Enclosure 3

United States Department of the Interior

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Ms. Jane M. Hicks
Chief, Regulatory Division
Department of the Army
San Francisco District, Corps of Engineers
1455 Market Street
San Francisco, California 94103

Subject: Formal Consultation on the Salt River Ecosystem Restoration Project, Humboldt County, California

Dear Ms. Hicks:

This document transmits the Fish and Wildlife Service's (Service) biological opinion (BO) based on our review of the proposed Salt River Ecosystem Restoration Project and effects to the federally-listed as endangered tidewater goby (*Eucyclogobius newberryi*; goby). We received your request for consultation on, July 15, 2011. 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 June 2011 project description from the Humboldt County Resource Conservation District (HCRCD; Applicant); the U.S. Army Corps of Engineers (Corps) consultation request letter to the Service, dated July, 13, 2011; and other sources of information. Documents related to this consultation are on file in this office.

CONSULTATION HISTORY

February 24, 2011 — The Service received the *Draft Biological Assessment for the Salt River Ecosystem Restoration Project Covering the Tidewater Goby* (Draft BA), from the HCRCD, as revised February 24, 2011.

March 24, 2011 — The Service received a March 21, 2011, letter from the Corps requesting initiation of formal section 7 consultation under the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*).

April 22, 2011	The Service requested additional information regarding the Draft Biological Assessment (BA). Project design plans for creating habitat for tidewater gobies and other aquatic species were incomplete, and potential negative impacts to goby could not be adequately analyzed.
July 15, 2011	The Corps provided the Service a BA with an updated project description and a final project design for the Salt River Ecosystem Restoration Project.
July 19, 2011	The Service responded to the Corps with a letter that confirmed that the BA was complete and consultation could proceed.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Salt River Ecosystem Restoration Project (Project) is a watershed-based, ecosystem-scale project with multiple objectives and benefits. The proposed project is intended to address numerous issues that have collectively resulted in a loss of nearly all natural hydraulic function in the Eel River watershed. The hydraulic dysfunction of the Salt River stems from a combination of historical land use practices, naturally highly erodible soils, extremely high average rainfall, and high tectonic activity. The main channel of the Salt River and the lower reaches of its tributaries have become aggraded with sediment and dominated by willows. To restore natural hydraulic function, the Project is composed of four main elements: 1) restoration of the Salt River channel and riparian floodplain, 2) tidal marsh restoration on Riverside Ranch, 3) sediment maintenance in the channel and riparian floodplain, and 4) upslope sediment reduction. The overall goals of these four main elements of the Salt River Ecosystem Restoration Project include the following:

- Restore the Salt River channel and adjacent riparian floodplain by increasing hydraulic conveyance and constructing habitat features that re-establish ecological processes beneficial to fish and other native species;
- Restore historic estuarine habitat and tidal connectivity within the lower Salt River;
- Improve water quality and drainage efficiency across the floodplain;
- Manage excess sediment loads by maximizing fluvial and tidal channel sediment transport capacity and designing sediment management areas;
- Initiate a long-term corridor adaptive management process that maximizes ecological restoration success in a working landscape by:

- reducing headwater erosion and sediment delivery to the Salt River floodplain;
- increasing the volume and efficiency of clear water drainage from the upstream watershed and adjacent agricultural land, and;
- providing and maintaining sediment management areas that minimize impacts to land use and ecological function.

The project will be constructed between October 2011 and December 2012, in two phases: Riverside Ranch Restoration (Phase 1) in 2011/2012 and Salt River Restoration (Phase 2) in 2012. The Project is being developed and implemented through collaboration between private landowners and multiple public agencies including the HCRCD, the County of Humboldt, the City of Ferndale, California Department of Fish and Game (CDFG), State Coastal Conservancy, the Corps, National Marine Fisheries Service (NMFS), U.S. Department of Agriculture-Natural Resources Conservation Service (NRCS), the Service, and other partners.

Major Project Components

Salt River Channel and Riparian Floodplain Corridor Restoration

The Salt River Ecosystem Restoration Project encompasses the lower reaches of the Salt River and parts of the tributaries that flow into the Salt River downstream to Cutoff Slough just upstream from the confluence with the Eel River, Humboldt County, California (Figure 1). The project includes all areas of the Salt River basin where in-stream and riparian construction and maintenance activities will occur, including the portion of the Salt River that located on Riverside Ranch. The project also includes some areas adjacent to the Eel River Estuary Preserve (Connick Ranch.

Restoration of the Salt River channel includes re-establishing a defined channel and riparian floodplain corridor from approximately 2,000 linear feet (ft) (610 meters (m)) upstream of the confluence with Williams Creek, downstream to the confluence of the Salt River with Cutoff Slough, a total channel length of approximately 7.7 miles (mi) (12.4 kilometers (km)). The corridor design is intended to re-establish a functioning channel and floodplain corridor that integrates long-term sediment management and regional drainage needs, while restoring significant aquatic and riparian habitat value and ecologic function to the project area.

The Project also aims to improve connectivity of the Salt River with Francis Creek and the Eastside Drainage Ditch. Francis Creek was previously re-aligned to maximize grazing lands and accommodate the Ferndale wastewater treatment plant (WWTP). Approximately 2,900 ft (884 m) of lower Francis Creek will be relocated to approximate its historical alignment and to eliminate an existing 90-degree turn. Also, the Eastside Drainage Ditch will be reconnected to Francis Creek near the City of Ferndale WWTP by reestablishing a channel through an approximately 500-ft-long (152 m) excavation. Improving the connectivity of these tributaries to

the Salt River is an important component of the restoration project. Excavated channel materials will be reused for various beneficial reuse opportunities, including creation of the new Riverside Ranch berms, and/or applying the material on nearby agricultural lands as an agricultural amendment.

The Salt River Channel and Floodplain Corridor Restoration include the following items to support the overall goals of the Salt River Ecosystem Restoration Project:

- Implement a suite of projects over several years to treat erosion sources and reduce sediment inputs to the tributaries.
- Establish and sustain a dynamic river corridor by optimizing flow and sediment conveyance, integrated with natural floodplain interaction and discrete sediment management areas.
- Integrate sediment capture and removal (sediment management) actions into the Adaptive Management Plan (AMP) in order to help sustain hydraulic conveyance and ecologic function.
- Minimize the cost, frequency, and extent of required sediment management related maintenance activities, which disturb the riparian corridor and disrupt ecosystem function.
- Maximize riparian habitat functions and values, extent and complexity by increasing plant species diversity, corridor shading, large wood recruitment, and minimizing invasive species.
- Optimize floodplain habitat complexity.
- Introduce instream salmonid rearing and refugia habitat where acceptable and sustainable within-corridor design.
- Incorporate opportunities to re-connect the corridor to watershed tributaries to improve fish access to spawning and rearing habitats.
- Improve and maintain adjacent land drainage.
- Integrate a Regional Landowner Drainage Management planning process into the AMP that establishes the framework for the development, coordination and funding to enhance the integration of overland drainage with agricultural land practices adjoining the corridor.

Overview of Construction Specifics for Salt River Restoration (Phase 2 - 2012)

Earthwork within the Salt River Restoration area will consist of excavation from within the Salt River channel upstream of Riverside Ranch. Excavated materials will be placed on nearby agricultural lands for beneficial purposes. Wetlands will be identified on the agricultural reuse lands, an additional buffer zone will be defined around the identified wetlands, and exclusion fences will be erected around those areas.

Prior to the start of excavation and during a low tidal elevation (less than 6 ft, NAVD88), a temporary coffer dam will be placed along the upstream edge of the grade control to prevent tidal inflow from entering the upstream Phase 2 excavation area. The temporary coffer dam will be constructed to an elevation of 8 to 9 ft (NAVD88). The coffer dam will consist of a water bladder, geotextile wrapped fill, sheetpiles, or a combination thereof. At the conclusion of the Phase 2 channel excavation and prior to October 15th, the coffer dam and rocked grade control will be removed and the excavation to connect the channels will occur.

Fill for beneficial reuse on agricultural land will likely be spread (top-dressed) in one thin (approximately 3-4 in thick) uncompacted lift on unprepared surfaces to minimize detrimental effects to existing vegetation and existing overland drainage patterns. Impacts to jurisdictional delineated wetlands will be avoided during the placement of the sediments by means of construction buffers. Depending upon the location of the reuse area, the material will be transported to the agriculture land reuse site in either a scraper, belly- or end-dump truck. Any wetlands on the site will be delineated and avoided during spreading of the fill material.

To improve construction efficiency, the material could be placed directly onto the agricultural lands and then spread with a grader, bulldozer or loader. Thicker application of materials may occur in locations identified as low spots that are not jurisdictional delineated wetlands or in areas intended to be farmed. Once the material has been applied to the pasture, a chain harrow will be run across the field to force the applied material to the top layer of soil and to "scratch" it into the surface. Depending upon soil moisture and climatic conditions, irrigation water may or may not be used after the harrow to further help the material become incorporated and to stimulate pasture growth.

Riverside Ranch Tidal Marsh Restoration

Riverside Ranch tidal marsh restoration will provide extensive habitat improvements and ecological benefits for the Project. Riverside Ranch is an approximately 444-acre (ac) (180 hectares (ha)) property with over 2.5-mi (4 km) of frontage along the lower Salt River. The property was acquired in 2007 by the Western Rivers Conservancy with funding from the Service, Wildlife Conservation Board, and the State Coastal Conservancy. Western Rivers Conservancy is in the process of transferring the property to California Department of Fish and Game (CDFG) for long-term management. Once transferred, it will become the Salt River Unit of the Eel River Wildlife Management Area.

The primary purpose of the Riverside Ranch Restoration is to restore tidal wetlands and expand the tidal prism in the lower Salt River in order to achieve hydraulically sustainable conditions for a restored Salt River channel. By restoring tidal action to the property, an increased volume of water would be exchanged on each tidal cycle via the Salt River, which would increase channel scour and help maintain and equilibrate the width and depth of the tidally influenced channel. Restoration of Riverside Ranch also presents an opportunity to improve habitat for salmon rearing.

The objectives of the Riverside Ranch restoration include the following items to support the overall goals of the Salt River Ecosystem Restoration Project:

- Use the increase in tidal prism to help maintain the constructed Salt River channel geomorphology and conveyance.
- Improve drainage and water quality in the lower Salt River and Eel/Salt River estuary.
- Restore tidal connectivity to historic tidal wetlands to allow for the natural evolution of diverse and self-sustaining salt- and brackish water tidal marshes, intertidal mudflat and shallow water habitats.
- Restore the marsh to include and expand the transition zone between tidal wetland and upland.
- Create a tidal drainage network that will naturally evolve towards increasing complexity. The network will maximize subtidal and intertidal habitats beneficial to target fish and wildlife species. This includes the enhancement of rearing and migration conditions for estuarine-dependent species including coho salmon, Chinook salmon, steelhead trout, coastal cutthroat trout, tidewater goby, and commercially and recreationally valuable species such as redtail perch.
- Retain approximately 70 acres where agricultural management techniques can be used for short-grass Aleutian cackling goose habitat.
- Provide wintering habitat for migratory waterfowl and shorebirds.
- Provide public access to the extent feasible without compromising the physical and biological project objectives.
- Avoid adverse impacts to the existing drainage of adjacent parcels.
- Design site components that can support natural geomorphic response to sea-level rise.

Restoration of Riverside Ranch is intended to strike a balance between creating significant amounts of new tidal marsh habitat, retaining and enhancing some of the important existing upland habitat features, preserving sufficient acreage for creation of short grass habitat, minimizing long-term site maintenance, and incorporating design features that accommodate sea-level rise.

The project would construct setback berms, which will largely be aligned to avoid impacting existing willow habitat, and to retain approximately 70 acres of contiguous agricultural land along the southeast portion of the property to be managed to provide short-grass habitat. Once construction is complete, ecologic and hydrologic functions and values will be improved. These improvements will be accomplished by extensive berm lowering in areas not dominated by willows; as well as two berm breach locations; an improved drainage network in the southern

section of the property; and filling of portions of specific ditches to increase hydrologic connectivity to the Salt River system.

The southern berm breach will be located approximately 1,000 ft farther downstream from the property boundary in an area that will facilitate significant scour of the Salt River. The northern breach will be located near the location of the current concrete spillway and partially utilizing the existing borrow ditch to convey flows into the remnant slough network. Two areas between the new breaches will be graded to elevations at or below mean high water (MHW) to provide additional drainage from the property and to enhance the tidal prism in the upstream portions of the adjacent Salt River.

