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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS-R8-ES-2022-0082; FF09E21000 FXES1111090FEDR 223]

RIN 1018–BG07

Endangered and Threatened Wildlife and Plants; Endangered Species Status for the San Francisco Bay-Delta Distinct Population Segment of the Longfin Smelt

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), propose to list the San Francisco Bay-Delta distinct population segment (DPS) of longfin smelt (*Spirinchus thaleichthys*) (Bay-Delta longfin smelt), a fish species of the Pacific Coast, as an endangered species under the Endangered Species Act of 1973, as amended (Act). After a review of the best scientific and commercial information available, we find that listing the DPS is warranted. Accordingly, we propose to list the Bay-Delta longfin smelt DPS as an endangered species under the Act. If we finalize this rule as proposed, it would add this DPS to the List of Endangered and Threatened Wildlife and extend the Act's protections to the DPS. We also find that the designation of critical habitat for the Bay-Delta longfin smelt is not determinable at this time.

DATES: We will accept comments received or postmarked on or before [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES**, below) must be received by 11:59 p.m. Eastern Time on the closing date.

We must receive requests for a public hearing, in writing, at the address shown in **FOR FURTHER INFORMATION CONTACT** by [INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: You may submit comments by one of the following methods:

(1) *Electronically*: Go to the Federal eRulemaking Portal: *https://www.regulations.gov*. In the Search box, enter FWS-R8-ES-2022-0082, which is the docket number for this proposed rule. Then, click on the Search button. On the resulting page, in the panel on the left side of the screen, under the Document Type heading, check the Proposed Rule box to locate this document. You may submit a comment by clicking on "Comment."

(2) *By hard copy*: Submit by U.S. mail to: Public Comments Processing, Attn: FWS-R8-ES-2022-0082, U.S. Fish and Wildlife Service, MS: PRB/3W, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We request that you send comments only by the methods described above. We will post all comments on *https://www.regulations.gov*. This generally means that we will post any personal information you provide us (see **Information Requested**, below, for more information).

FOR FURTHER INFORMATION CONTACT: Donald Ratcliff, Field Supervisor, U.S. Fish and Wildlife Service, San Francisco Bay-Delta Fish and Wildlife Office, 650 Capitol Mall Suite 8-300, Sacramento, CA 95814; telephone 916–930–5603. Individuals in the United States who are deaf, deafblind, hard of hearing, or have a speech disability may dial 711 (TTY, TDD, or TeleBraille) to access telecommunications relay services. Individuals outside the United States should use the relay services offered within their country to make international calls to the point-of-contact in the United States.

SUPPLEMENTARY INFORMATION:

Information Requested

We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial data available and be as accurate and as effective as possible. Therefore, we request comments or information from other governmental agencies, Native American Tribes, the scientific community, industry, or any other interested parties concerning this proposed rule.

We particularly seek comments concerning:

(1) The DPS's biology, range, and population trends, including:

(a) Biological or ecological requirements of the DPS, including habitat requirements for feeding, breeding, and sheltering;

(b) Genetics and taxonomy;

(c) Historical and current population levels, and current and projected trends; and

(d) Past and ongoing conservation measures for the DPS, its habitat, or both.

(2) Factors that may affect the continued existence of the DPS, which may include the present or threatened destruction, modification, or curtailment of its habitat or range, overutilization, disease, predation, the inadequacy of existing regulatory mechanisms, or other natural or manmade factors.

(3) Biological, commercial trade, or other relevant data concerning any threats (or lack thereof) to this DPS and existing regulations that may be addressing those threats.

(4) Additional information concerning the historical and current status of this DPS.

Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include.

Please note that submissions merely stating support for, or opposition to, the action under consideration without providing supporting information, although noted, do not provide substantial information necessary to support a determination. Section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or a threatened species must be made solely on the basis of the best scientific and commercial data available.

You may submit your comments and materials concerning this proposed rule by one of the methods listed in **ADDRESSES**. We request that you send comments only by the methods described in **ADDRESSES**.

If you submit information via *https://www.regulations.gov*, your entire submission—including any personal identifying information—will be posted on the website. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *https://www.regulations.gov*.

Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on *https://www.regulations.gov*.

Because we will consider all comments and information we receive during the comment period, our final determination may differ from this proposal. Based on the new information we receive (and any comments on that new information), we may conclude that the DPS is threatened instead of endangered, or we may conclude that the DPS does not warrant listing as either an endangered species or a threatened species.

Public Hearing

Section 4(b)(5) of the Act provides for a public hearing on this proposal, if requested. Requests must be received by the date specified in **DATES**. Such requests must be sent to the address shown in **FOR FURTHER INFORMATION CONTACT**. We will schedule a public hearing on this proposal, if requested, and announce the date, time, and place of the hearing, as well as how to obtain reasonable accommodations, in the *Federal Register* and local newspapers at least 15 days before the hearing. We may hold the public hearing in person or virtually via webinar. We will announce any public hearing on our website, in addition to the *Federal Register*. The use of virtual public hearings is consistent with our regulations at 50 CFR 424.16(c)(3).

Previous Federal Actions

On April 2, 2012, we published a 12-month finding on the status of the Bay-Delta longfin smelt (77 FR 19756), which concluded that the population of longfin smelt in the San Francisco Bay-Delta was a valid DPS and was warranted for listing under the Act. However, our completion of a proposed rule to amend the List of Endangered and Threatened Wildlife was precluded by higher priority actions. As a result, the Bay-Delta longfin smelt was added to our candidate species list. During the interim period between the DPS becoming a candidate and this proposed rule, we addressed its status through our annual candidate notices of review.

Supporting Documents

A species status assessment (SSA) team prepared an SSA report for the Bay-Delta longfin smelt (Service 2022, entire). The SSA team was composed of Service biologists and State resource agency staff, who then consulted with other scientific experts during the development of the SSA report. The SSA report represents a compilation of the best scientific and commercial data available concerning the status of the DPS, including the impacts of past, present, and future factors (both detrimental and beneficial) affecting the DPS and its habitat. In accordance with our joint policy on peer review published in the *Federal Register* on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we sought the expert opinions of five appropriate specialists regarding the SSA. We received three responses. The SSA report and other materials related to this proposed rule can be found at *https://www.regulations.gov* under Docket No. FWS-R8-ES-2022-0082.

I. Proposed Listing Determination

Distinct Population Segment

As stated above, on April 2, 2012, we concluded that the population of longfin smelt in the San Francisco Bay-Delta was a valid DPS and was warranted for listing under the Act (77 FR 19756). Since that time, additional genetic information has become available to further support our DPS conclusion that the population is both discrete and significant (Sağlam et al. 2021, p. 1793; Service 2022, chapter 2). Below is a summary of our conclusions regarding discreteness and significance for the San Francisco Bay-Delta population of the longfin smelt. For more background and details of our analysis see the 2012 12-month finding (77FR 19756).

Discreteness

Because of its limited swimming capabilities and because of the great distances between the San Francisco Bay-Delta and known breeding populations to the north, we conclude that the San Francisco Bay-Delta population is markedly separated from other longfin smelt populations, and thus meets the discreteness element of the 1996 DPS policy. The best available information indicates that longfin smelt from the San Francisco Bay-Delta population complete their life cycle moving between freshwater, brackish water, and saltwater portions of the estuary and nearby coastal ocean waters in the Gulf of Farallones. The nearest known breeding population of longfin smelt is Humboldt Bay, 420 km (260 mi) north of the San Francisco Bay-Delta. As a result, potential interchange between the San Francisco Bay-Delta population and other longfin smelt breeding populations is limited. Although the best scientific information suggests that potential movement of longfin smelt northward from the San Francisco Bay-Delta would be facilitated by ocean currents, potential movement from more northern estuaries south to the San Francisco Bay-Delta would be more difficult and unlikely because of ocean currents. Based on our review of the best scientific and commercial information available, we conclude that the San Francisco Bay-Delta population of longfin smelt is markedly separated from other longfin smelt populations as a consequence of physical, physiological, ecological, or behavioral factors.

Significance

We conclude that the San Francisco Bay-Delta population is biologically significant to the longfin smelt species because the population occurs in an ecological setting unusual or unique for the species and its loss would result in a significant truncation of the range of the species. The San Francisco Bay-Delta longfin smelt population occurs at the southern edge of the species' range and has likely experienced different natural selection pressures than those experienced by populations in middle and more northern portions of the species' range. The population may therefore possess unique evolutionary adaptations important to the conservation of the species. The San Francisco Bay-Delta also is unique because it is the largest estuary on the Pacific Coast of the United States. Because of its large size and diverse aquatic habitats, the San Francisco Bay-Delta has the potential to support a large longfin smelt population and is thus potentially important in the conservation of the species. The San Francisco Bay-Delta population also is significant to the taxon because the nearest known breeding population of longfin smelt is hundreds of miles away, so loss of the San Francisco Bay-Delta population would significantly truncate the range of the species and result in a significant gap in the species' range. Based on our review of the best available scientific and commercial information, we conclude that the San Francisco Bay-Delta population meets the significance element of the 1996 DPS policy.

Determination of Distinct Population Segment

Because we have determined that the San Francisco Bay-Delta population meets both the discreteness and significance elements of the 1996 DPS policy, we find that the San Francisco Bay-Delta longfin smelt population is a valid DPS and thus is a listable entity under the Act. As a result, we continue to find that the San Francisco Bay-Delta DPS of the longfin smelt meets the standards for determination as a DPS under our 1996 DPS policy (61 FR 4722).

Background

Below is a summary of biological information regarding the Bay-Delta longfin smelt. A thorough description and review of the range, life history, and ecology of the Bay-Delta longfin smelt is presented in the SSA report (Service 2022, entire).

Description and Distribution: The longfin smelt is a small fish species 9–11 centimeters (cm) (3.5–4.3 inches (in)) in length with a relatively short lifespan of approximately 2 to 3 years. The longfin smelt, as a species, occurs in bays and estuaries from northern California north along the coast through Alaska. The Bay-Delta longfin smelt occupies the San Francisco Bay Estuary and areas of the Pacific Ocean out to the Farallon Islands (see figure 1). The tidally influenced San Francisco Bay Estuary includes the central and south San Francisco Bay, Suisun Bay, and San Pablo Bay, and the Sacramento and San Joaquin River Delta (Delta). Longfin smelt in the San Francisco Bay-Delta are pelagic fish (fish most frequently occurring in open-water habitats) that exhibit a facultatively anadromous life history, meaning older juveniles and adults can migrate to the ocean, but are required to return to fresh water for spawning and rearing (Moyle 2002, p. 236). Bay-Delta longfin smelt spawn only once in their lifetime but may have multiple spawning events during the spawning season (generally late fall to early spring) (Service 2022, p. 12). Reproduction occurs in low-salinity to freshwater habitats beginning in late fall/early winter and extends into the spring as water temperature and low-salinity conditions allow (Service 2022, pp. 11–13).

