United States Department of the Interior

FISH AND WILDLIFE SERVICE

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DEC 0 1 2004

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(Attn.: Ms. Jane M. Hicks)
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Long fm
Aug 1 - Nov. 30
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5-10
Aug 1 - Oct. 31st

Colonel Ronald N. Light
District Engineer
(Attn.: Mr. Michael Finan)
U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, California 95814

Subject: Formal Programmatic Consultation on the Issuance of Section 10 and 404 Permits for Projects with Relatively Small Effects on the Delta Smelt *(Hypomesus transpacificus)* and its Critical Habitat within the Jurisdiction of the Sacramento Fish and Wildlife Office of the U.S. Fish and Wildlife Service, California

Dear Colonel Light and Lt. Colonel Feir:

This document represents the U.S. Fish and Wildlife Service's (Service's) programmatic biological opinion (Programmatic) on the issuance of section 10 and 404 permits by the U.S. Army Corps of Engineers (Corps) for projects with relatively small effects on the threatened delta smelt (*Hypomesus transpacificus*) and its critical habitat within the jurisdiction of the Sacramento Field Office of the Service, in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act). The geographic scope of this Programmatic consultation is the area within the jurisdiction of the Sacramento Fish and Wildlife Office of the Service. This area encompasses the entire range of the delta smelt and its entire designated critical habitat.

This document supercedes the Service's October 6, 1997, *Formal Programmatic Consultation and Conference on the Reauthorized Department of the Army's Nationwide and Regional General Permit Program within the "Legal Delta"* (Corps Regulatory Branch Number 199700173) (Service file No. 1-1-97-F-0091).

The following sources of information were used to develop this biological opinion: (1) numerous meetings, e-mails and telephone discussions with Corps staff; (2) references cited in this biological opinion; and (3) other information available to the Service.

This Programmatic does not exempt the Corps from their section 7 responsibilities, for any projects which may affect other listed species including, but not limited to, giant garter snake or be part of a larger project which may affect any species, other than the species covered under this Programmatic, protected pursuant to the Act. Such activities include, but are not limited to, the placement of dredged material on upland habitat, levee maintenance (including placement of material or removal of vegetation) above Mean High Water mark, any projects changing water diversion rates or points of diversion, and residential, commercial, or municipal development. The Corps shall submit the applicable information regarding the project and, if appropriate, request the Service to append the project to this Programmatic. For specific details regarding the implementation of this Programmatic, see the "Implementing Procedures" contained within this document.

Projects That Do Not Require Consultation

The Service has determined that the following proposed projects are not likely to adversely affect delta smelt and are not likely to adversely affect, modify, or destroy delta smelt critical habitat. These projects do not require consultation with the Service.

Aids to Navigation. The placement of aids to navigation and regulatory markers which are approved by and installed in accordance with the requirements of the U.S. Coast Guard.

Structures in Artificial Canals. Structures constructed in artificial canals within principally residential developments where the connection of the canal to a navigable water of the U. S. has been previously authorized.

Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities. Fish and wildlife harvesting devices and activities such as pond nets, crab traps, crab dredging, eel pots, lobster traps, duck blinds, clam and oyster digging; and small fish attraction devices such as open water fish concentrators (sea kites, etc.). This includes shellfish seeding provided this activity does not occur in wetlands or sites that support submersed aquatic vegetation (including sites where submerged aquatic vegetation is documented to exist, but may not be present in a given year). This excludes artificial reefs or impoundments and semi-impoundments of water of the United States for the culture or holding of motile species such as lobster, or the use of covered oyster trays or clam racks.

Scientific Measurement Devices. Devices whose purpose is to measure and record scientific data

such as staff gages, tide gates, water recording devices, water quality testing and improvement devices and similar structures. Small weirs and flumes constructed primarily to record water quality and velocity are also authorized provided the discharge is limited to 25 cubic yards. Activities that are active in nature (*i.e.*, a signal is emitted) such as acoustic barriers are excluded.

Mooring Buoys. Non-commercial, single-boat mooring buoys.

Temporary Recreational Structures. Temporary buoys, markers, small floating docks, and similar structures placed for recreational use during specific events such as water skiing competitions and boat races or seasonal use provided that such structures are removed within 30 days after use has been discontinued.

Oil Spill Cleanup. Activities required for the containment and cleanup of oil and hazardous substances which are subject to the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300) provided that the work is done in accordance with the Spill Control and Countermeasure Plan required by 40 CFR Part 112.3 and any existing State contingency plan and provided that the Regional Response Team (if one exists in the area) concurs with the proposed containment and cleanup action.

Cleanup of Hazardous and Toxic Waste. Specific activities required to effect the containment, stabilization, or removal of hazardous or toxic waste materials that are performed, ordered, or sponsored by a government agency with established legal or regulatory authority. Court ordered remedial action plans or related settlements are also included. This excludes the establishment of new disposal sites or the expansion of existing sites used for the disposal of hazardous or toxic waste.

Definitions

Shaded Riverine Aquatic Cover. The near-shore aquatic area occurring at the interface of the river and adjacent woody riparian habitat, where the river bank is composed of eroding, earthen substrate supporting riparian vegetation which overhangs and/or protrudes into the water, and the water may contain woody debris, including logs, branches, leaves, and roots, as well as variable depths, velocities and currents.

Shallow Water Habitat. The Service has defined this element of delta smelt habitat as all waters between Mean High Water and 3-meters below Mean Lower Low Water Mark. All waters with depths less than 3-meters at any given time are within the photic zone and are highly productive. These areas are considered suitable habitat for delta smelt and are both vegetated and un-vegetated, including areas where rock riprap may have once been applied. Critical habitat for delta smelt encompasses this definition but is not exclusive of shallow water habitat.

Conservation Bank Credits. The Service believes that the permanent and temporal loss of habitat from projects associated with the Programmatic can be offset through purchase of similar habitat value credits from a Service-approved conservation bank. To offset all adverse effects resulting from the project, the applicant should purchase three credits for every one unit of effect. For

example: for each acre of loss or shading of shallow water habitat, an applicant purchases three acres of shallow water habitat credits from a Service-approved conservation bank.

Shadow Zone. This is the shadow created by a structure placed over or in the waterways of the Delta within the shallow water habitat zone. This causes a loss of productivity and loss, prevention or thinning of the aquatic vegetation. The footprint of the structure shall be used to calculate the shadow zone and to offset all adverse effects resulting from the project. For example: A boat dock with a surface area of 400-square-feet (40-feet by 10-feet) will need to preserve, create or restore 1200-square-feet (a 3:1 ratio) of shallow water habitat.

Delta Smelt Zones

For purposes of this Programmatic, the range of the delta smelt is divided into three zones:

Central Zone: The Central Zone is defined as all delta smelt habitat east of the Interstate 80 Bridge over the Carquinez Strait and south of the City of Sacramento's I Street Bridge over the Sacramento River. The Central Zone contains all of the "Legal Delta" as defined by Section 12220 of the Water Code) and the entire designated critical habitat for delta smelt.

North Zone: The North Zone is defined as all delta smelt habitat in the Sacramento River north of the City of Sacramento's I Street Bridge over the Sacramento River.

West Zone: The West Zone is defined as all delta smelt habitat west of the Interstate 80 Bridge over the Carquinez Strait. The West Zone includes the Napa River, Napa Marsh, and San Pablo Bay.

