Arctic Char (*Salvelinus alpinus*)
Data: Alaska Department of Fish & Game
Partners: AK

Species Status Review:

Wild Arctic char populations in Alaska generally are healthy and lightly fished, and there are currently no special sport or subsistence harvest regulations for Arctic char. It is believed that all fisheries of wild populations are stable and support current levels of harvest. Most sport fisheries targeting Arctic char are on sterile, hatchery-reared fish stocked in lakes and ponds along the road system and these fish are not addressed here.

Sportfishing Status of Arctic char:

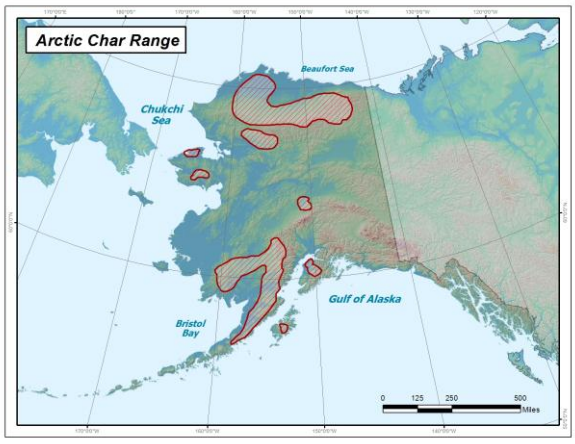
Arctic char are caught in both sport and subsistence fisheries in Alaska, however detailed harvest and catch estimates for each fishery are generally unavailable or, when available, are often unreliable. Most subsistence fisheries for non-salmon species are unregulated with no harvest reporting requirements, and because Arctic char look very similar to Dolly Varden (*Salvelinus malma*), the two species are combined for the purposes of sport harvest reporting and regulations. In general, the majority of Arctic char populations are found on protected Federal lands well-off the road system, and fishing pressure is believed to be light in most areas. Sport fish daily bag and possession limits for Arctic char/Dolly Varden generally range from one to five fish per day, and the vast majority of the harvest is believed to be Dolly Varden.

Distribution of Arctic char:

The Arctic char is the northernmost freshwater fish in the world, found as far north as Ellesmere Island, Northwest Territories, Canada (82°N) (Babaluk et al. 1997). It is circumpolar in distribution and can exhibit both anadromous and strictly freshwater life history patterns (Babaluk et al. 1997; Halden et al. 1995). In Alaska, Arctic char are found in deep oligotrophic lakes in the mountains and foothills, with some populations found in small lakes on the Arctic coastal plain. All of the very large lakes in Alaska (Illiamna, Becharof, Teshekpuk, Naknek, Clark, Ugashik, etc.) contain Arctic char. They can also be found seasonally in rivers feeding on outmigrating salmon smolt; however it is believed that most Arctic char populations must return to spawn in lakes in the fall and then overwinter. While commonly anadromous in Russia and Canada, to date it is not believed that anadromy is widespread in Alaskan Arctic char populations, although Scanlon (2000) found marine-derived strontium in otoliths in Arctic char from Becharof Lake in concentrations consistent with that found in anadromous species.

Range of Arctic char:

Arctic char have been documented in lakes and outlet streams in the Brooks Range, the Kigluaik Mountains, the Kuskokwim Mountains, the Alaska Peninsula, Kenai Peninsula, Kodiak Island, and in a small area of Interior Alaska near Denali National Park and Preserve. However, a comprehensive survey of Alaska water bodies that contain Arctic char is lacking. The vast majority of lakes and rivers where they have been surveyed and found are within Federal lands such as the National Petroleum Reserve-Alaska, Arctic National Wildlife Refuge, Gates of the Arctic National Park, Noatak National Preserve, Togiak National Wildlife Refuge, and others (see map). Most populations of Arctic char are well off the road system. Throughout most of their potential range, basic population-based information such as presence, life history, trophic morphology, genetic variability, abundance and growth is largely unknown.



Arctic char: (*Salvelinus alpinus*)

Arctic Char Habitat Requirements:

Similar to the lake trout *Salvelinus namaycush*, the Arctic char in Alaska principally inhabits deep, clear oligotrophic lakes with or without a passable outlet stream. In Canada and Europe, Arctic char spawning habitat may range from coarse sand to boulder-strewn gravel. In Alaska, what little information exists on spawning habitat suggests Arctic char prefer gravel mixed with small cobble near shorelines in 2-4 m of water, with depth increasing as lake fetch increases. As the northernmost freshwater fish in the world, the Arctic char has the capacity to withstand low temperatures for extended periods. On the North Slope of Alaska, many of the smaller oligotrophic lakes containing Arctic char are ice-free for only 10 weeks or less in a year. While Arctic char in Alaska usually exist in lakes with several other fish species, it is believed that typically the interaction with lake trout can be a negative one, and that the presence of lake trout may have had considerable influence on the distribution of the two species in North America (Johnson 1980).

