

CALIFORNIA COASTAL COMMISSION

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Staff: Melissa B. Kraemer
Staff Report: May 22, 2009
Hearing Date: June 12, 2009
Commission Action:

STAFF REPORT:**PERMIT AMENDMENT****APPLICATION NUMBER:****1-03-004-A3****APPLICANT:****Reclamation District 768****AGENT:**

Oscar Larson & Associates (Attn: Stein Coriell)

PROJECT LOCATION:

1,500-acre Reclamation District, including a 4.9-mile-long levee system, located north and south of Highway 255 along the northern shoreline of the Arcata Bay lobe of Humboldt Bay and the banks of Mad River Slough, Arcata Bottom area, Humboldt County.

**DESCRIPTION OF PROJECT
PREVIOUSLY APPROVED:**

Repair of a 230-foot-long breach in a portion of the levee north of Hwy 255, replacement of three 36-inch-diameter culverts and floodgates, and a 10-year permit for routine repair and maintenance activities on the levee system.

**DESCRIPTION OF FIRST
AMENDMENT REQUEST
(1-03-004-A1):**

Amend the approved project description to include the "2007 Levee Repair Project," to repair and/or protect approximately 7,877 linear feet (~1.5 miles) of eroded and damaged levee in 2007.

**DESCRIPTION OF SECOND
AMENDMENT REQUEST
(1-03-004-A2):**

Further amend the approved project description to include the following project components: (1) permanently authorize the repairs that were approved under Emergency Permit Nos. 1-06-044-G, 1-07-

008-G, 1-07-037-G, and 1-07-048-G for repairs and maintenance to approximately 13,115 linear feet of levee along Arcata Bay and Mad River Slough; (2) repair work to Site #9, which includes installation of approximately 600 feet of rock slope protection; (3) minor relocation of a temporary staging area and access route associated with repairs to the Jackson Ranch levee; and (4) amend the crossing method at the ditch crossing located just south of the Humboldt Bay Municipal Water District pipeline along the Mad River Slough from temporary bridge to a temporary culvert and fill crossing.

DESCRIPTION OF CURRENT
AMENDMENT REQUEST
(1-03-004-A3):

Further amend the approved project description to repair approximately 300 feet of eroded, damaged levee at repair site #9 along Mad River Slough using a combination of a steel sheet pile wall and 10 tons of rock slope protection to protect the levee face on the slough side.

OTHER APPROVALS RECEIVED:

- 1) U.S. Army Corps of Engineers Clean Water Act Section 404 Nationwide Permit Nos. 3 (Maintenance) and 13 (Bank Stabilization); File No. 2007-00663
- 2) North Coast Regional Water Quality Control Board Clean Water Act Section 401 Water Quality Certification No. 1B06068WNHU
- 3) Humboldt Bay Harbor, Recreation, and Conservation District Administrative Permit No. A-2007-04
- 4) NOAA.-Fisheries Informal Consultation File No. 2007/04970 (August 9, 2007)
- 5) Fish and Wildlife Service Biological Opinion and Incidental Take Statement File No. 8-14-2006-3050 (April 27, 2007)
- 6) Humboldt County Grading Permit No. 07-0881X6

SUBSTANTIVE FILE DOCUMENTS:

- | | |
|----------------------------------------|-------------------------------------------|
| 1) Commission CDP File No. 1-03-004 | 10) Commission CDP File No. 1-05-044-G |
| 2) Commission CDP File No. 1-03-004-A1 | 11) Commission CDP File No. 1-06-044-G |
| 3) Commission CDP File No. 1-03-004-A2 | 12) Commission CDP File No. 1-07-008-G |
| 4) Commission CDP File No. 1-03-061-G | 13) Commission CDP File No. 1-07-037-G |
| 5) Commission CDP File No. 1-03-070-G | 14) Commission CDP File No. 1-07-048-G |
| 6) Commission CDP File No. 1-04-017-G | 15) Humboldt County Local Coastal Program |
| 7) Commission CDP File No. 1-04-040-G | |
| 8) Commission CDP File No. 1-04-050-W | |
| 9) Commission CDP File No. 1-04-060-G | |

SUMMARY OF STAFF RECOMMENDATION

On March 17, 2005, the Commission approved Coastal Development Permit (CDP) No. 1-03-004 (Reclamation District 768) for repair of a 230-foot-long breach in a portion of the levee north of State Highway 255, replacement of three 36-inch-diameter culverts and floodgates, and a 10-year permit for routine repair and maintenance activities on the levee system. On July 13, 2007 the Commission approved CDP Amendment No. 1-03-004-A1, which authorized repair and maintenance of approximately 7,877 linear feet (~1.5 miles) of the applicant's 4.9-mile long levee system including approximately 60 repair sites, each with damage/repairs extending from 10 to 1,520 feet in length. On May 9, 2008, the Commission approved CDP Amendment No. 1-03-004-A2, which permanently authorized the repairs that were approved under Emergency Permit Nos. 1-06-044-G, 1-07-008-G, 1-07-037-G, and 1-07-048-G for repairs and maintenance to approximately 13,115 linear feet of levee along Arcata Bay and Mad River Slough. The permit amendment also provided for the placement of approximately 600 feet of rock slope protection at repair site #9, minor relocation of a temporary staging area and access route associated with repairs to the Jackson Ranch levee, and amending the crossing method at the ditch crossing located just south of the Humboldt Bay Municipal Water District pipeline along the Mad River Slough from temporary bridge to a temporary culvert and fill crossing.

The subject amendment application proposes to install an approximately 300-foot-long sheet pile wall along a portion of Repair Site #9 on the Jackson Ranch levee, which borders Mad River Slough just north of Humboldt Bay. The currently authorized project allows for standard methods of levee repair and maintenance using clean quarry rock, concrete rubble, and/or dry, clean fill materials. However, traditional levee repair methods have been determined to not be feasible at this location due to the changing hydraulics of the slough, which has enough energy (stream velocity) at this location to induce scour and cause severe erosion. The current amendment request would also amend the locations of the previously authorized temporary staging areas and access roads slightly to facilitate construction activities at Repair Site #9.

By modifying and reimposing various special conditions and attaching one new special condition, staff believes that the development authorized by the amended permit would be consistent with the Commission's intent in granting the original permit with conditions to avoid significant adverse impacts to wetlands and other ESHA resources. Modified and reimposed Special Condition No. 3 outlines various standards for the construction amended development; modified and reimposed Special Condition No. 4 details erosion control procedures to be undertaken; modified and reimposed Special Condition No. 6 requires various tidewater goby mitigation measures; modified and reimposed Special Condition No. 9 imposes assumption of risk requirements on the development as amended by CDP Amendment No. 1-03-004-A3; and modified and reimposed Special Condition No. 11 ensures that staff will have the right to inspect the site for compliance with the requirements of CDP Amendment No. 1-03-004-A3. Added Special Condition No. 14 requires submittal of a final eelgrass monitoring and mitigation plan to ensure that

the sheet pile wall development to be authorized under the amendment does not have significant adverse impacts to eelgrass habitat. Added Special Condition No. 15 requires measures to protect rare plant ESHA in the project vicinity. Finally, added Special Condition No. 16 requires submittal of final plans for insurance that geologic hazards will be minimized.

Staff believes that the amended development, as conditioned, is consistent with all Coastal Act Chapter 3 policies.

The Motion to adopt the Staff Recommendation of Approval with Conditions is on Pages 6-7.

STAFF NOTES:

1. Procedural Note

Section 13166 of the California Code of Regulations states that the Executive Director shall reject an amendment request if: (a) it lessens or avoids the intent of the approved permit; unless (b) the applicant presents newly discovered material information, which he or she could not, with reasonable diligence, have discovered and produced before the permit was granted.

On March 17, 2005, the Commission approved Coastal Development Permit (CDP) No. 1-03-004 for repair of a 230-foot-long breach in a portion of the levee north of State Highway 255, replacement of three 36-inch-diameter culverts and floodgates, and a 10-year permit for routine repair and maintenance activities on the levee system (Exhibit No. 11). The Commission approved the project with two special conditions. Special Condition No. 1 addresses the length of development authorization (five years with up to one request for an additional five-year period of development authorization). Special Condition No. 2 addresses standards for the repair and maintenance work, including specifications on armoring rock, fill material, placement of materials, revegetation of disturbed areas, spoils disposal, erosion control, spill prevention, no wet season work, no wetland fill, pre-contractor training, monitoring, annual reports, and annual inspections.

On July 13, 2007, the Coastal Commission approved CDP Amendment No. 1-03-004-A1, which authorized implementation of the “2007 Levee Repair Project,” including repair and/or protection of 7,877 linear feet (~1.5 miles) of the 4.9-mile long levee system including approximately 60 repair sites with damage extending from 10 to 1,520 feet in length (Exhibit No. 12). In its approval of the permit amendment, the Commission modified and reimposed Special Condition Nos. 1 and 2 of the original permit. Additionally, the Commission added Special Condition Nos. 3 through 11, which pertain specifically to the “2007 Levee Repair Project” and address construction standards, erosion control procedures, debris disposal, and measures to protect rare plants, tidewater goby, and archaeological resources, among others.

On May 9, 2008, the Coastal Commission approved CDP Amendment No. 1-03-004-A2, which permanently authorized the repairs that were approved under Emergency Permit Nos. 1-06-044-G, 1-07-008-G, 1-07-037-G, and 1-07-048-G for repairs and maintenance to approximately 13,115 linear feet of levee along Arcata Bay and Mad River Slough (Exhibit No. 13). The permit amendment also provided for the placement of approximately 600 feet of rock slope protection at repair site #9, minor relocation of a temporary staging area and access route associated with repairs to the Jackson Ranch levee, and amending the crossing method at the ditch crossing located just south of the Humboldt Bay Municipal Water District pipeline along the Mad River Slough from temporary bridge to a temporary culvert and fill crossing. In its approval of the permit amendment, the Commission modified and reimposed (1) Special Condition Nos. 2-I, 3-B, and 6-C to allow for use of temporary culverts and fill at the single crossing location located just south of the HBMWD pipeline; (2) Special Condition No. 2-N to require implementation of Tidewater goby mitigation measures for ongoing repair and maintenance activities; (3) Special Condition No. 2-O to require a rare plant management plan be submitted to the Executive Director prior to commencement of ongoing repair and maintenance activities near known rare plant ESHA; and (4) Special Condition Nos. 4 and 9 to impose erosion control and assumption of risk requirements (respectively) on the development as amended by CDP Amendment No. 1-03-004-A2. In addition, the Commission added Special Condition Nos. 12 (to require a rare plant management plan be submitted to the Executive Director prior to commencement of construction near known rare plant ESHA) and 13 (to require recovery and removal of revetment material placed under emergency authorization that has encroached beyond the historic footprint of the levees).

The current amendment request proposes to further amend the approved project description to allow for the installation of a 300-foot-long sheet pile wall at Repair site #9 on the Jackson Ranch levee. The currently authorized project (CDP No. 1-03-004, as amended) allows for standard methods of levee repair and maintenance using clean quarry rock, concrete rubble, and/or dry, clean fill materials. However, traditional levee repair methods have been determined to be not feasible at this location due to the changing hydraulics of the slough, which has enough energy (stream velocity) at this location to induce scour and cause severe erosion. The current amendment request would also amend the locations of the previously authorized temporary staging areas and access roads slightly to facilitate construction activities at Repair Site #9.

As conditioned, the proposed amendment would not lessen or avoid the intent of the currently approved project as amended. Conditions to protect wetlands and water quality include (1) requiring that any material placed on the levee shall not extend into the slough beyond the footprint of the levee as it existed before the repair; (2) using the least environmentally damaging feasible alternative for the amended staging area installation and to require post-construction restoration and monitoring of the areas to ensure that the temporarily impacted seasonal wetlands will be fully restored to pre-project conditions; and (3) limiting the use of temporary culverts and fill to a single crossing only located just south of the HBMWD pipeline, and installing and remove the crossing in the least

environmentally damaging feasible manner. Additionally, the permit amendment has been conditioned to require avoidance of rare plant habitat and submittal of a final eelgrass monitoring and mitigation plan to ensure that the sheet pile wall development to be authorized under the amendment does not have significant adverse impacts to eelgrass habitat. Thus, the Executive Director has determined that the proposed amendment as conditioned would not lessen or avoid the intent of the approved permit. Therefore, the Executive Director has accepted the amendment request for processing.

2. Commission Jurisdiction & Standard of Review

The proposed development will be conducted on a levee located within state tidelands and public trust lands in Humboldt County. Pursuant to Section 30519 of the Coastal Act, the Coastal Commission retains jurisdiction over the review and issuance of Coastal Development Permits in these areas even though the County of Humboldt has a certified Local Coastal Program. The standard of review for projects located in the Commission's original jurisdiction is Chapter 3 of the Coastal Act.

3. Scope

This staff report addresses only the coastal resource issues affected by the proposed permit amendment, provides recommended special conditions to reduce and mitigate significant impacts to coastal resources caused by the development, as amended, in order to achieve consistency with the Coastal Act, and provides findings for conditional approval of the amended development. All other analysis, findings, and conditions related to the originally permitted development, CDP Amendment No. 1-03-004-A1, and CDP Amendment No. 1-03-004-A2, except as specifically affected by the current permit amendment request and addressed herein, remain as stated within the original permit approval adopted by the Commission on March 17, 2005 (attached as Exhibit No. 11), in the staff recommendation for CDP Amendment No. 1-03-004-A1 adopted by the Commission on July 13, 2007 (attached as Exhibit No. 12), and in the staff recommendation for CDP Amendment No. 1-03-004-A2 adopted by the Commission on May 8, 2008 (attached as Exhibit No. 13).

I. MOTION, STAFF RECOMMENDATION, & RESOLUTION:

The staff recommends that the Commission adopt the following resolution:

Motion:

I move that the Commission approve the proposed amendment to Coastal Development Permit No. 1-03-004-A2 pursuant to the staff recommendation.

Staff Recommendation of Approval:

Staff recommends a **YES** vote. Passage of this motion will result in approval of the permit amendment as conditioned and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

Resolution to Approve with Conditions:

The Commission hereby approves the proposed permit amendment and adopts the findings set forth below, subject to the conditions below, on the grounds that the development with the proposed amendment, as conditioned, will be in conformity with the Chapter 3 policies of the Coastal Act. Approval of the permit complies with the California Environmental Quality Act because all feasible mitigation measures and alternatives have been incorporated to substantially lessen any significant adverse impacts of the development on the environment.

II. STANDARD CONDITIONS: See Attachment A.

III. SPECIAL CONDITIONS:

Note: The original permit contained two special conditions (Special Condition Nos. 1 and 2), both of which were modified and reimposed as conditions of CDP Amendment No. 1-03-004-A1. Additionally, CDP Amendment No. 1-03-004-A1 added new Special Condition Nos. 3 through 11. CDP Amendment No. 1-03-004-A2 reimposed without modification Special Condition Nos. 1, 5, 7, 8, 10, and 11 and modified and reimposed Special Condition Nos. 2, 3, 4, 6, and 9. Additionally, CDP Amendment No. 1-03-004-A2 added new Special Condition Nos. 12 and 13.

Special Condition Nos. 3, 4, 6, 9, and 11 of the CDP as previously amended are modified and reimposed as conditions of this permit amendment. Special Condition Nos. 1, 2, 5, 7, 8, 10, 12, and 13 are reimposed as conditions of CDP Amendment No. 1-03-004-A3 without any changes and remain in full force and effect. Special Condition Nos. 14, 15, and 16 are new special conditions added to CDP Amendment No. 1-03-004-A3. For comparison, the text of the conditions of both the original permit and the first and second permit amendments are included in Exhibit Nos. 11, 12, and 13, respectively.

Deleted wording within the modified special conditions is shown in ~~striketrough~~ text, and new condition language appears as **bold double-underlined** text.

3. Standards for the 2007 Levee Repair Project Authorized by Amendment No. 1-03-004-A1 and for Development Authorized by Amendment Nos. 1-03-004-A2 and 1-03-004-A3

The permittee shall undertake all development authorized by Amendment No. 1-03-004-A1 for the 2007 Levee Repair Project and for development authorized by Amendment Nos. 1-03-004-A2 **and 1-03-004-A3** in accordance with the following standards:

- A. Temporary access roads and staging areas: As described in the Project Description dated June 21, 2007 (Exhibit No. 3 of the June 29, 2007 staff report for CDP Amendment No. 1-03-004-A1), road surfacing materials (including road stabilization fabric, redwood bark and/or road base) shall be placed directly on top of the existing ground and then removed

immediately upon completion of construction activities in the area. The existing topsoil shall not be removed for any purpose.

- B. Temporary ditch crossings: The permittee shall use only the temporary bridge design for temporary ditch crossings, as depicted in Figure 8 of Exhibit No. 3 of the June 29, 2007 staff report for CDP Amendment No. 1-03-004-A1, except for the inboard ditch crossing located just south of the Humboldt Bay Municipal Water District Pipeline on Mad River Slough. At this crossing only, a temporary culvert and fill crossing consisting of plastic culverts and hay bales may be used in accordance with "Scenario 3" of the August 13, 2007 letter to Coastal Commission staff from Oscar Larson & Associates Project Manager Michael Holtrigel (Exhibit No. 5). The temporary culvert and fill crossing shall be completely removed within 10 days of completion of construction activities for each occurrence of levee repair in the vicinity of the crossing. No culverts or fill shall be placed in any other ditches for temporary crossing purposes. Any temporary bridge crossing shall remain in place for no more than 30 days maximum.
- C. Upon completion of project activities in the area and prior to ~~October 15, 2008~~ November 30, 2009, all temporarily disturbed seasonal wetlands (including but not limited to temporary staging areas, access roads, and ditch crossings) shall be decompacted and reseeded, as needed, with a mix of regionally appropriate native grasses and/or noninvasive agricultural species. No plant species listed as problematic and/or invasive by the California Native Plant Society, the California Invasive Plant Council, or as may be identified from time to time by the State of California, shall be employed or allowed to naturalize or persist on the site. No plant species listed as a "noxious weed" by the governments of the State of California or the United States shall be utilized within the property.
- D. The use of rodenticides containing any anticoagulant compounds, including, but not limited to, Bromadiolone, Brodifacoum or Diphacinone shall not be used.
- E. Within 18 months of completion of the 2007 Levee Repair Project and development authorized by CDP Amendment Nos. 1-03-004-A2 and 1-03-004-A3, the permittee shall submit, for the review and written approval of the Executive Director, a vegetation monitoring report prepared by a qualified biologist or botanist which evaluates whether the objective of reestablishing vegetation in all of the seasonal wetland areas (diked former tidelands) impacted by project construction to a level of coverage and density equivalent to vegetation coverage and density of the surrounding undisturbed areas has been achieved. If the report indicates that the revegetation of any of the disturbed areas, including the temporary access roads and staging areas identified on Figure 4 of Exhibit No. 3 of the June 29, 2007 staff report for CDP Amendment No. 1-03-004-A1, ~~and~~ in the site plan for CDP Amendment No. 1-03-004-A2 (Exhibit No. 3 of the

April 25, 2008 staff report for CDP Amendment No. 1-03-004-A2), and in the site plan for CDP Amendment No. 1-03-004-A3 (Exhibit No. 3). has not been successful, in part or in whole, the permittee shall submit a revised revegetation program to achieve the objective. The revised revegetation program shall require an amendment to Coastal Development Permit No. 1-03-004.

- F. Heavy equipment shall not operate in the bay or wetted channel. All repair or restoration work shall be done from the top of the levee or from the landward side of the channel by loader, backhoe, or excavator;
- G. No construction materials, debris, or waste shall be placed or stored where it may be subject to entering waters of Arcata Bay, Mad River Slough, or seasonal wetlands outside of levee repair areas and temporary staging areas and access roads;
- H. All construction debris shall be removed and disposed of in an upland location at an approved disposal facility within 10 days of project completion;
- I. All construction activities shall be conducted during the dry season period of April 15 through October 15; The Executive Director may approve construction activities beyond October 15 to as late as November 30 for work authorized under CDP Amendment No. 1-03-004-A3 at Repair Site #9 if the permittee has submitted a request in writing, the Executive Director determines that listed salmon are unlikely to be present within Mad River Slough during the extension period, and NOAA-Fisheries has approved construction activities occurring between October 15 and November 30. Construction activities occurring between October 16 and November 30 shall be subject to the following conditions:
 - (1) All work shall cease upon the onset of precipitation at the project site and shall not recommence until the predicted chance of rain is less than 30 percent for the Arcata area portion of the Redwood Coast segment of the National Weather Service's forecast for Northwestern California;
 - (2) The work site(s) shall be winterized between work cessation periods by installing stormwater runoff and erosion control barriers around the perimeter of each construction site to prevent the entrainment of sediment into coastal waters;
 - (3) Adequate stocks of stormwater runoff and erosion control barrier materials shall be kept onsite and made available for immediate use.
- J. All construction activities shall be conducted during low tide or limited to the areas above mean high water;

- K. During construction, all trash shall be properly contained, removed from the work site, and disposed of on a regular basis to avoid contamination of habitat during restoration activities. Following construction, all trash and construction debris shall be removed from work areas and disposed of properly;
- L. Any debris discharged into coastal waters shall be recovered immediately and disposed of properly;
- M. Any fueling and maintenance of construction equipment shall occur within upland areas outside of environmentally sensitive habitat areas or within designated staging areas;
- N. Fuels, lubricants, and solvents shall not be allowed to enter the coastal waters or seasonal wetlands. Hazardous materials management equipment including oil containment booms and absorbent pads shall be available immediately on-hand at the project site, and a registered first-response, professional hazardous materials clean-up/remediation service shall be locally available on call;
- O. All temporary access roads and staging areas shall be limited to the locations and sizes specified in the permit amendment applications.
- P. Armoring Rock: All new revetment material to be used shall consist of either clean quarry rock or concrete rubble materials that are free of asphalt and waste materials. The revetment materials shall not be greater than three feet in any one direction or smaller than one cubic foot in size except for Light Class RSP placed between the RSP fabric and the exposed armoring rock. All exposed reinforcement bar shall be removed prior to installation of any concrete rubble riprap. No rock shall be placed outside of the existing footprint of the levee system.
- Q. Fill Material: Only dry, clean fill may be used for levee repairs and must be free of debris (vegetation, asphalt etc.). No fill shall be placed outside of the existing footprint of the levee system.
- R. Placement of Materials: Materials placed on the levees to be repaired, including all riprap, shall not extend into the slough or Arcata Bay beyond the footprint of the levee as it existed before the repair. The determination of the location of the front of the levee shall be made through a 'string line' method, whereby the portions of the levee that are not in need of repair or restoration on each side of the areas that is in need of repair shall be used to determine the maximum extent of the repair. Revetment material shall not be end-dumped, but placed in an interlocking fashion along the levee face to avoid spreading beyond the former footprint of the levee and to provide a structurally integrated revetment.
- S. Sheet Pile Wall Materials: Installation of a sheet pile wall for levee repair and maintenance purposes shall be limited to an approximately 300-foot-long stretch at Repair Site #9 on the Jackson Ranch levee**

only, as generally depicted on Exhibit No. 3, and shall be in accordance with the Sheet Pile Wall Plan shown in Exhibit No. 4 of CDP Amendment No. 1-03-004-A3.

4. Erosion Control Procedures for the 2007 Levee Repair Project Authorized by Amendment No. 1-03-004-A1 and for development authorized by Amendment Nos. 1-03-004-A2 and 1-03-004-A3

The permittee shall undertake all development authorized by Amendment No. 1-03-004-A1 for the 2007 Levee Repair Project and development authorized by Amendment Nos. 1-03-004-A2 **and 1-03-004-A3** in compliance with the following erosion control procedures:

- A. The permittee shall use relevant best management practices (BMPs) as detailed in the “California Storm Water Best Management (Construction and Industrial/Commercial) Handbooks, developed by Camp, Dresser & McKee, *et al.* for the Storm Water Quality Task Force (see <http://www.cabmphandbooks.com>).
- B. All repair or restoration activities involving the levee shall include the placement of geotextile or similar erosion control material between the authorized fill and the levee and the placement of the riprap to reduce or minimize the amount of erosion that may otherwise occur.
- C. Effective erosion control measures shall be in place at all times during construction. Construction must not commence until all temporary erosion control devices (*e.g.*, silt fences, floating turbidity curtains, etc.) are in place downslope or downstream of the project site. A supply of erosion control materials shall be maintained on site to facilitate a quick response to unanticipated storm events or emergencies. If continued erosion is likely to occur after construction is completed, then appropriate erosion prevention measures shall be implemented and maintained until erosion has subsided. Erosion control devices are temporary structures and shall be removed after completion of construction.
- D. Erosion controls shall be used to protect and stabilize stockpiles and exposed soils to prevent movement of materials (*e.g.*, silt fences, berms of hay bales, plastic sheeting held down with rocks or sandbags over stockpiles, *etc.*).
- E. If operations are not adequately containing sediment, the activity shall cease. Turbid water shall be contained and prevented from being carried away in the tides in amounts that are deleterious to marine resources or could violate state pollution laws.
- F. Work sites shall be winterized at the end of each day when significant rains are forecast that may cause unfinished excavation to erode.
- G. After project completion and before the close of the seasonal work window, all exposed soils present in and around the project site which

may deliver sediment to a wetland, the bay, or the slough shall be stabilized with mulch, seeding, and/or placement of erosion control blankets. Erosion control seeding shall include only native, regionally appropriate species or noninvasive agricultural species. No plant species listed as problematic and/or invasive by the California Native Plant Society, the California Invasive Plant Council, or as may be identified from time to time by the State of California, shall be employed or allowed to naturalize or persist on the site. No plant species listed as a “noxious weed” by the governments of the State of California or the United States shall be utilized within the property.

