Fact Sheet for Wetland and Riparian projects, Appendix 1: Invasive Non-Native Plants"]. The US FWS should review the Tier I and Tier II lists and discuss with the Water Board staff which species are feasible to keep off the Project site. Invasive cordgrass (*Spartina alterniflora*) is a high priority for preclusion from tidal wetlands restoration sites in the Bay Region, and the US FWS shall coordinate efforts with the Invasive Spartina Project to eradicate this species as identified in Finding 51.
14. The site will be pre-flooded between October 1 and December 31. Breaching will occur in winter between November 1 and January 30 on a rising tide. (Findings 25, 37, 39)
15. If dissolved oxygen or pH are found at levels potentially harmful to aquatic life after the site is flooded and before it is breached, the following management measures will be considered before the breach: breaching after a major rain event; raising water levels from Pond 1 water control structures; and lowering some levees. The TAC for this project or Water Board staff will be consulted about the best possible approaches to take.

16. The US FWS will provide a plan to treat highway runoff that is acceptable to the Executive Officer.

Due Date for Plan to Treat Highway Runoff: 60 days before levee breaching occurs.

17. The Discharger shall submit notify the Water Board by email when construction starts and ends and when levee breaching occurs. The following reports will also be required: (i) a start-up report analyzing the first month of data and (ii) as-built report to note any changes that have occurred from the original design.

Due Date for Notification: when construction begins, ends, and when breaches occur.

Due Date for Start-Up (or Construction Completion) Report: no more than 45 days after levees are breached.

Due Date for As-Built Report: 90 days after construction is completed.

Other Operations

18. The US FWS shall conduct periodic inspection and maintenance of restoration features to ensure that the restoration is performing as intended. For example, routine inspection of ditch blocks for unintentional channel bypassing or erosion shall be necessary, particularly following storm events. If bypassing or erosion occurs, maintenance of the ditch block shall be performed to prevent unintended channel formation. The US FWS shall summarize the results of these efforts in its biennial reports or memos.

19. Routine inspection of the Pond 1 water control structures shall be necessary to ensure that they are functioning properly. Inspection of water control structures and canals for debris or trash obstructions shall be necessary to maintain desired flows. If obstructions are found during inspection, it may be necessary to remove the obstructions either manually or mechanically to maintain flows. Routine inspection of the managed pond levees, trails and internal berms for unintentional breaching and erosion shall also be necessary. If unintentional breaching or erosion occurs, the berm or levee shall be repaired as needed to maintain pond operations, prevent potential tidal inundation of adjacent areas, and to maintain public access along the trails.

20. Viewing platforms, interpretive signs, trails, gates, and fences shall be inspected periodically and shall be repaired and maintained as needed.

Construction Operations

21. A qualified, US FWS-approved biologist shall conduct a tailgate talk to inform construction crews regarding the sensitive wildlife resources and exclusion zones within the proposed construction areas, and regarding what to do if special status species are encountered.

22. A qualified, US FWS-approved biologist shall be present to monitor construction activities in or near areas known to be occupied by salt marsh harvest mouse and California clapper rail. The biologist shall have the authority to install or require wildlife protection measures such as fencing, noise buffers or noise level limitations during avian breeding seasons, and temporary halting or redirecting of construction activities to avoid impacts to sensitive species. Water Board staff shall be notified if construction activities are halted or redirected.
23. The US FWS has developed conservation measures to protect special status species especially the California clapper rail, salt marsh harvest mouse, soft bird's beak, delta smelt, and others which can be found in the Section 7 Biological Opinion for this project (Tracking #: SFB-2010-01/ May 7, 2010/ *Intra-Service Section 7 Consultation on Implementation of the Proposed Cullinan Ranch Restoration Project, Napa and Solano Counties, CA*). The Water Board staff shall be notified if the work plan is modified because sensitive species are present.
24. The US FWS shall minimize in-water construction during periods when listed species may be present.
25. Since greater than one acre will be impacted, the US FWS will, before construction begins, submit a Notice of Intent (NOI) to the State Water Board for coverage under the General National Pollutant Discharge Elimination System (NPDES) construction permit and shall implement required Best Management Practices (BMPs) to prevent water pollution from construction activities. The US FWS shall use both in-water and on-land BMPs such as the use of coffer dams and measures to prevent and control potential spills of hazardous material into the creeks and sloughs. Contractors are required to implement BMPs identified in a Storm Water Pollution Prevention Plan (SWPPP) to control soil erosion and discharges of other construction-related contaminants such as fuel, oil, grease, paint, concrete, and other hazardous material. Emergency response, routine maintenance, and preventative activities would be included in the plan. The plan shall be submitted to the Water Board for review and comment at least 30 days prior to the start of construction and must be acceptable to the Executive Officer.

