SHARING THE EDGE

Copper River Landowner's Guide

for Site Development & Fish Habitat Protection

Compiled by:
The Copper River Watershed Project

April 2005

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The Copper River Watershed Project is a community-based, non-profit organization with members throughout the Copper River drainage. Our mission is to provide residents with a forum to consider and implement innovative approaches for achieving balance between a diverse economy and healthy ecosystems while maintaining our quality of life and our cultural heritage. Careful development along streams and lakes is one way we can work toward an economically vibrant and ecologically sound place to live.

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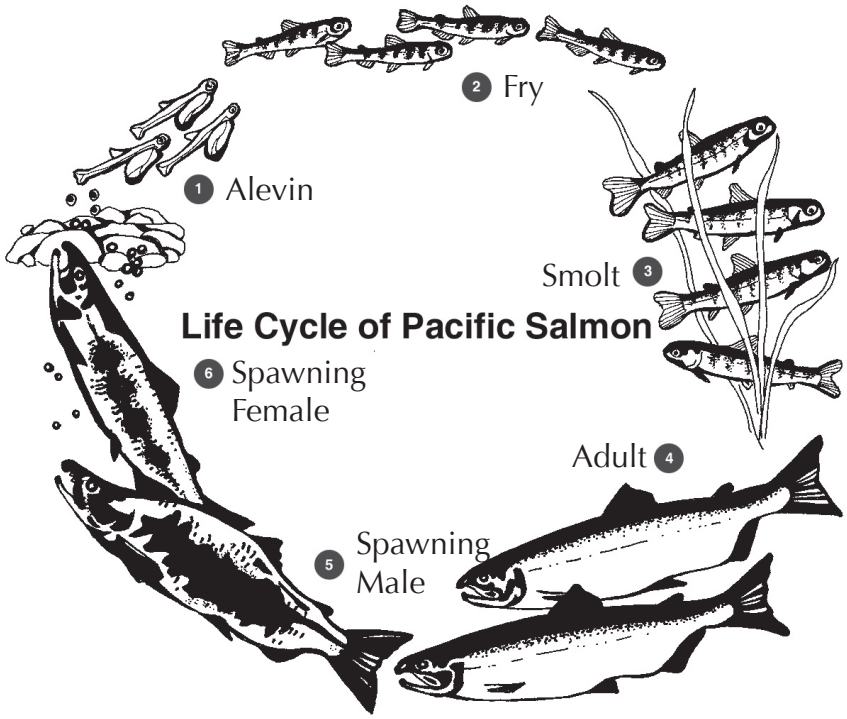
THE WATER'S EDGE DRAWS US ALL - people fish, and wildlife. This guide is a reference for people like yourself - landowners, contractors, and residents – to make informed decisions as you develop your stream and lake shore property. The Landowner's Guide introduces fish-friendly construction methods and provides an overview of the water and land permitting process. The goal is to help you design improvements that are sensitive to the habitat needs of native fish and will also enhance the value of your property. We have identified inexpensive measures for erosion control, revegetation and other techniques as well as sources for materials.

The rivers, streams, and lakes of the Copper River watershed are important habitat for salmon and other native fish. Commercial, subsistence, and sportfishing are critical economic activities throughout the watershed, and protecting fish habitat ensures a future bounty of fish for all watershed residents.



THE LIFE CYCLE OF PACIFIC SALMON begins in summer or fall, when the adult females dig nests in the gravel beds of freshwater streams, rivers, and lakes. Eggs incubate through the winter, hatching in early spring. Juvenile salmon either rear in freshwater bodies or journey immediately to the sea after hatching. The salmon then spend anywhere from one to seven years in the ocean before navigating through freshwater migration corridors and returning to their birth stream to spawn. Salmon occupy many distinct habitat niches during their life cycle.

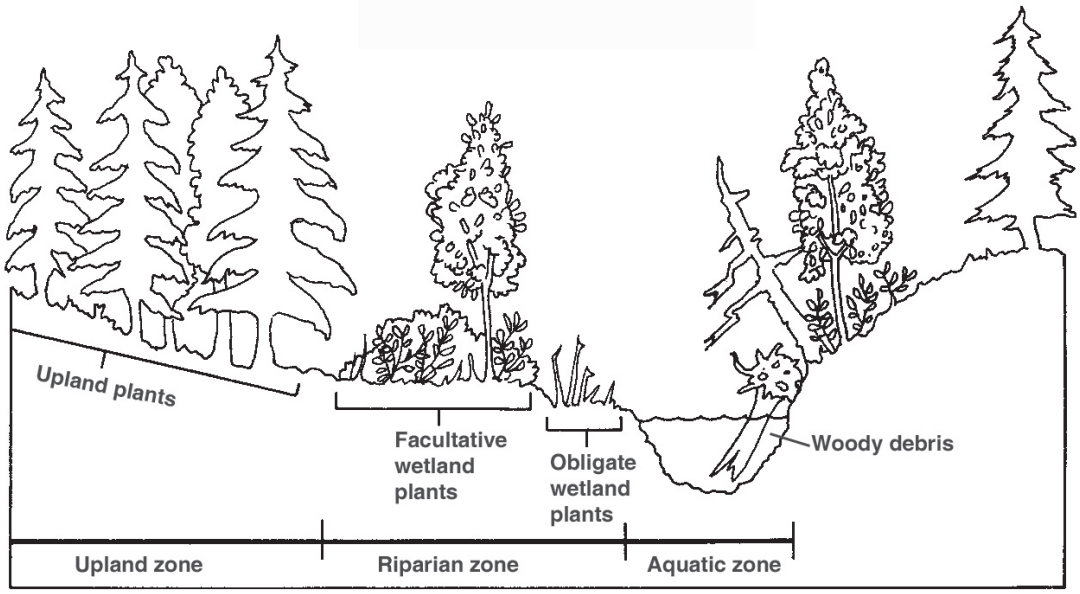
The location of spawning and rearing habitat for Pacific Salmon varies by species. All species, however, share a set of basic habitat requirements for both spawning and rearing. These include:

- Open migration corridors between the ocean and spawning grounds
- Accessible, exposed gravel substrate for spawning
- Cold water (40-65° F)
- Aquatic insects, zooplankton, crustraceans and aquatic invertebrates are an important food source for juvenile salmon (first 1-3 years of life)
- Clear, free-flowing water, necessary to supply oxygen and sweep away waste from eggs and keep the gills of juveniles and adults working
- Adequate dissolved oxygen (at least 5 parts per million)

Anadromous forms of Dolly Varden and cutthroat trout are also present in the Copper River basin. Resident fish are typically present in anadromous streams and in many streams that do not provide habitat for anadromous species.

RIPARIAN AREAS are the edge between aquatic and terrestrial ecosystems. The unique qualities of riparian vegetation make these areas highly productive for wildlife both on land and in the water. The availability of food, transportation, and aesthetic values make riparian areas desirable for human settlement. It has been estimated that 66% of riparian areas in the U.S. have been affected by development activities, with the majority of these cases involving conversion to farmland. In Alaska, agricultural conversion poses much less risk to riparian areas than construction, property development, and stream crossings.

HEALTHY RIPARIAN HABITAT



How can development affect fish habitat?

Clearing Stream-Bank Vegetation:

- Destabilizes bank soil, contributing to sediment load, reducing intergravel flow where eggs are buried, and altering the course and form of the stream.
- Alters water temperature; overhanging vegetation creates microhabitats for salmon with water 7-12° F cooler than stream sections exposed to the sun.
- Reduces the plant detritus available as food for aquatic insects and harms insect populations – aquatic insects and invertebrates are the primary food source for juvenile salmon and resident fish.

Buildings in riparian areas:

- Reduce infiltration of water into the soil and water table, increasing the volume of surface flow and sweeping sediment and other materials into the stream.
- Compact the soil, damaging soil structure and affecting subsurface water flow.
- Increase the load (weight) on the slope and shear stress, accelerating bank failure.
- Can cause nutrient loading, algal blooms, and reduced dissolved oxygen in the stream from diffusion and subsurface downstream flow of septic field liquids.
- Increase possibility of need for stream protection; stabilization most often leads to hardening (e.g., rip-rap).

Rip-rap and artificial bank stabilization:

- Confine the stream channel and eliminate meanders and pools, important habitats for juvenile salmon.
- Reduce natural riparian vegetation.
- May overstabilize the stream-bank, interfering with the natural evolution of the stream course.
- Changes water flow patterns both upstream and downstream of site

Site construction work can:

- Break up soil, freeing soil particles to be swept into streams and dumping sediment on spawning areas.
- Crush salmon eggs and fry if human or vehicle traffic enters the streambed at spawning sites.
- Cause loss of root mass
- Lead to planting of non-native plants that are unsuitable for a riparian area.

PART I: EROSION AND SEDIMENT CONTROL

PURPOSE:

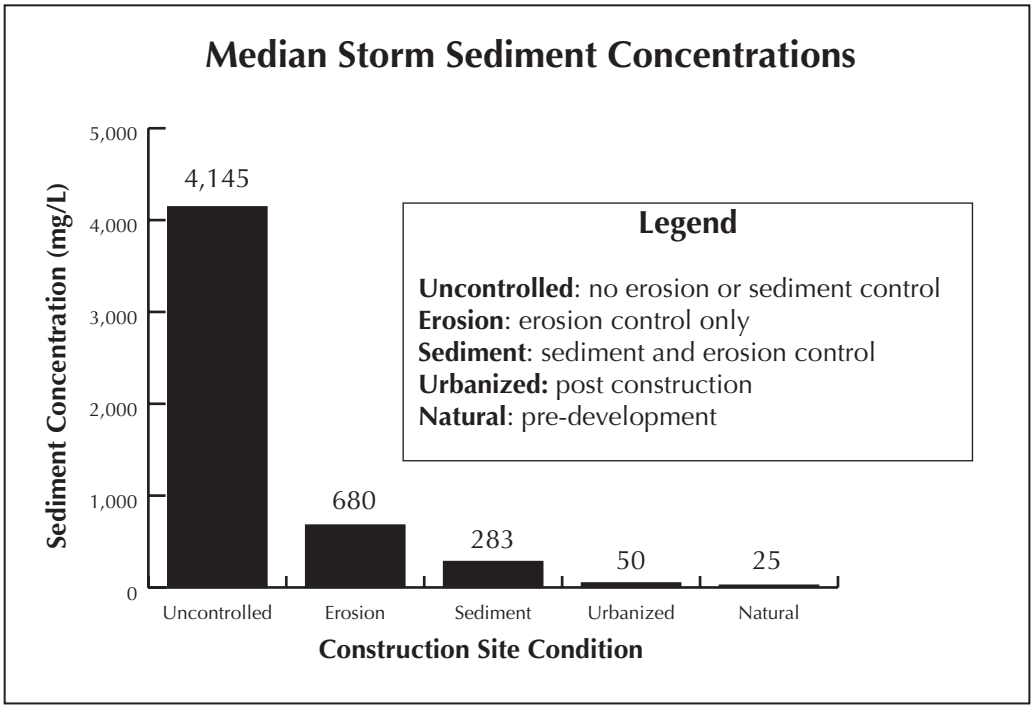
Erosion and sediment controls are used during construction to prevent the transport of sediment from entering fish-bearing streams, lakes, and wetlands. Erosion rates associated with uncontrolled construction sites are often a thousand or more times that of undeveloped land.

Erosion rates increase during construction due to the removal of soil cover, alteration of soil characteristics, and changes in site topography. The accelerated deposition of sediment into nearby streams and lakes can damage fish habitat by interfering with fish rearing, feeding, migration and spawning.

Erosion control prevents rain and wind from capturing exposed sediment as runoff. Sediment control attempts to remove the sediment from the surface runoff before it reaches a stream or lake.

As one might expect, it is far more efficient and cost-effective to prevent erosion than it is to try to correct the problem later. Landowners are encouraged to use a variety of strategies to minimize erosion and the transport of sediment to the greatest extent possible.

FIGURE 1



Source: Metropolitan Washington Council of Goverments, 1990

SUGGESTED ACTIONS:

(1.) Design the project to fit the natural topography, soils, and drainage patterns.

An ounce of prevention is worth a pound of cure. Through best management practices such as limiting disturbance of steeper slopes and avoiding disturbance of natural drainage ways, the characteristics of a site can be used to minimize erosion and sediment transport.

Remember, erosion of exposed soil begins with a single raindrop.

(2.) Keep the ground covered.

The root structures of grasses, shrubs, and trees stabilize topsoil and prevent sediment from being captured by runoff. Minimizing the amount of existing vegetation disturbed during construction is the easiest way to prevent erosion. One illustration of the effectiveness of erosion control is weed-free straw mulch, which can reduce sediment concentrations in runoff over 90%.

A construction project is not complete until exposed areas are revegetated. Using native grasses, willow cuttings or other native plants that are adapted to the specific locale will result in higher survival rates. Weed-free mulching will protect all seeded areas until adequate growth is established.

Annual rye is a useful non-native grass because it grows up quickly to control splash erosion then dies after one season so native species can come in. For all erosion control and revegetation activities, be vigilant to prevent introduction of invasive weeds or plants from poor quality seeds or straw bales.

Table 1: Contact Information for Native Plant Sources

Name	Location	Phone Number
Alaska Garden, Pet and Feed Supply	Anchorage	(907) 279-4519
Granite Mountain Farms	Delta Junction	(907) 895-2076
Landscape Alaska	Juneau	(907) 790-4916
Plant Materials Center	Palmer	(907) 745-4469
Project, Inc.	Fairbanks	(907) 456-3733
Seeds of Alaska	Kenai	(907) 260-1980
Seed-n-Tree Farms	Palmer	(907) 746-7125
Shoen Farm	Two Rivers	(907) 488-6669
Ward Farms	Delta Junction	(907) 895-5415

(from Alaska Department of Natural Resources, Division of Agriculture)

Table 2: Native Grasses and Plant Sources in Alaska

Common Name	Source
Tundra glaucous bluegrass	Granite Mountain Farms Alaska Garden, Pet and Feed Supply
Alaska cotton-grass	Landscape Alaska
Arctared red fescue	Alaska Garden, Pet and Feed Supply Ward Farms
Norcoast bering harigrass	Granite Mountain Farms Alaska Garden, Pet and Feed Supply
Tufted hairgrass - Aleutian strain	Seeds of Alaska
Thickhead sedge	Seeds of Alaska
Egan sloughgrass	Alaska Garden, Pet and Feed Supply Project, Inc.
Beach wildrye	Alaska Garden, Pet and Feed Supply
Miscellaneous Wetland Plants	Shoen Farm Tree-n-Seed
Bluejoint Grass	Alaska Garden, Pet and Feed Supply

(from Alaska Department of Natural Resources, Division of Agriculture)

FOR MORE INFORMATION:

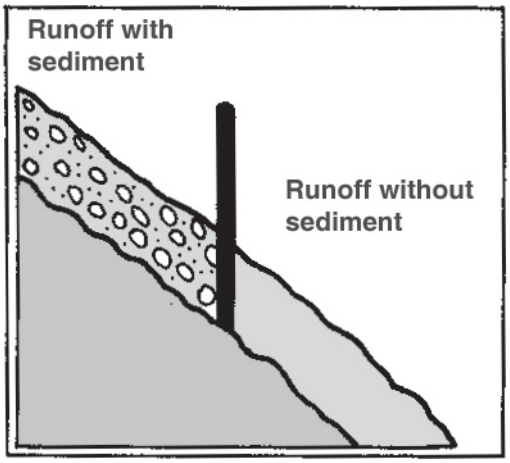
Visit the Alaska Department of Natural Resources, Division of Agriculture website at:

www.dnr.state.ak.us/ag/NEWnative_directory.htm

SUGGESTED ACTIONS (CONT'D):

(3.) Retain Sediment on Site.

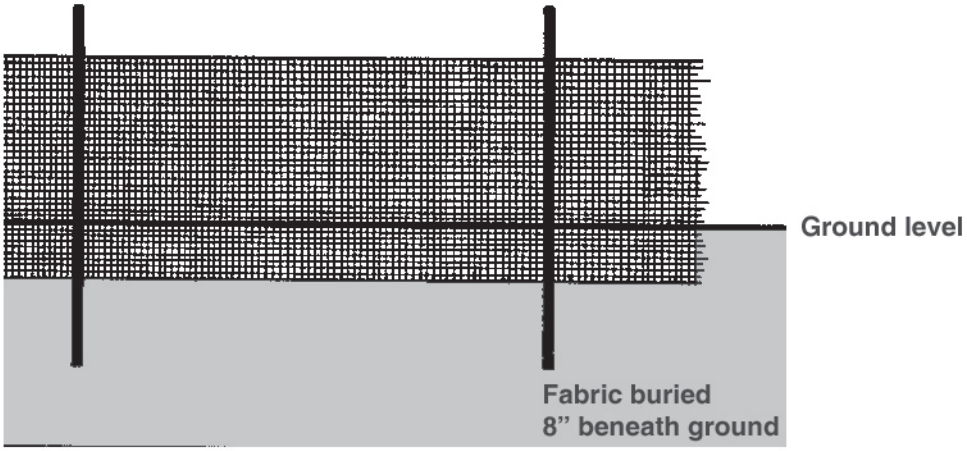
During the construction phase, it is nearly impossible to prevent erosion completely and the entrainment of sediment by runoff. Sediment retention is less effective than erosion control measures, such as maintaining soil cover, but it is nevertheless a vital part of construction projects. Preventing silty runoff from entering an anadromous stream is a primary responsibility of every landowner.



Sediment trapped in runoff can be retained at the perimeter of the construction site by digging a 20′ diameter pond to filter runoff and allow sediment to settle there. Filtering techniques include placing straw bales or silt fencing downslope of all disturbed areas. Fifty linear feet of silt fence per acre is recommended, and stakes are needed to hold the fence in place. Be sure to completely bury the fencing's bottom edge and use stakes generously.

Silt fencing costs less than 35¢ a foot!

Available at many hardware stores, including
Alaska Industrial Hardware in Anchorage: (800) 478-7201
(you can purchase 3′ x 100′ lengths of silt fencing with stakes for less than $35)



NOT ALL SEDIMENTS ARE THE SAME!

"Fish swim in silty, glacial streams just fine…so what's all the fuss about runoff and sediment?"

This is a common question among landowners who are unsure of how sediment affects fish habitat. The effects of sediment in fish-bearing waters varies depending on two important factors:

- **the SIZE of sediment entering the stream**
- **the TYPE OF HABITAT where the sediment occurs**

Adult salmon use glacial streams as **migration channels**, and are capable of swimming through the cloudy water without a problem.

Glacial flour, the sediment that makes glacial streams milky in color, is created when the weight of glaciers grinds rocks into a fine powder.

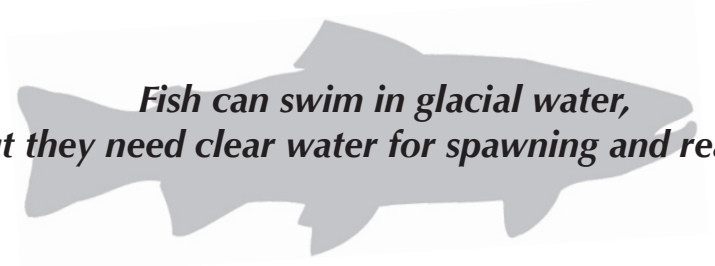
This extremely fine sediment does not clog adult fish gills, or irritate their eyes or scales.

Sediment from runoff and erosion, however, often enters **spawning and rearing waterbodies** that have much different habitat requirements than the mainstem migration channels. Runoff sediments, created from eroded topsoil, impair the habitat conditions for salmonid eggs and juvenile salmon.

Larger sediment covers the necessary spawning gravels and reduces oxygen flow between them. Salmon eggs developing there are smothered and suffocate.

Larger sediment affects fish in all life cycle phases. Sediment may clog and abrade fish gills, suffocate eggs and aquatic insect larvae on the bottom cobbles where fish lay eggs. Excessive sediment can effectively smother incubating eggs and entomb alevins and fry.