6. Implementation of Tidewater Goby Mitigation Measures for the 2007 Levee Repair Project Authorized by Amendment No. 1-03-004-A1 and for development authorized by Amendment Nos. 1-03-004-A2 and 1-03-004-A3:

The permittee shall undertake all development authorized by Amendment No. 1-03-004-A1 for the 2007 Levee Repair Project and for development authorized by Amendment Nos. 1-03-004-A2 and 1-03-004-A3 in accordance with the following protocols to ensure minimization of impacts to Tidewater goby and Tidewater goby proposed critical habitat:

- A. Effective and appropriate erosion control devices shall be used in accordance with all repair work at all times; any erosion control devices used are temporary and shall be removed upon completion of project activities;
- B. Any material that slips beyond the levee configuration into the mudflats outside the levee or the inboard borrow ditch and associated wetland channels shall be removed to staging areas and/or hauled off site;
- C. As specified in Special Condition No. 3-B above, the permittee shall use only the temporary bridge design for temporary ditch crossings, as depicted in Figure 8 of Exhibit No. 3 of the June 29, 2007 staff report for CDP Amendment No. 1-03-004-A1, except for the inboard ditch crossing located just south of the Humboldt Bay Municipal Water District Pipeline on Mad River Slough. At this crossing only, a temporary culvert and fill crossing consisting of plastic culverts and hay bales may be used in accordance with “Scenario 3” of the August 13, 2007 letter from Oscar Larson & Associates Project Manager Michael Hollrigel (Exhibit No. 5). The temporary culvert and fill crossing shall be completely removed within 10 days of completion of construction activities for each occurrence of levee repair in the vicinity of the crossing. No culverts or fill shall be placed in any other ditches for temporary crossing purposes. Any temporary bridge crossing shall remain in place for no more than 90 days maximum.
- D. Prior to construction of any temporary ditch crossing, Tidewater gobies shall be excluded from the areas of impact by using seine netting stretching from substrate to water surface and bank to bank. The netting must be a knotless mesh of no greater than 0.125-inch openings in the

largest dimension. Netting shall be deployed in such a way that it excludes gobies from the construction area and keeps them from entering the construction zone until the structure is in place and all work within the wetted channels for the purpose of constructing the crossing has been completed. The results of fish exclusion efforts shall be reported to the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and any other relevant agencies.

9. Assumption of Risk for the 2007 Levee Repair Project Authorized by Amendment No. 1-03-004-A1 and, for development authorized by Amendment No. 1-03-004-A2, and for development authorized by Amendment No. 1-03-004-A3

By acceptance of this permit amendment for the 2007 Levee Repair Project and for development authorized by Amendment Nos. 1-03-004-A2 and 1-03-004-A3, the applicant acknowledges and agrees (i) that the site may be subject to hazards from flooding; (ii) to assume the risks to the applicant and the property that is the subject of this permit of injury and damage from such hazards in connection with this permitted development; (iii) to unconditionally waive any claim of damage or liability against the Commission, its officers, agents, and employees for injury or damage from such hazards; and (iv) to indemnify and hold harmless the Commission, its officers, agents, and employees with respect to the Commission's approval of the project against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards.

11. Permission to Inspect for the 2007 Levee Repair Project Authorized by Amendment No. 1-03-004-A1 and for development authorized by Amendment No. 1-03-004-A3

The Coastal Commission staff shall have the right, upon 24-hours notification to the permittee, to enter and inspect the premises for the purpose of determining compliance with Coastal Development Permit Amendment Nos. 1-03-004-A1 and 1-03-004-A3.

14. Final Eelgrass Monitoring & Mitigation Plan

- A. PRIOR TO ISSUANCE OF COASTAL DEVELOPMENT PERMIT AMENDMENT NO. 1-03-004-A3, the applicant shall submit, for the review and approval of the Executive Director, a final revised eelgrass mitigation and monitoring plan that substantially conforms with the plan submitted to the Commission entitled "Eelgrass (*Zostera marina*) Mitigation and Monitoring Plan for Reclamation District 768 Levee Repair Project," prepared by Oscar Larson & Associates and Mad River Biologists., dated April 17, 2007 except that it shall be revised to include the following components:**

1. Only mapped eelgrass should be included in the two-step sampling design (wherein the eelgrass area is first mapped and then sampled in a stratified random manner);
 2. The stratified random approach should also be applied to the placement of quadrats within the eelgrass bed (to avoid biasing the sample to over-represent edges);
 3. Rationale for the proposed 2.5 to 1 mitigation ratio.
- B. If the final report indicates that the mitigation project has been unsuccessful in part or in whole based on the performance standards of achieving (1) no significant decrease in eelgrass coverage in the potential impact area relative to the control site, and (2) no significant time by location interaction as evaluated by the two-factor analysis of variance, the applicant shall submit a revised or supplemental mitigation program to compensate for those portions of the original program which did not meet the performance standard. The revised mitigation program shall be processed as an amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.
- C. The permittee shall undertake development in accordance with the approved final plan. Any proposed changes to the approved final plan shall be reported to the Executive Director. No changes to the approved final plan shall occur without a Commission approved amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.
15. Rare Plant Mitigation Plan for Development Authorized by Amendment No. 1-03-004-A3
- A. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION OF THE DEVELOPMENT AUTHORIZED BY AMENDMENT NO. 1-03-004-A3, the permittee shall submit a plan for the review and approval of the Executive Director for the dispersal of seed from individual specimens of Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *humboldtiensis*), Point Reyes bird's-beak (*Cordylanthus maritimus* ssp. *palustris*), and Western sand-spurrey (*Spergularia canadensis*) growing in the project area to adjacent salt marsh habitat.
1. The plan shall demonstrate that:
 - (a) No construction activities shall occur in the affected areas until after all Humboldt Bay owl's clover, Point Reyes bird's beak, and Western sand-spurrey plants have set seed, as determined by a qualified botanist;

- (b) If any rare plants are located in areas of potential impact, a qualified botanist shall collect and conserve all seed of the affected individuals to be distributed as appropriate in a suitable habitat nearest to where the seed was collected that already contains Humboldt Bay owl's clover, Point Reyes bird's beak, and/or Western sand-spurrey; and
- (c) Collected seed shall be distributed into the identified habitat areas at the phenologically appropriate time, as determined by the qualified botanist.

2. The plan shall include at a minimum the following components:

- (a) Seasonally appropriate botanical surveys conducted by a qualified botanist for Humboldt Bay owl's clover, Point Reyes bird's beak, and Western sand-spurrey that indicates the number of rare plants located on the levee system in the areas of potential impact;
- (b) A map that locates the affected areas of levee construction relative to the habitat area where seed will be distributed; and
- (c) A narrative that describes the seed collection and distribution program and methods, identifies the habitats that will receive the seeds to be dispersed and why the receiver sites were selected, and discusses the phenologically appropriate time for distribution of the seed.

B. The permittee shall undertake development in accordance with the approved final plan. Any proposed changes to the approved final plan shall be reported to the Executive Director. No changes to the approved final plan shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

16. Minimization of Geologic Hazards

A. PRIOR TO ISSUANCE OF COASTAL DEVELOPMENT PERMIT AMENDMENT NO. 1-03-004-A3, the applicant shall submit evidence for the review and written approval of the Executive Director that a geotechnical engineer has reviewed and approved all final design plans for the sheet pile wall.

B. The permittee shall undertake development in accordance with the approved final plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to

this coastal development permit unless the Executive Director determines that no amendment is legally required.

IV. FINDINGS & DECLARATIONS

The Commission finds and declares the following:

A. Project & Site Description

1. Background & Project Setting

Local winter storms from December 30, 2005 through January 3, 2006 led to overtopping, accumulation of debris, and the erosion of over 20,000 feet of levees under the jurisdiction of Reclamation District 768. The 3.5-mile-long Arcata Bay levee is located south of State Highway 255 along the north side of Arcata Bay (Humboldt Bay), and the 1.4-mile-long Jackson Ranch levee is located north of State Highway 255 adjacent to the Mad River Slough (see Exhibit Nos. 1 and 2). The levees were originally constructed with Humboldt Bay mud and are 20 to 24 feet wide at the base and 10 to 12 feet wide at the top. Levee height ranges from approximately 7 to 10 feet above mean sea level.

Reclamation District 768 was established in 1904 and consists of approximately 1,500 acres of land. The District is responsible for the maintenance of the 4.9-mile levee system. Currently the property in the District is owned by 15 separate owners, including private citizens, the City of Arcata, Humboldt State University, the California Department of Fish and Game, and Arcata Lodge #106. The publicly owned property is used primarily as marshland and wildlife habitat. The privately owned lands and the Arcata Lodge property are used as cattle pasture lands.

A major breach of the levees would not only subject adjacent property in the Reclamation District to flooding, but also State Highway 255, residential property, and public infrastructure in the southwest portion of the City of Arcata also are at risk of flooding in the event of a major breach. Since the 2005-2006 storm event, the Federal Emergency Management Agency (FEMA) and the Office of Emergency Services (OES) have funded the repair of all of the storm-damaged levees except for the proposed amended development, which includes approximately 300 feet of repairs on the Jackson Ranch levee at Repair Site #9 (described in more detail below). The Commission authorized the repair work to storm damaged levees under various emergency permits and permit amendments (see below and Substantive File Documents, page 2). Prior to the 2005/2006 storms the Commission also had authorized a 10-year permit for routine repair and maintenance of the levees (CDP No. 1-03-004) as well as various emergency permits that were necessary to protect coastal agricultural lands and public road facilities from flood damage following significant storm events (see below and Substantive File Documents, page 2).

The agricultural fields of the Reclamation District represent diked former tidelands of

Arcata Bay that were converted to pasture for agricultural purposes after the levees were built around 1880. The fields are considered to be seasonal wetlands. Other jurisdictional wetlands in the proposed project area include the inboard ditches, sloughs, and Arcata Bay and Mad River Slough, which are located outside of the levee system. Virtually the only uplands on the project site are the levees themselves.

2. Description of Originally Approved Project

On March 17, 2005, the Coastal Commission approved, with two special conditions, the following project (CDP No. 1-03-004; Exhibit No. 11), which consisted of three separate, but related, components:

- Follow-up Permitting for Culvert Replacement Emergency Permit Nos. 1-03-070-G and 1-04-017-G: The first part of the project was a follow-up permit to two Emergency Permits granted by the North Coast District Office in 2003 and 2004 for the replacement of three failing corrugated metal culverts and floodgates located at the west end of the levee system along Humboldt Bay and south of State Highway 255. The failed culverts were replaced with the same type and size of culverts and floodgates, with clean armoring rock re-installed around the outboard side of the levee (adjacent to Arcata Bay), consistent with the conditions placed on the Emergency Permits specifying the type of materials to be used in the repair of this section of the levee.
- Follow-up Permitting for Major Levee Breach Repair Emergency Permit No. 1-04-060-G: On December 23, 2003, a combination of extraordinarily high tides and 45 mile-per-hour (mph) winds caused a 230-foot-long breach in a portion of the levee located north of Highway 255. This breach resulted in the flooding of about 600 acres of pasture and a local county road and was temporarily contained by the installation of large “water bag” dikes. Emergency Permit No. 1-04-060-G was subsequently obtained from the North Coast District Office for repair of the breach along the original alignment with an earthen levee and outboard armoring as had existed prior to the incident, as well as the repair of 15 other, smaller eroded areas on the levee fronting Arcata Bay. This Emergency Permit was conditioned to require the use of clean fill for the levee and clean rock (*i.e.*, no debris, no re-bar) for the outboard armoring.
- Ten Year Programmatic Permit for Ongoing Repair & Maintenance Activities: The final part of the project involved a 10-year permit to undertake routine repair and maintenance of the levee system. In summary, the Reclamation District maintenance program includes vegetation control (mowing) along the top of the levees to allow access for maintenance equipment, replacement of riprap that has migrated or is needed to repair erosion, placement of clean fill to repair eroded areas, and flood gate and culvert replacement with the same size facilities. All of the work is to occur within the existing footprint of the levee and will not result in any encroachment into Arcata Bay or on the inboard (reclaimed land) side of the levee into the seasonal wetlands.

Special Condition No. 1 of the permit addresses the length of development authorization (five years with up to one request for an additional five-year period of development authorization). Special Condition No. 2 addresses standards for the repair and maintenance work, including specifications on armoring rock, fill material, placement of materials, revegetation of disturbed areas, spoils disposal, erosion control, spill prevention, no wet season work, no wetland fill, pre-contractor training, monitoring, annual reports, and annual inspections.

3. Description of Amended Development Approved Under CDP Amendment No. 1-03-004-A1

On July 13, 2007, the Coastal Commission approved, with conditions, an amendment to CDP No. 1-03-004, which authorized implementation of the “2007 Levee Repair Project.” CDP Amendment No. 1-03-004-A1 (Exhibit No. 12) authorized repair and/or protection of 7,877 linear feet (~1.5 miles) of the 4.9-mile long levee system including approximately 60 repair sites with damage extending from 10 to 1,520 feet in length. The amendment was necessary to authorize the installation of 8,000 lineal feet of temporary access roads and four large (25,000-square feet each) temporary staging areas within seasonal wetlands (diked former tidelands) to facilitate the implementation of the large-scale project (to stockpile and sort construction materials and to transport and store heavy equipment such as excavators, backhoes, tracked dumpers, dump trucks, bulldozers, *etc.*). The original permit did not authorize the installation of temporary access roads or staging areas anywhere in the project area during on-going, routine repair and maintenance activities. The temporary access roads and staging areas approved under CDP Amendment No. 1-03-004-A1 were limited to the locations and sizes specified in the permit amendment application.

In its approval of the permit amendment, the Commission modified and reimposed Special Condition Nos. 1 and 2 of the original permit. Additionally, the Commission added Special Condition Nos. 3 through 11, which pertain specifically to the one time “2007 Levee Repair Project” and address construction standards, erosion control procedures, debris disposal, and measures to protect rare plants, tidewater goby, and archaeological resources, among others.

4. Description of Amended Development Approved Under CDP Amendment No. 1-03-004-A2

On May 9, 2008, the Coastal Commission approved CDP Amendment No. 1-03-004-A2, which permanently authorized the repairs that were approved under Emergency Permit Nos. 1-06-044-G, 1-07-008-G, 1-07-037-G, and 1-07-048-G for repairs and maintenance to approximately 13,115 linear feet of levee along Arcata Bay and Mad River Slough (Exhibit No. 13). The permit amendment also provided for the placement of approximately 600 feet of rock slope protection at Repair Site #9 on the Jackson Ranch levee, minor relocation of a temporary staging area and access route associated with repairs to the levee, and amending the crossing method at the ditch crossing located just south of the Humboldt Bay Municipal Water District pipeline along the Mad River

Slough from a temporary bridge to a temporary culvert and fill crossing.

In its approval of the permit amendment, the Commission modified and reimposed (1) Special Condition Nos. 2-I, 3-B, and 6-C to allow for use of temporary culverts and fill at the single crossing location located just south of the HBMWD pipeline; (2) Special Condition No. 2-N to require implementation of Tidewater goby mitigation measures for ongoing repair and maintenance activities; and (3) Special Condition No. 2-O to require a rare plant management plan be submitted to the Executive Director prior to commencement of ongoing repair and maintenance activities near known rare plant ESHA; and (4) Special Condition Nos. 4 and 9 to impose erosion control and assumption of risk requirements (respectively) on the development as amended by CDP Amendment No. 1-03-004-A2. In addition, the Commission added Special Condition Nos. 12 (to require a rare plant management plan be submitted to the Executive Director prior to commencement of construction near known rare plant ESHA) and 13 (to require recovery and removal of revetment material placed under emergency authorization that has encroached beyond the historic footprint of the levees).

5. Description of Amended Development Proposed Under CDP Amendment No. 1-03-004-A3

The levee repair work proposed under the current permit amendment request was authorized by the Executive Director under Emergency Permit No. 1-07-037-G. However, the work was never able to be completed prior to the permit expiration date (December 15, 2007, as specified by Condition No. 3 of the emergency permit) due to funding and permitting constraints.

The current amendment request would permit the installation of an approximately 300-foot-long sheet pile wall at a portion of Repair Site #9 on the Jackson Ranch levee (Exhibit No. 3). The currently authorized project (CDP No. 1-03-004, as amended) allows for standard methods of levee repair and maintenance using clean quarry rock, concrete rubble, and/or dry, clean fill materials. Repair Site #9 is susceptible to the risks of extraordinary erosion and flood hazards of the surrounding property. The applicant submitted a Scour Analysis prepared for the project in August 2007 by Oscar Larson & Associates (Exhibit No. 8), which analyzed scour, wave energy, and geomorphology in Mad River Slough along the Jackson Ranch levee at repair site #9. Specifically, the report (1) quantified the maximum current velocity in the slough and compared it to a horizontal scour benchmark, (2) looked at wave energy in the slough caused by wind-wave interaction, shore bottom refraction, and tidal elevation, and (3) characterized why the scour is happening at the proposed project site in particular. The report concluded that the severe erosion at Repair Site #9 is caused by the changing hydraulics of the slough, which has enough energy (stream velocity) to induce scour and continue the meandering process. Thus, the applicant indicates that the standard methods of levee repair would not be adequate at this location and that the sheet pile wall is necessary. The current amendment request would also amend the locations of the previously authorized temporary staging areas and access roads slightly to facilitate construction activities at Repair Site #9 (see below).

The proposed amended levee repair work would involve installing a sheet pile wall along an approximately 300-foot-long stretch of the Jackson Ranch levee with a vibratory pile-driver operating from the top of the existing levee. Prior to sheet pile installation, approximately 50 cubic yards of existing levee material would be excavated to prepare the damaged area for the proposed repair work. Approximately 74 cubic yards of engineered fill and 5.5 cubic yards (10 tons) of rock slope protection (RSP) would be placed at the site for levee repair. Approximately 5 tons of RSP would be placed on the east end of the sheet piling to tie into the existing levee RSP, and approximately 5 tons of RSP would be placed on the west end of the sheet piling to reduce the potential for erosion at the end of the sheet piling.

The proposed sheet pile wall would consist of “AZ 19-700” sheets of steel sheet piling, 48-inch steel pipe piling (minimum 0.5-inch wall thickness), and type “C9” steel sheet/pile connectors. A corrosion resistant coating of “Carboguard 890” would be applied to all components of the sheet pile wall to a minimum depth of 5 feet below the design scour depth. The proposed sheet piling plans are attached as Exhibit No. 4.

As noted above, the previously approved staging area and access road locations would be moved slightly to facilitate construction of the sheet pile wall. However, the applicant proposes to maintain the same size of staging areas (i.e., 25,000 square feet) and install the access road and staging areas in the same manner as approved under CDP Amendment Nos. 1-03-004-A1 and 1-03-004-A2, which involves placing surfacing materials (fabric, bark and/or road base, etc.) for both temporary roads and staging areas directly on top of the existing ground (seasonal wetlands) and then removing the materials upon completion of construction activities in the area. Temporarily impacted wetlands would then, as necessary, be tilled (decompacted) and reseeded.

The applicant proposes to use a temporary culvert and fill crossing to cross the inboard ditch located just south of the Humboldt Bay Municipal Water District (HBMWD) pipeline to access Repair Site #9 on the Jackson Ranch levee (Exhibit No. 5).

The applicant also proposes to utilize an access route from Highway 255 (see Exhibit No. 3) for the sheet pile installation equipment. This route would follow the top of the levee to Repair Site #9. The levee is proposed to be temporarily widened away from the slough to provide the minimum 15-foot-wide width needed to provide for construction equipment access. Temporary sheet piles and/or trestle work would be used to contain the imported earth and rock used for the temporary widening. The levee would be widened by placing approximately 180 cubic yards of earthen and rock material on the upland portions of the levee slope. Materials used to widen the levee would be removed by November 30, 2009. The temporary sheet piles and/or trestle materials would be salvaged or hauled to an upland disposal site. The temporary earthen and rock fill would either be incorporated into the levee repairs as fill or removed to an approved upland disposal location. A wetland delineation was recently (May 12, 2009) completed by Mad River Biologists to confirm that no wetlands would be impacted by the proposed widening of the levee to accommodate the proposed access route. Additionally, the

applicant proposes to use the existing approximately 220-foot-long by 25- to 30-foot-wide upland area located along the shoulder of Highway 255 for staging purposes.

The Commission notes that the applicant has been issued several permits and associated authorizations for the project that contain terms and conditions for avoiding or minimizing impacts to coastal resources and the environment (see “other approvals” listed on page 2).

B. Permit Authority, Extraordinary Methods of Repair & Maintenance

Coastal Act Section 30610(d) generally exempts from Coastal Act permitting requirements the repair or maintenance of structures that does not result in an addition to, or enlargement or expansion of the structure being repaired or maintained. However, the Commission retains authority to review certain extraordinary methods of repair and maintenance of existing structures that involve a risk of substantial adverse environmental impact as enumerated in Section 13252 of the Commission regulations. Section 30610 of the Coastal Act provides, in relevant part, the following:

Notwithstanding any other provision of this division, no coastal development permit shall be required pursuant to this chapter for the following types of development and in the following areas: . . .

(d) Repair or maintenance activities that do not result in an addition to, or enlargement or expansion of, the object of those repair or maintenance activities; provided, however, that if the commission determines that certain extraordinary methods of repair and maintenance involve a risk of substantial adverse environmental impact, it shall, by regulation, require that a permit be obtained pursuant to this chapter. [Emphasis added]

Section 13252 of the Commission administrative regulations (14 CCR 13000 *et seq.*) provides, in relevant part, the following (emphasis added):

(a) For purposes of Public Resources Code section 30610(d), the following extraordinary methods of repair and maintenance shall require a coastal development permit because they involve a risk of substantial adverse environmental impact:...

(3) Any repair or maintenance to facilities or structures or work located in an environmentally sensitive habitat area, any sand area, within 50 feet of the edge of a coastal bluff or environmentally sensitive habitat area, or within 20 feet of coastal waters or streams that include:

(A) The placement or removal, whether temporary or permanent, of rip-rap, rocks, sand or other beach materials or any other forms of solid materials;

(B) The presence, whether temporary or permanent, of mechanized equipment or construction materials.

All repair and maintenance activities governed by the above provisions shall be subject to the permit regulations promulgated pursuant to the Coastal Act, including but not limited to the regulations governing administrative and emergency permits. The provisions of this section shall not be applicable to methods of repair and maintenance undertaken by the ports listed in Public Resources Code section 30700 unless so provided elsewhere in these regulations. The provisions of this section shall not be applicable to those activities specifically described in the document entitled Repair,

Maintenance and Utility Hookups, adopted by the Commission on September 5, 1978 unless a proposed activity will have a risk of substantial adverse impact on public access, environmentally sensitive habitat area, wetlands, or public views to the ocean....

The proposed amended development is a repair and maintenance project because it does not involve an addition to or enlargement of the levee. Although certain types of repair projects are exempt from CDP requirements, Section 13252 of the regulations requires a coastal development permit for extraordinary methods of repair and maintenance enumerated in the regulation. The proposed amended development involves the placement of construction materials and removal and placement of solid materials within 20 feet of coastal waters and directly adjacent to an environmentally sensitive habitat area. Therefore, the proposed project requires a coastal development permit under Sections 13252(a)(3) of the Commission regulations.

In considering a permit application for a repair or maintenance project pursuant to the above-cited authority, the Commission reviews whether the proposed *method* of repair or maintenance is consistent with the Chapter 3 policies of the Coastal Act. The Commission's evaluation of such repair and maintenance projects does not extend to an evaluation of the conformity with the Coastal Act of the underlying existing development.

The repair and maintenance of levees can have adverse impacts on coastal resources, in the case of this amendment primarily seasonal wetlands, an inboard ditch that supports habitat for the federally endangered Tidewater goby, and potentially other environmentally sensitive habitat areas including eelgrass beds and rare plant habitat, if not properly undertaken with appropriate mitigation.

The applicant proposes to minimize impacts to seasonal wetlands due to temporary access road and staging area installation by placing road surfacing materials (fabric, bark and/or road base, etc.) directly on top of the existing ground (seasonal wetlands) and then removing the materials upon completion of construction activities in the area. Temporarily impacted wetlands would then be tilled (decompacted) and reseeded as necessary. This method does not unnecessarily disturb wetland soils and vegetation through excavation, stockpiling, and replacement of topsoil. Instead, impacts to the soil and vegetation are minimized, and the areas would be fully restored to pre-project conditions following the temporary impacts.

For the two inboard ditch crossings associated with the proposed amended development, one will be a temporary bridge crossing and one will be a temporary culvert and fill crossing that was authorized under CDP Amendment No. 1-03-004-A2. Both crossing methods have been proposed and conditioned in a manner to minimize adverse effects to sensitive wetland habitat, which supports the federally endangered Tidewater goby. At both crossings, the applicant proposes to install silt curtains prior to construction and to maintain a qualified biologist on site to monitor crossing installation. Prior to installation of the temporary culvert and fill crossing, the applicant proposes, and special conditions require, that any tidewater gobies in the area will be seined and removed from the impact

area.

The applicant proposes, and special conditions require, that significant adverse impacts to eelgrass and rare plant habitats will be avoided by (1) delaying construction activities until after the rare plants have set seed, as determined by a qualified botanist, (2) the collection of seed from all individual rare plants found growing in the construction areas for redistribution to suitable, undisturbed habitat near the project site, and (3) implementation of an eelgrass monitoring and mitigation plan to ensure that indirect impacts of the proposed sheet pile wall do not adversely affect adjacent eelgrass beds in the slough through increased scour.

Although various measures proposed by the applicant to minimize adverse impacts to coastal resources are appropriate, additional measures are also needed to further avoid, as necessary, or minimize impacts to water quality, wetlands, and environmentally sensitive habitat areas. The conditions required to meet this standard are discussed in the Findings in the following sections.

C. Protection of Water Quality & Wetlands

The Coastal Act contains policies requiring the protection of coastal waters and wetlands to ensure biological productivity and to protect public health and water quality. New development must not adversely affect these values and should help to restore them when possible.

Coastal Act Policies:

Section 30231 of the Coastal Act states the following (emphasis added):

The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

Coastal Act Section 30233 states the following (emphasis added):

(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

- (1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.*
- (2) Maintaining existing, or restoring previously dredged, depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.*

- (3) *In open coastal waters, other than wetlands, including streams, estuaries, and lakes, new or expanded boating facilities and the placement of structural pilings for public recreational piers that provide public access and recreational opportunities.*
 - (4) *Incidental public service purposes, including but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.*
 - (5) *Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas.*
 - (6) *Restoration purposes.*
 - (7) *Nature study, aquaculture, or similar resource dependent activities.*
- (b) *Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such purposes to appropriate beaches or into suitable longshore current systems.*
- (c) *In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary...*
- (d) *Erosion control and flood control facilities constructed on watercourses can impede the movement of sediment and nutrients which would otherwise be carried by storm runoff into coastal waters. To facilitate the continued delivery of these sediments to the littoral zone, whenever feasible, the material removed from these facilities may be placed at appropriate points on the shoreline in accordance with other applicable provisions of this division, where feasible mitigation measures have been provided to minimize adverse environmental effects. Aspects that shall be considered before issuing a coastal development permit for such purposes are the method of placement, time of year of placement, and sensitivity of the placement area.*

Consistency Analysis:

The proposed amended development is located on the Jackson Ranch levee, immediately adjacent to Mad River Slough on the outboard side and seasonal wetlands and a drainage ditch (which supports Tidewater goby habitat) on the inboard side. The project work involves soil disturbance to the existing levee system, which could increase sedimentation in the slough and surrounding wetland areas. As summarized above, Coastal Act Section 30231 protects the quality of coastal waters, streams, and wetlands through, among other means, controlling runoff. Grading and soil disturbance can result in the discharge of sediment into site runoff, which, upon entering coastal waters, increases turbidity and adversely affects fish and other sensitive aquatic species. Sediment is considered a pollutant that affects visibility through the water, and affects plant productivity, animal behavior (such as foraging) and reproduction, and the ability of animals to obtain adequate oxygen from the water. In addition, sediment is the medium by which many other pollutants are delivered to aquatic environments, as many pollutants are chemically or physically associated with the sediment particles. Therefore, the proposed development has the potential to adversely impact the water quality and biological productivity of coastal waters and wetlands.

