National Park Service
U.S. Department of the Interior

Glacier Bay National Park & Preserve
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Glacier Bay National Park and Preserve

Anadromous Fish

Identification, Abundance, Distribution, & Run Timing

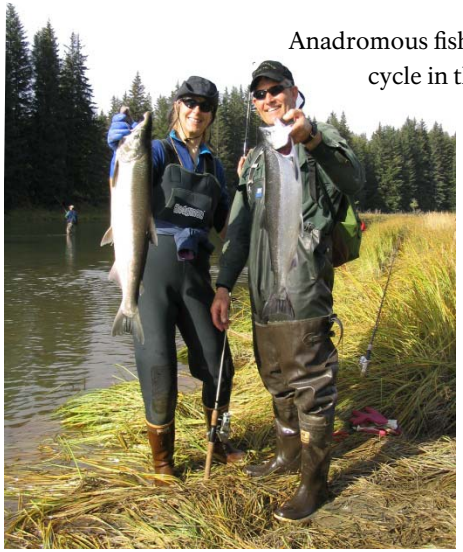
The Angler's Song

Of recreation there is none
So free as fishing is, alone;
All other pastimes do not less
Than mind and body, both possess:
My hand alone my work can do;
So I can fish and study too.

The Compleat Angler – Izaak Walton, 1653

Introduction

Five species of Pacific salmon (genus *Oncorhynchus*) frequent the fresh and salt waters of Glacier Bay National Park and Preserve: chinook, coho, sockeye, chum, and pink salmon. Several species of trout and char also spend time in the Park: the coastal cutthroat trout, steelhead (coastal rainbow trout), and Dolly Varden char (genus *Salvelinus*). Eulachon (genus *Thaleichthys*), a type of smelt, are also found in park waters. This document includes descriptions, abundance estimates, spawning run timing in freshwater or freshwater residency, and distribution among Park and Preserve streams for each of these anadromous species. This publication is intended to aid recreational anglers, wildlife viewers, and other interested persons in identifying some of the most numerous anadromous fish species within the park.



Anadromous fish are fish that spend part of their life cycle in the ocean and then return to freshwater to spawn. Fish such as salmon, trout, and char evolved an anadromous life cycle as a way to maximize growth and reproduction. Growth is maximized by feeding in productive oceans rather than comparatively nutrient poor streams. However, freshwater streams are optimal for reproduction because eggs and juveniles have fewer predators than in the ocean.

Photo Credits

Salmon Photos: Washington Department of Fish and Wildlife
wdfw.wa.gov/fish/identification/pac_salmon.htm

Spawning King Salmon Photo: Author Unknown
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Spawning Coho Salmon Photo: Washington Department of Fish and Wildlife
wdfw.wa.gov/wildwatch/salmoncam/hatchery.html

Spawning Sockeye Salmon: Fisheries and Oceans Canada
www.dfo-mpo.gc.ca/species-especes/species/spe...

Sockeye Chum Salmon Gill raker Illustrations/: US Forest service Tongass National Forest Website
www.fs.fed.us/.../fishcam/sockeye_id.shtml

Spawning Pink Salmon: Photo By E.R. Keeley/USGS
nas.er.usgs.gov/.../FactSheet.asp?speciesID=906

Spawning Chum Salmon Photo: Washington Department of Fish and Wildlife
wdfw.wa.gov/fish/chum/chum-9.htm

Spawning Steelhead Photo: Fisheries and Oceans Canada
www.pac.dfo-mpo.gc.ca/recfish/Species/trout_e.htm

Spawning Cutthroat Photo: ADF&G
http://www.sf.adfg.state.ak.us/region1/escapement/sitkoh.cfm

Cutthroat Vomer Illustration: Morrowo J.E. . 1974. Illustrated keys to the fresh water fishes of Alaska. Alaska Northwest Publishing Company. Anchorage.

Eulachon: Adult Photo: Royal B.C. Museum
www.livinglandscapes.bc.ca/.../index.htm

Spawning Male and Female Eulachon: Wikipedia.org
http://en.wikipedia.org/wiki/Image:Eulachon.jpg

Fish Outline: University of South Florida Center for Instructional Technology
http://etc.usf.edu/clipart/7300/7377/fish_7377.htm