Programmatic Consultation Guidelines

The purpose of this Programmatic is to expedite consultations on proposed projects with relatively small impacts to the delta smelt and its designated critical habitat. In order to append a proposed project to this Programmatic, the following conditions must be met prior to initiation of work:

1. For proposed projects which <u>will not</u> result in the loss or shading of shallow water habitat:

    a. The Corps will restrict in-water work to the following work windows:

        i. August 1st thought November 30th in the Central Zone.

        ii. July 1st thought November 30th in the North Zone.

        iii. August 1st through January 31st in the West Zone.

2. For proposed projects which will result in the loss or shading of shallow water habitat:

   a. The Corps will restrict in-water work to the following work windows:
      i. August 1st thought November 30th in the Central Zone.

      ii. July 1st thought November 30th in the North Zone.

   b. The Corps will ensure preservation, creation or restoration of shallow water habitat occur at a 3:1 ratio (For example, for every one acre of shallow water habitat lost or shaded, three acres will be preserved, created or restored).

   c. Due to insufficient data on the status of delta smelt in the West Zone, this Programmatic does not apply to projects which will result in the loss or shading of shallow water habitat in the West Zone.

3. The proposed project cannot be part of a larger project.

4. The proposed project cannot affect federally listed species or critical habitats not covered under this Programmatic.

Implementing Procedure

The following process will be followed to append future proposed projects to this Programmatic:

A. The Corps will, upon receipt of a project proposal, send a letter to the Service with a request for appending the project to this Programmatic and all of the information necessary to initiate formal consultation on the project as outlined in the regulations governing interagency consultations (50 CFR 402.14).

B. The Service shall respond, in letter or electronic mail format, within 45 days with a determination that 1) the project satisfies the guidelines and will be appended to the Programmatic; 2) the project does not satisfy the guidelines and would require a separate consultation pursuant to the Act; or 3) the project is not likely to adversely affect any listed species. Any additional conditions to a specific project will be detailed in the Service's response. The Service will detail in the response any reasons why a project fails to satisfy the guidelines.

C. Should the Service make a determination that the project does not satisfy the Programmatic consultation guidelines of this Programmatic, the Corps should request separate consultation pursuant to the Act for the project.

BIOLOGICAL OPINION

Description of the Proposed Action

The types of proposed projects with relatively small effects on the threatened delta smelt and its critical habitat can be divided into two categories: 1) those which will not result in the loss or shading of shallow water habitat and 2) those which will result in the loss or shading of shallow water habitat. The following is a description of the proposed projects which can be appended to this Programmatic:

Proposed Projects Which Will Not Result in the Loss or Shading of Shallow Water Habitat

Maintenance. The repair, rehabilitation, or replacement of any previously authorized, currently serviceable, structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification and no discharge of dredged or fill material occurs. Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, or current construction codes or safety standards which are necessary to make repair, rehabilitation, or replacement, are permitted, provided the environmental effects resulting from such a repair, rehabilitation, or replacement are minimal (*i.e.*, repair, rehabilitation, or replacement of piers, dolphins, boat docks or levees where existing riprap occurs and no woody riparian or aquatic vegetation has become established). Currently serviceable means useable as is or with some maintenance, but not so degraded as to essentially require reconstruction. This includes the repair, rehabilitation, or replacement of those structures destroyed by storms, floods, fire, or other discrete events, provided the repair, rehabilitation, or replacement is commenced or under contract to commence within two years of the date of their destruction or damage. In cases of catastrophic events, such as hurricanes or tornadoes, this two-year limit may be waved, provided the permittee can demonstrate funding, contract, or other similar delays. Maintenance dredging and beach restoration are excluded.

Survey Activities. Survey activities including core sampling, seismic exploratory operations, plugging of seismic shot holes and other exploratory-type bore holes, soil survey and sampling, and historic resources surveys. Discharges and structures associated with the recovery of historic resources are excluded. Drilling and the discharge of excavated material from test walls for oil and gas exploration is excluded; the plugging of such wells is included. Fill placed for roads, pads and other similar activities are excluded. This also excludes any permanent structures.

Utility Line Discharges. Discharges of dredged or fill material associated with excavation, backfill or bedding for utility lines, including outfall and intake structures, provided there is no change in preconstruction contours. A "utility line" is defined as any pipe or pipeline for the transportation of any gaseous, liquid, liquefiable, or slurry substance, for any purpose, and any cable, line, or wire for the transmission for any purpose of electrical energy, telephone and telegraph messages, and radio and television communication. The term "utility line" does not include activities which drain a water of the United States, such as drainage tile; however, it does apply to pipes conveying drainage from another area. This includes mechanized land clearing necessary for the installation of the utility lines, including overhead utility lines, provided the

cleared area is kept to the minimum necessary and preconstruction contours are maintained. However, access roads, temporary or permanent, or foundations associated with overhead utility lines are excluded, nor may any of the above stated activities occur within a special aquatic site (*i.e.*, a wetland).

Removal of Vessels. Temporary structures or minor discharges of dredged or fill material required for the removal of wrecked, abandoned, or disabled vessels, or the removal of man-made obstructions to navigation. This excludes maintenance dredging, shoal removal, or river bank snagging.

Modifications of Existing Marinas. Reconfiguration of existing docking facilities within an authorized marina area. This excludes dredging, additional slips or dock spaces, or expansion of any kind within waters of the United States.

Temporary Construction, Access and Dewatering. Temporary structures, work and discharges, including cofferdams, necessary for construction activities or access fills or dewatering of construction sites; provided that the associated primary activity is authorized by the Corps or the U.S. Coast Guard (Coast Guard), or for other construction activities not subject to Corps or Coast Guard regulations. Appropriate measures must be taken to maintain near normal downstream flows and to minimize flooding. Fill must be of materials, and placed in a manner, that will not be eroded by expected high flows. The use of dredged material may be allowed if it is determined by the District Engineer that it will not cause more than minimal adverse effects on aquatic resources. Temporary fill must be entirely removed to upland areas, or dredged material returned to its original location, following completion of the construction activity, and the affected areas must be restored to the pre-project conditions. Cofferdams cannot be used to dewater wetlands or other aquatic areas so as to change their use.

Dredging. Dredging in shallow water where final depth shall be less than 3-meters below Mean Lower Low Water Mark, and dredging in waters deeper than 3-meters below Mean Lower Low Water Mark.

Proposed Projects Which Will Result in the Loss or Shading of Shallow Water Habitat

Outfall Structures. Activities related to construction of outfall structures and associated intake structures where effluent from the outfall is authorized, conditionally authorized, or specifically exempted, or are otherwise in compliance with regulations issued under the National Pollutant Discharge Elimination System program (Section 402 of the Clean Water Act). Intake structures per se are not included; only those directly associated with an outfall structure.

Bank Stabilization. Bank stabilization activities necessary for erosion prevention, provided no material is placed in an area where woody riparian or aquatic vegetation has become established, and the activity meets all the following criteria:

a. No material is placed in excess of the minimum needed for erosion protection;

b. The bank stabilization activity is less than 500 feet in length;

c. No material is placed in any special aquatic site, including wetlands;

d. No material is of the type, or is placed in any location, or in any manner, so as to impair surface water flow into or out of any wetland area;

e. No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored trees and treetops may be used in low energy areas); and

f. The activity is part of a single and complete project.

