

Alaska Blackfish



Alaska blackfish (*Dallia pectoralis*) are found only in Alaska and eastern Siberia. They typically live in the densely vegetated areas of lowland swamps, ponds, rivers, and lakes. They are rather sluggish, bottom-dwelling fish that use their large pectoral fins to paddle slowly about the vegetation in search of food. Once a prey organism is spotted, they capture it with a quick dart, much like a northern pike.

General description: Alaska blackfish are small, seldom longer than 8 inches (200 mm), although individuals up to 13 inches (330 mm) have been found. They are distinguishable from other fish by their large paddle-like pectoral (lower front) fins and tail, tiny ventral (lower middle) fins, backward placement of their dorsal (upper) and anal fins, and rather broad, flat heads. Their color is dark green or brownish on the upper sides and pale below, with irregular blotchy areas on their side. Mature males can be distinguished from females by the presence of a reddish fringe along the dorsal, caudal (tail), and anal fins. Also, in mature males the tips of the ventral fins extend well beyond the front of the anal fin, whereas in females they do not.

Life history and habits: Spawning occurs from May to August, with the possibility of individual fish spawning several times and females releasing only a portion of their eggs each time. Depending on her size, a female may release a total of 40 to 300 eggs at intervals throughout the entire spawning period. The eggs adhere to the heavy vegetation and hatch in a short time (about nine days at 54°F). The young are tiny at hatching (about 6 mm), and, depending on water temperature, live off their yolk sacs for about ten days.

Rate of growth varies throughout Alaska. Blackfish from the Interior and Anchorage area are about 2.5 inches (108 mm) at age 2, 5.5 inches (138 mm) at age 3, and 7 inches (178 mm) at age 4. In contrast, Alaska blackfish from the Bristol Bay region are much slower growing and longer lived. Four-year-old fish are only about 2.5 inches in length, but they live up to eight years. One study found that female blackfish first reach sexual maturity at a length of about 80 mm.

The Alaska blackfish are unique because they have a modified esophagus capable of gas absorption, meaning they can exist off atmospheric oxygen. The existence of an air-breathing fish in arctic regions at first seems unlikely as most oxygen problems in the water would be expected to occur in winter—a time when air breathing would not appear to be of any advantage because of the ice cover. However, this capability allows these little fish to live in the small stagnant tundra or muskeg pools that are almost devoid of oxygen in summer and also to survive in the moist tundra mosses during extended dry periods while waiting for rain to fill the tundra pools again.

Food habits: Aquatic insects and other small invertebrates are the principal foods of most blackfish. However, in Bristol Bay the larger blackfish are cannibalistic and feed on their own kind; they also eat small, young-of-the-year northern pike.

Uses: Depending on one's viewpoint, the blackfish may be beneficial or detrimental. For example, in some areas of Alaska the blackfish are a major prey item for northern pike, therefore a benefit. Burbot, sheefish, river otter, mink, and loons also feed on blackfish. However, accidental or illegal introductions of blackfish, such as has occurred in the Anchorage area, may result in competition for food with important sport fish. Furthermore, blackfish introductions into stocked rainbow lakes may result in reduced growth and survival of rainbow trout.

One use of blackfish, however, is as food for man. Alaska Natives have used blackfish extensively for food. In many areas of Alaska the fish are still used as food for humans and dogs. Their great abundance and ease of capture make the Alaska blackfish excellent subsistence fish, especially when other food supplies may be less available. What makes these fish so easy to capture? In winter, Alaska blackfish have moved out of their tundra pool habitats and reside in the deeper portions of lakes, where oxygen is more abundant. However, in many of these waters, oxygen may become depleted, especially toward late winter or early spring. This stresses the blackfish, and their natural tendency is to seek open water areas and atmospheric oxygen. Hence, in known blackfish lakes Native people find holes where the blackfish come up to breathe, or they cut a hole in the ice. The fish will concentrate in the vicinity of these holes in large numbers, making them easy to capture with a rather simple funnel-shaped trap made from strips of tamarack, spruce, or small-mesh galvanized hardware cloth. In spring and fall blackfish are also easily caught while migrating to and from their summer habitat by placing the traps in narrow channels. The best blackfish lakes are reported to be those with the most otter and mink sign (they no doubt provide good food for the animals as well as for man). Many people who regularly harvest blackfish claim they are always extremely abundant, with no indication of depletion, despite years of use.

Since the blackfish can live off atmospheric oxygen, they are very hardy. Some Natives keep large numbers alive in a tub of water and use them as needed. Others cover them with snow, which often results in some of the fish moving towards the center, where the water is not frozen, to remain alive for extended periods. This ability has caused reports that Alaska blackfish can withstand becoming completely frozen. However, controlled experiments have shown this to be untrue. Even partial freezing of their bodies results in eventual death.

Alaska blackfish are certainly one of the most fascinating fishes in Alaska. Only one other species of fish in the world is known to have modified its esophagus for respiratory purposes, and that is a tropical swamp eel. One author believed the Alaska blackfish represented a prime example of an end-product of evolution in mutation and natural selection that results in the establishment of a species well-adapted to a limited environment.

Text: Robert H. Armstrong Illustration: ADF&G Staff Revised and reprinted 1994

The Alaska Blackfish

By Nancy Sisinyak



The hardy Alaska blackfish, a small but tough resident of Interior Alaska waters.
Photo by Nancy Sisinyak.

The Alaska blackfish looks like an overweight bulldog with fins. A severe underbite imparts a serious frown on this reclusive throwback to the dark ages. It would not be difficult to picture the little blackfish as a prime player in the evolutionary segment of Disney's *Fantasia*, attempting to drag itself out of the primordial soup, but not quite succeeding.