All other photos: Glacier Bay National Park and Preserve Photo Library

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Methods

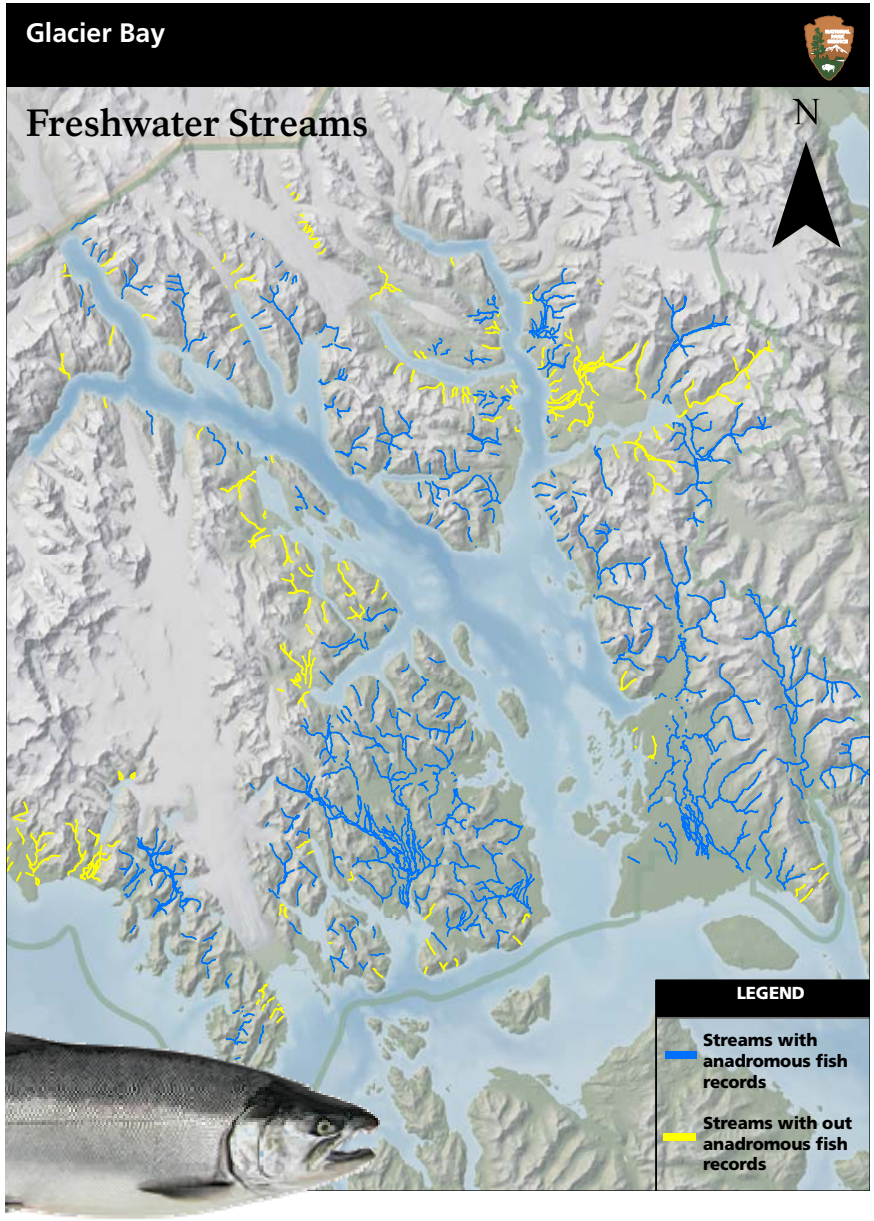
Run timing and distribution information for this publication came from the Glacier Bay Anadromous Streams Database (ASD). This database of fish observations in freshwaters within Glacier Bay National Park and Preserve is continuously updated by park fisheries staff. Observations in the database include sightings by visitors, researchers, and park staff. These range from simple qualitative sightings (*e.g.*, species presence) to repeated, quantitative observations (*i.e.*, where, when, how many) made by fisheries researchers. Some of these observations were made more than a half century ago!

Graphical information on run timing came from information in the ASD. The data represent a relative average of fish abundance observed each month across all records for that species. Anadromous Streams Database information was also used to construct the distribution map included in this document.

Limited information exists for most streams and species of anadromous fish within Glacier Bay National Park and Preserve because of the size, remoteness, and dynamic nature of this habitat. Dolly Varden, salmon, and trout colonize new stream habitat as glaciers recede. The loss of glacial ice from watersheds often influences stream temperature. As streamside vegetation develops, sediment loads decrease resulting in clear water and more stable conditions favorable to fish. Change is constant even within stream habitats.

You can help

If you are interested in contributing a sighting of fresh water fish within the park please contact Chad Soiseth, Fisheries Biologist, (907) 697-2659, chad_soiseth@nps.gov.



Map 1. Glacier Bay streams with records of anadromous fish (blue) and those lacking information (yellow). This view excludes known information for the outer coast of Glacier Bay and the Dry Bay National Preserve.

Terms

Alevin
The lifestage of a salmonid between egg and fry. An alevin looks like a fish with a huge pot belly, which is the remaining egg sac. Alevin remain protected in the gravel riverbed, obtaining nutrition from the egg sac until they are large enough to fend for themselves in the stream.

Anadromous
Fish that live part or the majority of their lives in saltwater, but return to freshwater to spawn.

Emergence
The act of salmon fry leaving the gravel nest.

Fry
A juvenile salmonid that has absorbed its egg sac and is rearing in the stream; the stage of development between an alevin and a parr.

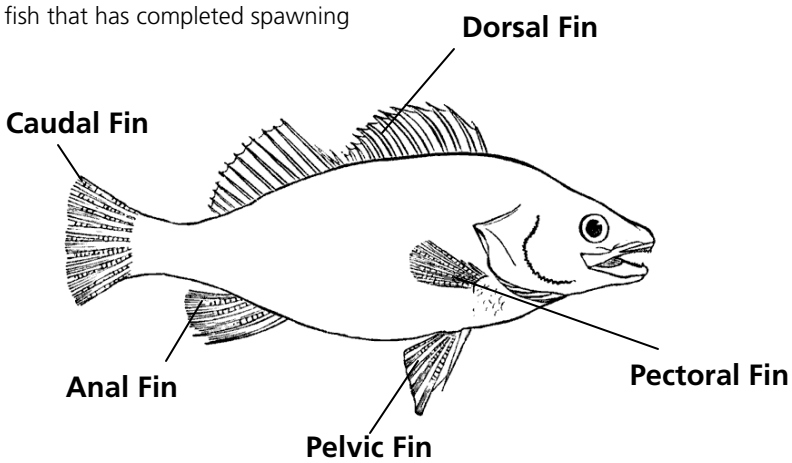
Kype
The hooked jaw many male salmon develop during spawning.

Parr
Also known as fingerling. A large juvenile salmonid, one between a fry and a smolt. Displays vertical bands on its side called parrs.

Smolt
A juvenile salmonid which has reared in-stream and is preparing to enter the ocean. Smolts exchange the spotted camouflage of the stream for the chrome of the ocean.

Substrate
The material which comprises a stream bottom.

Spawned Out
A fish that has completed spawning



Recommendations for Anglers

- Always inform someone of where you will be fishing and how long you plan to be gone in case of an emergency

- Always know the fishing regulations for the area you are fishing; particularly seasons, bag limits, and gear restrictions. Check Alaska Department of Fish and Game's website for Emergency Orders that can affect fishing seasons, bag limits, or allowable gear. See: http://www.sf.adfg.state.ak.us/Statewide/eonr/index.cfm

- Always carry your fishing license with you and be prepared to produce it if requested by enforcement personnel.

- Respect wildlife in the area: give animals plenty of room and know how to appropriately respond during a bear encounter.

