# STATUS AND MANAGEMENT OF THE COAST CUTTHROAT TROUT (*SALMO CLARKI CLARKI*) IN CALIFORNIA

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ABSTRACT.

Coast cutthroat trout, *Salmo clarki clarki*, are restricted in California to a narrow coastal strip 5 to 20 miles wide extending north from the Eel River Delta. Limited information regarding occurrence and relative abundance has been obtained as a by-product of anadromous fish sampling and habitat surveys. Estimates of sea run escapement, harvests, and angling use do not exist in California. Coast cutthroat trout appear to be declining in abundance as a result of widespread habitat degradation.

Coast cutthroat trout in California have been observed in 780 miles of stream and 4 coastal lagoons. The best populations occur in the Smith River system. Sea run populations occur in larger waterways north of the Mad River.

Little management effort outside of habitat protection and some limited stocking of hatchery reared fish has been directed toward coast cutthroat trout in this state.

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## INTRODUCTION

Information published regarding status, life history, and management of coast cutthroat trout in California is scanty and in part outdated. The last concerted effort to determine species distribution occurred during the early 1950's when a cursory survey of northwestern California waters was made (DeWitt 1954). Subsequent information on species occurrence has been obtained as a by-product of periodic creel census and routine stream surveys conducted by the Forst Service, U.S. Fish and Wildlife Service, National Park Service, Humboldt State University and the California Department of Fish and Game. Information from these surveys has been incorporated into this report.

## DISTRIBUTION AND ECOLOGY

Coast cutthroat trout Salmo *clarki clarki* occur in most coastal drainages from the Eel River Delta north to Seward, Alaska; generally within 100 miles of the Pacific Ocean (Moyle 1976; Behnke 1979). They are limited in California to a narrow coastal strip ranging in width from 20 miles at the Oregon border to less than 5 miles at the Eel River (Figure 1). They are less abundant in the southern portion of their California range (Moyle 1976).

Although coast cutthroat trout occur in a wide variety of habitats they seem to fare better in small streams with an abundance of cover and in stream systems possessing extensive, low gradient reaches before entering the sea (Moyle 1976).

Coast cutthroat populations in the Pacific northwest are frequently anadromous. Coast cutthroat trout in California south of the Mad River are rarely observed in salt water though further north they commonly occupy salt and brockish water lagoons and estuaries.

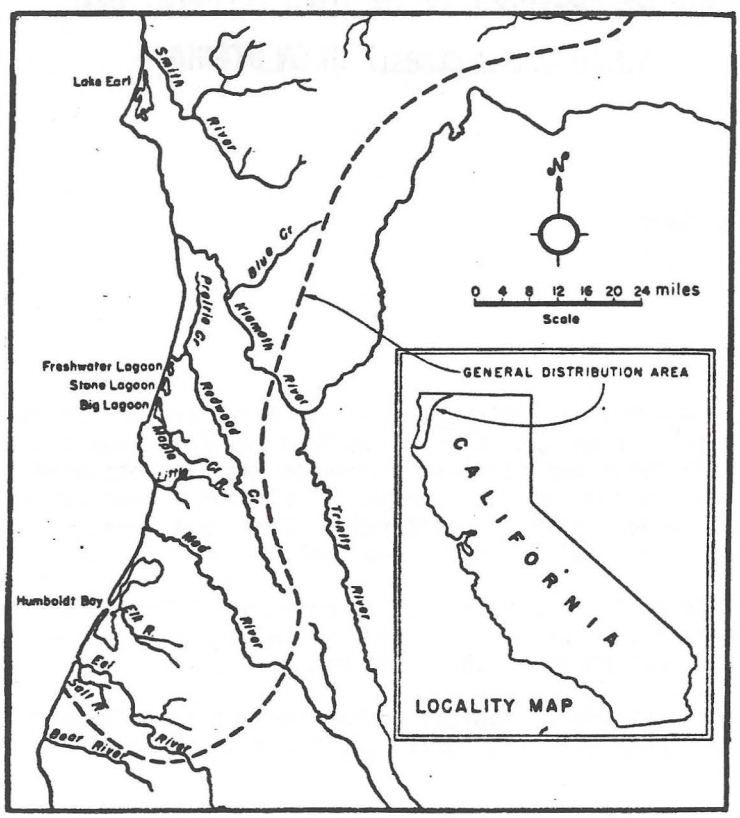


Figure 1. Map showing the range of the coast cutthroat trout in California.