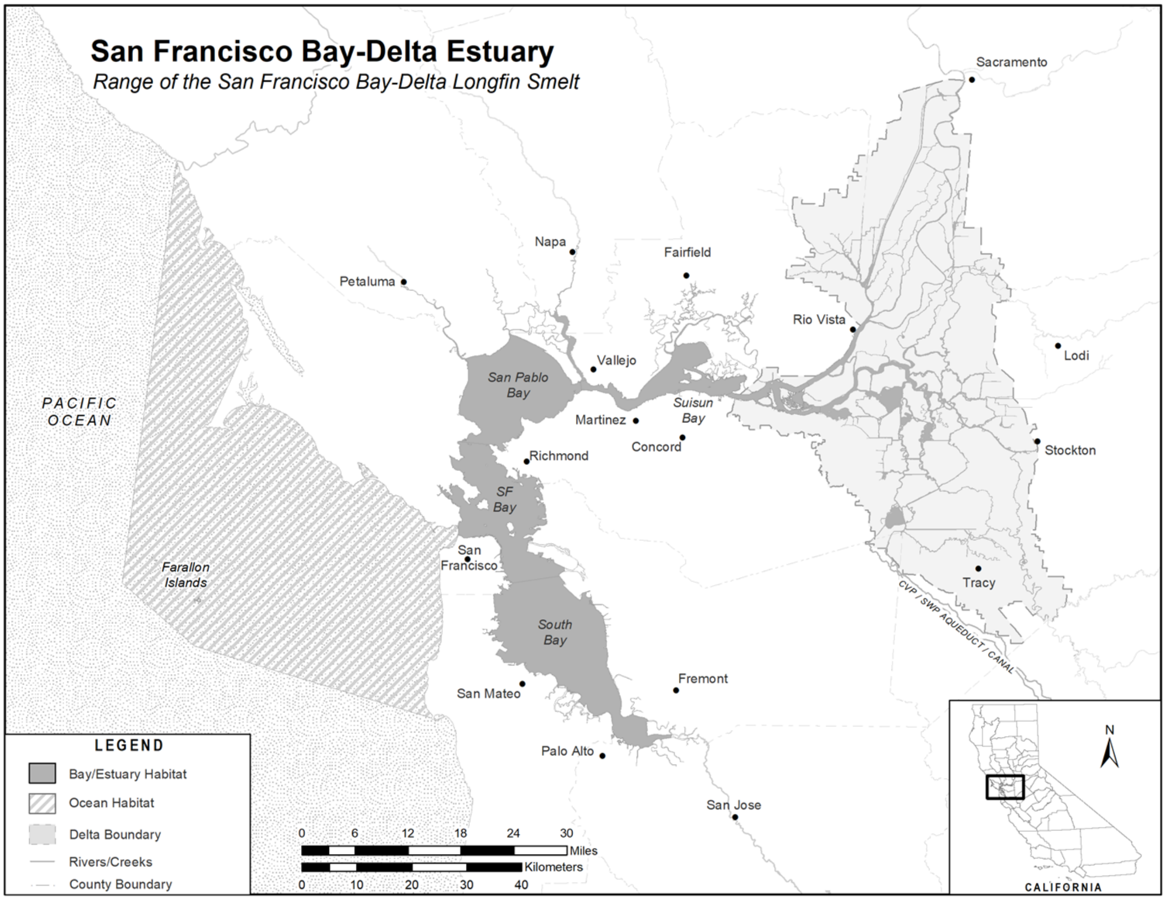

Figure 1: San Francisco Bay-Delta Longfin Smelt Distinct Population Segment Range

Regulatory and Analytical Framework

Regulatory Framework

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an endangered species or a threatened species. The Act defines an “endangered species” as a species that is in danger of extinction throughout all or a significant portion of its range, and a “threatened species” as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether any species is an endangered species or a threatened species because of any of the following factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

We use the term "threat" to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term "threat" includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term "threat" may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an "endangered species" or a "threatened species." In determining whether a species meets either definition, we must evaluate all identified threats by considering the species' expected response and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species, such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an “endangered species” or a “threatened species” only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future.

The Act does not define the term “foreseeable future,” which appears in the statutory definition of “threatened species.” Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term “foreseeable future” extends only so far into the future as we can reasonably determine that both the future threats and the species’ responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. “Reliable” does not mean “certain”; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions.

It is not always possible or necessary to define the foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial data available and should consider the timeframes applicable to the relevant threats and to the species’ likely responses to those threats in view of its life-history characteristics. Data that are typically relevant to assessing the species’ biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors.

Analytical Framework

The SSA report documents the results of our comprehensive biological review of the best scientific and commercial data available regarding the status of the DPS, including an assessment of the potential threats to the DPS. The SSA report does not represent our decision on whether the DPS should be proposed for listing as an endangered or threatened species under the Act. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at Docket No. FWS-R8-ES-2022-0082 on *https://www.regulations.gov* and by contacting the Service's Bay-Delta Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

To assess the Bay-Delta longfin smelt's viability, we used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–310). Briefly, resiliency supports the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years), redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of the species to adapt over time to long-term changes in the environment (for example, climate changes). In general, the more resilient and redundant a species is and the more representation it has, the more likely it is to sustain populations over time, even under changing environmental conditions. Using these principles, we identified the DPS's ecological requirements for survival and reproduction at the individual, population, and DPS level and described the beneficial and risk factors influencing the DPS's viability.

The SSA process can be categorized into three sequential stages. During the first stage, we evaluated the DPS's life-history needs. The next stage involved an assessment of the historical and current condition of the DPS's demographics and habitat characteristics, including an explanation of how the DPS arrived at its current condition. The final stage of the SSA involved making predictions about the DPS's responses to positive and negative environmental and anthropogenic influences. Throughout all of these stages, we used the best information available to characterize viability as the ability of the DPS to sustain itself in the wild over time. We use this information to inform our regulatory decision.

Summary of Biological Status and Threats

In the discussion below, we review the biological and resource needs of the Bay-Delta longfin smelt, and the threats that influence the DPS's current and future condition, in order to assess the DPS's overall viability and the risks to that viability.

Species (DPS) Needs

Below is a summary of the Bay-Delta longfin smelt's biological and ecological needs, more details of which can be found in the SSA report (Service 2022, chapter 2 entire).

The needs of the Bay-Delta longfin smelt to successfully carry out its life history are highly dependent on the freshwater inflow and resulting temperature and environmental conditions and resources of the San Francisco Bay estuary (comprising the San Francisco Bay, San Pablo Bay, Suisun Bay, and the Sacramento and San Joaquin River Delta). The amount and duration of freshwater input from rivers and tributaries flowing into the estuary greatly influences the location and extent of where the appropriate water temperature and saline conditions are present for the DPS to carry out its life functions (Service 2022, section 2.2, Ecological Setting, pp. 8–11). These freshwater flows can be natural, such as in wet years or dry years, or as a result of human-altered water management. Under high-flow conditions, the amount of low-saline/cool-water habitat is more abundant, whereas under low-flow conditions the availability, amount, extent, and duration of areas that contain the appropriate habitat conditions for the Bay-Delta longfin smelt are greatly reduced.

The needs of the Bay-Delta longfin smelt can be categorized into three main resource needs and biological condition categories, and include: (1) appropriate freshwater or low-saline water conditions; (2) appropriate water temperature conditions; and (3) adequate food resources and availability by life-stage. As the Bay-Delta longfin smelt is subject to both freshwater and saline water conditions, its habitat is extremely variable. These variable conditions along with other factors exert a strong influence on the condition of the DPS's food resources.

Interaction of Waterflow Conditions and Habitat

The San Francisco Bay estuary is one of the largest estuaries on the West Coast of the continental United States (Sommer et al. 2007, p. 271). Everywhere freshwater flow enters the San Francisco Bay estuary, it can generate variable freshwater and salinity conditions for plants and animals, such as the Bay-Delta longfin smelt, that are adapted to brackish water conditions. The San Francisco Bay estuary consists of five areas: the Sacramento-San Joaquin River Delta, Suisun Bay, San Pablo Bay in the north, as well as South San Francisco Bay and Central San Francisco Bay in the South. The northern regions receive freshwater input from the Sacramento-San Joaquin River systems, as well as lesser inputs from the Napa, Sonoma, and Petaluma Rivers. In the north, the prevailing direction of water flow is from east to west. In the south, the Central San Francisco Bay receives little freshwater from its mostly urbanized watersheds that are directly adjacent to the bay, and the South San Francisco Bay receives some freshwater input from Alviso Slough (Largier 1996, p. 69). We refer to these areas collectively as the San Francisco Bay-Delta. The Sacramento-San Joaquin River systems represent approximately 90 percent of the estuary's freshwater input, and as such, have the largest influence on estuarine habitat conditions (Jassby et al. 1995, p. 275, and fig. 4, p. 279; Monismith et al. 2002, fig. 7, p. 3010). The southern part of San Francisco Bay is generally characterized as a lagoonal system, whereas the northern reaches function as a tidal river estuary due to the much larger freshwater flow inputs (Kimmerer 2004, p. 7). However, during large freshwater flow events and wet rainfall years, the small tributaries can have important localized effects and support conditions suitable for Bay-Delta longfin smelt spawning and larval rearing (Lewis et al. 2019, p. 3).

Numerous studies have shown the positive correlation between Bay-Delta longfin smelt juvenile abundance and freshwater flow (Stevens and Miller 1983, pp. 431–432; Jassby et al. 1995, p. 285; Kimmerer 2002, p. 47; Rosenfield and Baxter 2007, p. 1585; Sommer et al. 2007, p. 274; Kimmerer et al. 2009, p. 381; MacNally et al. 2010, p. 1422; Thomson et al. 2010, pp. 1439–1440; Maunder et al. 2015, p. 108; and Nobriga and Rosenfield 2016, p. 53). The survival of longfin smelt through their early life-stages is lower during dry or low-flow conditions and higher during wet or high-flow conditions—the evidence for this finding is that Bay-Delta longfin smelt abundance indices nearly always decline sharply during dry or low-flow periods and are higher in wet or high-flow periods (Mahardja et al. 2021, pp. 9–10). As a result, freshwater flows with appropriate magnitude, timing, and frequency (both seasonally and annually) are a significant DPS need.

Low-salinity water is an important feature for the Bay-Delta longfin smelt. Because the San Francisco Bay is connected to the Pacific Ocean, saltwater tidal flows move upstream into the estuary and mix with inflowing freshwater flows moving downstream. These tidal and stream flows present opposing hydraulic forces that interact with each other and the estuary's bathymetry (underwater contours and channels) to create extremely variable and complex currents of vertical and lateral hydrodynamic mixing of salt- and freshwater (Stacey et al. 2001, pp. 17026–17035). Depending on the strength of the tidal or freshwater inflow, the area where the saltwater and freshwater interact may move either upstream toward the Delta or downstream into the bays toward the ocean. A common term that is used to refer to where this estuarine mixing and low-salinity zone is located is "X2". X2 is the distance in kilometers (km) from the Golden Gate (boundary between the San Francisco Bay estuary and the Pacific Ocean) to the place where salinity near the bottom of the water column is 2 practical salinity units

(PSU; also known as parts per thousand) (Jassby et al. 1995, pp. 274–275) (figure 2). Isohalines are lines (or contours) that join points of equal salinity in an aquatic system.