- See ADFG'S "Fishing in Bear Country" (found on ADFG website) or contact Glacier Bay National Park's Visitor Information Station for more information.

- Keep harvested fish and personal articles on you at all times. Allowing a bear access to these items may create food conditioned and potentially dangerous bears.

- Harvest only what you can reasonably expect to use! Deposit guts or offal into the deepest, fastest part of the stream. Avoid allowing bears to associate humans with food.

- Respect other anglers! Give them plenty of room and observe the direction of their movements. It is generally not acceptable to move directly adjacent to or just upstream or downstream of other fishers.

- Practice catch and release fishing only when able to effectively minimize or avoid fish injury. Consider using barbless hooks, minimally playing fish, and not removing fish from the water at any time. A hemostat or needle nose pliers is ideal for hook removal to avoid contacting a fish's protective slime layer. If you can't get the hook out, leave it embedded and cut the line. It will eventually work its way out. Any bleeding from the gills generally precludes post-release survival.

- Avoid leaving behind any waste or garbage (including clipped monofilament line, lead split shot, or snagged lures).

- Report angling concerns or wildlife incidents to enforcement personnel.

Anadromous Fish of Glacier Bay

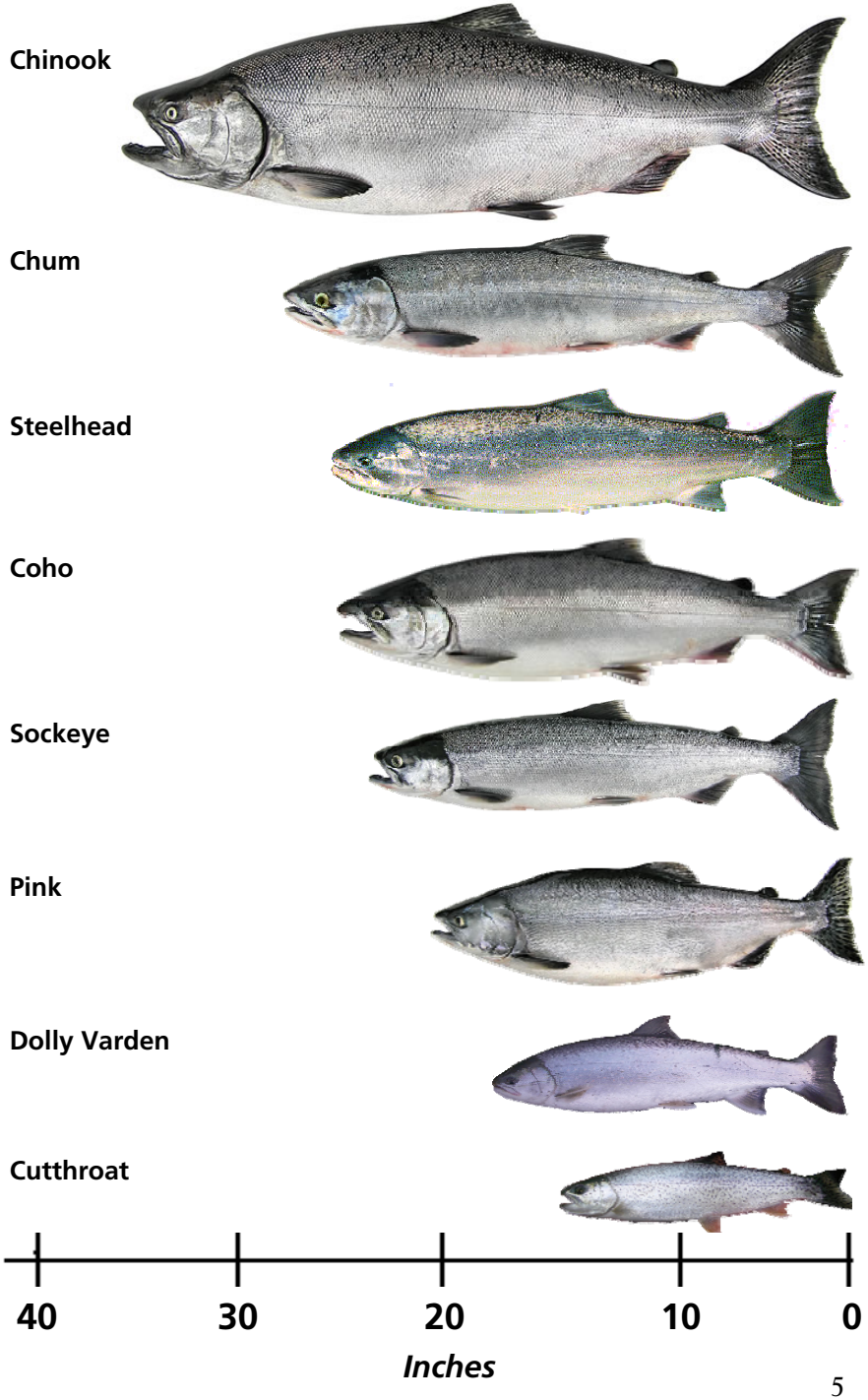


Figure 1. Chinook salmon in ocean coloration.

Photo: Washington Department of Fish and Wildlife

Chinook Salmon

(*Oncorhynchus tshawytscha*)

Other names: King Salmon, Tyee Salmon, Spring Salmon

Physical description:

Chinook salmon are the largest of the Pacific salmon species. Chinook salmon can grow as large as 53 inches and weigh over 100 pounds but usually average 30-40 inches and weigh between 20-40 pounds. They closely resemble and are often confused with coho salmon in ocean and spawning coloration (Figs. 1 and 3 vs 4 and 6). Chinook and coho salmon both have small black spots on the back and dorsal fin. However, distinguishing characteristics for chinook salmon include spots on both lobes of the caudal fin, and black gum coloration in the mouth at the base of the teeth (Fig. 2). Chinook are strong fighters and highly prized by anglers.

Photos: Washington Department of Fish and Wildlife

Figure 2. Distinguishing features of chinook salmon: spots on both lobes of the caudal fin (left) and black gums at the base of the teeth (right).