The proposed repair work could adversely affect water quality and wetland habitats if, for example, the placement of revetment material was not structurally sound and armoring rock was to slough off into the slough, thereby impacting tidal mudflat and aquatic habitat. Such a scenario would constitute “fill” in coastal waters or wetlands that is not for one of the allowable uses enumerated in Coastal Act Section 30233 (see above). Therefore, to ensure that any revetment material placed does not encroach beyond the historic levee footprint, the Commission modifies and reimposes **Special Condition No. 3-R**, which requires that any material placed on the levee for both previously approved activities and for activities at Repair Site #9 authorized by this permit amendment, shall not extend into the slough beyond the footprint of the levee as it existed before the repair. In addition, the Commission modifies and reimposes Special Condition No. 4 which requires best management practices be implemented to control erosion and sedimentation.

The applicant proposes to use a temporary culvert and fill crossing to cross the inboard ditch located just south of the Humboldt Bay Municipal Water District (HBMWD) pipeline to access Repair Site #9 on the Jackson Ranch levee (Exhibit No. 5). The same kind of crossing in the same location was approved under CDP Amendment No. 1-03-004-A2 for the particular repairs authorized by that amendment. The applicant’s engineers have determined that using a temporary bridge to cross the inboard ditch in this location is not feasible due to the load bearing capacity of the soils that would have to support the ends of the temporary bridge. Extensive excavation of the levee would be necessary to accommodate the bridge spread footings leaving the surrounding agricultural lands susceptible to flooding during high tide events. Additionally, the stability of soils on either side of the bridge may be questionable during construction resulting in the likelihood of bank failure into the inboard ditch. Furthermore, the spread footings would be large using this method at this location and potentially difficult to remove upon project completion due to the embedment and restraining properties of silty clay soils.

Thus, the applicant proposes using the least environmentally damaging feasible alternative crossing method at inboard ditch located just south of the HBMWD pipeline, which is the use of temporary culverts and fill as described above.

The primary impacts associated with using temporary culverts and fill rather than a temporary bridge for this crossing involve (1) the direct placement of fill in coastal wetland (ditch) habitat; and (2) potential impacts of fill placement on sensitive species that may occur in the ditch habitat, such as the Federally-listed endangered Tidewater goby (*Eucyclogobius newberryi*) and its proposed critical habitat. The U.S. Fish and Wildlife Service issued a Biological Opinion (B.O.) and Incidental Take Statement (I.T.S.) for the “2007 Levee Repair Project” (see “other approvals,” Page 2, and see Exhibit No. 6). The B.O. and I.T.S. were based on the understanding that the project would include the use of temporary culverts and fill within Tidewater goby habitat as an inboard ditch crossing method. The Service found that project is not likely to jeopardize the continued existence of the Tidewater goby given that the permits issued for the project (including the U.S. Army Corps of Engineers and Humboldt Bay Harbor,

Recreation, and Conservation District permits) include several terms and conditions to minimize project effects on the species. These terms and conditions include using erosion control devices such as silt fences, floating turbidity curtains, *etc.* for all repair activities, and surveying for and excluding any Tidewater gobies found prior to installation of any temporary ditch crossing. In addition to the terms and conditions attached to other agency approvals the applicant has received for the project (see Page 2), the applicant's project description specifies having a qualified biologist on site during construction activities to perform seining and removal of sensitive species prior to crossing installation.

Therefore, the Commission modifies and reimposes Special Condition No. 3. **Special Condition No. 3-B** allows for the applicant to use a temporary culvert and fill crossing for the proposed Site #9 repairs authorized by this permit amendment at the inboard ditch crossing located just south of the HBMWD pipeline only. All other ditch crossings must be accomplished using the temporary bridge method. The modified and reimposed conditions require that the temporary culvert and fill crossing be installed as proposed by the applicant in Exhibit No. 5, including the use of silt curtains and a qualified biologist to seine any gobies that may be present prior to crossing installation. Furthermore, the modified and reimposed conditions require that the temporary culvert and fill crossing be completely removed within 10 days of completion of construction activities, and the proposed temporary bridge crossing be completely removed within 30 days of completion of construction activities.

The applicant proposes to amend the locations of two temporary staging areas previously approved under CDP Amendment Nos. 1-03-004-A1 and 1-03-004-A2 (Exhibit No. 3). For the proposed amended staging areas locations, the applicant proposes to maintain the same size staging area as approved under the previous amendments (25,000 square feet). The applicant proposes to install the staging areas in the same manner as approved under the previous permit amendments, which includes placing road surfacing materials (fabric, bark and/or road base, etc.) directly on top of the existing ground (seasonal wetlands) and then removing the materials upon completion of construction activities in the area. Temporarily impacted wetlands would then be tilled (decompacted) and reseeded as necessary. This method is the least environmentally damaging feasible alternative because it does not unnecessarily disturb wetland soils and vegetation through excavation, stockpiling, and replacement of topsoil. Instead, impacts to the soil and vegetation are minimized, and the areas would be fully restored to pre-project conditions following the temporary impacts.

Therefore, the Commission modifies and reimposes **Special Condition No. 3**. Special Condition No. 3-A requires that the permittee installs and removes the temporary access roads and staging areas in accordance with the least environmentally damaging methods described above. **Special Condition Nos. 3-C, 3-D, and 3-E** also require post-construction restoration and monitoring to ensure that the seasonal wetlands temporarily impacted by project activities will be fully restored to pre-project conditions, or remedial actions will be required.

In conclusion, the Commission finds that as conditioned to (1) require that any material placed on the levee shall not extend into the slough beyond the footprint of the levee as it existed before the repair; (2) use the least environmentally damaging feasible alternative for the amended staging area installation and to require post-construction restoration and monitoring of the areas to ensure that the temporarily impacted seasonal wetlands will be fully restored to pre-project conditions; and (3) limit the use of temporary culverts and fill to a single crossing only located just south of the HBMWD pipeline, and to install and remove the crossing in the least environmentally damaging feasible manner, the proposed amended development is consistent with Coastal Act Sections 30231 and 30233.

D. Marine Resources & ESHA

The outboard side of the levee system is adjacent to Mad River Slough, and the proposed amended development has the potential to adversely affect marine resources and marine environmentally sensitive habitat areas. The following section of the Coastal Act requires that new development maintain, enhance, and, where feasible, restore damaged marine resources and protect environmentally sensitive habitat areas (ESHA).

Coastal Act Policies:

Section 30230 of the Coastal Act states the following:

Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Section 30107.5 of the Coastal Act defines ESHA as follows:

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

Section 30240 of the Coastal Act states the following:

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

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

Consistency Analysis:

Mad River Slough provides habitat for a number of marine species. The U.S. Fish and Wildlife Service’s (FWS) Formal Consultation for the project (Exhibit No. 6), which

includes the amended development proposed under this CDP amendment, notes that the proposed project is likely to adversely affect the Federally-listed endangered Tidewater goby (*Eucyclogobius newberryi*) and its proposed critical habitat. Tidewater goby is a small, short-lived fish that occurs in coastal brackish water habitats such as lagoons, tidal bays, and estuaries of rivers and streams along the coast. According to the USFWS report, threats to the species include upstream water diversion, dredging, pollution, siltation, urban development on adjacent lands, and competition/predation from introduced species.

The FWS issued an Incidental Take Statement (I.T.S.) for the “2007 Levee Repair Project” (including the activities proposed under the current amendment request) anticipating that the project would cause “harassment” (disturbance) of an estimated 200 breeding adults and “harm” (injury or death) to no more than 70 individuals. The FWS’s opinion and I.T.S. were based on the understanding that the project would include the use of temporary culverts and fill within Tidewater goby habitat as an inboard ditch crossing method. The FWS report concludes that the project would not likely jeopardize the continued existence of the Tidewater goby given that the permits issued for the project (see page 2) include several terms and conditions to minimize project effects on the species. These include using erosion control devices such as silt fences, floating turbidity curtains, *etc.* for all repair activities, and surveying for and excluding any Tidewater gobies found prior to installation of any temporary ditch crossing. In addition to the terms and conditions attached to other agency approvals the applicant has received for the project (see page 2), the applicant’s project description specifies having a qualified biologist on site during construction activities to perform seining and removal of sensitive species prior to crossing installation.

As discussed above, the applicant proposes to use a temporary culvert and fill crossing for the inboard ditch crossing located just south of the HBMWD pipeline, which the Commission found to be the least environmentally damaging feasible alternative crossing method in its approval of CDP Amendment No. 1-03-004-A2. The primary impacts associated with using temporary culverts and fill at this crossing include potential adverse impacts of fill placement on Tidewater goby and its proposed critical habitat. Therefore, the Commission modifies and reimposes **Special Condition No. 6**. The modified and reimposed condition requires that the temporary culvert and fill crossing be installed as proposed by the applicant in Exhibit No. 5, including the use of silt curtains and a qualified biologist to seine any gobies that may be present prior to crossing installation. Furthermore, the amended conditions require that the crossing must be completely removed within 10 days of completion of construction activities. Additionally, modified and reimposed **Special Condition No. 6-D** requires surveying for and excluding any gobies found at ditch crossings prior to crossing installation.

In addition to Tidewater goby, the project vicinity also supports habitat for Humboldt Bay owl’s-clover (*Castilleja ambigua* ssp. *humboldtiensis*), Point Reyes’ bird’s-beak (*Cordylanthus maritimus* ssp. *palustris*), and Western sand-spurrey (*Spergularia canadensis*). All three rare plant species have the potential to be affected by proposed project activities. Because all of these species are rare, their habitat meets the definition

of environmentally sensitive habitat (ESHA) found in Coastal Act Section 30107.5. Therefore, development adjacent to these habitats must also comply with Section 30240(b) of the Coastal Act.

Both Humboldt Bay owl's-clover and Point Reyes bird's-beak are annual, hemiparasitic species in the Broom-rape family (Orobanchaceae) that grow in coastal salt marsh habitats primarily along the North Coast of California. In addition to photosynthesizing, these hemiparasites supplement their nutrient intake by parasitizing the live roots of adjacent salt marsh species. Humboldt Bay owl's-clover plants typically germinate in late winter to spring and bloom sometime between April and August (often peaking in June). Point Reyes bird's-beak plants are slightly later: on average, germination is in spring and flowering is approximately in July (CNPS 2007). Western sand-spurrey is an annual species in the Pink family (Caryophyllaceae) known only from scattered occurrences around Humboldt Bay.

Surveys conducted by the applicant's biologist in 2006, 2007, and 2008 discovered approximately 450, 275, and 304 (respectively) Humboldt Bay owl's-clover plants on the levee system within areas that potentially would be impacted by project activities. These plants are estimated to represent less than 1 percent of the total population of the species in the surrounding suitable salt marsh habitat. For the Point Reyes bird's-beak, 2006 surveys found a total of 5 plants, 2007 surveys found a total of 314 plants, and 2008 surveys found a total of 146 plants in potential impact areas. Again, this represents less than 1 percent of the population of the species in the surrounding salt marsh habitat. A total of 37 Western sand-spurrey individuals were located on an eroded bank of the levee near Site #9 in 2007, and none were located in 2008. Again, as with the other species, the low number of documented individuals represents less than 1 percent of the population of the species in the surrounding salt marsh habitat. Population numbers of all three species normally fluctuate from year to year, since, as annuals, germination rates are dependent on a number of environmental factors. In general, the three species are threatened by development, nonnative plants, and other causes (CNPS 2007).

The Commission found, in its approval of CDP Amendment Nos. 1-03-004-A1 and 1-03-004-A2, that the rare plant ESHAs would not be significantly disrupted by the authorized activities with the incorporation of appropriate mitigation measures, including (1) conducting seasonally appropriate pre-construction surveys of the Jackson Ranch levee and the Arcata levee east of site #58 for both species; (2) delaying construction activities on the Jackson Ranch levee and the Arcata levee east of site #58 until after the owl's-clover and bird's-beak plants have died back/set seed (in July or early August); (3) collection and conservation of seed from any individuals observed growing in an area of potential impact; (4) transplantation/distribution of seed in suitable habitat nearby; and (5) pre- and post-construction monitoring of rare plants located immediately adjacent to the construction site to document any impacts that might occur as a result of project activities. Special Condition No. 12 of CDP Amendment No. 1-03-004-A2 required the submittal of a final mitigation plan for the review and approval of the Executive Director that provides for implementation of the mitigation measures listed above. The Commission attaches new **Special Condition No. 15**, which requires that a similar final

mitigation plan specific to the development authorized by CDP Amendment No. 1-03-004-A3 be submitted for the review and approval of the Executive Director.

The Mad River estuary is known to support the growth of eelgrass in subtidal areas of the river channel. Eelgrass (*Zostera marina*) is considered to be an environmentally sensitive habitat area because it functions as important shelter and foraging habitat. For example, eelgrass provides cover for juvenile fish and in some locations, serves as a spawning ground for herring. In addition, black brant, a species of migratory geese, feed almost exclusively on eelgrass. Eelgrass is a flowering plant that extends long rhizomes (roots) an average of 1.5 – 8 inches below the substrate from which the turions (stems) sprout with long, green blades (leaves). It thrives in protected coastal waters with sandy or muddy bottoms. Eelgrass can be adversely impacted by direct contact, or indirectly by shading from over-water structures.

The proposed project is not expected to result in direct impacts to eelgrass, since it appears that eelgrass is not growing close enough to the levee to be destroyed or damaged by the installation of the sheet pile wall at Repair Site #9. However, it is conceivable that the placement of the sheet piling at this location may alter currents in the slough in such a way that will result in damage to eelgrass by scouring out of the mud banks on which the eelgrass grows. The potential impact area is approximately 3,900 feet in length, including approximately 2,050 feet along the east bank of the slough south of the southernmost Humboldt Bay Municipal Water District pipeline and 1,850 feet along the west bank of the slough along an island (see figure in Exhibit No. 7).

The applicant's consultants, Mad River Biologists and Oscar Larson & Associates, prepared a preliminary eelgrass monitoring and mitigation plan dated April 17, 2007 (Exhibit No. 7) intended to mitigate for potential impacts to eelgrass caused by scour associated with the proposed levee repair work at Site #9. The plan, which was developed in consultation with the Eureka office of the Department of Fish and Game and the Arcata office of NOAA-Fisheries, proposes to follow procedures that have been developed for the evaluation of eelgrass coverage and density, modified to meet the conditions of the project site and the monitoring needs for this project. Namely, the applicant proposes to conduct both pre-construction and post-construction surveys of the slough areas potentially affected by scour resulting from the proposed Site #9 repairs. The pre-construction survey will be conducted prior to any levee repairs at Site #9, and post-construction surveys will be conducted annually (beginning in the first active growing season for eelgrass immediately following construction) for a period of five years. The pre-construction survey will be valid until the beginning of the next period of active eelgrass growth, so if the project does not commence before the start of the next growing season, a new pre-construction survey would be completed during the active growing season. All surveys will be conducted during low tides and during the active growing season for the plant, which in this area is May-June. Investigators wearing mud boots or in small boats will measure eelgrass distribution and density in the potential impact area and in a nearby control area within the slough. Details on proposed sampling and analysis are provided in the preliminary plan (see Exhibit No. 7). If, at the end of the five-year monitoring period, monitoring results indicate that there has been a significant

reduction in eelgrass distribution or density, the plan proposes to mitigate for the loss by conducting an eelgrass transplant program according to the guidelines of the Southern California Eelgrass Mitigation Policy (NMFS 1991). The plan proposes that mitigation, if necessary, will occur nearby the project site in Mad River Slough, at a ratio of 2.5 to 1. Material for transplanting will be collected from a donor site. Additional details on the proposed eelgrass mitigation and monitoring program are described in Exhibit No. 7.

The Commission's ecologist reviewed and generally agreed with the proposed preliminary monitoring and mitigation plan, with only minor recommended revisions to the proposed sampling design. Namely, Dr. Dixon recommended that (1) only mapped eelgrass should be included in the two-step sampling design (wherein the eelgrass area is first mapped and then sampled in a stratified random manner); (2) the stratified random approach should also be applied to the placement of quadrats within the eelgrass bed (to avoid biasing the sample to over-represent edges); and (3) rationale be provided for the proposed 2.5 to 1 mitigation ratio. The applicant is currently working with DFG on a final plan, which, the applicant states, will include Dr. Dixon's recommended revisions. To ensure that the applicant completes the final plan with the recommended revisions as proposed, the Commission attaches new **Special Condition No. 14**. This condition requires the applicant to submit a final eelgrass monitoring and mitigation plan for the review and approval of the Executive Director prior to issuance of the amended permit. The final plan shall substantially conform to the April 17, 2007, plan except that it shall include the Dr. Dixon's suggested revisions listed above. As conditioned, the Commission finds that the amended development, as conditioned, will not result in significant adverse impacts to eelgrass habitat.

In conclusion, as conditioned, the Commission finds that the proposed amended development is consistent with Coastal Act Sections 30230 and 30240 in that it incorporates the least environmentally damaging methods feasible as well as all feasible mitigation measures to avoid significant disruption of ESHA and to maintain marine resources.

E. Hazards

Summary of Coastal Act Policies:

Coastal Act Section 30253 states in applicable part:

New development shall do all of the following:

- (a) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*
- (b) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.*

Consistency Analysis:

Coastal Act Section 30253 requires in applicable part that new development minimize

risks to life and property in areas of high geologic, flood, and fire hazard and neither create nor contribute significantly to erosion or geologic instability.

Repair Site #9 is susceptible to the risks of extraordinary erosion and flood hazards of the surrounding property. The applicant submitted a Scour Analysis prepared for the project in August 2007 by Oscar Larson & Associates (Exhibit No. 8), which analyzed scour, wave energy, and geomorphology in Mad River Slough along the Jackson Ranch levee at repair site #9. Specifically, the report (1) quantified the maximum current velocity in the slough and compared it to a horizontal scour benchmark, (2) looked at wave energy in the slough caused by wind-wave interaction, shore bottom refraction, and tidal elevation, and (3) characterized why the scour is happening at the proposed project site in particular. The report concluded that the severe erosion at Repair Site #9 is caused by the changing hydraulics of the slough, which has enough energy (stream velocity) to induce scour and continue the meandering process. Thus, the standard method of levee repair used elsewhere in the levee system would not be adequate at this location, and the sheet pile wall is necessary. The applicant also submitted a Geotechnical Engineering Report prepared for the project in June 2007 by Anchor Environmental CA, L.P. (Exhibit No. 9). The report presents the results of a geotechnical engineering study for the proposed sheet pile wall and gives various recommendations for design and construction of the wall to ensure the wall's stability, including design recommendations for cantilever sheet piles, design recommendations for king piles, construction considerations for sheet piles and king piles, recommendations for backfilling, and others.

The geotechnical and scour reports were reviewed by the Commission's engineer, Lesley Ewing, who generally agrees with the recommendations and conclusions of each. To ensure that the final plans implemented for the amended development conform to the plans that have been determined to be acceptable, the Commission attaches **Special Condition No. 16**. This condition requires that prior to issuance of the permit amendment, the applicant shall submit evidence for the review and approval of the Executive Director that a geotechnical engineer has reviewed and approved all final design plans for the sheet pile wall.

The proposed amended development has been designed to account for end effects of the sheet pile wall and associated erosion. The applicant prepared an analysis of how its engineers determined the appropriate location to end the wall (Exhibit No. 10). The analysis demonstrates that the proposed wall has been specifically designed to avoid such erosion effects.

Modified and reimposed **Special Condition No. 9** requires the landowner to assume the risks of extraordinary erosion and flood hazards of the property and waive any claim of liability on the part of the Commission. Given that the applicant has chosen to implement the project despite these risks, the applicant must assume the risks. In this way, the applicant is notified that the Commission is not liable for damage as a result of approving the permit for the amended development. The condition also requires the applicant to indemnify the Commission in the event that third parties bring an action against the Commission as a result of the failure of the development to withstand hazards.

Therefore, the Commission finds that as conditioned, the amended project will minimize risks to life and property from geologic and flood hazards, will assure stability and structural integrity, and will neither create nor contribute significantly to erosion, geologic instability, or erosion of the site or surrounding area consistent with the requirements of Section 30253 of the Coastal Act.

F. Public Access

This proposed amended development is located between the first public road and Mad River Slough, an arm of the sea (see Exhibit No. 2). Section 30604(c) of the Coastal Act requires that every coastal development permit issued for development between the first public road and the sea “*shall include a specific finding that the development is in conformity with the public access and public recreation policies of Chapter 3 (commencing with Section 30200).*”

Coastal Act Policies:

Section 30210 of the Coastal Act states the following:

In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.

Section 30211 of the Coastal Act states the following:

Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.

Section 30212 of the Coastal Act states the following:

(a) *Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where (1) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources, (2) adequate access exists nearby, or (3) agriculture would be adversely affected. Dedicated access way shall not be required to be opened to public use until a public agency or private association agrees to accept responsibility for maintenance and liability of the access way.*

(b) *For purposes of this section, "new development" does not include:*

(1) *Replacement of any structure pursuant to the provisions of subdivision (g) of Section 30610.*

(2) *The demolition and reconstruction of a single-family residence; provided, that the reconstructed residence shall not exceed either the floor area, height or bulk of the former structure by more than 10 percent, and that the reconstructed residence shall be sited in the same location on the affected property as the former structure.*

(3) *Improvements to any structure which do not change the intensity of its use, which*

do not increase either the floor area, height, or bulk of the structure by more than 10 percent, which do not block or impede public access, and which do not result in a seaward encroachment by the structure.

(4) *The reconstruction or repair of any seawall; provided, however, that the reconstructed or repaired seawall is not seaward of the location of the former structure.*

(5) *Any repair or maintenance activity for which the commission has determined, pursuant to Section 30610, that a coastal development permit will be required unless the commission determines that the activity will have an adverse impact on lateral public access along the beach.*

As used in this subdivision, "bulk" means total interior cubic volume as measured from the exterior surface of the structure.

(c) *Nothing in this division shall restrict public access nor shall it excuse the performance of duties and responsibilities of public agencies which are required by Sections 66478.1 to 66478.14, inclusive, of the Government Code and by Section 4 of Article X of the California Constitution. [Emphasis added.]*

The access policies cited above direct the Commission to generally require maximum public access in new development unless the access would be inconsistent with public safety, resource protection, private property rights, or military security needs (§30210 and §30212) or would be otherwise exempt from providing access by statute [§30212(b)(5)]. Coastal Act Section 30211 requires that new development shall not interfere with existing public access that has been acquired either by use or through legislative authorization.

Consistency Analysis:

As stated above, the proposed amended development is for repair and maintenance of a pre-Coastal Act levee. Ordinarily, routine repair and maintenance is an exempt activity under Coastal Act Section 30610(d), and thus no coastal development permit would be required. Certain repair and maintenance activities are, however, excepted from this general exemption by regulation, as authorized by Section 30610(d), because they may “*involve the risk of substantial adverse environmental impact.*” The Commission’s regulations identify repair and maintenance activities performed near the shoreline and/or within an ESHA and/or adjacent to an ESHA (as proposed by this permit amendment application) as needing to obtain coastal development permits and are not exempt under Section 30610(d) [CCR, Title 14, Sec. 13252(a)(3)]. However, because repair and maintenance is not considered new development for purposes of Section 30212, Coastal Act Section 30212(b)(5) excludes these repair and maintenance activities from Coastal Act access requirements unless the Commission “*determines that the activity will have an adverse impact on lateral beach access.*”

The proposed staging area along Highway 255 will temporarily displace some informal parking used by the public off the Mad River Slough Bridge. However, this impact is not significant because it is only temporary, affects only a limited area, and there is available parking in the immediate vicinity on the other side of the bridge. The project is, therefore, consistent with the requirements of Sections 30210.

Coastal Act Section 30211 also requires new development not interfere with existing access. The Commission notes that the levee has not been used by the public to gain access to the shores of Humboldt Bay and Mad River Slough during its long existence, except by permission of the owners.

In conclusion, the proposed amended development is not considered new development for the purposes of application of Section 30212 of the Coastal Act because it is a repair and maintenance activity that would not adversely affect lateral beach access consistent with the policy direction found in Section 30212. As discussed above, the proposed amended development is also consistent with Coastal Act Sections 30210 and 30211. Therefore, the proposed amended development is consistent with the applicable access and recreation policies of the Coastal Act.

G. California Environmental Quality Act (CEQA)

The Humboldt Bay Harbor, Recreation, and Conservation District served as the lead agency for the project. The District found the project to be exempt pursuant to CEQA Guidelines Section 15269 (Emergency Projects).

Section 13096 of the California Code of Regulations requires that a specific finding be made in conjunction with coastal development permit applications showing the application to be consistent with any applicable requirements of CEQA. Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse effect which the activity may have on the environment.

The Commission incorporates its findings on Coastal Act consistency at this point as if set forth in full, including all associated environmental review documentation and related technical evaluations incorporated-by-reference into this staff report. Those findings address and respond to all public comments regarding potential significant adverse environmental effects of the amended development that were received prior to preparation of the staff report. As discussed above, the amended development has been conditioned to be consistent with the policies of the Coastal Act. As specifically discussed in these above findings, which are hereby incorporated by reference, mitigation measures that will minimize or avoid all significant adverse environmental impacts have been required. As conditioned, there are no other feasible alternatives or feasible mitigation measures available that would substantially lessen any significant adverse impacts that the activity may have on the environment. Therefore, the Commission finds that the amended development, as conditioned to mitigate the identified impacts, can be found consistent with the requirements of the Coastal Act and to conform to CEQA.