The Service considers that *Bank Stabilization* would apply to bank stabilization activities where currently serviceable riprap does not occur. Projects proposing to repair, rehabilitate, or replace currently serviceable or recently destroyed riprap are considered maintenance by the Service and would be appended to this Programmatic the same as *Maintenance*, described above.

Road Crossing. Fills for roads crossing waters of the United States, including wetlands and other special aquatic sites, provided the activity meets all the following criteria:

a. The crossing is culverted, bridged or otherwise designed to prevent the restriction of, and to withstand, expected high flows, tidal flows, and low flows and allows the movement of aquatic organisms;

b. The width of the fill is limited to the minimum necessary for the actual crossing;

c. The crossing, including all attendant features, both temporary and permanent, is part of a single and complete project for crossing of a water of the United States;

d. The crossing does not affect woody riparian or aquatic vegetation; and

e. The fill placed in water of the United States is limited to a filled area of no more than 1/3 acre. Furthermore, no more than a total of 200 linear feet of the fill for the roadway can occur in special aquatic sites, including wetlands.

Boat Ramps. Activities required for the construction of boat ramps provided:

a. The discharge into waters of the United States does not exceed 50 cubic yards of concrete, rock, crushed stone or gravel into precast forms, or placement of precast concrete planks or slabs. (Unsuitable material that causes unacceptable chemical pollution or is structurally unstable is not authorized);

b. The boat ramp does not exceed 20 feet in width;

c. The base material is crushed stone, gravel or other suitable material;

d. The excavation is limited to the area necessary for site preparation, the site is not a special aquatic site, and all excavated material is removed to an upland site; and

e. No material is placed in special aquatic sites, including wetlands.

Boat Docks. The construction of one or more covered or uncovered boat docks.

Conversion of Shallow Water to Deep Water. Dredging shallow water habitat, defined as all waters between Mean High Water and 3-meters below Mean Lower Low Water Mark, to a depth greater than 3-meters below Mean Lower Low Water Mark.

Status of the Species

Delta smelt

Delta smelt was federally listed as a threatened species on March 5, 1993, (58 **FR** 12854) (Service 1993). Critical habitat for delta smelt was designated on December 19, 1994, (59 FR 65256) (Service 1994a). The Sacramento-San Joaquin Delta Native Fishes Recovery Plan was completed in 1996 (Service 1996). The Five Year Status Review for the delta smelt was completed on March 31, 2004 (Service 2004).

Description: Delta smelt are slender-bodied fish that typically reach 60-70 mm standard length (measured from tip of the snout to origin of the caudal fin), although a few may reach 120 mm standard length. The mouth is small, with a maxilla that does not extend past the midpoint of the eye. The eyes are relatively large, with the orbit width contained approximately 3.5-4 times in the head length. Small, pointed teeth are present on the upper and lower jaws. The first gill arch has 27-33 gill rakers and there are 7 branchiostegal rays (paired structures on either side and below the jaw that protect the gills). Counts of branchiostegal rays are used by taxonomists to identify fish. The pectoral fins reach less than two-thirds of the way to the bases of the pelvic fins. There are 9-10 dorsal fin rays, 8 pelvic fin rays, 10-12 pectoral fin rays, and 15-17 anal fin rays. The lateral line is incomplete and has 53-60 scales along it. There are 4-5 pyloric caeca. Live fish are nearly translucent and have a steely-blue sheen to their sides. Occasionally there may be one chromatophore (cellular organelle containing pigment) between the mandibles, but usually there is none. Delta smelt belong to the family Osmeridae, a more ancestral member of the order Salmoniformes which also includes the family Salmonidae (salmon, trout, whitefish, and graylings) (Molye and Cech 1988).

Distribution: Delta smelt are endemic to the upper Sacramento-San Joaquin estuary. They occur in the Delta primarily below Isleton on the Sacramento River, below Mossdale on the San Joaquin River, and in Suisun Bay. They move into freshwater when spawning (ranging from January to July) and can occur in: (1) the Sacramento River as high as the confluence with the Feather River, (2) the Mokelumne River system, (3) the Cache Slough region, (4) the Delta, and, (5) Montezuma Slough, (6) Suisun Bay, (7) Suisun Marsh, (8) Carquinez Strait, (9) Napa River, (10) Napa Marsh, and 11) San Pablo Bay. It is not known if delta smelt in San Pablo Bay are a permanent population or if they are washed into the Bay during high outflow periods. Since

1982, the center of delta smelt abundance has been the northwestern Delta in the channel of the Sacramento River. In any month, two or more life stages (adult, larvae, and juveniles) of delta smelt have the potential to be present in Suisun Bay (Department of Water Resources (DWR)

and the Bureau of Reclamation (Reclamation) 1994; Molye 1976; and Wang 1991). Delta smelt are also captured seasonally in Suisun Marsh.

Habitat Requirements: Delta smelt are euryhaline (a species that tolerates a wide range of salinities) fish that generally occur in water with less than 10-12 parts per thousand (ppt) salinity. However, delta smelt have been collected in the Carquinez Strait at 13.8 ppt and in San Pablo Bay at 18.5 ppt (DFG 2000). In recent history, they have been most abundant in shallow areas where early spring salinities are around 2 ppt. However, prior to the 1800's before the construction of levees that created the Delta Islands, a vast fluvial marsh existed in the Delta and the delta smelt probably reared in these upstream areas. During the recent drought (1987-92), delta smelt were concentrated in deep areas in the lower Sacramento River near Emmaton, where average salinity ranged from 0.36 to 3.6 ppt for much of the year (DWR and Reclamation 1994). During years with wet springs (such as 1993), delta smelt may continue to be abundant in Suisun Bay during summer even after the 2 ppt isohaline (an artificial line denoting changes in salinity in a body of water) has retreated upstream (Sweetnam and Stevens 1993). Fall abundance of delta smelt is generally highest in years when salinities of 2 ppt are in the shallows of Suisun Bay during the preceding spring ($p < 0.05$, $r = 0.50$) (Herbold 1994) (p is a statistical abbreviation for the probability of an analysis showing differences between variables, r is a statistical abbreviation for the correlation coefficient, a measure of the linear relationship of two variables). Herbold (1994) found a significant relationship between number of days when 2 parts per thousand was in Suisun Bay during April with subsequent delta smelt abundance ($p < 0.05$, $r = 0.49$) (Figure 2.2), but noted that autocorrelations (interactions among measurements that make relationships between measurements difficult to understand) in time and space reduce the reliability of any analysis that compares parts of years or small geographical areas. It should also be noted that the point in the estuary where the 2 ppt isohaline is located (X2) does not necessarily regulate delta smelt distribution in all years. In wet years, when abundance levels are high, their distribution is normally very broad. In late 1993 and early 1994, delta smelt were found in Suisun Bay region despite the fact that X2 was located far upstream. In this case, food availability may have influenced delta smelt distribution, as evidenced by the *Eurytemora* found in this area by DFG. In Suisun Marsh, delta smelt larvae occur in both large sloughs and small dead end sloughs. New studies are under way to test the hypothesis that adult fall abundance is dependent upon geographic distribution of juvenile delta smelt.

Critical thermal maxima for delta smelt was reached at 25.4 degrees Celsius in the laboratory (Swanson et al., 2000); and at water temperatures above 25.6 degrees Celsius delta smelt are no longer found in the delta (DFG, pers. comm.).

