Chinook Salmon
(Oncorhynchus tshawytscha)

Robert H. Armstrong and Marge Hermans

Chinook, or king, salmon are the largest and least abundant of the Pacific salmon species found in Southeastern Alaska (Southeast) (Fig 1). Most chinook salmon harvested in Southeast marine waters come from rivers in British Columbia, Washington, and Oregon (Orsi and Jaenicke 1996). Chinook that frequent Alaska marine waters outside of Southeast, especially in the very northern part of the Pacific Ocean and the Bering Sea, are of Alaskan origin (Armstrong 1996).

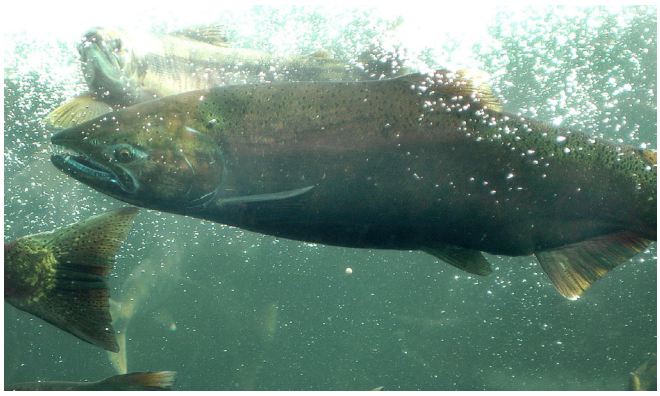

FIG 1. Adult Chinook salmon in southeastern Alaska. (John Schoen)

Historically, chinook salmon were much more abundant in Southeast. At one time, freshwater systems like the Columbia River in Washington and Oregon had spawning runs of or exceeding 1 million to 2 million fish every year. Chinook from the Columbia River were once particularly abundant in Southeast, but these runs were severely reduced by a host of environmental problems.

Compared with other salmon, chinooks spawn in a limited number of the streams and rivers that empty into marine waters of Southeast. Fewer than 40 watersheds in Southeast support spawning populations of chinook salmon, and most of these fish have spawned in the Canadian portions of the rivers (Heard et al. 1995).

Most chinook salmon stocks in Southeast are referred to as "stream-type" (age 1) because they spend one year in fresh water before migrating to sea. Most chinook salmon from the Situk River near Yakutat are "ocean-type" (age 0)—fish that migrate to sea during their first year without spending a winter in fresh water (Thedinga et al. 1998). Unlike chinook salmon in other Alaskan rivers, those in the Situk River attain sufficient size in their first summer to migrate to sea as age-0 smolts (Johnson et al. 1992, Thedinga et al. 1998). The only other river in Alaska with an apparent emigration of substantial numbers of age-0 chinook smolts is the Deshka River in Southcentral Alaska (Delaney et al. 1982).

An adult chinook salmon is characterized by small black spots on its tail lobes, and black gums (Mecklenberg et al. 2002). At sea, it is bluish green on the back, silver on the sides, and white on the belly. At spawning, chinooks turn red to copper to almost black.

Because of its large size and fighting capabilities, chinook is the salmon most sought after and prized by sportfishers. In 2003, more than 209,000 residents and visitors bought king salmon stamps to fish for chinooks in Alaska.

The state angling record for chinook salmon is 97 lb 4 oz (44 kg), and a 126-lb (57-kg) chinook was caught in a fish trap in 1949 near Petersburg.

STATUS IN SOUTHEASTERN ALASKA

Distribution

Spawning stocks of chinook are found on the east coast of Asia from northern Hokkaido in Japan to the Anadyr River in Russia, and on the west coast of North America from central California to Kotzebue Sound, Alaska (Healey 1991).

Among the fewer than 40 watersheds that support spawning populations of chinooks in Southeast, the largest are the Taku, Stikine, and Alsek rivers (Heard et al. 1995) (Fig 2). These rivers originate in the Canadian provinces of British Columbia and the Yukon Territory, where the subarctic climate is drier and colder than the temperate maritime climate of Southeast. Most spawning in these rivers occurs in Canada.