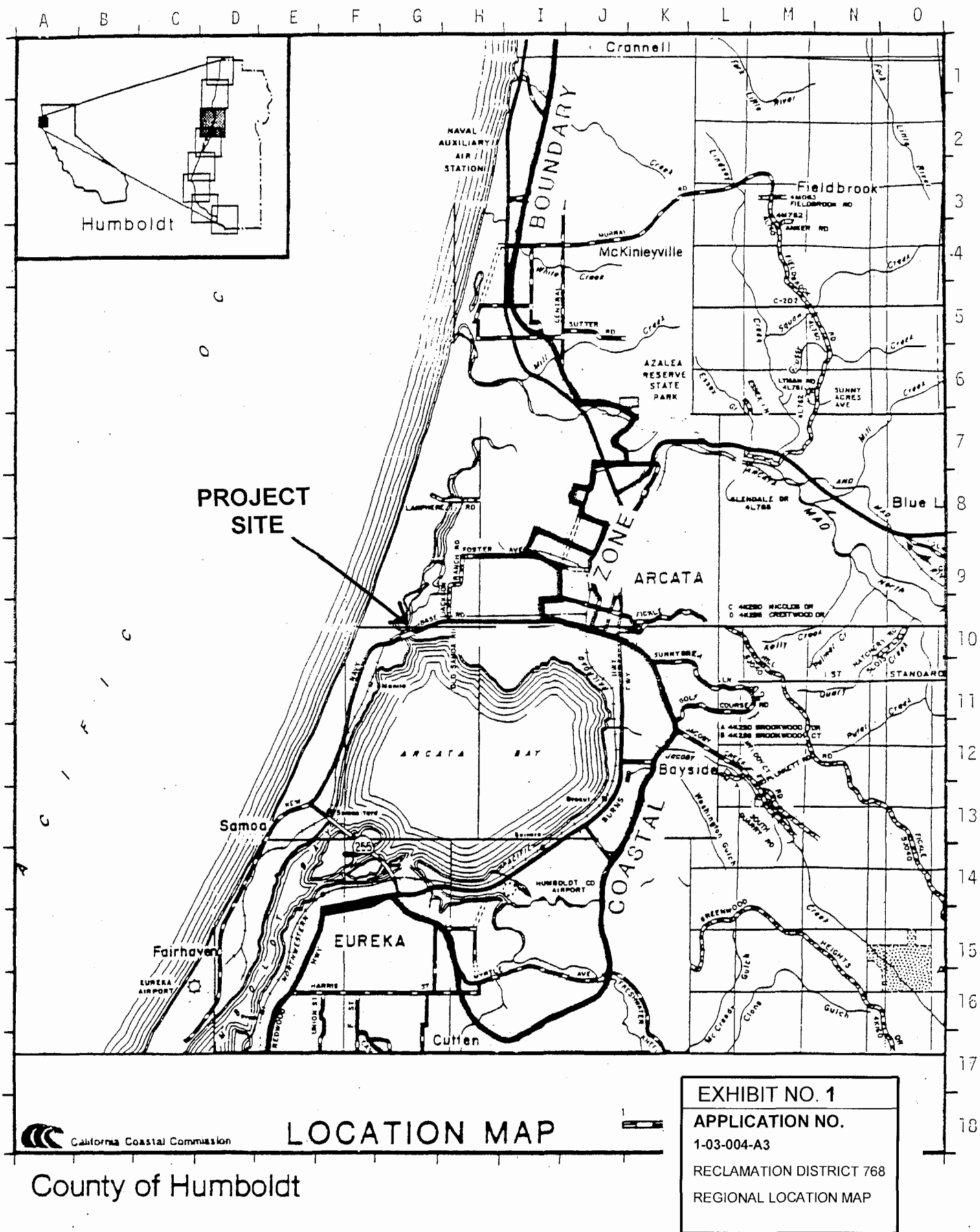
V. EXHIBITS

- 1) Regional Location Map
- 2) Vicinity Maps
- 3) Site Plan for Amended Development
- 4) Project Plans
- 5) Alternatives for Temporary Ditch Crossing
- 6) U.S. Fish & Wildlife Service Formal Consultation
- 7) Eelgrass Monitoring & Mitigation Plan by Oscar Larson & Associates and Mad River Biologists, April 17, 2007
- 8) Scour Analysis by Oscar Larson & Associates, August 2007 (excerpt)
- 9) Geotechnical Engineering Report by Anchor Environmental, June 2007
- 10) Analysis of Appropriate Sheet Pile End Location
- 11) Adopted Findings Report for CDP No. 1-03-004
- 12) Staff Report for CDP Amendment No. 1-03-004-A1
- 13) Staff Report for CDP Amendment No. 1-03-004-A2

ATTACHMENT A

Standard Conditions:

1. Notice of Receipt and Acknowledgment. The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.
2. Expiration. If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.
3. Interpretation. Any questions of intent or interpretation of any condition will be resolved by the Executive Director of the Commission.
4. Assignment. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.
5. Terms and Conditions Run with the Land. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.



**LOCATION MAP
RECLAMATION DISTRICT 768**

SCALE: 1" = 10,000' ±

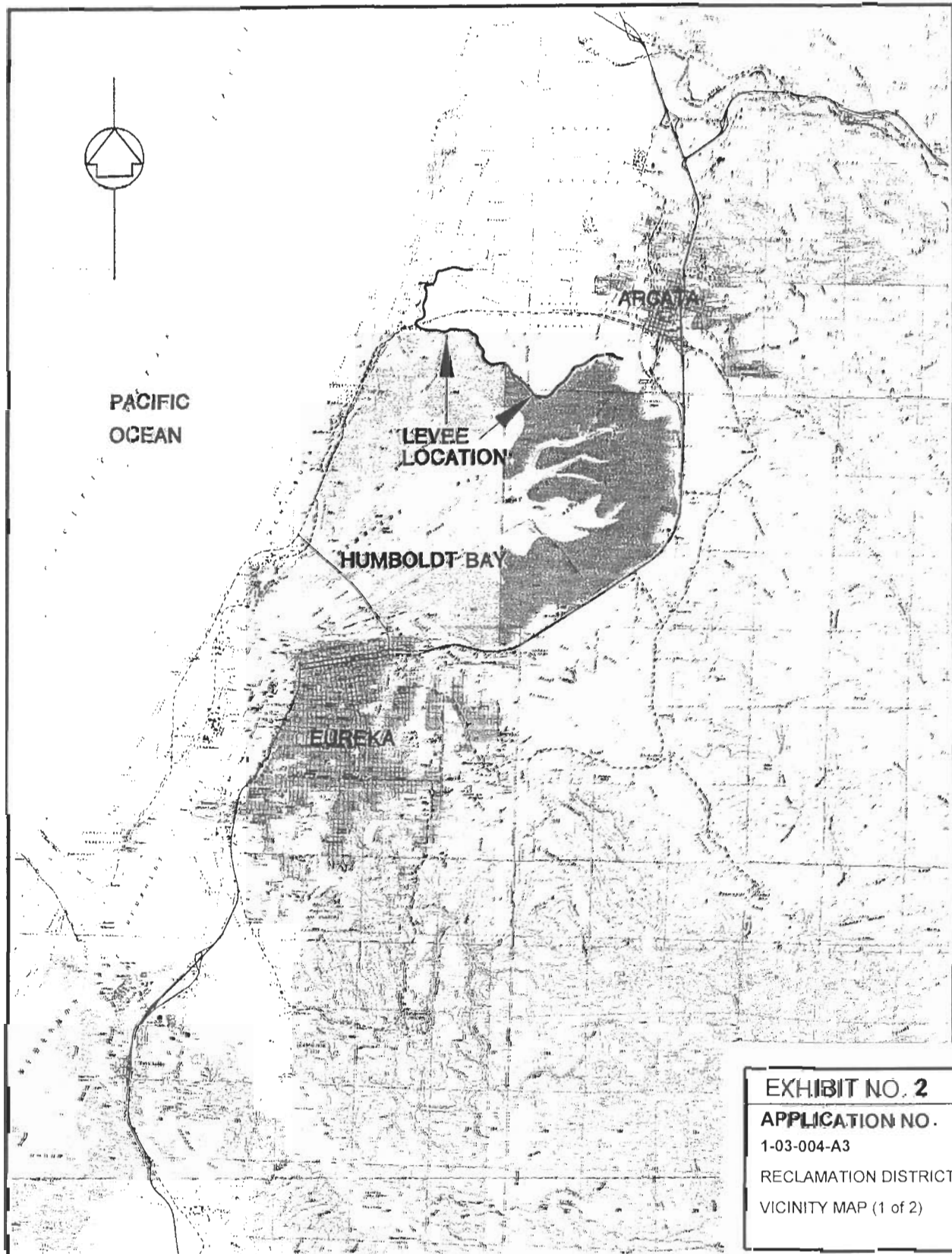


EXHIBIT NO. 2

APPLICATION NO.

1-03-004-A3

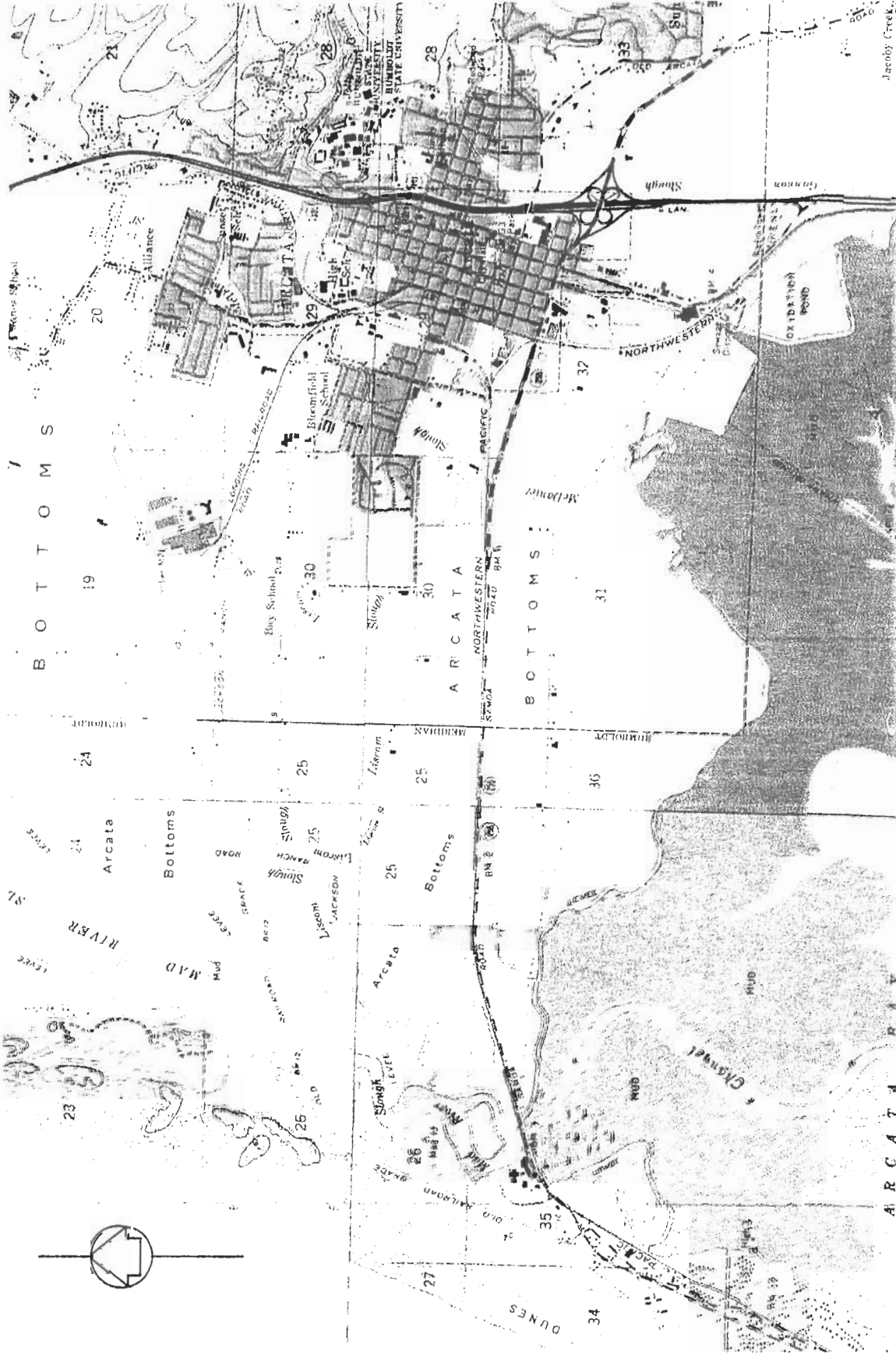
RECLAMATION DISTRICT 768

VICINITY MAP (1 of 2)



VICINITY MAP

SCALE: 1" = 3000' ±



LEEVES WEST OF ARCATA

OSCAR LARSON & ASSOCIATES

2 of 2

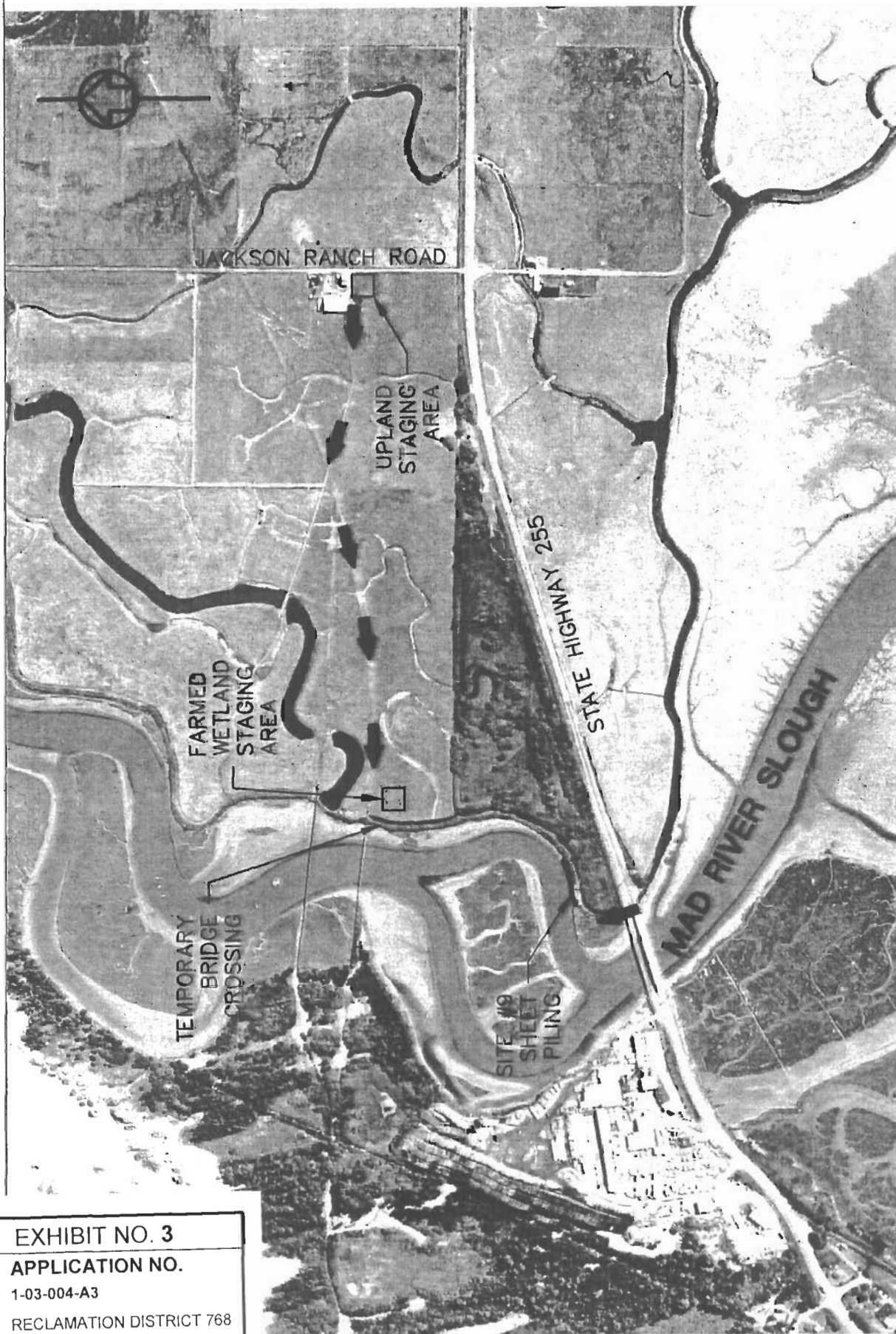
EXHIBIT NO. 3

APPLICATION NO.

1-03-004-A3

RECLAMATION DISTRICT 768

SITE PLAN



□ PROPOSED STAGING AREA

➡ PROPOSED ACCESS ROUTE

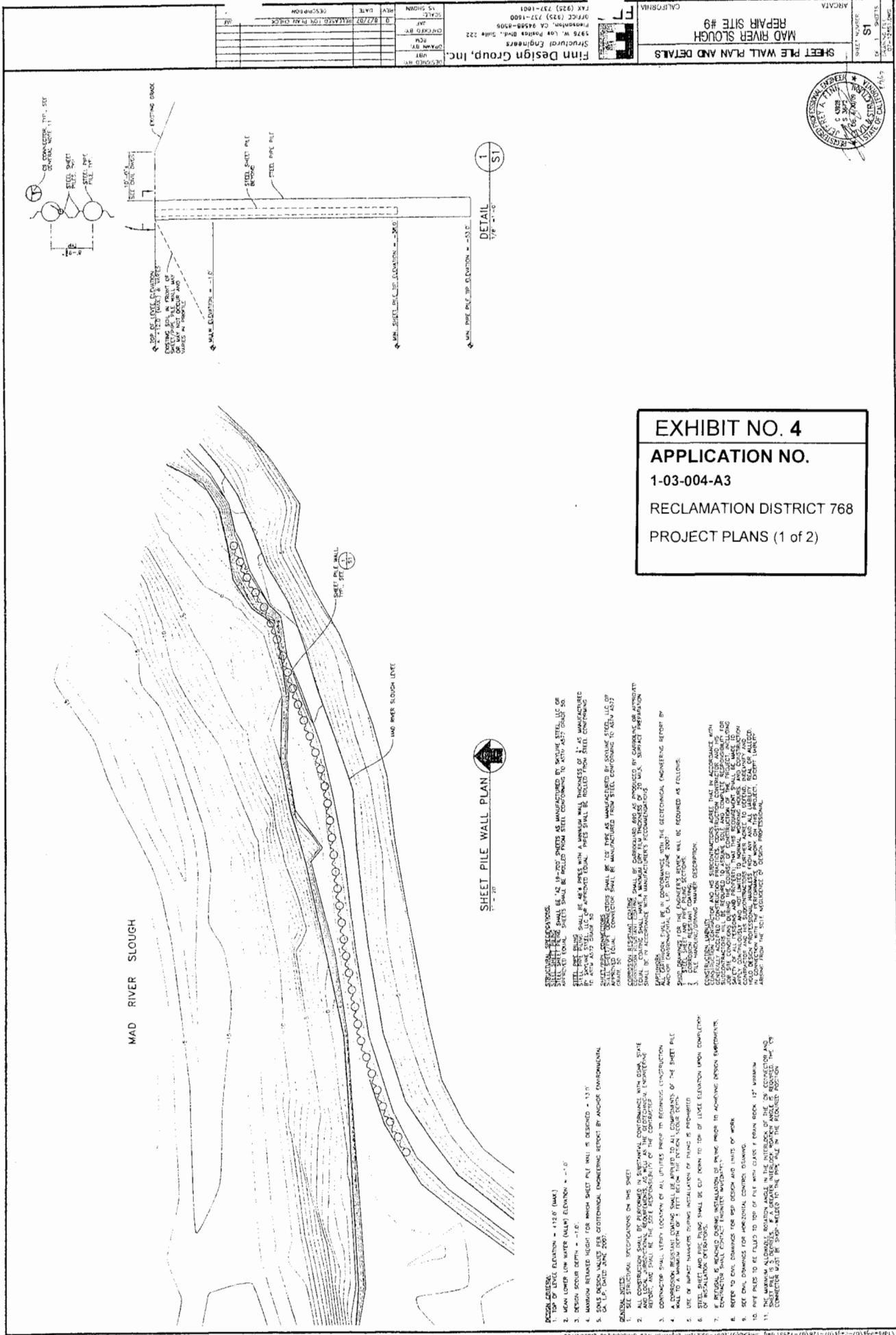
PROPOSED ACCESS ROUTES
AND STAGING AREAS FOR
SHEET PILING REPAIRS

OSCAR LARSON & ASSOCIATES

UNAPPROVED CHANGES & USCS: The engineer preparing these plans will not be responsible for any changes to the plans unless they are approved by the preparer of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

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Locations and elevations of utilities shown are provided for information only. Such information may not be complete or accurate. Contractor is responsible for contacting all agencies involved and locating all utilities that may be impacted by his work.



CONSTRUCTION NOTES:

1. TOP OF LEVEL ELEVATION = 412.6' (MAD)
2. MEAN LOWER LOW WATER (MLLW) ELEVATION = -1.0'
3. DESIGN SCOUR DEPTH = -1.0'
4. MAXIMUM RETAINED HEIGHT FOR THIS SHEET PILE WALL IS DESIGNER = 13'5"
5. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEERING REPORT BY JACOBS ENVIRONMENTAL
6. USE OF IMPACT HAMMERS DURING INSTALLATION OF PILES IS PROHIBITED
7. STEEL SHEET PILE WALLS SHALL BE 12" TYPE AS MANUFACTURED BY SOUTHEAST STEEL, LLC OF
8. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEERING REPORT BY JACOBS ENVIRONMENTAL
9. SET OUT DIMENSIONS FOR HORIZONTAL CENTER DRAINING
10. PILE PILES TO BE FILLED TO TOP OF PILE WITH CLASS 4 FILL (SEE 12" MAXIMUM)
11. THE MAXIMUM ALLOWABLE SPACING BETWEEN THE INTERSECTIONS OF PILES IS 12' (SEE 12" MAXIMUM)
12. THE MAXIMUM ALLOWABLE SPACING BETWEEN THE INTERSECTIONS OF PILES IS 12' (SEE 12" MAXIMUM)
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1. TOP OF LEVEL ELEVATION = 412.6' (MAD)
2. MEAN LOWER LOW WATER (MLLW) ELEVATION = -1.0'
3. DESIGN SCOUR DEPTH = -1.0'
4. MAXIMUM RETAINED HEIGHT FOR THIS SHEET PILE WALL IS DESIGNER = 13'5"
5. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEERING REPORT BY JACOBS ENVIRONMENTAL
6. USE OF IMPACT HAMMERS DURING INSTALLATION OF PILES IS PROHIBITED
7. STEEL SHEET PILE WALLS SHALL BE 12" TYPE AS MANUFACTURED BY SOUTHEAST STEEL, LLC OF
8. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEERING REPORT BY JACOBS ENVIRONMENTAL
9. SET OUT DIMENSIONS FOR HORIZONTAL CENTER DRAINING
10. PILE PILES TO BE FILLED TO TOP OF PILE WITH CLASS 4 FILL (SEE 12" MAXIMUM)
11. THE MAXIMUM ALLOWABLE SPACING BETWEEN THE INTERSECTIONS OF PILES IS 12' (SEE 12" MAXIMUM)
12. THE MAXIMUM ALLOWABLE SPACING BETWEEN THE INTERSECTIONS OF PILES IS 12' (SEE 12" MAXIMUM)
13. THE MAXIMUM ALLOWABLE SPACING BETWEEN THE INTERSECTIONS OF PILES IS 12' (SEE 12" MAXIMUM)

SHEET PILE WALL PLAN
11-03

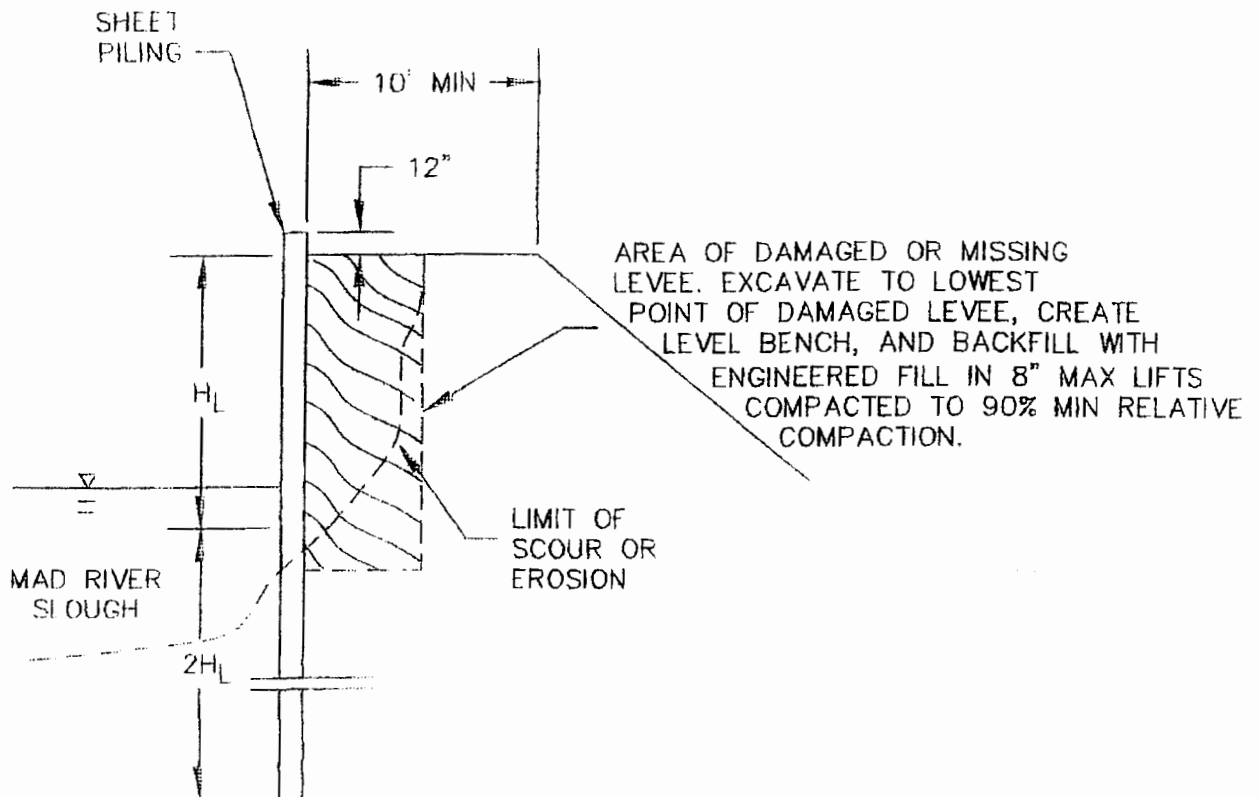
DETAIL 1
11-03

EXHIBIT NO. 4
APPLICATION NO.
1-03-004-A3
RECLAMATION DISTRICT 768
PROJECT PLANS (1 of 2)



NO.	DATE	DESCRIPTION
1	10/10/2007	ISSUED FOR PERMIT
2	10/10/2007	ISSUED FOR PERMIT
3	10/10/2007	ISSUED FOR PERMIT
4	10/10/2007	ISSUED FOR PERMIT
5	10/10/2007	ISSUED FOR PERMIT
6	10/10/2007	ISSUED FOR PERMIT
7	10/10/2007	ISSUED FOR PERMIT
8	10/10/2007	ISSUED FOR PERMIT
9	10/10/2007	ISSUED FOR PERMIT
10	10/10/2007	ISSUED FOR PERMIT

FINN DESIGN GROUP, INC.
Office (925) 737-1800
1975 W. Las Posas Blvd., Suite 222
Fremont, CA 94558-8505
Fax (925) 737-1801
California
SHEET NO. 15
OF 1 SHEETS
10/10/2007



LEVEE REPAIR W/ SHEET PILING

SCALE: 1/8" = 1'

NOTES:

1. HYDROSEED ALL NON-TIDAL DISTURBED EARTH SURFACES.
2. REMOVE ALL DEBRIS AND CLEAR AND GRUB PRIOR TO WORK.
3. THIS IS NOT A FINAL DESIGN. SHEET PILES WILL BE DESIGNED TO CURRENT ARMY CORP OF ENGINEERS STANDARDS WHICH MAY INCLUDE ADDITIONAL APPURTENANCES SUCH AS TIE-BACK RODS, VERTICAL BRACING AND HORIZONTAL BRACING, AND MAY REQUIRE DIFFERENT GRADING THAN SHOWN IN THIS DETAIL.