Life History: Wang (1986) reported spawning taking place in fresh water at temperatures of about 7º-15º Celsius (C). However, ripe delta smelt and recently hatched larvae have been collected in recent years at temperatures of 15º-22º C, so it is likely that spawning can take place over the entire 7º-22º C range. Temperatures that are optimal for survival of embryos and larvae

have not yet been determined, although R. Mager, UCD, (unpublished data) found low hatching success and embryo survival from spawns of captive fish collected at higher temperatures. Delta smelt of all sizes are found in the main channels of the Delta and Suisun Marsh and the open waters of Suisun Bay where the waters are well oxygenated and temperatures relatively cool, usually less than 20º-22º C in summer. When not spawning, they tend to be concentrated near the zone where incoming salt water and out flowing freshwater mix (mixing zone). This area has the highest primary productivity and is where zooplankton populations (on which delta smelt feed) are usually most dense (Knutson and Orsi 1983; Orsi and Mecum 1986). At all life stages delta smelt are found in greatest abundance in the top 2 m of the water column and usually not in close association with the shoreline.

Delta smelt inhabit open, surface waters of the Delta and Suisun Bay, where they presumably school. In most years, spawning occurs in shallow water habitats in the Delta. Shortly before spawning, adult smelt migrate upstream from the brackish-water habitat associated with the mixing zone to disperse widely into river channels and tidally-influenced backwater sloughs (Radtke 1966; Moyle 1976, 2002; Wang 1991). Migrating adults with nearly mature eggs were taken at the Central Valley Projects' (CVP) Tracy Pumping Plant, located in the south Delta, from late December 1990 to April 1991 (Wang 1991). In February 2000, gravid adults were found at both CVP and the State Water Projects' (SWP) fish facilities in the south Delta. Spawning locations appear to vary widely from year to year (DWR and Reclamation 1993). Sampling of larval smelt in the Delta suggests spawning has occurred in the Sacramento River, Barker, Lindsey, Cache, Georgiana, Prospect, Beaver, Hog, and Sycamore sloughs, in the San Joaquin River off Bradford Island including Fisherman's Cut, False River along the shore zone between Frank's and Webb tracts, and possibly other areas (Wang 1991). In years of moderate to high Delta outflow, smelt larvae are often most abundant in Suisun Bay and sloughs of Suisun Marsh, but it is not clear the degree to which these larvae are produced by locally spawning fish and the degree to which they originate upstream and are transported by river currents to the bay and marsh. Some spawning probably occurs in shallow water habitats in Suisun Bay and Suisun Marsh during wetter years (Sweetnam 1999 and Wang 1991). Spawning has also been recorded in Montezuma Slough near Suisun Bay (Wang 1986) and also may occur in Suisun Slough in Suisun Marsh (P. Moyle, UCD, unpublished data).

The spawning season varies from year to year, and may occur from late winter (December) to early summer (July). Pre-spawning adults are found in Suisun Bay and the western delta as early as September (DWR and Reclamation 1994). Moyle (1976, 2002) collected gravid adults from December to April, although ripe delta smelt were common in February and March. In 1989 and 1990, Wang (1991) estimated that spawning had taken place from mid-February to late June or early July, with peak spawning occurring in late April and early May. A recent study of delta smelt eggs and larvae (Wang and Brown 1993 as cited in Water Resources and Reclamation 1994) confirmed that spawning may occur from February through June, with a peak in April and May. Spawning has been reported to occur at water temperatures of about 7° to 15° C. Results from a University of California at Davis (UCD) study (Swanson and Cech 1995) indicate that although delta smelt tolerate a wide range of temperatures (<8° C to >25° C), warmer water temperatures restrict their distribution more than colder water temperatures.

Delta smelt spawn in shallow, fresh, or slightly brackish water upstream of the mixing zone (Wang 1991). Most spawning occurs in tidally-influenced backwater sloughs and channel edgewaters (Moyle 1976, 2002; Wang 1986, 1991; Moyle *et al.* 1992). Although delta smelt spawning behavior has not been observed in the wild (Moyle *et al.* 1992), some researchers believe the adhesive, demersal eggs attach to substrates such as cattails, tules, tree roots, and submerged branches in shallow waters (Moyle 1976, 2002; Wang 1991).

Laboratory observations have indicated that delta smelt are broadcast spawners (DWR and Reclamation 1994) and eggs are demersal (sinks to the bottom) and adhesive, sticking to hard substrates such as: rock, gravel, tree roots or submerged branches, and submerged vegetation (Moyle 1976, 2002; Wang 1986). At 14º-16º C, embryonic development to hatching takes 9 -14 days and feeding begins 4-5 days later (R. Mager, UCD, unpublished data). Newly hatched delta smelt have a large oil globule that makes them semi-buoyant, allowing them to maintain themselves just off the bottom (R. Mager, UCD, unpublished data), where they feed on rotifers (microscopic crustaceans used by fish for food) and other microscopic prey. Once the swimbladder (a gas-filled organ that allows fish to maintain neutral buoyancy) develops, larvae become more buoyant and rise up higher into the water column. At this stage, 16-18 mm total length, most are presumably washed downstream until they reach the mixing zone or the area immediately upstream of it. Growth is rapid and juvenile fish are 40-50 mm long by early August (Erkkila *et al.* 1950; Ganssle 1966; Radtke 1966). By this time, young-of-year fish dominate trawl catches of delta smelt, and adults become rare. Delta smelt reach 55-70 mm standard length in 7-9 months (Moyle 1976, 2002). Growth during the next 3 months slows down considerably (only 3-9 mm total), presumably because most of the energy ingested is being directed towards gonadal development (Erkkila *et al.* 1950; Radtke 1966). There is no correlation between size and fecundity, and females between 59-70 mm standard lengths lay 1,200 to 2,600 eggs (Moyle *et al.* 1992). The abrupt change from a single-age, adult cohort during spawning in spring to a population dominated by juveniles in summer suggests strongly that most adults die after they spawn (Radtke 1966 and Moyle 1976, 2002). However, in El Nino years when temperatures rise above 18º C before all adults have spawned, some fraction of the unspawned population may also hold over as two-year-old fish and spawn in the subsequent year. These two-year-old adults may enhance reproductive success in years following El Nino events.

In a near-annual fish like delta smelt, a strong relationship would be expected between number of spawners present in one year and number of recruits to the population the following year. Instead, the stock-recruit relationship for delta smelt is weak, accounting for about a quarter of the variability in recruitment (Sweetnam and Stevens 1993). This relationship does indicate, however, that factors affecting numbers of spawning adults (*e.g.*, entrainment, toxics, and predation) can have an effect on delta smelt numbers the following year.

Delta smelt feed primarily on (1) planktonic copepods (small crustaceans used by fish for food), (2) cladocerans (small crustaceans used by fish for food), (3) amphipods (small crustaceans used by fish for food) and, to a lesser extent, (4) on insect larvae. Larger fish may also feed on the opossum shrimp, *Neomysis mercedis*. The most important food organism for all sizes seems to be the euryhaline copepod, *Eurytemora affinis*, although in recent years the exotic species, *Pseudodiaptomus forbesi*, has become a major part of the diet (Moyle *et al.* 1992). Delta smelt

are a minor prey item of juvenile and subadult striped bass, *Morone saxatilis*, in the Sacramento-San Joaquin Delta (Stevens 1966). They also have been reported from the stomach contents of white catfish, *Ameiurus catus*, (Turner 1966 *in* Turner and Kelley (eds) 1966) and black crappie, *Pomoxis nigromaculatus*, (Turner 1966 *in* Turner and Kelley 1966) in the Delta.