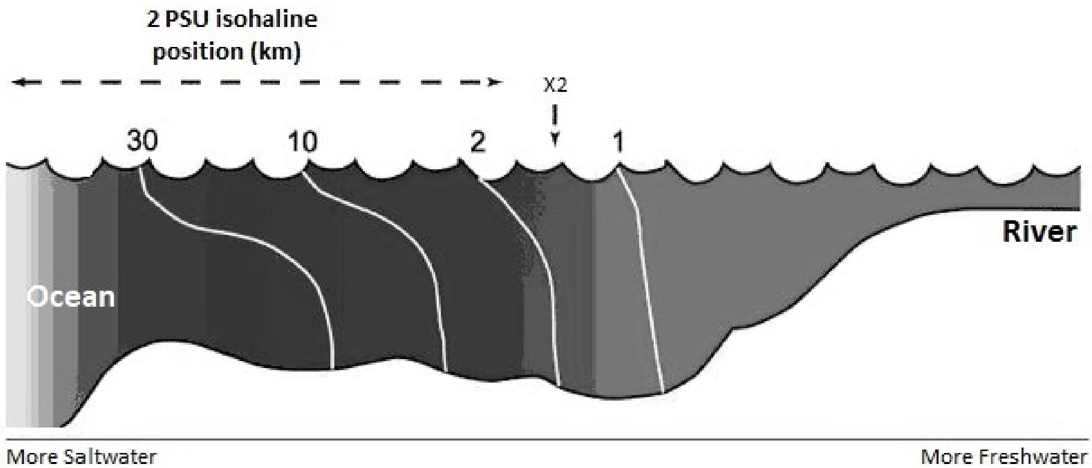

Figure 2: Illustration showing 30, 10, 2, and 1 PSU isohalines (modified from OzCoast.org.au website)

X2 is used in part because it represents the approximate upstream limit of where surface and bottom salinity differ, and because favorable turbidity conditions and high phyto- and zooplanktonic abundances are broadly associated with it. Estuarine pelagic fishes, including the Bay-Delta longfin smelt, are also associated with this location due to it being the downstream limit of the low-salinity zone for spawning and rearing and for this zone providing favorable environmental conditions and abundance of food resources (Dege and Brown 2004, fig. 3, p. 57).

The position of X2 is always moving as a result of freshwater or tidal flows. This movement results in changes to the size, shape, and ecological function of the low-salinity zone (MacWilliams et al. 2015, figs. 11–12, p. 22). Tidal flows affect the position of X2 most strongly over short time scales (hours to weeks) (Kimmerer 2004, fig. 2, p. 12). Over longer time scales, freshwater from the Sacramento-San Joaquin Delta system has the dominant influence on the position of X2 in the estuary (Jassby et al. 1995, p. 275, and fig. 4, p. 279; Monismith et al. 2002, fig. 7, p. 3010). The surface area of the low-salinity zone (and, therefore, the habitat available for Bay-Delta longfin smelt) increases very rapidly as it begins to include areas within the San Pablo Bay (X2 ≤ 55 km

(34 miles (mi)), resulting in peak low-salinity zone areas of 150 to 250 square km (58 to 97 mi^2) (MacWilliams et al. 2015, fig. 12, p. 22).

Water Temperature

Bay-Delta longfin smelt require cool water conditions. Laboratory and field studies and surveys have found that hatching success, size, growth, and survivability of Bay-Delta longfin smelt are all closely dependent on water temperatures near 15 degrees Celsius (°C) (59 °Fahrenheit (°F)) or less. Water temperatures of 16 °C (61 °F) are the upper limit for spawning, with temperatures of 13 °C (55 °F) and potentially lower being more ideal (Baxter 2016, entire; Tempel and Burns 2021, slide 12; Service 2022, p. 21). Studies and information have identified water temperatures near 20 °C (68 °F) as the upper limit for larval fish (Jeffries et al. 2016, p. 1709). The larvae rear during the spring in the low-salinity/cool-water locations near where they were spawned and born. Adults and juveniles have been found in water temperatures of less than 22 °C (71 °F) and likely spend the warmer periods of the year in cooler Bay habitats and the coastal ocean to escape warming temperatures that occur in much of the estuary during the summer. This movement is likely part of the DPS's adaptive capacity and could be facilitated as water temperatures rise toward 20 °C (68 °F) in the late spring. Likewise, Bay-Delta longfin smelt adults have not been known to return to most of the estuary until temperatures drop below 22 °C (71 °F) in the autumn.

Water temperatures within the estuary vary and depend on ambient air temperatures and on the amount of freshwater inflow into the system (Vroom et al. 2017, pp. 9918–9920). Because of California's Mediterranean climate of cool wet winters and hot dry summers, the majority of natural inflow and input of cooler freshwater (from cool-season rains and snowmelt) into the estuary occurs in the late fall to early spring, which coincides with the spawning period of the Bay-Delta longfin smelt. The operation of the State Water Project and Central Valley Project and the many large reservoirs that store and supply water to agricultural and municipal beneficial uses modify the flow regime and affect the volume and timing of delta freshwater inflow and outflow. As freshwater flows decrease and water temperatures warm each spring into early summer, the young fish (those >20 millimeter (mm) (0.79 in) in length) move seaward, and many individuals (both juveniles and adults) that are more tolerant of saline conditions move into the Pacific Ocean during the late spring and summer months (Service 2022, p. 17).

Food Resources

The diet of Bay-Delta longfin smelt is very specific and varies by age class and location within the estuary. Bay-Delta longfin smelt larvae select strongly for the calanoid copepod *Eurytemora affinis* as their food resource. All other prey types combined account for only about 10 percent of their diet (Barros et al. 2022, fig. 6a and 6c; Service 2022, Section 2.5 Diet). When Bay-Delta longfin smelt reach about 25 mm (1 in) in length, their diet switches and is nearly all mysids, a taxonomic group of larger crustaceans commonly called opossum shrimp (Barros et al. 2022, fig. 6b). This observation of a highly specified diet applies to fresh- and brackish-water habitats throughout the estuary (Barros et al. 2022, fig. 3). The peak abundances of these food resources have been identified as being in the estuary's largest low-salinity zone associated with X2 and generated by freshwater flow from the Delta (Kimmerer *et al*. 1998, pp. 1701–1708; Kimmerer 2002, fig. 2, p. 45). These factors explain the interrelatedness of flow with key resource needs of the DPS—such that prey, salinity, and temperature conditions facilitate the access of particular life stages to habitat areas with sufficient food resources to meet the DPS's life-history requirements.

Threats Influencing the Bay-Delta Longfin Smelt

The threats facing the Bay-Delta DPS of the longfin smelt include habitat alteration (Factor A) and changes to hydrology associated with reduced and altered freshwater flows and resulting increases in saline habitat conditions (Factor A); increased water temperatures (Factor A); reduced food resource availability (Factor E); predation (Factor C); entrainment from freshwater diversion facilities (Factor E); and contaminants (Factor E). We consider reduced and altered freshwater flows resulting from human activities and impacts associated from current climate change conditions (increased magnitude and duration of drought and associated increased temperatures) as the main threat facing the Bay-Delta longfin smelt due to the importance of freshwater flows to maintaining the life-history functions and species needs of the DPS. However, because the Bay-Delta longfin smelt is an aquatic species and the needs of the species are closely tied to freshwater input into the estuary, the impact of many of the other threats identified above are influenced by the amount of freshwater inflow into the system (i.e., reduced freshwater inflows reduce food availability, increase water temperatures, and increase entrainment potential).

Reduced and Altered Freshwater Flows

The development of dams and water delivery infrastructure built throughout the Sacramento and San Joaquin River basins for flood protection and water supply for agriculture and human consumption has greatly impacted freshwater flows into the San Francisco Bay estuary (Service 2022, section 3.1.1). The creation of this water storage and delivery system, where water is stored during the wet season and conveyed to farms and cities during the dry season, has resulted in one of the largest human-altered water systems in the world (Nichols et al. 1986, p. 569). Operation of this system has resulted in a broader, flatter hydrograph with less seasonal variability, thus changing the timing, magnitude, and duration of freshwater flows into the San Francisco Bay-Delta (Kimmerer 2004, p. 15; Andrews et al. 2017, p. 72; Gross et al. 2018, p. 8). It is estimated that the State and Federal water projects annually reduce an average of about 5 million acre-feet (MAF) of freshwater into the Delta, while other municipal or private reservoirs or diverters annually decrement an additional 8 MAF of potential freshwater into the Delta

(Hutton et al. 2017, fig. 4, p. 8). The cumulative effect of this annual average of about 13 MAF of freshwater supplies has resulted in a long-term decline in freshwater inflow into the estuary during the period of February through June relative to estimates of what flows would have been available absent water development (Gross et al. 2018, fig. 6, p. 12; Reis et al. 2019, fig. 3, p. 12). This situation has further increased the frequency of very low outflow years that, prior to water development, would have been very rare and associated only with extreme drought (Reis et al. 2019, fig. 3, p. 12).

In addition to the flood control and water storage and delivery systems, water diversion and export systems are also reducing freshwater inflow into the system (Kimmerer and Nobriga 2008, p. 2). From 1956 to the 1990s, water exports increased, rising from approximately 5 percent of the Delta freshwater inflow to approximately 30 percent of the Delta inflow (Cloern and Jassby 2012, p. 7). By 2012, an estimated 39 percent of the estuary's unimpaired freshwater flow in total was either consumed upstream or diverted from the estuary (Cloern and Jassby 2012, p. 8).

A reduction in freshwater flows into the estuary influences and impacts the location and extent of the low-salinity zone (spawning and rearing habitat). Freshwater inflow into the estuary and other co-linear indicators of wet versus dry conditions during the winter and spring have been statistically associated with first-year recruitment of Bay-Delta longfin smelt (Service 2022, section 3.1.1). Prior to large-scale water exports and reduced freshwater flows, the location of the low-salinity zone (X2) reached the ≤55-km (34-mi) point in the estuary (monthly averages from February through May) in about half of all years. More recently the position of the low-salinity zone reaching at least the 55-km (34-mi) point occurred only very rarely as a result of wet year conditions (Gross et al. 2018, fig. 6, p. 12 and fig. 7, p. 13) (Service 2022, section 3.1.1). In the case of Bay-Delta longfin smelt, the amount of low-salinity habitat available for optimal growth and rearing conditions (food and water conditions (salinity, turbidity)), especially for early life stage fish, is directly linked to freshwater inflow.

Drought Conditions

California's annual weather and rainfall patterns can be extremely variable and alternate from wet to dry periods from year to year. Occasionally, several years of dry conditions have occurred over numerous extended periods (i.e., varying levels of drought) (Department of Water Resources (DWR) 2020, entire). Drought periods can be characterized as having less freshwater flow, as well as shorter duration and lower magnitude of peak flows. The current trend in drought conditions has recently increased in frequency, duration, and magnitude (Swain et al. 2018, pp. 427–433). Prior to the 21st century, dry and critically dry years occurred approximately 33 percent of the time. However, since the year 2000, the dry and critically dry year frequency has increased to 43 percent. Based on soil moisture reconstruction, the period between 2000–2021 was probably the driest 22-year period on record (Williams et al. 2022, p. 1). As the existing impacts from climate change (i.e., warmer temperatures) increase evapotranspiration in the watershed, the aforementioned water supply needs can exacerbate the magnitude of realized dry conditions over and above these natural patterns in precipitation and reduced delta freshwater inflow.