Concerns, Issues, or Obstacles relative to the Conservation and Improvement of the status of Arctic char:

Population Viability Concerns

Unknown, but because of the large size and remoteness of most lakes containing Arctic char, concern regarding population viability is small. A few small lakes along the Dalton Highway Corridor on the North Slope contain small populations that are easily accessible, but harvests have been negligible and there it little concern regarding overexploitation.

Genetic Considerations

Unlike its close relative the Dolly Varden, very little genetics research has been conducted on Arctic char. Between- and within-lake system differences have not been investigated. However, with recent evidence of anadromy in Arctic char from the lakes on the Alaska Peninsula, there exists the possibility of movement between drainages that may be detected through stock identification. It may be valuable for future management to determine if genetic mixing occurs and to what extent.

Disease Concerns

To date there have been no disease concerns in Arctic char in Alaska. Incidence of heavy parasitism by *Diphyllobothrium spp.* has been observed in coastal populations in Southwest Alaska, however there is no evidence that this has had deleterious effects at the population level.

Habitat Concerns

Climate change in the Arctic may pose the largest threat for freshwater fishes. Alaska's Arctic environment is projected to experience a rise in temperature of approximately 7°C by 2100. The magnitude of change is imprecisely known, but global circulation models identify Alaska as one of the fastest warming regions of the planet (Martin et al. 2009). Annual precipitation is also expected to increase, although there is less certainty surrounding this prediction. Rising temperatures, sea level rise, permafrost degradation, lake eutrophication, increased storm surges, and changes to river discharge and sediment transport may continue to affect habitat availability and quality. In addition, climate change may increase availability and uptake of contaminants for fish and their habitats. Contaminants currently contained within glacial ice, multi-year sea ice, and permafrost, including persistent organic pollutants and mercury, may be released to aquatic ecosystems as the temperature rises (Martin et al. 2009). The development of monitoring and research programs, and modeling of those priorities will become imperative for managers to better understand future conditions of Arctic char as well as other fish species populations in Alaska.

Arctic char: (*Salvelinus alpinus*)

Introduced Species Concerns

None to date.

Overutilization Concerns

While Arctic char typically are found in low densities and have low reproductive rates (older ages at maturity than most freshwater fishes, skip spawning, etc.), fishing pressure appears to be light across its distribution in Alaska and no special harvest regulations appear necessary at this time.

Oil and Gas Development Concerns

Natural resource development may present significant challenges for the health of many Arctic char populations. In Alaska, oil and gas exploration occurs on a large scale on the North Slope, and development of mineral extraction projects are beginning on the Alaska Peninsula. As resource development increases in Alaska, environmental monitoring will become more important and the potential for degradation of Arctic char habitat may increase.

Opportunities and Strategies for Improving Arctic char Status:

- Locate and assess all Arctic char populations
- Genetic analysis
- Evaluate potential effects of resource development and climate change
- Develop and implement consistent methods for fish population status and trend analyses

Population surveys, genetic analyses, and fish population manipulation:

Key Actions:

Design stock assessments to estimate relative abundance, age/sex/length composition
Otolith microchemistry research to determine prevalence of anadromy in coastal populations
Characterize, conserve, and monitor genetic diversity.
Locate and categorize spawning locations for potential critical habitat designation

Regulatory and Administrative Actions:

Maintaining the sportfish status of the Arctic char and utilizing regulations to control over-utilization may be an important component of maintaining the health of its populations if the species becomes more popular to anglers and access to lakes with populations is improved. In addition, working with others (particularly Federal agencies which manage lands and waters where most Arctic char populations are found) to maintain appropriate regulations for prevention of disease, water quality impairment, and habitat disturbance are important considerations.

Key Actions:

Foster working partnerships with land management agencies and other land owners on which populations of Arctic char are found to develop stock assessment and sustainable management practices.
Maintain and protect Arctic char habitat from degradation by achieving compliance with existing habitat protection laws, policies, and guidelines.
Enforce regulatory mechanisms that prevent impacts associated with recreational angling.
Enhance and maintain regulatory mechanisms that prevent disease or illegal introduction of nuisance species.

Recommended Actions to improve the status of the Arctic Char:

1. Evaluate potential effects of resource development and climate change.
2. Determine if anadromy is a common life history strategy in coastal populations and if this leads to mixed stocks.

3. Characterize conserve, and monitor genetic diversity.
4. Develop and implement consistent methods for evaluating Arctic char population status and trend analyses.

References:

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