Cutthroat Trout
(Oncorhynchus clarki)

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Cutthroat trout are a highly prized sport fish that can be found year-round in streams and lakes throughout Southeastern Alaska (Southeast). They are beautiful fish—sea-run individuals are uniformly silver with numerous black spots, and lake residents can be golden-yellow with numerous black spots (Fig 1). Sea-run individuals can weigh from 1-2 lb (0.5-0.9 kg); some lake residents weigh up to 6 lb (2.7 kg).

FIG 1. Cutthroat trout. (Bob Armstrong)

Often a cutthroat trout has a red or orange streak on the underside of the lower jaw. The streak may be absent or inconspicuous in fish in the sea or fresh from the sea. A cutthroat is best distinguished from a rainbow trout (*Oncorhynchus mykiss*) by the presence of a patch of small teeth behind its tongue between the gills (Mecklenburg et al. 2002).

Throughout its range, the cutthroat trout, like a canary in a mine, is a sensitive indicator of environmental change. This species was once found in abundance throughout the American West. The cutthroat now survives in only a few protected areas; it has vanished from many systems and has been much reduced from others in the Lower 48. The demise of the cutthroat trout was caused by habitat loss resulting from human changes to the environment and widespread introduction of non-native races of rainbow and brook trout (*Salvelinus fontinalis*). Introduced rainbow trout hybridized with the cutthroat, and brook trout competed with it for habitat and food (Armstrong 1996).

Southeast is fortunate to have many streams, rivers, and lakes with good cutthroat habitat. In addition, because the Alaska Department of Fish and Game prohibits introduction of non-native fish species, many "pure" populations of cutthroat are found in the region. The populations may be sea-run (anadromous), spend their entire life in a lake-stream system, or reside only in streams.

Sea-run cutthroat are usually associated with lakes and a few larger, slow-moving rivers. Most of these anadromous populations are found south of Frederick Sound in Southeast (Armstrong 1996). Each year, the fish go to sea in May and June and return to fresh water in September and October.

Resident cutthroat trout are found in most landlocked lakes at the lower elevations in Southeast. Large, trophy-sized cutthroat may be found in a few of these systems. Some lake-resident cutthroat trout grow large because they prey heavily on small landlocked sockeye salmon (*Oncorhynchus nerka*), called kokanee. These cutthroat live longer than sea-run individuals. Other resident cutthroat have evolved ways to live their entire lives in streams so small that a person can easily step across them. These fish adapt to small spaces by spawning at an early age and growing to only a few inches long.

Research has shown that the numbers of cutthroat trout in the lakes and streams of Southeast are relatively small. Cutthroat mature fairly late in life and

can be quite vulnerable to depletion through overharvest. In addition, judging from their demise in the Lower 48, they appear to be even more harmed by habitat alteration than other species of fish. Because Southeast is the last major stronghold for native cutthroat trout, this species is of special concern and worthy of all the protection it can be given.

STATUS IN SOUTHEASTERN ALASKA

Distribution

Cutthroat trout occur in coastal streams and lakes from Prince William Sound, Alaska, to the Eel River in California (Behnke 1979). In Southeast, fewer than 100 streams are known to contain runs of anadromous cutthroat trout (Armstrong 1996). More than 200 lakes and associated stream systems are home to the resident coastal cutthroat trout. It is not known how many systems contain the cutthroat trout that reside in small streams, but these fish appear to be widespread.

Abundance

The numbers of cutthroat trout have been counted or estimated in only a few systems in Southeast. The systems checked have been traditionally known as some of the better or best systems for cutthroat fishing. Fewer cutthroat than expected were found.

At the Eva Lake weir on Baranof Island, the runs of anadromous cutthroat averaged about 1,400 individuals a year during a three-year study (Armstrong 1971). Another count of anadromous cutthroat trout at Eva Lake in 1995 (2,562) was almost double the earlier counts (Yanusz and Schmidt 1996). Even smaller numbers of anadromous cutthroat were counted at the Petersburg Creek weir, where counts averaged 660 fish a year during a five-year study (Jones 1977). At the Auke Creek weir near Juneau, the number of anadromous cutthroat leaving Auke Lake averaged 254 during a 22-year period from 1980 through 2002 (Taylor and Lum 2003).

