Aquatic Life

The major species found in Alaskan waters in the undeformed region of the 1002 area are the arctic grayling and Dolly Varden. They are both quite migratory and can be found both in Alaska streams as well as the coastal waters. They are important components of the aquatic food web, providing food to animals such as bears.

Other species are found in the coastal waters offshore, such as the bowhead whale, important culturally to the Inupiats, and ringed seals, an important food source to polar bears.

Bowhead Whale
Ringed Seal
Fish

Aquatic Life - Bowhead Whale

Bowhead whales are large, robust whales that are more contoured than other whales: they have the largest head and mouth in the animal kingdom (around six feet); their upper jaws are arched forward and their blowholes are located at a peak of their crown. (Board on Environmental Studies and Toxicology (BEST), Polar Research Board (PRB), 2003)

Adult bowheads have smooth skin that is free of external parasites. Because they are black with differing amounts of white on their chins, bellies and tails, airborne researchers are able to identify individual bowheads by studying the white markings in addition to scars. At birth, bowhead whales are 14 feet long and weigh about 2000 pounds. Bowheads give birth every three to four years during spring migration. Calves grow to 26 feet during their first year, and then slow down to reach 40 feet in twenty years. Females reach sexual maturity at 41-6 feet in about 15 years. The largest recorded bowhead is about 60 feet and 120,000 pounds, and while it is unknown how old the whales are, it is estimate that they have a lifespan similar to that of humans. (Board on Environmental Studies and Toxicology (BEST), Polar Research Board (PRB), 2003)

Bowhead whales are very vocal and use underwater communication while traveling, feeding, and socializing. The most noticeable use of sound combined with playful behavior is while mating, in which the whales produce long repetitive songs and breach, tail slap and spy hop their potential mates. (Board on Environmental Studies and Toxicology (BEST), Polar Research Board (PRB), 2003)

Migration

The only bowhead whale stock that survives in significant numbers are the Bering Sea stock, and they follow a 3,600 mile migration yearly. They spend the winter in areas of open water within pack ice (polynyas) in the Bering Strait. During late March and April, bowhead moves north through the Bering strait, following cracks (leads) in the ice, sometimes breaking through ice of up to 2 feet with their hummocks to breath, and reaching Beaufort sea by mid-June. These bowhead spend the summer- from June until October- in the Beaufort Sea and swim south along the Russian coast to pass back at the Bering Strait in November. (Board on Environmental Studies and Toxicology (BEST), Polar Research Board (PRB), 2003)

Sensitivities

Sound

“The activities most likely to affect the bowhead are marine seismic exploration, exploratory drilling, ship and aircraft traffic, discharges into the water, dredging and island construction, and production drilling.” (Board on Environmental Studies and Toxicology (BEST), Polar Research Board (PRB), 2003)

Marine seismic exploration produces the loudest industrial noise because most exploring is done during summer-autumn months open water period and the bowheads and seismic boats occupy the same water. Bowheads will not come into an area within 12 miles of an operating vessel, and avoid the vessels starting at 21 miles. Bowheads also avoid drilling noises; they avoided the 1992 Kuvlum oil drilling site by 19 miles. During the 1986 open-water drilling site at Hammerhead no whales were found within 6 miles of the site; the area of avoidance seem to extend between 15 to 25 miles. The sound frequency that the whales avoided are between 105-130 dB. (Board on Environmental Studies and Toxicology (BEST), Polar Research Board (PRB), 2003)

The excess noise created by the drilling is dangerous because it might lead whales to take paths they normally would not take, for instance, a path with thicker ice. When two or more types of disturbance occurred at the same time the effects are more pronounced than when there is only one source. (Board on Environmental Studies and Toxicology (BEST), Polar Research Board (PRB), 2003)

Oil Spill

Since oil spill can't be effectively cleaned up on ice, an oil spill is regarded as the largest potential threat to bowhead whales. The whales do not avoid oil contaminated waters because they cannot detect it, and inhaling oil vapor has toxic effects on the skin, eyes, baleen (food filter) and the lining of the gastrointestinal tract of bowhead whales. Although the skin of bowheads are generally smooth, they have roughed areas in which oil can adhere. In these roughened areas, bacteria with tissue-destructive enzymes can react with the oil to harm the whale. The eye is another area that oil can severely damage. The space between the eyeball and lid is large enough to allow a human hand to pass two thirds of the way around- this large surface allows for oil to touch sensitive eye structures. In a study of the baleen, oil stuck to the filaments and affected with filtering efficiency. The baleen filaments that normally break off during feeding and enter the stomach can combine with swallowed oil to form a sticky mass. This sticky mass can block passages between a bowhead whale's four stomach chambers.