The fill material from the excavation of the Salt River may be used at the outer edges of the site to expand the wetland to upland transition zones along the toe of the setback berm. These areas may be selectively re-vegetated with high marsh or willow species. Willow and riparian forest tree species (*e.g.*, Sitka spruce, pine, alder, and redwood) will be added to revegetation areas to restore historical Salt River Delta forested habitat on the Riverside Ranch property. Preservation of existing willow habitat on-site will also maintain habitat for nesting birds.

Implementation of this project will quickly provide habitat functions and values associated with restored tidal connectivity to historical wetlands. The project will allow for the natural evolution of self-sustaining tidal marshes, intertidal mudflat and shallow water habitats, promote the development of a complex tidal drainage network, and increase the tidal prism to help maintain the lower Salt River geomorphology.

The Riverside Ranch restoration factors in key design constraints, including the following:

1. Account for projected sea-level rise over the next 50 years in the project design;
2. Protect adjacent agricultural property from inundation following breaching of levees at Riverside Ranch;
3. Maintain adequate drainage from surrounding agricultural properties towards the lower Salt River and Eel River confluence; and
4. Protect existing infrastructure during construction phase.

Overview of Construction Specifics for Riverside Ranch Restoration (Phase 1- 2011/2012)

A new setback berm will be constructed along the eastern boundary of the project to protect adjacent parcels from tidal flooding (Figure 2). The berm will be constructed from materials excavated from the Salt River and would have a very gentle (10:1 or greater) interior slope to reduce wave erosion and create wetland transition habitat. The site was designed to take full advantage of the restored tidal prism and promote salt marsh development, while retaining approximately 70 acres for agricultural land uses. Specific activities for the Riverside Ranch restoration are summarized below.

Salt River Channel Excavation: Approximately 12,875 linear ft of the Salt River channel from upstream of Cutoff Slough to the Reas Creek confluence on Riverside Ranch will be excavated in 2012 to accommodate flows from Riverside Ranch and the upper Salt River channel. Temporary coffer dams will be placed in the Salt River, with specific locations of the upstream-most and downstream-most coffer dams provided in the 100-percent design; the upstream-most coffer dam will likely be near the confluence of Reas Creek, and the downstream-most coffer dam will likely be upstream of Cutoff Slough. There may need to be additional temporary coffer dams placed between the upstream- and downstream-most coffer dams, based on discretion of contractor; field conditions will determine the number and locations of intermediate coffer dams.

The contractor will include dewatering specifications (including measures described below) in their dewatering plan for review and approval by the engineer/construction manager prior to commencement of dewatering and excavation. The expanded channel will more closely represent the historic channel configuration, and will thereby enhance and expand tidal prism exchange at Riverside Ranch. The expanded channel will also enhance tidal exchange within wetlands that will be created on Riverside Ranch, jump-starting the restoration and preventing development of anoxic conditions within newly created salt marsh habitat.

The excavated materials will be used to construct setback berms to protect adjacent properties from flooding following breach of the existing levees at Riverside Ranch and also incorporated to provide elevation gradients for transitional habitat. Temporary erosion control measures will be used at the upstream terminus of the Phase 1 excavation near Reas Creek to minimize erosion and scour of the excavated transition from the existing channel thalweg elevation (approximately 6 ft, North American Vertical Datum 1988 (NAVD88)) to the new thalweg bottom elevation (1 ft, NAVD88). This temporary transition in the channel slope will be designed to remain stable and dissipate energy from freshwater inflow during the winter months between Phase 1 and 2. The temporary erosion control measure will be installed when the Salt River channel is dewatered and is anticipated to be a rock armored grade control, which will prevent localized scour and upstream propagation of a headcut.

Wetland Connections to Salt River: Excavations through the perimeter levees and creation of an internal slough channel network will open Riverside Ranch to tidal inundation from the adjacent Salt River in 2012. In the northern half of Riverside Ranch, the connection will occur near a historic slough location located near the current concrete spillway to capitalize on reconnecting with remnant slough networks; the connection will align the slough channel flow in a downstream direction relative to the Salt River. This approach will expedite the natural development of complex and sustainable channel networks. In the southern half of the site, the connection will be located as far upstream along the Salt River as possible in order to maximize the length of Salt River channel exposed to tidal exchange (Figure 2) and will also be aligned in a downstream direction relative to the Salt River. This work will be complemented by lowering internal pasture grades (as described by the "Marshplain Enhancements," below). Although not a historic connection point, it will maximize the length of Salt River channel exposed to tidal exchange, thereby maximizing the use of tidal exchange energy in expanding and maintaining a larger channel. Further connectivity between the restored wetland and Salt River will occur as a

result of levee removal and marshplain flooding (as described by the "Levee Lowering" section, below).

Marshplain Enhancement: Up to 26 ac of selected elevated areas within Riverside Ranch will be lowered through targeted excavation during Phase 1 construction in 2011/2012 in order to enhance marshplain created as part of the project. Two broad internal areas will be excavated to the MHW tidal datum elevation in order to achieve this enhancement and support the southern internal slough channel connection to the Salt River. Up to 85 ac of pastures in selected areas will receive fill.

Levee Lowering: At least 6,220 linear ft of Riverside Ranch levee adjacent to the Salt River will be lowered to adjacent pasture/marshplain grades (approximately mean higher high water (MHHW)) in 2012 to create high marsh habitat and restore the high-tide hydraulic connection between the river and the restored wetland. However, the majority of flows will be directed to the connector channel locations to maximize the tidal prism and subsequent scour in the Salt River. Some of the existing ranch levees will likely be retained in order to preserve existing willow riparian habitat. However, if required to satisfy the filling of existing wetlands, all existing levees could be removed.

New Internal Marsh Channels: New internal marsh channels will be excavated to connect the restored wetlands with the receiving waters of the Salt River in 2011-2012. Internal wetland improvements will include the excavation of new internal slough channels and deepening of existing drainage ditches and/or remnant sloughs to facilitate channel development. Adequate drainage of the marshplain is important to marsh development. Poor drainage between high tides can prolong inundation of the marshplain, adversely impact water quality, limit sediment supply to the restored site, and inhibit plant colonization. The following internal channels will be created:

- 1st Order: Approximately 8,180 linear ft (+/- 10%) of first order channel will be created. These channels will have a top width ranging 6-12 ft and depths of about 1-3 ft.
- 2nd Order: Approximately 5,220 linear ft (+/- 10%) of second order channel will be created. These channels will have a top width of 10 feet and depths of about 2-4 ft.
- 3rd Order: Approximately 4,630 linear ft (+/- 10%) of third order channel will be created. These channels will have a top width ranging 40-50 ft and depths of about 4.5-6 ft.

Complexity of channel geometry will be increased, through introducing asymmetrical channel geometry, channel widening and channel confluence pools. At least 1,000 linear ft of internal channel will be widened. Changes in channel geometry are intended to alter flow structure (i.e., slow flow velocity) through widening the channel cross-sectional area and/or altering the channel geometry from trapezoidal channel to asymmetrical "point-bar/cut-bank" form. These same processes will be enhanced by incorporating large wood structures to these areas. The intent is to increase hydraulic diversity, channel geometry and habitat complexity.

Construct New Setback and Refurbished Berms: Approximately 11,500 linear ft of new berm will be constructed along the eastern boundary of the project to protect adjacent parcels from tidal flooding in 2012. The berm will be constructed from approximately 180,000 cubic yards (cy) of fine sediments excavated from the Salt River channel, and will have a very gentle (10:1 or greater) interior slope to help reduce wave erosion and create wetland-upland transition habitat. The berm will have a crest height of 14.75 feet NAVD88 and top width of at least 12 feet; the outboard slope would be 4:1. The inboard slope will transition from 10:1 to 4:1 at an elevation of 9 to 14.75 feet NAVD88. The design provides for inclusion of three culverts, future transport of livestock, maintenance access, and potential floodways for Eel River flooding. Approximately 3,500 linear feet of existing berm along the northern boundary of Riverside Ranch will be refurbished to match the dimensions of the new berm described above. Approximately 10,800 linear feet of a drainage ditch will be constructed parallel the outboard side of the berm in order to maintain drainage of adjacent pasture lands.

Ditches: The central portions of many existing channels will be filled with compacted soil, to the adjacent marshplain elevations in 2011/12, to create more complex habitats and keep the preferred slough channel flow alignments. At least 10,000 linear feet of existing remnant ditches will have in-channel grade control berms, as well as large wood structures (logs and stump wads) to enhance habitat diversity. Most ditches will be connected to the internal slough network, but a few will be segregated and function as off-channel ponds. Retaining slack water pockets will enhance marsh complexity and connectivity. The proposed segregated ditch north of the existing concrete spillway will be evaluated to determine if it will be elevated above regular tidal flooding. If so, it will likely be connected to the main northern slough channel to provide drainage.

Water Control Structures: In 2012, the four culverts with tidegates that drain to the Salt River will be retained; plugged and retained; or removed to help facilitate proper drainage and a more natural channel network. These four culverts drain water from Riverside Ranch into the existing seasonally used tidewater goby habitat (Figure 3). The two existing culverts with tidegates closest to the concrete spillway (Figure 3; Sites 2 and 3) will be retained. The ultimate fate of the northern-most culverts at Sites 5 and 6 (Figure 3) will be determined based on the final habitat conversion and mitigation ratios necessary to meet the requirements of the Coastal Commission. Several (number unknown) small internal drainage culverts will also be removed.

In 2012, four new culverts with tide or canal gates will also be added through the new outboard berm to outfalls feeding the internal slough channels (3) and one outfall to an existing northern outboard channel connecting directly from Site 5 or 6 to the Salt River. These culverts will ensure proper drainage of fresh water from pastures on adjacent parcels and drainage ditches along the toe of the new berm into the restored tidal areas of Riverside Ranch. The type and manufacturer of gates will be determined based on input by site managers, resources agencies, and project needs. These new culverts will not be "fish friendly," they will drain fresh water sources one-way (upstream to downstream) and, therefore will not connect to fish-bearing creeks or sloughs, nor promote fish colonization upstream of the tide gates. The area upstream of the

tide gates dries out during summer and is not suitable habitat for fish, thus the installation of this type of gate is designed to purposely restrict fish access to avoid stranding.

Revegetation: The creation of upland transition habitat will take full advantage of the restored tidal prism and promote salt marsh development. Vegetation design components will include the retention of a grassland area with seasonal wetland characteristics in the northeast corner adjacent to a significant thicket of mature willows. Riparian vegetation will be planted to restore historic Salt River Delta forested habitat. Setback berms on Riverside Ranch will be aligned to avoid impacting existing willow habitat to preserve habitat for nesting birds. The marshplain that will extend to a new setback berm in the interior area of Riverside Ranch that is currently dominated by pastures with a salt marsh fringe on the outboard side of the levee. Once a tidal connection is reestablished, the wetland will be dominated by naturally recruiting tidal salt marsh species.

- Invasive Species Control and Removal: Control and removal of the following invasive plant and animal species are addressed in the Adaptive Management Plan (AMP): dense-flowered cordgrass (*Spartina densiflora*), dwarf eelgrass (*Zostera japonica*), and Sacramento pikeminnow (*Ptychocheilus grandis*). A short description for each species is provided below, and more details are provided in the AMP. Dense-flowered cordgrass: A regional control plan for dense-flowered cordgrass is currently being prepared by the California Coastal Conservancy and its partners for Humboldt Bay, the Eel River Delta, and the Mad River Estuary. Dense-flowered cordgrass is difficult to eradicate and current eradication techniques being used with some success in Humboldt County include mowing and hand-digging. Herbicide use for large-scale eradication has not been approved. Methods developed in the regional plan will be used to eradicate dense-flowered cordgrass if this plan is developed prior to the start of construction and restoration activities. If the regional plan is not developed prior to restoration, botanists at the Humboldt Bay National Wildlife Refuge and the Invasive *Spartina* Project in San Francisco Bay will be consulted regarding recent research on cordgrass eradication methods, and these methods will be used during project activities.

  Removal of dense-flowered cordgrass will likely take place during the Salt River excavation, and may also occur at Riverside Ranch at that time. In addition, revegetation after construction activities is expected to limit colonization or expansion of weedy and invasive species. Targeted plantings of some less common high marsh species (*i.e.*, Humboldt Bay owl's clover), as well as willows in seasonal wetland areas, may also accelerate revegetation and increase plant diversity. The project grading plan is also designed to create hydrologic conditions that preclude dense-flowered cordgrass.

