

1 **A.21 SACRAMENTO SPLITTAIL**
 2 **(*POGONICHTHYS***
 3 ***MACROLEPIDOTUS*)**

4 **A.21.1 Legal and Other Status**

5 The Sacramento splittail was federally listed as threatened on
 6 February 8, 1999 (USFWS 1999), and delisted on September
 7 22, 2003 (USFWS 2003). The splittail is a Class 1 (qualifies
 8 as threatened under the California ESA) California Species
 9 of Special Concern (CDFG 2003).

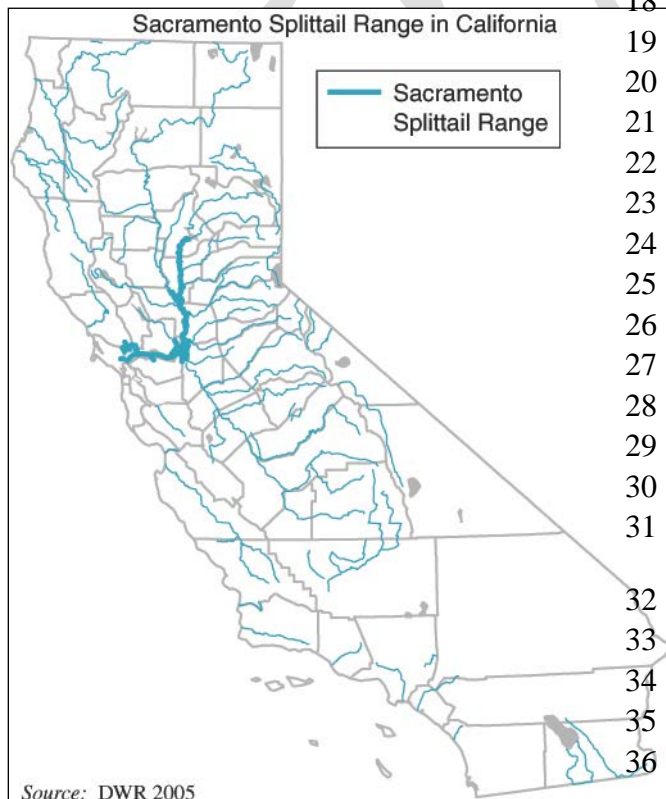


photo courtesy Randall Baxter

10 **A.21.2 Species Distribution and Status**

11 **A.21.2.1 Range and Status**

12 The Sacramento splittail is endemic to California. Historically, it inhabited sloughs, lakes, and rivers
 13 of the Central Valley with populations extending upstream to Redding in the Sacramento River, to
 14 the vicinity of Colusa State Park in Butte Creek/Sutter Bypass, to Oroville in the Feather River, to
 15 Folsom in the American River, and to Friant in the San Joaquin River (Moyle 2002). Populations
 16 also appear to have been present in Tulare and Buena Vista lakes. The current distribution is limited
 17 by dams and other barriers. The species migrates up the Sacramento River to Red Bluff Diversion



18 Dam and up the San Joaquin River to Salt
 19 Slough in wet years as well as into the
 20 lower reaches of the Feather River and
 21 American River. When they are not
 22 spawning, most are found in the Delta,
 23 Suisun Bay, Suisun Marsh, the lower Napa
 24 River, the lower Petaluma River, and other
 25 parts of the San Francisco estuary (Moyle
 26 2002). Populations in the lower Petaluma
 27 and Napa rivers are self-sustaining and
 28 genetically distinct (Baerwald et al. 2007).
 29 Several individuals have been caught in San
 30 Luis Reservoir, which stores water pumped
 31 from the Delta.

32 Splittail abundance fluctuates considerably
 33 from year to year and is positively related to
 34 the magnitude and duration of flood plain
 35 inundation (Sommer et al. 1997). The
 36 species has the ability to recover rapidly

1 under favorable conditions (Moyle 2002). Their abundance in most years within their current range
2 is estimated to be approximately 35 to 60 percent of that in 1940.

3 **A.21.2.2 Distribution and Status in the Plan Area**

4 Splittail migrate upstream to spawn in the Sacramento River along the western border of Butte
5 County up to Red Bluff Diversion Dam (Moyle et al. 2004). There are anecdotal reports of
6 individuals in the Feather River up to the Thermalito Outlet (B. Cavallo, pers. comm., as cited in
7 Moyle et al. 2004; B. Oppenheim pers. comm.. to R. Baxter 2003), although these accounts are rare.
8 California Department of Fish and Game has no records of Sacramento splittail within Butte County
9 (CNDDDB 2006) (see Figure A-21) and SWRI (2003) indicated that splittail are not expected to be in
10 Feather River within Butte County.