If the blackfish at one time really did attempt to exit the confines of the murky depths of our lakes, it did not fail its task completely. The bottom-dwelling Alaska blackfish is one of the few species of fish in the world that are able to breathe air using a modified esophagus. This trait comes in handy for the blackfish that inhabit tundra pools and seasonal ponds which, during times of low precipitation, can morph into muck puddles. As long as the blackfish can wriggle down into that anoxic, smelly sludge and keep its skin from drying out, it can gulp air until the next rain fills its pond and oxygenates its water.

Along with the ability to "breathe" atmospheric oxygen, the blackfish can also survive in waters with very low dissolved oxygen levels. This helps the blackfish survive winters under the ice in Interior, Northern & Western Alaska's lakes, ponds and sloughs. As winter drones on, the dissolved oxygen levels under the ice diminishes. Most fish at this time become inactive, conserving energy and reducing their metabolic rate. This time of winter, just before ice-out, is critical in a fish's life. They are just trying to survive until the ice cap pulls away from the lake shore and allows oxygen to once again diffuse into their realm, bringing the promise of continued life. The Alaska blackfish, however, can tolerate much lower concentrations of dissolved oxygen than the other fish in the lake.

If the opportunity presents itself, however, the blackfish will head to the surface for a few gulps of atmospheric oxygen. Holes in the ice in the middle of winter are sometimes hard to come by, but this is where an unlikely, nearly symbiotic relationship is formed between the blackfish and the muskrat. It is the fortunate blackfish that lives in a lake with resident muskrats. Muskrats construct “pushups” which are winter stores of food above the ice, but over a hole in the ice. Besides a place to feed, muskrats use these pushups as breathing stations. When dissolved oxygen levels are very low in the lake, the Alaska blackfish gather at these muskrat pushups to gulp air. Blackfish are also credited with helping to keep these breathing holes open by getting together in mass and churning the water beneath the holes. The movement of the water deters ice from forming, and even erodes existing ice, keeping access open to the life-saving air for both blackfish and muskrat. In lakes where no muskrat reside, the blackfish may find areas of thin ice and churn the water beneath in an attempt to open the ice to the air.

This ability, which contributes to the blackfish’s winter survivability, can also lead to its demise. The blackfish is a winter subsistence fish. Though not relied upon as heavily as in days gone by, the Alaska blackfish is still harvested by some village residents and used as food for themselves and their dogs.

Villagers harvest Alaska blackfish by drilling a hole in the ice and setting a cone-shaped trap in the hole. When the blackfish come up for air, they cannot find their way out of the trap. Hundreds of blackfish can be harvested in one good trap set. The blackfish can be kept alive in washtubs or simply frozen courtesy of Mother Nature.

Within the aquaria at the Fairbanks Alaska Department of Fish and Game Information Center live a number of Alaska blackfish. More than one Alaska Native elder visiting the information center has commented that if you thaw a blackfish after it has been frozen it will “come back to life.” One elder collapsed into spasms of giggles as she relayed a story from her youth. Once as a young girl she was feeding the family dogs by tossing them frozen blackfish. A few minutes later, much to her surprise (and repulsion) one of the dogs threw up and a thawed and very much alive blackfish wriggled on the ground.

Debate continues as to whether the Alaska blackfish can survive total freezing or partial freezing, for how long and at what temperatures. Surprisingly, there are very few studies in scientific journals that focus on the blackfish. Little is known about their life history and physiology. Given the abilities of the wood frog and the Arctic ground squirrel to survive at sub-freezing body temperatures, I don’t doubt that the Alaska blackfish has the ability to do so. Maybe some hungry grad student may decide that the case of the frozen blackfish is worthy of further investigation. Until then the debate will continue as to how much of the stories are fact and how much are folk lore.

Nancy Sisinyak is the Sport Fish Information Officer for Region III and lives in Fairbanks. For more information on Alaska blackfish see the ADF&G Wildlife Notebook Series.

Alaska Blackfish

(Dallis pectoralis)



The Alaska blackfish is distributed throughout eastern Siberia and most of western Alaska. Alaska blackfish inhabit lowland weed-choked ponds, lakes, and sloughs of the Togiak National Wildlife Refuge.

Alaska blackfish have an elongated body shape with a flattened round snout. Cryptic in color, they can vary from dark green to brown with irregular bands on the sides. Alaska blackfish rarely exceed 8 inches in length, although specimens have been collected up to 12.8 inches in length in Alaska.

Alaska blackfish feed on a variety of prey items including zooplankton, insects, and small fish. Larger fish are known to be opportunistically cannibalistic. The Alaska blackfish is prey for many predators, such as northern pike, other Alaska blackfish, birds, and man.

The life history of Alaska blackfish is not well studied, but it is thought that they spawn in spring and summer throughout southwest Alaska. Adults spawn in the quiet streams and ponds, scattering fertilized eggs on the vegetation. The eggs hatch in about two weeks and young probably get nutrients from their yolk sac for a couple of weeks.

Growth can be rapid during the first year depending on food availability and water temperature. Little is known about the migratory behavior of Alaska blackfish, but it is assumed that short movements occur between spawning and feeding areas.

Alaska blackfish are known for their ability to withstand the harsh conditions found in the shallow ponds and lakes of Alaska. Tales are told of the Alaska blackfish's amazing ability to survive freezing; however, total freezing will result in death. They can withstand partial freezing of some body parts, including the head. Alaska blackfish can also endure water devoid of oxygen at 0°C for up to 24 hours. Its tolerance to low oxygen, ability to withstand near-freezing conditions, and varied diet allow the Alaska blackfish to outcompete other fish in many areas.

Resources

- Morrow, James E. 1980. The freshwater fishes of Alaska. Alaska Northwest Publishing Company. Anchorage Alaska.