- Dwarf eelgrass: If dwarf eelgrass is detected during monitoring, eradication efforts will be coordinated with Susan Schlosser at California Sea Grant in Eureka, California to ensure that the most current eradication methods are being used. Current experimental methods in use by California Sea Grant and CDFG include manual excavation and heat treatments. Manual excavation is performed by digging up individual plants or patches, and heat

treatments consist of experimental burn plots and heated water to control eelgrass (S. Schlosser, California Sea Grant, pers. comm. 2010).

- Sacramento pikeminnow: Monitoring for Sacramento pikeminnow will occur in the restored Salt River channel. In the event that adult piscivorous pikeminnow (adults greater than 10 inches in length with evidence of piscivory, such as stomach contents) become dominant in the project area, to the exclusion of native species, the HCRCD will conduct a 3-year, pilot, pikeminnow control program subsequent to the 5-year monitoring program. The anticipated approach will include annual seining or netting of the main channel with a suitable mesh size in order to trap, document and euthanize pikeminnow. Native species will be documented and returned unharmed to the channel. The program will be conducted in coordination with the CDFG and the Redwood Sciences Laboratory over a 3-year period, culminating in a survey report of the Salt River fish assemblage no later than 12 years after project implementation.

Projected Tidewater Goby Habitat: Riverside Ranch restoration will create features that may enhance or create habitat for tidewater gobies (Figure 2). These features are expected to change over time as the project area adjusts and reaches equilibrium, so the final quantity of created habitat features is unknown, although the project is expected to result in a large increase in quantity and quality of tidewater goby habitat. The following features will be created during project activities:

- Existing topographic depressions or tidal marsh pannes that pond water during low tides will be retained or enhanced. The pannes will generally be 0.25-1 ft deep at low tide, although could be up to 2 ft. Most pannes will pond water once water levels fall below 5 ft. (between mean tide level (MTL) and MHW), although a couple of pannes are proposed for construction at higher elevations (up to 7.5 ft) on marshplain fill areas to allow ponding for longer durations without flushing. Based on existing topographic maps, approximately 7-11 ac of tidal pannes are expected to form, particularly in the northern half of the project site. In addition, ditches will be minimally filled to provide additional complex habitat that may be used by tidewater goby (see "ditches").
- Scour holes will be created and lined with rock at the foot of all four new culverts where drainage will be directed from adjacent pasture lands in culverts through the set-back berm. It is anticipated that scour holes will provide tidewater goby habitat similar in structure to the existing scour holes located at Sites 2, 3, 5 and 6 (Figure 3). One of the new culverts will be near Sites 5 and 6 (and the outfall will drain into an existing channel); the addition of this culvert may alter the function of Sites 5 and 6 such that: 1) they no longer provide seasonal habitat for tidewater gobies; or 2) may augment already existing habitat at these sites. However, the loss of this habitat, if it occurs, is expected to be compensated by addition of goby habitat within the project site.

- Approximately 10 low-energy ponded channel reaches totaling at least 2,500 linear ft of channel will be created by constructing broad, low-relief earthen grade controls across the base of new or existing primary channels (potential locations for berms are indicated in Figure 2). The grade controls will be constructed to maintain at least 1 ft of perennial ponding in channels upstream of the grade control site. Where a channel feeds into a terminal panne, the grade control will also maintain ponding in the panne during ebb tide. This approach will prevent full dewatering of the channel and maintaining habitat, which can be used by tidewater gobies during ebb tides. The targeted elevation of the ponded reach will be as low as MTL in order to introduce ponding to a lower elevation than the marshplain pannes. The intent is to increase habitat diversity by creating ponded areas at different locations and elevations. Ponded tide channels will be created in new channels as well as within retained channels that currently serve as pasture drainage ditches.
- The central portions of at least 10,000 linear ft of existing ditches will be filled with compacted soil to the adjacent marshplain elevations, and grade-control berms will be installed to create habitat diversity. Most of the ditches will be connected to the internal slough network, but a few will be segregated and function as off-channel ponds.
- Large wood structures will be added to in-channel and marshplain areas to introduce cover and hydraulic diversity. The number and type of wood structures added will depend on the availability of local material generated during project clearing and grubbing and availability from off-site sources.
- Riparian vegetation along internal ditches will be left intact during construction to provide some short-term habitat benefits (channel cover and shading), although it is expected that the vegetation will die-off with the introduction of tidal exchange to the marsh.

Riparian Floodplain and Channel Corridor Maintenance

Periodic maintenance of sediment and vegetation will be required to maintain tidal prism and corridor function. The Salt River is located in a seismically active area in close proximity to the Mendocino Triple Junction. The channel is subject to large earthquakes resulting in ground shaking, subsidence, landslides, coastal uplift, and liquefaction, and these factors contribute to the sedimentation. Upslope land uses also contribute to the Salt River's high sediment load.

Adaptive Management Plan (AMP)

In order to ensure lasting hydraulic and ecological function of the restored system, maintenance of project components, for example, the Salt River channel, drainage ditches, and berms, will require activities such as re-excavation of deposited sediments and vegetation maintenance. This will be accomplished through implementation of the AMP. This plan includes long-term monitoring of erosion, sediment control, water quality, habitat development, vegetation

maintenance, and Best Management Practices (BMPs) for management activities. For each of these categories, annual performance criteria have been developed and will be monitored. If criteria are not met, the cause of failure will be analyzed and necessary remedial actions will be identified and implemented. Hydrologic modification by sediment removal may be implemented if it is determined that no other procedure could restore the target habitat and meet monitoring criteria.

Excess sediment supply from the upper watershed could constrain the estuarine restoration component if the project's targeted long-term equilibrium of a fully tidal marsh system is not achieved. For example, if sediment loads in the Salt River exceed the capacity of the newly generated tidal scour such that the new channel geomorphology cannot be maintained, tidal connectivity to the restored Riverside Ranch may be impeded. In order to maintain optimal flows, sediment conveyance, riparian forest and associated aquatic and wetland ecosystems along the Salt River corridor, active and passive sediment management practices will be required throughout the corridor.

Two types of sediment management areas (SMAs) were designed as part of the channel design configuration (Kamman 2010). SMAs are only proposed within the fluvial reach of the Salt River Corridor (Phase 2) and depicted on the Phase 2 May 2011 50% Design Plans. SMAs are intended to be integrated along the mainstem Salt River in coordination with floodplain and riparian vegetation enhancements. SMA's are referred to as Active and Passive, with Active SMAs including areas of annual or periodic sediment removal and Passive SMAs including areas that promote sediment deposition without sediment removal. In the event that channel transport and SMA performance are not capable of eliminating undesirable sediment accumulation in the mainstem Salt River channel, or if sediment accumulation poses an undesirable threat, excavation may be performed on a smaller scale within the river corridor (excavating specific areas of the channel).

Large-scale excavation across the entire width of the channel corridor may be necessary at sediment deposition-prone areas, such as the confluence with Francis Creek, if designed SMAs and adjacent Salt River corridor are overwhelmed with sediment, which overflows into the adjacent river corridor. Routine vegetation maintenance activities and sediment removal within SMAs will occur during late summer or early fall (July-October) when channel flows are lowest to minimize potential erosion and sediment transport and to minimize disturbance to salmonids, tidewater gobies, wildlife, surface waters and water of the United States. Vegetation removal will be conducted after August 15 to avoid potential take of nesting birds.

Upslope Sediment Reduction

Upslope sediment reduction activities will take place as part of an overall watershed restoration effort; however, specific activities have not been identified. Thus, upslope sediment reduction

activities are not part of the current permit action. Techniques that may be employed include upslope channel restoration, riparian planting, bank stabilization, livestock exclusion fencing and off-site watering facilities, and road drainage upgrades. All activities will be accomplished in accordance with best management practices and applicable CDFG guidance manuals. Sediment source and erosion hazard inventories have been completed for Francis Creek and Williams Creek sub-watersheds that identify and prioritize potential stream bank and road-related sediment sources. Treatments have already been implemented, and will continue to be implemented over the foreseeable future in cooperation with private landowners, to reduce fine sediment entering the stream. These and future treatments, along with measures in the AMP and HMMP, such as well as the maintenance of SMAs (described above) will be implemented to ensure that Phase 1 and Phase 2 actions are not compromised.

Overview of Construction Techniques (Phases 1 and 2)

The primary excavation methods available include track-mounted excavators, scrapers, and large clam-shell type equipment. Track-mounted excavators may be used to excavate material perpendicular to the flow direction, if located outside of the channel, or parallel to the flow direction if used within the channel. Scrapers are an efficient method to excavate material above the saturated zone, and for transport and emplacement in specified areas. Clam shell buckets may be utilized and allow removal of material from within either the stream channel or from the bank. Clam shell buckets are generally attached to excavators, cranes or dredges and can be used to excavate both saturated and unconsolidated material. Dredges are not anticipated to be used on this project due to size, weight, and access constraints.

Haul roads are anticipated to be constructed adjacent and perpendicular to excavation areas to provide equipment access and allow transport of excavated material to the placement/ conditioning areas. County roads are anticipated to be used to transport some of the excavated material. Haul trucks that will use the County roads to transport material will likely be 10- and 18-wheel end and belly dump trucks. It will be the responsibility of the contractor to ensure the haul trucks are street legal and that local speed and weight limits are obeyed. The Contractor will also be responsible for developing and submitting for review a Traffic Control Plan prior to construction commencement.

Construction Phasing and Implementation

Phase 1 is proposed for the 2011/2012 construction season and would include excavation of the lower 10,000 ft of the Salt River channel and other improvements on Riverside Ranch. Phase 1 would likely include partial or complete vegetation removal through the channel corridor in preparation for Phase 2. Phase 2 is proposed for the 2012 construction season and will include excavation of the remaining Salt River Channel including Francis Creek and Eastside Drainage and transporting excavated materials to the beneficial reuse locations.

Dewatering and Diversions

During excavation of the Salt River during both Phases 1 and 2, a combination of pumped and/or gravity diversion pipes and or ditches will be used to route flow around the active work areas. Nuisance water (*i.e.*, turbid water seeping into excavated areas from ground water) will be pumped to adjacent fields for infiltration or into settling basins. Clean water (*e.g.*, water from the Salt River and contributing tributaries) will be diverted using coffer dams that will prevent clean freshwater and clean tidal water from entering the exaction. This will be accomplished using one or more (in combination) of the scenarios depicted on the design plans. These scenarios provide options for the contractor to manage inflow throughout the site as conditions change. The Contractor will be required to submit for review and approval by the Construction Manager and Environmental Monitoring a Dewatering and Creek Diversion Plan that shall include the proposed dewatering and diversion techniques and schedule of operations. The diversion options for diverting clean freshwater flow from the Salt River around the channel excavation are depicted on the design plans and are anticipated to be utilized by the Contractor and include:

<u>Phase 1 – Riverside Ranch Tidal Marsh Restoration</u>

Diversion from the upstream side of the uppermost coffer dam, with a pump or gravity pipe to:

1. An existing or a temporary ditch or by pipe (or some combination of ditches/pipes) on Riverside Ranch or along the existing Salt River channel (but not in the way of the construction work) downstream to the tidal side of the lowermost coffer dam or an existing outfall downstream of the lowermost coffer dam on the Salt River.
2. Smith Creek and existing adjacent drainage ditches that will direct flow to an outfall on the downstream side of the existing Corps tidegate structure.

<u>Phase 2 – Salt River Channel and Riparian Floodplain Corridor</u>

1. Diversion of Francis Creek through pumped or gravity pipe or ditches and conveyed outside the limits of excavation that will direct flow to an outfall at the Meridian Road storm drain pipe, Reas Creek, Smith Creek or an intermediate location in the Salt River, or a combination thereof.
2. Diversion of Francis Creek through pumped or gravity pipe or ditches conveyed within the limits of excavation (but not in the way of the construction work) and to a downstream location in the Salt River.
3. Diversion of Williams Creek through pumped or gravity pipe or ditches that will direct flow to Perry Slough following the current topographic relief.