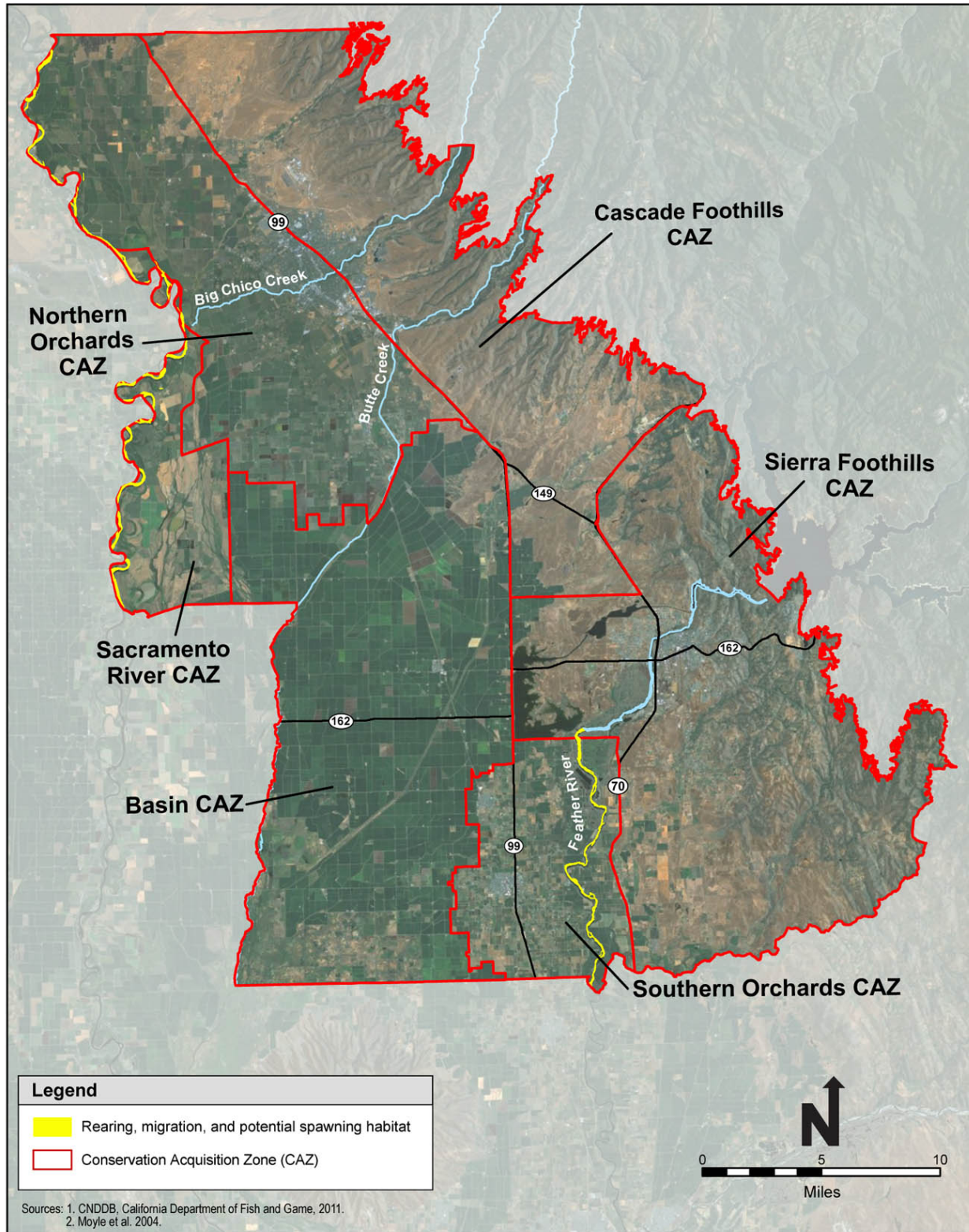
11 **A.21.3 Habitat Requirements and Special Considerations**