Cutthroat trout in Redwood Creek in the Smith River system and perhaps in the Klamath River drainage and in some of the coastal lagoons appear to spend a portion of their life cycle in the ocean (D. LaFaunce, CDFG, pers. comm. 1981). Coast cutthroat trout in smaller California streams appear to be primarily residents, particularly those above log jams and other barriers (DeWitt, 1954).

Most published life history accounts of coast cutthroat have been obtained from studies on Oregon waters which closely resemble those in northwestern California. Thus findings are probably applicable to California waters. Oregon investigators observed where migratory populations occur, coast cutthroat trout spend an average 3 to 4 years in freshwater with the first year of life in small headwater tributaries. Smolts migrate to sea during the late spring when generally about 6-8 inches fork length (Giger, 1972). They move back into tidewater during the early fall after about 3 months in the fertile marine environment. At this time they measure 12 to 14 inches fork length (Giger, 1972). Coast cutthroat trout may spawn several times, make several summer migrations to sea, and reach a length of 20 inches fork length (Giger, 1972). Upstream migration of adults above tidewater generally does not occur until late fall rains have increased stream flow and moderated water temperatures (Giger, 1972). Adults spawn in small headwater streams during late winter or early springs (DeWitt 1954, Moyle, 1976).

Coast cutthroat trout do not usually feed much on their upstream spawning migrations but feed heavily on their return spring migrations to salt water when they can be readily caught by anglers (Giger, 1972). Creel census results from the Smith River, California, reveal that most of the cutthroat trout creeled are caught during May and June perhaps on their downstream migration to salt water (Taylor, 1981).

## POPULATION AND HABITAT STATUS

DeWitt (1954) found coast cutthroat trout in 53 California waters. The California Fish and Wildlife Plan (1965) utilizing information derived from Department of Fish and Game stream survey files notes coast cutthroat trout occurring in 323 miles of California streams, nearly 2% of the estimated cold-water stream miles in the state at that time. Subsequent surveys indicate coast cutthroat trout occur in at least 130 California streams possessing 780 miles of accessible habitat and four coastal lagoons with 3,700 acres of occupied habitat (Table 1). (Much of the above stream habitat may be occupied by cutthroat trout only a portion of the year).

Table 1. Known Populations of Coast Cutthroat Trout in California Waters.

Eel River Drainage
- Salt River (Slough)
- Russ Creek
- Reas Creek
- Francis Creek
- Williams Creek
- Strong Creek
- Barber Creek

Humboldt Bay Drainage
- Jacoby Creek
- Washington Gulch
- Grotzman Creek
- Janes Creek
- Jolly Giant Creek
- Ryan Slough
- Elk River

Mad River Drainage
- Mill Creek
- Warren Creek
- Lindsey Creek
- North Fork Mad
- Mule Creek
- Tyson Creek

Redwood Creek
- Captain Creek
- McArthur Creek
- Emerald Creek
- Devils Creek
- Tom McDonald Creek
- Prairie Creek
  - Little Lost Man Creek
  - Lost Man Creek
  - Boyes Creek
  - May Creek
  - Brown Creek
  - Godwood Creek

Klamath River Drainage
- Salt Creek
- Hunter Creek
- Richardson Creek
- Hoppaw Creek
- Saugep Creek
- Waukell Creek
- McGarvey Creek
- Tarup Creek
- Blue Creek
- Ah Pah Creek and forks
- Bear Creek
- Johnson Creek
- Pecwan Creek
- Miners Creek
- Surpur Creek
- Tectan Creek
- Turwar Creek
- Panther Creek

Smith River Drainage
- North Fork
  - Diamond Creek
  - North Fork Diamond Creek
  - High Plateau Creek
  - Peridotite Creek
- Middle Fork
  - Siskiyou Fork
  - Fall Creek
  - Griffin Creek
  - Kelly Creek
  - Monkey Creek
  - Patrick Creek and forks
  - Wimer Creek
- South Fork
  - Coon Creek
  - Craigs Creek
  - Eight Mile Creek
  - Goose Creek
  - Gordon Creek
  - Hurdygurdy Creek
  - Jones Creek
  - Little Jones Creek
  - Muzzle Loader Creek
  - Quartz Creek
  - Rock Creek
- Mill Creek
  - West Branch
  - East Branch
  - Bummer Lake Creek
- Cedar Creek
- Rowdy Creek