Due Date: SWPPP at least 30 days prior to start of construction.

26. The US FWS shall have a construction monitor on site to ensure that the Project is constructed according to the design and construction plan. The construction monitor shall also resolve implementation questions and refer "Requests for Information" and "Submittals" to the design engineers. Biological monitors, either USFWS or CDFG staff or contractors approved by those agencies, shall be on site during specific activities to ensure compliance with mitigation measures and protection of listed species, as discussed above. Construction monitoring notes and observations shall be maintained for five years after project construction is completed, and submitted to the Water Board upon request.

Soil Excavation and Placement Provisions

27. To minimize the effects on special status fish species of temporary increases in suspended sediment and turbidity, the use of BMPs for turbidity control shall be employed during all in-water work conducted in the sloughs or bay, where appropriate.
28. To minimize the effects on special status fish species resulting from the loss of existing habitat, construction activities in river or slough areas having immersed or submersed aquatic plants shall be avoided to the maximum extent practical.
29. Ditch blocks shall be located in such a way as to not trap fish at low tide. Berms adjacent to starter channels shall be constructed on one side of the channel only, and shall be discontinuous, so that fish have easy access to the starter channels as the tide recedes.
30. Since US FWS is the lead agency on this project, it can follow its own protocols for species protection and choose to implement or not the following general provision which is included as a general safety provision to protect biological species:
“Construction activities shall be scheduled to avoid the local nesting periods of the special status wildlife species, to the extent practical. When construction is conducted during the nesting period of a special status species known to be present, the activities shall be restricted to maintain a 150-foot buffer between heavy equipment and the nesting sites. Construction activities shall be scheduled in such a way as to limit the period of disturbance in a particular area to as brief a time window as is practical.”
31. Before constructing facilities within tidal marsh habitat, the Discharger shall conduct clearance surveys for all species of concern in the construction area.
32. To the extent feasible, the Discharger shall avoid construction activities in or near marsh habitat suitable for the salt marsh harvest mouse.

Mosquito Abatement Provision

33. The Discharger shall coordinate with the county mosquito abatement districts during the design, implementation, and operations of the project.

Potential Future Sediment or Soil Importation Provisions

34. If sediment is imported, the following conditions shall apply and be subject to Executive Officer approval: (i) instructions listed under Specification B.1 shall be followed; (ii) if the materials is proposed for levee maintenance, a levee inspection report shall be submitted at least 30 days prior to dredge material placement and, (iii)

if applicable, a work plan and schedule for making any repairs or improvements shall also be submitted prior to dredge material placement.

Due Date for Levee Inspection if Sediment is Imported: at least 30 days before material placement.

35. If upland soil is imported during or after the completion of the project, the following conditions shall apply and be subject to Executive Officer approval: (i) instructions listed under Specification B.2 shall be followed, including the preparation of a Quality Assurance Project Plan; (ii) if the materials is proposed for levee maintenance, a levee inspection report shall be submitted at least 30 days prior to dredge material placement and, (iii) if applicable, a work plan and schedule for making any repairs or improvements shall also be submitted prior to imported soil placement.