Conservation Measures

The following conservation measures will be implemented to avoid and minimize effects on tidewater gobies:

1. All in-stream construction and maintenance activities, including channel excavation, will be conducted between 15 June and 15 October, with extension to 31 October, if rainless.

   a) Prior to in-stream construction activities in 2012, temporary coffer dams (described above) will be placed upstream of the active work zone to control stream flow from the Salt River tributaries (including Coffee, Williams, Francis, Reas, and Smith creeks). A combination of pumped and/or gravity diversion pipes will be used to route flow around the active work areas. Fish screens (maximum 1/16-inch (in) opening mesh screen) will be installed immediately upstream from the coffer dams to prevent aquatic organisms, including tidewater gobies, from being exposed to pumps.

   b) 1-2 days prior to installation of the coffer dams, and again after installation of coffer dams but prior to dewatering the channel, fish will be captured and removed by seining or dip netting (using the Service approved methods) in known tidewater goby habitats (Sites 2, 3, 5, and 6; see Figure 3) by biologists qualified to handle tidewater gobies under a scientific recovery permit pursuant to section 10(a)(1)(A) of the Act. Gobies from Sites 2 or 3 may be relocated (see measure "d" below).

   c) Appropriate dewatering techniques will be employed to minimize the potential for fish entrainment. A maximum 1/16-in opening mesh screen will be used around pump inlets to prevent the potential entrainment of fish species during dewatering.

   d) Qualified biologists will also be on location during dewatering to capture and relocate any stranded gobies (and other fish). Dewatering will concentrate gobies (and other fish) into smaller areas allowing for their capture and relocation. The qualified biologist will identify, record, and report to the Service all gobies captured and relocated, or the occurrence of any mortality.

      Where tidewater gobies may occur, capture methods will be limited to beach seines, dip nets, or minnow traps as per Appendix F., Recovery Plan for the Tidewater Goby (Service 2005). Tidewater gobies that are captured will be placed in a 5-gallon bucket, in water from the location captured, and relocated within 30 minutes of being captured. Specific sites for relocation were determined based on results of genetic analysis, landowner permission, and suitability of habitat, and were decided in coordination with the Service. Connick Ranch, where gobies have been detected (Figure 4) was determined to be a suitable relocation site for tidewater gobies from Riverside Ranch.

2. At Sites 2, 3, 5, and 6 on Riverside Ranch, where tidewater gobies were detected during surveys conducted by the Service on 4 May 2010 (Service 2010; Figure 3), conservation measures, that are intended to protect existing tidewater goby habitat, will be implemented through the following modifications and/or construction:

   a) Sites 2 and 3: The culverts, tide gates, scour holes, downstream tidal channels and adjacent levees at these sites will not be permanently modified or disturbed during construction activities. However, these sites will be temporarily impacted during dewatering and excavation of the Salt River channel, which will temporarily eliminate tidal exchange via the small connector channels between the scour holes and mainstem Salt River.

   b) Sites 5 and 6: Both sites are scour holes formed on the out-board side of culverts equipped with tide gates. These culverts drain winter flood waters out of the adjacent pastures to the mainstem Salt River. At both sites, the levees and culverts will either be retained, plugged and retained, or removed and the levee repaired with compatible fill material. The tidal channels and associated structures connecting these sites to the mainstem Salt River will not be disturbed or altered. A new 48-inch diameter culvert with tidegate will be installed through the new setback berm between the outboard drainage ditch and existing outboard tidal channel(s) connected to Salt River. It is unknown if the culverts at Sites 5 and 6 will continue to function similar to existing conditions after installation of the new culvert (*i.e.*, seasonally draining lands to the north of winter storm waters and maintaining the existing scour holes); however, if tidewater goby habitat at Sites 5 and 6 is reduced or lost, it will be more than compensated for throughout the project site.

3. A qualified biologist will provide environmental awareness training to all construction personnel before construction begins. The training will include descriptions of sensitive species, and discussion of all required protection measures.

4. In accordance with Federal and State endangered species acts, all observations of sensitive species will be reported to the appropriate agency (the Service).

5. A Stormwater Pollution Prevention Plan (SWPPP) has not yet been developed but will be prepared and implemented by the contractor to ensure that water quality in the Salt River and tributaries is not degraded during construction activities and until the disturbed areas are stabilized and erosion potential is minimized. The SWPPP will detail erosion and sediment Best Management Practices (BMPs) that will be implemented to prevent entry of storm water runoff into the excavation site, entrainment of excavated contaminated materials leaving the site, and entry of polluted storm water runoff into coastal waters during transportation and storage of excavated materials. BMPs that will be implemented as part of the SWPPP will include:

a) Coffer dams or other temporary fish barriers/water control structures will be placed in the channel during low tide, and will only be removed during low tide (if possible), after work is completed.

b) Because coffer dams will be installed and the channel will be dewatered prior to excavation, equipment will not be operated directly within tidal waters or stream channels of flowing streams, after fish removal efforts have been completed.

c) Silt fences and or silt curtains will be deployed in the vicinity of the coffer dams and at excavation of sloughs at culvert installation and removal areas to prevent any sediment from flowing into the creek or wetted channels. If the silt fences are not adequately containing sediment, construction activity will cease until remedial measures are implemented that prevents sediment from entering the waters below.

d) Sediment sources will be controlled using fiber rolls, sediment basins, and/or check dams that will be installed prior to or during grading activities and removed once the site has stabilized.

e) Erosion control may include seeding (using natural material), mulching, erosion control blankets, plastic coverings, and geotextiles that will be implemented after completion of construction activities.

f) Excess water will be pumped into the surrounding fields to prevent sediment-laden water from entering the stream channel. When internal sloughs are connected to the mainstem Salt River, excavation will occur during a rising tide so that water flows into the marsh and sediment has a chance to settle out, allowing impacts of turbid water generated from excavations necessary for connection of the sloughs to the mainstem to be minimized by settlement and dilution.

g) Appropriate energy dissipation devices will be utilized to reduce or prevent erosion at discharge end of dewatering activity.

h) Turbidity and pH monitoring will be conducted in the Salt River throughout the site stabilization period to ensure that water quality is not being degraded as per the AMP. Turbid water will be contained and prevented from being transported in amounts that are deleterious to fish, or in amounts that could violate state pollution laws. Silt fences or water diversion structures will be used to contain sediment. If sediment is not being contained adequately, as determined by visual observation, the activity will cease. The Regional Water Quality Control Board (RWQCB) 401 water quality certification and the SWPPP will contain turbidity and pH thresholds for the construction period, which will require downstream monitoring.

i) Exposed surfaces above high marsh, down to 7-8 ft elevation (NAVD88), will be mulched and seeded with appropriate native seed after the work has been completed.

j) Construction materials, debris, and waste will not be placed or stored where it can enter into or be washed by rainfall into waters of the U.S./State.

k) Upland areas will be used for equipment refueling. If equipment must be washed, washing will occur where wash water cannot flow into wetlands or waters of the U.S./State.

l) Operators of heavy equipment, vehicles, and construction work will be instructed to avoid sensitive habitat areas. To ensure construction occurs in the designated areas and does not impact environmentally sensitive areas, the boundaries of the work area will be fenced or marked with flagging.

m) Equipment when not in use will be stored outside of the slough channel and above high tide elevations.

n) All construction equipment will be maintained to prevent leaks of fuels, lubricants or other fluids into the Salt River. Service and refueling procedures will be not conducted where there is potential for fuel spills to seep or wash into the slough.

o) Extreme caution will be used when handling and/or storing chemicals and hazardous wastes (*e.g.*, fuel and hydraulic fluid) near waterways, and any and all applicable laws and regulations will be followed. Appropriate containment and spill cleanup materials will be on site to prevent and manage spills.

p) All trash and waste items generated by construction or crew activities will be properly contained and removed from the project area.

q) After work is completed, project staff will ensure that the area is recontoured as per approved specifications. If necessary, restoration work (including revegetation and soil stabilization) will be performed in conformance with the Revegetation and SWWP plans.

6. An AMP has been prepared and will be implemented. It includes long-term monitoring of erosion, sediment control, water quality, habitat development, vegetation maintenance, and BMPs for management actions. Monitoring and management actions that affect tidewater gobies include:

   a) Tidewater goby surveys will be conducted every year for 5 years on Riverside Ranch, using the protocol described in the Recovery Plan for the tidewater goby (Service 2005; Appendix F), and in habitats specifically created to support gobies. If gobies continue to be detected each year for 5 years, then monitoring will be discontinued at the end of that monitoring period. As described in the Service protocol, surveys will

be conducted in two sampling periods between July 1 and October 31, as this period is the time of highest abundance for the species in general, and therefore, the period of highest chance of detection. The two sampling periods will be separated by at least 30 days to accommodate changes in water level, seasonal movements, or other functions that result in movement of gobies within the survey area. All surveys will be recorded and reported, including surveys that do not detect tidewater gobies, following the Service (2005) Recovery Plan survey protocol (Appendix F).

b) Following the Table 4 in the AMP, dissolved oxygen, temperature, and salinity will be monitored for a minimum of 5 years in the Salt River channel and Riverside Ranch to ensure that water quality is adequate to support tidewater gobies. If water quality is degraded and not adequate to support tidewater gobies, management actions (AMP Table 3) will be taken to improve water quality.

c) Tidal exchange will be monitored following Table 1 in the AMP for a minimum of 5 years in the Salt River channel and Riverside Ranch to determine if the project has established the desired tidal exchange, functional tidal prism, and salinity structure. Management actions will be taken if the desired tidal exchange is not achieved as described in the AMP.

7. If plant removal activities are to occur where tidewater gobies have been detected, or in suitable habitat for tidewater gobies, the Service will be contacted.

STATUS OF THE SPECIES AND CRITICAL HABITAT

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 goby critical habitat. 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 goby in areas north of Orange and San Diego Counties, California, and (2) retain 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).

On August 3, 1999, we proposed critical habitat for the 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 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 mi (14.5 kilometers [km]) in length.

On November 7, 2002, we withdrew our proposal to delist the goby in areas north of Orange County (67 FR 67803). Therefore, the 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 goby and any currently unoccupied goby habitat.

A proposed revised critical habitat rule was published in the Federal Register November 28, 2006 (71 FR 68914). A final critical habitat rule was designated and published in the Federal Register on January 31, 2008 (73 FR 5920), and included approximately 10,003 acres (ac) (4, 048 hectares [ha]) range-wide.

Taxonomy and Life History

Accounts of the taxonomy, ecology, and reproductive characteristics of the goby are found in the following publications: final rule listing the species (59 FR 5494), the proposed rule to delist northern goby populations (64 FR 33816), the final rule withdrawing the Service's proposal to delist the northern goby populations (67 FR 67803), the recovery plan (Service 2005), and the proposed revised critical habitat rule (71 FR 68914).

The goby is a small gray-brown fish rarely exceeding 2 inches (in.) (5 centimeters [cm]) 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. Male gobies are nearly transparent with a mottled brownish upper surface. Females develop darker colors, often black, on the body and dorsal and anal fins.

The 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 (Service 2005).

The 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.
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 parts per thousand [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 (71 FR 68914). 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 mi (2.6 to 11.7 km) upstream from the ocean environment (Irwin and Soltz 1984; Swift *et al.* 1997; Chamberlain 2006; 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 gobies has most commonly occurred in water less than 6 feet (ft) (2 meters [m]) deep (Wang 1982; Worcester 1992). Consequently, most observations have been made within this depth range. However, gobies were recently collected in Big Lagoon in Humboldt County during the breeding season at a water depth of 15 ft (4.6 m) (Goldsmith 2006).

Gobies have been documented in habitats with water temperatures that range from 46 to 77 degrees Fahrenheit (F) (8 to 25 degrees Celsius [C]) (Irwin and Soltz 1984; Swift *et al.* 1989).

Current and Historical Range

The 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 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. 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 (Service 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 in. (1.3-1.8 cm) (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). Spawning occurs in lagoons/estuaries from April through November. Suitable water temperatures for nesting are 75.6 to 79.6° F (24.2-26.4° C) (most likely a limiting factor in Brainard Slough or Humboldt Bay), with salinities of 2 to 27 ppt. Larvae emerge and live in vegetated areas until they reach 0.5-0.7 in. (1.3-1.8 cm), when as juveniles they ascend and occupy streams for rearing.

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; water diversions that alter downstream flows; drought, groundwater overdrafting, and agricultural; and sewage discharge (*i.e.*, pollution) (59 FR 5494). 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*]) (Service 2005).

Conservation Strategy

The 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 (Service 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 gobies.

The recovery plan subdivides the geographic distribution of the 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 (Service 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 (Service 2005).

Current Conditions Range-wide

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 (Service and NMFS 1998).

