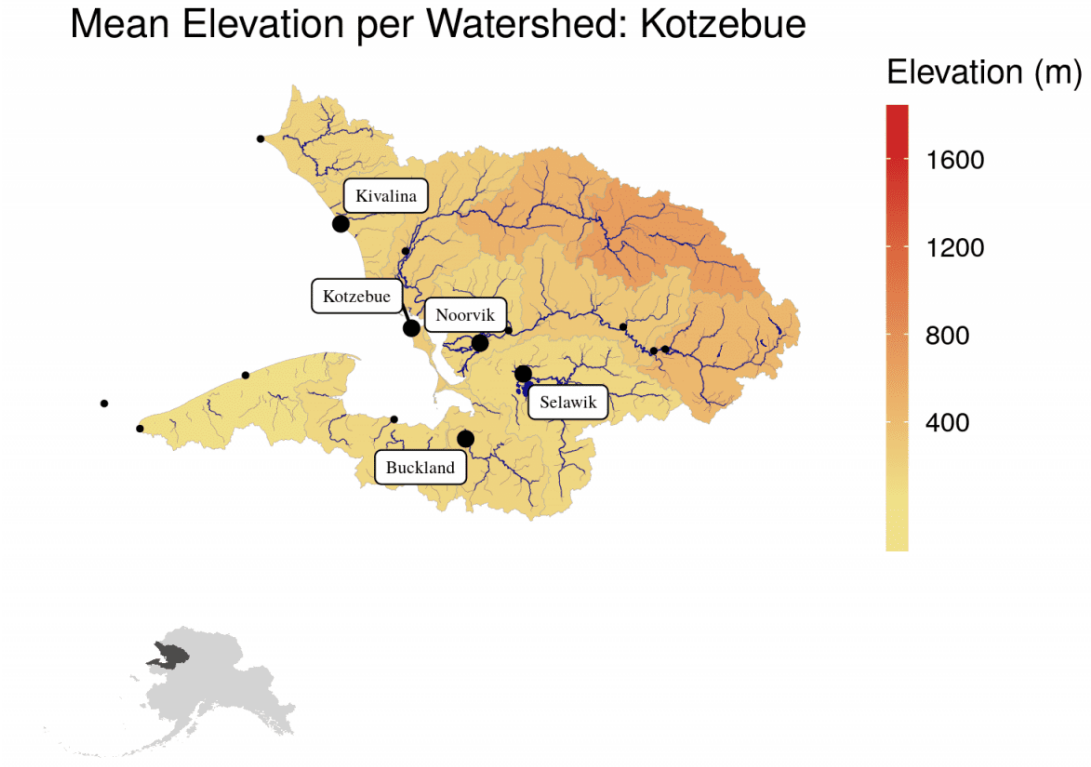
KOTZEBUE

Geography

The geography of the Kotzebue Sound region is characterized by high-latitude coastal lowlands and riverine uplands. Along the coast of the Chukchi Sea, numerous sand barrier islands encircle lagoons that provide excellent fishing and hunting opportunities for nearby communities (e.g., Shishmaref, Kotzebue, Kivalina). Low elevations are dotted with wetland lake complexes, and recent lava flows and maars between Deering and Shishmaref. Moving inland, the landscape shifts to arctic and alpine tundra (the latter at higher elevations), and taiga high in the Noatak and Kobuk river drainages. Both valleys exhibit postglacial sand dunes that have largely, but not completely, been replaced by northern forest and tundra.

Straddling the Arctic Circle, this region is twice the size of West Virginia and home to 9019 people as of 2015. On average, 166 cm of precipitation fall over the course of a year, ranking Kotzebue along with the Arctic and Yukon as the driest regions. Chum salmon are the primary species that occur in this region and they are harvested by local users in both subsistence and commercial fisheries.



Jared Kibele, Rachel Carlson, and Marie Johnson. 2018. Elevation per SASAP region and Hydrologic Unit (HUC8) boundary for Alaskan watersheds. Knowledge Network for Biocomplexity. doi:10.5063/F1D798QQ.

Early People and Salmon Systems

The Iñupiat of the Northwest Arctic, which includes communities on the coast of Kotzebue Sound and in the Noatak and Selawik River valleys, have existed in the region for at least 4,000 years. Prior to contact with white explorers, the region was populated by several culturally distinct autonomous nations that spoke dialects of Iñupiatun (the Iñupiaq language; Burch 1998).

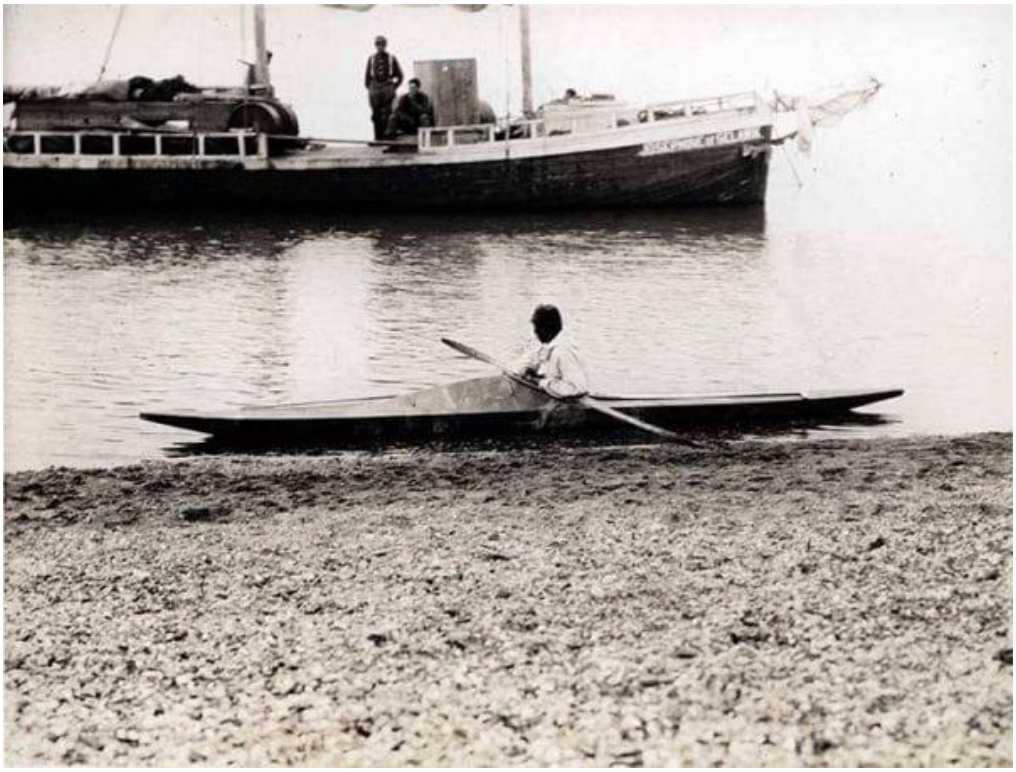
A sudden drop in abundance of the Western Arctic caribou herd and the resulting famine, combined with deaths from epidemics in the 1880s, resulted in the complete social upheaval of these nations (Burch 1998). Populations stabilized soon after, but the nations no longer functioned independently. Trade and barter of wild resources have long been customary among coastal Iñupiat and Athabascans of interior Alaska (Magdanz et al. 2007).