Abundance: The smelt is endemic to Suisun Bay upstream of San Francisco Bay and throughout the Delta, in Contra Costa, Sacramento, San Joaquin, Solano and Yolo counties, California. Historically, the smelt is thought to have occurred from Suisun Bay and Montezuma Slough, upstream to at least Verona on the Sacramento River, and Mossdale on the San Joaquin River (Moyle *et al.* 1992, Sweetnam and Stevens 1993).

Since the 1850s, however, the amount and extent of suitable habitat for the delta smelt has declined dramatically. The advent in 1853 of hydraulic mining in the Sacramento and San Joaquin rivers led to an increase in siltation and the alteration of the circulation patterns of the Estuary (Nichols *et al.* 1986, Monroe and Kelly 1992). The reclamation of Merritt Island for agricultural purposes, in the same year, marked the beginning of the present-day cumulative loss of 94% of the Estuary's tidal marshes (Nichols *et al.* 1986, Monroe and Kelly 1992). The extensive levee system in the Delta has led to a loss of seasonally flooded habitat and significantly changed the hydrology of the Delta ecosystem, restricting the ability of suitable habitat substrates to re-vegetate.

Delta smelt were once one of the most common pelagic (living in open water away from the bottom) fish in the upper Sacramento-San Joaquin estuary, as indicated by its abundance in DFG trawl catches (Erkkila *et al.* 1950; Radtke 1966; Stevens and Miller 1983). Delta smelt abundance from year to year has fluctuated greatly in the past, but between 1982 and 1992 their population was consistently low. The decline became precipitous in 1982 and 1983 due to extremely high outflows and continued through the drought years 1987-1992 (Moyle *et al.* 1992). In 1993, numbers increased considerably, apparently in response to a wet winter and spring. During the period 1982-1992, most of the population was confined to the Sacramento River channel between Collinsville and Rio Vista (D. Sweetnam, DFG unpublished data). This was still an area of high abundance in 1993, but delta smelt were also abundant in Suisun Bay. The actual size of the delta smelt population is not known. However, the pelagic life style of delta smelt, short life span, spawning habits, and relatively low fecundity indicate that a fairly substantial population probably is necessary to keep the species from becoming extinct.

Recreation in the Delta has resulted in the presence and propagation of predatory non-native fish such as striped bass (*Morone saxatilis*). Additionally, recreational boat traffic has led to a loss of habitat from the building of docks and an increase in the rate of erosion resulting from boat wakes. In addition to the loss of habitat, erosion reduces the water quality and retards the production of phytoplankton in the Delta.

In addition to the degradation and loss of estuarine habitat, delta smelt have been increasingly subject to entrainment, upstream or reverse flows of waters in the Delta and San Joaquin River, and constriction of low salinity habitat to deep-water river channels of the interior Delta (Moyle *et al.* 1992). These adverse conditions are primarily a result of the steadily increasing proportion

of river flow being diverted from the Delta by the Projects, and occasional droughts (Monroe and Kelly 1992).

Reduced water quality from agricultural runoff, effluent discharge and boat effluent has the potential to harm the pelagic larvae and reduce the availability of the planktonic food source. When the mixing zone is located in Suisun Bay where there is extensive shallow water habitat within the euphotic zone (depths less than four meters), high densities of phytoplankton and zooplankton may accumulate (Arthur and Ball 1978, 1979, 1980). The introduction of the Asian clam (*Potamocorbula amurensis)*, a highly efficient filter feeder, presently reduces the concentration of phytoplankton in this area.

According to seven abundance indices which provide information on the status of the delta smelt, this species was consistently at low population levels through the 1980's (Stevens *et al.* 1990). These same indices also showed a pronounced decline from historical levels of abundance (Stevens *et al.* 1990).

For a large part of its annual life span, this species is associated with the freshwater edge of the mixing zone, where the salinity is approximately 2 ppt. (Ganssle 1966, Moyle *et al.* 1992, Sweetnam and Stevens 1993). The relationship between the portion of the smelt population west of the Delta as sampled in the summer townet survey and the natural logarithm of Delta outflow from 1959 to 1988, indicates the summer townet index increased dramatically when outflow was between 34,000 and 48,000 cubic feet per second, placing X2 between Chipps and Roe islands (DWR and Reclamation 1994).

Specifically, the summer townet abundance index constitutes one of the more representative indices because the data have been collected over a wide geographic area (from San Pablo Bay upstream through most of the Delta) for the longest period of time (since 1959) (DFG 2001). The summer townet abundance index measures the abundance and distribution of juvenile delta smelt and provides data on the recruitment potential of the species (DFG 2001). Since 1983, (except for 1986, 1993, and 1994), this index has remained at consistently lower levels than previously found (DFG 2001). These consistently lower levels correlate with the 1983 to 1992 mean location of X2 upstream of the confluence (DFG 2001).

The final summer townet index for 2000 was 8.0, a decline from the 11.9 index for the 1999 summer townet (DFG 2001). Both of these indices represent an increase from the 1998 index of 3.3. However, both 1999 and 2000 indices are still below the pre-decline average of 20.4 (1959-1981, no sampling in 1966-1968) (DFG 2001).

The second longest running survey (since 1967), the fall midwater trawl survey (FMWT), measures the abundance and distribution of late juveniles and adult delta smelt in a large geographic area from San Pablo Bay upstream to Rio Vista on the Sacramento River and Stockton on the San Joaquin River (Stevens *et al.* 1990, DFG 1999). The FMWT indicates the abundance of the adult population just prior to upstream spawning migration (DFG 1999). The index calculated from the FMWT uses numbers of sampled fish multiplied by a factor related to the volume of the area sampled (DFG 1999). Until recently, except for 1991, this index has

declined irregularly over the past 20 years (DFG 1999). Since 1983, the delta smelt population has exhibited more low FMWT abundance indices, for more consecutive years, than previously recorded (DFG 1999). The 1994 FMWT index of 101.2 was a continuation of this trend (DFG 1999). This occurred despite the high 1994 summer townet index for reasons unknown (DFG 1999). The low 1995 summer townet index value of 3.3 was followed by a high FMWT index of 839 reflecting the benefits of higher flows due to an extremely wet year (DFG 1999, 2001).

The 1999 FMWT index of 717, which is an increase from 1998's index (417.6), is the third highest since the start of decline of delta smelt abundance in 1982 (DFG 1999). The FMWT abundance index (127) for 1996 represented the fourth lowest on record (DFG 1999). The 1997 abundance index (360.8) almost tripled since the 1996 survey, despite the low summer townet index (4.0) (DFG 1999, 2001).

Both 2001 TNS and FMWT abundance indices for delta smelt decreased from 2000 (Souza and Bryant 2002, DFG 1999 and 2001). The 2001 TNS delta smelt index (3.5) is less than 1999 (11.9) and 2000 (8.0) but comparable to recent years (1995, 1997, and 1998) when the index ranged from 3.2 to 4.0 (Souza and Bryant 2002, DFG 2001). The 2001 FMWT delta smelt index (603) decreased by 20% from 2000 (756) (Souza and Bryant 2002, DFG 2001). Both surveys exhibited an overall trend of decline in the last three years, but this decline seems more pronounced in the TNS where the 2001 delta smelt index is 95% lower than the greatest index of record (62.5) in 1978 (Souza and Bryant 2002, DFG 2001).

