California's Living Marine Resources: A Status Report

The Errata

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The California Department of Fish and Game

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The Errata

The "Salmonids" Section on "Coastal Cutthroat Trout" has been reproduced from the original report article and is included with this errata sheet. In addition, for the Section on "Bay and Estuarine Finfish Resources," please insert the enclosed new article on "Gobies." The following are corrections for typographical errors in articles that appeared in the original report.

P. 85, Bathymetry of the Southern California Continental Shelf: "Channel Islands National Marine Sanctuary" (in red) should include "Santa Barbara Island."

P. 201, photo: "Pacific Sanddab, Citharichthys sordidus" should read "Speckled Sanddab, Citharichthys stigmaeus."

P. 219, line 19: "By 1916," should read "The southern California...."

P. 123, Spot Prawn, References: "Butler, T.H." should read "Sunada, J.S."

Coastal Cutthroat Trout

History of Fishery

Coastal cutthroat trout (Oncorhynchus clarki clarki) inhabit California in rivers from the Eel River delta to the Oregon border. This distribution represents the southern extent of their range. Coastal cutthroat trout exist in small populations, and by some estimates, occur in less than three percent of the stream habitat occupied by other salmon and steelhead in California. This limited distribution has resulted in a general lack of awareness of these fish among sport anglers in California. While no commercial fishery exists for coastal cutthroat trout, their catchability and striking appearance make them a popular sport fish for those few anglers familiar with their seasonal movements. Most angling effort for coastal cutthroat trout in California occurs in coastal lagoons and the Smith River basin. Because these fish can be similar in appearance to steelhead, many anglers are not aware they have caught a coastal cutthroat trout. Moreover, the difficulty in distinguishing juvenile steelhead and coastal cutthroat trout hampers management and research; typically these two species are identified only as "trout." Little information on the historic distribution and abundance of coastal cutthroat trout is available, and current information is sparse.

Coastal cutthroat trout are susceptible to harvest by sport angling; but their low numbers, variable movement patterns, and patchy distribution result in limited sport harvest. Because of their vulnerability to angling, fishery managers in California and across the range of coastal cutthroat trout are implementing special regulations to maintain or rebuild depleted populations.

Status of Biological Knowledge

The coastal cutthroat trout is the most widely distributed subspecies of cutthroat trout. They occupy habitats ranging from small to large rivers that drain the coastal rainforest between the Eel River, California, and Prince William Sound, Alaska. Anecdotal information suggests that they may occasionally be found in basins south of the Eel River. In general, coastal cutthroat trout are the most widely distributed salmonid species in those basins where they are found, with individuals occupying habitat from the estuary to the most upstream reaches of a basin, often with populations above migration barriers (*e.g.*, waterfalls) that anadromous fish can not pass. Coastal cutthroat trout are usually found in headwaters and smaller tributaries, and may also occur in small streams upstream from sloughs where steelhead are often absent.

Life-history traits of coastal cutthroat trout differ from other anadromous salmonids of the Pacific Coast, but exhibit some similarity to steelhead. Coastal cutthroat trout have both anadromous (often referred to as sea-run cutthroat trout) and potamodromous (life-history forms that migrate entirely within freshwater, sometimes moving over large distances). Like steelhead, anadromous coastal cutthroat trout may spawn more than once, but rely on freshwater and estuarine habitat for a greater portion of their life cycle than do Pacific salmon and steelhead. Downstream migration and movement into the marine environment typically occurs in late spring or early summer after two or three years in freshwater, although movement from upper tributaries into downstream areas may occur after a year.

Coastal cutthroat trout appear to have strong fidelity to their natal stream, perhaps because they do not make extensive ocean migrations. Anadromous adults return to freshwater between June and April. Run times appear to be relatively consistent from year to year within a stream but vary widely among streams. Spawning usually occurs between December and June. Coastal cutthroat trout have a higher incidence of repeat spawning than steelhead, although they may not spawn every year. Anadromous individuals rarely spawn before age four while potamodromous individuals may mature at an earlier age. Anadromous coastal cutthroat trout commonly overwinter in fresh water, although their affinity to natal streams for nonspawning purposes is not well understood. Tagging studies in Alaska and Washington have found adult coastal cutthroat trout moving into non-natal freshwater habitat seasonally, either for over-wintering or perhaps feeding purposes. Since migrations to freshwater can be made for reasons other than spawning, the term amphidromous may be more appropriate than anadromous to describe the migration pattern of coastal cutthroat trout. Anadromous individuals do not obtain the large size of other anadromous Pacific salmon and steelhead.