Abundance, distribution, and natural history:

Twenty five records currently exist for eulachon which are known to have spawned during past years in at least nine streams within the Park and Preserve. Eulachon are typically found in larger river systems. The Alsek and East Alsek Rivers within the Preserve are thought to have the largest runs. Smaller runs exist in the Doame, Dixon, and Excursion rivers as well as Dog Salmon, Clear and Sea Otter creeks. Unconfirmed reports also exist for Topsy, Eagle, Echo, Justice creeks (along the outer coast) and the Godess River in Adams Inlet. Runs usually begin in March or April and are typically over by the 1st of May. Run timing and strength may vary dramatically from year to year in some river systems while others are more predictable. Sea birds and bald eagles can often be seen in large numbers foraging on this species along rivers during eulachon returns. Steller sea lions often aggregate along the Alsek and East Alsek rivers during the eulachon run (Fig. 34).

Photo: Lexa Meyer, NPS

Figure 34. Steller's sea lion aggregation at the mouth of the Alsek River, Dry Bay National Preserve, in April.

Conservation measures/concerns:

Little is known about the exact distribution of eulachon in the Park and Preserve due to the early run timing and year to year variability of this species. Eulachon populations appear to be stable in Alaska, but certain stocks elsewhere in the Pacific Northwest are being considered for listing under the Endangered Species Act, mostly due to habitat loss. The early run timing, high oil content, and large spawning aggregations make eulachon an important "bonanza" food source for other marine, terrestrial and avian species in the early spring following lean winter months. No commercial fishery exists for eulachon in the Park and Preserve and only a limited amount of subsistence harvest occurs in the Excursion, Alsek, and East Alsek Rivers.

Photo: Royal B.C. Museum

Figure 32. Eulachon in ocean coloration.

Eulachon

(Thaleichthys pacificus)

Other names: Hooligan, Candle Fish

Physical description:

Eulachon are small fish between 4-12 inches in total length. They can be distinguished from other small forage fish species by the dorsal fin located far back on the body and by circular grooves on the gill covers (Figs. 32 and 33). The mouth is equipped with canine-like teeth which are lost as the fish approach spawning. Eulachon at sea are blue-silver in color (Fig. 32) but turn to gray-brown during spawning (Fig. 33). Spawning males also develop tubercles (small bony ridges) on the head and on the scales along the lateral line. The name candle fish originated from the oil rendered from these fish by coastal Alaska native people as fuel for lamps. The rendered oil was also a prized (and very nutritious) edible delicacy, and trade item. Fish were eaten fresh, dried, and smoked.

Photo: http://en.wikipedia.org/wiki/Image:Eulachon.jpg

Figure 33. Eulachon in spawning coloration.

Abundance, distribution, and natural history:

Though chinook frequent park marine waters they are the least abundant salmon species and few spawning populations exist. The Alsek River system contains the best documented spawning park population with records from August 1964 and July 2005**.** These represent late spawners as chinook typically enter Alaska rivers during May and June. Limited evidence for Doame and Seclusion river spawning populations also exists. Recreational anglers target chinook entering the East Alsek/ Doame estuary during their presumed June run up the Doame River. However, some observers assert these are actually Alsek River fish that temporarily hold here before heading 2.5 miles west up the Alsek River. Nine recorded observations of 2-33 individual chinook, mostly during June, exist from 1986-2005 for this system. One adult in spawning coloration was documented up the Doame River by NPS staff during August 2010 and one juvenile fish (B. Wing, NOAA NMFS verified) was captured in the East River estuary during September 2005. This suggests a small Doame River population exists. Three adults in spawning coloration were similarly documented up the Seclu-

Photo: Pacific Northwest National Laboratory

Figure 3. Male chinook salmon in spawning coloration.

Conservation measures/concerns:

Annual catch limits for chinook salmon throughout Southeast Alaska are set by the Pacific Salmon Treaty and implemented by the Alaska Department of Fish and Game. Sport and commercial catch limits for chinook salmon are often set at a fraction of limits for other species due to their comparatively low abundance. Chinook salmon caught in Glacier Bay's marine waters originate from other river systems throughout Alaska and the Pacific Northwest and are thus cooperatively managed with input by Alaska, British Columbia, Washington, Oregon, and California fisheries interests and managers. Identification of spawning habitat in the Doame and Seclusion rivers and documentation of other spawning populations are ongoing management goals for this Glacier Bay species.

Photo: Washington Department of Fish and Wildlife

Figure 4. Coho salmon in ocean coloration.

Coho Salmon

(*Oncorhynchus kisutch*)

Other names: Silver Salmon

Physical description:

Coho salmon typically weigh between 8-12 pounds and measure, on average, 24-30 inches long. Smaller coho, ranging in length from 12-20 inches, may be seen spawning with larger fish. These smaller male coho are referred to as "jacks" and return to spawn after only one year in the ocean. Other species of salmon also have precocious jacks that comprise small segments of annual spawning populations. Coho salmon closely resemble chinook salmon in ocean and spawning coloration (Figs. 4 and 6). Distinguishing characteristics for coho salmon include spots on the upper lobe of the caudal fin (not on the bottom lobe) (Fig. 5), white instead of black gum coloration, and an overall smaller size. Coho are typically not quite as "beefy" in appearance compared with chinook. They are often targeted by recreational anglers but are typically not as highly esteemed as chinook salmon.

Photos: Washington Department of Fish and Wildlife

Figure 5. Distinguishing features of coho salmon: no spots on the lower lobe of the tail (left) and a lack of black coloration (white gums) at the base of the teeth (right).

Abundance, distribution, and natural history:

Two hundred seventy three records currently exist for this species but only about 70% of records provide abundance information. Dolly Varden have been observed in 65 stream systems within the park.

Char are thought to be a primary colonizing species in newly emerged (*i.e.*, deglaciated) streams because of their habit of moving among different streams during the year. They move into streams in the spring to consume out-migrating salmon smolts and later in the summer enter streams with spawning salmon to feed on salmon eggs and occasionally carcasses. Fry and juveniles have been reported in Park streams from May through early November (Fig. 31). Spawning adults have been reported slightly later from the end of July through early November. Individuals are likely present year round in some systems where they rear, spawn, and overwinter.