A seasonal trade fair in Sheshalik brought people from distant locations to exchange animals, plants, tools, weapons, staple foods and other goods acquired through trade with Russian or Euro-American settlers (Moncrieff 2007b).

Changes in Systems

The 20th century in the Kotzebue Sound region was marked by social, economic, technological and climatic changes that restructured many aspects of everyday life. Christianity spread as churches were built, and primary education became mandatory as village schools were built (Burch 1994). Rifles replaced spears and harpoons, snow machines replaced dog teams, and monofilament replaced seal gut in fishing nets (Sobelman 1985; Burch 1998).

In the latter half of the century, political movements to recognize Indigenous rights in Alaska began to gain momentum. Several Iñupiaq leaders from the Kotzebue Sound region were instrumental in the passage of the 1971 Alaska Native Claims Settlement Act that established corporate ownership of Alaska Native lands. Fewer than 10 years later, the Alaska National Interest Land Conservation Act created the Cape Krusenstern National Monument and the Kobuk Valley National Preserve and gave rural preference to Alaskans living near federal lands to harvest subsistence resources.



Credit: Alaska State Library, Clarence Leroy Andrews Photo Collection (P45-0617)

Subsistence

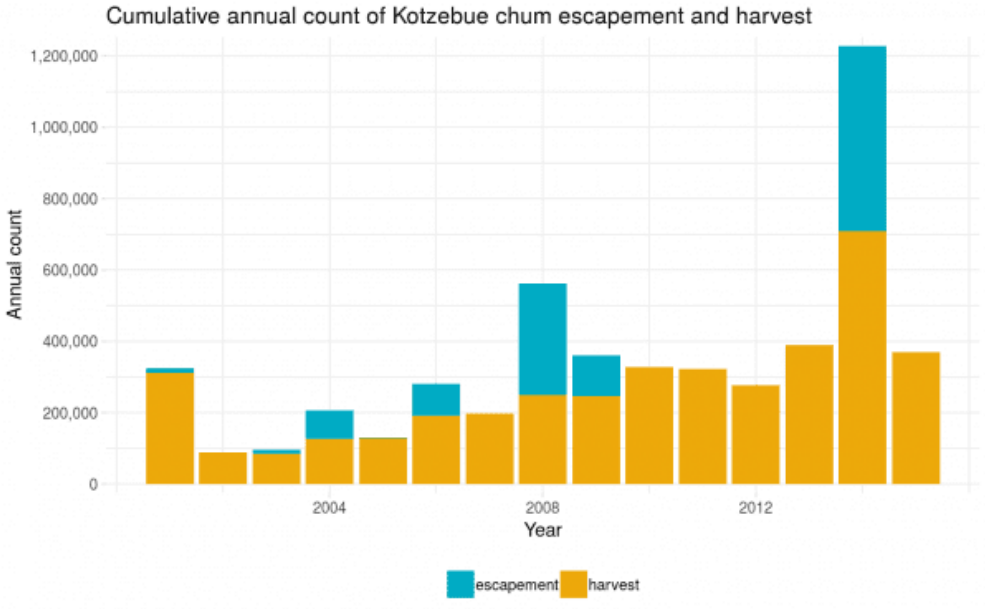
In contrast to the abundance of change that the 20th century brought, subsistence culture during that time changed very little. The use of rifles and snow machines changed the means by which animals were taken from the land and water, but the underlying beliefs and institutions that guide how wild resources are processed, stored and shared have remained relatively stable through time. Communities in the region are at the northern extent of the geographic distribution of most salmon species, and thus subsistence practices with respect to salmon vary based on how abundant salmon have traditionally been in the local area. Subsistence fishermen along the coast primarily target chum, Chinook, and coho salmon. In Kobuk River communities, located away from the coast, chum salmon make up large proportions of subsistence harvests of fish (Magdanz et al. 2011).

Climatic shifts in the region have changed aspects of subsistence in general and salmon fishing in particular. Warmer winters and earlier ice break up have required adjusting seasonal travel to fish camps to coincide with earlier or later arrival of fish, and wetter summers have made drying fish on racks prone to spoilage. In addition, thawing permafrost and the resulting siltation of rivers have increased the number and size of gravel bars and made river travel challenging.

Regional Snapshot Today

Salmon and Habitat

Chum salmon are the dominant species in the Kotzebue region, comprising most of the fish counted in rivers for escapement and in harvest by commercial and subsistence users. Whether the other species will be more common in the face of increased Arctic warming seems likely, but it is unknown whether species will successfully colonize and establish populations in new areas. The total abundance of salmon in the Kotzebue region ranks behind only the Arctic as having the fewest salmon of any region. Between the period of 2001-2015, approximately 344,000 chum salmon returned to the region each year, while on average fewer than 3,000 of the other species returned. Over 3400 km of streams and rivers are known to contain chum salmon, whereas only 549 km have been documented as coho salmon habitat. Despite this low abundance, the importance to people and thus the maintenance of high quality salmon habitat is vital. The footprints of 17 mines total 26 km² in the region, yet Kotzebue as a whole has the least amount of human activity of any of the regions.



