

Appendix

FISH HABITAT IN ALASKA

Water as Environment

Alaska contains over half of the fresh water in the entire United States. This water is held in lakes, rivers, streams, and glaciers. Alaska has more coastline than all of the other states combined and more than half of the wetlands remaining in the United States. Water is so common to Alaskans that we take it for granted, yet it is essential to life.

Water covers over 70 percent of the earth's surface. Over 97 percent of this water is found in the oceans as salt water. Fresh water only accounts for about three percent of the earth's water. Two-thirds of this is held in glaciers and the polar icecaps. Less than 1 percent of the world's water occurs as ground or surface fresh water.

The water cycle is how fresh water is returned to the land from the sea. Our fresh water comes from the Pacific Ocean. Water evaporates from the surface of the ocean and creates clouds and storms. Winds carry these storms over Alaska. Clouds drop the moisture as rain or snow. The water may be held in a watershed for some time. Eventually the water finds its way back to the sea, and the cycle of evaporation, condensation, precipitation, and flow is repeated.

In many parts of Alaska, such as the Interior, this cycle can take many years. Rain in the Interior may run off to creeks and rivers quickly, or slowly filter through muskegs and black spruce forests. Water may also be held for decades in the form of permafrost only to be released when wildfire opens the ground to the heating of the summer sun.

In contrast, in Southeast Alaska the water cycle can take just a few days to complete. Coastal rivers are steep and soils are shallow. Rains pulse through the panhandle and flush water into the sea quickly. The shortness of the water cycle along much of coastal Alaska actually helps define the climate as a temperate rainforest. This type of coastal forest is dependent upon high annual rainfall for continued health. Without the influence of the rain, the dynamic system of life from the mountains to the sea could not exist.

Where Alaska's Fish Live

Fish habitat is the place where a fish lives. To be good fish habitat, a water body must have clean, unpolluted water. The water must also be the right temperature, the correct depth, and have the right amount of current for the species of fish. Good habitat must provide food and shelter. At different stages in their life-cycle, fish also need specialized habitat for feeding, migration, spawning, or rearing. Habitat needs also change as fish grow.

Most types of salmon lay their eggs in gravel of a certain size and shape. The eggs will survive only if the water flowing over and around them provides sufficient oxygen. Also, the spawning gravel must not be disturbed.

Once the fish breaks out of the egg, it remains in the gravel until it has completely absorbed the egg sac. After it swims up through the gravel, the young of most salmon species still require clean, fresh water and protection. They also need food.

In much of Alaska, marshes and wetlands provide excellent protection and good sources of food. Tiny streams with undercut banks, overhanging brush, and sunken rootages or logs are very important to young fish. Like wetlands, these tiny streams are among the most important fish habitat in Alaska. When salmon outmigrate to the sea, they remain in the intertidal or estuary area for a period of time. This allows the fish to adapt to life in salt water.

Research by fisheries biologists has shown that young fish rely upon all of these habitats at different times in their early years. In the Kenai River, young king salmon rely on slow water found along the banks to migrate between the lower river where they feed during the summer and the upper river where they overwinter. If the natural bank vegetation that slows the river's flow is heavily impacted, then the number of young fish able to successfully travel back upriver during the fall will be reduced. The habitat needs of adult salmon are different from those of young fish. Salmon spend much of their lives feeding in the open ocean. In order for adult salmon to return to their watershed to spawn, the rivers and streams along the way must not be blocked. Once a salmon reaches its spawning beds, the gravel must be clean and free of debris if the next generation of salmon is to survive. When their fragile eggs are laid in redds and covered, all Pacific salmon die. Other anadromous fish, such as steelhead trout, Dolly Varden char, or some sheefish, may return to the sea and survive to spawn again.

Even in death, salmon play an important role in the health of the watershed. They provide food for birds, bears and a host of other animals, and salmon carcasses also provide essential nutrients to the stream. Without carcasses the watershed would not be as productive and the habitat could eventually degrade and not support future generations of salmon.

People tend to think that only the water that they see adult fish in is important to fish. Actually, good habitat, and clean water is critical at all stages of a fish's life cycle.

Human Impacts on Fish Habitat

Many major development projects are completed without having adverse impacts on Alaska's fish and game. With proper engineering and attention to the environment during construction, we can improve roads, build homes, and develop business, while protecting, and even improving, the habitat for our wildlife resources. But when people are careless about the environment they can do great harm.

People usually do not destroy fish habitat on purpose. They often do so accidentally or without knowing better. There are many ways to damage fish habitat. Sometimes it is done on a large scale. At other times, the activities of individuals can seriously impact fish habitat.

Potential Impacts

Improper siting or construction of bridges, dikes, and culverts can funnel water flow in a stream or river. If not properly installed, these structures can increase water speed so much that fish cannot get upstream. Culverts perched above the level of the stream bed can also prevent fish migration upstream.

Construction projects that remove or reroute large amounts of water or gravel can severely damage fish habitat. Rerouting a stream can create pools in which fish get stranded and die. If properly done, most human activities can have little impact, enhance, or create needed habitat for fish.

Another activity that can affect fish survival is the removal of natural vegetation from stream banks. The result is loss of cover and food for fish. In forested areas, clear-cutting all of the trees from the banks removes the source of logs which fall into the stream and exposes the stream to extremes of heat and cold. This is why logging set backs, that require leaving unlogged buffer areas along salmon streams, are required in Alaska. As soils are exposed following logging, runoff may cause fine soil to clog spawning gravel.

Projects that dump tailings, bark, dirt, or other materials into watersheds can cover or block important habitat. Some large earth-moving activities, such as placer mining and gravel extraction, can have many impacts on streams. Regulations are in place to make certain that these important economic activities are performed in such a manner that salmon habitat is protected.

Pickup trucks and ATVs driven in streams can kill buried eggs. Forging a stream with a pickup truck may create deep ruts that block fish passage when water levels drop. Also, the tire tracks left by ATVs in wetlands can fill with water and strand spawning fish.

Even too much foot traffic along streams can eliminate good fish habitat. Examples of this can be found in many places along the Kenai River. There, and along other Alaska rivers, a series of factors which include high numbers of people walking the banks, wakes from powerboats, destruction of streamside vegetation, and urban development have destroyed some of the undercut banks and structures that young fish use to hide and rest. Fish need cover to hide, and they need water flows appropriate to their size and species. Anglers who break down banks or property owners who remove natural vegetation, impact both cover and flow and may seriously degrade good fish habitat.

High speed boat traffic can also be a problem. Wakes from boats may degrade fish habitat by eroding banks and washing sediment into rivers. Sediment in the water makes it hard for fish to find their food. Over time, it can bury and kill eggs, and can even injure fish's gills. Sediment also causes turbidity which may reduce the amount of light available to plants and reduce food production in the stream.

Dumping household materials into drains or pouring waste oil into ditches also are significant sources of pollution. In fact, home owners who use too much fertilizer on their lawns or remove natural vegetation along stream banks may be contributing to fish habitat destruction.