12 Sacramento splittail are adapted to living in freshwater and estuarine habitats as well as alkaline
13 lakes and sloughs (Moyle 2002). The fish are regularly found in salinities of 10 to 18 parts per
14 thousand (ppt), and adults can tolerate up to 29 ppt for short periods of time. The species can
15 also tolerate low dissolved oxygen concentrations (to less than 1 milligrams per liter [mg/l]) and
16 a wide range of temperatures from 5°C to 33°C (Moyle 2002). Young fish appear to prefer
17 shallow water less than 2 meters deep and are able to swim against strong tidal and river
18 currents. Splittail are generally more abundant where other native fish are present (Moyle et al.
19 1995). Non-reproductive splittail are abundant in moderately shallow (less than 4 meters)
20 brackish and freshwater tidal sloughs such as Suisun Marsh and margins of the lower
21 Sacramento River (Feyrer et al. 2005; Moyle et al. 2004). Adults move upstream in winter and
22 spring to feed and spawn. Flooded vegetation is necessary for spawning and to provide cover for
23 larvae and young. Year class success is highest in wet years, and the fish live more than 8 years.
24 The splittail feeds on benthic invertebrates such as opossum shrimp, benthic amphipods, and
25 harpacticoid copepods, as well as detritus (Moyle 2002). Piscivorous fish, including striped
26 bass, prey upon splittail.

27 **A.21.4 Life History**

28 Males and females generally mature at the end of their second year, although a few males mature
29 earlier and some females mature later (Moyle 2002). Splittail spawn from February into early
30 July over flooded vegetation, although peak activity is usually in March and April. Spawning
31 appears to be triggered by rising water levels, increasing water temperature (14 to 19°C), and
32 increasing day length. Females are very fecund and can produce over 100,000 eggs. Individuals
33 typically do not lay all their eggs at once but spawn over several months. The adhesive fertilized
34 eggs attach to vegetation or debris and hatch in 3 to 7 days. Most larvae remain in shallow areas
35 with vegetation for 10 to 14 days and then move into deeper water (Moyle 2002).

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Figure A-21. Sacramento Splittail Modeled Habitat

1 A.21.5 Threats

2 Sacramento splittail populations have been reduced due to loss and modification of riverine
3 spawning and rearing habitat and changes in hydrology. Flood control processes have created
4 artificial hydrologic conditions that may act to reduce the regularity of flooding in floodplain
5 habitat, such as the Cosumnes floodplain and Yolo Bypass.

6 Juvenile splittail are thought to begin migrating downstream with increasing water temperatures;
7 however, artificially constructed channels in the watershed are often too deep to sufficiently
8 warm the water, potentially causing stranding of juveniles on the floodplains. Other threats to the
9 population include variations in climate, introduction of nonnative predators and competitors,
10 toxic substances, and exploitation (Moyle 2002).

11 A.21.6 Relevant Conservation Efforts

12 The CALFED Ecosystem Restoration Program (ERP) (CALFED 2000) lists splittail as “r,”
13 contribute to recovery, and includes the following prescription to achieve the species goal:

14 Species recovery objectives will be achieved when 2 of the following 3 criteria are met in
15 at least 4 of every 5 years for a 15 year period: 1) the fall mid-water trawl survey
16 numbers must be 19 or greater for 7 of 15 years. 2) Suisun Marsh catch per trawl must be
17 3.8 or greater and the catch of young-of-year must exceed 3.1 per trawl for 3 of 15 years,
18 and 3) Bay Study otter trawls must be 18 or greater AND catch of young-of-year must
19 exceed 14 for 3 out of 15 years.

20 The ERP has funded the Yolo Bypass Watershed Restoration Strategy. The purpose of this
21 project is to develop a local implementation strategy for broad landscape-level restoration and
22 rehabilitation for the Yolo Bypass, which should directly benefit splittail.

23 The ERP has also funded a feasibility study for flood protection and ecosystem restoration at
24 Hamilton City. The feasibility study identified constructing an 11 kilometer [km] (6.8 mile)
25 setback levee with varying heights. To accomplish ecosystem restoration within the project area,
26 the majority of the existing “J” levee would be removed to reconnect the river to the floodplain,
27 allowing overbank flooding and increasing capacity in the Sacramento River. Native vegetation
28 would be restored on all project lands waterside of the new setback levee. Existing orchards in
29 the proposed restoration areas would be removed and native vegetation would be planted.
30 Native vegetation would consist of riparian, scrub, oak savannah, and grassland species.

31 Connectivity to and restoration of floodplain habitat were achieved along the Cosumnes River
32 through breaching of levees on the Cosumnes River Preserve during the 1990s (Booth et al.
33 2006). The Cosumnes River Preserve is managed by a coalition of state, federal, and nonprofit
34 organizations, such as The Nature Conservancy California, and is now thought to be used for
35 spawning by splittail (Crain et al. 2004, Moyle et al. 2004).