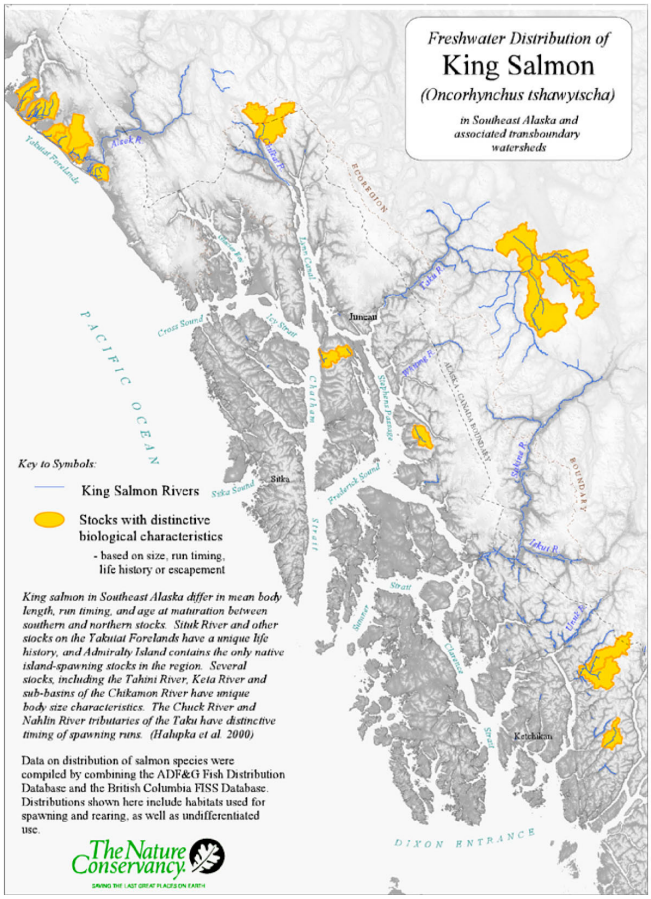

FIG 2. Distribution map of Chinook salmon spawning areas in southeastern Alaska.

The other mainland coast streams supporting spawning chinook populations are shorter (generally less than 31 mi [50 km]). Many produce only a few hundred spawners annually (Heard et al. 1995).

Only three naturally occurring stocks of chinook salmon have been found on islands in Southeast. All are on Admiralty Island (Armstrong and Hermans 2004).

Abundance

Heard et al. (1995) provided the following statistics: Annual spawning escapements of chinook salmon into all systems in Southeast averaged 76,271 fish during 1991-1993. Major systems (with greater than 10,000 spawners) were the Alsek, Taku, and Stikine rivers. Medium systems (with between 1,500 and 10,000 spawners) included Andrew Creek and Blossom, Chickamin, Keta, Situk and Unuk rivers. Minor systems (with fewer than 1,500 spawners) included systems such as King Salmon River on Admiralty Island.

Baker et al. (1996) identified 63 chinook salmon spawning locations in Southeast. The escapement trends for 31 of these locations (those with enough data to be evaluated) were increasing for 11 (36%), stable for 19 (61%), and declining for 1 (3%). None was in precipitous decline. Anecdotal reports suggest that as many as four small chinook stocks in Southeast may be extirpated (Halupka et al. 2000).

Taxonomic Considerations

Halupka et al. (2000) analyzed the biological characteristics of chinook salmon stocks in Southeast and concluded that the following stocks had distinctive characteristics:

- **Situk River** chinooks compose the only stock in Southeast that exhibits an age-0, ocean-type, juvenile life history and is only one of two stocks documented in Alaska.
- **King Salmon River, Wheeler Creek, and Greens Creek** chinooks are the only naturally occurring stocks known on islands in the region. The King Salmon River stock has a distinctively early run timing. The fish may enter fresh water ready to spawn immediately, and some may spawn in tidally influenced areas. These characteristics may be unique among Southeast chinook salmon stocks.
- **Tahini River** chinook have an unusual allozyme frequency indicating they are related to chinook stocks from southern British Columbia and Washington. Limited data also suggest that these fish have distinctively large young of the year and, after migrating to sea, may feed for prolonged periods in Lynn Canal and Icy Strait.

Significance to the Region and Tongass National Forest

Chinook salmon in Southeast are important to residents and visitors alike. The 2004 all-gear chinook harvest of 474,000 fish was the largest harvest of this species since 1953. At $1.62 per pound, these fish had an ex-vessel value of $11.5 million (Alaska Department of Fish and Game [ADF&G] 2004a). In 2003, sportfishers harvested an estimated 73,000 chinook salmon (ADF&G 2004b) and sport fishing brought substantial income and employment to the region. In 2002, Southeast residents took more than 1,800 chinook salmon for subsistence and personal use (K. Monagle, ADF&G, personal communication 2004).

Orsi and Jaenicke (1996) identified the importance of marine waters of Southeast as a nursery and feeding area for chinook salmon stocks originating between Oregon and Southeast, a range of 1,125 mi (1,800 km). These marine waters are also important to residents of Southeast because chinook are the only salmon caught in inside waters during the winter.

Special Management or Conservation Designations

The chinook in King Salmon River and Wheeler Creek on Admiralty Island are unique island genetic stocks and have been designated as Sensitive Species by the U.S. Forest Service (Armstrong and Hermans 2004). U.S. Forest Service Sensitive Species are "those plant and animal species identified by the Regional Forester for which population viability is a concern on National Forest System lands within the Region. A viability concern is evidenced by either a significant current or predicted downward trend in population numbers or density, or a significant current or predicted downward trend in habitat capability that would reduce a species' existing distribution." (U.S. Forest Service 1997)

Some chinook stocks from Washington, Idaho, and Oregon, whose members may be taken incidentally in Southeast fisheries, have been listed as Threatened Species under the U.S. Endangered Species Act. These include the Snake River fall chinook salmon, the lower Columbia River chinook salmon, and the upper Willamette River chinook salmon. The Snake River fall chinook salmon is also listed as a State of Alaska Species of Special Concern (Armstrong and Hermans 2004).