Rearing habitat is compromised because aquatic insects cannot live in the silty water, reducing the food supply for juvenile salmon. The runoff sediment clogs juvenile fish gills and can irritate fish scales, leading to infection and disease.



Fish can swim in glacial water,
but they need clear water for spawning and rearing!

PART II: RIPARIAN BUFFERS

PURPOSE:

Many landowners live near water because of the scenic quality, tranquil surroundings, and everyday practicality.

Different landowners want different things from their riverbanks and shorelines. Some want an easy place to launch their boat, while others want quiet picnic areas. Whatever the objectives may be, most Copper River watershed landowners have three goals in common:

- **Protecting fish habitat**
- **Protecting property & structures**
- **Maintaining shoreline stability**

The aquatic corridor, where land and water meet, deserves special protection in the form of riparian buffers.

A **riparian buffer** is an area designated along a stream or shoreline that physically protects a stream, lake or wetland channel from future disturbance or encroachments.

Buffers help absorb the effects of a river's natural flooding cycle, limiting the chance that structures will be damaged due to high water. Buffers allow for stream-side vegetation to shade the stream channel and offer a place for invertebrates to become accessible to juvenile fish.

Over 80% of young salmon in anadromous streams can be found within 6 feet of the bank! Natural vegetation within a buffer helps stabilize the soil and reduces erosion. Buffers also filter runoff by removing sediment, bacteria, and nutrients from storm water flows and septic effluent.

A buffer can physically protect and separate a waterway from future disturbance or encroachment

SUGGESTED ACTIONS:

(1.) Implement structure setbacks.

A "setback" requires structures such as houses, sheds, garages, and fuel storage platforms to be located a minimum distance outside of the riparian buffer zone. There are no specific setback requirements for Copper River landowners, however many municipalities throughout the U.S. recommend locating permanent structures at least 50 feet outside of the buffer zone.
(See Figure 2.)

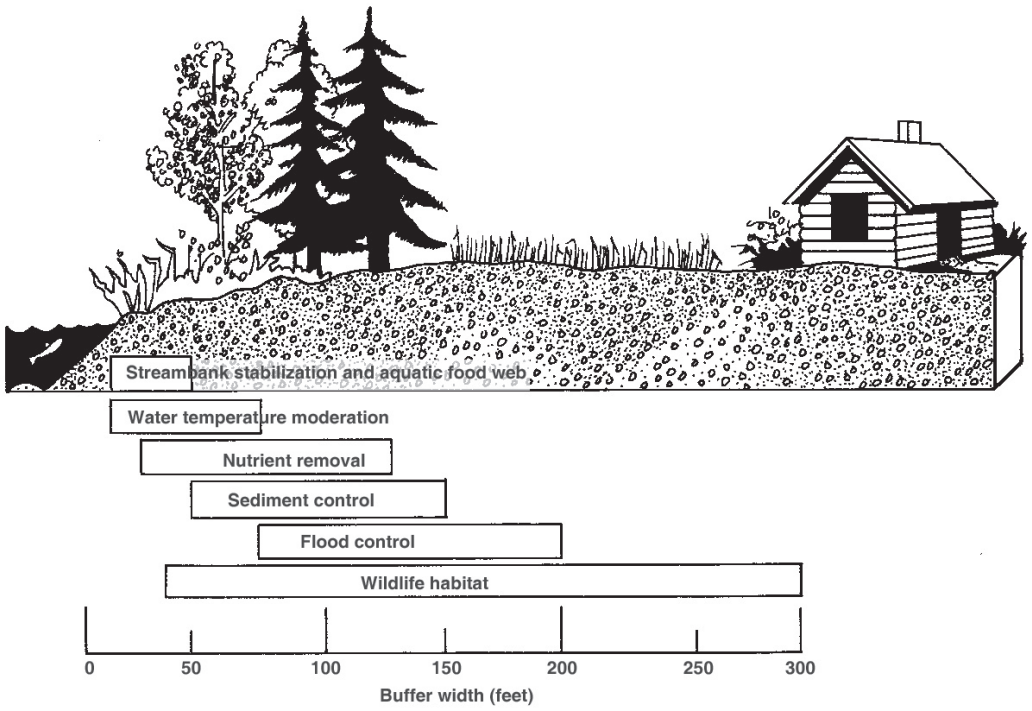


FIGURE 2: DIAGRAM OF BUFFER ZONE AND STRUCTURE SETBACK ZONES/WIDTHS: Recommended buffer widths for bank, habitat, and structure protection.

(2.) Adopt buffer width criteria

RESIDENTIAL: The effectiveness of vegetated riparian buffers for fish habitat is dependent upon buffer width and vegetation type. The Copper River Basin Plan, adopted in Dec. 1986, provides management guidelines for state lands that can also be useful on private lands.