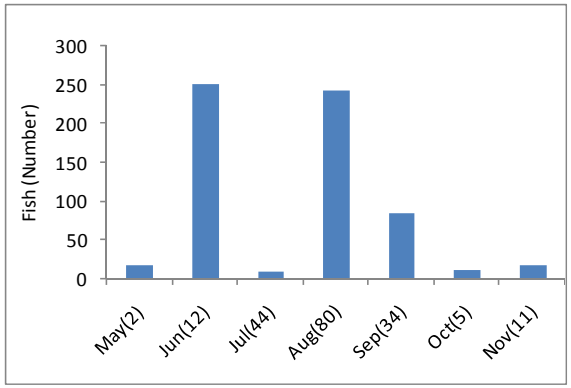


Figure 31. Relative (averaged across records) Dolly Varden stream residency for all life stages. Values in parenthesis indicate number of records for each month (total n = 188 records).

Conservation measures/ concerns:

Dolly Varden are a common species in freshwater throughout Southeast Alaska and in park streams. Liberal sport harvest limits (*e.g.* 10 fish daily) for this species exist for most waters in Southeast Alaska. Isolated stream resident forms are more susceptible to overharvest because of slower growth (adults are usually less than 8 inches long) and low reproductive rates. Small, spatially and genetically isolated resident populations of Dolly Varden occur in Falls Creek (Kahtaheena River) near Gustavus and in Stonefly Creek in Wachusett Inlet above insurmountable waterfalls.

Dolly Varden from different populations often aggregate in watersheds containing lakes to overwinter. Identification and protection of these critical overwintering habitats is paramount.

Photo: Lexa Meyer, NPS

Figure 29. Dolly Varden in non-spawning coloration.

Dolly Varden Char

(*Salvelinus malma*)

Other names: Char, Dolly

Physical description:

The namesake for this species was derived from a character in *Barnaby Rudge*, an 1841 novel by Charles Dickens, who wore brightly colored polka-dot dresses. Dolly Varden in ocean coloration are typically silver with pink spots along their sides and white leading edges on the pectoral, anal, and pelvic fins (Fig. 29). These markings intensify as the fish approach spawning readiness (Fig. 30). Males also develop hooked jaws tinted orange and a red-orange tint to the fins. Individuals within populations of this species are known to exhibit both sea-run (anadromous) and stream resident life history strategies. Anadromous fish typically rear in fresh water for three to four years, migrating seaward in early spring. They return in late summer/early fall to spawn or rear in lake systems. Dolly Varden typically spawn after their second summer of rearing in the marine environment and can attain lengths of up to 36 inches but are typically 12-20 inches long. Similar to cutthroat and steelhead trout, Dolly Varden spawn in subsequent years (up to two or three times). Because this species has a more ventrally located mouth, it feeds more on benthic or bottom dwelling insects compared with rainbow and cutthroat trout.

Photo: Craig Murdoch, NPS

Figure 30. Male Dolly Varden char in spawning coloration.

Abundance, distribution, and natural history:

A total of 322 records exist for this species but only 30% provide spawning fish abundance estimates. Coho salmon are documented in 56 streams and tributaries (spawning adults in only 26) but they're likely in almost every stream from short, small creeks one can literally step across to large complex systems like the Dundas/Seclusion and Alsek River. Fish enter rivers from August through October with peak abundance occurring in September (Fig. 7). Few records exist beyond October, although fish are still present in streams, because little research or recreational fishing typically occurs at this time of year.

Photo: Washington Department of Fish and Wildlife

Figure 6. Male coho salmon in spawning coloration.

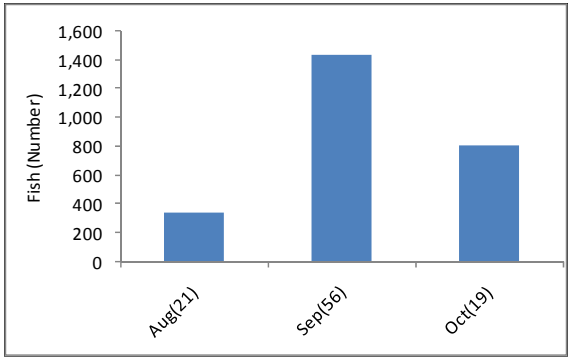


Figure 7. Relative (averaged across records) coho salmon run timing. Values in parenthesis indicate number of records for each month (total n = 96) .

Conservation measures/concerns:

Coho salmon throughout Alaska and within the Park are generally not a conservation concern because of their widespread spawning distribution and relatively undisturbed habitat. Spawning populations in small creeks and headwater streams may be very small, numbering in the tens or hundreds of individuals. These small populations could be susceptible to overharvest by recreational anglers or extinction due to geologic forces (*e.g.*, glacial advances, landslides, *etc.*) affecting spawning habitat or habitat access. Development and logging on or adjacent to small streams in the Pacific Northwest has also threatened spawning runs. Protection of small, seemingly inconsequential watersheds and "ditches" is key to preserving species diversity.

Photo: Washington Department of Fish and Wildlife

Figure 8 Sockeye salmon in ocean coloration.

Sockeye Salmon

(*Oncorhynchus nerka*)

Other names: Red Salmon, Blueback Salmon

Physical description:

Sockeye salmon differ from most other species of Pacific salmon, trout, and char by their complete lack of spots. Ocean fish are silver on the sides with a rich blue to blue green coloration on the dorsal surface (Figs. 8 and 9). Spawning sockeye males and females develop bright red bodies and green heads (Fig. 10). Adult fish range from 4-8 pounds in weight and are 18-24 inches long. Male spawning sockeyes develop humped backs like pink salmon. Ocean caught sockeye salmon can often be confused with chum salmon which they closely resemble. Chum salmon have a narrow caudal peduncle (base of the tail) and 19-26 short stout gill rakers on the first (forward-most) gill arch (Fig. 15) while sockeye salmon have 29-40 long, slender, close-set gill rakers (Fig 11). Sockeye eat smaller prey which accounts for the longer, more closely spaced gill rakers.

