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FISH SPECIES OF SPECIAL CONCERN OF CALIFORNIA

by

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Final Report Submitted to
State of California
The Resources Agency
Department of Fish and Game
Inland Fisheries Division
Rancho Cordova
Contract No. 7337

October 1989

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INTRODUCTION

The fish fauna of California is characterized by a high degree of endemism. Sixty-five of the 113 species and subspecies are found only in the state, and many of the remainder are shared only with a few other western states (Moyle et al. 1989). This endemism is the result of long isolation of California's drainage basins, coupled with aquatic environments requiring special adaptations for long-term persistence of fish populations (Moyle 1976). Fish are found in habitats ranging from tiny desert springs, to rivers that have huge fluctuations in flow, to shallow alkaline lakes and sloughs. Although the native fishes are admirably suited for surviving the vagaries of nature, they have done poorly when forced to compete with humans for the water in which they live. In California, most streams have been dammed, diverted, or otherwise altered; many lakes and marshes have been drained; much of the water has been polluted; and numerous fish species have been introduced into both altered and unaltered waters. As a result, five species or subspecies have become extinct in recent years and 16 others have been recognized as threatened or endangered by state or federal governments (Table 1).

Unfortunately, the forms that are formally recognized as extinct, endangered, or threatened are only the most obvious part of the picture. In this report, we describe four species or subspecies and two major runs of salmonids that deserve immediate recognition as threatened or endangered. Forty-four other taxa are described that need special protection because they appear to have seriously declining populations, because they have very limited ranges, or because we know so little about their status. In the latter case, we listed them on the assumption that the lack of information is at least partially a reflection of rarity. Three other taxa described in this report, Sacramento perch, arroyo chub, and Volcano Creek golden trout, would probably deserve listing as threatened or endangered if they had not been widely planted outside their native ranges; we list them because their native populations are still in trouble. Altogether, counting taxa that are extinct, taxa that are already listed as threatened or endangered, and taxa covered in this report, there are 721 species, subspecies, or salmon runs that need special protection or management, 64% of the native freshwater fish taxa! The decline of the native fishes should also be regarded as indicative of the decline of native aquatic habitats and ecosystems, which no doubt contain many poorly known endemic invertebrates and plants as well.

The decline of California's native aquatic organisms will continue and many extinctions will occur unless the widespread nature of the problem is recognized and a systematic effort is made to protect aquatic habitats in all drainages. The task of protecting the native fauna is going to be extraordinarily difficult because California's human population is growing rapidly and the demand for the state's limited water is growing with it. **It** is nonetheless a task well worth undertaking.

METHODS

The first step in creating this report was compiling the list of California fishes based on Moyle (1976) and more recent literature and knowledge of the authors. For the freshwater fishes the biggest problem faced was the inclusion of forms of uncertain taxonomic status; there are many isolated populations of undescribed fishes around the state whose relationship to described forms is poorly known yet seem to have distinctive morphological or ecological characteristics. Usually,

TABLE 1. Status of native freshwater fishes within the state of California. Fish classified as C1-C4 are species of special concern treated in this report. FE and FT are federally listed endangered and threatened species, respectively. SE and ST are state listed endangered and threatened species, respectively. Extinct species may be either globally extinct or extinct in California.

Petromyzontidae

- Kern brook lamprey, *Lampetra hubbsi* (C2)
 Pacific lamprey, *Lampetra tridentata*
 Sea-run Pacific lamprey, *L. t. tridentata* (C5)
 Goose Lake lamprey, *L. t. subsp.* (C2)
Pit-Klamath brook lamprey, *Lampetra lethophaga* (C5)
Klamath river lamprey, *Lampetra similis* (C3)
 Modoc brook lamprey, *Lampetra folletti* (C3)
 River lamprey, *Lampetra ayresi* (C3)
 Pacific brook lamprey, *Lampetra pacifica* (C5)

Acipenseridae

- White sturgeon, *Acipenser transmontanus* (C5)
 Green sturgeon, *Acipenser medirostris* (C5)