Bay-Delta longfin smelt exhibit poor survival and reproduction during droughts (Thomson et al. 2010, pp. 1438–1446; Mahardja et al. 2021, pp. 9–10). The survival of Bay-Delta longfin smelt through their early life-stages is lower during dry conditions and higher during wet conditions, as evidenced by Bay-Delta longfin smelt abundance indices nearly always declining sharply during dry periods then rebounding when wet weather returns (Mahardja et al. 2021, pp. 9–10). However, such recovery does not always occur after each drought cycle, leading to lower baseline numbers for the DPS (Moyle 2002, p. 237; Sommer et al. 2007, pp. 270–276). In addition, extended dry years compound the negative impacts to Bay-Delta longfin smelt as the DPS has not shown an ability to quickly recover and reoccupy upstream spawning habitats following drought. These drought conditions have exacerbated the impact of reduced freshwater flows from human activities and have been attributed to accelerating the establishment of the overbite clam (*Potamocorbula amurensis*) (see *Reduced Food Resources* and *Pelagic Organism Decline (POD),* below) by making saline water conditions more available throughout areas typically associated with more freshwater (Carlton et al. 1990, pp. 90–91).

Habitat Alteration

Large-scale habitat alteration such as channelization and dredging of streams and bays, building of levees and canals, and draining of wetlands has occurred since the 1850s. The impacts of such in-water and adjacent upland habitat alterations greatly affected and continues to impact the bathymetry of the estuary by collectively making the estuary deeper and less hydrodynamically connected to the surrounding landscape (Andrews et al. 2017, fig. 5, p. 64). The altered waterways create more space and avenues for the incoming tides to bring more saline water landward. Specifically, landscape changes since 1850 are estimated to have resulted in an average landward shift of X2 of over 3 km (2 mi) (Andrews et al. 2017, p. 68). This change along with reductions in freshwater input into the estuary (see *Reduced and Altered Freshwater Flows*, above) has caused a winter-spring upstream (landward) shift of X2 on the order of 10–20 km (6–12 mi). Taken together, the landscape changes discussed above and changes to the estuary's flow regime have changed how mixing processes function, and thus altered the habitat and food resource opportunities available for the estuary's biota, including the Bay-Delta longfin smelt

Water Temperature Alterations

The water temperature within the San Francisco Bay Estuary is also greatly influenced by freshwater inflow (Vroom et al. 2017, pp. 9918–9920). The reduction and alteration of freshwater flows into the San Francisco Bay estuary has limited the area where appropriate water temperature conditions for the Bay-Delta longfin smelt occur. As described in the Life History and Biology section of the SSA report (Service 2022, section 2.4) and summarized above, Bay-Delta longfin smelt spawning occurs within cool water conditions below 15 °C (59 °F), while larvae and young juveniles show a preference for temperatures below 12 °C (54 °F) and 20 °C (68 °F), respectively. The embryonic through early juvenile life stages are when Bay-Delta longfin smelt are believed to be most vulnerable to warming temperatures because these early life stages do not possess the ability to migrate to the cooler waters of central San Francisco Bay and the coastal ocean. Bay-Delta longfin smelt are also most abundantly detected within a narrow temperature range of cool water relative to the range that occurs in the upper estuary. Several studies and reports have found water temperatures in the Delta (the area containing favorable freshwater conditions) commonly exceeds 22 °C (72 °F) during the summer (Vroom et al. 2017, p. 9904; data from California Data Exchange Center, Central & Northern California Ocean Observing System, and U.S. Geological Survey (Blodgett et al. 2011, entire)). Increased freshwater inflow during the appropriate period of time greatly influences the amount and distribution of favorable spawning and rearing water temperature conditions (Service 2022, section 3.1.3).

Reduced Food Resources

As discussed above and in the SSA report (Service 2022, section 3.1.2), the Bay-Delta longfin smelt historically limited their diet to a relatively small number of crustacean meso- and macrozooplankton taxa. Bay-Delta longfin smelt larvae have diets dominated by a copepod, *Eurytemora affinis,* that is common in the low-salinity zone during the spring (California Department of Fish and Wildlife (CDFW), unpublished data). The two most common prey taxa for larger longfin smelt are epibenthic mysids and amphipods (Burdi 2022, pers. comm.; CDFW unpub. Diet Study Data). The copepod *E.*

affinis was also at one time an important prey item for a now much-depleted mysid species, *Neomysis mercedis* (Knutson and Orsi 1983, p. 478), a prey species of juvenile and adult Bay-Delta longfin smelt.

Since the 1970s, the *Eurytemora affinis* population in the estuary has been in decline, but beginning in the late 1980s, the zooplankton community for the San Francisco Bay estuary started undergoing about a decade of rapid change in species composition, trophic structure, and utility for fish production (Winder and Jassby 2011, pp. 683–685; Kratina et al. 2014, p. 1070; Brown et al. 2016, p. 8). This decline coincided with the rapid invasion of the estuary by the nonnative overbite clam (Carlton et al. 1990, pp. 81 and 85, fig. 3) and with an extended drought in the Central Valley in the period 1987–1994 (Rosenfield and Baxter 2007, p. 1589).

The overbite clam is a filter feeder that is thought to have diverted food resources from the primary food sources of, or fed directly on, the nauplii (first larval stage) of common calanoid copepods, and resulted in their decline. These native copepods are one of the main sources of prey of larval Bay-Delta longfin smelt (Carlton et al. 1990, pp. 90–91; Kimmerer et al. 1994, p. 87; Feyrer et al. 2003, pp. 284–286; Rosenfield and Baxter 2007, p. 1589). The invasion of the overbite clam has resulted in an over tenfold decrease in abundance of native copepods, which now account for less than 4 percent of total zooplankton biomass within the estuary after 1994 (Winder and Jassby 2011, p. 684). In addition to lower abundance, the average individual sizes of mysids in the estuary have decreased over time, with a species composition shift towards *Hyperacanthomysis longirostris*, an invasive species that reaches maturity at a smaller mass than *Neomysis* species (Hennessy 2011, entire). Although Bay-Delta longfin smelt consume these nonnative species, they are not preferred (see below) and the change in food resources most likely results in an increased effort for the DPS to meet its food resource needs.

To further exacerbate the impacts of the change in food resources, the decline of the Bay-Delta longfin smelt's historical prey base has not been accompanied by a large change in prey use by the DPS (Barros et al. 2019, p. 15; Feyrer et al. 2003, p. 285). This finding suggests that Bay-Delta longfin smelt had formed strong predator–prey interactions with their primary prey, a hypothesis supported by empirical data (MacNally et al. 2010, p. 1426). Because the DPS continues to exhibit very little variation in prey use despite the reduction in natural prey availability, they are considered more susceptible to food web changes than some other fishes (Feyrer et al. 2003, p. 281). The decline in food resources is likely affecting juvenile and adult longfin smelt growth and fitness as well as increasing the effort needed to meet food resource demands (Kimmerer and Orsi 1996, pp. 418–419; Feyrer et al. 2003, p. 281). The result of the introduction of overbite clam and reduced freshwater flows has limited abundances and availability of the Bay-Delta longfin smelt's primary food sources, especially for larval and rearing individuals that are restricted to the low-salinity zone during their development.

Predation

Little information is available on the exact predators of the Bay-Delta longfin smelt; however, Bay-Delta longfin smelt are relatively small fish, even as adults, and are thus most likely food for many fish-eating (piscivorous) predators, such as birds, jelly fish, and other fish (CDFW 2009a, p. 27). The number of piscivorous fish in the San Francisco Bay estuary is considerable (Grossman 2016, pp. 5, 12). However, studies on the diets of predatory fish in the estuary provide limited insight into predation of the Bay-Delta longfin smelt. These studies were based on visually identifying the stomach contents of numerous species of predatory fish in the estuary. In most cases, these studies did not find Bay-Delta longfin smelt (Stevens 1966, pp. 94–96; Thomas 1967, pp. 51, 57; Nobriga and Feyrer 2007, unpaginated, Results/Discussion section; CDFW 2009a, pp. 27–28; Grossman 2016, pp. 9–16). In one study in Suisun Marsh and the Sacramento-San

Joaquin Delta that used DNA analysis of stomach contents, Bay-Delta longfin smelt were identified as prey of Sacramento pikeminnow (*Ptychocheilus grandis*), striped bass (*Morone saxatilis*), and largemouth bass (*Micropterus salmoides*), but only rarely (Brandl et al. 2021, tables 2 and 4). However, given the Bay-Delta longfin smelt's recent low abundance (see SSA report, section 3.2. Current DPS Survey Indices (Service 2022, pp. 41–46)) and limitations typical of field-based food-habit studies, it is expected that the Bay-Delta longfin smelt would rarely be identified in the diet of piscivorous fishes, since predatory fish feed predominantly on the fish prey that is most available (Nobriga and Feyrer 2007, unpaginated, Results/Discussion sections; CDFW 2009a, p. 27; Grossman 2016, p. 15).

Because information on direct predation is lacking, we reviewed general information about predator–prey relationships in fish food webs that are broadly applicable to situations and conditions faced by the Bay-Delta longfin smelt. The early life stages of fish are often subject to high rates of predation that play important roles in modulating abundance and amplifying the consequences of food limitation (Ahrens et al. 2012, fig. 2, p. 46, and throughout; Pangle et al. 2012, pp. 5–6). Chronic food limitation (such as those described for the Bay-Delta longfin smelt described above) and predation risk are often tightly linked in fish food webs (Ahrens et al. 2012, pp. 47–48). One way prey organisms reduce their risk to predation is to limit their foraging times, which are often relatively risky because small fishes have to behave in ways that increase their exposure or attractiveness to predators when they are actively foraging (e.g., leaving sheltered habitats, moving around more actively) (Ahrens et al. 2012, fig. 1, p. 43). Thus, when food densities decline, prey fishes have two choices. They can either eat less and grow more slowly or they can increase foraging times to compensate for the lower prey densities, which may result in an increased predation risk. Other factors such as habitat or ecosystem conditions, such as turbidity and food availability, also play an important part in this relationship.

Although predation and its effects do impact the Bay-Delta longfin smelt, we do not consider the impacts to be a primary driver, but we still include this consideration as part of the cumulative impact from all threats for the DPS, especially during poor habitat conditions when food is lacking.