At Turner Lake near the Taku River, ADF&G estimated a population of 1,526 resident cutthroat trout. The researchers stated, “The cutthroat trout population in Turner Lake was smaller than we had anticipated considering the size of the lake and its popularity as a trophy class cutthroat system” (Jones et al. 1990). Other lakes checked for resident cutthroat in Southeast included Jims Lake (2,816), Mirror Lake (5,633), Harvey Lake (669), and Virginia Lake (5,631) (Jones et al. 1990). (It should be noted that several of these estimates reflect the number of cutthroat within the 4- to 16-in. [100- to 400-mm] size range, the size sampled by the gear used.)

No information on the abundance of stream-resident cutthroat could be found, but numbers are expected to be quite small.

Taxonomic Considerations

The subspecies of cutthroat trout found in Southeast is the coastal cutthroat trout (*S. c. clarki*). It is the most abundant of the cutthroat trout subspecies (Behnke 1979, Johnston 1981), but serious declines in numbers have been reported since 1960, at least among anadromous populations. The reasons cited for these declines include loss of stream habitat from logging and forest road building and, in more populated regions, increased urbanization (Trotter 1989).

Probably the most serious taxonomic problems would come from the introduction of rainbow trout to cutthroat systems in Southeast. Indiscriminate mixing of various subspecies of cutthroat trout and hybridization with rainbow trout from hatcheries appears to have been a major cause of the rapid decline of pure native subspecies in the Lower 48 (Behnke 1979). “In areas where coastal cutthroat trout are known to hybridize with rainbow trout, however, the stocking of hatchery trout may be a significant factor causing the breakdown of reproductive isolation between rainbow trout and coastal cutthroat trout,” Behnke (1979) stated.

Significance to the Region and Tongass National Forest

In Southeast, cutthroat trout are of special importance because of their high desirability as a sport fish. In addition, they are significant to Alaska and the nation because Southeast is the last remaining stronghold of pure native wild cutthroat.

An estimated 3,851 cutthroat trout were harvested by sportfishers in Southeast in 2002 (ADF&G 2004). This figure is only 25% of the estimated cutthroat harvest of 15,351 in 1993, despite a substantial increase in angler effort.

The role of cutthroat trout in the food web of Southeast has not been studied, but because of the year-round presence of the species in lakes and streams, cutthroat undoubtedly provide food for American dippers (*Cinclus mexicanus*), mink (*Mustela vison*), river otters (*Lutra canadensis*), and fish-eating birds such as belted kingfishers (*Ceryle alcyon*), common mergansers (*Mergus spp.*), and great blue herons (*Ardea herodius*).

Special Management or Conservation Designations

The numbers of fish within the various subspecies of cutthroat trout have been considerably diminished in the Lower 48. Of the 13 subspecies of interior cutthroat trout, two are extinct and most of the rest occur at only a tiny fraction of their original distribution and abundance (Behnke 1991). Some of these subspecies are now listed as threatened in Nevada, California, and Colorado.

At the state level, several western states (for example, Washington, Oregon, California, Utah, Nevada, Idaho, and Montana) have adopted wild fish management policies that give special consideration to native forms. In addition, states having their own endangered species legislation have written management plans directed toward recovery of cutthroat trout subspecies recognized as threatened or as species of special concern in those states (Trotter 1991).

In Southeast, some lakes containing cutthroat trout have been designated as "Trophy Fish Waters" and are under special management designations. Others have been recognized by ADF&G and the U.S. Forest Service (USFS) for their sport fishing qualities.

Thirteen lakes in Southeast have been designated as trophy cutthroat lakes. These lakes have special management regulations designed to maintain large cutthroat trout. The sport fish regulations covering these waters allow one cutthroat per day and in possession, 25 in. (64 cm) or more. One lake, Turner, allows catch-and-release fishing only for cutthroat trout. The trophy cutthroat lakes are Distin, Hasselborg, and Jims lakes and Lake Guerin all on Admiralty Island; Turner Lake, on the mainland near the Taku River; Eagle Lake off West Behm Canal; and Ella, Humpback, Manzanita, Orchard, Patching, Wilson, and Reflection lakes in the Ketchikan area.