Illinois River Drainage
- East Fork
- Chicago Creek
- Broken Kettle Creek
- Elk Creek

Pacific Ocean (Direct Drainage)
- Widow White Creek
- Little River and forks
- Luffenholtz Creek
- Patrick Creek
- Mills Creek
- McNeil Creek
- Big Lagoon
  - Maple Creek and forks
- Stone Lagoon
  - McDonald Creek
  - Fresh Creek
- Espa Lagoon
- Squashan Creek
- Home Creek
- Wilson Creek
- Elk Creek
- Lake Earl
  - Jordan Creek
- Gilbert Creek
- South Fork Winchuck River
- Camp Six Creek
- Clarks Creek
- Peacock Creek
- Rock Creek
- Ritmer Creek
- Sultan Creek
- Penn Creek

Although coast cutthroat trout are now known to occur in more California waters than previously thought, stream survey information indicates populations have declined in many waters as a result of habitat degradation largely associated with timber harvesting and road construction.

Coast cutthroat trout because of their preference for heavy cover appear to be more sensitive than other coastal salmonids to streambed alterations and clear cut logging. For example, clear cut logging along tributaries of the Alsea River, in Oregon, depressed cutthroat trout abundance for 6-8 years, although coho salmon abundance rebounded rapidly after logging (Moring and Lantz, 1975).

Because migratory coast cutthroat trout spend a greater part of their lives in the estuaries of coastal streams than do other salmonids; dredging and filling for agricultural, urban and industrial development can have an adverse affect on these populations (Giger 1972).

Obstructions, stream channelization, and riparian vegetation removal associated with agricultural development have adversely affected habitat utilized by coast cutthroat trout in the delta region of the Eel River (Monroe et al 1974) They are confined to small streams flowing into the southeastern portion of the Eel River estuary, particularly those tributary to Salt Slough where they occupy about 15 miles of habitat. They are only occasionally observed in the main body of the estuary (Murphy and DeWitt 1951; and Puckett 1974).

At Humboldt Bay, coast cutthroat trout are rarely observed in the bay except at the mouths of tributary streams where they are occasionally caught by anglers (Gotshall, Allen, and Barnhart 1980). Early newspaper accounts report that "speckled trout", presumably coast cutthroat trout, were formerly very abundant and could be readily caught in most tributaries to the bay. Sea run populations have been severely depressed by reclamation of the bay with dikes possessing "flap gates" on entrances of small tributaries (Gotshall, Allen, and Barnhart 1980). Logging debris, siltation, channelization, and pollution have also degraded many bay tributaries (Monroe et al 1974).

During recent years coast cutthroat trout have been observed in 8 bay tributaries possessing about 20 miles of habitat (Table 1). Most of these populations appear to be resident. The best populations have been observed in Janes Creek and in the tributaries to Ryan Creek (D. LaFaunce, pers. comm. 1981).

Cutthroat trout have been observed in 7 tributaries to the lower Mad River immediately north of Arcata (Table 1). Recent observations indicate relatively high population densities (D. LaFaunce, pers. comm. May 1981). These populations appear to be mostly resident, since cutthroat trout are now only occasionally observed in the Mad River mainstem or estuary.

Little River, the next largest drainage to the north supports coast cutthroat trout including what may be sea run fish. Some of the cutthroat trout appear to be hybridized with rainbow trout. The watershed of the stream is in relatively good condition and a relatively unimpaired estuary exists.

Between Little River and Redwood Creek resident populations of coast cutthroat trout have been observed in a number of small streams flowing directly into the Pacific Ocean (Table 1). Expanded residential development and associated domestic water diversions in the vicinity of Trinidad are beginning to adversely affect some of these streams.

Further north, Big and Stone lagoons, two of the largest brackish water lagoons in California, support a limited fishery for coast cutthroat trout. Early season anglers are reported to catch fair numbers of 12 to 15 inch cutthroat trout (D. LaFaunce, pers. comm. 1981). The Department of Fish and Game operated a Merwin Trap in Big Lagoon during the late 1970's and found cutthroat trout ranging from 6-24 inches fork length to comprise about 30% of the trout populations (D. LaFaunce, pers. comm. 1981). Although the majority of these fish appear to spend most of their adult life in the lagoon, the

large size of some of the fish indicate possible migration to sea. Trout production in Big Lagoon severely inhibits benthic fauna and hence productivity. Portions of the lagoon are turning into marsh as a result of accelerated sedimentation.