Genetic data suggest that coastal cutthroat trout are characterized by smaller, more genetically diverse local populations that act in a more independent, isolated manner than has been observed for other species of Pacific salmon and steelhead. Genetic research on coastal cutthroat trout indicates hybridization occurs between coastal cutthroat trout and steelhead in the wild. It is unclear whether this is a result of these species' relatively recent evolutionary split, past hatchery practices that reared and released hybrid individuals, reduction in the quality and quantity of habitat, or a combination of these and other factors. It does not appear that this phenomenon can be attributed solely to anthropogenic factors since suspected hybrid individuals have been identified in relatively pristine habitats devoid of hatchery releases

in southeast Alaska. Still, the greatest frequency of suspected hybrids in recent genetic surveys have been found in areas subject to a range of land management activities and hatchery releases. The occurrence of hybrids and similarities in appearance between "pure" coastal cutthroat trout and steelhead provide many challenges to researchers and managers.

Habitats for coastal cutthroat trout include gravelly lowland coastal streams, large and small rivers and estuaries, and nearshore ocean areas. Although there is some disagreement in the literature over preferred habitat of juveniles, young-of-the-year coastal cutthroat trout will use pool, run, and riffle habitat. Some studies found a preference for pool habitat by young-of-the-year individuals, while other studies have found a preference for faster, shallow water and shifts in habitat use in response to the presence of juvenile steelhead and salmon. Little is known about movement of smolts through esturine habitat into the ocean, but the few data that exist suggest that they remain in nearshore waters. Although the proportion of the lifecycle that coastal cutthroat trout spend in the marine environment is short compared to that observed with Pacific salmon and steelhead, the marine environment is critical for the subspecies' persistence. The marine environment provides opportunities for individual fish to move among river basins and enables dispersal and recolonization following localized extinctions, or as new habitat becomes available.

The diet of juvenile coastal cutthroat trout, like that of other juvenile salmonids, consists mainly of aquatic and terrestrial insects and other invertebrates. Fish, particularly salmonids, make up an important part of the diet of coastal cutthroat trout. In the marine environment they feed on crustaceans and fish. Little is known about predation on coastal cutthroat trout; however, piscivorus fishes such as steelhead and pike minnow, and avian predators probably prey on juveniles and smolts. Scars observed on adult coastal cutthroat trout in Oregon indicate potential predation in the marine environment.

Status of Population

Populations of coastal cutthroat trout tend to be smaller than populations of other Pacific salmonids. Information on adult coastal cutthroat trout abundance is available only for a few streams. Data on juvenile abundance can be confounded by misidentification with steelhead, and estimates of out-migrants are often imprecise since the capture efficiency of downstream migrant traps is usually poor for coastal cutthroat trout. Overall, the abundance of coastal cutthroat trout in California appears to be reduced from historical levels. What little information there is suggests that recent abundance of coastal cutthroat trout is relatively stable, although depressed, and may be slightly increasing in some streams. Interestingly, in 1940, one researcher observed a decline in cutthroat abundance in northern California streams since he first fished them in 1897. It is unclear whether this was the first observation of what is believed to be an overall decline in the size of coastal cutthroat trout populations or if these populations have always cycled between periods of abundance and extinction.

Two of the greatest concerns with coastal cutthroat trout are the changes in suitable habitat which can reduce or eliminate dispersal among populations, and the loss of certain life history types. Although the number of individual fish within a basin may appear to be stable, perhaps increasing in some areas, the number of anadromous and potamodromous individuals may be declining. These life history types are required for the persistence of the subspecies, enabling dispersal and recolonization. Degradation and modification of mainstem river and esturine habitat has limited the opportunity for the expression of these life history type and reduced the capacity for these populations to respond to disturbances and conservation efforts. In addition, the ability of coastal cutthroat trout to use habitat from tidewaters to headwaters within a basin may give a false impression of stability, since they appear to be well distributed, but reasonable estimates of abundance are needed to assess long-term persistence.

Management Considerations

This Management Consideration is provided for informational purposes only. These views, submitted by the authors, do not necessarily represent the views of either the California Department of Fish and Game or the California Fish and Game Commission, and no endorsement of any of these views by these agencies is implied.

Sportfishing regulations in many waters have been changed to catch-and-release, enabling sport fishing to continue while reducing direct harvest.

1. Catch and release regulations should be continued and expanded to waters where direct harvest still occurs.

2. Data on abundance and distribution of coastal cutthroat trout should be collected in the context of habitat conditions so that the relationship between the fish and ecological processes can be understood.

3. Programs should implement conservation measures and restoration of habitat to allow dispersal among populations and the expression of the range of life history types of coastal cutthroat trout. This will require the preservation and restoration of ecological processes that create and maintain aquatic habitat through time.

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