Residents in the Copper River watershed can also use buffer guidelines adopted in similar salmon-dependent Alaska regions as a reference. For example, the Kenai Peninsula Borough requires a 50 foot riparian buffer around salmon streams to protect spawning and rearing habitat while recognizing private property rights. (visit http://www.borough.kenai.ak.us/KenaiRiverCenter/Agencies/planning/HPAOrdinance.htm for more information)

The 50 foot buffer was adopted to address impacts such as bank erosion, bank trampling, inadequate tourism infrastructure, and accidental fuel spills.

FORESTRY: The Alaska Forest Resources Practices Act requires that any commercial timber harvest that occurs on private land within 66 feet of the shore or bank be sited and designed primarily to protect fish habitat and surface water quality from significant adverse effects. Although the Act only applies if 40 acres or more are involved in a forestry operation, the provisions of the Act and its regulations provide useful guidelines for road reconstruction and clearing operations. (See Figure 2.)

SUGGESTED ACTIONS (CONT'D):

(3.) Minimize bank trampling

Most landowners want to enjoy the recreational opportunities offered by living close to a stream or lake. Activities such as boating, fishing, and wildlife viewing all require access to the water's edge.

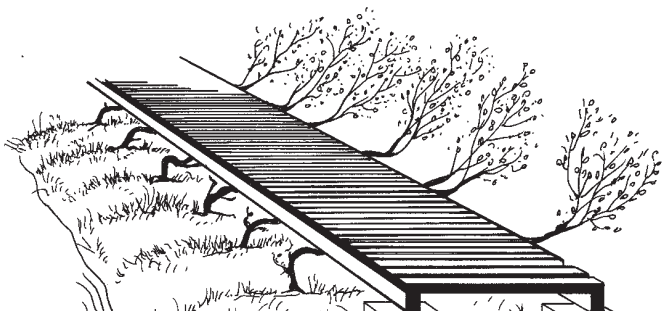
If not designed properly, foot paths and boat launch areas severely degrade the majority of plant and animal life near a shoreline.

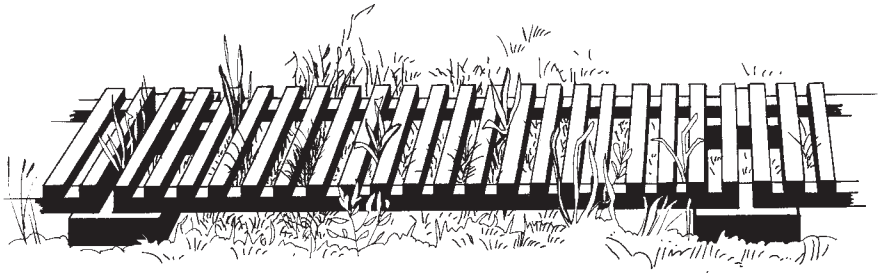
Luckily, there are three simple structures that can provide landowners with access to water as well as protect fish habitat: boardwalks, floating docks, and access stairs down bank slopes.

Boardwalks prevent foot paths from becoming muddy and eroded over the seasons. They can be designed to allow plant growth underneath the planks while still providing a safe access route to a stream or lake.

Floating docks do not interfere with aquatic habitat below ordinary high water. They are less intrusive to fish and vegetation, and do not require extensive permits.

Access stairs prevent the "scramble" that usually ensues when trying to get into or out of a steep-sloped waterbody. Access stairs can be built on gentle or steep slopes with little or no modification to the bank surface and relatively little disturbance of vegetation. They're much safer, too!





FIGURES 3 & 4: BOARDWALKS HELP PREVENT FOOT PATHS FROM ERODING AND PROTECT PLANT GROWTH UNDERNEATH.

PART III: FISH PASSAGE

PURPOSE:

In order for fish to reach their sensitive spawning and rearing areas, they must be able to pass freely through the migratory stream channels that direct them upriver.

Fish are naturally adapted to jump over small cascades and beaver dams to reach their final destination, but human features can create artificial barriers.

Just one unnatural barrier, such as a blocked or perched culvert, can prevent an entire population of fish from reproducing.

Landowners must consider the importance of migratory stream channels when developing near streams and lakes.

SUGGESTED ACTIONS:

(1.) Identify all fish streams on your property.

It's important to be aware of which streams serve as migratory channels for anadromous fish, and which ones have resident populations. Fish use different channels at specific times of the year, so it may not always be obvious which streams need special habitat considerations.

Luckily, the Alaska Department of Fish and Game has assembled a ***"Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes"*** that locates and identifies the majority of anadromous channels in the Copper River watershed.

See Appendix A for a partial listing of anadromous streams in your area. Contact the fisheries biologist nearest you to determine whether fish pass through streams on your property.

Alaska Department of Fish & Game Area Offices

Glennallen Office: (907) 822-3309
Cordova Office: (907) 424-3212

Anadromous Waters Catalog and Atlas can be found at:
www.sf.adfg.state.ak.us/SARR/FishDistrib/anadcat.cfm

SUGGESTED ACTIONS (CONT'D):

(2.) Culverts are the culprits!

Failed or poorly designed culverts are often the primary culprits of blocked fish passage. When it is necessary to build a road or driveway over a fish-bearing stream, proper fish passage should be included in the construction design.