Oscar Larson & Associates
Consulting Engineers & Land Surveyors
317 Third Street, 2nd Floor • Eureka, CA 95501

EXHIBIT NO. 5

APPLICATION NO.

1-03-004-A3

RECLAMATION DISTRICT 768

ALTERNATIVES FOR
TEMPORARY DITCH
CROSSING (1 of 3)

phone: 707-445-2043 • phone: 800-660-2043
fax: 707-445-8230
email: larson@olarson.com
website: <http://www.olarson.com>

Melissa Kraemer
California Coastal Commission
710 E Street, Suite 200
Eureka CA 95501

OL:08137:MAH:6907.1

13 August 2007

Subject: Reclamation District 768 Levee Repair Project – Investigation of Scenarios for Construction Equipment and Construction Materials to Access the Levee Repair Work

Dear Mrs. Kraemer:

This is a letter report regarding the subject project.

Background:

Our goal was to investigate plausible scenarios for construction equipment and construction materials to access the levee repair work along the Jackson Ranch levee.

The generalized route for access to the levee repair work is a 12-foot wide access across the agricultural field along the existing Humboldt Bay Municipal Water District's water line easement to just short of the non-operating water line riser, then curving around the water line riser to the south and finally bridging the inboard ditch to the levee. All materials used in the construction of the access shall be removed upon completion of the levee repair work. It is our understanding that the entire route resides within a wetland-designated area.

Three access scenarios are presented below. The access scenarios were selected based on construction equipment readily available, materials to be used, expected construction methods, demolition and minimizing impact to the environment.

Scenario 1:

Provide access for 10-yard dump trucks to move materials. Bridge the inboard ditch.

Construct 13-foot wide access road of wood fiber material with 2-foot shoulders and a 70-foot long, 50-foot wide, temporary concrete deck, steel beam, bridge ditch crossing.

The 13-foot width of the access road is required for the dump trucks to negotiate the curves near the water line riser. The 2-foot shoulders are provided to allow the dump trucks to slightly change alignment to minimize rutting. The 50-foot width of the bridge is necessary (based on AASHTO geometry requirements) for dump trucks to turn onto the levee and stay within the 10-foot levee width.

Calculations revealed, based on 500 lb/sqft soil bearing capacity, that the required spread footing width would be at least 9 feet wide by 50 feet long. On the levee side of the bridge, we estimated to maintain soils stability along the east side of the levee (the west bank of the inboard ditch), nearly the entire levee required excavation to accommodate the spread footing. On the access side of the bridge we estimated that the spread footings would be extremely close to the east bank of the inboard ditch.

Melissa Kraemer

California Coastal Commission

Subject: Reclamation District 768 Levee Repair Project – Investigation of Scenarios for Construction Equipment and Construction Materials to Access the Levee Repair Work

13 August 2007

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Potential adverse impacts resulting from this Scenario:

- Extensive excavation of the levee to accommodate the bridge spread footings leaving the agricultural lands subject to flooding during high tide events.
- Soils stability on either end of the bridge may be questionable during construction resulting in the likelihood of bank failure into the inboard ditch.
- Access road width exceeds the allowable 12-foot access road width.
- The spread footings are large and potential difficult to remove upon completion of the construction due to the embedment and restraining properties of silty clay soils.

Scenario 2:

Provide access for track dump equipment to move materials. Bridge the inboard ditch.

The allowed 12-foot width access road for track dumps is acceptable. Bridging of the inboard ditch would be achieved with a bridge based on a 60-foot long, 14-foot wide, Acrow 700 XS design or similar. At the levee side of the bridge, the track dumps would be maneuverable enough to negotiate (right angle turns) the width of the levee and the support panels of the bridge.

Calculations based on the same soil bearing strengths used in Scenario 1 (500 lb/sqft), we estimate two 5-foot by 20-foot crane mats to support the east side of the bridge and one 5-foot by 20-foot crane mat to support the west side (levee side) of the bridge. As a factor of safety, we selected to add the second crane mat on the east side of the bridge to compensate for the inclined angle necessary to have the top of the bridge match the top of the levee.

Potential adverse impacts resulting from this Scenario:

- Limits access to only one track dump at a time. Larger 10-yard dump trucks cannot negotiate the west (levee) side of the bridge, thus limiting the availability of competitive construction bids.
- Soils stability on either end of the bridge may be questionable during construction resulting in the likelihood of bank failure into the inboard ditch.
- The spread footings are large and potential difficult to remove upon completion of the construction due to the embedment and restraining properties of silty clay soils.

Scenario 3: (Preferred)

Provide access for track or 10-yard dump equipment to move materials. Bridge the inboard ditch.

The allowed 12-foot width access road for track dumps is acceptable. However, if 10-yard dump truck were selected, a 13-foot wide access road of wood fiber material with 2-foot shoulders would be required. Bridging of the slough will be achieved with 48-inch diameter plastic culverts placed within the slough and bales of hay stacked between the culverts and placed above the culverts to sufficient height

Oscar Larson & Associates

Melissa Kraemer

California Coastal Commission

Subject: Reclamation District 768 Levee Repair Project – Investigation of Scenarios for Construction Equipment and Construction Materials to Access the Levee Repair Work

13 August 2007

Page 3

above the slough water level to provide access. The width of the culverts and stacked bales of hay could be adjusted to accommodate both types of hauling equipment.

The temporary crossing would be contained with silt curtains on either side of the culverts and a registered biologist would be contracted to perform seining.

Potential adverse impacts resulting from this Scenario:

- Directly impacts the slough by placing culverts and bales of hay within.
- If 10-yard dump trucks are selected, access road width exceeds the allowable 12-foot width.


Positive attributes with this Scenario:

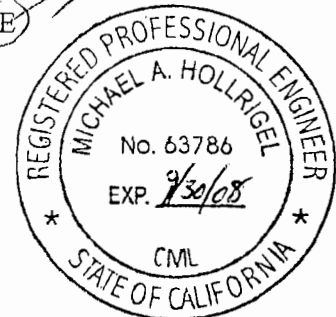
- Construction of the bridge would require a minimum of equipment.
- Hay bales are organic, and any material inadvertently left behind would decompose into the environment.
- Upon completion of the project, could serve as erosion and sediment control or part of the reseeding process.
- Materials are readily accessible.

Should you have any questions and/or comments regarding this information, please contact me.

Sincerely,

OSCAR LARSON & ASSOCIATES


Michael A. Hollrigel, PE
Project Manager



MAH:ikmy

Encl.

copy: Reclamation District 768 (w/Encl.)
File (w/Encl.)

3 of 3



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Arcata Fish and Wildlife Office

1655 Heindon Road

Arcata, CA 95521-5582

Phone: (707) 822-7201 Fax: (707) 822-8411



In Reply Refer To:
File #: 8-14-2006-3050

APR 27 2006/7

Lieutenant Colonel Craig W. Kiley
District Commander
San Francisco District, U.S. Army Corps of Engineers
1455 Market Street
San Francisco, California 94103-1398

EXHIBIT NO. 6

APPLICATION NO.

1-03-004-A3

RECLAMATION DISTRICT 768

USFWS FORMAL
CONSULTATION (1 of 31)

Subject: Formal Consultation on the proposed Reclamation District 768's 10-year individual permit for Levee Storm Damage Repairs (File No. 4002350N), and the proposed Reclamation District 768's Regional General Permit for Levee Storm Damage Repairs (File No. 4002351N), located in Humboldt County, California

Dear Lieutenant Colonel Kiley:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion (BO) based on our review of the proposed Reclamation District 768's levee storm damage repairs located in Humboldt County, California (File No. 4002350N and 4002351N). We received your request for formal consultation and formal conference on February 7, 2007. You have determined that the project is likely to adversely affect the Federally-listed endangered tidewater goby (*Eucyclogobius newberryi*), and is likely to adversely affect proposed critical habitat for the tidewater goby. This document was prepared in accordance with the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act) and its implementing regulations (50 CFR §402).

This BO is based on information provided in the December 12, 2006 project description from Oscar Larson & Associates, and other sources of information. A complete administrative record of this consultation is on file in this office.

Consultation History

September 18, 2006 The Service received a request for informal consultation on levee repair activities by Reclamation District No. 768.

September 26, 2006 The Service received a transmittal from Oscar Larson & Associates dated September 21, 2006, describing the proposed fall 2006 emergency levee repairs as a separate action from 2007 and beyond activities.

October 3, 2006 The Service met with David Ammerman of the Army Corps of Engineers (Corps), Keytra Meyer with National Oceanic Atmospheric Administration Fisheries Service, a representative of the Reclamation District, and staff from Oscar Larson & Associates to discuss the separation of the 2006 activities from the 2007 activities.

October 4, 2006 A field visit was conducted and the proposed 2006 activities were reviewed.

October 4, 2006 The Service issued a letter of concurrence with the Corps' determination that the proposed 2006 activities were not likely to adversely affect the tidewater goby.

October 10, 2006 The Service received an amended request for informal consultation on the 2006 activities

October 17, 2006 Telephone conversation between Lynn Roberts (Service) and David Ammerman of the Corps, concerning the Corps' need to separate the 2006 from 2007 work in a new request for formal consultation on the 2007 work. He stated that we would receive another request for formal consultation by the end of the year. We emailed the Corps a map containing the positive results of goby surveys recently conducted in the action area thus confirming the need for formal consultation.

October 18, 2006 Telephone conversation between Lynn Roberts (Service) and Stein Coriell of Oscar Larson & Associates requesting that they re-send a description of the 2007 work separated from the emergency 2006, and re-send the original project description (containing both the 2006 and 2007 work) dated 9/5/06 and mailed on 9/7/06. We cannot find the document which Oscar Larson & Associates states they mailed on 9/7/06.

December 12, 2006 The Service received from Oscar Larson & Associates a project description for the 2007 and beyond activities.

February 7, 2007 The Service received an amended request for formal consultation from the Corps on the 2007 and beyond activities

February 23, 2007 Telephone conversation between Greg Goldsmith (Service) and Stein Coriell of Oscar Larson & Associates, requesting a map or description of all tidegates and culverts that are within the project area.

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February 27, 2007 The Service received a map from Oscar Larson & Associates showing all tidegates and culverts within the project area.

March 19, 2007 Telephone conversation between Greg Goldsmith (Service) and Stein Coriell of Oscar Larson & Associates, clarifying project description information.

March 20, 2007 Telephone conversation between Greg Goldsmith (Service) and Stein Coriell of Oscar Larson & Associates, clarifying project description and project timeframe limitations.

March 27, 2007 Electronic mail from Stein Coriell of Oscar Larson & Associates regarding the decision to split the project into two consultations and Corps permits, separating the sheet piling repair area from the remainder of the project as proposed.

March 28, 2007 Telephone conversation between Greg Goldsmith (Service) and Stein Coriell of Oscar Larson & Associates, discussing the split of the project and the requirement for two Corps permits. I stated that we would consult on both permits as we planned, prior to splitting the project. We also clarified the 10 year permit timeframe, the fact that sheet piling would only occur outside the levee, and that we would place a conservation measure in the description stating that if gobies are detected in the inboard ditch in the future, seasonal restrictions would be placed around that area for work that could occur in the water, or cause accidental levee material spills into the water.

April 3, 2007 Electronic mail from David Ammerman of the Corps asking for clarification of whether an additional request for consultation is required since the project is being split and covered by two separate permits due to the sheet piling at site #9. Service response from Greg Goldsmith indicated that a single biological opinion would be prepared to address both permits.

April 3, 2007 The Service received a letter dated March 28, 2007 from Oscar Larson & Associates containing an updated table of construction quantities for the levee repairs, with the quantities for site # 9 removed, where sheet piling is proposed to occur.

April 17, 2007 Telephone conversation between Greg Goldsmith (Service) and David Ammerman (Corps) clarifying permit file numbers for sheet piling in site #9 and remainder of project..

BIOLOGICAL OPINION

Description of the Proposed Action

Project Description

Reclamation District 768 has obtained emergency funding from the Federal Emergency Management Agency to conduct repairs to damaged portions of approximately 4.9 miles, or 25,872 lineal feet of earthen or rock levees adjacent to Mad River Slough and Humboldt Bay. The project includes the currently needed repair of levees, as well as construction of temporary access roads, staging areas, construction of one slough crossing, placement of rock slope protection in areas damaged by winter storms in 2005-2006, and possible future repairs and maintenance within the ten year period of the permit. All levee repairs will not extend beyond the original footprint.

Clearing and Grubbing, Riprap Removal, and Riprap Replacement

In preparation for repair to damaged areas of the levees, approximately 7,780 tons of debris, slumped soil, concrete, woody debris, rooted vegetation, and other material would be excavated from the levee tops and faces and either hauled to off-project upland disposal sites, or re-used on site if suitable. Material would be removed by heavy equipment accessing the tops of levees or crossings, or by barge from the Bay side of levees. Floating containment booms, silt fences, or sediment curtains will be used in areas where debris has the potential to accidentally fall into the Bay or inboard ditches.

Tidal Influenced Levee Repair

The area of the damaged levee will be excavated to the lowest point of damage. Portions of the levees need to be re-contoured to accept rock slope protection fill. A level bottom bench will be created and earthen engineered backfill will be placed in 8-inch lifts and compacted to 90 percent relative compaction specifications. A layer of Type B rockslope protection fabric will be placed on the graded slope and anchored at the toe and top of the levee. A layer of light class (average 25 lb.) rock slope protection will be placed on the fabric, with ½ ton rock slope protection on top, forming the sloped outer face of the levee. The levees will be restored to original pre-storm dimensions of an average width at the top of 12.4 feet, with no increases in height or width.

Top of Levee Erosion Repair

Horizontal shearing or overtopping of the levee would be repaired by re-grading, compacting, and filling with an average of 12 inches of California Department of Transportation class 2 aggregate base or engineered fill on top of the levees compacted to 95 percent relative compaction. A clay-based soil surface will cover the engineered fill, and will be seeded.

Nontidal Levee Repair

The damaged portion of levees would be excavated to the lowest point of damage. A level bench would be created and backfilled with engineered fill in the same fill lifts and compaction

methods as described in the section on tidal influenced levee repair above. Erosion control blankets would be used where appropriate.

Levee Repair with Sheet Piling on Mud River Slough in Repair Site 9

The areas of damaged levee in work Repair Site 9, as identified in Figure 2 in the March 28, 2007 update letter from Oscar Larson & Associates, directly north of State Highway 255 will be removed to the lowest point of damage. Sheet piles will be driven into the substrate on the outside face of the levee in Mud River Slough. A level bench will be created and backfilled as described in the section on tidal influenced levee repair above. Sheet piles will be designed to U.S. Army Corps of Engineers standards.

Culvert and Tidegate Replacement

There are a total of 10 culverts with tidegates and 7 open culverts identified within the project area. Currently, there are no plans to replace any of these structures. Throughout the ten year period of this project, there may be a need for repair or replacement of failed tidegates and/or culverts, in which case the replacements would be similar structures, placed at the same elevations and locations. No new tidegates or culverts are proposed as part of this project.

Access and Staging Areas

Small excavators could access the top of the levees, however most of the heavy equipment will conduct work from the landward side of the levee. Access to the levees will occur via both existing roads and the construction of 8,000 linear feet of temporary roads (12 feet wide) to provide access to levees across seasonal agricultural wetlands. Temporary roads and staging areas would be surfaced with an 8-inch layer of redwood bark over road stabilization fabric covering an average 6-inch layer of road base. Temporary access roads would branch off of existing farm roads. The borrow ditch would be crossed using existing crossing locations, and the construction of one temporary earth fill crossing. The crossing will consist of a culvert with earth fill cover, or a free span ditch crossing.

Approximately four locations totaling 2.5 acres of temporary staging areas will be constructed for storage of heavy equipment and construction materials in 2007, and an area of less than 1 acre for the remaining duration of the project. Upon completion of the project, all access and staging areas will be removed, mechanically tilled and planted with agricultural seed mix.

Site Preparation, Excavation, Debris Removal

In preparation for repair to damaged areas of the levees, approximately 7,728 tons of debris, slumped soil, concrete, woody debris, and other material would be excavated from the levee tops and faces and either hauled to off-project upland disposal sites, or re-used on site. Material would be removed by heavy equipment accessing the tops of levees or crossings, or by barge from the Bay side of levees. Floating containment booms, silt fences, or sediment curtains will be used in areas where debris has the potential to accidentally fall into the Bay or inboard ditches.

Conservation Measures

When used in the context of the Act, "conservation measures" represent actions proposed by the Federal agency that are intended to further the recovery of and/or to minimize or compensate for project effects on the species under review. Because conservation measures are pledged in the project description by the action agency, their implementation is required under the terms of the consultation (USDI Fish and Wildlife Service and USDC National Marine Fisheries Service 1998).

Recovery Measures

As part of this proposed action the Corps is not proposing to include any measures to further the recovery of the tidewater goby.

Minimization Measures

The Corps will ensure that the following measures to minimize project effects are included in the permit terms for the Reclamation District #768 project.

1. All repair activities that include the removal or replacement of levee materials shall incorporate coffer dams, containment booms, sediment curtains, or equivalent similar structures that meet sediment control requirements to reduce the discharge of materials into the bay and into the inboard ditches. These would be temporary structures to be removed after completion of construction.
2. No onsite refueling of equipment shall occur. No equipment shall be operated that visually displays sign of leaking fuels, lubricants or similar materials. Spill prevention measures shall be in place for all equipment.
3. No equipment shall operate in the wetted channels or on the mud flat on the bay side. All work shall be done from the top of the levee or from the landward side of the channel by loader, backhoe, or excavator. Construction activities shall be limited to the times in which low tides occur, or where construction activities occur above water.
4. Any material that slips beyond the levee configuration into the mudflats outside the levee, or the inboard borrow ditch and associated wetland channels shall be removed to staging areas and/or hauled off site.
5. All repair or restoration activities involving the levee shall include the placement of geotextile or similar erosion control material between the structural fill and the levee and the placement of the riprap. This will reduce or minimize the amount of erosion that may otherwise occur.
6. Prior to construction of the temporary crossing or any repair or replacement of tidegates or culverts, tidewater gobies will be excluded from the areas of impact by using seine netting stretching from substrate to water surface and bank to bank. The netting must be a knotless mesh of no greater than 0.125" openings in the largest dimension. Netting will

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be deployed in such a way that it excludes gobies from the construction area and keeps them from entering the construction zone until the structure is in place and all work within wetted channels for the purpose of constructing the crossing or repairing/replacing the culvert has been completed.

7. If future tidewater goby surveys result in discovery of new occupied locations within the project area, the Corps will contact the Service. The Service will identify those areas immediately adjacent to the goby locations that are to be avoided by conducting repair work outside of the period from July 1 to September 1. This seasonal restriction will aid in avoiding impacts to breeding fish during likely peak breeding periods.

Action Area

For purposes of this biological opinion, the action area includes approximately 4.9 miles of bay front levee, borrow ditches, tributary slough channels and the intervening agricultural and seasonal wetlands between the City of Arcata's Marsh and Wildlife Sanctuary property to the east, Mad River Slough at Highway 255/Samoa Boulevard Bridge to the west, and Liscom Slough to the north.

Time-frame of Biological Opinion

This biological opinion is valid from the date of issuance through April 15, 2017.

Status of the Species: Tidewater Goby

Legal Status

On February 4, 1994, the tidewater goby was listed as endangered throughout its entire historic range (59 FR 5494). We did not designate critical habitat at the time we listed this species, explaining that, "In the case of the tidewater goby, critical habitat is not presently determinable. A final designation of critical habitat requires detailed information on the possible economic effects of such a designation. The Service does not currently have sufficient information needed to perform the economic analysis."

On September 18, 1998, the Natural Resources Defense Council, Inc. filed a lawsuit in Federal District Court in California against the United States Department of the Interior et al. for failure to designate critical habitat for the tidewater goby. On April 5, 1999, Judge Carlos R. Moreno ordered that the "Service publish a proposed critical habitat designation for the tidewater goby in 120 days" (Natural Resources Defense Council, Inc. v. United States Department of the Interior et al. CV 98-7596).

On June 24, 1999, we published a proposed rule to: (1) delist populations of the tidewater goby in areas north of Orange and San Diego Counties, and (2) retain the tidewater goby populations in Orange and San Diego Counties as endangered based on our re-evaluation of the species' status throughout its range (64 FR 33816).

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On August 3, 1999, we proposed critical habitat for the tidewater goby in Orange and San Diego Counties (64 FR 42250); we did not propose critical habitat for this species throughout the rest of its geographic range in 1999 because we had proposed to delist the species where it occurred in areas north of Orange County. On November 20, 2000, the Service designated critical habitat for the tidewater goby in Orange and San Diego Counties (65 FR 69693). The critical habitat designation consisted of 10 coastal stream segments that collectively measured 9 linear miles (14.5 km) in length.

On November 7, 2002, we withdrew our proposal to delist the tidewater goby in areas north of Orange County (67 FR 67803). Therefore, the tidewater goby has remained listed as an endangered species throughout its historic geographic range since 1994.

On August 31, 2001, Cabrillo Power L.L.C. (Cabrillo) filed a lawsuit in the U.S. District Court for the Southern District of California challenging a portion of the final rule that designated the 10 critical habitat units in Orange and San Diego Counties. Specifically, Cabrillo objected to the critical habitat unit involving Agua Hedionda Lagoon and Creek. In a consent decree dated February 27, 2003, the U.S. District Court: (1) agreed to vacate the critical habitat designation involving Agua Hedionda Lagoon and Creek; (2) stated the nine other critical habitat units should remain in effect; (3) stated the final rule designating critical habitat was remanded in its entirety for reconsideration; and (4) directed the Service to promulgate a revised critical habitat rule that considers the entire geographic range of the tidewater goby and any currently unoccupied tidewater goby habitat. The consent decree requires that the Service submit proposed and revised rules to the Federal Register no later than November 15, 2006, and November 1, 2007, respectively.

A proposed revised critical habitat rule was published in the Federal Register November 28, 2006. The rule proposes to designate approximately 10,003 acres (4,050 hectares) range-wide. This is an increase of approximately 8,422 ac (3,408 ha) from the currently designated critical habitat, and a considerable expansion to the north. In the previous rule, critical habitat was only designated in Orange and San Diego County due to uncertainty over the future listing status of tidewater goby populations to the north. The proposed revised critical habitat is located in Del Norte, Humboldt, Mendocino, Sonoma, Marin, San Mateo, Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, Ventura, and Los Angeles Counties, California.

Taxonomy and Life History

Accounts of the taxonomy, ecology, and reproductive characteristics of the tidewater goby are found in the following publications: final rule listing the species (USDI 1994), the proposed rule to delist northern goby populations (USDI 1999), the final rule withdrawing the Service's proposal to delist the northern goby populations (USDI 2002), the recovery plan (USDI 2005), and the proposed revised critical habitat rule (USDI 2006).

The tidewater goby is a small gray-brown fish rarely exceeding 2 inches (5 centimeters) in length. This species possesses large pectoral fins, and the pelvic, or ventral fins are joined to each other below the chest and belly from below the gill cover back to just anterior of the anus.

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Male tidewater gobies are nearly transparent with a mottled brownish upper surface. Female tidewater gobies develop darker colors, often black, on the body and dorsal and anal fins.

The tidewater goby is a short-lived species; the lifespan of most individuals appears to be about 1 year (Irwin and Soltz 1984, Swift et al. 1989). They prey opportunistically on benthic invertebrates including small crustaceans, insect larvae and snails (Swift et al. 1989, Irwin and Soltz 1984, Swenson and McCray 1996). They use three different foraging styles to capture prey: plucking prey from substrate surface, sifting sediment in their mouth, and mid-water capture (USDI 2003a).

The tidewater goby has only been found in California, and occurs in coastal brackish water habitats, such as lagoons, tidal bays and estuaries of rivers and streams along the coastline. The species is unique among Pacific coast fish in its restriction to brackish waters of coastal wetlands where the water is fairly still but not stagnant. They are weak swimmers concentrating in slack-water areas and generally avoiding swiftly moving waters. The species appears to spend all life stages in these brackish waters but may enter marine environments when flushed out by flooding or breaching of sandbars.