Jeanette Clark and Robyn Thiessen-Bock. Estimate of total Alaskan salmon abundance by region, 2000-2015. Knowledge Network for Biocomplexity. doi:10.5063/F1BR8QG4

Salmon and People

Salmon have always played a critical role to the people of Kotzebue Sound as a high-quality, high-energy food source for both themselves and their dog teams. They are present in large numbers during the months of July and August at a time when many other food items are not available and when conditions for cutting and drying/smoking are favorable. Traditionally they were caught right off the beach of Kotzebue using gill nets, or in some cases seines, and hung on racks lining the shoreline. With an increase in population came an increase in the use of vehicles, which brought associated increases in dust and beach erosion. Local fishing slowly decreased over the last half of the 20th Century, and fishing now occurs in a number of camps located immediately south of town and in the other campsites scattered around the northern coast of Kotzebue Sound and Hotham Inlet (Kobuk Lake).

Photo: Cutting salmon. Gladys Knight Harris Collection Circa 1949

Today, residents of the Kotzebue Sound region participate in mixed cash-subsistence economies that are typical of rural Alaskan communities. The foundations of subsistence persist, including sharing, cooperation, and trade of wild foods for small amounts of cash (i.e. customary trade). Contemporary trade and barter are regulated, although lightly enforced, through discordant federal and state subsistence regulations. Federally qualified subsistence users (i.e. those living in rural communities harvesting resources from federal lands and waters) may engage in customary trade and barter (Magdanz et al. 2007; Jenkins 2015). In addition to limited noncommercial sales of subsistence salmon, Kotzebue Sound is the home to the northernmost commercial salmon fishery in Alaska. The fishery harvests mostly chum salmon, and in the 1980s and 1990s a hatchery produced fish to supplement the wild harvest and provide additional commercial fishing opportunities (Menard et al. 2017). Income from commercial fishing activity funds the purchase of nets, equipment, and fuel that are used for commercial and subsistence fishing and hunting.

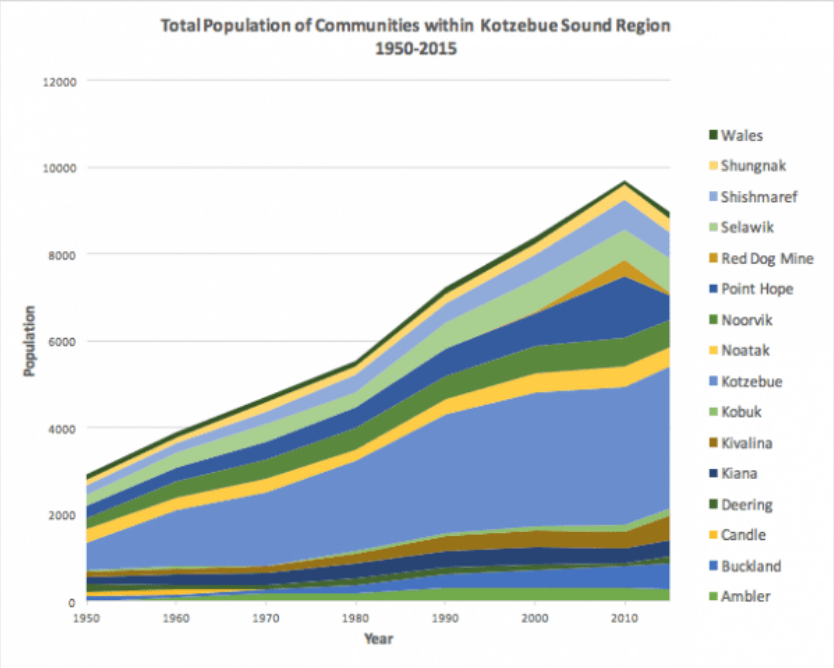
Photo: Saima Chase in Kotzebue cutting fish with her son and niece. By Keira Jones

Percent Change from Number of Initially Issued Commercial Permits to Number of Permits in 2016

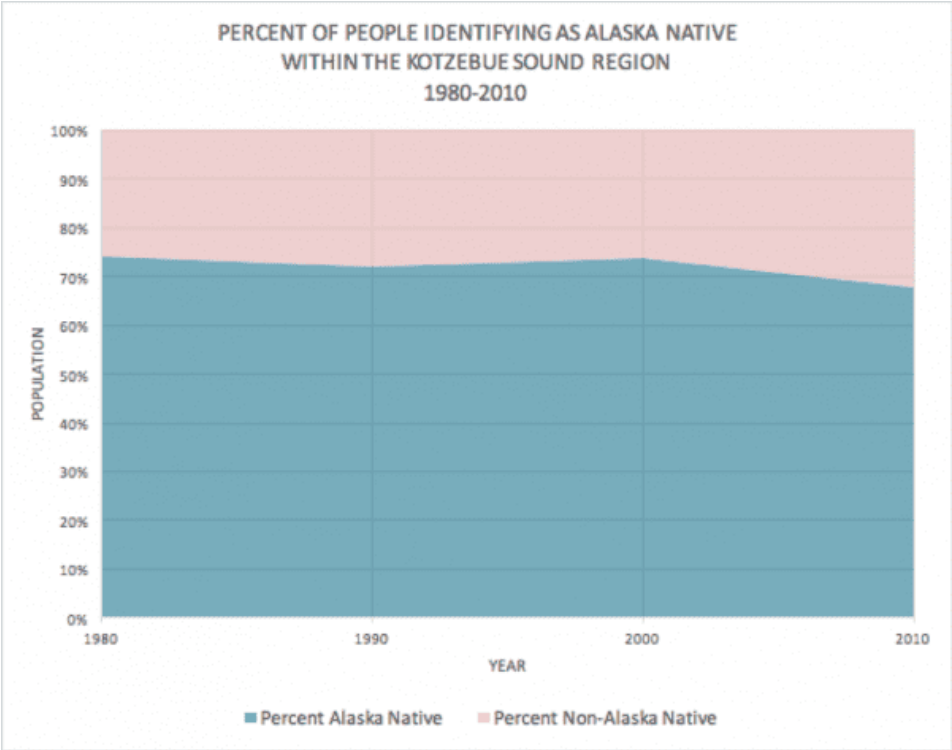
Percent change from number of initially issued (ranging from 1975-1982) permanent commercial salmon permits held by Alaska residents to number of permits in 2016 by community. Alaska Department of Fish and Game, Commercial Fisheries Entry Commission. 2017. Commercial Fisheries Entry Commission (CFEC) Public Permit Holders by Community of Residence 1975-2016. Knowledge Network for Biocomplexity. doi:10.5063/F189144V.