Photos: Washington Department of Fish and Wildlife

Figure 9. Distinguishing features of sockeye salmon head and tail. Note the large scales and lack of spots.

Photo: Fisheries and Oceans Canada

Figure 10. Female (top) and male (bottom) sockeye salmon in spawning

Abundance, distribution, and natural history:

Forty two cutthroat trout records currently exist, documenting their presence among 16 different stream systems within the Park and Preserve (however, only 55% of these records provide abundance information). Five of these drainages contain lakes. Coastal cutthroat trout probably occur throughout many Park stream systems but their distribution and abundance is poorly known. Most populations are probably small, consisting of perhaps a few hundred fish. Drainage basins containing lakes are thought to be more likely to harbor this species.

Fish typically rear from two to five years in freshwater before going to sea. Cutthroat may reside for a few to perhaps 100 or more days at sea before returning to natal streams to spawn from late April to early June. Cutthroat do not seem to move between river systems as often as do anadromous Dolly Varden char and are probably not ready colonizers of recently deglaciated stream habitat. Similar to steelhead, cutthroat trout may repeat spawning every few years but survival for repeat spawning adults is similarly reduced.

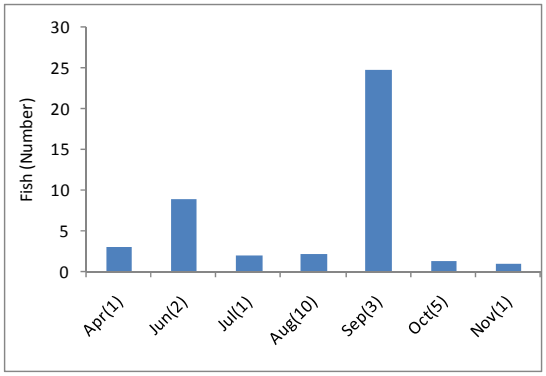


Figure 28. Relative (averaged across records) coastal cutthroat trout stream residency. Values in parenthesis indicate number of records for each month (total n = 23 records).

Juvenile growth rates and residency along with adult residency and reproductive timing are poorly documented within Glacier Bay. Fry and juveniles have been reported in streams from June through November (Fig 28). Adults have been observed in streams from April through October.

Conservation measures/concerns:

Cutthroat are generally quite vulnerable to angler overharvest because of their predatory nature and willingness to strike a lure. Southeast Alaska spawning populations are typically small. Multiple cutthroat populations often overwinter together in lakes and these aggregations rarely exceed 2,000 fish. Recreational harvest limits are generally conservative (2 fish daily; 11-22 inch size limit) compared with Pacific salmon species. More information is needed on the distribution and abundance of this species.

Photo: Lexa Meyer, NPS

Figure 25. Coastal cutthroat trout in non-spawning coloration.

Coastal Cutthroat Trout

(*Oncorhynchus clarki clarki*)

Other names: Harvest Trout, Sea-Run Cutthroat Trout,

Physical description:

Coastal cutthroat trout are silvery in coloration with a darker gray or olive back and numerous small black spots evenly distributed over the entire body (Fig. 25). These fish average 12-16 inches but can reach up to 20 inches in length. Spawning individuals of both sexes may develop darker coloring and a pink side stripe similar to rainbow trout (Fig . 26). The characteristic orange slash marks under the jaw may be faint or absent. These orange markings may or may not become more prominent as the fish near spawning readiness. Cutthroat (and coastal rainbows) both exhibit teeth on the head and shaft of the vomer, a bone located at the back of the mouth in the upper jaw (Fig. 27). But cutthroat trout also exhibit small teeth, often difficult to see, on the floor of the mouth behind the tongue. Coastal cutthroat trout exhibit a wide variety of life history strategies ranging from stream resident to sea-run (anadromous) forms. Sea-run forms typically stay quite close to home and rarely venture more than 50 miles from their natal streams.

Photo: Alaska Department of Fish and Game

Figure 26. Coastal cutthroat trout in spawning coloration.

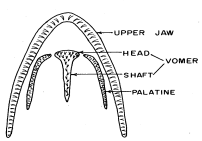


Illustration: Morrow 1974

Figure 27. Location of teeth on the vomer bone (roof of mouth) of a costal cutthroat trout or coastal rainbow.

Abundance, distribution , and natural history:

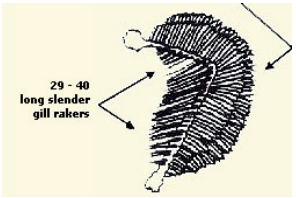


Illustration: US Forest Service Tongass National Forest Website

Figure 11 Sockeye salmon gill rakers.

603 total records exist with 82% estimating spawning fish abundance among 26 streams. Sockeye are colonizers of new habitat and glacial outwash plains provide optimal spawning habitat for this species. Sockeye prefer river systems with lakes that provide rearing habitat for fry and juveniles. Most juveniles rear 1-2 years in a lake system. However, juveniles in systems lacking lakes, called "ocean-type" sockeye leave streams soon after hatching for a brief (weeks-months) estuary rearing period. Limited run timing information exists for most park streams. Fish enter rivers starting in June or July and spawning individuals are present through November (Fig. 12). Peak spawning occurs during September and October. The most complete run timing data exists for the East Alsek River in the Dry Bay Preserve. A small commercial set gillnet fishery occurs there thus making it a relatively well-studied stream.