Entrainment

Freshwater diversion occurs throughout the estuary through pumping for agricultural, waterfowl, or municipal purposes and in some cases may lead to entrainment of Bay-Delta longfin smelt. Entrainment occurs when the suction caused by pumping creates an opportunity for fish to follow or be captured by the flow of water and become trapped and transported by the hydrodynamic footprint of those diversions. This entrainment often results in fish, especially early-life-stage fish, being killed or removed from the estuary. Bay-Delta longfin smelt can be entrained in water exported by the major pumping facilities in the South Delta (see Water Project Exports, below) when adults and commingling age-1 individuals move upstream into the freshwater portions of the Delta (CDFW 2020a, fig. 13, p. 53). Bay-Delta longfin smelt larvae and small juveniles that are either rearing or being tidally dispersed landward of X2 can also be entrained (CDFW 2020a, fig. 13, p. 53). During periods of high freshwater flow into the estuary, Bay-Delta longfin smelt (adults, juveniles, and larvae) are much less likely to be entrained by the major pumping facilities in the South Delta because the low-salinity zone (X2) is further downstream (or seaward) of the Delta. Individuals are more likely to be cued to spawn in tributaries of the San Francisco, San Pablo, and Suisun Bays rather than in the Delta since these tributaries would also be flowing high. However, changes to the estuary's bathymetry (see *Habitat Alteration*, above) have caused the tidal flows to reach further into the Old and Middle Rivers (Andrews et al. 2017, p. 66) which, as discussed below, may further impact Bay-Delta longfin smelt (see Water Project Exports, below). Below we describe the types of freshwater diversions and exports and their impacts on Bay-Delta longfin smelt.

Agricultural Diversions: Freshwater is diverted at numerous sites throughout the Delta for agricultural purposes, particularly during the summer months (Siegfried et al. 2014, figs. 10–11, p. 11). Based on the life history of the DPS during this timeframe, the majority of Bay-Delta longfin smelt are seeking cooler water during the late spring and summer and are more seaward of the Delta and areas associated with agricultural diversions. Given the temporal mismatch between seasonal peaks in agricultural water diversions and limited use of the Delta waterways by Bay-Delta longfin smelt during this timeframe, we do not consider seasonal diversion of water for agricultural purposes and the potential for entrainment to be a high-level threat for the DPS but this activity still contributes cumulatively with other threats facing the population.

Wetland Diversions: In Suisun Marsh, the Roaring River and Morrow Island Distribution Systems (RRDS and MIDS) are California Department of Water Resources (DWR) facilities that divert water from Montezuma and Goodyear sloughs in Solano County, respectively. The water is distributed to waterfowl management wetlands in Suisun Marsh and eventually returned to marsh channels leading to Suisun Bay (minus what evaporates and is retained in wetland areas). Both diversions have been observed to entrain Bay-Delta longfin smelt (Enos et al. 2007, p. 16; CDFW 2009a, pp. 40–41). The RRDS has fish screens that were installed to reduce entrainment of fish in the vicinity of the diversion, which was recognized as a source of fish mortality (Pickard et al. 1982, pp. 4–10). The MIDS pumping facility is not screened. However, based on the results of monitoring, MIDS is considered not to have a great influence on entrainment of Bay-Delta longfin smelt (Enos et al. 2007, pp. 16–18; CDFW 2020a, p. 63).

Water Project Exports: The State of California through the DWR and the Federal Bureau of Reclamation operate freshwater diversion facilities and infrastructure associated with the State Water Project (SWP) and Central Valley Project (CVP) respectively. These facilities export freshwater from the Delta. The DWR also operates the Barker Slough Pumping Plant, which diverts water from Barker Slough into the North Bay Aqueduct (NBA) for delivery in Napa and Solano Counties. The Barker Slough diversion has positive barrier fish screens that were installed to reduce entrainment of fish in the vicinity of the diversion, which was recognized as a source of mortality for federally listed species such as the delta smelt (*Hypomesus transpacificus*), chinook salmon (*Oncorhynchus tshawytscha*) (Sacramento River winter-run, California coastal, Central Valley spring-run salmon), and steelhead salmon (*Oncorhynchus mykiss*)) (Service 2008, pp. 111–232). In dry seasons and at higher pumping rates, modeling data suggest the facilities could exhibit some level of entrainment vulnerability, despite the fish screens in place (Service 2008, p. 231). The SWP and CVP each include pumping plants in the south Delta. These pumping plants are used to export freshwater to users for municipal and agricultural purposes via the California Aqueduct to the Central Valley and Southern California. The operation of these facilities can exert a strong influence on regional hydrodynamics that has resulted in the entrainment of Bay-Delta longfin smelt, sometimes from considerable distances (Kimmerer 2008, p. 2, fig. 1, p. 3; Kimmerer and Nobriga 2008, fig. 7, p. 12; Hutton et al. 2019, fig. 7, p. 11).

Several methods have been implemented to limit and offset the entrainment impacts at these facilities, including construction of forebays (areas used to collect fish before they enter the pumps), fish screens, gate systems (used to divert fish away from pumps), and salvage operations (active collection and transport of fish back into the estuary). In most years, Bay-Delta longfin smelt have been collected (“salvaged”) in the fish facilities that are in front of each pumping plant and from screens on the pump intakes. The salvage of fish is an indicator that individuals are being entrained by pumping of water at these facilities and either being killed or removed from the estuary. The peak of salvage of age-1 and older Bay-Delta longfin smelt typically occurs in January (Grimaldo et al. 2009, fig. 5, p. 1262). These adult and age-1 fish likely represented individuals searching for spawning habitats, and immature individuals commingling with the adults. The peak of salvage of age-0 fish (fish younger than 1 year old) typically occurs in April or May as larval fish reach sizes at which they could be retained on the fish screens of the CVP and SWP fish collection facilities. However, in all likelihood some larvae begin to be entrained once they start hatching in December or January, but remain undetected until about March, with salvage efficiency increasing in April–May as the fish grow larger. Despite these salvage operations helping conserve Bay-Delta longfin smelt, the salvage operations themselves are not free from impacts on the DPS as collection, transportation, and release of salvaged fish often causes additional mortality of individuals (CDFW 2009b, pp. 4–20, table 2; CDFW 2020a, pp. 23–24, table 1).

It is possible that past entrainment and loss of Bay-Delta longfin smelt may have reached levels of concern (CDFW 2020a, fig. 10, p. 47). However, since 2009, the entrainment of longfin smelt has not been substantial (Service 2022, fig. 3.4), perhaps partly due to monitoring and management of flows in the Old and Middle Rivers (OMR) between the Sacramento/San Joaquin River confluence and the export facilities. When net OMR flow is positive, San Joaquin River water is generally moving seaward through the Delta and away from the pumping facilities. The more net negative OMR is flowing, the more the water in the Delta is moving back upstream toward the pumping plants and the faster that water is moving south, thereby increasing entrainment potential. The additional negative flow causes Sacramento River water entering the northwest portion of the Delta to be diverted southward toward the pumping facilities rather than seaward, which allows saltier tidal flows to move further toward the Delta and reduces spawning habitat for the Bay-Delta longfin smelt. In order to address and minimize effects to federally listed fish species (delta smelt, chinook salmon (Sacramento River winter-run, California coastal, Central Valley spring-run salmon), and steelhead salmon), restrictions to pumping and other water operations management strategies have been implemented by the DWR and Reclamation to limit negative OMR flows and associated entrainment through the section 7 process of the Act (Service 2008, entire; National Oceanic and Atmospheric Administration, National Marine Fisheries Service [NMFS] 2009, entire; Service 2019, entire; NMFS 2019, entire). In addition, the DWR has implemented similar measures for State-listed species (including longfin smelt) (CDFW 2009c Incidental Take Permit (ITP), entire; CDFW 2020b, ITP, entire).

The results of two different analytical approaches to the Smelt Larval Survey (SLS) data suggest that entrainment of fish has not exceeded 3 percent since 2009 (Kimmerer 2022, pers. comm.). One of the two analyses coupled particle tracking modeling with the SLS data set and found an upper 95 percent credible interval of proportional entrainment was 2.9 percent in the critically dry winter of 2013 and nearly zero in the wet winter of 2017. A second analysis (similar in approach to Kimmerer 2008, entire) analyzed all of the SLS data in the period 2009–2020. Similarly, this approach also found proportional entrainment was unlikely to have exceeded 3 percent (range = 0.5 to 2.9 percent) (Kimmerer 2022, pers. comm., unpublished data). We interpret these findings, as well as previously published information (CDFW 2020a, entire), to indicate that the OMR management strategies in place since 2009 have been an effective conservation strategy for limiting the impact of entrainment and its consequences for the Bay-Delta longfin smelt. As a result, the best information currently available indicates that management actions for operating water diversion facilities are assisting in limiting entrainment impacts for the Bay-Delta longfin smelt.

Contaminants

The San Francisco Bay estuary has been identified as an impaired water body due to it containing numerous and persistent contaminant compounds (California State Water Resources Control Board 2018, appendix A). The list of contaminant compounds identified within the estuary includes elemental contaminants or ‘metals’ (e.g., mercury and selenium), toxic organic compounds (dioxins, furans, polychlorinated biphenyls), and pesticides (chlordane dieldrin, DDT). Additional emerging contaminants of concern include flame retardants, nutrients, naturally occurring toxins, microplastics, and pharmaceuticals and personal care products (i.e., plastic microbeads, insect repellant, sunscreen, cosmetics, etc.) (Klosterhaus et al. 2013, pp. 97–98, table 1; Sutton et al. 2017, entire). Ongoing analysis of water in the Delta suggests that on average 10 new synthetic organic pesticide chemicals are detected every year (California Department of Pesticide Regulation 2020, dataset). Water sampling in one study of the Delta indicated the presence of more than 50 chemical compounds from a single 1-liter (L) (34-ounce (oz)) water sample (Moschet et al. 2017, pp. 1557–1560).

The sources of contaminants include discharge from municipal wastewater treatment plants, agricultural outfalls, stormwater runoff, anti-fouling paints on boat and ship hulls, and direct human application of pest and aquatic plant control compounds (Service 2022, section 3.1.6). Legacy contaminants in the Bay-Delta (those from historical loading, such as organochlorine chemicals (e.g., DDT) from past agricultural use and mercury from past gold mining activity), have been shown to persist in the environment and continue to impact ecosystems and can bioconcentrate through the food web, posing additional health risks (Connor et al. 2006, pp. 87–88; Marvin-DiPasquale and Cox 2007, p. 2). Regulation has reduced the use of some contaminants, only to be replaced by other more potent alternative water-soluble chemicals such as neonicotinoids, which have additional impact on nontarget species such as aquatic invertebrates and fish (Buzby et al. 2020, pp. 15–21).

Field-based toxicity is difficult to determine, as impacted fish are not recovered in order to be examined (i.e., fish either die from direct exposure and resulting disease, or are eaten). Risk of exposure and effect, as determined by comparison to other species (e.g., delta smelt and the introduced inland silverside (*Menidia beryllina*)), potentially include direct effects on development, growth, and reproduction; impacts resulting from impairments to bioenergetic demands; and impaired locomotion, reducing feeding success, which can lead to increased susceptibility to predation, disease, and entrainment (Connon et al. 2009, p. 12; Connon et al. 2011, p. 299; Brander et al. 2012, p. 2854; Hasenbein et al. 2014, p. 696; Jeffries et al. 2015a, p. 17407; Jeffries et al. 2015b, p. 55; Brander et al. 2016, pp. 247–260; Cole et al. 2016, p. 219; DeCourten and Brander 2017, p. 2).