Chum salmon are by far the most common salmon in the region. Next in abundance are the pink salmon, followed by silver, sockeye, and king salmon. The Noatak and Kobuk Rivers and their larger tributaries are the main spawning sites for chum salmon. Pink salmon spawn in many of the smaller creeks that empty directly into Kotzebue Sound/Kobuk Lake or the lower sections of the large rivers. Where and how much spawning activity in the region actually occurs for the other three species is poorly documented. The first chum salmon of the year usually arrive along the northern coast around June 20th. Shortly thereafter and into early July a small number of king salmon are sometimes taken in subsistence nets set right off the beach of the far northwest coast of the Sound. Most of these are in the 10-30 lb. range, but occasional 40, 50 pound or even larger king salmon are taken.

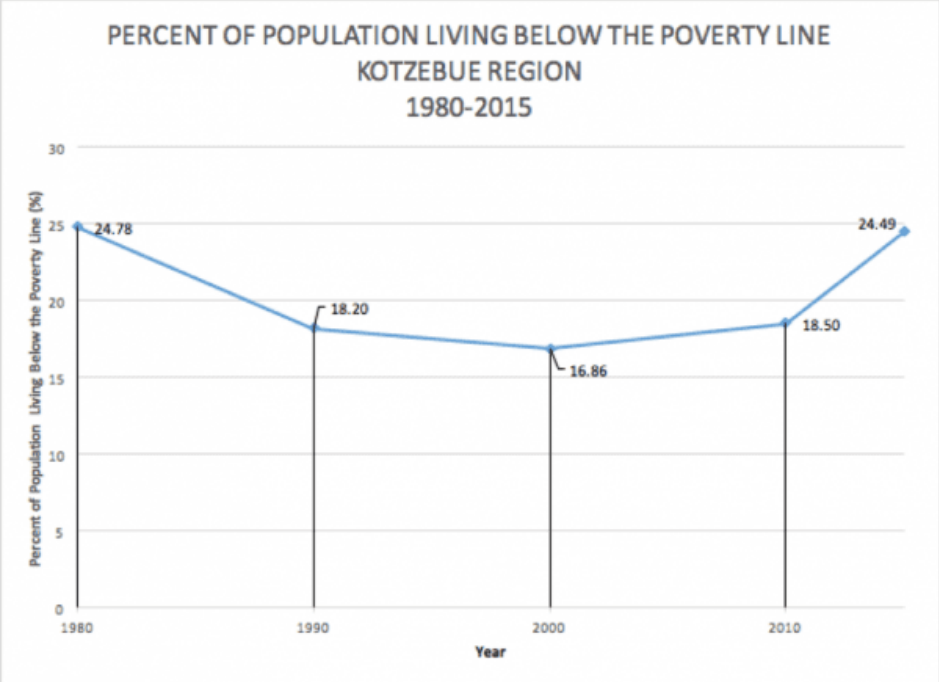
Commercial fishing for salmon begins on or soon after July 10 each year (notably, in 2002 and 2003 there were no major buyers for commercial salmon and only a small-scale commercial effort by a couple of guys catching and selling locally). During July, pink salmon in even years become somewhat abundant and a handful of king, sockeye, and silver salmon are also taken throughout July and August in the commercial fishery, with only the chum salmon being sold. In recent years the catch of king salmon has increased and 2018 was the best year for king salmon in many people's memories, with commercial fisherman averaging catches in the teens per boat for the season, instead of the single digits of most past years. Interestingly, subsistence fishing targeting sockeye and silver salmon using short gillnets set off the beaches near coastal camps occurs in the month of September on both the northern coast of Kotzebue Sound and Kobuk Lake. Although the total catches at this time are not large, averaging a dozen or two for a week or so of effort, the rarity of these species in the region, the fact that they are usually more silver in color at this time than the remaining chum salmon in these areas, and the different flavor in relation to the ubiquitous chum salmon make them worth the effort for many.