Tidewater gobies are most commonly found in areas with a muted or intermittent connectivity to tidal waters (Chamberlain 2006). Relatively low salinities, i.e., less than 10-12 ppt, are frequently characteristic of these habitats, however the species has been collected in salinities as high as 63 ppt (Goldsmith 2006). The species' tolerance of high salinities likely enables it to withstand some exposure to the marine environment, allowing it to recolonize nearby lagoons and estuaries following flood events (USDI 2006). Tidewater gobies also occur in freshwater streams up-gradient and tributary to brackish habitats; the salinity of these freshwater streams is typically less than 0.5 ppt. They can occur 1.6 to 7.3 miles (2.6 to 11.7 km) upstream from the ocean environment (Irwin and Soltz 1984, Swift et al. 1997, Chamberlain 2006, and Goldsmith 2006). Although the reasons for the variation in up-stream movement between one locality and another have not been determined, stream gradient and velocity are likely to be important factors.

Previous sampling for tidewater gobies has most commonly occurred in water less than 6 feet (2 m) deep (Wang 1982, Worchester 1992). Consequently, most observations have been made within this depth range. However, tidewater gobies were recently collected in Big Lagoon in Humboldt County during the breeding season at a water depth of 15 feet (4.6 m) (Goldsmith 2006).

Tidewater gobies have been documented in habitats with water temperatures that range from 46 to 77 degrees F (8 to 25 degrees C) (Irwin and Soltz 1984, Swift et al. 1989).

Current and Historical Range

The tidewater goby historically ranged from Tillas Slough in Del Norte County south to Agua Hedionda Lagoon in San Diego County. The species is currently found entirely within the original known range. The known localities are discrete lagoons, estuaries, or stream mouths separated by marine conditions. Natural gaps in the species' distribution occur where the

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coastline is steep and streams do not form lagoons or estuaries. Some of the largest gaps in distribution occur in Humboldt and Mendocino Counties, as well as in northern Sonoma County. From Tomales Bay southward to San Francisco, habitat loss and other anthropogenic-related factors have resulted in the creation of unnatural gaps in the species' distribution where the species is absent from several locations where it historically occurred (Capelli 1997). Several large natural and unnatural gaps occur between San Francisco Bay and San Diego County. Tidewater gobies have been documented at 134 localities within the historical geographic range of the species. Of these 134 localities, 23 (17 percent) are considered extirpated and 55 to 70 of the localities are naturally so small or have been degraded that long-term persistence is uncertain (USDI 2005).

Reproductive Biology

Reproduction can occur at all times of the year, however peak spawning usually occurs in the spring and then again in late-summer (Swenson 1999). Males excavate burrows, typically in clean coarse sand but also in mud, in which females lay an average of about 400 eggs per clutch. Females can lay 6 to 12 clutches per year (Swenson 1999). Males remain in the burrow to guard the eggs. Larvae emerge in 9 to 10 days, and live in a pelagic form, becoming benthic after reaching a length of about 0.5 to 0.7 inches (Moyle et al. 1995). Length of the pelagic larval period is not well studied, but is believed to last anywhere from a couple of days to two weeks or more (Camm Swift, personal communication).

Threats

Factors responsible for the historic decline and extirpation of goby populations and habitat include: human development in coastal salt marsh and riparian habitats, dredging, channelization of rivers, loss of habitat due to sediment deposition from upstream watershed disturbances, upstream water diversions that alter downstream flows, drought, groundwater overdrafting, and agricultural and sewage discharge (i.e., pollution) (USDI 1994). Existing threats to the goby include historic threats as well as artificial breaching of creek mouths and lagoons, extreme weather and streamflow conditions, predation by introduced species including mosquitofish (*Gambusia affinis*), sunfish (*Lepomis* spp.), and bass (*Micropterus* spp.), and competition with introduced species (e.g. yellowfin goby (*Acanthogobius flavimanus*) and chameleon goby (*Tridentiger trigonocephalus*)) (USDI 2005).

Conservation Strategy

The tidewater goby recovery plan provides a strategy for recovery that is designed to: (1) preserve the diversity of habitats throughout the range, (2) preserve the natural processes of recolonization and population exchange that enable population recovery following catastrophic events, and (3) preserve genetic diversity (USDI 2005). Recovery actions include: (1) protecting and enhancing currently occupied habitat, (2) conducting biological research to enhance the ability to integrate land use practices with tidewater goby recovery, (3) evaluating and implementing translocation where appropriate, and (4) increasing public awareness about tidewater gobies.

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The recovery plan subdivides the geographic distribution of the tidewater goby into 6 recovery units, encompassing a total of 26 sub-units defined according to genetic differentiation and geomorphology. A description of each recovery unit and subunit with recommended tasks for recovery are provided in Appendix G of the recovery plan (USDI 2005).

The recovery plan states that downlisting may be considered when the following criteria have been met: (1) specific threats to each metapopulation, such as habitat destruction and alteration, introduced predators, and competition with introduced species have been addressed through the development and implementation of individual management plans that cumulatively cover the full range of the species, and (2) a metapopulation viability analysis based on monitoring over a 10-year period indicates that each Recovery Unit is viable. Downlisting criteria for the North Coast Recovery Unit specifies that 5 of the 6 identified sub-units must have at least 75 percent chance of persistence for a period of 100 years. The delisting criterion specifically calls for a 95 percent chance of persistence for a period of 100 years (USDI 2005).

Current Conditions Range-wide

The current conditions incorporate the effects of all past human and natural activities or events that have led to the present-day status of the species (USDI Fish and Wildlife Service and USDC National Marine Fisheries Service 1998).

Habitat: Amount, Distribution and Quality

The wetland habitat of individual tidewater goby localities varies on a site-specific basis, and is affected in part by local precipitation patterns and topography. For example, in coastal areas where the topography is steep and precipitation is relatively low, the habitats occupied by tidewater gobies may be a few acres in size, only extend a few hundred feet inland from the ocean, and backwater marshes may be small or absent. In coastal areas where topography is less steep and precipitation is more abundant the habitats occupied by tidewater gobies may be hundreds of acres in size, extend many miles inland, and contain extensive backwater marshes (U.S. Fish and Wildlife 2006).

Appendix E in the recovery plan describes for each of 151 localities of known and potential habitat within 26 recovery subunits, the relative amount and quality of existing habitat (USDI 2005). The amount of habitat is characterized by a description of the size of water bodies and available habitat: large, medium, and small. Large water bodies are those meeting at least one of the following general physical parameters: streams with channel bankfull widths in excess of 66 feet (20 meters) at any point and/or with estuarine (areas with salt water intrusion) habitats exceeding 0.6 mile (1 kilometer) in length; or lagoons and ponds larger than 5 acres (2 hectares) surface area. Medium sized water bodies include smaller streams less than 66 feet (20 meters) bankfull width and/or estuaries longer than 328 feet (100 meters) but less than 0.6 mile (1 kilometer) in length. Medium sized lagoons and ponds have a surface area between 1 (0.4 hectare) and 5 acres (2 hectare) in size. Small water bodies include the remaining streams, ditches, sloughs, lagoons, and ponds that are smaller than the dimensions of medium sized water bodies.

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Rangewide, forty-nine (32 percent) localities contain large water bodies, 44 (29 percent) contain medium sized water bodies, 55 (36 percent) contain small water bodies, and 3 (2 percent) localities were not ranked.

The relative quality of habitat is characterized by a statement of the need for habitat restoration at a particular locality: much, some or none. Sixty-one (40 percent) localities require much restoration, 80 (53 percent) require some restoration, 9 (6 percent) require no restoration, and 1 site was not ranked.

The distribution of currently occupied, historically occupied and potential habitat is discontinuous along the California coast. Several large natural gaps in habitat occur throughout the North Coast Unit where the coastline is steep and streams do not form lagoons or estuaries. The Greater Bay Unit contains unnatural gaps in suitable habitat due to habitat loss and anthropogenic-related factors that have degraded habitat and resulted in the extirpation of species from several historic sites. A large natural gap in habitat occurs in the north half of the Central Coast Unit. Both natural and unnatural gaps in habitat occur throughout the Conception, LA/Ventura and South Coast Units (USDI 2005).

Population: Numbers, Distribution, and Reproduction

The current tidewater goby population is known to occur from Tillas Slough in Del Norte County to Cocklebur Canyon in San Diego County, 9.2 miles (14.8 km) north of Agua Hedionda Lagoon. Tidewater gobies do not currently occur in Agua Hedionda Lagoon (USDI 2006). The recovery plan identifies the following 6 recovery units that encompass the historic and current geographic range of the species: North Coast Unit, Greater Bay Unit, Central Coast Unit, Conception Unit, LA/Ventura Unit, and South Coast Unit (USDI 2005).

Currently, there are no long-term monitoring programs in place for this species. Population dynamics are not well documented, and few data are available on the general size of goby populations. However, when present, tidewater gobies are frequently the most abundant fish species found at a site (Lafferty et al. 1999a). Population distribution and density can be highly variable within a site. Gobies have been reported in densities as high as 0-138 per square meter and as low as 0-4 per square meter (USDI 2005).

Female tidewater gobies are capable of producing as many as 400 eggs in a single reproductive effort. Female gobies frequently initiate more than one reproductive effort per year (Swenson, 1995). Reproductive success of each effort is likely highly variable, with some egg laying efforts completely failing.

The tidewater goby is known to have formerly inhabited at least 134 localities. In 2005, approximately 17 percent of the 134 documented localities are considered extirpated and 41 to 52 percent are naturally so small or have been degraded over time that long-term persistence is uncertain (USDI 2005). Recolonization of extirpated localities has been documented when extant populations are present within several kilometers (Holland 1992, Lafferty et al. 1999a, 1999b). However, recently tidewater gobies have been found in localities considered extirpated

that are separated from the nearest population by 6 to 12 miles. These records suggest that distant movement and recolonization is possible (USDI 2005).

Current Conditions in the North Coast Sub-Unit 3

Sub-Unit 3 of the North Coast Recovery Unit is completely within Humboldt County. The sub-unit extends about 25 miles in length from the mouth of the Mad River south across Humboldt Bay to the Eel River. The Recovery Plan identifies five localities within Humboldt Bay watersheds. These localities include Freshwater Slough, Mad River Slough, McDaniel Slough/Klopp Lake, KATA Radio Station, and Jacoby Creek/Gannon Slough. These sites were known to exist prior to 2004, during development of the recovery plan. In addition, White Slough and Hookton Slough had goby detections that were unknown to the Service until 2005 (Cole 2004). From 2005 to the present, tidewater gobies have been located in at least five additional areas within Humboldt Bay, including Elk River, Hookton Slough, White Slough, Highway 101 Ditch, and Rocky Gulch. At the same time, the previously known localities of Klopp Lake and Liscom Slough have been resurveyed without detection. Currently, the status of the Mad River Slough, KATA Radio Station, Klopp Lake, and Highway 101 Ditch localities is unknown.

The localities within Humboldt Bay encompass approximately 500 to 1,000 acres, although due to the apparent transient nature of some of the populations, it is likely that the area inhabited by tidewater goby at any given time is probably somewhat smaller.

At this time, very little is known about the relationships between tidewater goby populations in Humboldt Bay. Research investigations focusing on genetic relationships within Humboldt Bay are underway to determine whether the known locations are inhabited by separate populations, or whether they are part of one larger metapopulation that uses the Bay as a means of travel from one suitable site to another.

Sub-Unit 3 also includes the separate Eel River locality, located approximately 8.7 miles south of Humboldt Bay, connected only via the Pacific Ocean. Extensive surveys have not been conducted to determine the extent of goby presence in the Eel River.

Habitat Amount, Distribution and Quality

The margins of Humboldt Bay and the Eel River in Humboldt County consist of generally broad low elevation benches historically dominated by mudflats, tidal marshes, estuarine channels, and brackish marshes. Within these complex estuaries, a substantial amount of historic salt and brackish marsh habitat was converted to agricultural, urban, and industrial uses through the construction of levees and drainage channels. This alteration in Humboldt Bay resulted in the loss of up to 10,000.ac (4,047 ha) of potentially suitable habitat (USDI 2006).

As a result of habitat alteration, several of the localities occupied by the tidewater goby do not contain natural sandbars between the ocean and habitat where the species is present. Instead, manmade water control structures, such as tidegates and culverts, exist between tidal waters and the locations where tidewater gobies occur. Many of these tidegates have been in place for

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decades, and in some cases, they provide habitat conditions similar to those created by the presence of a seasonal sandbar. In fact, most of the occupied tidewater goby habitat in both the Humboldt Bay and Eel River estuaries is separated from full tidal influence by tidegates.

The Eel River delta contains many small, slough channels and other backwater areas that provide suitable habitat for tidewater gobies, but it also contains larger channels open to direct tidal influence that do not provide suitable habitat. The Eel River is subject to infrequent but severe flooding. In addition to human-caused alterations of the estuary, major floods during the past century may have severely altered habitat in most channels, including the one known location. Much of the suitable habitat in the Eel River is on private lands, and consequently has not been surveyed for tidewater gobies.

Population: Numbers, Distribution, and Reproduction

Mad River Slough – This population was actually not found within Mad River Slough, but in the system of adjacent channels connected to McDaniel Slough, which is separated from Mad River Slough by tidegates. Gobies were first detected in 1988 by Dr. Camm Swift in the inboard ditch immediately north of the levee at the junction of State Highway 255 and Mad River Slough. As a result of that effort, approximately 50 gobies were collected and released, noted as "common". This location was surveyed again in either 1999 or 2000 by Dr. Swift, and tidewater gobies were again detected. In addition, gobies were reported in 2001 from nearby Liscom Slough, which is a tributary slough to Mad River Slough approximately 1.3 miles north of where State Highway 255 crosses Mad River Slough. Tidewater gobies were not detected here in subsequent surveys by Service staff in 2003.

McDaniel Slough – This location includes the estuary of Janes Creek, as well as tributary slough and ditch channels that run the length of the levee system bordering the northeast portion of Humboldt Bay. This location is connected hydrologically with the Mad River Slough location described above. Tidewater goby surveys were conducted here by Service staff in 2005 with no detections. In 2006, gobies were found in two tributary channels to the inboard ditch along the levee system.

Arcata Marsh/KATA Radio station site – This site, 0.5 miles east of the project boundary, was surveyed in July 1975 by Dr. Camm Swift, with detections of 6 or 7 adult gobies, noted as "scarce". This area was resurveyed in 1981 with tidewater gobies noted as "common". This area was resurveyed by Service staff in 2003 with no detections.

Klopp Lake – This location, 0.25 miles east of the project boundary, was surveyed in 1982, resulting in detection of an unknown number of tidewater gobies. Since that time, the only known survey was conducted by Service staff in 2004, and did not result in any detections.

Gannon Slough – A tidally muted slough channel system, Gannon Slough includes channels of three small freshwater streams, as well as remnant bay channels. Tidewater gobies were first detected here in 2005, and have been present during several repeat visits in 2005 and 2006.

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During the initial detection, it is apparent that gobies were breeding in this location. An estimate of density was recorded for this observation, of 1-3 fish per square meter.

Jacoby Creek - The Jacoby Creek location may be unique among known tidewater goby locations within Humboldt Bay in that it is the only system open to full tidal fluctuation. The location has been surveyed several times between 1975 and 2004 with detections during most or all survey efforts.

Freshwater Slough - Service staff recently discovered gobies in a small elevated channel behind a leaking tidegate adjacent to Wood Creek, a tributary to Freshwater Slough.

Elk River - This location was first documented as containing tidewater gobies in a 2006 survey by Service staff.

White Slough and Hookton Slough, Humboldt Bay National Wildlife Refuge - These two locations, in the South Bay portion of Humboldt Bay, were first documented as containing gobies in 2000. The Hookton Slough location was re-located in 2004 by Service staff.

To date, monitoring has consisted primarily of conducting presence/absence surveys for the species throughout the north coast. In general, many areas that contain suitable tidewater goby habitat remain unsurveyed. There is a monitoring effort underway in the Gannon Slough system, about 1 mile to the southeast of the project site, conducting presence/absence surveys to monitor response to the installation of a new "fish-friendly" tidegate.

Conservation Strategy for the North Coast Sub-Unit 3

The recovery plan identifies the following management tasks for recovery: (1) monitor, (2) establish degree of genetic isolation of the sub-unit, (3) transfer gobies to the Mad River Estuary, Klopp Lake, Hookton Slough, and White Slough from the Mad River Slough, Jacoby Creek, Gannon Slough, KATA Station, and Freshwater Slough, (4) consider other sites around the margin of Humboldt Bay for transfer of gobies, and (5) consider localities for transfer from persisting sites after 2 years of absence (USDI 2005). No efforts at transferring gobies from one location to another have occurred to date in the north coast recovery unit.

Status of Proposed Critical Habitat: Tidewater Goby

Legal Status

As stated above, a proposed revised critical habitat rule was published in the Federal Register November 28, 2006, and included approximately 10,003 acres (4,050 hectares) range-wide.

Primary Constituent Elements

As part of our responsibility in designating critical habitat, the Service has identified the known physical and biological features essential to the conservation of the tidewater goby as primary constituent elements. Based on current knowledge of the life history, biology, and ecology of the

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tidewater goby, and the requirements of the habitat to sustain the essential life history functions of the species, we have determined that the primary constituent elements are:

1. Persistent, shallow (in the range of about 0.1–2 m), still-to-slow-moving, aquatic habitat most commonly ranging in salinity from less than 0.5 parts per thousand (ppt) to about 10–12 ppt, which provides adequate space for normal behavior and individual and population growth
2. Substrates (e.g., sand, silt, mud) suitable for the construction of burrows for reproduction;
3. Submerged and emergent aquatic vegetation, such as *Potamogeton pectinatus* and *Ruppia maritima*, that provides protection from predators;
4. Presence of a sandbar(s) across the mouth of a lagoon or estuary during the late spring, summer, and fall that closes or partially closes the lagoon or estuary, thereby providing relatively stable water levels and salinity.

Current Condition in Proposed Critical Habitat Unit HUM-3

The HUM-3 proposed critical habitat unit is located within and around Humboldt Bay and its tributaries, and totals 1,478 acres. This unit is comprised of several disjunct and interconnected estuary sloughs, streams, ponds, and ditches along the periphery of the bay. These channels collectively mimic, on a much reduced scale, habitats that were lost through past management practices. Many of the channels have muted tidal action compared to the open portions of the bay, due to water control structures placed as an interface between fresh and marine waters.

Conservation Strategy for Proposed Critical Habitat Unit HUM-3

We anticipate that the persistence of the tidewater goby source population within this unit may require protection of localities that are not occupied every year, but collectively form a source population through an interconnected complex of channels and shallow water habitats. That is, any of the several known occupied localities within a channel complex may be used by tidewater gobies during various years in response to dynamic habitat conditions during seasonal, annual, and longer term climatic cycles (e.g., drought). Data collected by the Service within the HUM-3 unit since 2002 suggests that in some locations where gobies were recently present, they were subsequently found to be absent. This data supports the idea that tidewater gobies within the unit appear to use locations intermittently.

The interconnectivity of habitat within this unit will reduce the chance of losing the tidewater goby along this portion of the coast, help conserve genetic diversity within the species, and help facilitate colonization of currently unoccupied locations.

Recently, significant restoration efforts have occurred or are anticipated to occur within habitats proposed for designation as critical habitat in this unit. The outcome of these restoration efforts for tidewater gobies is unknown, and will likely vary with their design features and location, but in general, net gains of goby habitat should result.

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Known threats in this unit that may require special management include coastal development, channelization of habitats, non-point and point source pollution, and cattle grazing.

The threats related to coastal development are not well defined for this unit, but could result from a variety of construction related projects in and adjacent to proposed critical habitat. The threats related to channelization of habitats consist of creating, modifying, and maintaining artificial channels designed to drain agricultural lands of surface water. The resulting channels have had water control structures, usually tidegates, installed to protect these lands from tidal inundation. Pollution threats include the potential for oil spills, other spills associated with transportation on adjacent highways, and pollutants from nearby paper and lumber mills. Grazing threats in this unit include the potential for destruction of proposed critical habitat due to animal use of the channels, by trampling and eroding channel banks, aquatic vegetation, and modification of slough and stream channels. Humboldt Bay is designated as "Water Quality Limited" by the State Water Resources Control Board. These known threats are listed in detail in Appendix E of the recovery plan.

Environmental Baseline (in the Action Area): Tidewater Goby

Regulations implementing the Act (50 CFR §402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation process. As stated earlier, the action area for this consultation includes the following: approximately 5 miles of bay front levee, borrow ditches, sloughs and remnant channels, and the intervening farmland between California Department of Fish and Game property to the east and Mad River Slough at Highway 255/Samoa Boulevard Bridge to the west.

Conservation Strategy

The decline of the tidewater goby throughout its range can be attributed to threats that include upstream water diversions, dredging, pollution, siltation, urban development on adjacent lands, and competition/predation from introduced species (USDI 2004). These threats continue to affect the remaining goby populations. Small population numbers, coupled with a high level of fragmentation and apparent isolation of existing populations, has decreased the probability of genetic exchange between populations. It has also reduced opportunities for re-colonization of unoccupied suitable habitats. These factors likely affect goby populations that may occur in McDaniel Slough, as well as in Gannon Slough, Jacoby Creek, and other nearby populations.

Throughout Humboldt Bay, tidewater gobies occupy several known locations in a spatially distributed network that has the potential to change over time as new locations are colonized and others are extirpated. Because of this movement between habitat locations, it is important to maintain sites in a well distributed pattern throughout the bay. Currently, the only location in the northwestern portion of the bay known to be occupied is within the project area.

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Throughout the project area, there are seasonal breaks in hydrologic connections, causing periodic isolation of tidewater gobies, especially during the dry season. This condition can result in poor water quality, increased predation from wading birds, stranding from higher quality habitat, and in extreme conditions, desiccation of the habitat and resident fish. Connectivity to a variety of habitat, with the maintenance of a muted tidal cycle, is an important factor in maintaining opportunities for a network of tidewater goby populations.

Current Condition

Habitat: Amount, Distribution and Quality

McDaniel Slough and Mad River Slough form tidally influenced estuarine tributaries to Humboldt Bay. The sloughs are the result of Janes Creek, a perennial stream, other seasonal freshwater channels that meet areas of tidal flow in Bay mudflats and marsh wetlands being isolated behind human-created levees. There are currently four culverts with tidegates connecting the inboard borrow ditch (from the original construction of the levee) to the Mad River Slough at the western end of the project, and four culverts (three with tidegates) connecting the inboard ditch to the Bay at McDaniel Slough, the outlet for Janes Creek. Until recently, only two of the four culverts on the eastern opening had tidegates. One of the tidegates, which was detached during the last year or two, was replaced in December of 2006 or January of 2007. The span between the two outlets includes at least 4 locations where culverts provide continuity of the ditch at crossings, and one culvert connecting an area to the east of the McDaniel Slough opening.

In general, tidewater gobies are not found in completely open tidal systems, evidenced by the results of recent presence/absence surveys (Goldsmith 2006). Alternatively, tidewater gobies are more often found in areas with muted tidal flow. Within the action area, one open culvert to the Bay on the eastern end of the project, as well as any leakage from the other seven tidegates, results in a muted tidal flow into the system, and creates a gradient of brackish water conditions throughout the interior channels. The limited tidal inflow does not reach the highest elevation wetlands, but causes the lowest elevation areas nearest the culvert to remain close to marine conditions. In addition to the salinity gradient, conditions also include a gradient of velocity, substrate, vegetation, and other physical attributes such as channel morphology, which creates a habitat complexity that is favorable for tidewater gobies. Within the action area, the majority of the wetted channel areas appear to be suitable habitat that may vary in quality due to water quality, amount of tidal exposure, sediment composition, and structural complexity.

Population: Numbers, Distribution, and Reproduction

Tidewater goby breeding season range-wide is characterized as typically occurring in the spring and summer months (USDI 1994, USDI 2005a). However, evidence of breeding occurs year-round in some north coast estuaries, indicated by the presence of gravid females and sub-adult sized fish in all months of the year (McGourty, 2005). Direct evidence of breeding locations is limited in the Humboldt Bay region, but was documented in early July in Gannon Slough, 1.3 miles to the southeast of the project site (W. Pinnix, 2004, AFWO, pers. comm.).

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Service staff conducted surveys in McDaniel Slough and the surrounding connected water bodies within the eastern half of the project area on August 19, 2005 and on October 25, 2005. The purpose of the surveys in 2005 was to determine whether tidewater goby currently occupy the project area for the City of Arcata's Proposed McDaniel Slough Wetland Restoration. The restoration project covers approximately the eastern 25 percent of the levee repair project area. The 2005 surveys were completed using the approved presence/absence survey protocol for assessing project related impacts within suitable goby habitat (USDI 2005). Additional surveys were conducted throughout the project area from August 23-25, 2006. The purpose of the 2006 survey was to collect genetic data to determine whether there are significant genetic differences between tidewater goby populations within Humboldt Bay. The results from the 2005 surveys were negative for 4 seine hauls and dip-netting in 18 locations. No tidewater gobies were detected as a result of any surveys in 2005. During 2006, tidewater gobies were detected at two distinct locations within the project area. One location was 1.7 miles east of the junction of the levee with state highway 255. A total of 32 tidewater gobies in this location were found in an isolated depression behind a wooden water control structure approximately 100 meters north of the inboard ditch in a tributary channel. The salinity was as high as 65 ppt in the location where the fish were detected. The other location was 0.35 miles west of McDaniel Slough in a tributary channel from approximately 15 to 75 meters from the inboard ditch. In this location, a total of 9 gobies were captured. Throughout the project area, only a small portion has currently been surveyed. There are several tributary channels similar to those where gobies have been located that are inaccessible due to private ownership. Based on habitat suitability and locality of presence detections, it is likely that tidewater gobies inhabit portions of the project area in addition to those locations where gobies have been detected. Due to the limited nature of the presence/absence survey protocol, it is not possible to make estimates of population size from our survey results. In addition, the area of the borrow ditch associated with the levee is difficult to survey, due to deep water and soft sediment, which focused more survey effort in the tributary channels. In order to obtain information relative to population abundance, a much more extensive and intensive survey effort would need to occur.

Environmental Baseline (in the Action Area): Tidewater Goby Proposed Critical Habitat

Current Condition of PCEs

Within the action area, there are a total of 190 acres of proposed critical habitat. The majority of the proposed area encompasses the inboard ditch along the levee system, and the branched slough channels that are hydrologically connected to known locations where tidewater gobies have been found.