Pelagic Organism Decline (POD)

Between the years 2002 through 2004, abundance indices for multiple fish species within the San Francisco Bay estuary declined abruptly in what is known as the Pelagic Organism Decline, or POD. Specifically, the POD referred to a drop in survey catches of four fish species (Bay-Delta longfin smelt, delta smelt, striped bass (*Morone saxatilis*), and threadfin shad (*Dorosoma petenense*)) (Sommer et al. 2007, p. 273). The POD event is generally recognized as a population step decline (where populations decline to lower abundance level and not rebound to previous levels) for numerous fish species in the estuary. The coincident declines of multiple species suggested a possible common cause, but a single mechanism for decline that applied to all four fish has not been identified (MacNally et al. 2010, p. 1426; Thomson et al. 2010, pp. 1442–1443). As a result, researchers have focused on multiple causes, from habitat changes, reductions in freshwater inflow, water diversions, food resource changes, competition, predation, and contaminants as contributing to the POD (Sommer et al. 2007, pp. 271–276; MacNally et al. 2010, p. 1418; Fong et al. 2016, pp. 20–21). As outlined above, all of these factors have been identified as threats impacting the Bay-Delta longfin smelt to varying degrees. Although the POD event is not a threat in itself, but is instead most likely a result of multiple threats, the subsequently smaller populations are more susceptible to poor habitat conditions and have a reduced capability of rebounding from lower abundance years.

Bay-Delta Longfin Smelt Current Condition

Current Abundance

Several long-term survey efforts have been established for monitoring San Francisco Bay estuary fish populations including the Bay-Delta longfin smelt. These established survey efforts include the Fall Midwater Trawl (FMWT), the 20-mm Survey, and the San Francisco Bay Study (Bay Study). The 20-mm Survey has been conducted since 1995, and although it does not produce an abundance index for Bay-Delta longfin smelt, we adapted the results of the survey by using the methods in the study for the delta smelt abundance index for the Bay-Delta longfin smelt. Our methods and information on how we adapted the study information is outlined in appendix B of the SSA report (Service 2022, appendix B). The longest of these survey efforts is the FMWT, which was initiated in 1967 and has surveyed pelagic waters from the Delta into San Pablo Bay monthly from September through December each year. The FMWT captures mostly juvenile and adult fish 50–150 mm (2–6 in) in length and has been used to monitor the abundance of sampled fish species since the late 1970s (Stevens and Miller 1983, pp. 431–432). In the case of Bay-Delta longfin smelt, the FMWT samples adults and juveniles, most likely those returning from more marine environments to freshwater areas associated with spawning. Figure 3 identifies FMWT abundance information for Bay-Delta longfin smelt since its inception in 1967 with emphasis on the years 2000 to 2020.

Similar abundance estimates are reflected in the 20-mm Survey, Bay Study, and other modeling efforts (Service 2022, section 3.2.1).

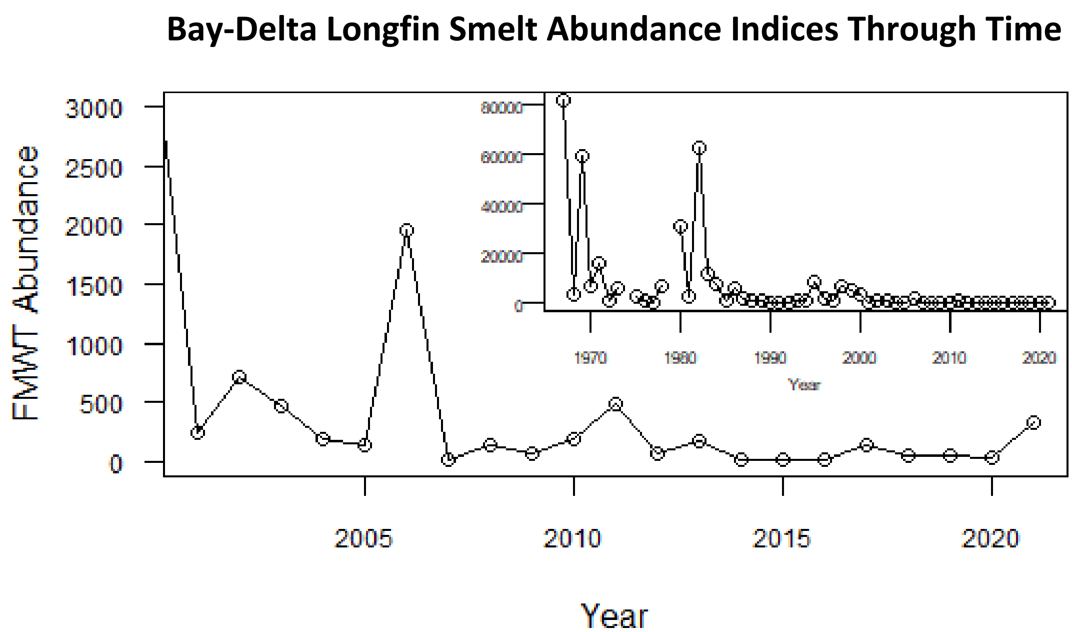

Figure 3: Bay-Delta longfin smelt abundance indices for 2000–2020 from the FMWT (Inset displays time series since 1967). Source: Adapted from California Department of Fish and Wildlife 2021

Collectively, these survey efforts encompass abundance estimates of all life stages of the Bay-Delta longfin smelt in the estuary. The data from these efforts indicate a recent and significant decline for the Bay-Delta longfin smelt throughout the estuary and across all life stages resulting in the conclusion that the current Bay-Delta longfin smelt population size is considered to be small (Service 2022, section 3.2, appendices A and B).

Population Trends

All the best available field surveys for documenting long-term abundance trends indicate Bay-Delta longfin smelt numbers have substantially declined over time, with current relative abundance reflecting small fractions of the species' historical relative abundance and representing a decline of three to four orders of magnitude over the course of available historical abundance records. Even considering the small periodic increases in numbers in occasional years in the most recent survey results (past 20 years), the general trend over time has been lower highs and lower lows in abundance for the DPS.

This finding supports the conclusion that abundance of all life stages has declined substantially over the course of several decades and that the overall decline has continued in recent years (Service 2022, section 3.2). A summary of annual population growth rates derived from the monitoring data showed that, on average, abundance has declined from year to year, although some years with large growth rates contributed to variability (Service 2022, section 3.2.2).

Effects of Threats Impacting the Bay-Delta Longfin Smelt

Reduced and altered freshwater flows into the estuary greatly impact the availability, distribution, and amount of Bay-Delta longfin smelt spawning and rearing habitat. Freshwater input into the estuary provides for proper low-salinity and cooler water conditions for Bay-Delta longfin smelt to spawn and rear young and provides abundant food resources for the DPS. Reductions in availability of such habitat conditions reduces the number of young available to mature to breeding age the following year. Reduced freshwater flows also require the DPS to move farther inland to find appropriate low-salinity conditions for spawning and rearing. This movement farther inland makes the DPS's larvae and young more vulnerable to entrainment as a result of water diversion from water export facilities. These larvae and young are often not captured and returned to the estuary as a result of salvage measures due to their smaller size.

The amount of freshwater input into the estuary is dependent on natural wet/dry precipitation patterns. These patterns have been influenced by the effects of current climate change conditions, which have resulted in more frequent, prolonged, and intense drought conditions (reduced flows) and increased water temperatures (poor habitat conditions). Freshwater flows into the estuary have also been greatly influenced by human-caused alteration of rivers and streams leading into the estuary as well as diversion and export of freshwater from the estuary. These human-caused impacts of water management have exacerbated the impacts of environmental variability of natural wet/dry precipitation patterns.

In addition to altered habitat conditions for the Bay-Delta longfin smelt, the available food resources for the DPS have also been severely impacted. A rapid change to the zooplankton community in the estuary beginning in the late 1980s along with the introduction of the nonnative species such as the overbite clam and others has greatly reduced the natural prey base for the DPS and replaced it with a smaller nonnative mysid. Because the DPS continues to exhibit very little variation in prey use despite the reduction in natural prey availability, they are considered more susceptible to food web changes than some other fishes. The decline in food resources is likely affecting juvenile and adult longfin smelt growth and fitness as well as increasing the effort needed to meet food resource demands.

After the review of the threats of predation, entrainment, and contaminants, we have determined that they are not primary driving factors currently influencing the Bay-Delta longfin smelt. However, these threats are likely still contributing cumulatively to the overall impacts acting on the DPS.

We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have not only analyzed individual effects on the DPS, but we have also analyzed their potential cumulative effects. We incorporate the cumulative effects into our SSA analysis when we characterize the current and future condition of the DPS. To assess the current and future condition of the DPS, we undertake an iterative analysis that encompasses and incorporates the threats individually and then accumulates and evaluates the effects of all the factors that may be influencing the DPS, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire DPS, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative effects analysis.

Resiliency, Redundancy, and Representation for the Bay-Delta Longfin Smelt

In the SSA report for the Bay-Delta longfin smelt (Service 2022, chapter 3), we evaluated the Bay-Delta longfin smelt's resiliency, redundancy, and representation under our SSA framework (Service 2016, entire).

Resiliency describes the ability of a species to withstand stochastic disturbance. Because the Bay-Delta longfin smelt is a single, intermixed population, we did not identify multiple resiliency units, but looked at the population as a whole. As discussed above, the Bay-Delta longfin smelt is subject to multiple interacting threats, including saltwater intrusion and reduced freshwater flows, that are altering and degrading habitat conditions. The resulting impact of these threats limits the extent, duration, and availability of appropriate habitat conditions needed for spawning, rearing, and ultimate recruitment of individuals into the population. These threats include anthropogenic actions (such as freshwater management, freshwater diversion, and physical alterations to the bathymetry of the estuary) or poor or altered environmental conditions (such as increased frequency and magnitude of drought resulting from current climate change conditions). Disruptions to the estuary's food web associated with reductions in freshwater flow or introductions of nonnative species are also limiting resiliency for the DPS.

Redundancy is the ability of a species to withstand catastrophic events. The Bay-Delta longfin smelt is a single intermixed population and occurs in areas within the San Francisco Bay estuary as dictated by the extremely modified and altered habitat and resource conditions. The estuary is also subject to extreme environmental variability as a result of climate change conditions resulting in increased temperatures and extreme drought. As a result of these changes, the ability of the system and organisms within the estuary to withstand catastrophic events and rebound during periods of more favorable conditions is greatly reduced. Large-scale estuary-wide ecosystem population collapses of fish and native zooplankton have occurred in the estuary. Although no single cause for the collapses has been identified, both native and nonnative fish populations have not recovered. The result has been step-declines of the Bay-Delta longfin smelt population size since the mid-1980s.

Representation describes the ability of a species to adapt to changing environmental conditions over time. This definition includes the ability of a species to adapt to both near-term and long-term changes in its physical and biological environments. The Bay-Delta longfin smelt population occurs in the San Francisco Bay estuary and is a single, genetically indistinguishable population. The Bay-Delta longfin smelt represents the southern extent of the species as a whole and most likely is a source for populations along the coast north of San Francisco Bay. Due to ocean currents and the species' poor swimming capability, populations north of the San Francisco Bay have limited ability to reestablish a population in the San Francisco Bay-Delta once they have been extirpated from the San Francisco Bay-Delta. The DPS's ability to adapt behaviorally to environmental changes (to have adaptive capacity) is also limited. This limitation is exemplified by the DPS's behavioral tendency of not adapting to food resource changes. As discussed, food resources for the DPS have changed significantly yet the DPS's behavior has not shifted to adapt to those changes.