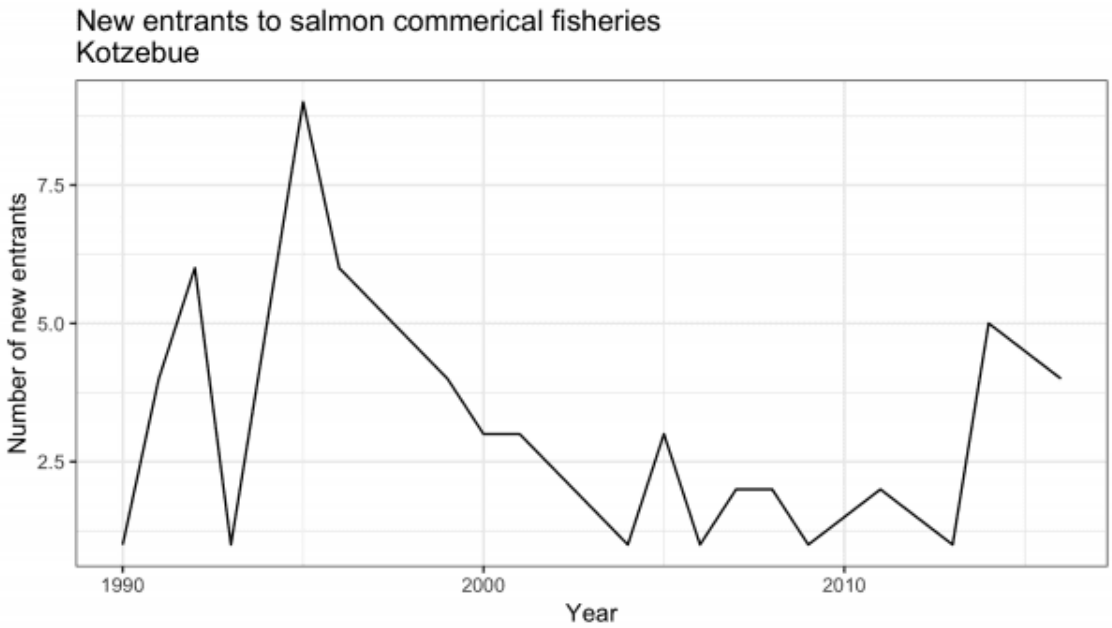
Changes in total population size of communities around the Kotzebue Sound region. United States Census Bureau, Juliet Bachtel, John Randazzo, and Erika Gavenus. 2018. Alaskan Population Demographic Information from Decennial and American Community Survey Census Data, 1940-2016. Knowledge Network for Biocomplexity.[doi:10.5063/F1XW4H3V](doi:10.5063/F1XW4H3V).



Percent of people in the Kotzebue region identifying as Alaska Native (Note: Data presented here for 2000 and 2010 represent all people identifying as Alaska Native, either alone or in combination with other ethnicities. Census questionnaires in 1980 and 1990 did not allow such distinctions.) United States Census Bureau, Juliet Bachtel, John Randazzo, and Erika Gavenus. 2018. Alaskan Population Demographic Information from Decennial and American Community Survey Census Data, 1940-2016.



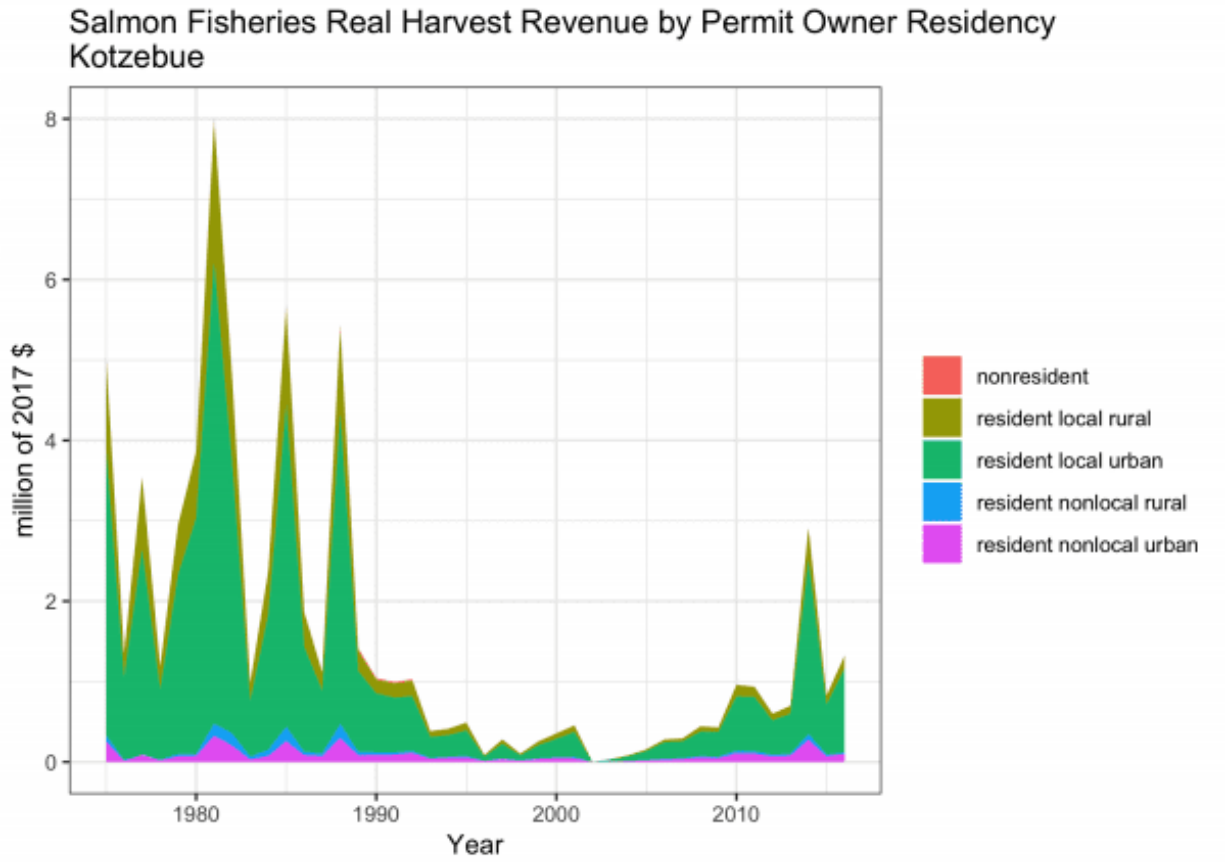
Percent of the population of the Kotzebue region living below the poverty line, 1980 - 2015. United States Census Bureau, Juliet Bachtel, John Randazzo, and Erika Gavenus. 2018. Alaskan Population Demographic Information from Decennial and American Community Survey Census Data, 1940-2016. Knowledge Network for Biocomplexity. doi:10.5063/F1XW4H3V.



*Changes in the number of new entrants into salmon commercial fisheries in the Kotzebue area. Commercial Fisheries Entry Commission CFEC and Tobias Schwoerer. 2016. Commercial Fisheries Entry Commission Public Permit Database from 1975-2016. Knowledge Network for Biocomplexity.*doi:10.5063/F1CV4G17.