General Provisions

36. The Discharger shall comply with all the Prohibitions, Specifications, Limitations and Provisions of this Order, immediately upon adoption of this Order, unless otherwise provided below.
37. The Discharger shall notify the Water Board immediately whenever violations of this Order, for which the Discharger is responsible, are detected.
38. The Discharger shall remove and relocate any wastes that are discharged at any sites in violation of this Order.
39. The Discharger shall implement and comply with appropriate BMPs to prevent and control erosion and sedimentation.
40. No debris, soil, silt, sand, cement, concrete, or washings thereof, or other construction related materials or wastes, oil or petroleum products or other organic or earthen material shall be allowed to enter into or be placed where it may be washed from the site by rainfall or runoff into waters of the State. When operations are completed, any excess material shall be removed from the work area and any adjacent area where such material may be washed into waters of the State.
41. Construction contractors working on the Project shall be required to provide their employees with spill prevention and response training, and shall be required to have spill response equipment available at the job site, as directed by the Discharger. Contractors shall provide double containment for any hazardous materials or wastes at the job site. Contractors shall be prepared to respond to any spill immediately and to fully contain spills in the area, including any open-water areas.
42. The Discharger shall maintain a copy of this Order at the Headquarters of the FWS San Francisco Bay National Wildlife Refuge, 7715 Lakeville Highway, Petaluma, CA

94954. The Order shall be available at all times to site personnel. The Discharger shall ensure that all individuals working on the site, including all contractors and sub-contractors, are familiar with the contents and requirements of this Order, and with all relevant plans and BMPs.

43. The Discharger shall permit the Water Board or its authorized representative, upon presentation of credentials:
 - a. Entry onto premises on which wastes are located and/or in which records are kept.
 - b. Access to copy any records required to be kept under the terms and conditions of this Order.
 - c. Inspection of any monitoring equipment, construction area(s), or monitoring method completed as part of the Project.
 - d. Sampling of any discharge or surface water covered by this Order.
44. This Order does not authorize commission of any act causing injury to the property of another or of the public; does not convey any property rights; does not remove liability under federal, state, or local laws, regulations or rules of other programs and agencies; nor does this Order authorize the discharge of wastes without appropriate permits from this agency or other agencies or organizations.
45. The Discharger shall immediately notify the Water Board by telephone or email whenever an adverse condition occurs as a result of the proposed discharge or construction activities. An adverse condition includes, but is not limited to, a violation or threatened violation of the conditions of this Order, significant spill of petroleum products or toxic chemicals, or other events that could affect compliance. Pursuant to CWC Section 13267(b), a written notification of the adverse condition shall be submitted to the Water Board within two weeks of occurrence. The written notification shall identify the adverse condition, describe the action(s) necessary to remedy the condition, and specify a time schedule for performance, subject to modification by the Water Board.
46. The Discharger shall halt work activities if dead or dying fish, or fish exhibiting stress, are observed within 1,000 feet of work activity or discharge. The Discharger shall immediately assign a qualified biologist to investigate the cause of the problem, and to identify an acceptable response, if the cause is determined to be the work activity or discharge. The Discharger shall immediately report all incidents of dead, dying, or stressed fish, as well as prescribed action plans, to the Water Board.
47. All reports pursuant to this Order shall be prepared under the supervision of a suitable professional in the State of California.
48. This certification or Order is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to

Section 13330 of the CWC and Section 3867 of Title 23 of the California Code of Regulations (23 CCR).

49. This certification action is not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to 23 CCR Subsection 3855(b) and that application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.
50. An annual fee for WDRs pursuant to Section 13260 of the California Water Code is required.
51. The Water Board may modify, or revoke and reissue, this Order if present or future investigations demonstrate that the discharge(s) governed by this Order shall cause, have the potential to cause, or shall contribute to adverse impacts on water quality and/or beneficial uses of the receiving waters. The Water Board may reopen this Order to review results of the Discharger's and Water Board staff's studies and new data on Section 303(d) listed contaminants and decide whether effluent limits should be revised.
52. The Water Board notified the Discharger and interested agencies and persons of its intent to issue WDRs for the Project activities and provided them with an opportunity to submit their written views and recommendations.
53. The Board, in a public meeting on XXXXX, heard and considered all comments pertaining to the WDRs for the Project.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on _____.

Bruce H. Wolfe
Executive Officer

Attachments--

Attachment A: Figures

Attachment B: (i) Detailed Work Components; (ii) Time Line

Attachment C: [draft] Monitoring and Adaptive Management Plan

Draft Tentative Order for Cullinan Ranch

8/12/2010

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Attachment D: Monitoring and Reporting Plan from EIR

Attachment E: Water Quality Self Monitoring Program (SMP)

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