Proposed critical habitat for the tidewater goby includes four primary constituent elements that are essential to the conservation of the tidewater goby: persistent shallow (0.1-2 m) slow-moving aquatic habitat; substrates suitable for the construction of burrows; submerged and emergent aquatic vegetation, and; stable water levels due to formation of a sandbar. Within the HUM-3 unit, some human-made water control structures appear to provide the stability that would typically occur from the formation of a natural sandbar. These elements are all present within the area proposed for designation in the project area. Proposed critical habitat in this unit includes

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known locations of tidewater goby populations, as well as contiguous habitat located up-channel and down-channel from the known location.

Within the project area, approximately 14,304 linear feet (55 percent of the total project length) of the inboard ditch parallel to the earthen and rock bayfront levee are included as proposed critical habitat for the tidewater goby. In addition, many of the interior branched slough channels that connect to the inboard ditch are also in proposed critical habitat.

Effects of the Action

This section presents an analysis of the direct and indirect effects of the proposed project on the tidewater goby and its proposed critical habitat, together with the effects of other activities that are interrelated and interdependent with the proposed action. These effects are evaluated along with the environmental baseline and the predicted cumulative effects to determine the overall effect to the species and its proposed critical habitat.

Likelihood of Species Presence

Tidewater gobies have been found in Liscom Slough, tributary to Mad River Slough as recently as 2001, and in the western portion of the inboard ditch in 1988 (Camm Swift, pers. comm.). On August 23, 2006, surveys by USFWS personnel detected three tidewater goby from one of the branches of the inboard ditch along McDaniel Slough. Over the next two days, both in the same area, and another branch of the ditch to the west, a total of 27 and 3 gobies, respectfully, were captured (USFWS unpublished data). Much of the action area and surroundings has not been surveyed, but habitat similar to the occupied location discovered in 2006 exists throughout much of the action area. We assume that tidewater gobies can be present in any of the wetted channels based on survey history and habitat similarity.

Habitat Modification

Scientific Basis for Habitat Modification

The decline of the tidewater goby throughout its range can be attributed to water diversions, dredging, pollution, sedimentation, and urban development on adjacent lands. These threats continue to affect the many of the remaining goby populations.

Excessive sedimentation may degrade substrate conditions needed for reproduction, and can result in the loss of habitat as shallow wetland areas fill in and become dewatered upland habitat (LSDJ 1994, 2005).

Effects of the Action – Habitat Modification

There is an area of approximately 46,450 square meters of suitable habitat within the inboard ditch adjacent to the levee along the entire length of the project. Material used for the levee repair may accidentally fall into the inboard channels and ditches, and directly reduce and/or degrade the available habitat by filling in channels and ditches. We anticipate that these impacts

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will be temporary if they occur. Any material that falls off the levee and into the inboard ditch will be removed.

A section of the inboard ditch approximately 35 square meters will be subject to material being directly deposited into the inboard channel at the site of the temporary earth fill crossing, resulting in the complete loss of this habitat for the project duration. However, material from this crossing will be removed after the project completion, thus restoring the habitat to its original condition.

As a result of both accidental material spill into the ditch, and the construction and removal of the temporary crossing, breeding habitat may be inundated with sediment that could bury the habitat and/or make it unsuitable for breeding in the future.

Disturbance

Scientific Basis for Disturbance Effect

The Service believes that disturbance can adversely affect gobies when work activities result in behavioral modifications that cause a loss or reduction in reproductive effort or survival of individuals of the species. The effects of disturbance depend on the frequency, timing, location, and intensity of the activities.

Effects of the Action - Disturbance

The proposal to allow heavy equipment to operate on the levees could result in disturbance to tidewater gobies. Should gobies be present in or very near the work area, accidental spill of levee material, or retrieval of that material could directly disturb gobies in the area. In addition, heavy equipment operation near or in water occupied by gobies could cause significant vibration of the substrate as well as movement of rock and other materials. As a result of material spill, retrieval, and vibration, gobies may move out of the impacted area, leaving desirable habitat. This can include abandoning breeding or foraging habitat, and fleeing areas of cover which can expose individuals to predation, or otherwise directly modify important behaviors for survival.

In general, disturbance will be minimized by conducting work in wetted areas only at periods of low tide. During the installation of the access road crossing, disturbance will be minimized by excluding fish as stated in conservation measure (6) above. In addition, the use of sediment curtains to minimize sediment input to the wetted channel will be used while repairing severely damaged levee sections facing the inboard ditch.

Based on the information provided in the form of maps, site visits, and conversations with Stein Coriell of Oscar Larson and Associates, the permit applicant, we anticipate that less than 10 percent of the entire length of the inboard ditch will receive treatment that could cause disturbance to tidewater gobies. Therefore, the tidewater gobies associated with no greater than 2,500 feet of the inboard ditch would be subject to disturbance.

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Injury or Mortality

Scientific Basis for Direct Injury or Mortality

Tidewater gobies, their eggs or young can be directly injured or killed as a result of a variety of construction related activities:

1. Handling and removal of tidewater gobies from the work area: using fine-mesh seine nets, gobies will be excluded or relocated from the area to be dewatered for the construction of the temporary crossing. At this time, they are susceptible to being injured or crushed by workers while they are entangled in, or being removed from netting.
2. Dewatering of suitable habitat to construct the channel crossing: gobies are very small, especially in the planktonic larval form; it will not be possible to relocate and move all of the larval or small juvenile size classes to permanently watered habitat outside the work area. Any remaining fish in the section of channel proposed for dewatering may die from desiccation, predation, or other causes.
3. Trampling or crushing by people, equipment, or levee material while operating in suitable habitat: trampling or other physical damage to tidewater goby breeding burrows and the crushing of individuals is possible as a result of excluding fish from the constructed channel crossing and/or from levee material falling into the channel during levee repair work.
4. Excessive sedimentation of burrows containing eggs and adult males while their mobility is restricted.
5. Accidental spill of petroleum products or other waste materials into suitable habitat.

Effects of the Action – Injury or Mortality

Dewatering of a portion of the inboard ditch for the construction of one temporary earth fill crossing may result in the direct mortality or injury of gobies, despite attempts to move fish out of the work area. Fish may also be injured or killed as a result of the process of excluding them from the area prior to dewatering.

Sedimentation entering the sloughs and associated channels and ditches from levee repair activities and construction of the single earth fill crossing may settle on occupied breeding burrows resulting in direct mortality to both adults and eggs.

Based on the mean value of an estimate of tidewater goby density in nearby Gannon Slough of 2 fish per square meter, we anticipate that as a result of the proposed construction and removal of one temporary earthen fill crossing, a total of 70 tidewater gobies may be killed or injured.

The likelihood that injury or death may occur as a result of accidental spill of oil products or other waste materials associated with the project is considered to be discountable due to the

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minimization measures required by the Corps as part of the permit condition implemented. Therefore, we assume none will occur.

Summary of Project Effects on Numbers, Distribution, and Reproduction

The proposed action may affect the number and productivity of tidewater gobies in the action area by causing direct mortality of adults or young, temporarily reducing the functional suitability of habitat, and disturbance of breeding or non-breeding adults or young.

The proposed levee repair work will affect tidewater gobies in the inboard ditch along the length of the project area. This analysis of effects and our conclusions are based on the expectation that the minimization measures will be implemented. However, even with full implementation and compliance with the measures, adverse impacts to foraging and breeding tidewater gobies are likely to occur. Spilling of levee material into the ditch could kill gobies, causing a reduction in total number of gobies, as well as an impact on breeding gobies. Since tidewater gobies are primarily an annual species, impacts to the population may result in a short-term reduction in breeding adults. As a result, we expect that these actions will result in lower productivity of gobies in the available suitable habitat.

Effects to Proposed Critical Habitat

Effects to Primary Constituent Elements

Activities such as rock placement within wetted channels, accidental spill of levee material into wetted channels, and construction of the temporary crossing of the inboard ditch channel can adversely affect primary constituent elements including persistent shallow slow-moving water, substrates suitable for construction of breeding burrows, and areas of submergent vegetation.

Effects to Proposed Critical Habitat Units

Individual critical habitat units are expected to provide conservation benefits to the species. We assume that goby presence is spatially correlated with the quantity, quality, and availability of primary constituent elements (USDI 2006). Activities that result in a reduction in the quantity, quality, and availability of primary constituent elements, such as a significant reduction due to fill of levee construction material, within a proposed critical habitat unit, can adversely affect the function and conservation role of the affected unit. We estimate that on average, no more than 1 meter encroachment into the inboard ditch will occur to place rock material for levee repair. Using the previously determined estimate of 10 percent of the total project length along the levee system (approximately 2,500 meters) for areas to be repaired with severe damage, an area of 2,500 square meters of proposed critical habitat may be removed. This represents less than one percent of the suitable habitat in proposed critical habitat unit HUM-3.

Cumulative Effects

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur within the action area considered in this biological opinion. Future

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Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. Proposed projects on City of Arcata lands and California Department of Fish and Game lands within and adjacent to the action area will have a Federal nexus and require section 7 consultation with the Service. There are no other actions on private or State lands within the action area that are reasonable certain to occur; therefore, cumulative effects would not be likely for activities within the action area.

Conclusion

After reviewing the current status of the tidewater goby, the environmental baseline for the action area, the effects of implementing the proposed action, and the cumulative effects, it is the Service's biological opinion that issuance of a permit for the Reclamation District 768's Levee Storm Damage Repair project, as proposed, is not likely to jeopardize the continued existence of the tidewater goby and is not likely to adversely modify proposed critical habitat.

The Service reached the non-jeopardy conclusion based on the following factors:

1. The proposed action will permanently remove less than 0.6 acre of suitable tidewater goby habitat.
2. The relatively small number of tidewater gobies expected to be affected by the proposed project. Minimization measures are likely to reduce the number of gobies directly injured or killed.
3. The McDaniel Slough goby population, as well as other nearby populations in the north portion of Humboldt Bay appears to be in relatively stable condition.
4. Adverse impacts from the proposed action are expected to be of limited duration within the overall project timeframe. The sunset date for this consultation is April 15, 2017.

The Service reached the no adverse modification conclusion based on the following factors:

1. The proposed action will permanently remove a minimal amount (less than 0.6 acre) of proposed critical habitat for the tidewater goby. Proposed critical habitat unit HUM-3 contains 1,478 acres of potentially suitable habitat. Therefore, less than one percent of suitable habitat in proposed critical habitat unit HUM-3 will be impacted by the proposed project.
2. There are an estimated 190 acres of proposed critical habitat within the action area. The loss of no more than 0.6 acre of habitat containing primary constituent elements will not significantly alter the intended function and conservation role of the HUM-3 proposed critical habitat unit for the species.

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INCIDENTAL TAKE STATEMENT

INTRODUCTION

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the taking of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to an applicant, as appropriate, for the exemption of 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fail to assume and implement the terms and conditions of (2) fail to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR 402.14(i)(3)]

AMOUNT OR EXTENT OF TAKE ANTICIPATED

Deriving estimates for the number of tidewater gobies within the action area is difficult because of seasonal changes in distribution and abundance due to constantly varying environmental conditions. In addition, tidewater goby density estimates can be extremely variable depending upon sampling method, location within a site, vegetation, and substrate (USDI 2005b). Survey efforts for project related purposes are generally confined to presence/absence surveys. Consequently, anticipating the precise number of tidewater gobies that may be taken as a result of the proposed action is difficult. We based the anticipated amount of take on the past survey efforts in McDaniel Slough and estimated peak densities from similar nearby occupied breeding habitat.

The Service anticipates incidental take in the form of:

Harassment – due to disturbance of 200 breeding adults within the first year of construction, and disturbance of up to 10 breeding adults annually for the remaining 9

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years of the project; and

Harm – due to injury or death and loss of 0.6 acres of suitable habitat from sedimentation of breeding sites, dewatering of habitat, exclusion from a temporary crossing by seining of individuals, of a total of no more than 70 individuals throughout the duration of the ten year project term.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the tidewater goby, or destruction or adverse modification of proposed critical habitat for the tidewater goby.

REASONABLE AND PRUDENT MEASURES

The Service believes the impacts of the proposed action largely will be minimized by compliance with measures incorporated in the project design. Consequently, no reasonable and prudent measures are necessary.

TERMS AND CONDITIONS

As mentioned above, the Service considers the measures incorporated in the project design to be sufficient to minimize take of the tidewater goby; therefore, no terms and conditions are necessary.

If during the course of the action the level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the need for reasonable and prudent measures. The Corps must immediately provide an explanation of the causes of the taking and review with the Service the need for possible inclusion of reasonable and prudent measure.

MONITORING REQUIREMENTS

In order to monitor the impacts of incidental take, Corps must report the progress of the action and its impacts on the species to the Service, as specified in the incidental take statement. The reporting requirements are established in accordance with 50 CFR 13.45 and 18.27 and specified as follows:

1. At the end of each calendar year, the Corps will provide to the Service the results of any surveys for tidewater gobies.
2. At the completion of work requiring the construction and removal of the temporary inboard ditch crossing, the Corps will provide to the Service the results of fish exclusion efforts, specifically whether any tidewater gobies are detected.

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REPORTING REQUIREMENTS

Upon locating a dead or injured tidewater goby, initial notification must be made to the Service's Division of Law Enforcement in Chico, California at (530) 342-8724 and the Arcata Fish and Wildlife Office at (707) 822-7201 immediately, and in writing within three (3) working days. Notification must include the date, time, and location of the carcass; cause of death or injury, if known; and any other pertinent information. Care must be taken in handling injured animals to ensure effective treatment and care and in handling dead specimens to preserve biological material in the best possible state for later analysis of cause of death. The finder has the responsibility to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed, unless to remove it from the path of further harm or destruction. Should any treated listed species survive, the Service should be contacted regarding the final disposition of the animals. In the case of take or suspected take of tidewater gobies not exempted in this biological opinion, the Arcata Fish and Wildlife Office and the Division of Law Enforcement shall be notified within 24 hours.

COORDINATION OF INCIDENTAL TAKE WITH OTHER LAWS, REGULATIONS, AND POLICIES

The incidental take statement provided in this biological opinion satisfies the requirements of the Act. The Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions, including the amount and/or number specified herein.

CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the Act direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species and the ecosystems upon which they depend. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

Anticipating future projects within suitable habitat surrounding Humboldt Bay that may require a Corps permit, the Corps should fund surveys for presence/absence of tidewater gobies.

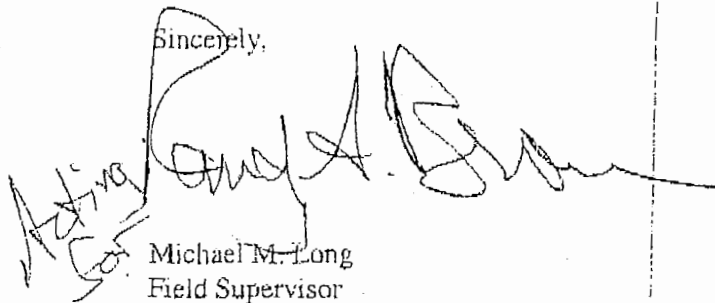
In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed, proposed, or candidate species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

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REINITIATION NOTICE

This concludes formal consultation on the proposed Reclamation District 768's Levee Damage Repairs project. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease pending reinitiation. If you have any questions regarding this biological opinion, please contact Greg Goldsmith of my staff at (707) 822-7201.

Sincerely,



Michael M. Long
Field Supervisor

cc:

US Army Corps of Engineers, Eureka, CA
Oscar Larson & Associates (Attn: Stein Coriell)

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Eelgrass (*Zostera marina*)
Mitigation and Monitoring Plan
For

Reclamation District 768 Levee Repair Project

April 17, 2007

Prepared For:

Reclamation District 768

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EXHIBIT NO. 7
APPLICATION NO.
1-03-004-A3
RECLAMATION DISTRICT 768
EELGRASS MONITORING & MITIGATION PLAN (1 of 13)

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FIGURES

Figure 1 – 2007 Levee Repair Map

Figure 2 – Eelgrass Impact and Control Area Map

1.0 INTRODUCTION

Reclamation District 768 (Reclamation District) proposes approximately 8,777 linear feet ($\pm 2,675$ meters) of levee repair along Humboldt Bay and Mad River Slough (see Figure 1 – Levee Repair Map). Local winter storms from December 30, 2005 through January 3, 2006 caused significant damage to the levee, which is need of immediate repair/restoration to a pre-damage condition. A failure to take action could result in further levee damage, levee breaches, the potential loss of high-grade soil types, saltwater intrusion into agricultural fields and freshwater wetlands, and the inundation of public roads (Jackson Ranch Road and Old Samoa Road).

Eelgrass occurs sporadically and in long contiguous mats along the sides of the Mad River Slough channel. At proposed repair site #9 (see Figure 1 – 2007 Levee Repair Map), a combination of sheet piling and rock slope protection is proposed to be used to repair a 900 foot long severely damaged section of levee. Approximately 300 feet of the 900 foot section will be repaired using sheet piling. While repairs at this location are not expected to result in direct impacts to eelgrass beds, there is a possibility that eelgrass could be indirectly impacted as a result of scour caused by the placement of sheet piling.

Eelgrass beds are recognized as Essential Fish Habitat (EFH) by the U.S. Army Corps of Engineers (USACE). USACE is consulting with the National Marine Fisheries Service (NMFS) on EFH as part of the formal Section 7 Consultation for the Reclamation District's levee repair project.

Eelgrass beds are also recognized as Environmentally Sensitive Habitat Areas (ESHA) by the California Coastal Commission and are protected under section 30240 of the California Coastal Act. The California Department of Fish & Game (CDFG) recommends avoidance of these habitats when possible, and depending on the quantity and/or quality of the habitat, to mitigate for them when avoidance is not possible.

To comply with USACE policy, CDFG policy and the Coastal Act, the Reclamation District is proposing to mitigate for potential impacts to eelgrass caused by scour associated with the levee repair project. Mitigation will include pre-construction surveys of eelgrass distribution and density in the potential impact site and a suitable control site. Mitigation will also include annual surveys of the potential impact site and control site for a period of five years following construction. The annual post-construction surveys will determine if a decrease in eelgrass distribution or density has occurred associated with the placement of sheet piling. If the annual post-construction surveys show a decrease in eelgrass distribution or density relative to the control site, then the loss of eelgrass will be mitigated by conducting an eelgrass transplant program, according to the guidelines of the Southern California Eelgrass Policy (NMFS 1991).

2.0 SUMMARY OF POTENTIAL IMPACTS TO EELGRASS

This project is not expected to result in direct impacts to eelgrass, since it appears that eelgrass is not growing close enough to the levee to be destroyed or damaged by the

placement of rock and sheet piling. However, at repair site #9 (see Figure 2), concerns have been raised that the placement of sheet piling may alter currents in Mad River Slough that will result in damage to eelgrass by scouring out of the mud banks the eelgrass grows on. This is uncertain at present, but the possibility has triggered the implementation of this mitigation and monitoring plan.

3.0 PRE- AND POST-CONSTRUCTION SURVEY DETAILS

The eelgrass survey methods will follow procedures that have been developed for the evaluation of eelgrass coverage and density (NMFS 1991) modified to meet the conditions of the project site and the monitoring needs for this project. Surveys will include pre-construction surveys of areas potentially affected by scour resulting from the placement of sheet piling, and post-construction surveys yearly following construction, for a period of five years. Control transects nearby to the project area will also be surveyed. Surveys will delineate eelgrass beds and measure density along project site transects and along control transects.

The potential impact area is along both sides of Mad River Slough in the vicinity of repair site #9 (see Figure 2). It has been identified by the applicant's engineer as the area which could possibly be affected by scour resulting from the placement of sheet piling, and it has been approved by representatives of the resource agencies (including USACE, NMFS, CDFG).

The control site (see Figure 2) has been selected based on its proximity to the potential impact area and for its similarity with regard to characteristics such as depth, sediment type, distance from ocean connection, water quality, and currents.

3.1 Pre-Construction Survey

The pre-construction survey will be made prior to beginning any levee repairs at site #9. In this area, the active growing season is estimated to be from May through August, although it may extend beyond this range. In southern California, March through October is considered the typical active growing season (NMFS 1991). For this project, the pre-construction surveys are planned for sometime during May or early June. Favorable low tides occur during daylight hours between May 16 and May 22, 2007.

Potential Impact Area Survey

The potential impact area is an area approximately $\pm 1,180$ meters ($\pm 3,900$ feet) in length, that includes (1) ± 625 meters ($\pm 2,050$ feet) along the east bank of the slough south of the southernmost Humboldt Bay Municipal Water District (HBMWD) pipeline, and (2) ± 565 meters ($\pm 1,850$ feet) along the west bank of the slough which is on an island (see Figure 2).

Distribution – Eelgrass distribution in the potential impact area will be measured by investigators wearing mud boots or in small boats. Investigators will measure the width

of the eelgrass mats perpendicular to the slough every 10 meters. A polygon or series of polygons representing the distribution of eelgrass will be mapped and the area of eelgrass mats will be calculated.

Density – Eelgrass density will be measured by establishing 12 transects oriented perpendicular to the banks of Mad River Slough. A stratified random sampling design will be used to place the transects. Within the $\pm 1,200$ meter long area, the transects will be stratified such that one transect occurs in each 100 meter segment of the 1200 meter potential impact area. The position of the transects within each 100-meter wide section (1-100 meter, 100-200 meter, 200-300 meter, etc.) will be determined with a random number generator. The selected transects will be located at measured distances from a physical benchmark on shore. At each of the 12 transects, three 0.25m^2 quadrats will be positioned (for a total of 36 0.25m^2 quadrats). One quadrat will be placed at the upper boundary of the eelgrass bed, one at the lower boundary of the bed, and one in the middle of the eelgrass bed. All turions within each quadrat will be counted and recorded. A turion is a structural unit of an eelgrass plant that consists of the above-surface, green eelgrass shoot and attached eelgrass blades. If there is no eelgrass bed where a transect has been established by the stratified random sampling method, then a new transect location will be randomly selected within that 100 meter section.

Control Site Survey

A suitable control site will be selected, with the input of Vicki Frey (CDFG) and Diane Ashton (NMFS). It will be in Mad River Slough, nearby to the potential impact area. It will have the same dimensions as the potential impact area, and it will be outside of the area which could be subject to scour associated with the proposed sheet piling. The control site will exhibit similar slope and elevation as the potential impact area.

Monitoring of the control site is intended to identify potential environmental perturbations not associated with the sheet piling that may influence the eelgrass in Mad River Slough. One suitable option for the control site is to the west of the potential impact area, on both banks of the other side of the island in Mad River Slough (see Figure 2).

The control site will be sampled using the same methodology as the potential impact site, and within as close a time period as possible. As in the potential impact area, a total of 36 0.25m^2 quadrats will be sampled in the control site.

3.2 Annual Post-Construction Surveys

During the Active growth period of May through August each year following installation of the sheet piling, the field surveys of both the potential impact area and the control site will be repeated. The post-construction surveys will be done as close as possible to the date of the original pre-project surveys. The methods used for the pre-construction survey will be repeated to monitor the potential impact area for any indirect impacts to eelgrass that may result from the installation of sheet piling, and to monitor the control site for any changes in eelgrass distribution and density that are unrelated to project effects. Post-

construction surveys will be done for a period of five years following installation of the sheet piling at repair site #9.

4.0 DATA ANALYSIS

Eelgrass in the potential impact and control areas will be evaluated using a two stage sampling design. (1) Eelgrass coverage/distribution will be quantified through the mapping of polygons as described in section 3.1 above. (2) Eelgrass density within delineated eelgrass beds will be determined by counting eelgrass in sample plots using a stratified random sampling approach discussed in Section 3.1.

Eelgrass Coverage

Eelgrass will be mapped using survey data to reveal large-scale changes in eelgrass distribution, should any occur over the life of the project. Mapped eelgrass coverage will be measured within the potential impact area and the control area. Post-project eelgrass coverage will be compared to the coverage mapped in the same areas during the pre-project surveys.

Based on existing knowledge of eelgrass in Humboldt Bay, it appears that there is large seasonal and year-to-year variation in eelgrass distribution and density. This is likely to influence eelgrass coverage observations in pre- and post-construction surveys. Therefore, changes in eelgrass coverage between pre- and post-construction surveys will be adjusted to account for seasonal or inter-annual variation in eelgrass coverage that is unrelated to project effects by a correction factor based on the proportional difference in coverage found in the control area. A decrease in eelgrass coverage in the potential impact area relative to the control site will be considered evidence of impact.

Eelgrass Density

Eelgrass density will be evaluated by a two factor (time and location) analysis of variance (ANOVA). A significant time by location interaction will be considered evidence of impact. Prior to the pre-project distribution and density surveys, a preliminary data collection will be done. The results of this sample will be used to conduct a statistical power analysis to determine the necessary replication for pre-construction and post-construction sampling. The sampling will be conducted with sufficient replication to detect a biologically significant difference with $\alpha=\beta=0.10$.

5.0 MITIGATION AND MONITORING PROGRAM

5.1 Selection of a Suitable Mitigation Area and Donor Site

It is unknown whether the proposed sheet piling at repair site #9 of the levee repair project will impact eelgrass habitat along Mad River Slough. If, upon completion of the five year monitoring period, analysis of the monitoring data demonstrates to the satisfaction of the resource agencies that there has been no net loss of eelgrass habitat

within the potential impact area relative to the control site, then no further monitoring shall be required. However, if any significant reduction in eelgrass distribution or density is observed, the loss will be mitigated by conducting an eelgrass transplant program, according to the guidelines of the Southern California Eelgrass Mitigation Policy (NMFS 1991). Mitigation, if necessary, will occur nearby the project site in Mad River Slough, at a ratio of 2.5 to 1. The 2.5 to 1 mitigation ratio was chosen by DFG and NMFS to account for temporal loss of eelgrass habitat during the mitigation and monitoring period. Material for planting will be collected from a donor site.

The mitigation program for impacts to eelgrass which may occur would involve several tasks, including (1) the selection of a suitable transplant (receiver) mitigation area and donor site, (2) transplanting eelgrass to the mitigation area at a 2.5 to 1 replacement ratio, (3) conducting mitigation monitoring surveys to evaluate the level of transplant success, and (4) if necessary, the initiation of remediation measures by conducting additional transplanting if the initial mitigation plan does not meet success criteria.