Salmon and the Economy

Salmon fisheries of Kotzebue Sound have historically generated more than $65 million in revenue to harvesters since 1975 (2017 inflation-adjusted dollars). Historically, the largest revenue share went to local urban residents residing in Kotzebue, followed by much smaller shares going to local rural residents and residents from elsewhere in Alaska. The commercial salmon fishery in this region provides important cash income for local rural subsistence cash-economies, similar to other western Alaska regions. The cash earned in commercial fishing supports cultural activities including subsistence fishing and hunting. Year-by-year fishing revenues have varied the most in this region since 1975 compared to any other regions in Alaska.



Tobias Schwoerer. Regional commercial salmon permit earnings by residency status, Alaska, 1975-2016. Knowledge Network for Biocomplexity. doi:10.5063/F1WW7FZ2.

Salmon and Subsistence

State Regulatory Framework

Under state regulations, the Kotzebue District is part of the Arctic-Kotzebue Management Area. State regulations allow subsistence fishing for salmon with gillnets, beach seines, or hook and line attached to a rod or pole. A subsistence permit is not required. There are no bag or possession limits if fishing with a net or seine; bag and possession limits established for the sport fishery apply if a person is subsistence fishing with a hook and line attached to a rod or pole (5 AAC 01.100 – 136).

Although the Alaska Board of Fisheries has made a positive customary and traditional use determination for salmon in the Kotzebue District, the board has not established an ANS for these salmon stocks. This is likely due to the lack of regulatory issues regarding salmon in the district.

Federal Regulatory Framework

Federal regulations classify these waters as a separate management area (the Kotzebue Area). Federal rules are similar to state regulations, except there are no limits for rod and reel fishing. Federal subsistence fishery regulations apply on the following federal lands: the Alaska Maritime National Wildlife Refuge, Cape Krusenstern National Monument, Noatak National Preserve, Kobuk Valley National Park, Gates of the Arctic National Park and Preserve, Selawik National Wildlife Refuge, and the Bering Land Bridge National Preserve.

Subsistence Salmon Harvest Patterns

From 1994 through 2004, the Division of Subsistence of ADF&G administered post-season household surveys to estimate annual subsistence salmon harvests in the Kotzebue District. This program was terminated beginning in 2005 due to lack of funding. No annual estimates were produced until 2012-2014 when the Division of Subsistence received funding from Fisheries Resource Monitoring Program of US Fish and Wildlife Service's Office of Subsistence Management to administer harvest surveys in a selected set of district communities (Braem and Kostick in press). With this information, ADF&G developed a procedure to estimate district harvests for the intervening years (2005 through 2011), as well as for 2012 through 2016 (Fall et al. 2018:36-37).

From 1994 through 2016, the subsistence harvest of salmon in the Kotzebue District averaged 69,188 fish, with a range of 42,000 in 2003 to 109,000 in 1995 (Figure 8-1). Over this period, chum salmon comprised 93% of the total subsistence harvest, followed by coho (3%), pink (2%), sockeye (1%), and Chinook (<1%) (Figure 8-2).

Based upon the most recent comprehensive household harvest surveys, salmon make up approximately 13% of annual subsistence harvests by the residents of the local communities of the Kotzebue District (the Northwest Arctic Borough); land mammals (36%) (mostly caribou), fish other than salmon (35%) (primarily whitefish, sheefish, northern pike, and Dolly Varden), along with marine mammals (12%) make up the bulk of the subsistence harvests in this area (Figure 8-3).

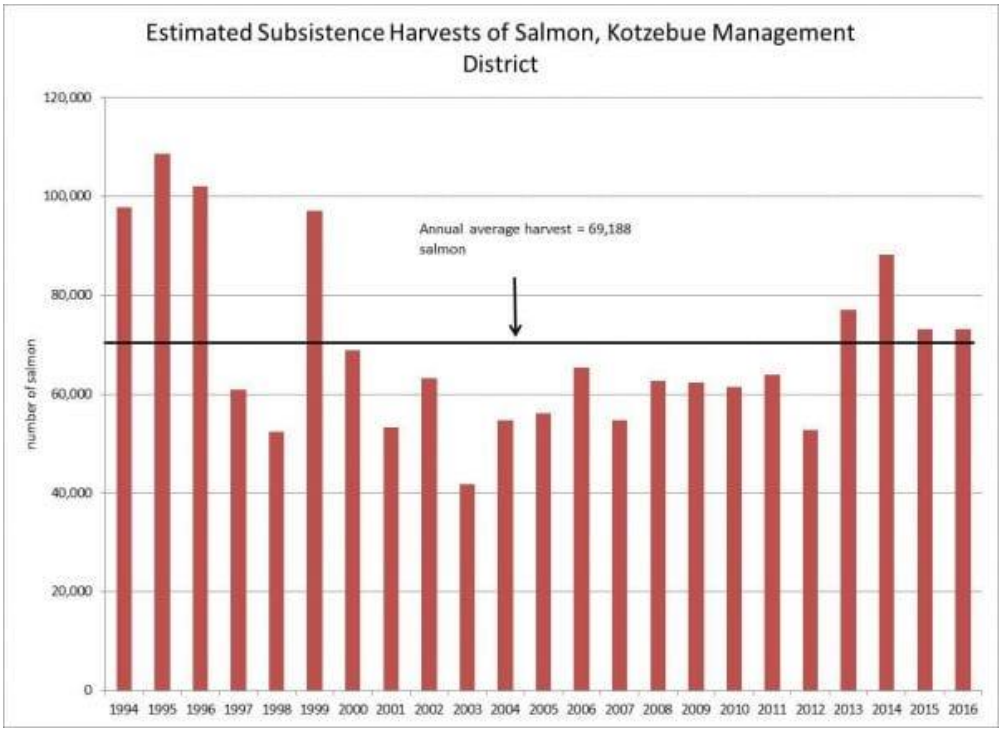


Fig. 8-1 Estimated Subsistence Harvests of Salmon, Kotzebue Management District. Alaska Department of Fish and Game, Division of Subsistence. Subsistence and personal use harvest of salmon in Alaska, 1960-2012. Knowledge Network for Biocomplexity. doi:10.5063/F18P5XTN