Habitat: Amount, Distribution and Quality

The wetland habitat of individual 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, habitats occupied by gobies may be hundreds of acres in size, extend many miles inland, and contain extensive backwater marshes (Service 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 (Service 2005a). 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 m) at any point and/or with estuarine (areas with salt water intrusion) habitats exceeding 0.6 mi (1 km) in length; or lagoons and ponds larger than 5 ac (2 ha) surface area. Medium sized water bodies include smaller streams less than 66 ft (20 m) bankfull width and/or estuaries longer than 328 ft (100 m) but less than 0.6 mi (1 km) in length. Medium sized lagoons and ponds have a surface area between 1 ac (0.4 ha) and 5 ac (2 ha) 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.

Rangewide, 49 (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. Rangewide, 61 (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 (Service 2005).

Population: Numbers, Distribution, and Reproduction

The current goby population is known to occur from Tillas Slough in Del Norte County to Cockleburr Canyon in San Diego County, 9.2 mi (14.8 km) north of Agua Hedionda Lagoon. Gobies do not currently occur in Agua Hedionda Lagoon (71 FR 68914). 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 (Service 2005).

Female 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 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 (Service 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 gobies have been found in localities considered extirpated that are separated from the nearest population by 6 to 12 mi. These records suggest that distant movement and recolonization is possible (Service 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, gobies are frequently the most abundant fish species found at a site (Lafferty *et al.* 1999a). Goby densities are highly variable and can fluctuate from year to year, season to season, and within a sampled area. Therefore, determining goby density can be

difficult. Gobies have been reported in densities as high as 0-138 per square meter, and as low as 0-4 individuals per square meter (Service 2005). The recovery plan for the goby discusses density surveys that were conducted by Worcester (1992) and Swift and Holland (1998) using meter-square (ms) drop nets. The distribution of gobies within an area, was found to be quite patchy and not evenly dispersed. The results indicated the following range of densities of tidewater gobies per square meter sampled (gobies/ms): Little Pico Creek, San Luis Obispo County: May 1990 0-67 gobies/ms, November 1990 0-138 gobies/ms, February 1991 0-27 gobies/ms; and Camp Pendleton Marine Corps Base, San Diego County: (all samples in October 1996) San Mateo Creek 2-11 gobies/ms, San Onofre Lagoon 1-102 gobies/ms, Hidden Creek 0-6 gobies/ms, Los Flores Creek 0-4 gobies/ms, and French Creek Lagoon1-51 gobies/ms.

Current Conditions in the North Coast Recovery Plan Sub-Unit 3 (NC3g – Eel River)

Sub-Unit 3 of the North Coast Recovery Unit is completely within Humboldt County. The sub-unit extends about 25 mi in length from the mouth of the Mad River south across Humboldt Bay to the Eel River. Sub-Unit NC 3g includes the separate Eel River locality, located approximately 8.7 mi south of Humboldt Bay, connected only via the Pacific Ocean. Extensive surveys have not been conducted to determine the extent of tidewater goby presence throughout the Eel River Estuary. Surveys were conducted in the project area in 2010. Tidewater gobies were detected at four locations on the property, which is within the Eel River Recovery Sub-unit (NC-3g).

Habitat Amount, Distribution and Quality in North Coast Sub-Unit 3

The margins of 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 the Eel River Estuary resulted in significant losses of potentially suitable tidewater goby habitat (71 FR 68914).

As a result of habitat alteration, several of the localities occupied by the 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 gobies occur. Many of these tidegates have been in place for decades, and in some cases, they provide habitat conditions similar to those created by the presence of seasonal sandbars. Muck of the known, occupied, tidewater goby habitat in the Eel River Estuary 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 several known

locations. 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 in North Coast Sub-Unit 3

Eel River Estuary (NC-3g)

In 2004, tidewater gobies were located in a small watered area behind a tide gate in the northern part of the Eel River Estuary (G. Goldsmith pers. comm. 2004). During the 2010 tidewater goby surveys inside the Connick Ranch, a total of 88 adult tidewater gobies were captured at four sites. Those surveys were to collect tissue samples, for genetic studies only. No population estimates or additional information was attempted, and is not available at this time.

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 goby habitat remain unsurveyed. Tidewater gobies were not previously known to occur in the Salt River vicinity, but were known to exist in other locations to the north, in the adjacent Eel River Estuary (Service 2005). However, in May 2010, tidewater gobies were observed by the Service at 4 of 6 sites (Sites 2, 3, 5, and 6) surveyed in Riverside Ranch and at one of four sites (Site 5) in May 2011; gobies were found in small quiet pools (*i.e.*, 4-5 m diameter) downstream of tide gates adjacent to the Salt River channel (Figure 3 and Appendix A, Figure 1). The total habitat area, occupied by tidewater gobies at the four sites in 2010, equaled 0.024 acres (Table 2). In contrast, surveys conducted in adjacent Humboldt Bay tended to find tidewater gobies upstream of tidegates (Service 2005; Wallace and Allen 2007; Wallace and Allen 2009). Other fish species observed at Riverside Ranch sites in May 2010 included numerous threespine stickleback (*Gasterosteus aculeatus*) at all four sites, and Sacramento pikeminnow (*Ptychocheilus grandis*), staghorn sculpin (*Leptocottus armatus*), prickly sculpin (*Cottus asper*), and 1 young-of-the-year coho salmon (*Oncorhynchus kisutch*). Emergent vegetation included widgeongrass (*Ruppia maritima*) (Sites 2 and 5), and eelgrass (*Zostera marina*) (Site 5); Site 5 may represent the first site where tidewater gobies were found in association with eelgrass.

Tidewater gobies were not detected from multiple seine net hauls and dip net samples taken from both sides of a levee and tide gate at Site 1. This site is adjacent to the Salt River at around river mile 2.0, the most upstream site sampled, and had very low dissolved oxygen levels (<2 mg/L), potentially indicating poor water quality at that site (Appendix A, Table 1). Tidewater gobies were also not detected at Site 4, which was described as a 2 x 3 m pool surrounded by woody vegetation, where only threespine stickleback were observed.

Surveys following the Service Protocol were repeated by CDFG at Sites 1, 2, 4, and 5 on 8 September 2010 (CDFG 2010, Appendix B), and by the Service on 13-14 October 2010 at Sites 1-6 (Chamberlain 2011), and no tidewater gobies were detected during either survey. Surveys were also conducted by the Service at Sites 1, 2, 3, and 5 on 12 May 2011. Three tidewater gobies were detected at Site 5, but none were detected at the other three sites. These survey

results suggest that tidewater gobies may only occur seasonally in this location (*i.e.*, in May but not September/October), possibly due to poor habitat quality and quantity.

HCRCD conducted water quality surveys on 21 October 2010 at the sites where goby surveys were conducted by the Service on 13-14 October 2010 (A. Shows, HCRCD, pers comm. 27 October 2010). Salinity increased at Sites 2, 3, 5, and 6 between May (ranging 2.0-11.54 ppt) and October (ranging 27.1-31.6 ppt). Numerous tidewater gobies were found in tidal channels within Connick Ranch directly west of Riverside Ranch in August and October (Figure 4, Table 1), when none were detected on Riverside Ranch (Figure 3). Tidewater gobies were also reported from an unnamed slough in the northern portion of the Eel River estuary, which is north of Riverside Ranch (Service 2005). This suggests that Connick Ranch and/or other locations occupied by tidewater gobies in the Eel River Estuary may function as a "population source" for tidewater gobies that are detected on Riverside Ranch.

Table 1. Water quality measurements at four sites on Connick Ranch where tidewater gobies were detected October 21, 2010.

Site	# Tidewater gobies captured	Depth (ft)	Temperature (° C)	Dissolved oxygen (mg/L)	Salinity (ppt)
1	12	0 (surface)	12.6	5.90	6.5
		1.0 (bottom)	12.9	6.76	17.1
2	45+	0 (surface)	14.5	5.44	25.3
		1.5 (bottom)	14.7	5.01	26.5
3	3	0 (surface)	13.6	3.70	11.9
		0.5 (bottom)	14.0	2.41	24.4
4	1	0 (surface)	13.0	4.35	28.2
		0.5 (bottom)	13.4	4.20	28.2

In 2011, results from genetic tests, on tissue collected from gobies captured at Connick Ranch and within the project area, indicated that both populations are genetically homogenous (Andrew Kinziger pers. comm.). Gobies found in the northern portion of the Eel River Estuary were found to be genetically different from Connick Ranch and Riverside Ranch gobies. These results corroborate the theory that Connick Ranch could be the source for gobies found on Riverside Ranch. On Riverside Ranch, gobies apparently failed to reproduce and died out, which may indicate that the current goby habitat is poor quality and may be a "population sink" for tidewater goby larvae that settle there.

Both the Salt River and Eel River estuaries have been reduced in size through construction of levees, tide gates, berms, and drainage channels; these actions also eliminated some of the natural sandbars between the ocean and the estuaries. Adult tidewater gobies are not anticipated to be present in the mainstem Salt River because of unsuitable habitat associated with the constant tidal exchange and high-velocities. Therefore, surveys were not conducted in the mainstem reach by the Service in May 2010 and 2011.

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 tidewater 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 (Service 2005). Efforts at transferring tidewater gobies from one location to another have not occurred to date in the north coast recovery unit.

Status of Critical Habitat

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 goby as primary constituent elements. Based on current knowledge of the life history, biology, and ecology of the 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 0.3 to 6.5 ft [0.1 to 2 m]), still to slow moving, aquatic habitat most commonly ranging in salinity from less than 0.5 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) or a sill formation 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 Critical Habitat Unit HUM-4
(Note: Critical Habitat Unit HUM-4 is the same as Recovery Unit NC-3g)

The HUM-4 unit consists of the tidewater goby populations found in the northern region of the Eel River Estuary (73 FR 5920). Additional populations of tidewater gobies were found in 2010, in the southwestern parts of the estuary on Connick Ranch, and the project area. Neither the Connick Ranch nor the project area is currently designated as critical habitat for the goby. The Eel River Estuary is similar to Humboldt Bay in that, tidewater goby populations have been found in isolated populations in severely and artificially fractured habitats, which that are often found behind tidegates, culverts, and other man-made structures. In Humboldt Bay, McCraney

(2010) found that artificial fragmentation reduced dispersal and gene flow in those populations. The same may be true for the Eel River Estuary populations. Artificially fractured habitats in the Eel River estuary may have genetically isolated or weakened populations of tidewater gobies, as has been identified in Humboldt Bay. Current and proposed estuarine restoration projects in the Eel River estuary may improve dispersal of tidewater gobies, increase genetic diversity, and aid in recovery of the species in these locations as well.

Conservation Strategy for Critical Habitat Unit HUM-4

We anticipate that the persistence of the 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 known occupied localities within a channel complex may be used by 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-4 unit since 2004 suggests that in some locations where gobies were recently found to be present, they were subsequently found to be absent in later surveys. This data supports the idea that tidewater gobies within the unit may use locations intermittently.

The interconnectivity of habitat within this unit and in association with this project will reduce the chance of losing the 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 such as the proposed project have occurred or are planned within the Eel River Estuary. The outcome of these restoration efforts for gobies is unknown, and will likely vary with their design features and location, but in general, net gains of tidewater goby habitat should result.

Known threats in this unit that may require special management and include channelization of habitats, non-point and point source pollution, and cattle grazing. 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, and other spills associated with transportation on adjacent highways. Grazing threats in this unit include the potential for destruction of critical habitat due to animal impacts to channels, by trampling and eroding channel banks, aquatic vegetation, and modification of slough and stream channels. The Eel River Estuary 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 (Service 2005).

ENVIRONMENTAL BASELINE

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.

Action Area

According to 50 CFR § 402.02 pursuant to section 7 of the Act, the "action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. Subsequent analyses of the environmental baseline, effects of the action, and levels of incidental take are based upon the action area. We consider the action area for the proposed project to be the approximate estuarine areas associated with Riverside Ranch, the Salt River, and the Eel River Estuary (Figure 1). The action area includes all areas of the Salt River basin where in-stream and riparian construction and maintenance activities will occur, including the portion of the Salt River that occurs on Riverside Ranch. The action area also includes Connick Ranch, as that is the proposed relocation site for any gobies captured at Riverside Ranch.

Project Location and Surrounding Land Uses

The Salt River Ecosystem Restoration Project encompasses the lower reaches of the Salt River and parts of the tributaries that flow into the Salt River downstream to Cutoff Slough just upstream from the confluence with the Eel River (Figure 1).