In our evaluation of the current condition of the Bay-Delta longfin smelt, we evaluated several population viability analyses (PVAs) that quantitatively derive probabilities of extinction over time based on the DPS's historical and current abundance estimates (Service 2022, pp. 107–120; appendix B). The PVAs used information from the existing suite of surveys, including the FMWT, the 20-mm Survey, and the Bay Study, as well as others (Service 2022, figure 3.11). The PVAs modeled extinction probability based on a continuation of existing threats currently facing the DPS under varying levels of population recruitment. The results of the PVAs identified that the probability of quasi-extinction for the Bay-Delta longfin smelt exceeds 20 percent over the next 5 years and reaches 50–60 percent by 2040 (Service 2022, pp. 107–120). Applying the same assumptions over a longer time horizon (i.e., 2050–2065), the suite of surveys used in the PVAs predicts that the probability of extinction for the Bay-Delta DPS under current conditions is roughly 50–80 percent (Service 2022, pp. 107–120).

As a result of our review of the best scientific and commercial data available on the Bay-Delta longfin smelt, we have determined that the DPS's resiliency is low. Numerous decades of declining abundance indices for the Bay-Delta longfin smelt document the inability of the DPS to rebound during more favorable environmental conditions and respond to the threats it is facing in the contemporary San Francisco Bay estuary. The Bay-Delta longfin smelt also has extremely limited redundancy because it effectively represents a single, small population inhabiting the San Francisco Bay-Delta and nearshore ocean environment, and because it continues to be impacted by large-scale stochastic events and is subject to catastrophic events. We have determined that the representation of the Bay-Delta longfin smelt is limited as well, reflecting that same declining abundance trend and no discernible and quantifiable compensatory adaptation to current ecological conditions. Based on our evaluation of the current resiliency, redundancy, and representation for the Bay-Delta longfin smelt, we conclude the current ability of the DPS to maintain populations in the wild is low.

Future Condition

As part of the SSA, we also developed future condition scenarios to capture the range of uncertainties regarding future threats and the projected responses by the Bay-Delta longfin smelt. To assess the future condition of the Bay-Delta longfin smelt, we used published information related to the varying environmental conditions of the San

Francisco Estuary, including future climate change information and projected increases in water demand, and how these changes may impact how well the estuary can support the Bay-Delta longfin smelt into the foreseeable future. In our analyses, we considered two plausible future scenarios based on representative concentration pathways (RCP) 4.5 and 8.5 as the bookends for our analysis. The scenarios assessed climate change information (temperature increases, changes precipitation patterns, sea-level rise) through 2100, as published information was available. The information identified that declines in Bay-Delta longfin smelt population abundance will continue into the foreseeable future under both the RCP 4.5 and 8.5 scenarios. Because we determined that the current condition of the Bay-Delta longfin smelt was consistent with an endangered species (see **Determination of the Bay-Delta Longfin Smelt's Status**, below), we are not presenting the results of the future scenarios in this proposed rule. Please refer to the SSA report ((Service 2022, Chapter 4) for the full analysis of future scenarios.

Conservation Efforts and Regulatory Mechanisms

Numerous efforts have been initiated regarding conservation and regulation of the San Francisco Bay estuary and its resources, including managing water flows into and export from the estuary, improving water quality, conducting habitat restoration, and implementing measures or regulations to protect native fish. This effort includes establishment of multiagency collaborations such as the Interagency Ecological Program (IEP), which focuses on coordinating and prioritizing science needs and research to meet responsibilities under State and Federal regulatory requirements (IEP 2014, entire). The State of California listed the longfin smelt in the San Francisco Bay estuary and along the California Coast as a threatened species under the California Endangered Species Act in 2009 (CDFW 2009a, entire; California Natural Diversity Database 2022, entire) and has issued restrictions and requirements for the export of water for the State Water Project (see *Entrainment*, Water Project Exports, above). Several other fish species (delta smelt, several salmonid species) are listed under both the Act and the California Endangered Species Act, and the Service and NMFS have also issued biological opinions regarding the effects to these species and their habitats for delivery and export of water from the estuary (see *Entrainment*, Water Project Exports, above). The State Water Board is responsible for issuing water quality standards and monitors contaminants within the estuary (see *Contaminants*, above). However, despite efforts such as those identified above, the current condition of the estuary and continued threats facing the estuary and Bay-Delta longfin smelt, such as reduced freshwater inflow, severe declines in population size, and disruptions to the DPS's food resources have not been ameliorated.

Determination of the Bay-Delta Longfin Smelt's Status

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of an endangered species or a threatened species. The Act defines an "endangered species" as a species in danger of extinction throughout all or a significant portion of its range and a "threatened species" as a species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether a species meets the definition of an endangered species or a threatened species because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence.

Status Throughout All of Its Range

The current Bay-Delta longfin smelt abundance, density, and distribution throughout the San Francisco Bay estuary have substantially declined. Currently, the DPS exists in very low abundance despite periods when appropriate habitat conditions, which typically would allow for population rebounds, are available. Our analysis revealed that several threats are causing or contributing to this decline and currently pose a meaningful risk to the viability of the DPS. These threats have put the Bay-Delta longfin smelt largely into a state of chronic population decline due to habitat loss (reduction in freshwater flows into the estuary), which is exacerbated by limited food resources and the impacts associated with climate change, thereby limiting its resiliency and ability to withstand catastrophic events (reduced redundancy). This decline in numbers of the Bay-Delta longfin smelt is also a reflection of the DPS's ability to adapt to the ecosystem changes. As a result of the DPS's poor performance in adapting to the suite of stressors acting upon it, we consider the Bay-Delta longfin smelt's adaptive capacity and, therefore, its current representation to be low. The Bay-Delta longfin smelt's continued reduced population size makes the DPS vulnerable to varying habitat conditions (reduced freshwater flows) from year to year due to both anthropogenic and environmental conditions that are being influenced by the effects of climate change. Historically, with a larger population size, the DPS was more resilient to such stochastic and catastrophic events due to its ability to rebound in abundance when habitat conditions and resources would allow. The habitat changes, limitations to food resources, and resulting small population size now limit the DPS's ability to maintain its current population.

After evaluating threats to the DPS and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we find that the threats facing the San Francisco Bay-Delta DPS of the longfin smelt are current and ongoing and include habitat degradation and reduction from reduction of freshwater outflow from the Delta into the estuary (Factor A), increased intrusion of saltwater into spawning habitat areas (Factor A), alteration of food resources and availability (Factor E), nonnative species competition and food resource effects (Factor E), and the effects associated with climate change such as increased temperatures and frequency, magnitude, and duration of drought (Factor E).

Because these threats are ongoing and currently impacting the DPS, and have already been shown to have caused a significant decline in the DPS's current resiliency, redundancy, and representation, the DPS meets the Act's definition of endangered status.

Thus, after assessing the best available information, we determine that the San Francisco Bay-Delta DPS of the longfin smelt is in danger of extinction throughout all of its range.

Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. We have determined that the San Francisco Bay-Delta longfin smelt DPS is in danger of extinction throughout all of its range and accordingly did not undertake an analysis of any significant portion of the DPS's range. Because the DPS warrants listing as endangered throughout all of its range, our determination does not conflict with the decision in *Center for Biological Diversity* v. *Everson*, 435 F. Supp. 3d 69 (D.D.C. 2020), because that decision related to significant portion of the range analyses for species that warrant listing as threatened, not endangered, throughout all of their range.

Determination of Status

Our review of the best available scientific and commercial information indicates that the San Francisco Bay-Delta longfin smelt DPS meets the definition of an endangered species. Therefore, we propose to list the San Francisco Bay-Delta longfin smelt DPS as endangered in accordance with sections 3(6) and 4(a)(1) of the Act.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened species under the Act include recognition as a listed species, planning and implementation of recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and conservation by Federal, State, Tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and other countries and calls for recovery actions to be carried out for listed species. The protection required by Federal agencies, including the Service, and the prohibitions against certain activities are discussed, in part, below.

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Section 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

The recovery planning process begins with development of a recovery outline made available to the public soon after a final listing determination. The recovery outline guides the immediate implementation of urgent recovery actions while a recovery plan is being developed. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) may be established to develop and implement recovery plans. The recovery planning process involves the identification of actions that are necessary to halt and reverse the species' decline by addressing the threats to its survival and recovery. The recovery plan identifies recovery criteria for review of when a species may be ready for reclassification from endangered to threatened ("downlisting") or removal from protected status ("delisting"), and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery outline, draft recovery plan, final recovery plan, and any revisions will be available on our website as they are completed (*https://www.fws.gov/endangered*), or from our San Francisco Bay-Delta Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g., restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands.

If this DPS is listed, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost-share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the State of California would be eligible for Federal funds to implement management actions that promote the protection or recovery of the Bay-Delta longfin smelt. Information on our grant programs that are available to aid species recovery can be found at: *https://www.fws.gov/service/financial-assistance*.

Although the Bay-Delta longfin smelt is only proposed for listing under the Act at this time, please let us know if you are interested in participating in recovery efforts for this species. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service.

Federal agency actions within the species' habitat that may require conference or consultation or both as described in the preceding paragraph include management and any other landscape-altering activities on Federal lands or waters administered by the Service, NMFS, U.S. Bureau of Reclamation, U.S. Army Corps of Engineers, U.S. Department of Agriculture, or Federal Highway Administration.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to endangered wildlife. The prohibitions of section 9(a)(1) of the Act, codified at 50 CFR 17.21, make it illegal for any person subject to the jurisdiction of the United States to take (which includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these) endangered wildlife within the United States or on the high seas. In addition, it is unlawful to import; export; deliver, receive, carry, transport, or ship in interstate or foreign commerce in the course of commercial activity; or sell or offer for sale in interstate or foreign commerce any species listed as an endangered species. It is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to employees of the Service, the NMFS, other Federal land management agencies, and State conservation agencies.

We may issue permits to carry out otherwise prohibited activities involving endangered wildlife under certain circumstances. Regulations governing permits are codified at 50 CFR 17.22. With regard to endangered wildlife, a permit may be issued for the following purposes: for scientific purposes, to enhance the propagation or survival of the species, and for incidental take in connection with otherwise lawful activities. The statute also contains certain exemptions from the prohibitions, which are found in sections 9 and 10 of the Act.

It is our policy, as published in the *Federal Register* on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a proposed listing on proposed and ongoing activities within the range of the species proposed for listing. Based on the best available information, the following actions are unlikely to result in a violation of section 9, if these activities are carried out in accordance with existing regulations and permit requirements; this list is not comprehensive:

(1) Take of the longfin smelt outside the range of the DPS as identified in figure 1;

(2) Take as a result of recreational fishing as permitted by the State of California; and

(3) Recreational boating on open water areas of the San Francisco Bay-Delta Estuary.