Swimming Behavior: Observations of delta smelt swimming in a swimming flume and in a large tank show that these fish are unsteady, intermittent, slow speed swimmers (Swanson and Cech 1995). At low velocities in the swimming flume (<3 body lengths per second), and during spontaneous, unrestricted swimming in a 1 m tank, smelt consistently swam with a "stroke and glide" behavior. This type of swimming is very efficient; Weihs (1974) predicted energy savings of about 50% for "stroke and glide" swimming compared to steady swimming. However, the maximum speed smelt are able to achieve using this mode of swimming is less than 3 body lengths per second, and the fish did not readily or spontaneously swim at this or higher speeds (Swanson and Cech 1995). Although juvenile delta smelt appear to be stronger swimmers than adults, forced swimming at 3 body lengths per second in a swimming flume was apparently stressful; the smelt were prone to swimming failure and extremely vulnerable to impingement (Swanson and Cech 1995). Delta smelt swimming performance was limited by behavioral rather than physiological or metabolic constraints (Brett 1976).

Summary of the Five Year Review: In summary, the threats of the destruction, modification, or curtailment of its habitat or range resulting from extreme outflow conditions, the operations of the State and Federal water projects, and other water diversions as described in the original listing remain. The only new information concerning the delta smelt's population size and extinction probability indicates that the population is at risk of falling below an effective population size and therefore in danger of becoming extinct. Although VAMP and Environmental Water Account have helped to ameliorate these threats, it is unclear how effective these will continue to be over time based on available funding and future demands for water. In addition, there are increased water demands outside the CVP and the SWP, which could also

impact delta smelt. The increases in water demands are likely to result in less suitable rearing conditions for delta smelt in Suisun Marsh, increased vulnerability to entrainment, and less water available for maintaining the position of X2. The importance of exposure to toxic chemicals on the population of delta smelt is highly uncertain. Therefore, a recommendation to delist the delta smelt is inappropriate.

In addition, many potential threats have not been sufficiently studied to determine their effects, such as predation, disease, competition, and hybridization. Therefore, a recommendation of a change in classification to endangered is premature.

In his August 24, 2003, letter, the foremost delta smelt expert, Dr. Peter B. Moyle, stated that the delta smelt should continue to be listed as a threatened species (Moyle 2003). In addition, in their January 23, 2004, letter, DFG fully supported that the delta smelt should retain its threatened status under the Act (DFG 2004).

There are recent records of the delta smelt from the action area. Therefore, the Service Therefore, the Service believes that the San Joaquin kit fox is reasonably certain to occur within the action area given the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the action area, as well as the recent records of this listed fish.

Delta Smelt Critical Habitat

In determining which areas to designate as critical habitat, the Service considers those physical and biological features that are essential to a species' conservation and that may require special management considerations or protection (50 CFR §424.12(b)).

The Service is required to list the known primary constituent elements together with the critical habitat description. Such physical and biological features include, but are not limited to, the following:

1. space for individual and population growth, and for normal behavior;

2. food, water, air, light, minerals, or other nutritional or physiological requirements;

3. cover or shelter;

4. sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and

5. generally, habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

In designating critical habitat for the delta smelt, the Service identified the following primary constituent elements essential to the conservation of the species: physical habitat, water, river flow, and salinity concentrations required to maintain delta smelt habitat for spawning, larval and

juvenile transport, rearing, and adult migration. Specific areas that have been identified as important delta smelt spawning habitat include Barker, Lindsey, Cache, Prospect, Georgiana, Beaver, Hog, and Sycamore sloughs and the Sacramento River in the Delta, and tributaries of northern Suisun Bay.

Larval and juvenile transport. Adequate river flow is necessary to transport larvae from upstream spawning areas to rearing habitat in Suisun Bay and to ensure that rearing habitat is maintained in Suisun Bay. To ensure this, X2 must be located westward of the confluence of the Sacramento-San Joaquin Rivers, located near Collinsville (Confluence), during the period when larvae or juveniles are being transported, according to historical salinity conditions. X2 is important because the "entrapment zone" or zone where particles, nutrients, and plankton are "trapped," leading to an area of high productivity, is associated with its location. Habitat conditions suitable for transport of larvae and juveniles may be needed by the species as early as February 1 and as late as August 31, because the spawning season varies from year to year and may start as early as December and extend until July.

Rearing habitat. An area extending eastward from Carquinez Strait, including Suisun, Grizzly, and Honker bays, Montezuma Slough and its tributary sloughs, up the Sacramento River to its confluence with Three Mile Slough, and south along the San Joaquin River including Big Break, defines the specific geographic area critical to the maintenance of suitable rearing habitat. Three Mile Slough represents the approximate location of the most upstream extent of historical tidal incursion. Rearing habitat is vulnerable to impacts of export pumping and salinity intrusion from the beginning of February to the end of August.

Adult migration. Adequate flow and suitable water quality is needed to attract migrating adults in the Sacramento and San Joaquin river channels and their associated tributaries, including Cache and Montezuma sloughs and their tributaries. These areas are vulnerable to physical disturbance and flow disruption during migratory periods.

The Service's 1994 and 1995 biological opinions on the operations of the CVP and SWP provided for adequate larval and juvenile transport flows, rearing habitat, and protection from entrainment for upstream migrating adults (Service 1994b, 1995). Please refer to 59 FR 65255 for additional information on delta smelt critical habitat.

Environmental Baseline

Delta Smelt

Adult delta smelt spawn in central Delta sloughs from February through August in shallow water areas having submersed aquatic plants and other suitable substrates and refugia. These shallow water areas have been identified in the Delta Native Fishes Recovery Plan (Recovery Plan) (Service 1996) as essential to the long-term survival and recovery of delta smelt and other resident fish. A no net loss strategy of delta smelt population and habitat was proposed in this Recovery Plan.

The delta smelt is adapted to living in the highly productive Estuary where salinity varies spatially and temporally according to tidal cycles and the amount of freshwater inflow. Despite this tremendously variable environment, the historical Estuary probably offered relatively consistent spring transport flows that moved delta smelt juveniles and larvae downstream to the mixing zone (Peter Moyle, U.C. Davis pers. comm.). Since the 1850's, however, the amount and extent of suitable habitat for the delta smelt has declined dramatically. The advent in 1853 of hydraulic mining in the Sacramento and San Joaquin rivers led to increased siltation and alteration of the circulation patterns of the Estuary (Nichols et al. 1986, Monroe and Kelly 1992). The reclamation of Merritt Island for agricultural purposes, in the same year, marked the beginning of the present-day cumulative loss of 94 percent of the Estuary's tidal marshes (Nichols *et al.* 1986, Monroe and Kelly 1992).