Most of the project area is composed of former tidelands that now support grazing and other agricultural uses. Much of the project areas are zoned Agriculture Exclusive (A-E) and Natural Resource (NR) with a Wetland and Creek Protection Overlay Zone. The site is in the 100 year FEMA (Federal Emergency Management Agency) floodplain, and is located in the coastal zone. Many areas surrounding the Eel River Estuary are dominated by pasture grasses, and Himalaya and California blackberry on the existing levees.

Goby Habitat: Type, Distribution, and Quality

Tidally influenced estuarine tributaries to the Eel River estuary are the result of a perennial stream, other seasonal freshwater channels that meet areas of tidal flow on the Eel River gravel bars and mudflats, and marsh wetlands that are isolated behind human-created levees. Site vegetation is comprised of agricultural grasslands upstream of the tidegates and salt marsh vegetation downstream of the tidegates.

Throughout the action area, there are seasonal breaks in hydrologic connections, causing periodic isolation of 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. A total of approximately 0.024 ac of habitat is currently occupied by tidewater gobies within Riverside Ranch (Table 2).

Table 2. Existing and projected tidewater goby habitat at Riverside Ranch after implementation of the Salt River Ecosystem Restoration Project.

	Existing habitat		**Projected habitat (minimum)**	
Tidewater goby habitat	**acres**	**linear ft**	**acres**	**linear ft**
Site 2 (13x26 ft)	0.008	-	0.008	-
Site 3 (16x16 ft)	0.006	-	0.006	-
Site 5 (13x16 ft)	0.005	-	0-0.005	-
Site 6 (13x16 ft)	0.005	-	0.005	-
Internal ditches	-	0	-	10,000
In-channel ponding	-	0	-	2500
Tidal marsh pannes	0	-	7-11	-
Total	0.024	0	7.019-11.024	12,500

Status of the Species within the Action Area

Within the action area, 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. Gobies have been detected in several locations in the Eel River Estuary. Tidewater goby surveys were conducted in the project area in 2010 and 2011. On May 5, 2010, surveys by the Service for tidewater gobies in the project area, captured eight adult tidewater gobies in four locations out of the six sampled (Sites 2, 3, 5, and 6; Figure 3). On October 14, 2010, surveys by the Service in the same locations, captured no tidewater gobies. The same locations were again surveyed during May 2011, and three adult tidewater gobies were captured. No juveniles were captured. Since adult tidewater gobies are not known to disperse well between different suitable habitat areas, tidewater goby larvae or juveniles may populate the available habitat on the Riverside Ranch area each year, fail to successfully reproduce, and then die out. Larvae from Connick Ranch, where 88 adult tidewater gobies were captured on October 13, 2010, may provide a source of larvae that seed the Riverside Ranch area every year.

Genetic tests were conducted in 2011 on tissue collected from gobies captured in the northern portion of the Eel River Estuary, Connick Ranch, and the Riverside Ranch project area, in the southern Eel River Estuary. The results indicated that populations in Connick Ranch and Riverside Ranch are genetically homogenous, whereas the population in the northern Eel River Estuary is genetically different from the other two (Andrew Kinziger pers. comm.). The results indicate that isolated populations of tidewater gobies within the Eel River estuary may be genetically fragmented in the same manner that populations are in Humboldt Bay. Connick

Ranch is the likely source for gobies found in the project area. This could also indicate that the current goby habitat in the project area is of poor quality and may only support tidewater gobies seasonally.

Tidewater Goby Critical Habitat

Critical habitat has not been designated for tidewater goby in the project area and vicinity, which is located along the Salt River and southern Eel River Estuary (Sub-Unit NC-3g in the Recovery Plan).

EFFECTS OF THE ACTION

This section presents an analysis of the direct and indirect effects of the proposed project on the goby and its designated 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 critical habitat.

Tidewater gobies could be killed or injured during in-channel construction activities as a result of dewatering the Salt River channel and channel excavation, adjacent to Riverside Ranch. This is most likely to occur during Riverside Ranch restoration (Phase 1) at Sites 2 and 3 where tidewater gobies were detected in May 2010 (Figure 3). Channel dewatering and excavation is not going to occur at Sites 5 and 6, where tidewater gobies were detected in May 2010 (Figure 3); therefore, no tidewater gobies are expected to be affected at these locations. The outboard drainage ditch upstream of Site 6 was not surveyed for tidewater gobies because it is on private property that is not part of Riverside Ranch project area. The ditch is known to dry up in the summer (B. Slocum, pers. comm., 18 January 2011), and therefore is not believed to support tidewater gobies. Project related work will be conducted during the dry months. It is anticipated that there will be little, or no effect of the project on tidewater gobies at Site 6, since the hydrologic function in that location will not be altered.

In-channel construction activities, and maintenance during Phases 1 and 2 of the project, could increase suspended sediment and turbidity and introduce contaminants such as, oil, grease, or fuel from construction equipment to the channel, which could degrade water quality and result in injury or mortality to tidewater gobies. To minimize these potential adverse effects, all in-stream construction and maintenance activities, including channel excavation, will be conducted outside of the rainy period (*i.e.*, construction will occur between 15 June and 15 October, with extension to 31 October if rainless). In addition, the Salt River channel upstream of Riverside Ranch will not be connected to Riverside Ranch during Phase 2 construction, because coffer dams will be installed in the channel prior to construction activities, thus minimizing sediment transfer and turbidity downstream.

Although the construction window (*i.e.*, June through October) is outside the rainy period, when sediment and turbidity should be low, this period may coincide with the sensitive spawning and

larval life stages of tidewater gobies. However, given that tidewater gobies were detected during surveys in May, but not in September and October, on Riverside Ranch, the species may not successfully reproduce and survive in the action area, but is only occasionally or seasonally present. Therefore, in-channel construction activities are not likely to disrupt breeding activities of tidewater gobies.

Larval, juvenile, or adult tidewater gobies, detected during in-channel construction activities, will be captured and relocated outside of the construction area before dewatering of the channel, as described in Conservation Measure 1 (page 16). This measure will reduce or eliminate injury or mortality to gobies as a result of in-channel construction. Mortality or injury of tidewater gobies could occur as a result of handling and during relocation. To minimize this potential adverse effect, qualified biologists (*i.e.*, those biologists who have a recovery permit for gobies) will be responsible for capture and handling of gobies, as described in Conservation Measure 1 (page 16).

Adverse effects to gobies could occur if gobies are relocated to an unsuitable location. This is unlikely to occur because tidewater gobies will be relocated to suitable habitat at Connick Ranch that is currently occupied by tidewater gobies. Within 30 minutes of capture, gobies will be relocated as per Conservation Measure 1 (page 16). The genetic similarity between Riverside Ranch and Connick Ranch presents an opportunity for transfer of rescued gobies from Riverside Ranch to Connick Ranch during construction. It is anticipated that tidewater goby larvae will be naturally recruited to Riverside Ranch from Connick Ranch once construction is complete. If natural recruitment fails, then an inter-location transfer may be considered.

The approximately 0.024 ac, of existing tidewater goby habitat, could be adversely affected by project construction (Table 2.). The 0.024 ac is the total habitat area occupied by tidewater gobies at the four sites where they were found during surveys in in 2010 and 2011. Efforts will be made to avoid existing goby habitat during construction. Post-project, the Salt River Ecosystem Restoration Project is expected to improve and enhance tidewater goby habitat by increasing the complexity, quality and quantity of available low-velocity tidal habitat, reducing the potential for entrainment of tidewater gobies in areas disconnected from the estuary, and improving water quality by reducing turbidity and water temperatures. Project implementation will increase the amount of available low-velocity tidal habitat in the form of scour holes adjacent to culverts, internal ditches, in-channel ponding, and tidal marsh pannes (Table 2). Up to 7-11 ac of improved and potential tidewater goby habitat will be created. After completion of construction and restoration activities, Sites 2, 3, and 6 should maintain their pre-existing tidal exchange and scour holes. These sites are expected to continue to provide suitable habitat for tidewater gobies.

Over time, as the hydrology of the project area adjusts and reaches equilibrium, the amount of tidewater goby habitat ultimately created by the restoration is likely to change, although it is expected to result in an increase in quantity and quality of habitat in the action area. In addition, implementation of the Project is expected to provide approximately 18,030 linear ft of new 1st-order, 2nd-order, and 3rd-order internal marsh channels at Riverside Ranch. Tidewater gobies are

not expected to use the majority of this additional marsh channel habitat; however, restoration of this habitat will support the tidal ecosystem and indirectly support tidewater gobies by providing important ecosystem functions and connectivity with Connick Ranch and the Eel River Estuary.

It is unknown whether the newly created habitat will provide year-round habitat for gobies, since gobies appear to currently use Riverside Ranch only occasionally, or seasonally. However, one of the objectives of this project is to design habitat suitable for occupation and survival of tidewater goby populations. In addition to improving habitat quality for tidewater gobies, restoration of the Salt River could also improve habitat for non-native fish species that prey on tidewater gobies, such as the Sacramento pikeminnow, which are abundant in the Eel and Salt Rivers. However, it is expected that as the habitat quantity, complexity, and quality improves for gobies, the goby population will expand and be better able to withstand potential predation.

To evaluate this project and help design future restoration projects, an adaptive management plan will be used that will determine the effects of project implementation on gobies and their habitat and apply appropriate management actions (see Conservation Measure 6). The AMP will incorporate post-project monitoring for water quality, sedimentation, goby presence/absence, and other parameters. Surveys for gobies will be conducted each year, for 5 years. If post-project water quality is not suitable to support gobies, management actions will be taken to improve water quality.

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 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. Future proposed actions within and adjacent to the action area are likely to have a Federal nexus with the Corps and require section 7 consultation with the Service. We are not aware of any other actions on private or State lands within the action area that are reasonably 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 the Salt River Ecosystem Restoration Project, as proposed, is not likely to jeopardize the continued existence of the tidewater goby and is not likely to adversely modify critical habitat.

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

1. The proposed project would only temporarily adversely impact a small, but unknown number of dispersing and potentially non-reproductive gobies. The

number of gobies inhabiting the construction footprint of the action area is low, and represents a small portion of the range-wide population of this species.

2. The number of gobies adversely affected will be minimized through implementation of the conservation measures identified in the project description.

3. A small amount of habitat suitable for gobies will be adversely affected (*i.e.*, 0.024 ac) during project construction, but these impacts will be offset by the creation of up to 11 ac of habitat potentially suitable for gobies.

No critical habitat for gobies has been designated within the action area; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

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) fails to assume and implement the terms and conditions or (2) fails 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

It is difficult to quantify the number of gobies that could be affected by the action due to seasonal changes in goby distribution and abundance, the variability of environmental conditions, sampling method used, sampling location within a site, and vegetation and substrate type. In

addition, survey efforts for project related purposes are generally confined to presence/absence surveys.

Any gobies captured will be relocated outside of the construction footprint, and some gobies may be missed and subsequently die as a result of project construction activities. Some gobies may also be killed or injured as a result of capture and relocation efforts. It is not anticipated that many, if any, adult gobies will be killed during relocation. Previous surveys, over several years and in other locations, have successfully captured and released many gobies without any mortality (Chamberlain 2011; Mike Wallace, CDFG, pers. comm. 2011). However, the Service determined that oversight should be maintained so that consultation with the Service will be reinitiated if a certain conservative number (5) of gobies are killed or injured.

Because of the uncertainty in assessing goby populations, take thresholds will be authorized as follows:

- Loss or adverse alteration not to exceed 0.024 acre of existing tidewater goby habitat in the project area.

- Mortality of 5 adult gobies due to capture and release efforts.

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 critical habitat for the tidewater goby.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize the impact of incidental take of the tidewater goby:

1. Minimize and/or avoid harm of tidewater gobies during and as a result of the proposed action as described in the terms and conditions below.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Corps and/or Applicant must comply with the following term and condition, which implements the reasonable and prudent measure described above. This term and condition is nondiscretionary.

1. To implement the reasonable and prudent measure, the Corps and/or Applicant shall fully undertake the conservation measures as described in the project description of this biological opinion.

The reasonable and prudent measures with their implementing terms and conditions are designed to minimize the impact of incidental take that might otherwise result from the proposed action. 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 to include reasonable and prudent measures. The Corps must immediately provide an explanation of the causes of the taking and review with the Service (Arcata Fish and Wildlife Office) the need for possible inclusion of reasonable and prudent measures.

MONITORING REQUIREMENTS

In order to monitor the impacts of incidental take, Corps and/or Applicant must report the progress of the action and its impacts on the species to the Service, as specified below:

1. The Corps and/or Applicant will ensure that pre-project presence/absence goby surveys are conducted to collect baseline data, prior to the initiation of the project. These areas shall be sampled following the Tidewater Goby Survey Protocol (Appendix F., Recovery Plan for the Tidewater Goby (Service 2005)).