Aquatic Life - Ringed Seal

Ringed seals are most common and widespread seals in the artic, spreading in the northern Bering, Chukchi, and Beaufort seas and staying on shore ice during the winter. They are the smallest of all pinnipeds, rarely exceeding five feet and hundred fifty pounds. (Board on Environmental Studies and Toxicology (BEST), Polar Research Board (PRB), 2003)

Critical Time:

"Females give birth to single, white-coated pup in snow dens on either land or drifting ice during March and April." The mother nurse the pups in the dens for about two months; these dens are used for protection against severe weather and from predators. (Board on Environmental Studies and Toxicology (BEST), Polar Research Board (PRB), 2003)

Sensitivities

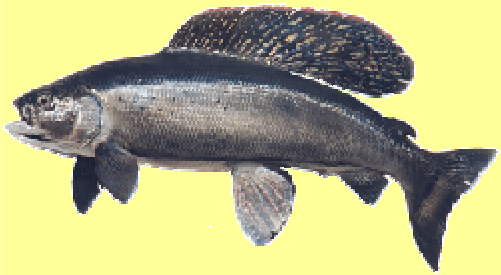
Noise:
Pinnipeds react to noise from aircraft and ocean vessels. Mothers and pups are less likely to stay in their natural dens if there is noise. Although there is no broad scale difference noticed by aerial studies in regards to ringed seal distance from industrialization, it was noted that the seals were less frequently sighted around areas with industrial noise. (Board on Environmental Studies and Toxicology (BEST), Polar Research Board (PRB), 2003) Ringed seals are more likely to abandon their breathing holes if the holes are close to seismic survey lines, lines likely to have noise due to exploration.

Oil:
Drastic consequences occur when putting mammals in oil. In an experiment, three seals were placed with a pool filled with oil. After 24 hours, the blood and tissues of the seals showed "hydrocarbons that had been incorporated through inhalation," (Board on Environmental Studies and Toxicology (BEST), Polar Research Board (PRB), 2003) resulting in liver and kidney damage. However, there has been no evidence of such effects of industrial oil on seals.

Reference:
1. Board on Environmental Studies and Toxicology (BEST), Polar Research Board (PRB). (2003). *Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope*

Fishes

Arctic Grayling



U.S. Fish and Wildlife Service
(Photo: http://www.r7.fws.gov/nwr/arctic/fish.html)

General Information

The artic grayling is one of the most abundant freshwater fish in the oil field region, and is found on all the major river systems. (Inaru River, Meade River, Topagoruk River, Chipp River, Ikpikpuk River, Colville River, Kuparuk River, Sagavanirktok River, Shaviovik River, Canning River.)

“Grayling can be highly migratory, using different streams for spawning, juvenile rearing, summer feeding, and over winter survival. Or, in other areas, they can complete their entire life without leaving a short section of stream or lake. Their tolerance of low dissolved oxygen levels allows grayling to survive the long winters in areas where many other salmons would die. With the coming of spring, grayling begin an upstream migration to spawning grounds. Like salmon, grayling faithfully return every year to the same spawning and feeding areas. Grayling spawn for the first time at an age of 4 or 5 years and a length of about 11 to 12 inches.

About one month after spring breakup, adult grayling begin their post-spawning migration to summer feeding areas. Depending on where they have spawned, the distance traveled can be up to 100 miles. By the middle of summer, grayling will segregate within a stream according to age and maturity. The older adults will be found in the upper reaches of river and stream systems, the sub-adults in the middle, and the juveniles in the lower ends. Grayling fry hatch about three weeks after spawning, and they tend to occupy the quieter waters near where they were spawned. In the early fall, grayling again begin a leisurely downstream migration to reach over wintering areas.” (Rocky Holmes, 1994)

Critical Time Periods

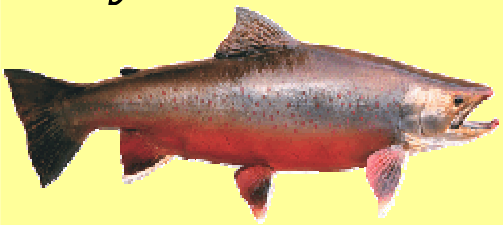
During the summer the grayling use the glacial rivers as summer migration corridors and feast on hug numbers of drifting insects; they need this energy to survive the frozen and foodless months of winter.