Salmonidae

- Mountain whitefish, *Prosopium williamsoni* (C5)
 Chinook salmon, *Oncorhynchus tshawytscha*²
 Spring chinook salmon (C2)
 Winter chinook salmon (C1)
 Fall chinook salmon (C5)
 Late-fall chinook salmon (C5)
 Coho salmon, *Oncorhynchus kisutch* (C3)
 Pink salmon, *Oncorhynchus gorbuscha* (C2)
 Chum salmon, *Oncorhynchus keta* (C5)
 Sockeye salmon, *Oncorhynchus nerkes* (C5)³
 Rainbow trout, *Oncorhynchus mykiss*
 Coastal rainbow trout
 Resident rainbow trout *O. m. gairdneri* (C5)
 Summer steelhead (C1)
 Winter steelhead (C5)
 Eagle Lake rainbow trout, *O. m. aquilarum* (C3)
 Kern River rainbow trout, *O. m. gilberti* (C2)
 Little Kern golden trout, *O. in. whitei* (FT)
 Volcano Creek golden trout, *O. in. aguabonita* (C4)
 Goose Lake redband trout, *O. m. subsp.* (C2)
 McCloud River redband trout, *O. m. subsp.* (C3)
 Cutthroat trout, *Oncorhynchus clarki*
 Coastal cutthroat, *O. c. clarki* (C3)
 Lahontan cutthroat, *O. c. henshawi* (FT)
 Paiute cutthroat, *O. c. seleniris* (FT)

Bull trout, *Salvelinus confluentus* (EXTINCT)

Osmeridae

Delta smelt, *Hypomesus transpacificus* (C1)

Longfin smelt, *Spirinchus thaleichthys* (C5)

Eulachon, *Thaleichthys pacificus* (C5)

Cyprinidae

Tui chub, *Gila bicolor*

Lahontan creek tui chub, *G. b. obesa* (C5)

Lahontan lake tui chub, *G. b. pectinifer* (C2)

Mohave tui chub, *G. b. mohavensis* (SE, FE)

Owens tui chub, *G. b. snyderi* (SE, FE)

Cowhead Lake tui chub, *G. b. vaccaceps* (C2)

Goose Lake tui chub, *G. b. thalassina* (C3)

Eagle Lake tui chub, *G. b. subsp.* (C3)

High Rock Springs tui chub, *G. b. subsp.* (C2)

Klamath River tui chub, *G. b. bicolor* (C5)

Pit River tui chub, *G. b. subsp.* (C5)

Blue chub, *Gila coerulea* (C5)

Arroyo chub, *Gila orcutti* (C4)

Thicktail chub, *Gila crassicauda* (EXTINCT)

Bonytail chub, *Gila elegans* (SE, FE)

Lahontan redbelly, *Richardsonius egregius* (C5)

Hitch, *Lavinia exilicauda*

Sacramento hitch, *L. e. exilicauda* (C5)

Clear Lake hitch, *L. e. chi* (C3)

Monterey hitch, *L. e. harengus* (C5?)

California roach, *Lavinia symmetricus*

Sacramento roach, *L. s. symmetricus* (C5)

San Joaquin roach, *L. s. subsp.* (C3)

Monterey roach, *L. s. subditus* (C3)

Navarro roach, *L. s. navarroensis* (C3)

Tomales roach, *L. s. subsp.* (C3)

Gualala roach, *L. s. parvipinnis* (C2?)

Pit roach, *L. s. mitrulus* (C2)

Sacramento blackfish, *Orthodon microlepidotus* (C5)

Sacramento splittail, *Pogonichthys macrolepidotus* (C2)

Clear Lake splittail, *Pogonichthys ciscoides* (EXTINCT)

Hardhead, *Mylopharodon conocephalus* (C3)

Sacramento squawfish, *Ptychocheilus grandis* (C5)

Colorado squawfish, *Ptychocheilus lucius* (SE, FE, EXTINCT)

Speckled dace, *Rhinichthys osculus*

Amargosa Canyon speckled dace, *R. o. subsp.* (C2)

Klamath speckled dace, *R. o. klamathensis* (C5)

Lahontan speckled dace, *R. o. robustus* (C5)

- Owens speckled dace, *R. o.* subsp. (C2)
- Sacramento speckled dace, *R. o.* subsp. (C5)
- Santa **Ana** speckled dace, *R. o.* subsp. (C1)