Florence Lake and Hasselborg Lake are two of the most popular lakes in Southeast for fly-in fishing for cutthroat trout. Access to both lakes is mostly by small plane from Juneau or Sitka. Florence and Hasselborg lakes are designated "High Quality" or "Important" watersheds by both ADF&G and USFS (USFS 1979). The number of reported visitor days to these lakes nearly doubled during a 15-year period to more than 4,000 at Florence Lake and 3,000 at Hasselborg Lake as of 1991 (Jones et al. 1992).

In the Petersburg/Wrangell area, only Eagle Lake off West Behm Canal has been designated a trophy cutthroat trout lake. In the Ketchikan area, the trophy cutthroat trout lakes are Ella, Humpback, Manzanita, Orchard, Patching, Wilson, and Reflection lakes.

HABITAT RELATIONSHIPS

Smaller streams in Southeast may be especially important as spawning and rearing areas for cutthroat. In a study of the coastal cutthroat trout in British Columbia, Hartman and Gill (1968) found that large streams, with drainage areas of more than 50 mi2 (130 km2), were occupied predominantly by steelhead. Small streams, with drainage areas of less than 5 mi2 (13 km2) were occupied predominantly by cutthroat. Where both species occurred, the most often predominant species were cutthroat in the small tributaries and headwaters and steelhead in the lower reaches of the main stream.

Johnston (1981) determined that cutthroat in Washington and Oregon selected spawning sites in tiny headwater tributaries upstream from more dominant salmonids. He also found that cutthroat less than a year old reared in similar areas.

Studies of cutthroat trout in Southeast have also indicated small streams could be important for cutthroat spawning (Harding and Jones 1993). For example, a small (3- to 6.5-ft [1- to 2-m]) inlet to Florence Lake was identified as a relatively important spawning area. Results from USFS at Hasselborg Lake also indicate that spawning cutthroat use small inlet streams, possibly as much as or more than the major inlet streams (Mark Lake, U.S. Forest Service, Admiralty National Monument, Juneau, Alaska, personal communication in Harding and Jones 1993). Jones (1977) determined that rearing cutthroat preferred slough-like areas of Petersburg Creek, beaver dams adjacent to Petersburg Creek, and the shoreline areas of Petersburg Lake.

Anadromous cutthroat trout may also depend on different watersheds for spawning, feeding, and overwintering. For example, cutthroat tagged at Petersburg Creek were recaptured by sportfishers in a total of 14 streams in the Petersburg area (Jones 1977). These streams varied in distance from Petersburg from ½ mile (0.80 km) to 44 miles (70.8 km). Tagged cutthroat tended to follow the shorelines on their migrations and were reluctant to cross large open bodies of water. This behavior could mean that spawning fish home to specific tributaries and non-maturing fish do not always return to a home stream on

a feeding run or when seeking overwintering habitat (Johnston 1981).

IMPLICATIONS FOR CONSERVATION

Anadromous populations of coastal cutthroat trout outside of Alaska have declined sharply through time, and many are now listed as at risk. The declines have been attributed to environmental alteration, mainly from logging, conscription of habitat for urbanization and for rearing millions of stocked salmon and steelhead (*Oncorhynchus mykiss*) in places that historically did not support them, and over-exploitation by anglers (Trotter 1991).

Historically, in Southeast, clear-cut logging was generally allowed along small tributary streams, areas where cutthroat spawn and rear. This practice may have had a long-term negative effect on cutthroat populations because in forested streams, large woody debris creates productive habitat for salmonids by forming pools, meanders, secondary channels, and undercut banks (Bisson et al. 1987). As the debris decomposes or is transported downstream, it is gradually replaced with new material from the riparian, or streamside, zone. Removal of all streamside vegetation by clear-cutting depletes the bank area of potential new debris for the stream channel.

Because more sunlight increases water temperature and stream productivity, the initial effect of canopy removal may be a rise in salmonid population size and biomass; but eventually the loss of debris leads to habitat changes that are undesirable for salmonids. Loss of cover also may reduce overwinter survival. Through time, usually several decades, trout populations fall to well below pre-logging levels unless provisions are made for the addition of new, large woody structures to streams (Trotter 1989).

Logging could also have a negative short-term effect on cutthroat. A significant decline occurred in the cutthroat population following logging of the Alsea watershed in Oregon (Anonymous 1966, 1975). The population was depressed for eight years following logging, and in the eighth year was only 21.2% of the pre-logging average. Control streams did not show a similar decline.