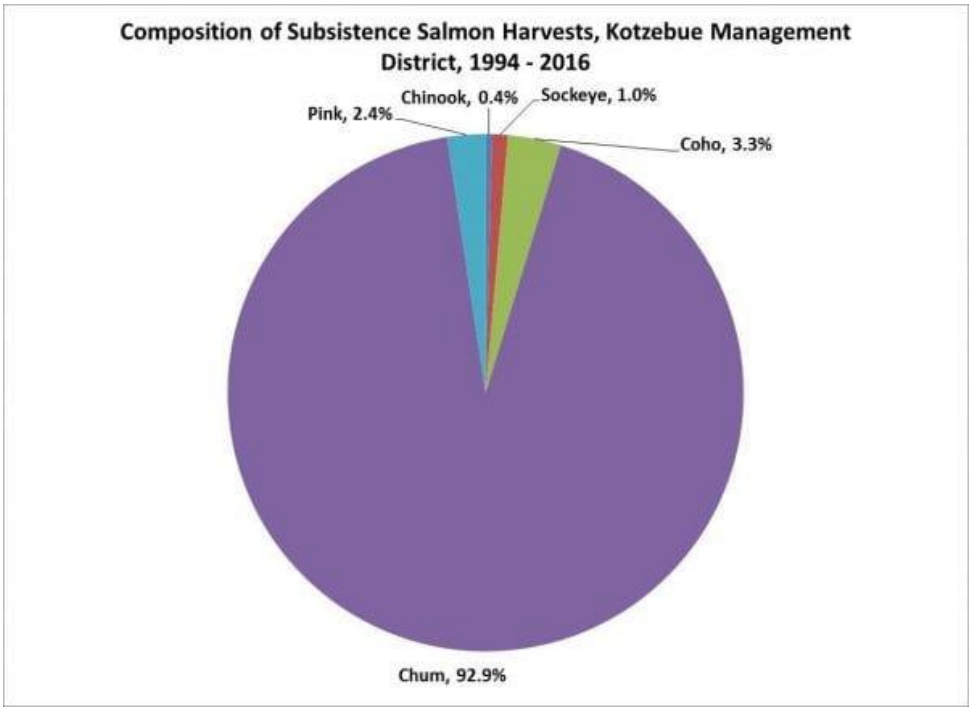


Fig. 8-2 Composition of Subsistence Salmon Harvests, Kotzebue Management District, 1994 - 2016. Alaska Department of Fish and Game, Division of Subsistence. Subsistence and personal use harvest of salmon in Alaska, 1960-2012. Knowledge Network for Biocomplexity. doi:10.5063/F18P5XTN

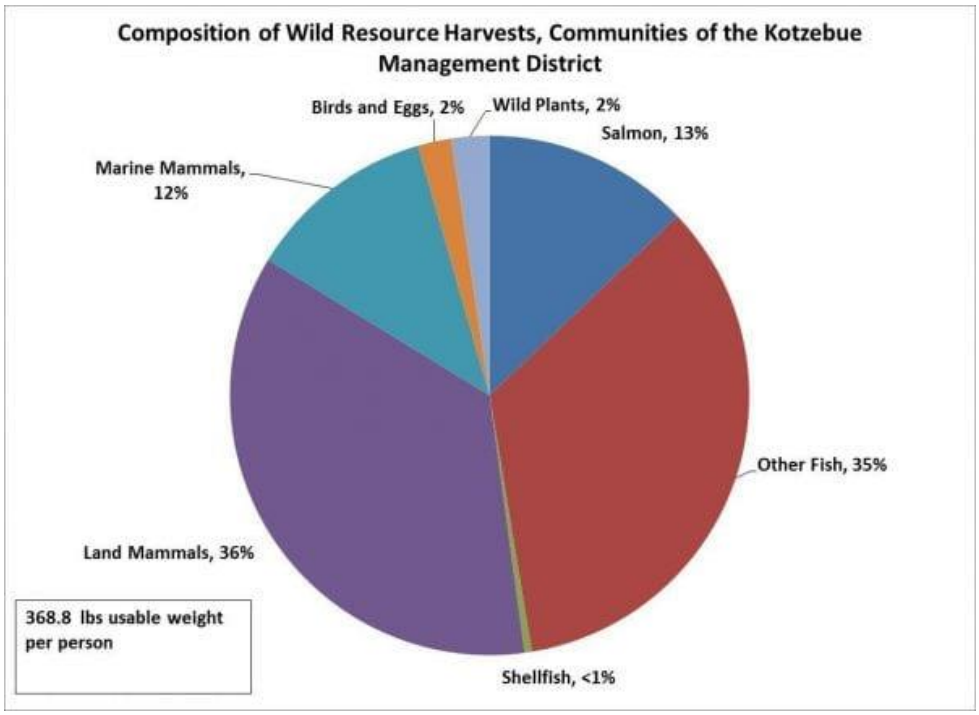


Fig. 8-3 Composition of Wild Resource Harvests, Communities in the Kotzebue Management District. Alaska Department of Fish and Game, Division of Subsistence. 2018. Subsistence harvest information by region, community, resource, and year, 1964-2015. Knowledge Network for Biocomplexity. doi:10.5063/F1S75DNC

Salmon and Governance

Salmon governance in the Kotzebue area is predominantly under state management, although significant subsistence fishing occurs on the Noatak and Kobuk rivers within federal conservation units. Salmon stocks, particularly pink salmon, are relative abundant, and very few limitations on subsistence fishing are needed. Access to processors has restrained commercial salmon fishing, primarily for chums. While state management predominates, the Kotzebue area encompasses parts of seven federal conservation units. Significant levels of subsistence fishing occur on the Noatak and Kobuk rivers, within federal conservation units like the Noatak National Preserve and the Kobuk Valley National Park, for example.