2. The Corps and/or Applicant will ensure that post-project presence/absence monitoring surveys are implemented for a period of 5 years and are conducted in the following manner:

    - Following the Tidewater Goby Survey Protocol (Appendix F., Recovery Plan for the Tidewater Goby (Service 2005)), up to 20 seine hauls or dip nets at specific locations to be determined in consultation with the Service will be conducted twice per year, between July 1 and October 31 (4.6, Appendix F.). A single survey in May of each year may also be conducted to monitor potential early recruitment and survival in existing and newly created habitat in the project area.

3. By December 31 of each calendar year, the Corps and/or Applicant will ensure that the Service receives the results of monitoring surveys for tidewater gobies as electronic files, in Word 2010 or pdf format, and hard copy, including data sheets. Data will also be provided in a format that can be used by the Service without requiring re-entry (Excel 2010).

REPORTING REQUIREMENTS

Upon locating a dead or injured or stranded tidewater goby, initial notification must be made to the Service's Division of Law Enforcement in Sacramento, California at (916) 414-6660 and the Arcata Fish and Wildlife Office at (707) 822-7201 immediately, and in writing within three 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.

The Service has identified the following conservation recommendation, which could be implemented by the Corps and/or Applicant:

- Anticipating future projects within suitable habitat surrounding the Eel River Estuary that may require a Corps permit, the Corps and/or Applicant should survey 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.

REINTIATION NOTICE

This concludes formal consultation on the Salt River Ecosystem Restoration 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 Steve Kramer of my staff at (707) 822-7201.

Sincerely,

Nancy J. Finley
Field Supervisor

cc:
Humboldt County Resource Conservation District, Eureka, CA (Attn: Donna Chambers)
U.S. Army Corps of Engineers (Attn: David Ammerman)
Winzler and Kelly (Attn: Jeremy Svehla)

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Figure 1. Salt River Ecosystem Restoration Project action area.

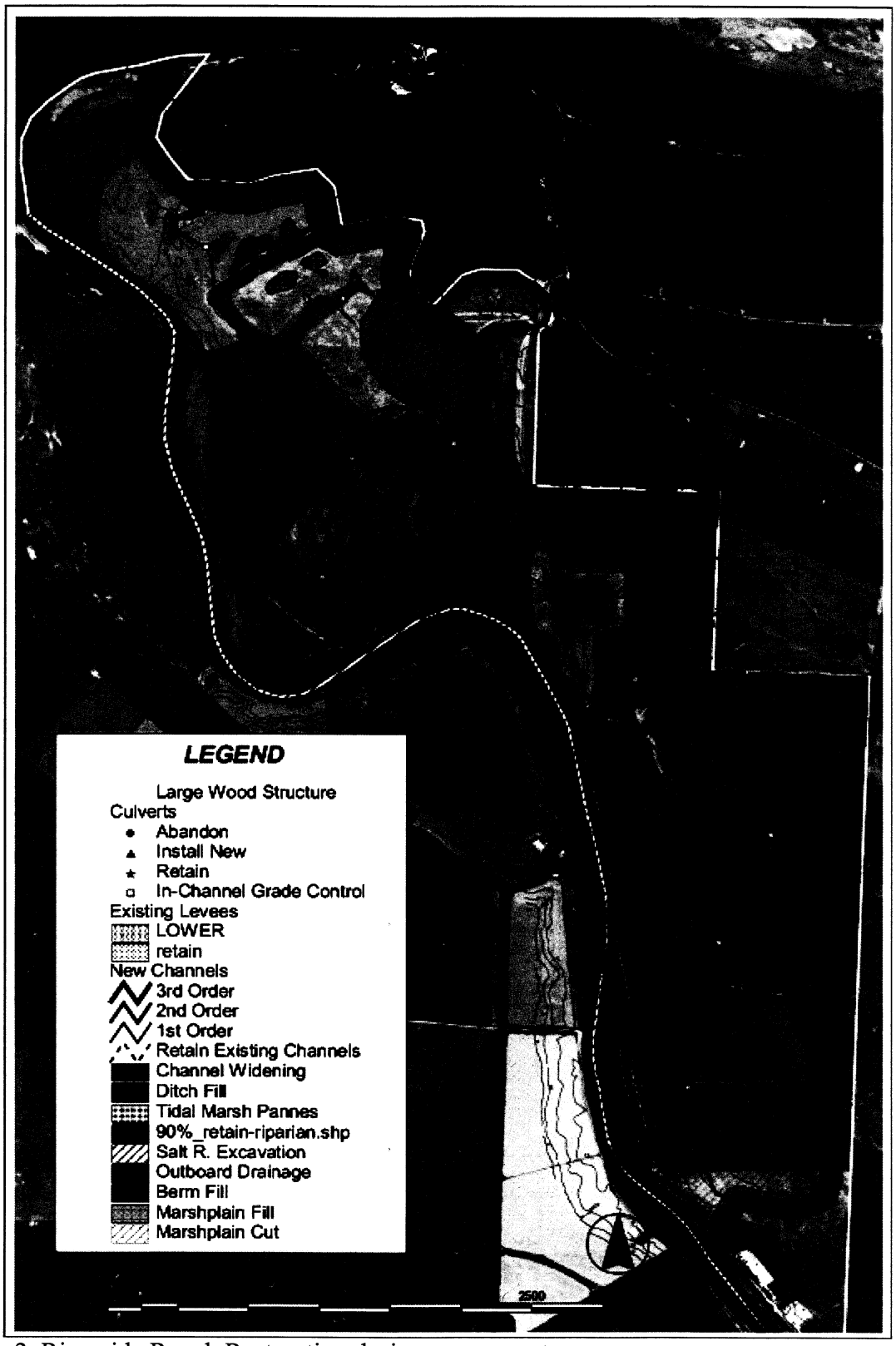

Figure 2. Riverside Ranch Restoration design components

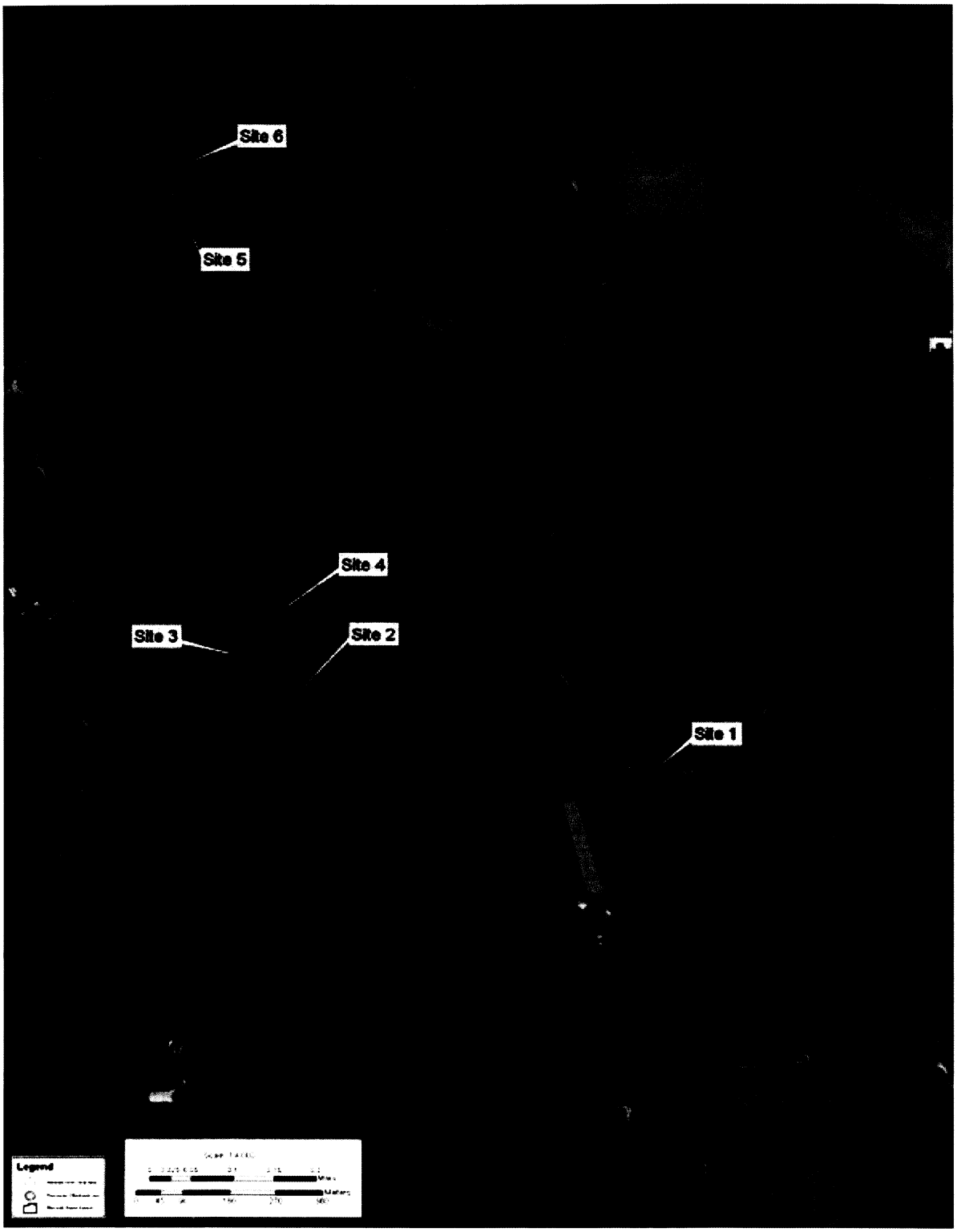

Figure 3. Tidewater goby survey locations on Riverside Ranch, California, 4 May 2010. Yellow circles indicate tidewater goby detections, blue circles indicate where surveys were conducted and no tidewater gobies were detected.

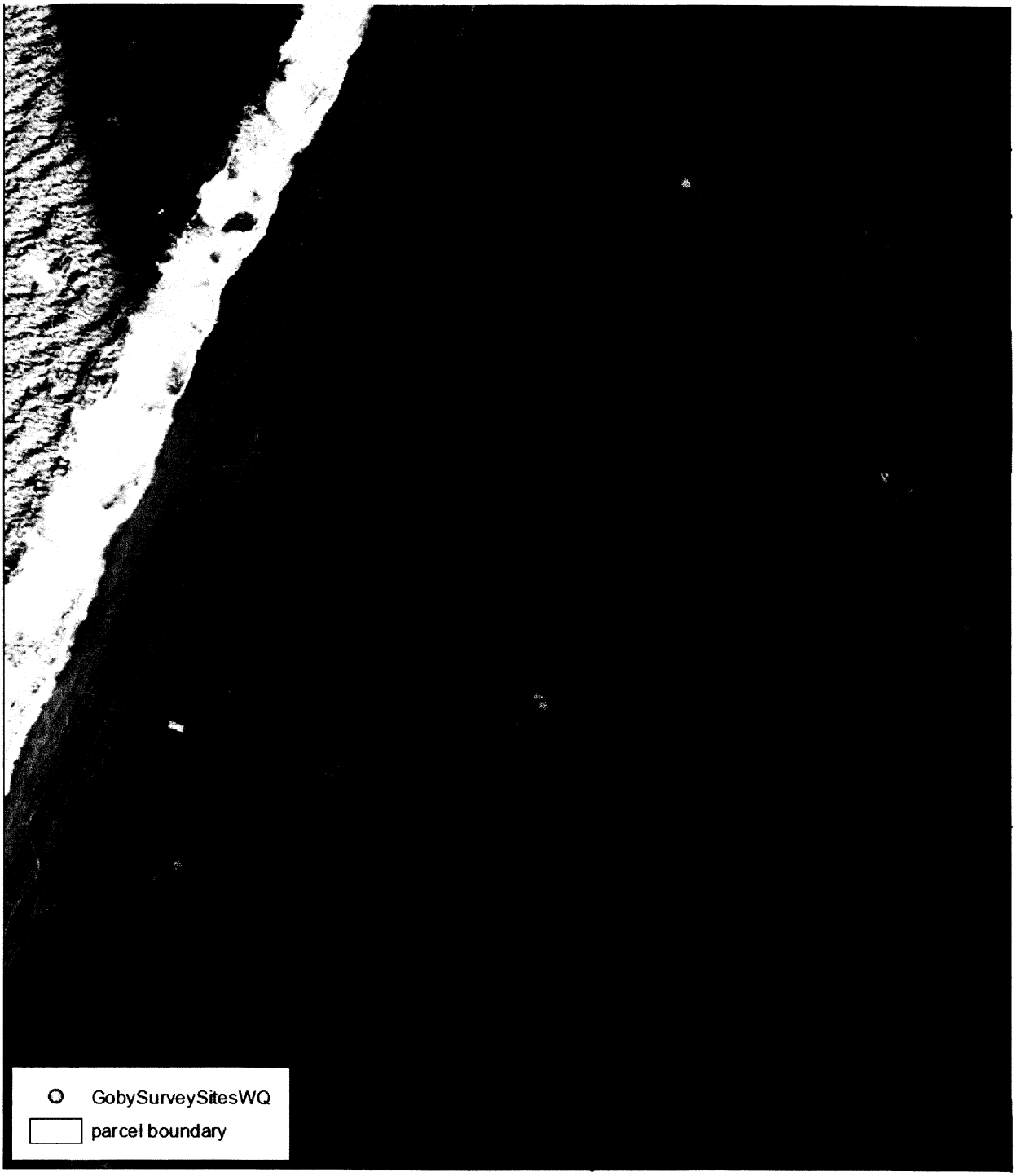

Figure 4. Locations on Connick Ranch where tidewater gobies where detected by USFWS on 21 October 2010. Any tidewater gobies captured during project activities will be relocated to one of these locations.