HABITAT RELATIONSHIPS

Chinook spawn in relatively few rivers compared to most other species of Pacific salmon, probably because their spawning requirements are more exacting. Chinook, like other salmon, tend to spawn only in areas that have a good flow of subsurface water through the gravel. Because chinook salmon spawners are larger than spawners of most other salmon, they select rivers with larger gravel, faster stream flow, and a good supply of dissolved oxygen for their larger eggs (ADF&G 2002) (Fig 3).

FIG 3. The Taku River south of Juneau is a major spawning river for Chinook salmon as they migrate upstream into Canadian waters where most spawning takes place. The big mainland transboundary rivers are fast flowing and have large coarse gravel that Chinook salmon seek out for spawning habitat. (John Schoen)

IMPLICATIONS FOR CONSERVATION

Threats to Habitat

Compared to other species of salmon in Southeast, the characteristics of large body size, small population numbers, and restricted habitat use make chinook salmon more susceptible to endangerment or local extinction. In the Pacific Northwest, for example, 64 populations of chinook salmon (more than any other species of salmon) are considered at risk of extinction (Nehlsen et al. 1991).

The sparsely scattered chinook populations of Southeast can also be threatened by unusual natural events such as landslides or "galloping" glaciers. If Hubbard Glacier, for example, were to dam Russell Fjord, water would inundate the present Situk River basin and dramatically alter the physical characteristics of the river (Thedinga et al 1993). Glacial movements also could block the main channels of the Taku and Alsek rivers, disrupting chinook populations (Halupka et al. 2000).

In general, there has not been significant human disturbance in most Southeast watersheds that support chinook salmon (Halupka et al. 2000). However, anecdotal reports suggest that logging in the Bradfield River drainage during the 1950s may have contributed to a temporary decline in the river's chinook stocks (Halupka et al. 2000). Most chinook stocks in Southeast rivers appear to be stable or increasing (Baker et al. 1996).

Because many chinook spawn in Canada, there is concern that activities beyond the control of Alaskans could significantly affect local fisheries. For example, acid mine drainage from the former Tulsequah Chief mine in British Columbia flows into the transboundary Taku River and its tributary the Tulsequah River. Proposed reopening of the mine, if done without proper environmental safeguards, threatens chinook salmon in the Taku River and the multimillion-dollar Taku River fishery near Juneau (Southeast Alaska Conservation Council 2004).

Alteration of Wild Stocks

There is some risk that the release of hatchery-reared chinook into Southeast waters could disrupt or alter native stocks. Such effects are possible because the coupling of smoltification and imprinting with seaward migration may be necessary for precise homing. Releases of hatchery fish that disrupt or circumvent the coupling of these processes may reduce homing ability (Hard and Heard 1999). For example, when Heard et al. (1995) examined 40,762 adults in eight wild chinook salmon systems during 1979-1993, they found only 123 hatchery-origin fish (0.3%); however, in the Farragut River, hatchery strays exceeded 8% of adults examined, and in one year they represented 26% of adults sampled. Such deleterious interactions between hatchery stocks of chinook salmon in Southeast have been found to be minimal (Heard et al. 1995).

Threat of Overfishing

Historically the population of chinook salmon in the marine waters of Southeast has decreased overall. Various fisheries probably have contributed to declining runs of chinook salmon. However, loss and deterioration of natural habitats because of industrialization, urbanization, other land-use practices, and, especially, the damming of rivers in southern parts of the range (i.e., the Pacific Northwest) are thought to be the main factors in the coastwide decline of many stocks (Heard et al. 1995). Because both commercial and sportfishers in Southeast depend largely on these outside stocks (i.e., from British Columbia and the Pacific Northwest), a continued decline of these stocks could be devastating to commercial and sport fisheries in Southeast.

Conservation Considerations

Five considerations seem most important for conserving healthy populations of chinook salmon in Southeast:

- Maintain protection of the limited number of watersheds suitable for chinook salmon runs;
- Control logging, mining, and other human impacts on habitat to avoid decimation of stocks that has occurred on the West Coast south of Southeast;
- Continue to develop international cooperation on habitat protection for transboundary river stocks;
- Further monitor straying patterns in Southeast hatchery chinook salmon to (1) document interactions with wild populations and (2) identify aquacultural practices that reduce risks to natural salmon populations posed by straying; and
- Recognize the importance of the marine waters of Southeast as a nursery and feeding area for chinooks originating from Canada and from other U.S. states.

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