1 Several conservation activities to improve shallow subtidal habitat are planned in the Delta that
2 should benefit splittail. The CALFED ERP Suisun Marsh Land Acquisition and Tidal Marsh
3 Restoration project will restore 500 acres within the Suisun Marsh to tidal wetland. The Suisun
4 Marsh/North San Francisco Bay Ecological Zone Biological Restoration and Monitoring project
5 will restore, maintain, and monitor the biology of at least three major eastern San Pablo Bay and
6 southern Suisun Bay areas within a single CALFED-defined ecological zone (Suisun Bay/North
7 San Francisco Bay), and compare and improve these restoration efforts through an integrated
8 monitoring program. The overall goal of this project is to restore tidal influence and re-create
9 natural/historic elevations/topography, soil conditions, and plant communities throughout the entire
10 elevational range to restore tidal marsh habitat.

11 The construction of the Sutter Mutual Water Company Tisdale positive barrier fish screen and
12 pumping plant has been completed using ERP funds. This diversion is located 45 miles north of
13 Sacramento on the Sacramento River and will eliminate entrainment losses while maintaining
14 Sutter Mutual Water Company's diversions.

15 Construction is ongoing for the Reclamation District 108 Poundstone Intake Consolidation and
16 Positive Barrier Fish Screen Project in Colusa County. This project will construct an 81-foot-
17 long positive barrier fish screen at the entrance to a new water diversion site on the Sacramento
18 River (rm 110.5) in Colusa County. The new diversion will consolidate and allow removal of
19 three existing unscreened diversions. Other projects (e.g., Reclamation District 1004 intake
20 screens, RD 108 Wilkins Slough Positive Barrier Fish Screen) have been constructed on the
21 Sacramento River to reduce entrainment of splittail and other fish.

22 The Sacramento River Conservation Area Forum, DWR, USFWS, DFG, the Department of
23 Parks and Recreation, the Wildlife Conservation Board, nonprofit organizations such as the
24 Nature Conservancy and the Sacramento River Partners, and many other stakeholders conduct
25 conservation and restoration activities in the middle and upper reaches of the Sacramento River.
26 The Sacramento River Conservation Area Forum developed guidelines for all stakeholders to
27 follow in directing their restoration and conservation actions. These guidelines “ensure that
28 riparian habitat management along the river addresses the dynamics of the riparian ecosystem
29 and the reality of the local agricultural economy.”

30 On December 10, 2009, the California Fish and Game Commission adopted DFG's proposal to
31 establish fishing regulations on splittail in an attempt to reduce the potential effects of harvest on
32 the splittail population. Effective March 1, 2010, there is a year-round two fish daily bag and
33 possession limit.

34 **A.21.7 Species Habitat Suitability Model**

35 **Rearing/Migration/Potential Spawning Habitat.** Splittail exist in the mainstem Sacramento
36 River along the western edge of the Plan Area and in the Feather River as far upstream as just
37 below the Thermalito Afterbay Outlet (A Seesholtz pers. comm., B. Oppenheim pers. comm.).

1 Based on the size of these fish, it is thought that these splittail are spawning here or close by
2 although no spawning has been observed directly. There have been no confirmed sightings of
3 splittail upstream of the Thermalito Afterbay Outlet, possibly because flows above the Outlet
4 (the Low Flow Channel) are too stable to cause a rise in water levels to a point where spawning
5 and rearing would occur (A. Seesholtz pers. comm.).

6 **Assumptions.** There have been multiple observations of splittail in the Feather River. Spawning
7 occurs preferentially in inundated floodplains, which provide relatively warm water and a high
8 abundance of food, allowing splittail to grow and develop rapidly. This habitat exists outside the
9 Plan Area in the Sutter and Yolo bypasses and the Cosumnes River. When floodplain inundation
10 does not occur during drier years, adult splittail migrate farther upstream in the Sacramento
11 River, Feather River, and into Butte Creek (downstream of the Plan Area) to find suitable habitat
12 along channel margins or flood terraces (Feyrer et al. 2005).

13 Larval and juvenile splittail typically remain upstream in shallow channel margins for weeks to
14 months before migrating downstream towards the brackish, turbid waters of Suisun Bay and the
15 western Delta. A less well-studied life history strategy occurs in the mainstem Sacramento River
16 and downstream of the Plan Area in Butte Creek (Baxter 1999). This latter strategy involves
17 remaining upstream through the summer into the next fall or the following spring and migrating
18 downstream as a subadult (Moyle et al. 2004). As water recedes further, juveniles remaining in
19 upstream riverine habitats have been observed congregating in large eddies for feeding (Baxter
20 unpubl. data).

21 **A.21.8 Recovery Plan Goals**

22 No recovery plan has been prepared for the Sacramento splittail because the species is not
23 federally listed.

24 **A.21.9 References**

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31 Personal Communications

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2 Wilder on September 20 regarding fish use of the Feather River.

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DRAFT