Selection of a Suitable Mitigation Planting Area

A suitable mitigation planting area will be selected in coordination with NMFS and DFG. The site will be in an area of Mad River Slough which is similar to that where the potential impact would occur. Factors such as distance from project, depth, sediment type, distance from ocean connection, water quality, and currents are among those that will be considered in evaluating potential sites. A suitable donor site would be one that currently supports eelgrass beds but provides sufficient area (i.e. unvegetated mudflat) for the expansion of the existing habitat to meet mitigation objectives (i.e. 2.5 to 1 mitigation ratio).

Selection of a Suitable Donor Site

A suitable donor site will be identified in coordination with NMFS and DFG. The site will be one that has sufficient source material for the mitigation project without compromising the integrity of the existing eelgrass beds at the donor site. No more than 10% of an existing eelgrass bed will be harvested for transplanting purposes. Plants harvested will be taken in a manner to thin an existing bed without leaving any noticeable bare areas.

5.2 Eelgrass Transplant Procedure

Eelgrass transplanting would be scheduled to take advantage of low tide. To perform the project, the following equipment is recommended:

- Full length waders or wet suit
- Wading boots
- Mud shoes (similar to snow shoes – these are optional)
- Nylon or neoprene gloves
- Inflatable raft or similar small boat

- 5 gallon buckets or large storage tubs (10 gallon)
- 6-inch landscape staples
- cardboard or plastic-coated wire-ties (available in rolls)

The procedure for transplanting is as follows:

1) Collect eel grass at the donor site: The donor plants will be carefully extracted from the Bay mud by hand – no implements shall be used. Collectors shall use their gloved hands to carefully pry the roots of each eel grass plant from the mud, making sure that each plant has a minimum of 8 inches of intact, unbroken roots with at least 2 root nodes. The plants shall be placed in buckets or tubs filled with cool water and shall be kept hydrated at all times. Care shall be taken to lay the donor plants in the bucket so they do not get tangled. Buckets or tubs shall be kept cool (keep in the shade or frequently replace the water to prevent them from getting warmed by the sun – even in overcast conditions). Only as many plants as can be planted on the same day shall be collected at one time. The inflatable raft or a dingy or skiff with shallow draft can be used to hold the buckets/tubs for ease of moving them around. The Bay mud is very sticky and difficult to walk in – mudshoes (similar to snowshoes – for use in soft mud) may be useful.

2) Planting preparation: Once the donor plants have been collected, planting units will be made. Each planting unit shall consist of 3 turions bundled together, secured with a twist tie, and attached to a 6-inch landscaping staple with a piece of tie wire, taking care not to tighten the tie wire too much or breaking the stems of the turions. The staple should be fastened to the turions at the root collar – where the roots transition into the above ground stem. Two people should work together – one removing the donor plants from the mud while the other person bundles them into planting units, attaches them to a landscape staple with tie wire, and carefully stores the planting units in the tub of water. Care must be taken to assure roots and stems do not get tangled as plants are delicate and break easily.

3) Installation: Collecting and preparing the plants for planting will take longer than planting. At approximately the midpoint of the working day, the crew should begin installing the plants prepared up to that time, so that all the plants prepared will be installed by the end of the work day. At the planting site, it is important to work strategically as the site will be very mucky and once an area has been planted, it is best to avoid traversing that area. As the tide will be incoming when the plants are installed, planting should begin at the lowest elevation and proceed toward the higher elevation. Workers should be evenly distributed on the same contour across the width of the planting area, each with his/her own bucket or tub of plants ready to install. The optimal technique is for each planter to define his/her “lane” and work back and forth, installing plants one foot apart. If one planter is faster, his/her lane can be widened and the slower planter’s lane can be reduced so that everyone proceeds towards the higher elevation at approximately the same rate, i.e., staying on the same contour as much as possible. Because of the muddy conditions, this will make it easier to keep track of where the plants have and have not been installed. This is very important to obtain thorough and even distribution and to avoid damaging already installed plants.

4) Production Estimates: A reasonable production rate is approximately 100 plants per person per 8-hour day, collected, prepared, and planted (Mad River Biologists 2005).

5.3 Mitigation Monitoring Surveys

In the event that a mitigation planting program is initiated, the sampling and monitoring procedure previously discussed shall be implemented to document the success of the mitigation program. All monitoring work shall be conducted during the active eelgrass growth period (May through August). A schedule will be developed that will detail when each of the required monitoring events will be completed. Monitoring methods for evaluating the success of the replanting will be similar to the methods used for the pre- and post-construction surveys and shall include on-the-ground sampling of eelgrass to determine coverage and density. Monitoring data will be analyzed as described in the Data Analysis section (Section 4.0).

Monitoring shall also include observations of any non-native plant species that may attempt to colonize the mitigation or control sites. Non-native plant species found growing within the mitigation or control sites shall be removed with the least amount of disturbance possible to native eelgrass during annual monitoring visits. Any occurrence of non-native eelgrass *Zostera japonica* found in the project area will immediately be reported to CDFG and eradicated.

5.4 Success Criteria

The criteria for determining success of the mitigation plan shall be based upon monitoring the percent vegetative cover (area) and percent density (turions per square meter) of the transplanted area. Vegetative cover shall be defined as that area where eelgrass is present and where gaps in coverage are less than one meter between individual turion clusters, and density shall be defined by the number of turions per square meter present in representative samples within the impact, control, and transplant beds, as specified in the Southern California Eelgrass Policy (NMFS 1991).

Specific criteria are as follows:

- The mitigation site shall achieve a minimum of 70% area of eelgrass and 30% density as compared to the target values immediately following the completion of eelgrass transplant after the first monitoring year;
- The mitigation site shall achieve a minimum of 85% area of eelgrass and 70% density as compared to the target values after the second year;
- The mitigation site shall achieve a sustained 100% area of eelgrass and at least 85% density as compared to the target values for the third, fourth and fifth monitoring years.

5.5 Remediation Measures

If specific success criteria listed in section 5.4 are not met within the timeframes indicated, then the project applicant and/or biological consultants in the employ of the project applicant shall consult with local representatives of the NMFS and CDFG to evaluate the data and examine the mitigation area to determine if modifications can be made or additional transplanting conducted to increase the probability of achieving success. Remediation measures shall be conducted by the applicant within 120 days following the monitoring event that identifies a deficiency in meeting success criteria. As such, monitoring should be timed such that both monitoring and remediation actions can occur within the eelgrass active growth period for Humboldt Bay.

If it is determined through agency consultation that habitat modifications or additional transplanting within the original mitigation site will not likely result in the attainment of mitigation goals, or if success criteria are not met by the end of the five year monitoring period, a supplemental transplant area (STA) will be established at a location to be determined in consultation with the resource agencies, and additional transplanting will be conducted. The amount of eelgrass to be transplanted in the STA shall be based upon a formula that takes into account area and/or density deficiencies and associated conditions as outlined in the Southern California Eelgrass Mitigation Policy (NMFS 1991). Annual monitoring shall be conducted at the STA for five years following implementation of a transplanting program, and shall be subject to the same monitoring schedule and performance standards as the original mitigation area. The applicant shall submit amendments to the various permits if necessary to ensure all performance criteria are satisfied consistent with all terms and conditions of the approved permits.

6.0 REPORTING

Monitoring reports will be provided to the NMFS and CDFG, and any other agencies who have asserted jurisdiction over eelgrass habitat, within 30 days of completion of each required monitoring survey. Each report shall include a map of eelgrass distribution and transect and quadrat locations for the impact, control and mitigation areas. Each report shall also include tabulations of turion density overall and for each quadrat and transect. Observations regarding the encroachment of non-native plants and significant changes in site topography will be included, as well as recommendations for remedial measures if the transplant is not meeting success criteria as scheduled.

7.0 APPLICANT RESPONSIBILITY

The permit applicant shall be fully responsible for any failure to meet the success criteria of the eelgrass mitigation and monitoring program. Levee repair activities shall be conducted in accordance with the approved eelgrass mitigation and monitoring program. Any proposed changes to the approved final plan shall be reported to the permitting agencies (US Army Corps of Engineers/Coastal Commission). No changes to the approved final plan shall occur without an approved amendment to the Coastal

Development Permit and Corps permit issued for the proposed project unless the permitting agencies determine that no amendment is legally required.

Each phase of the mitigation procedure will be administered by the Reclamation District 768 and a contractor employed by the Reclamation District to perform the mitigation in conjunction with representatives of the CDFG and NMFS. The contractor shall have experience with the transplanting of eelgrass and will perform the harvesting and transplanting procedures. Monitoring reports shall be prepared by the Reclamation District or a qualified biologist familiar with the proposed transplantation techniques acting in the capacity of a consultant.

8.0 REFERENCES

Mad River Biologists and Redwood Community Action Agency. August 12, 2005. Eelgrass (*Zostera marina*) Mitigation and Monitoring Plan for Fisherman's Terminal Dock Construction Project and Humboldt Bay Maintenance Dredging Project.

National Marine Fisheries Service. Adopted July 31, 1991. *Southern California Eelgrass Mitigation Policy*.

Unknown Author. October, 2006. Ten Mile River Bridge Replacement Project Eelgrass Mitigation and Monitoring Plan.



EELGRASS IMPACT AND CONTROL AREA MAP

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CALIFORNIA
COASTAL COMMISSION

1 Scour Analysis

1.1 Problem Statement

The levee protecting the lands of the members of Reclamation District 768 have been developing scour problems over their years of service. Certain places along the levee have been the hardest hit, especially the site which runs east and west along Repair Site #9 (Appendix, sheets 1 & 2).

To quantify the maximum current velocity in Mad River Slough and compare to a horizontal scour benchmark. It was initially assumed that the velocity value at the railroad trestle bridge over Mad River Slough is the worst case scenario, thus if the scour velocity was not achieved at the bridge, then it won't be achieved at levee repair site 9. Actual current velocities were measured in the slough and then compared to the calculated velocities.

1.2 Assumptions

1. The Mad River Slough railroad trestle bridge presents the worst case scenario for scour velocity.
2. The soil is the same throughout the channel, and is reported as soft to medium stiff clay, which is the same material that the levee is constructed from. The soft clay is assumed to be wholly unconsolidated while the medium stiff clay is assumed to be between wholly consolidated and wholly unconsolidated.
3. The channel cross-section can be represented as triangular
4. Solely tidally influenced channel. Extreme flood flows, wave analysis, and wind-wave interactions were not looked at in this particular analysis.

EXHIBIT NO. 8

APPLICATION NO.

1-03-004-A3

RECLAMATION DISTRICT 768

SCOUR ANALYSIS EXCERPT
(1 of 14)

5. Clay diameters are assumed to be uniformly distributed between 0.001-0.002 mm (Appendix, sheets 3 & 4) , thus the expected value is 0.0015 mm, the average between the two extremes (Appendix, sheets 5 & 6)

1.3 Site Observations

The channel was observed from the North side of the railroad trestle. Observations done from East abutment to West abutment, and was split into seven sections:

- Section 1: 11 feet from East abutment to levee toe
- Section 2: 18 feet of rock layer from levee toe to transition layer
- Section 3: 15 feet of rock and mud transition layer from rock layer to mud flat
- Section 4: 122 feet of mud flat from transition layer to eelgrass strip
- Section 5: 250 feet of deep channel between eelgrass strips
- Section 6: 18 feet of mud flat from eelgrass strip to rock layer
- Section 7: 20 feet of rock and rip-rap layer from mud flat to West abutment
- Total: 454 feet from East abutment to West abutment

Depths were taken once every 7.5 feet along the railroad trestle during a low tide event on June 7, 2007. Attached is a spreadsheet which contains the observed depths adjusted to depth below MLLW, and adjusted to tidal height by the time of the day (Appendix, sheet 7).

1.4 Hydraulic Radius

The hydraulic radius was found by measuring the cross-section of the channel at the bridge and then adjusting the cross-section to be triangular (Appendix, sheet 8). The hydraulic radius is the ratio of the cross-sectional area to the wetted perimeter.

$$A_1 = 0.5(139\text{ft})(33.5\text{ft}) = 2,328 \text{ ft}^2$$

$$P_1 = [(139\text{ft})^2 + (33.5)^2]^{1/2} = 143 \text{ ft}$$

Where $n=0.04$ (Appendix, sheet 11)

$R=16.5$ ft

$S=0.024$ ft/min

$V=37.4$ ft/min

$V=0.62$ ft/s

$V=19.0$ cm/s

The velocity throughout the slough channel during the assumed worst case scenario is 0.62 ft/s.

1.6 Measured velocities

Because the calculated velocities were too low to cause the scour necessary to change the meandering pattern of the slough, the velocity was measured at the repair site itself. Current velocities were measured at the proposed sheet pile site by timing how fast it took floating material to flow between two markers placed at a specific interval. The measurements were done at ebb tide, as the slough flowed down from the north and followed along the repair site, with the repair site being along the outside curve (the faster portion of the flow). The floating materials (plant matter) were measured at three different 25 foot intervals, and were measured three times at each interval. Velocity measurements which showed a major discrepancy with the averages were ignored. Velocities were measured for two different ebb tide events along the Mad River Slough (Appendix, sheet 12).

Table 2: Tide events 7/18/2007

<i>Tide Event</i>	<i>Time</i>	<i>Elevation (NAVD88)</i>
High	3:13 am	7.0 ft
Low	9:48 am	0.4 ft
Total	395 min	6.6 ft

Slope: 6.6 ft/395 min=0.017 ft/min

Table 3: Tide events 7/27/2007

<i>Tide Event</i>	<i>Time</i>	<i>Elevation (NAVD88)</i>
High	12:48 pm	4.9 ft
Low	5:00 pm	3.6 ft
Total	252 min	1.3 ft

Slope: 1.3 ft/252 min=0.005 ft/min

Table 4: Measured velocities in Mad River Slough

VELOCITIES				
		<i>Average</i>	<i>Adjusted average</i>	<i>Total average velocity (adjusted)</i>
7/18/2007	<i>Section 1A</i>	0.775675	0.775675	1.176312
	<i>Section 1B</i>	0.570985	1.582192	
	<i>Section 1 average</i>	0.67333	1.178933	
	<i>Section 2</i>	0.789889	1.249167	
	<i>Section 3</i>	1.100837	1.100837	
7/27/2007	<i>Section 1</i>	0.327375	0.327375	0.392942
	<i>Section 2</i>	0.438161	0.438161	
	<i>Section 3</i>	0.315864	0.413291	

1.7 Slope

The corresponding slough current velocities are assumed to be linearly dependent on the tidal slope change in the slough. The graph of the tidal slope vs. slough velocity is assumed to be a linear function that goes through the point (0,0) (Appendix, sheet 13). The linear function which describes the two points is good fit with an R^2 value of 0.9979. The formula for tidal slope vs. slough velocity is calculated to be:

$$V=0.7089S$$

Where S=slope as a percentage

Using the slope calculated for the worst case scenario:

$$V=0.7089(2.4\%)$$

$$V=1.7 \text{ ft/s}$$

$$V=51.9 \text{ cm/s}$$

The measured velocities in the slough are almost three times higher than the calculated velocities using Manning's Equation. This discrepancy can be attributed to the assumptions, which assumed no wave energy or wind-wave interactions, thus attributed to the higher slough velocities. There was no recorded wind speed at the times of the measured velocity analysis, thus wave energy was most likely responsible for the dramatic increase in the slough velocity.

1.8 Scour Threshold

The Hjulstrom Curve is a graph used to determine whether sediment in a stream system will erode, remain in suspension, or will settle out (Appendix, sheets 14-16). The graph

uses grain size (mm) and stream velocity (cm/s) to determine threshold erosion velocities. As shown on attached sheet, clay particles have a higher threshold than sand particles, depending on the degree of consolidation. This reluctance to erosion can be explained by the cohesive nature of clay particles.

Assuming a soil particle diameter of 0.0015 mm the scour threshold falls between 200 cm/s for wholly consolidated material and 5 cm/s for wholly unconsolidated material. The medium stiff clay scour threshold is assumed to be on the graph, equally placed between the consolidated and unconsolidated thresholds. Since the axes on the graph are shown on a log-log plot, the average threshold value is:

$$V_{avg} = (1/2)[\log(200 \text{ cm/s}) + \log(5 \text{ cm/s})]$$
$$V_{avg} = 32 \text{ cm/s}$$

Grain Size (Appendix, sheet 4): 0.0015 mm

Assumed Stream Velocity (Slope=0.024 ft/min): 19.0 cm/s

Measured Stream Velocity (Slope=0.024 ft/min): 51.9 cm/s

From Hjulstrom Curve (Appendix, sheet 16) the assumed velocity in the slough is moving fast enough to scour soft clay but not medium stiff clay. The measured stream velocity is large enough to scour the entire range of levee material, if the worst case monthly tide scenario is assumed.

1.9 Conclusion

If the measured velocity curve is assumed to be accurate for negligible wind events then the levee material will scour under the extreme tidal change event. The energy provided by the waves is not negligible as the calculated slough velocity was found to be less than half the value of the measured values.

2 Wind-Wave Analysis

2.1 Problem Statement

To determine what physical process is causing the slope of the levee at site 9, in the location of proposed sheet piling, to erode. This analysis will look at the wave energy in Mad River Slough, caused by wind-wave interaction, shore bottom refraction, and tidal elevation.

2.2 Area Overview

Repair site 9 contains about 300 feet of levee that is eroded away so badly that a cliff face edge remains on the slough side of the levee (Appendix, sheet 1). The potential sheet piling site is located on a sharp bend in the slough, especially from the North (Appendix, sheet 2). The fetch is taken at high tide (mud flat inundation) from due north all the way to the bend in the slough upstream. This fetch distance was measured as 2,400 ft.

2.3 Assumptions

1. Analysis done for a high tide event, assuming tidal elevation of 9 feet, all tidal elevations use NAVD88 for the datum
2. Analysis done as high tide ebbing, not flooding. This assumes that the tidal flow and fetch are moving in the same direction and are thus constructive in wave set-up
3. Diffraction energy around island considered negligible
4. Wave refraction is the main energy force driving the erosion process
5. Assume entire levee and slope to thalweg is soft to medium stiff clay (Appendix, sheet 3).

2.4 Bathymetry

Bathymetry measurements were calculated using the transects of the sections containing potential sheet piling area (Sections 1.1-6) (Appendix, sheet 17). Measurements were taken from the thalweg to the top of the levee, facing slough ward.

- Section 1.1: Thalweg elevation: -14 ft
Top elevation: 12 ft
Lateral distance: 95 ft
Slope: 0.27
- Section 2: Thalweg elevation: -16 ft
Top elevation: 9.5 ft
Lateral distance: 87 ft
Slope: 0.29
- Section 3: Thalweg elevation: -17 ft
Top elevation: 9.5 ft
Lateral distance: 83 ft
Slope: 0.32
- Section 4: Thalweg elevation: -17 ft
Top elevation: 9.5 ft
Lateral distance: 85 ft
Slope: 0.31
- Section 5: Thalweg elevation: -18 ft
Top elevation: 10 ft
Lateral distance: 82 ft
Slope: 0.34

- Section 6: Thalweg elevation: -16 ft
Top elevation: 10 ft
Lateral distance: 87 ft
Slope: 0.30
- Average Slope: $(\sum \text{slopes} / \# \text{ of sections}) = 0.30$

2.5 *Wave Forecasting*

In order to find the characteristics of the wave heights near the levee, the deep water waves in the channel have to be accounted for. Deep water waves are assumed to run along the slough thalweg, and the depth is assumed to be 25 (9 foot high tide and -16 foot elevation for thalweg).

Wind stress: $U_A = 0.589U^{1.23}$ where U is the measured wind speed (Appendix, sheet 18).

If wind speed is calculated to be the annual peak wind event from the north, then $U = 72$ mph (Appendix, sheet 19)

$$U_A = 0.589(72 \text{ mph})^{1.23}$$

$$U_A = 113 \text{ mph}$$

The wave heights and periods can be calculated from the USACE charts (Appendix, sheets 23-25). The deepwater wave characteristics can be determined from the chart which shows values for H and T at a depth of 25 feet.

From sheet: $H_0 = 2.1$ feet

$T_0 = 2.0$ seconds

The deepwater wavelength and celerity (speed of wave at the surface) can be solved for using the time period values located above (Appendix, sheet 20 & 21):

$$C_0 = 5.12T_0 = 10.24 \text{ ft/s}$$

$$L_0 = 5.12T_0^2 = 20.48 \text{ ft}$$

The wave characteristics for the changing depths as the wave approaches shore is to be determined to find the beginning of the breaker zone. The breaker zone determines when the waves will start to break when $H > 0.78d$ (Appendix, sheet 22) (Note that $H = 0.78d$ is equal to $d = 1.28H$).

When $d = 25$ feet: $H = 2.1$ feet (Appendix, sheet 23)

$2.1 \text{ feet} < 0.78(25 \text{ feet})$ thus waves don't break

When $d = 20$ feet: $H = 2.2$ feet (Appendix, sheet 24)

$2.2 \text{ feet} < 0.78(20 \text{ feet})$ thus waves don't break

When $d = 15$ feet: $H = 2.0$ feet (Appendix, sheet 24)

$2.0 \text{ feet} < 0.78(15 \text{ feet})$ thus waves don't break

When $d = 10$ feet: $H = 2.0$ feet (Appendix, sheet 25)

$2.0 \text{ feet} < 0.78(10 \text{ feet})$ thus waves don't break

When $d = 5$ feet: $H = 1.8$ feet (Appendix, sheet 25)

$1.8 \text{ feet} < 0.78(5 \text{ feet})$ thus waves don't break

Since there were no charts to show wave heights and periods based on the water depth, extrapolating the data points below a depth of 5 feet was assumed to fit a parabolic function (Appendix, sheet 26):

When $d = 4$ feet: $H = -0.0023d^2 + 0.0846d + 1.42$

$H = 1.72 \text{ ft} < 0.78(4 \text{ ft})$ thus waves don't break

When $d = 3$ feet: $H = -0.0023d^2 + 0.0846d + 1.42$

$H = 1.65 \text{ ft} < 0.78(3 \text{ ft})$ thus waves don't break

$$\text{When } d=2 \text{ feet: } H = -0.0023d^2 + 0.0846d + 1.42$$

$$H = 1.58 \text{ ft} > 0.78(2 \text{ ft}) \text{ thus waves break}$$

Since the wave becomes unstable when $H=1.56$ feet at a depth of 2 feet, the breaker height is determined to be 1.56 feet.

2.6 Velocity Profile

The angle, α_b , between the breakers and the shoreline was found to be 15° from orthogonal. Since the waves approach the shore obliquely (Appendix, sheet 27) a longshore current will arise parallel to the levee shore (Appendix, sheet 28).

Since the breaker zone is at such a shallow depth, and in an area with a high slope, the speed at the breaker zone is assumed to be the speed at the shore.

$$V_b = M_1 m (g H_b)^{1/2} \sin(2 \alpha_b)$$

Where m =beach slope (0.3)

G =gravity constant (32.2 ft/s^2)

H_b =breaker height (1.56 ft)

α_b =angle between breaker crest and shoreline (15°) (Appendix, sheet 27)

M_1 =physical coefficient (9.0)

$$V_b = (9.0)(0.3) [(32.2 \text{ ft/s}^2) (1.56 \text{ ft})]^{1/2} \sin(2 * 15^\circ)$$

$$V_b = 9.57 \text{ ft/s}$$

$$V_b = 292 \text{ cm/s}$$

The wave energy in the slough at repair site 9 is greater than the scour threshold (Appendix, sheet 16) for the worst case wind scenario, thus the whole range of levee material will be scoured during the worst case wind event.

2.7 Wave Forecasting for Lower Wind Speed

The lowest charted wind shear is $U_A=10$ mph, which is reasonably close to the 7 mph annual average wind speed, from the north. As in section 2.5 the breaker height will be determined using the USACE charts:

When $d=25$ feet: $H=0.3$ feet (Appendix, sheet 23)

$0.3 \text{ feet} < 0.78(25 \text{ feet})$ thus waves don't break

When $d=20$ feet: $H=0.3$ feet (Appendix, sheet 24)

$0.3 \text{ feet} < 0.78(20 \text{ feet})$ thus waves don't break

When $d=15$ feet: $H=0.3$ feet (Appendix, sheet 24)

$0.3 \text{ feet} < 0.78(15 \text{ feet})$ thus waves don't break

When $d=10$ feet: $H=0.3$ feet (Appendix, sheet 25)

$0.3 \text{ feet} < 0.78(10 \text{ feet})$ thus waves don't break

When $d=5$ feet: $H=0.3$ feet (Appendix, sheet 25)

$0.3 \text{ feet} < 0.78(5 \text{ feet})$ thus waves don't break

The waves for $U_A=10$ mph don't break before reaching a depth of 5 feet thus an assumption will have to be made about the wave characteristics in the shallower water. At each depth between 25 feet and 5 feet the breaker height is constant at 0.3 ft, thus for depths shallower than 5 ft, the wave height can be assumed to be 0.3 ft.

2.8 Velocity Profile for Lower Wind Speed

Using the same breaker velocity profile equation with the same assumptions the equation remains as:

$$V_b = M_1 m (g H_b)^{1/2} \sin(2 \alpha_b)$$

Where m = beach slope (0.3)

G = gravity constant (32.2 ft/s²)

H_b = breaker height (0.3 ft)

α_b = angle between breaker crest and shoreline (15°) (Appendix, sheet 27)

M_1 = physical coefficient (9.0)

$$V_b = 4.20 \text{ ft/s}$$

$$V_b = 128 \text{ cm/s}$$

The wave velocity in the slough is more than twice the velocity value for the worst case tidal change, assuming no wind-wave interaction.

2.9 Scour Threshold

The scour threshold is determined from the Hjulstrom diagram (Appendix, sheet 16) for medium stiff and soft clay (Appendix, sheet 3) at a depth of one meter (3.3 ft). The wave velocity in the slough is much higher than the velocity needed to induce scour, thus at a sustained north wind of 10 mph, the full range of levee material is subject to scour.

2.10 Conclusion

Wind-wave energy can also contribute to the levee scour that was shown to occur during extreme tide changes. When the fetch and tide are moving in the same direction, the resulting waves move much faster than when just tide change is involved, thus inducing more scour. However, there are instances where the wind is not blowing, or is blowing in the opposite direction of fetch, which would cause destructive waves in terms of set-up. Also many of the extreme tide events are in the early morning hours, when there isn't much wind to speak of, thus only tidal slope changes will cause the velocity profile.

An above average wind speed in the same direction of a tidal event, can greatly increase the velocity in the water. These factors can greatly increase the chances of levee scouring, but only occur at special, specific times.