Bridges are the preferred alternative, because they allow the stream to maintain natural sediment loads and water flows.
Undersized culverts block fish passage because they accumulate debris, and are often eroded at their base. Over time, eroded culverts become "perched", and fish cannot jump high enough to make it through the narrow tunnels.

Culverts should be large enough to withstand high water events, and must be maintained and repaired when necessary. A bigger culvert may also be less expensive over time than a culvert that is too small, which will become plugged with rocks and gravel and wash the out the roadway.

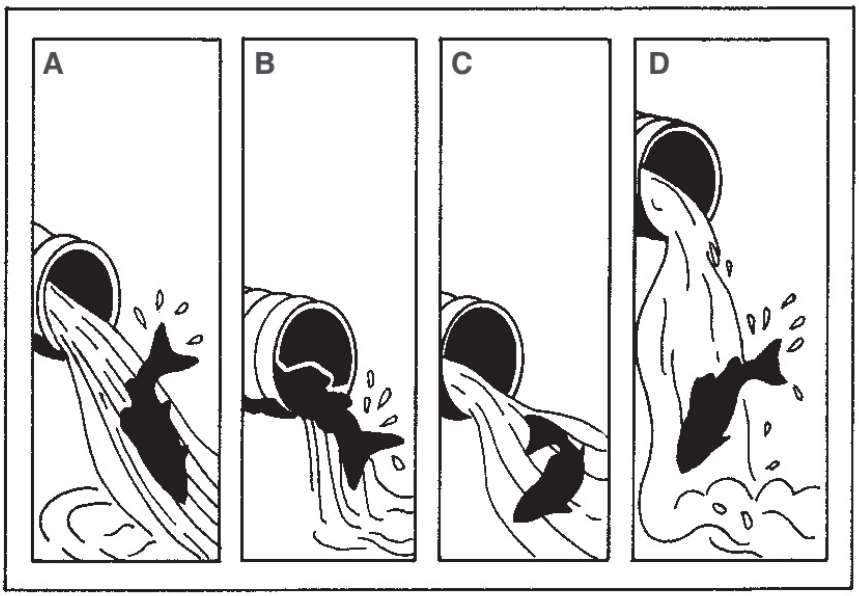


FIGURE 5: IMPROPERLY DESIGNED OR INSTALLED CULVERTS CAN BLOCK FISH PASSAGE:
(A) WATER VELOCITY TOO GREAT
(B) WATER IN CULVERT TOO SHALLOW
(C) NO RESTING POOL BELOW CULVERT
(D) JUMP TOO HIGH
(REDRAWN FROM EVANS AND JOHNSTON, 1980)

(3.) Tips for making effective stream crossings

- Minimize the number of crossings.
- Cross where the channel is most stable: at a riffle of where banks are solid rock.
- Use a bridge instead of a ford or culvert.
- Span as much active floodplain as possible, preferably at least twice the bankfull width.
- Use and armored ford instead of a culvert.
- If you must use a ford or a culvert, minimize the width of the ford or length of the culvert.
- For culverts, use a natural bottom; don't change the substrate.
- For fords, armor the crossing if the natural substrate consists of clay, silt, sand, or grave; use stones large enough to withstand scour during flood events.
- Size culverts to handle the largest expected flows and to allow a flood fringe to develop inside.
- Design the approach, to descend into and climb out of a crossing, at an 8% grade maximum
- Provide grade reversals on both approaches to prevent water and sediment from entering the stream.
- Get runoff from the trail into the soil - use outslopes, dips, and waterbars. Avoid outside berms.

Culvert designed to simulate streambed: Little Meadow Creek at Meadow Creek Loop Culvert Replacement, Matanuska-Susitna Bourough. Photo by Bill Rice, USFWS, 2004.

(4.) Complex streams are healthy streams.

Large pieces of wood, branches, boulders, and other natural objects in the stream channel benefit fish by creating complex habitats. Complex stream channels provide juvenile salmon with resting pools and protection from predators. Beaver dams and ponds provide the same service by creating deep pools for over-wintering habitat.

Well-intentioned landowners may think that removing these natural objects may help fish pass through the stream. This tactic, however, can severely compromise juvenile fish habitat. Being a helpful neighbor to fish-bearing waters means leaving a stream as windy and complex as possible.

Figure 6: Channelized stream vs. Complex stream

PART IV: THE PERMITTING PROCESS

PURPOSE:

Landowners are faced with an endless amount of decisions to make both during construction (materials?, location?, expenses?, design?) and after construction (additions? repairs? improvements?). Permits and questionnaires are often the last thing to cross a landowner's mind.

A few minutes of paperwork at the start of a project, however, can save MONTHS of complications (and possible fines!) down the road. This section gives a quick summary of permit information that is relevant to streams, lakes, and fish habitat concerns. Contacts are given for each agency for further information.

RELEVANT PERMITS:

(1.) U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers issues permits for dredging, filling, or placing a structure in tidal waters, streams, lakes, and wetlands. A landowner will need a permit from the Army Corps of Engineers before putting any dredged or fill material in wetlands.

For example, this includes road building, clearing land, or leveling land in wetland areas. Dredging wetlands or adding fill without a valid permit can result in civil fines or criminal charges. The Corps is responsible for determining whether an area is designated as a wetland for permit purposes.