In addition to the degradation and loss of estuarine habitat, the delta smelt has been increasingly subject to entrainment, upstream or reverse flows of waters in the Delta and San Joaquin River, and constriction of low salinity habitat to deep-water river channels of the interior Delta (Moyle et al. 1992). These adverse conditions are primarily a result of drought and the steadily increasing proportion of river flow being diverted from the Delta by the CVP and SWP (Monroe and Kelly 1992). The relationship between the portion of the delta smelt population west of the Delta as sampled in the summer townet survey and the natural logarithm of Delta outflow from 1959 to 1988 (Department and Reclamation 1994). This relationship indicates that the summer townet index increased dramatically when outflow was between 34,000 and 48,000 cfs which placed X2 between Chipps and Roe islands. Placement of X2 downstream of the Confluence, Chipps and Roe islands provides delta smelt with low salinity and protection from entrainment, allowing for productive rearing habitat that increases both smelt abundance and distribution.

The results of seven surveys conducted by the Interagency Ecological Program (IEP) corroborate the dramatic decline in delta smelt. Existing baseline conditions, as mandated for delta smelt under the Service's consultations on CVP operations (Service 1994b, 1995), provide sufficient Delta outflows from February 1 through June 30 to transport larval and juvenile delta smelt out of the "zone of influence" of the CVP and SWP pumps, and provide them low salinity, productive rearing habitat. This zone of influence has been delineated by DWR's Particle Tracking Model and expands or contracts with CVP and SWP combined pumping increases or decreases, respectively (Department and Reclamation 1993). With tidal effects contributing additional movement, the influence of the pumps may entrain larvae and juveniles as far west as the Confluence.

According to seven abundance indices designed to record trends in the status of the delta smelt, this species was consistently at low population levels during the last ten years (Stevens *et al.* 1990). These same indices also show a pronounced decline from historical levels of abundance (Stevens *et al.* 1990). The summer townet abundance index constitutes one of the more representative indices because the data have been collected over a wide geographic area (from San Pablo Bay upstream through most of the Delta) for the longest period of time (since 1959). The summer townet abundance index measures the abundance and distribution of juvenile delta smelt and provides data on the recruitment potential of the species. Except for three years since 1983 (1986, 1993, and 1994), this index has remained at consistently lower levels than

experienced previously. As indicated, these consistently lower levels correlate with the 1983 to 1992 mean location of X2 upstream of the Confluence, Chipps and Roe islands.

The second longest running survey (since 1967), the fall midwater trawl survey (FMWT), measures the abundance and distribution of late juveniles and adult delta smelt in a large geographic area from San Pablo Bay upstream to Rio Vista on the Sacramento River and Stockton on the San Joaquin River (Stevens *et al.* 1990). The fall midwater trawl provides an indication of the abundance of the adult population just prior to upstream spawning migration. The index that is calculated from the FMWT survey uses numbers of sampled fish multiplied by a factor related to the volume of the area sampled. Until recently, except for 1991, this index has declined irregularly over the past 20 years. Since 1983, the delta smelt population has exhibited more low fall midwater trawl abundance indices, for more consecutive years, than previously recorded. The 1994 FMWT index of 101.7 is a continuation of this trend. This occurred despite the high 1994 summer townet index for reasons unknown. The 1995 summer townet was a low index value of 319 but resulted in a high FMWT index of 898.7 reflecting the benefits of large transport and habitat maintenance flows with the Bay-Delta Accord in place and a wet year. The abundance index of 128.3 for 1996 represented the fourth lowest on record. The abundance index of 305.6 for 1997 demonstrated that the relative abundance of delta smelt almost tripled over last years results, and delta smelt abundance continued to rise, peaking in 1999 to an abundance index of 863, only to fall back down to the low abundance indexes of 139 for 2002 and 213 for 2003.

Delta Smelt Critical Habitat

Delta smelt critical habitat has been affected by activities that destroy spawning and refugial areas and change hydrology patterns in Delta waterways. Critical habitat also has been affected by diversions that have shifted the position of X2 upstream of the confluence of the Sacramento and San Joaquin rivers. This shift has caused a decreased abundance of smelt. Existing baseline conditions and implementation of the Service's 1994 and 1995 biological opinions concerning the operation of the Central Valley Project and the State Water Project, provide a substantial part of the necessary positive riverine flows and estuarine outflows to transport smelt larvae downstream to suitable rearing habitat in Suisun Bay outside the influence of marinas, agricultural diversions, and Federal and State pumping plants.

The demands on surface water resources in the Central Valley have increased. The proposed Freeport Regional Water Project would divert up to 185,000 acre-feet(af)/year of water from a point of diversion north of the delta at Freeport (Freeport Regional Water Authority 2003). The proposed expansion of Los Vaqueros Reservoir would entail an additional 400,000 af of off-stream storage, diverted from the delta using existing facilities as well as new facilities located at Old River and/or Middle River (CALFED 2003a and Reclamation 2003). Reclamation and DWR have proposed to increase pumping capacity at the SWP Banks pumping plant from 6,680 cubic feet per second (cfs) to 8,500 cfs and eventually to 10,300 cfs (CALFED 2002, 2003b). Reclamation and CDWR have also proposed construction of a 400 cfs intertie connecting their aqueducts, which would allow Reclamation to increase the pumping at their Tracy Pumping Plant from 4,200 cfs to 4,600 cfs. The CALFED Bay-Delta Program proposes to expand surface

water storage capacity at existing reservoirs and strategically located off-stream sites by 3.5 million af (including the 400,000 af at Los Vaqueros) by: 1) north of the delta off stream storage; 2) Shasta enlargement; 3) Los Vaqueros Expansion; 4) in-delta storage; and 5) additional storage in the Upper San Joaquin (Friant) (CALFED 2002 and Reclamation 2003). Finally, the City of Stockton proposes to construct a new intake at the southwestern tip of Empire Tract on the San Joaquin River with an ultimate diversion capacity of 371 cfs (Environmental Science Associates 2003). The diversions would likely result in lower delta outflows and increased entrainment.

Effects of the Proposed Action

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statute and the August 6, 2004, Ninth Circuit Court of Appeals decision in *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service* (No. 03-35279) to complete the following analysis with respect to critical habitat.

Proposed actions appended to this Programmatic could detrimentally affect delta smelt by increasing turbidity, increasing noise, reducing water quality, creating predator habitat, restricting channels, and changing water velocities. Resuspended sediments may contain toxic substances which may interfere with the development of young delta smelt. The vegetation upon which delta smelt may depend for egg attachment and refugia may become silted over or removed by the proposed actions. As shallow water habitat is removed and turbidity increased, the delta smelt's feeding, breeding, and sheltering would likely be reduced as food sources associated with the aquatic plants and found in the water column is destroyed, and habitat used for spawning substrate and refugia is eliminated.

The above effects are greatly reduced by the Programmatic's restriction of in-water work to time periods when delta smelt eggs, larvae, and juveniles are not present and delta smelt adults are rarely present or present in low numbers. In addition, the above effects are further greatly reduced by the Programmatic's requirement for the preservation, creation, or restoration of shallow water habitat lost or shaded at a 3:1 ratio.

Cumulative Effects

Delta Smelt and its Critical Habitat

Cumulative effects on the delta smelt and its designated critical habitat include the impacts of point and non-point source chemical contaminant discharges. These contaminants include selenium and numerous pesticides and herbicides associated with discharges related to agricultural and urban activities. Implicated as potential sources of mortality for delta smelt, these contaminants may adversely affect delta smelt reproductive success and survival rates. Spawning habitat may also be affected if submersed aquatic plants used as substrates for adhesive egg attachment are lost due to toxic substances.