Most of the timber land between the Mad River and the mouth of Redwood Creek is owned by large timber companies and has been heavily cutover. Good stands of second growth timber have returned to these formerly denuded watersheds and salmonid habitat in tributaries to the lower Mad River, Little River and coastal lagoons is recovering well. Improvement should continue until relogging occurs. With improved logging techniques and more strigent harvesting regulations future damage is expected to be less severe.

The Redwood Creek drainage, which until the early 1960's supported good numbers of coast cutthroat trout, was badly damaged by clear cut tractor logging during the last two decades (Fisk et al 1966, NPS 1975). Silt and debris resulting from severe erosion and massive landslides raised the bed of the mainstem by several yards thus eliminating pools and cover (NPS, 1975). Most tributaries with the exception of the relatively unimpaired Prairie Creek drainage had been either severely aggraded by slide debris or are clogged with silt and log jams. The lowermost 3 miles of Redwood Creek has been channelized for flood control thus nearly eliminating a formerly productive estuary (D. LaFaunce pers. comm. 1981).

During recent electrofishing surveys of the Redwood Creek drainage by National Park Service crews, coast cutthroat trout have been observed in only 3 tributaries upstream from Prairie Creek (Hofstra 1980). Cutthroat trout are still relatively abundant in the latter. The National Park Service is now engaged ina $33 million watershed rehabilitation program authorized by the Redwood National Park Expansion Act of 1978. Coast cutthroat trout as well as other anadromous fish should benefit.

Coast cutthroat trout occur in the Klamath River drainage as far upstream as Johnson Creek, some 20 miles above tidewater (Table 1). Twenty-nine tributaries to the river downstream from this point were surveyed in 1979 by U.S. Fish and Wildlife Service electrofishing crews and coast cutthroat trout were observed in 16 waters (USFWS 1979). Most of the streams where coast cutthroat trout were noted possessed relatively sparse populations and showed evidence of damage from past logging. Because of the severity of watershed damage incurred by tractor logging on steep and unstable slopes, habitat recovery in some instances may take several decades.

Fair numbers of coast cutthroat trout averaging 9 to 10 inches fork length occur in the Klamath River estuary (Boydstun 1981). Because of their silvery appearance, creel checkers as well as anglers frequently confuse them with steelhead "half pounders" thus making it difficult to determine the magnitude of the cutthroat trout fishery. The relatively small average size of observed adults indicates that most probably are not of sea run origin.

The Smith River is California's best known angling stream for coast cutthroat trout. They occur throughout the mainstem including the estuary, the three forks and many of the smaller tributaries (Table 1). Some 560 miles of the 3,000 miles of stream within the Smith River watershed have been surveyed (EDAW, Inc. 1980).

Coast cutthroat trout have been observed in 41 tributaries with 321 miles of accessible habitat (EDAW, Inc. 1980). They undoubtedly occur in many others. In most tributaries accessible to other anadromous salmonids cutthroat trout comprise a relatively minor portion of the total salmonid population. The greatest population densities have been observed upstream from natural barriers. The best "fishable" tributary populations within the Smith River drainage occur in the three forks and in Goose, Jones, Rock and Hurdy-gurdy creeks. During the early summer months some cutthroat trout migrate downstream to the estuary and perhaps to the ocean.

A creel census was conducted by the California Department of Fish and Game on the Smith River and its forks during the summer and fall of 1980. Coast cutthroat trout comprised about 10% of the total catch which included an estimated take of 1200-2000 cutthroat trout (Taylor, 1981). About half of the cutthroat trout observed in angler creels ranged from 10 to 14 inches fork length (Taylor, 1981).

Like other northwestern California streams the Smith River has been substantially altered by man. The estuary which was formerly characterized by numerous deep holes, backwaters and good bank cover has been partially filled with silt and gravel while accelerated bank erosion has reduced bank cover (Monroe et al 1974). Aggradation of the lower river channel and estuary coincided in time with the proliferation of extensive logging and road building within the relatively unstable watershed (EDAW, Inc. 1980). The greatest damage occured in 1964 and 1969 when abnormally high flows triggered massive landslides and transported millions of cubic yards of sediment to the lower river (EDAW,Inc. 1980). The Smith River estuary which supported a good cutthroat trout fishery prior to 1964 now yields only an occasional cutthroat trout to the angler.