U.S. Army Corps of Engineers, Regulatory Branch
P.O. Box 898, Anchorage, AK 99506-0898
1-800-478-2712

(2.) U.S. Environmental Protection Agency (EPA)

The EPA manages storm water permits that are required for all construction projects that disturb more than one acre of land. The EPA permit is required under the federal Clean Water Act to limit water pollution (including sediment) from construction sites.

U.S. EPA Office
Region 10, Office of Water
1200 Sixth Avenue
Seattle, WA 98191
(800) 424-4372 ext. 6919
www.epa.gov/region10/

EPA - Alaska Operations Office
Federal Building, Room 537
222 W 7th Aveenue #19
Anchorage, AK 99513
(907) 271-3424

(3.) State of Alaska, Dept. of Natural Resources – Title 41 Permit

Landowners conducting activities within or across an anadromous fish-bearing water body must notify OHMP and obtain a Title 41.14.870 Fish Habitat Permit (formerly known as an ADF&G Title 16 Fish Habitat Permit). Regulated activities include, but are not limited to: bank stabilization, culvert installation, stream realignment or diversion, water withdrawl, gravel removal, low-water crossings, and the placement or removal of fill or other structures within the limits of ordinary high water. Activieis such as creating an impediment to fish passage or draining into a waterbody also require notifying OHMP and obtaining a title 41 permit.

For landowners in Copper River Basin (upstream of Haley Creek):
DNR – Office of Habitat Management and Permitting
1300 College Rd.
Fairbanks, AK 99701-1551
(907) 459-7289

For landowners near Copper River Delta (below Haley Creek):
DNR – Office of Habitat Management and Permitting
550 West 7th Ave, Suite 1420
Anchorage, AK 99501
(907) 269-8690

(4.) State of Alaska, Dept. of Natural Resources – Office of Project Management and Permitting (OPMP)

Landowners in Cordova are located in the Southcentral coastal district, and therefore must comply with the Alaska Coastal Management Program. The Alaska Coastal Management Program (ACMP) requires projects in Alaska's coastal zone to be reviewed by the OPMP. A landowner must fill out a Coastal Project Questionnaire to determine if a permit is required. The ACMP standards and the enforceable policies of an affected coastal district ensure that development interests observe the vision set out for the future by the state and coastal communities. It is called the "consistency review process." A finding of consistency with the ACMP must be obtained before permits can be issued for the project.

DNR - Office of Project Management and Permitting
302 Gold St. Suite 202
Juneau, AK 99801
(907) 465-3562

A Coastal Project Questionnaire can be downloaded at:
www.alaskacoast.state.ak.us

APPENDIX A:
Anadromous Waters Near Copper River Communities

CORDOVA

Water Body	Species of Fish
Eccles Creek	Coho, Pink, Cutthroat Trout
Eyak Lake	Sockeye, Coho, Pink, Dolly Varden, Cutthroat Trout
Eyak River	Sockeye, Coho, Pink, Dolly Varden, Cutthroat Trout
Fleming Spit	Pink, Chum, King
Hartney Bay	Pink, Coho, Chum, Dolly Varden, Cutthroat Trout
Humpback Creek	Pink
Nelson Bay (Inlet Streams)	Pink
Nicolet Creek	Pink
Power Creek	Sockeye, Coho, Pink, Dolly Varden, Cutthroat Trout
Rude River	Pink, Coho

MID-WATERSHED

Water Body	Species of Fish
Bernard Creek	King
Dry Creek	King (short term juvenile residence)
Durham Creek	Steelhead
Haley Creek	Coho (short term adult residence)
Klutina River	Sockeye, King, Coho
Little Tonsina River	Sockeye, King, Coho
Mendeltna Creek	King, Sockeye
Moose Creek	Arctic grayling
O'Brien Creek	Coho (short term adult residence)
Squirrel Creek	Coho (short term juvenile residence)
Tazlina Lake	Sockeye
Tazlina River	King, Sockeye, Steelhead

For a complete and current listing, see the Fish Distribution Database or contact your local ADF&G office.

UPPER WATERSHED

Water Body	Species of Fish
12 Mile Creek	King, Steelhead
Ahtell Creek	King
Copper Lake & Creek	Sockeye
Fish Creek	Sockeye
Gakona River	King, Sockeye
Gillespie Creek	King
Gulkana River	Sockeye, King, Steelhead
Gunn Creek	Sockeye
Hungry Hollow Creek	King
Indian River	King
Mentasta Lake	Sockeye
Mud Lake	Sockeye
Paxson Lake	Sockeye
Sourdough Creek	King
Swede Lake	Sockeye
Tanada Creek	Sockeye, King
Tanada River	Sockeye
Tenmile Lake	Sockeye

MCCARTHY

Water Body	Species of Fish
Chitina River	Sockeye, Coho, King, Steelhead
Kennicott River	Coho
Lakina River	Coho
Long Lake	Coho, Sockeye
Long Lake Creek	Sockeye, Coho, Steelhead
Nizina River	Coho
Tana River	Sockeye, King
Tebay River	King, Steelhead

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