Both systems provide for subsistence fishing with a variety of gear, generally, with no seasons, and no bag or possession limits. In a minor difference, state regulations include bag and possession limits for the sport fishery and these apply to subsistence users fishing with rod and reel. Federal regulations do not apply these limits to those fishing with rod and reel. The commercial fishery for chum salmon saw a record harvest in 2018, but access to processors resulted in limitations during the season. Between 2000-2018, the Kotzebue salmon fisheries were not declared a fisheries disaster.

CASE STUDY

How We Eat Salmon

By Alex Whiting

Chum salmon predominate the catch of Kotzebue area salmon and are the most frequently eaten by far. The chum salmon found in the area are said to be qualitatively better than almost anywhere else they are found, due to the high level of oil, color (mostly bright salmon/orange) and texture of meat. They are almost all taken in gill nets adjacent to the community in brackish waters that are 50 to 100 miles or more from their upriver spawning locations. The majority are still bright silver in color and are taken a month or more from when they will spawn.

While these days salmon in the Kotzebue area are prepared for consumption in a multitude of ways like anywhere they are harvested (e.g. fried, baked, broiled), there are a number of ways salmon are prepared for eating according to local customs. One of these ways is to cut the salmon fillets keeping them attached together by the tail and score them vertically before hanging them on drying racks flesh side out (and out of the sun) for a day, or two, or three. As the salmon dries from the surface down through the meat, both the texture and flavor changes. Half-dried fish, as it is called, can be baked or roasted but it is commonly boiled and eaten with the addition of seal oil (most fish, no matter how it is prepared, is generally eaten with seal oil as a condiment). Another approach that is somewhat unique is to boil fresh salmon heads, eggs, and chopped up carcass and then eat these by taking out of the broth. The plain broth of boiled

salmon (with the addition of onions, salt and pepper) is also a favorite of local people to drink with the meal and even to drink throughout the day like tea. Adding a flour slurry to boiled salmon is also popular and termed flour soup locally. Even just boiling heads and eggs separate from the meat is a frequent preparation. The gills and lower jaw or both sets of teeth are cut off before boiling. The soft cartilage, the fat behind the eyes and the cheek meat make for a variety of flavors and textures, although it takes some mouth work to clean off all the many pieces.

Fully dried salmon fillets which are scored vertically on the meat side and connected by the tail section remaining intact so that they can be hung over wooden poles, are still regularly made and almost always eaten with seal oil after they are fully dried. The skin side is hung on the outside for the first day or two to firm the skin, before turning it around to the meat side out. This keeps the meat from falling apart and the fillets from getting wrinkled. The eggs skeins can be dried separately and eaten as is. In the later part of the run female salmon are cut and hung with the meat on one side and the fully intact belly part (which is mostly full of eggs) hanging on the other side. This can be allowed to ferment (aged) as it dries if its not freezing out, or can be hung at colder temps to make a milder product. Either way they are eaten either frozen or dried with seal oil and no further cooking.

Placing cleaned salmon heads in a gunny sack and fermenting them in grass lined ground pits (next to the permafrost and covered with moss to keep them out of the sun and heat) for a week or more until ready, was also popular in the past, but a lot fewer people do this nowadays. It was important to keep them cool and let them age slowly. The salmon heads are eaten as is with no further cooking. Salting salmon bellies in wooden barrels and putting in cold storage ground cellars to be taken out and freshened with water before cooking throughout the winter, was also ubiquitous in the past, but today most people just freeze salmon in modern freezers for winter use, although some of the Elders still try and make some salt salmon every season.

Interestingly, most of the fish found in the region, except for salmon, can be eaten fresh-frozen (that is where you freeze the freshly caught fish and eat it later as frozen slices with seal oil). In order to eat frozen salmon this way, it has to be aged first. A lengthy and more detailed understanding of the variety of methods of preparation of salmon and other fish in the region can be found in the U.S. Fish and Wildlife Service Office of Subsistence Management Fisheries Resource Monitoring Program Final Report No. FIS02-023 titled: *“Iqaluich Niġiñaqtuat, Fish That We Eat,”* by Anore Jones.

References

Braem, N.M. and M. L. Kostick, in press. Key Subsistence Fisheries in Northwest Alaska, 2012-2014. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 433. Anchorage.

Burch, E. S. (1998). The Iñupiaq Eskimo Nations of Northwest Alaska. Fairbanks, Alaska: University of Alaska Press.

Fall, James A. et al. 2018. Alaska Subsistence and Personal use Salmon Fisheries 2015 Annual Report. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 440. Anchorage.

Jenkins, D. (2015). Impacts of neoliberal policies on non-market fishing economies on the Yukon River, Alaska. Marine Policy, 61, 356–365. https://doi.org/10/gd53k7

Jones, A., & Fisheries Resource Monitoring Program (U.S.). (2006). Iqaluich nigiñaqtuat: Fish that we eat (Final ed.). Anchorage, Alaska: U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Resource Monitoring Program.

Magdanz, J. S., Smith, H., Braem, N., Fox, P., & Koster, D. S. (2011). Patterns and trends in subsistence fish harvests, Northwest Alaska, 1994-2004 (Technical Paper No. 366). Kotzebue, Alaska: Alaska Department of Fish and Game, Division of Subsistence. Retrieved from http://www.subsistence.adfg.state.ak.us/TechPap/TP%20366.pd

Magdanz, J. S., Tahbone, S., Ahmasuk, A., Koster, D. S., & Davis, B. L. (2007). Customary Trade and Barter in Fish in the Seward Peninsula Area, Alaska (Technical Paper No. 328). Juneau, Alaska: Alaska Department of Fish and Game.

Menard, J., Soong, J., Kent, S., Harlan, L., and Leon, J. (2017). 2015 Annual management report for Norton Sound, Port Clarence, and Arctic, Kotzebue Areas (Fishery Management Report No. 17-15) (p. 230). Anchorage, Alaska: Alaska Department of Fish and Game.

Sobelman, S. S. (1985). The Economics of Wild Resource Use in Shishmaref, Alaska (Technical Report No. No. 112). Fairbanks, Alaska: Alaska Department of Fish and Game.