Based on the best available information, the following activities may potentially result in a violation of section 9 of the Act if they are not authorized in accordance with applicable law; this list is not comprehensive:

Activities that the Service believes could potentially harm the Bay-Delta longfin smelt and result in "take" include, but are not limited to:

(1) Handling or collecting individuals of the DPS;

(2) Destruction/alteration of the Bay-Delta longfin smelt's habitat by discharge of fill material, dredging, draining, ditching, or stream channelization or diversion;

(3) Unauthorized diversion or alteration of surface flow into the San Francisco Bay-Delta estuary by removal of freshwater from rivers, streams wetlands, and other aquatic features;

(4) Pesticide applications in violation of label restrictions or introduction of other contaminants that may degrade water quality of the San Francisco Bay-Delta estuary; and

(5) Introduction of nonnative species that compete with or prey upon the Bay-Delta longfin smelt or alter food resources for the DPS.

Questions regarding whether specific activities would constitute a violation of section 9 of the Act should be directed to the San Francisco Bay-Delta Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

II. Critical Habitat

Background

Section 4 of the Act (16 U.S.C. 1533) and the implementing regulations in title 50 of the Code of Federal Regulations set forth the procedures for determining whether a species is an endangered species or a threatened species, issuing protective regulations for threatened species, and designating critical habitat for threatened and endangered species. In 2019, jointly with the National Marine Fisheries Service, the Service issued final rules that revised the regulations in 50 CFR parts 17 and 424 regarding how we add, remove, and reclassify threatened and endangered species and the criteria for designating listed species' critical habitat (84 FR 45020 and 84 FR 44752; August 27, 2019). At the same time the Service also issued final regulations that, for species listed as threatened species after September 26, 2019, eliminated the Service's general protective regulations automatically applying to threatened species the prohibitions that section 9 of the Act applies to endangered species (collectively, the 2019 regulations).

However, on July 5, 2022, the U.S. District Court for the Northern District of California vacated the 2019 regulations (*Center for Biological Diversity* v. *Haaland*, No. 4:19-cv-05206-JST, Doc. 168 (N.D. Cal. July 5, 2022) (*CBD* v. *Haaland*)), reinstating the regulations that were in effect before the effective date of the 2019 regulations as the law governing species classification and critical habitat decisions. Accordingly, in developing the analysis contained in this proposal, we applied the pre-2019 regulations, which may be reviewed in the 2018 edition of the Code of Federal Regulations at 50 CFR 424.12(a)(1). Because of the ongoing litigation regarding the court's vacatur of the 2019 regulations, and the resulting uncertainty surrounding the legal status of the regulations, we also undertook an analysis of whether the proposal would be different if we were to apply the 2019 regulations. That analysis, which we described in a separate memo in the decisional file and posted on *https://www.regulations.gov*, concluded that we would have reached the same proposal if we had applied the 2019 regulations because under either regulatory scheme we find that critical habitat is prudent for the DPS of Bay-Delta longfin smelt.

On September 21, 2022, the U.S. Circuit Court of Appeals for the Ninth Circuit stayed the district court's July 5, 2022, order vacating the 2019 regulations until a pending motion for reconsideration before the district court is resolved (*In re: Cattlemen's Ass'n,* No. 22-70194). The effect of the stay is that the 2019 regulations are currently the governing law. Because a court order requires us to submit this proposal to the *Federal Register* by September 30, 2022, it is not feasible for us to revise the proposal in response to the Ninth Circuit's decision. Instead, we hereby adopt the analysis in the separate memo that applied the 2019 regulations as our primary justification for the proposal. However, due to the continued uncertainty resulting from the ongoing litigation, we also retain the analysis in this preamble that applies the pre-2019 regulations and we conclude that, for the reasons stated in our separate memo analyzing the 2019 regulations, this proposal would have been the same if we had applied the 2019 regulations.

Critical habitat is defined in section 3 of the Act as:

(1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features

(a) Essential to the conservation of the species, and

(b) Which may require special management considerations or protection; and

(2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Our regulations at 50 CFR 424.02 define the geographical area occupied by the species as an area that may generally be delineated around species' occurrences, as determined by the Secretary (i.e., range). Such areas may include those areas used throughout all or part of the species' life cycle, even if not used on a regular basis (e.g., migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals).

Conservation, as defined under section 3 of the Act, means to use and the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.

Critical habitat receives protection under section 7 of the Act through the requirement that Federal agencies ensure, in consultation with the Service, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Such designation also does not allow the government or public to access private lands. Such designation does not require implementation of restoration, recovery, or enhancement measures by non-Federal landowners. Where a landowner requests Federal agency funding or authorization for an action that may affect a listed species or critical habitat, the Federal agency would be required to consult with the Service under section 7(a)(2) of the Act. However, even if the Service were to conclude that the proposed activity would result in destruction or adverse modification of the critical habitat, the Federal action agency and the landowner are not required to abandon the proposed activity, or to restore or recover the species; instead, they must implement "reasonable and prudent alternatives" to avoid destruction or adverse modification of critical habitat.

Under the first prong of the Act's definition of critical habitat, areas within the geographical area occupied by the species at the time it was listed are included in a critical habitat designation if they contain physical or biological features (1) which are essential to the conservation of the species and (2) which may require special management considerations or protection. For these areas, critical habitat designations identify, to the extent known using the best scientific and commercial data available, those physical or biological features that are essential to the conservation of the species (such as space, food, cover, and protected habitat).

Under the second prong of the Act's definition of critical habitat, we can designate critical habitat in areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific data available. Further, our Policy on Information Standards Under the Endangered Species Act (published in the *Federal Register* on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106-554; H.R. 5658)), and our associated Information Quality Guidelines provide criteria, establish procedures, and provide guidance to ensure that our decisions are based on the best scientific data available. They require our biologists, to the extent consistent with the Act and with the use of the best scientific data available, to use primary and original sources of information as the basis for recommendations to designate critical habitat.

When we are determining which areas should be designated as critical habitat, our primary source of information is generally the information from the SSA report and information developed during the listing process for the species. Additional information sources may include any generalized conservation strategy, criteria, or outline that may have been developed for the species; the recovery plan for the species; articles in peer-reviewed journals; conservation plans developed by States and counties; scientific status surveys and studies; biological assessments; other unpublished materials; or experts' opinions or personal knowledge.

Habitat is dynamic, and species may move from one area to another over time. We recognize that critical habitat designated at a particular point in time may not include all of the habitat areas that we may later determine are necessary for the recovery of the species. For these reasons, a critical habitat designation does not signal that habitat outside the designated area is unimportant or may not be needed for recovery of the species. Areas that are important to the conservation of the species, both inside and outside the critical habitat designation, will continue to be subject to: (1) conservation actions implemented under section 7(a)(1) of the Act; (2) regulatory protections afforded by the requirement in section 7(a)(2) of the Act for Federal agencies to ensure their actions are not likely to jeopardize the continued existence of any endangered or threatened species; and (3) the prohibitions found in section 9 of the Act. Federally funded or permitted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. These protections and conservation tools will continue to contribute to recovery of the species. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans, or other species conservation planning efforts if new information available at the time of those planning efforts calls for a different outcome.

Prudency Determination

Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, the Secretary shall designate critical habitat at the time the species is determined to be an endangered or threatened species. Our regulations (50 CFR 424.12(a)(1)) state that a designation of critical habitat is not prudent when any of the following situations exist:

(i) The species is threatened by taking or other human activity and identification of critical habitat can be expected to increase the degree of such threat to the species; or

(ii) Such designation of critical habitat would not be beneficial to the species. In determining whether a designation would not be beneficial, the factors the Services may consider include but are not limited to: Whether the present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or whether any areas meet the definition of "critical habitat."

As discussed in the SSA report, there is currently no imminent threat of collection or vandalism (identified under Factor B) for this species, and identification and mapping of critical habitat is not expected to initiate any such threat. In our SSA report for the Bay-Delta longfin smelt, we determined that the present or threatened destruction, modification, or curtailment of habitat or range is a threat to Bay-Delta longfin smelt. Therefore, because none of the circumstances enumerated in our regulations at 50 CFR 424.12(a)(1) have been met, we have determined that the designation of critical habitat is prudent for the Bay-Delta longfin smelt.

Critical Habitat Determinability

Having determined that designation is prudent, under section 4(a)(3) of the Act we must find whether critical habitat for the Bay-Delta longfin smelt is determinable. Our regulations at 50 CFR 424.12(a)(2) state that critical habitat is not determinable when one or both of the following situations exist:

(i) Data sufficient to perform required analyses are lacking, or

(ii) The biological needs of the species are not sufficiently well known to identify any area that meets the definition of "critical habitat."

We reviewed the available information pertaining to the biological needs of the DPS and habitat characteristics where this DPS is located. Careful assessments of the economic impacts that may occur due to a critical habitat designation are not yet complete. Therefore, data sufficient to perform required analyses are lacking, and we conclude that the designation of critical habitat for the Bay-Delta longfin smelt is not determinable at this time. The Act allows the Service an additional year to publish a critical habitat designation that is not determinable at the time of listing (16 U.S.C. 1533(b)(6)(C)(ii)).

Required Determinations

Clarity of the Rulemaking

We are required by E.O.s 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(1) Be logically organized;

(2) Use the active voice to address readers directly;

(3) Use clear language rather than jargon;

(4) Be divided into short sections and sentences; and

(5) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**. To better help us revise the proposed rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

It is our position that, outside the jurisdiction of the U.S. Court of Appeals for the Tenth Circuit, we do not need to prepare environmental analyses pursuant to the National Environmental Policy Act (42 U.S.C. 4321 et seq.) in connection with regulations adopted pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the *Federal Register* on October 25, 1983 (48 FR 49244). This position was upheld by the U.S. Court of Appeals for the Ninth Circuit (*Douglas County* v. *Babbitt*, 48 F.3d 1495 (9th Cir. 1995), cert. denied 516 U.S. 1042 (1996)).

Government-to-Government Relationship with Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), E.O. 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. No Tribal lands were identified within the range of the Bay-Delta longfin smelt, and we did not receive any information during our development of the SSA report for the DPS. We will continue to reach out and coordinate with Tribal entities during the development of a final determination for listing the Bay-Delta longfin smelt.

References Cited

A complete list of references cited in this rulemaking is available on the internet at *https://www.regulations.gov* and upon request from the San Francisco Bay-Delta Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this proposed rule are the staff members of the Fish and Wildlife Service's Species Assessment Team and the San Francisco Bay-Delta Fish and Wildlife Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

1. The authority citation for part 17 continues to read as follows:

AUTHORITY: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245, unless otherwise noted.

2. Amend § 17.11(h) by adding an entry for "Smelt, longfin [San Francisco Bay-Delta DPS]" to the List of Endangered and Threatened Wildlife in alphabetical order under FISHES to read as set forth below:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Common name	Scientific name	Where listed	Status	Listing citations and applicable rules
* * * * * * *				
FISHES				
* * * * * * *				
Smelt, longfin [San Francisco Bay-Delta DPS]	*Spirinchus thaleichthys*	U.S.A. (CA)	E	[*Federal Register* citation when published as a final rule]
* * * * * * *				

Martha Williams,
Director,
U.S. Fish and Wildlife Service.

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