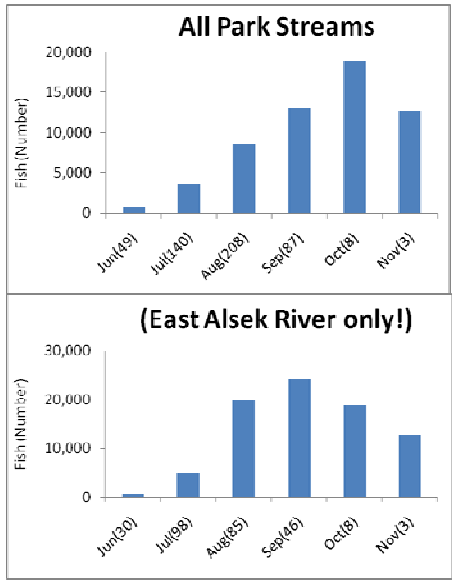


Figure 12. Relative (averaged across records) sockeye salmon run timing for all streams combined (n=495 records) and the East Alsek River (n= 270 records) .

Conservation measures/concerns:

Glacial habitats that sockeye occupy are rapidly changing and lakes can be relatively ephemeral landscape features due to vegetation colonization and isostatic rebound (absolute increases in ground elevation after glaciers recede and overlying weight is reduced). Reduction in the Vivid Lake spawning population occurred in 1994 when a tributary stream no longer allowed passage for sockeyes into the lake due to rebound. It is possible that other spawning populations (*i.e.*, East Alsek and Bartlett Rivers) within the Park and Preserve may decline as rebound mediated landscape changes affect access to traditional spawning habitat as well as the overall quantity and quality of this habitat.

Photo: Washington Department of Fish and Wildlife

Figure 13. Chum salmon in ocean coloration.

Chum Salmon

(*Oncorhynchus keta*)

Other names: Dog Salmon, Keta Salmon, Calico Salmon

Physical description:

Chum salmon in ocean coloration are metallic greenish-blue on the dorsal surface with fine black speckles (Figs. 13 and 14) making them difficult to distinguish from sockeye salmon. Chum salmon have fewer (19-26), shorter and heavier gill rakers on the first arch (Fig. 15), relatively large eyes, a very narrow caudal peduncle (base of the tail), and deeply forked caudal fin (Fig. 14). Chum salmon range in weight from 7-18 pounds and measure between 24 -32 inches long. Male chum salmon spawning coloration includes an overall olive with vertical bars of darker green and purple, which provides the visual cue indicative of the common name, calico salmon (Fig. 16). Spawning females generally sport a dark horizontal band along the lateral line and less intense green and purple vertical bars. The males develop the typical hooked snout of Pacific salmon and very large teeth which at least partly accounts for their other name of dog salmon.

Photos: Washington Department of Fish and Wildlife

Figure 14. Distinguishing features of chum salmon head and tail. Note the narrow caudal peduncle (left) and lack of spots.

Illustration: US Forest Service Tongass National Forest

Figure 15. Chum salmon gill rakers.

Abundance, distribution, and natural history:

Only 16 records exist for this species with many observers reporting only species presence. Coastal rainbow and steelhead trout are known from only 8 different stream systems throughout the park but undoubtedly occur within many more. Adult fish have been reported in streams from April through September (Fig. 24). Although few fish have been reported, returning steelhead spawning adults are likely most abundant in May. Those reported in April through June likely represent the anadromous steelhead form while fish reported in August and September likely represent resident type fish. Reports of steelhead and resident rainbow trout are often suspect because of the difficulty of discriminating coastal rainbow trout from cutthroat trout. Cutthroat in this area are often mistaken for rainbow trout because they do not consistently display the orange slash marks under the jaw. Steelhead typically spend two to three years in freshwater before migrating to sea. They return to their natal waters one to three years later to spawn. Unlike Pacific salmon, steelhead may survive after spawning to spawn in subsequent years after time in salt water. Repeat spawning steelhead typically comprise a small component (10-20%) of spawning populations.

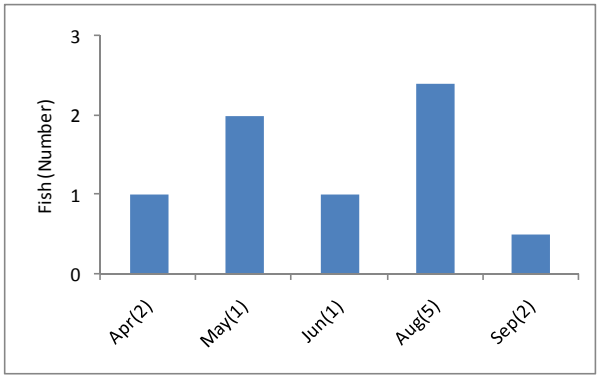


Figure 24. Relative (averaged across records) coastal rainbow trout stream residency . Values in parenthesis indicate number of records for each month (total n = 11 records).

Conservation measures/ concerns:

Populations of this species throughout Southeast Alaska are typically small and susceptible to overharvest. Recreational steelhead harvest limits are conservative (1 fish daily; 2 fish annual limit) compared with other Pacific salmon species. The steelhead form of coastal rainbow trout are notoriously difficult to catch but are highly prized by recreational anglers. Most steelhead anglers practice catch and release because these fish are esteemed more for their quality as a game fish rather than table fare and very few fish achieve the minimum harvest size ($\geq$ 36 inches) specified by angling regulations. Considerably more information is needed on the distribution and abundance of this poorly documented species.

Photo: Carmel River Association

Figure 22. Coastal rainbow trout in ocean coloration.

Coastal Rainbow Trout

(*Oncorhynchus mykiss*)

Other names: Steelhead

Physical description:

Steelhead and rainbow trout are essentially the same species with varying life histories. Steelhead are the sea-run form (anadromous) while rainbow trout are typically stream resident their entire lives. Both forms may be present in park streams. However, this has not yet been substantiated. Steelhead are typically much larger in body size (average 20-30 inches, up to 40 inches and 20 pounds) because they spend time in the marine environment feeding and growing at rates (up to 1 inch/month) that are not possible for stream resident fish. Yet very few fish in this area meet the 36 inch recreational angling minimum size limit. Steelhead/rainbow trout are often confused with cutthroat trout. However, they lack small teeth on the floor of the mouth behind the tongue (see coastal cutthroat trout description). They can be distinguished from Pacific salmon species by a shorter head, a maxillary (upper jaw) that does not extend much beyond the posterior margin of the eye, and wide caudal peduncle (Fig. 22). Ocean going fish are chrome bright, with a dark grey/black back, and fine dark spots on the dorsal surface and both lobes of the caudal fin. Spawning fish are typically darker in coloration and develop a pink or red stripe along the lateral line (Fig. 23).