Catostomidae

- Flannelmouth sucker, *Catostomus latipinnis* (EXTINCT)
- Sacramento sucker, *Catostomus occidentalis*
 - Sacramento sucker, *C. o. occidentalis* (C5)
 - Goose Lake sucker, *C. o. lacusanserinus* (C3)
- Tahoe sucker, *Catostomus tahoensis* (C5)
- Owens sucker, *Catostomus fumeiventris* (C3)
- Modoc sucker, *Catostomus microps* (SE, FE)
- Klamath smallscale sucker, *Catostomus rimiculus* (C5)
- Klamath** largescale sucker, *Catostomus snyderi* (C2)
- Lost River sucker, *Deltistes luxatus* (SE, FE)
- Mountain sucker, *Catostomus platyrhynchus* (C3)
- Santa **Ana** sucker, *Catostomus santaanae* (C2)
- Razorback sucker, *Xyrauchen texanus* (SE)
- Shortnose sucker, *Chasmistes brevirostris* (SE,FE)

Cyprinodontidae

- Desert pupfish, *Cyprinodon macularius* (SE,FE)
- Amargosa pupfish, *Cyprinodon nevadensis*
 - Saratoga Springs pupfish, *C. n. nevadensis* (C3)
 - Amargosa pupfish, *C. n. amargosae* (C3)
 - Shoshone pupfish, *C. n. shoshone* (C1)
 - Tecopa pupfish, *C. n. calidae* (EXTINCT)
- Owens pupfish, *Cyprinodon radiosus* (SE,FE)
- Salt Creek pupfish, *Cyprinodon salinus*
 - Salt Creek pupfish, *C. s. salinus* (C3)
 - Cottonball Marsh pupfish, *C. s. milleri* (ST)
- California killifish, *Fundulus parvipinnis* (C5)

Atherinidae

- Topsmelt, *Atherinops affinis* (C5)⁶

Gasterosteidae

- Threespine stickleback, *Gasterosteus aculeatus*
 - Unarmored threespine stickleback, *G. a. williamsoni* (SE,FE)
 - Santa **Ana** threespine stickleback, *G. a. santannae* (C1)
 - Partially plated threespine stickleback, *G. a. microcephalus* (C5)⁷
 - Fully plated threespine stickleback, *G. a. aculeatus* (C5)⁷

Centrarchidae

- Sacramento perch, *Archoplites interruptus* (C4)

Embiotocidae

- Tule perch, *Hysterocarpus traski*
 Sacramento **tule** perch, *H. t. traski* (C5)
 Russian River **tule** perch, *H. L. porno* (C2)
 Clear Lake **tule** perch, *H. t. lagunae* (C5)
 Shiner perch, *Cymatogaster aggregata* (C5)

Mugilidae

- Striped mullet, *Mugil cephalus* (C5)⁶

Gobiidae

- Tidewater goby, *Eucyclogobius newbenyi* (C2)
 Longjaw mudsucker, *Gillichthys mirabilis* (C5)⁶

Cottidae

- Prickly sculpin, *Cottus asper*⁸
 Coastal prickly sculpin, *C. a. subsp.* (C5)
 Sacramento prickly sculpin, *C. a. subsp.* (C5)
 Clear Lake prickly sculpin, *C. a. subsp.* (C5)
 Riffle sculpin, *Cottus gulosus* (C5)
 Pit sculpin, *Cottus pitensis* (C5)
 Reticulate sculpin, *Cottus perplexus* (C3)
 Marbled sculpin, *Cottus klamathensis*
 Upper Klamath marbled sculpin, *C. k klamathensis* (C5)
 Bigeye marbled sculpin, *C. k macrops* (C3)
 Lower Klamath marbled sculpin, *C. k polyporus* (C5)
 Paiute sculpin, *Cottus beldingi* (C5)
 Coastrange sculpin, *Cottus aleuticus* (C5)
 Rough sculpin, *Cottus asperrimus* (ST)
 Pacific staghorn sculpin, *Leptocottus armatus* (C5)⁶
Pleuronectidae
 Starry flounder, *Platichthys stellatus* (C5)⁶

⁶The population of "*L. pacifica*" from Los Angeles Basin probably represent a distinct species, now extinct (C. Swift, pers. comm.).

⁷Chinook salmon have genetically distinct populations (nuts) in each major drainage. Probably all wild populations have declined in recent year but we only list spring run and winter nut chinook salmon as Class 1 species.

⁸Only sways into California freshwater; probably have never had established populations in California.

⁹Like chinook salmon, steelhead have a number of genetically distinct runs in each drainage.

¹⁰Listed as "state endangered," but recent surveys indicate that the bull trout is extinct in California.