Many tributaries to the Smith River have been damaged by siltation, landslide debris, channel scouring and log jams. Of 321 miles of the river and tributaries surveyed 15% has been severely degraded, 29% moderately degraded, 35% slightly damaged and 21% is relatively pristine (EDAW, Inc. 1980).

Coast cutthroat trout exist in a number of waters in the vicinity of the Smith River notably Lake Earl, Gilbert Creek and the South Fork of the Winchuck River. Lake Earl near Crescent City provides a good early season fishery for 12 to 15 inch cutthroat trout. During the summer the lake becomes grown over with pond weed (Monroe et al 1974). This fishery is dependent upon the natural reproduction occurring in Jordan Creek the only significant natural tributary. Jordan Creek has been damaged to some extent by channelization and diversions.

## RESEARCH AND MANAGEMENT

Biological information on coast cutthroat trout has been obtained largely as a byproduct of anadromous fisheries investigations and evaluation of trout planting programs. Limited creel census information is available from Lake Earl and some population sampling data was collected on Big and Stone lagoons by Humboldt State University. More intensive creel census primarily for anadromous fishes has been conducted on the lower Eel, Mad, Klamath and Smith rivers. Some stream survey and fish population data has been collected incidental to water project planning studies, timber harvest review and planning for stream clearance projects. Spawning escapement estimates and estimates of angling use and harvest for coast cutthroat trout waters in California do not exist.

Most management efforts in northwestern California have been directed toward salmon and steelhead, thus only indirectly involving coast cutthroat trout. Habitat maintenance has been the major focus (review of timber harvest plans, proposed streambed alterations and applications to divert water). Although many potential threats to coast cutthroat habitat exists, the tools to effectively deal with them are improving. More effective forest practices rules have reduced logging damage to streams on private lands while improved logging technology and multidisciplinary planning and review is improving stream protection on National Forest lands. Requirements for protection of "inner gorge areas", stream side strips and skyline cable logging on steep slopes could help reduce future stream damage on National Forest lands though expected future increases in timber harvesting could ultimately negate some hoped for benefits to stream fisheries.

Further protection may be provided by provisions of the state and federal wild and scenic rivers acts pertaining to the Smith River if the acts are not esmasculated by pending legislation or court action. Corps of Engineers permit procedures and implementation of coastal land use plans may provide greater protection to wetlands and estuaries used by coast cutthroat trout. Existing and proposed state and federal acquisitions at Humboldt Bay, Stone and Big Lagoons, Redwood Creek and Lake Earl will reduce the potential for habitat damage to these waters.

The Department of Fish and Game is conducting an extensive stream clearance project aimed at removing log jams and other barriers to anadromous fishes. This program should benefit migratory cutthroat, though some resident populations could be partially displaced by increased numbers of competing anadromous salmonids.

Oregon and to a lesser extent Washington have improved cutthroat trout angling in coastal waters through artificial propagation programs (Giger, 1972). Artificial propagation of coast cutthroat trout in California has been confined to limited production of fingerlings, yearlings and a few "catchables" at the Prairie Creek Hatchery, a former state facility now operated by Humboldt County. A small broodstock obtained from Oregon (Alsea River) was maintained at the hatchery until the program was terminated in 1978, after the majority of the broodstock had been lost and the remaining fish had become inbred (D. LaFaunce, pers. comm. 1981).

Survival of planted fingerling and yearling coast cutthroat trout in California streams was found to be poor, while plants of catchable sized trout failed to produce sea run returns to the hatchery during recent years. The majority of the latter were caught out quickly in a "put and take" situation.

Small plants of hatchery reared coast cutthroat trout were periodically made in the coastal lagoons and estuaries of northwestern California with little or no evaluation of their benefit to the fishery. A larger scale program involving plants of marked yearling coast cutthroat trout produced from endemic broodstocks should be initiated and evaluated before artificial propagation is considered as a feasible management option.

In conclusion coast cutthroat trout in California, though not wide spread, are an integral component of our natural diversity and as such, populations should be maintained and where feasible enhanced. In addition to providing angling diversity increased coast cutthroat trout populations would help improve angling in northwestern California during early summer months when angling for anadromous species is at a low ebb.

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