Additional cumulative effects may result from any continuing or future non-Federal diversions of

water that may entrain adult or larval fish or that may decrease outflows incrementally, thus shifting the position of the delta smelt's preferred habitat upstream. Water diversions through intakes serving numerous small, private agricultural lands and duck clubs in the Delta, upstream of the Delta, and in Suisun Bay contribute to these cumulative effects. These diversions also include municipal and industrial uses, as well as providing water for power plants. State or local levee maintenance may also destroy or adversely modify critical habitat by disturbing spawning or rearing habitat and release contaminants into the water.

The introduction of exotic species may occur when levees are breached or when separate creeks or river systems are reconnected during various projects. Several exotic species may adversely affect the smelt, including the Asian clam (*Potamocorbula amurensis*) and three non-native species of euryhaline copepods. The Asian clam could potentially play an important role in affecting the phytoplankton dynamics. The exotic copepods may displace native species and at least one species of copepods (*Sinocalanus doerri*) is difficult for larval fishes to catch because of its fast swimming and effective escape response. Reduced feeding efficiency and ingestion rates weaken and slow the growth of young and make them more vulnerable to starvation and predation.

Other cumulative effects include: wave action in water channels caused by boats may degrade riparian and wetland habitat and erode banks; the dumping of domestic and industrial waste may present hazards to the fish because they could become trapped in the debris, injure themselves, or ingest the debris; golf courses may reduce habitat and introduce pesticides and herbicides into the environment; oil and gas development and production remove habitat and may introduce pollutants into the delta; agricultural uses on levees may reduce riparian and wetland habitats; residential or agricultural land use can fragment and reduce wildlife habitat and corridors; unscreened agricultural diversions throughout the delta divert all life stages of the fish (Service 1995); and grazing activities may degrade or reduce suitable habitat and increase erosion and sedimentation.

Conclusion

After reviewing the current status of the delta smelt and its critical habitat, the environmental baseline, the effects of the Programmatic, and the cumulative effects, it is the Service's biological opinion that the implementation of the Programmatic is not likely to jeopardize the continued existence of the delta smelt, or result in the destruction or adverse modification of its critical habitat. We base this determination on the nature of the effects; the restriction of in-water work to times when delta smelt are not present; and the preservation, creation, or restoration of shallow water habitat lost or shaded at a 3:1 ratio.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take 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 to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or

omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including 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 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 with this Incidental Take Statement.

The measures described below are nondiscretionary for listed species in this opinion and must be implemented by the Corps so they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity that is covered by this incidental take statement. If the Federal agency (1) 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, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

The Service anticipates that incidental take of delta smelt will occur. However, the Service anticipates that any take of delta smelt will be difficult to detect and quantify for a number of reasons: they have a relatively small body size; they are relatively secretive; their presence in the delta and associated areas coincides with relatively turbid conditions, which makes their detection difficult; and additionally, their presence in aquatic vegetation makes them difficult to detect. Therefore, it is not possible to provide precise numbers of delta smelt that could be injured, harassed, harmed, or killed from the projects appended to the Programmatic. Accordingly, the Service is quantifying take incidental to the implementation of the Programmatic as the acreage of delta smelt habitat that may be impacted by the projects appended to the Programmatic. The Service anticipates that annually all delta smelt inhabiting up to 30 acres of shallow water habitat may be harmed, harassed, injured, or killed as a result of the projects appended to the Programmatic. Low mortality is anticipated because of the work restriction windows. Because the species is wide-ranging and its distribution varies from one year to the next, take may vary from year to year. Additionally, losses of the species may be masked by seasonal fluctuations in numbers. Upon implementation of the following reasonable and prudent measures, incidental take associated with the projects appended to the Programmatic in the form of harm, harassment, injury, or mortality to delta smelt, the Corps will become exempt from the prohibitions described under section 9 of the Act.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the delta smelt or adverse modification or destruction of its critical habitat.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the impact of incidental take on the delta smelt and its critical habitat:

1. The Corps shall minimize the potential for harassment, harm, or mortality of delta smelt.

2. The Corps shall minimize effects to delta smelt spawning habitat.

3. The Corps shall minimize the effects on delta smelt survival caused by the mobilization of sediments that may contain toxins.

4. The Corps shall ensure compliance by the permittees.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. To minimize the potential for harassment, harm, or mortality of delta smelt, the Corps shall ensure each project description meets the "Programmatic Consultation Guidelines" described above.

2. To minimize effects to delta smelt spawning habitat, the Corps shall avoid areas having emersed or submersed plants to the maximum extent possible.

3. To minimize the effects on delta smelt survival caused by the mobilization of sediments that may contain toxins, the Corps shall require the use of silt trapping devices during all in-water work where feasible.

4. The Corps shall ensure that permittess comply with the Reporting Requirements of this biological opinion.

Reporting Requirements

The Service is to be notified immediately of the finding of any listed species or any unanticipated take or suspected take of species addressed in this opinion. Notification must include the date, time, and precise location of the incident/specimen(s) and any other pertinent information. The Service contact persons are Catrina Martin, Deputy Assistant Field Supervisor for Endangered Species, at (916) 414-6600, and Scott Heard, Resident Agent-in-Charge of the Service's Law Enforcement Division at 916/414-6660.

Any salvaged delta smelt specimens taken shall be properly preserved in accordance with the Natural History Museum of Los Angeles County's policy of accessioning (10% formalin in a

quart jar or freezing). Information concerning how the specimen was taken, length of the interval between death and preservation, the environmental conditions, the incidental take permit number (1-1-04-F-0149), and any other relevant information shall be written on 100% rag content paper, with indelible ink, and included in the container with the specimen. Preserved specimens shall be delivered to the Service's Division of Law Enforcement at 2800 Cottage Way, Room W-2928, Sacramento, California 95825 (telephone: 916/414-6660).

All observations of delta smelt shall be recorded on California Natural Diversity Data Base (CNDDB) field sheets and sent to the Staff Zoologist, California Natural Diversity Data Base, California Department of Fish and Game, 1807 13th Street Suite 202, Sacramento, California 95814.

The Corps shall provide to the Service annually a listing of permits authorized under this biological opinion. Such a list shall provide the name of the permittee, Corps authorization number, and the location. This is information the Corps routinely tracks and can be provided either as a paper version or electronically. The Service and the Corps shall meet annually to review this information as well as information provided by permittees.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of Act directs 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. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases.

1. The Service recommends the Corps enhance and restore aquatic and wetland habitat in the Sacramento-San Joaquin River estuary as part of the CALFED program.

2. The Service recommends the Corps work to assist the Service in implementing recovery actions identified in the recovery plan for the Sacramento-San Joaquin Delta native fishes.

To be kept informed of actions minimizing or avoiding adverse effects or benefiting listed and proposed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation with the Corps on the issuance of Section 10 and 404 Permits for Projects with Relatively Small Effects on the Delta Smelt and its critical habitat within the jurisdiction of the Sacramento Fish and Wildlife Office of the U.S. Fish and Wildlife Service. As provided in 50 CFR 402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new

information reveals effects of the proposed action 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 listed species or critical habitat that was not considered in this opinion; or (4) a new species or critical habitat is designated that may be affected by the proposed action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

If you have any questions regarding this Programmatic biological opinion on the delta smelt, please contact Ryan Olah or the Coast Bay Delta Branch Chief of the Sacramento Fish and Wildlife Office at (916) 414-6625.

Sincerely,

Cay C. Goude

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