¹¹Marine species common in lower reaches of coastal streams.

¹²See Bakker and Svenster (1988) for alternate "subspecies" terminology for sticklebacks Copeia 1988(2):569-571.

¹³Hopkirk (1973) suggested at least three subspecies of prickly sculpin exist in California. The Clear Lake population especially may deserve recognition as it is distinctive ecologically.

we included undescribed or poorly described forms if they were listed in Hubbs et al. (1979) and one or more other sources, or we had some personal experience in working with them that indicated their distinctness. The poor descriptions and lack of life history information for many subspecies indicate the need for more work on the systematics and biology of widely distributed species with many isolated populations such as tui chub (*Gila bicolor*) and California roach (*Lavinia symmetricus*). The extensive work done on one such species, rainbow trout (*Oncorhynchus mykiss*), demonstrates that many of these populations probably do deserve recognition as distinct taxa (e.g., Berg 1987). The ones listed as undescribed subspecies in this report are only the most obvious of these populations. All taxa described in this report, however, fit the definition of species in the Federal Endangered Species Act of 1973 as "any species, subspecies, or distinct population that interbreeds when mature."

Unless otherwise indicated, descriptions of species are based on Moyle (1976). Fish lengths are reported as total length (TL), fork length (FL), or standard length (SL), although the latter is used wherever possible.

The status of each species described in this report is based solely on the condition of the species within California. Taxa were excluded that were already extinct or listed as endangered or threatened by state or federal agencies. After evaluating the evidence available, the remaining species were placed in five classes according to the likelihood of their becoming extinct in the near future. Class 5 species were considered secure and not included in this report. The classes are as follows:

Class 1 Species (C1).

These are taxa that seem to conform to the state definitions of the threatened or endangered species and should be added to the official list.

Class 2 Species (C2).

These taxa have populations that are low, scattered, or highly localized. Their populations have declined in abundance in recent years and so require management to prevent them from becoming threatened species.

Class 3 Species (C3).

These are uncommon taxa occupying much of their natural range, formerly more abundant, but still with pockets of abundance within their range. These species should be periodically monitored to see if their decline is accelerating. Taxa with very restricted distributions but stable populations are also included here.

Class 4 Species (C4).

These fishes have declined in abundance within their native range but have been introduced and established in greater numbers outside their native range. Special management is required to prevent loss of native populations.

Class 5 Species (C5).

These are common or widespread taxa whose populations appear stable or increasing in the face of habitat alterations. However, at least four species in this category need investigation to

see if our designation is accurate: green sturgeon, blue chub, Lahontan speckled dace, and mountain whitefish.

The following agency and institution abbreviations are used in this report: AFS (American Fisheries Society), BLM (Bureau of Land Management), CDFG (California Department of Fish and Game), PG&E (Pacific Gas and Electric Company), UCD (University of California, Davis), USFS (United States Forest Service), and USFWS (United States Fish and Wildlife Service).

Species accounts in this report were initially assembled from the literature and files of Moyle and Williams by Wikramanayake. Moyle and Williams determined the status of each taxon, wrote the status and management sections, and revised the species accounts.

ACKNOWLEDGMENTS

Preparation of this report was aided greatly by the use of unpublished data from various scientists throughout California. In particular we would like to thank Donald G. Buth, Tom R. Haglund, and Camm C. Swift for information on southern California fishes; Donald W. Sada for data on speckled dace in the Owens Valley; Don C. Erman on Lahontan fishes; and Eric R. Gerstung for material on numerous salmonids. The following employees of CDFG improved quality of this document through their careful reviews: Betsy C. Bolster, Almo Cordone, Paul P. Chappell, Susan Ellis, Eric R. Gerstung, John M. Hayes, Terry Healey, Frederick Meyer, Edwin P. Pister, Forrest Reynolds, Mike Rode, Donald E. Stevens, and Don W. Weidlein. Financial support was provided by the CDFG through the Endangered and Rare Fish, Wildlife, and plant Species Conservation and Enhancement Account (Income Tax Check-Off). We especially appreciate the assistance of our contracting officer, Betsy C. Bolster. This report was prepared while Jack E. Williams was participating in an Intergovernmental Personnel Act appointment from the U.S. Fish and Wildlife Service. Final editing and manuscript preparation was completed by Shirley H. Cable; illustrations are by T. J. Roehrig.