During the winter streams are largely emptied of the artic grayling, and in fact of most fish. The lack of circulating oxygen in the frozen over streams makes it difficult for the fishes to breathe. The best time to build anything would be during winter.

Sensitivities/Proposal

“The distribution of artic grayling has expanded because of habitat alterations in the oil field region. Large deep gravel pits excavated to meet the needs for oil field construction material have filled with water after abandonment and formed large artificial lakes that provide abundant wintering habitat.
The populations of arctic grayling were reduced in the surrounding streams when pipelines and oil fields were first developed in Alaska. The culverts in the roads were of the wrong size, blocking upstream spawning migrations; this problem can be prevented by using smaller culverts and designing culverts based on grayling swimming performance.” (Rocky Holmes, 1994)

Dolly Varden



U.S. Fish and Wildlife Service
(Photo: http://www.r7.fws.gov/nwr/arctic/fish.html)

General Information

“Two basic forms of Dolly Varden occur in Alaska waters and both are common in all local coastal waters. The southern form ranges from lower Southeast Alaska to the tip of the Aleutian Chain, and the northern form is distributed on the north slope drainages of the Aleutian Range northward along Alaska’s coast to the Canada border. Anadromous and freshwater resident varieties of both forms exist with lake, river, and dwarf populations being found among the freshwater residents.

Young Dolly Vardens rear in streams before beginning their first migration to sea. During this rearing period, their growth is slow, a fact which may be attributed to their somewhat inactive habits. Young Dolly Varden often remain on the bottom, hidden from view under stones and logs, or in undercut areas along the stream bank, and appear to select most of their food from the stream bottom.

Most Dolly Varden migrate to sea in their third or fourth year, but some wait as long as their sixth year. At this time, they are about 5 inches long and are called smolt. This migration usually occurs in May or June, although significant but smaller numbers have been recorded migrating to sea in September and October. Once at sea, they begin a fascinating pattern of migration.

After their first seaward migration, Dolly Varden usually spend the rest of their lives wintering in and migrating to and from fresh water. Southern form Dolly Varden over winter in lakes, while most northern Dolly Varden over winter in rivers. Those hatched and reared in a lake system carry on annual feeding migrations to sea, returning to a lake or river each year for the winter. However, southern Dolly Varden originating from nonlake systems must seek a lake in which to winter. Recent research indicates that they find lakes by random searching, migrating from one stream system to another until they find one with a lake. Once a lake is found, these fish

may also conduct annual seaward migration in the spring, sometimes entering other stream systems in their search for food.

At maturity, Dolly Varden return to spawn in the stream from which they originated. The fish possesses the ability to find their “home” stream without randomly searching, as was the case in their original search for a wintering area. Those of the southern form that survive the rigors of spawning return to the lake shortly thereafter, while northern form Dolly Varden usually overwinter in the river system in which they have spawned.” (Dennis Hubartt, 1994)

Critical Time Periods/ Sensitivities

“Dolly Varden spawn in streams, usually during the fall from mid-August to November. The female, depending on her size, may deposit from 600 to 6,000 eggs (2,500 to 10,000 in the northern form) in depressions, or redds, which she constructs in the streambed gravel by digging with her tail fin. The male usually takes no part in these nest building activities and spends most of his time fighting and chasing other males. When the female is ready to deposit her eggs, the male moves to her side and spawning begins. Sperm and eggs are released simultaneously into the redd.

The eggs develop slowly in the cold water temperatures usually present during the incubation period. Hatching of the eggs may occur in March, four to five months after fertilization. After hatching, the young Dolly Varden obtain food from their yolk sac and usually do not emerge from the gravel until this food source is used. Emergence usually occurs in April or May for the southern form and in June for the northern form.” (Dennis Hubartt, 1994)

Reference:

1. Holmes, Rocky. (1994). http://www.adfg.state.ak.us/pubs/notebook/fish/grayling.php
2. Hubartt, Dennis. (1994). http://www.adfg.state.ak.us/pubs/notebook/fish/dolly_v.php