Photo: Fisheries and Oceans Canada

Figure 23. Male steelhead in spawning coloration.

Abundance, distribution, and natural history:

482 total records (all life stages) exist and 82% provide spawning fish abundance estimates. Spawning chum salmon are documented among 43 unique streams. Chum exhibit the widest distribution of any Pacific salmon species, spawning as far south as Monterey, California in the Eastern Pacific, east to the Mackenzie River on the Arctic coast of North America and as far as Korea in the Western Pacific. Most reports in Glacier Bay come from larger rivers such as the East Alsek, Dundas/Seclusion, and Excursion rivers. Chum salmon have been recorded spawning in streams in Glacier Bay between July and October (Fig. 17). They generally prefer deeper, fast flowing water with larger gravel substrate commonly influenced by upwelling. Peak spawning fish abundance is evident in October but spawning activity varies among populations. When fry emerge from the gravel in the spring they migrate immediately to salt water, accounting for few juvenile records.

Photo: Washington Department of Fish and Wildlife

Figure 16. Female (top) and male (bottom) chum salmon in spawning

Conservation measures/ concerns:

Little recreational and commercial fishing effort is currently directed towards this species. However, they were historically an important food source (dried for storage) for interior indigenous people along some of the larger Alaska rivers. Returning Excursion River fish comprise a culturally important subsistence seine fishery for the Hoonah Tlingit. The East Alsek River was once a productive chum fishery but few chum now return to this system likely due to changing habitat conditions and early (1951-1980) commercial, set gillnet harvests averaging around 10,500 fish annually.

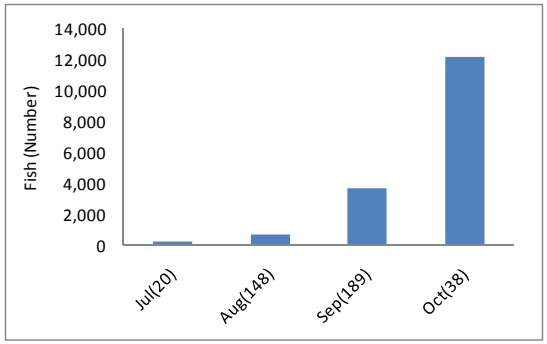


Figure 17. Relative (averaged across records) chum salmon run timing. Values in parenthesis indicate number of records for each month (total n = 395) .

Photo: Washington Department of Fish and Wildlife

Figure 18. Pink salmon in ocean coloration.

Pink Salmon

(*Oncorhynchus gorbuscha*)

Other names: Humpy, Humpback Salmon

Physical description:

The pink salmon is the smallest of the Pacific salmon found in park waters with an average weight of about 3.5 to 4 pounds and an average length of 14-24 inches. Pink salmon can be distinguished from other Pacific salmon by their small scales and large black spots on the dorsal surface and caudal fin (Figs. 18, 19 and 20). The common name comes from the characteristic humped back developed by spawning males (Fig. 20).

Photos: Washington Department of Fish and Wildlife

Figure 19. Distinguishing features of pink salmon head and tail. Note the small scales and large spots.

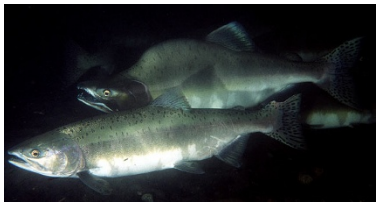


Photo By: E.R. Keeley, USGS

Figure 20. Female (foreground) and male (background) pink salmon in spawning coloration..

Abundance, distribution, and natural history:

453 total records (all life stages) exist for this species of which 73% provide spawning fish abundance information. There are 83 unique streams in which spawning pinks have been documented. This species is the most abundant of all Pacific salmon species both in the Park and Preserve and throughout the North Pacific. Most park stream systems likely have a run of pink salmon. Pinks or humpies have a fixed two year life span that has lead to reproductive and genetic isolation between even and odd year runs in many river systems. Odd year runs are the most productive throughout Southeast Alaska although some streams are an exception to this generality. Pink salmon have been reported in Glacier Bay streams from June to October. However, most fish occur during July through September with peak spawning fish abundance occurring during August (Fig. 21). When fry emerge from the gravel in the spring they migrate immediately to salt water, similar to chum salmon. Therefore, few juvenile records also exist for this species.

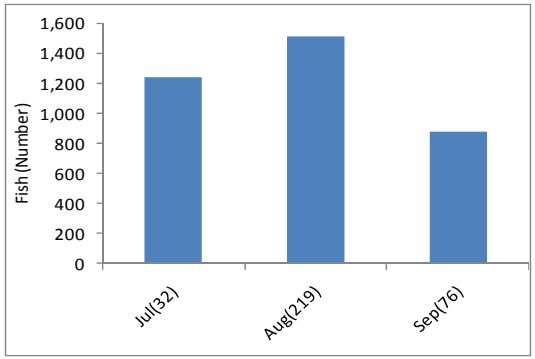


Figure 21. Relative (averaged across records**)** pink salmon run timing . Values in parenthesis indicate number of records for each month (total n= 327).

Conservation measures/ concerns:

There are currently no special regulations or management concerns for pink salmon within the Park or Preserve. The wide distribution, prolific runs, and low angling effort for this species account for the low level of concern. Pink salmon are the least commercially valuable species due to their high abundance, low meat oil content, and small fillet size, fetching a much lower price per pound than other species. Pink salmon are caught in huge numbers in seine and troll fisheries for canning, fish meal, and commercial fishing bait. Dead spawned out pink salmon add a tremendous amount of nutrients, mostly carbon and nitrogen, annually to stream and riparian habitats. Spawning and spawned out fish are an important food source for a wide variety of terrestrial mammals and avian predators. Low or high returns of this species can greatly influence habitat productivity.