Two other Oregon watersheds that were clear-cut logged, without retention of buffer strips along the streams, showed 46% and 44% declines in their cutthroat populations. A third stream, separated from clear-cut logging by a buffer strip, showed only a 6.6% decline in the cutthroat population (Moring and Lantz 1974).

The cause of these mortalities was never determined. The cause could well have been one or more of the following factors: increased stream temperatures (Golden 1975), loss of cover (Lowry 1966), siltation of spawning and rearing habitat (Bustard and Narver 1975), and reductions in invertebrate food supplies. Some populations of cutthroat trout have even been eliminated from small tributaries as a result of logging operations (Wustenberg 1954).

Such negative effects of logging in the Lower 48 could also operate in Southeast. Studies of the rearing habits and requirements of young sea-run cutthroat within the Petersburg Creek system have shown that cutthroat are quite selective in their rearing habitat sites and that only small sections of the entire system could be classified as prime rearing areas (Jones 1977). For anadromous cutthroat, the 3 to 4 years of juvenile life in freshwater makes the cutthroat particularly susceptible to habitat alteration (Armstrong 1971, Giger 1972).

There is some evidence that clear-cut logging around a popular cutthroat fishing lake reduces its popularity for sport fishing. For example, Florence Lake on Admiralty Island was extremely popular until 1991 when extensive clear-cut logging began at the lake. With the onset of clear-cut logging, interest in fishing Florence Lake declined dramatically (Harding and Jones 1993). Effort dropped from 1,035 angler hours in 1990 to 731 hours in 1991, then 350 hours in 1992—a decline of 66% in three years (Jones et al. 1992). Catches of cutthroat trout at the lake during this period also dropped, from 2,332 to 1,883, then 1,057, a decline of more than 54%.

Another risk is that cutthroat trout seem to be especially vulnerable to insecticides, which may indicate they are overly sensitive to pollutants as well. In a study on the effects of forest insecticide spray on salmon streams in Southeast, Reed (1963) found DDT and DDE in cutthroat from all 4 streams sampled.

In a study of the effects on cutthroat of DDT spraying for spruce budworm in the Yellowstone River system in Montana, Cope (1961) found DDT in cutthroat trout 85 mi (136 km) below the spray area and in fish taken more than 2 years after spraying. In another study of the effects of Kraft paper wastes on a Montana stream, Whitney and Spindler (1959) found dead cutthroat trout for 25 mi (40 km) downstream

after several months, and pathological examination showed death to be by poisoning. Bottom fauna were seriously reduced at a station 2 mi (3.2 km) downstream.

Cutthroat trout may also be susceptible to contracting viruses from stocked hatchery fish. The Turner Lake sockeye stocking project, for example, was canceled in May 1990 because of concerns related to the potential for introduction of Infectious Hematopoietic Necrosis Virus (IHNV). There was concern for both the kokanee and cutthroat trout in Turner Lake because both species are IHNV susceptible (Jones et. al. 1990).

In light of current knowledge about coastal cutthroat trout in Southeast, the following actions merit consideration:

- Maintaining the genetic purity of Southeast cutthroats, which are among the few pure stocks remaining in the United States;
- Protecting the small headwater streams important for cutthroat spawning and rearing;
- Taking into account the special sensitivity of cutthroat to pollutants whenever spraying of herbicides or insecticides or creation of by-products from mining are being considered;
- Recognizing and learning more about the dependency of specific cutthroat stocks on different watersheds for spawning; and
- Protecting the Trophy Fish Waters identified by ADF&G and the High Quality and Important watersheds designated by USFS.

After a 10-year study of anadromous cutthroat trout in Southeast, Jones (1976) recommended:

- Establishing selected cutthroat systems in Southeast as roadless, dispersed recreation, or natural areas; and
- Giving special consideration to identified cutthroat spawning and rearing areas during road-building and logging operations.

Jones noted that research into the spawning and rearing habitat of cutthroat in the Petersburg Creek system has shown these 2 functions are easily damaged by various land-use activities. Cutthroat spawning areas are located in small tributary streams that sometimes have not been given protection. Habitat preferred by rearing cutthroat is not as diverse as that of other salmonids and is usually limited within a given system. Alteration of this preferred habitat because of land-use activities could seriously affect the cutthroat population.

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