Appendix A. Tidewater Goby Survey Field Note for: Salt River, Tributary to Eel River, Humboldt County, California, May 4, 2010.

Tidewater Goby Survey Field Note for:
Salt River, Tributary to Eel River, Humboldt County, California

May 4, 2010

This report details sampling for tidewater goby (Eucyclogobius newberryi) conducted on May 4, 2010 in the Salt River watershed, tributary to the Eel River estuary. The surveys were conducted on the Riverside Ranch property, along the lower 2 miles of Salt River. Photographs of some of the sites are attached.

Sampling was conducted by Greg Gray, Dan Gale, Steve Kramer, and Greg Goldsmith, all staff from the U.S. Fish and Wildlife Service in Arcata, California. The areas surveyed are shown in Figure 1. The objective was to conduct presence/absence surveys for tidewater goby prior to finalization of restoration design and subsequent Section 7 consultation for the species. The survey locations were previously identified both from aerial photography, and from a field visit conducted on April 21, 2010 as those having the highest likelihood of tidewater goby presence in the area.

Site 1 - We began by surveying a ditch on both sides of a levee and tidegate that connects to Salt River at approximately river mile 2.0. We used both dip nets and a pole seine 3m by 1.5 m with 3 mm mesh. A total of 5 seine hauls were conducted, and approximately 20 minutes of dip netting. Most of this effort was on the landward side of the levee, but approximately 5 minutes of dip netting effort was made on the estuary side as well. Threespine stickleback (*Gasterosteus aculeatus*) were numerous at this site, and several dead stickleback were noted. Dissolved oxygen levels were very low (see water quality data in table 1). The site is characterized by a soft muddy substrate, shallow water (0.5-1.0m during sampling), patches of sedges along the margins of the ditch, but very little submergent vegetation. Amphipods and isopods were found at low to moderate density, along with some dead *Corophium spp.* Amphipods identified. No gobies were observed in 4 seine hauls and dip netting at a total of 6 locations within this ditch.

Site 2 is a scour pool on the outside of the levee associated with a 4' diameter tidegate. The pool was approximately 4m by 8m with a narrow channel that was almost dry leaving it during this low tide period. The site was characterized by firm to soft mud substrate, 0.2m-1.0m depth, deepest below the tidegate, with dense surface growth of widgeongrass (*Ruppia maritima*) over 40% of the surface. Using only dip nets, we captured 5 tidewater goby adults, all of which had darkened body and fin pigmentation possibly indicative of breeding condition. There were numerous threespine stickleback here as well. Other than the goby and stickleback, no other fish species were captured. Amphipods and isopods were abundant.

Site 3 is another scour pool feature caused by a tidegate, similar to site 2. This site was located approximately 125 meters north of site 2. The pool was approximately 5m by 5m in size. This pool had almost no vegetation present, but similar substrate to site 2. The site was sampled with dip nets, and we captured 2 tidewater goby, in addition to numerous threespine stickleback and one staghorn sculpin (*Leptocottus armatus*). After capture of the tidewater goby, we ceased sampling in order to minimize disturbance to a potential breeding population.

Site 4 is a 2m by 3m pool surrounded by woody vegetation. Dip nets were used, and only stickleback were captured.

Site 5 is on the north, or downstream end of the Riverside Ranch, and consisted of another tidegate-associated scour pool. The pool was approximately 4 m by 5m in size, with a firm

mud substrate, and small patches of both widgeongrass and eelgrass (*Zostera marina)*. Dip nets were used to capture one tidewater goby as well as numerous stickleback, and one prickly sculpin (*Cottus asper*). This is one of the first sites we are aware of where tidewater gobies have been found in association with eelgrass.

Site 6 is located 55 meters from site 5, and both are very similar features in size and composition. At this site, we used dip nets, and captured one tidewater goby, as well as one yoy *Oncorhynchus kisutch* (coho salmon) approximately 50-60 mm F.L. and six Sacramento pikeminnow (*Ptychocheilus grandis*) in the 40-55 mm range (F.L.). This site also contained small patches of eelgrass.

Figure 1. Approximate sampling locations, Salt River tributary channels, Humboldt County, CA.

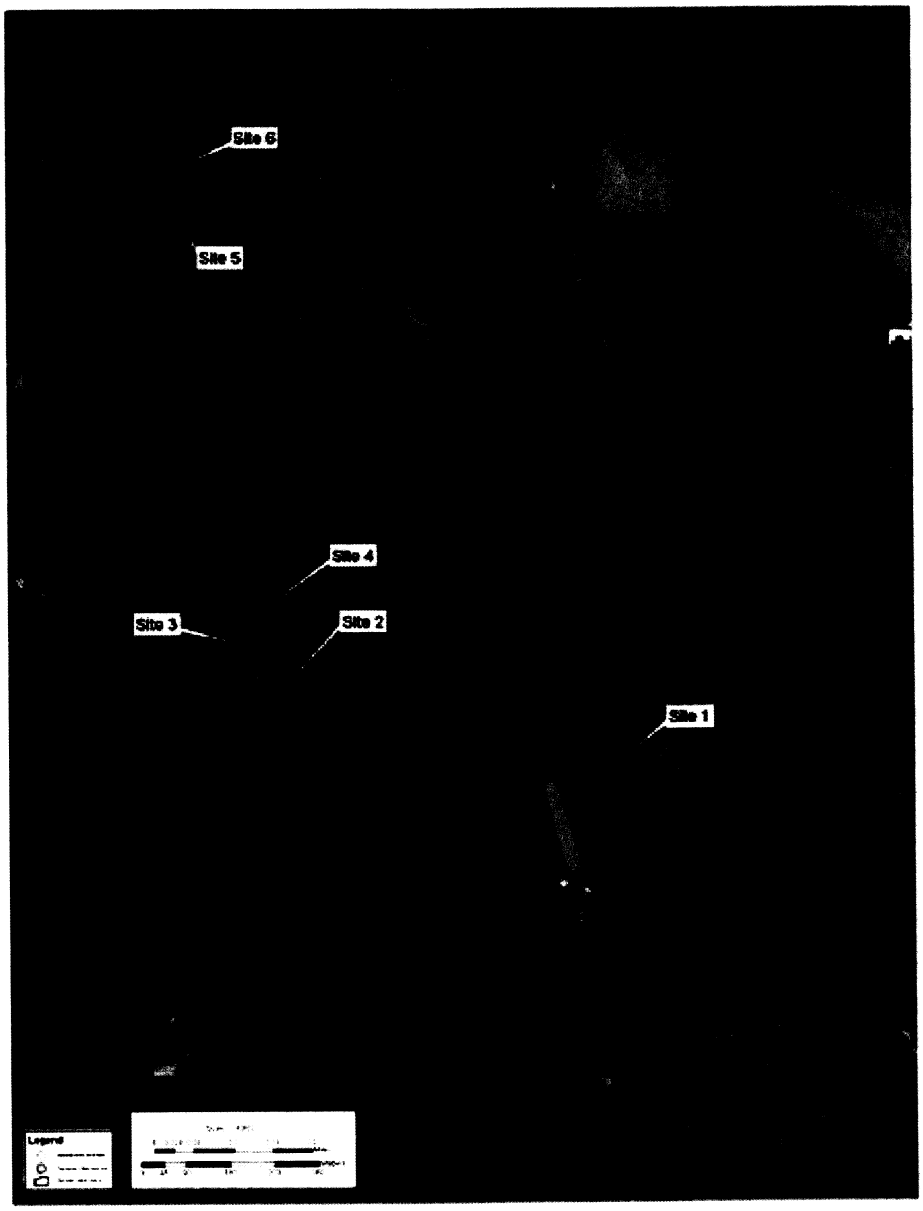

Table 1. Water quality data from fish survey locations identified in Figure 1.

Timestamp	Conductivity (uS/cm)	Salinity (ppt)	Dissolved Oxygen (mg/L)	pH_1 (Units)	Temperature (C)	Site	Map ID#
5/4/2010 9:41	2159	1.4	7.35	7.47	14.7	RVRSD RCH 30' ABV LWR TG	1
5/4/2010 9:56	3048	2.09	0.82	7.24	13.3	RVRSD RCH IMM ABV LWR TG	1
5/4/2010 10:03	3057	2.14	1.28	7.25	12.5	RR LWR CHNL LWR SEINE	1
5/4/2010 10:19	2990	2.08	0.29	7.28	12.7	RR LWR CHNL UPR SEINE	1
5/4/2010 10:34	2019	1.31	1.11	7.12	14.4	RR FW CNL AT LWR TG	1
5/4/2010 11:07	9310	7.46	5.93	7.29	10.3	RR TG BLW FLOOD RAMP	2
5/4/2010 11:26	14541	11.54	2.5	7.25	12	RR TG ABV FLOOD RAMP	3
5/4/2010 11:52	12374	9.41	9.91	7.47	13.1	RR CHL ABV TG ABV FLOOD RAMP	4
5/4/2010 12:17	6128	3.97	11.61	7.87	17.3	RR UPR TG	5
5/4/2010 12:42	3252	2	13.16	7.99	17.8	RR PIKE MINNOW TG	6

Appendix B. California Department of Fish and Game Field Note: Tidewater goby survey of tributaries to the Salt River at Riverside Ranch conducted September 8, 2010

Field Note: Tidewater Goby survey of tributaries to the Salt River at Riverside Ranch conducted September 8, 2010

Author: Allan Renger California Department of Fish and Game 1487 Sandy Prairie Ct Suite A, Fortuna CA, 95540, (707) 725-7194 arenger@dfg.ca.gov

Sampling was conducted 9/8/2010 by Allan Renger and Adam Frimodig from the California Department of Fish and Game, Patrick Scott and Brett Leonard from the Americorp Watershed Stewards Project, and Tim Anderson from the California Conservation Corps. The survey consisted of 1.5m X 3m fine mesh pole seine and fine mesh dip net sampling at four locations (Figure 1).

Site 1-C Sampling at the site consisted of six seine hauls in the ditch area upstream of the tide gate and 120 minutes of dip netting in the ditch area upstream of the tide gate and in a small tributary to the ditch. Three spine stickle back were captured by seine and dip net. No tidewater goby were captured.

Site 2 Sampling at this site consisted of five seine hauls in the pool and small channel downstream of the tide gate and 120 minutes of dip netting up and downstream of the tidegate. Threespine stickleback was captured above and below the tidegate and bayshrimp were captured below the tide gate. No tidewater goby were captured.

Site 4-D Sampling at this site consisted of five seine hauls in the pool and small channel downstream of the tide gate and 120 minutes of dip netting up and downstream of the tidegate. Threespine stickleback and staghorn sculpin were captured above and below the tidegate, and bay shrimp were captured below the tide gate. No tidewater goby were captured.

Site 5-B Sampling at this site consisted of nine seine hauls in the channel upstream of the tide gate and 120 minutes of dip netting upstream of the tidegate. Threespine stickleback and bay shrimp were captured at this site. No tidewater goby were captured.

Figure 1

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Proposed locations of additional tidewater goby protocol surveys for Riverside Ranch
Riverside Ranch (3117-04)
August 2010