

# Healthy Streambanks Support Healthy Salmon

## Healthy streambanks and salmon benefit everyone



**Individuals** rely on salmon for recreation and as a food source and cultural connection to the land. Healthy streambanks mitigate flood damage to personal property and enhance property value.



**Local economies and businesses**, such as sportfish guides and lodges, rely on sustainable fisheries and tourism, and benefit from streambank functions such as flood resilience.



The **State of Alaska** invests money and resources in fisheries management. Ensuring healthy streambanks and salmon runs will protect this investment into the future.

## What are riparian areas?

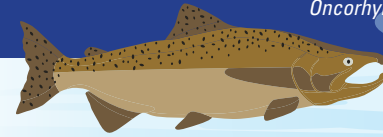
Riparian areas are the vegetated zone where land and water meet along streambanks or pond shores. These areas provide important habitat for rearing and spawning salmon populations. Removing or changing natural vegetation along waterways can impact both juvenile and adult salmon.

Conserving and maintaining continuous, healthy riparian corridors and habitat along streams and lakes will help salmon and other fish populations thrive, ensuring the longevity of this natural resource that Alaskans rely on for commercial, subsistence and sportfishing.



Riparian

Chinook (king)  
*Oncorhynchus tshawytscha*

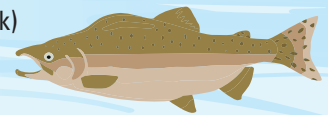


Sockeye (red)  
*O. nerka*



Chum (keta/dog)  
*O. keta*

Pink (humpback)  
*O. gorbuscha*



Coho (silver)  
*O. kisutch*

## Salmon species in the Mat-Su

All five species of Pacific salmon found in the Mat-Su Basin spend varying amounts of their life cycle in freshwater, from a few weeks to a few years!

## Thriving salmon and healthy habitats make vibrant communities in the Mat-Su

The Mat-Su is a special place where vibrant communities and resilient wild salmon are closely linked. Generally, salmon numbers remain strong here; however, human use and development may be impacting habitat quality and causing localized declines in salmon numbers.

We have a unique opportunity to develop our economy while living side by side with wild salmon, an important natural resource that supports our communities and economies.

# What Services Do Riparian Areas Provide?

Riparian areas benefit our community by delivering economic, cultural and ecological services. They are vital for the overall health and function of streams, providing critical habitat for rearing and spawning salmon and helping to maintain healthy water quality. The native vegetation in these areas benefits people by providing natural erosion control and mitigating flood damage.

## Water quality matters

Salmon are sensitive to the quality of the water in which they live, including temperature and the levels and type of sediment and nutrients in the water. Fisheries may be negatively affected by human activities that alter water temperature, change sediment levels, and pollute water, resulting in impaired water quality.<sup>5</sup>

### Supply shade and cool temperatures

- Shade from vegetation helps maintain adequate water oxygen levels for aquatic life
  - » Warmer waters cannot carry as much oxygen, and Alaska stream species need high levels of dissolved oxygen
- Alaska fish species prefer cooler water temperature ranges for spawning, incubation, and rearing
  - » Water temperatures above these ranges affect their health and productivity

### Provide nutrients and organic matter

- Leaves and vegetation support insects and other juvenile salmon food sources

### Provide protection for juvenile salmon

- Overhanging vegetation, emergent aquatic plants, and woody debris provide cover and protection from predators, as well as areas of refuge during high velocity floodwaters

### Maintain biodiversity

- Riparian corridors provide important habitat and migration routes for fish, mammals, and birds

### Stabilize streambanks

- Riparian tree and shrub roots hold streambank soils together, helping to prevent erosion during flood events

### Reduce flooding and resulting flood damage

- Riparian vegetation provides a rough surface that reduces the water velocity of flood waters and reduces the potential damage to floodplain surfaces and structures

### Provide recreation opportunities

- Walking trails, ATV trails and boating activities allow people to enjoy these areas along with the wildlife

### Retention of sediment

- Native riparian vegetation traps sediment which helps maintain water quality and support fish habitat
  - » Clear water keeps fish gills healthy and provides accessible, sediment-free gravel for spawning and healthy egg development

### Filter urban pollutants

- Native riparian vegetation filters pollutants (such as fertilizers, heavy metals, pesticides, and soil) from surface runoff
  - » Some plants immobilize pollutants in the soil where they can be broken down by microbes over time, while others bioaccumulate them into the plant tissue

# Human Activities and Resulting Impacts to Riparian Services

Human activities have the potential to negatively impact riparian areas, threaten salmon habitat and degrade water quality. Alterations and activities that affect salmon include removing, disturbing or changing the composition of native shoreline vegetation, development of impervious surfaces, and recreational activities.

## Human Activities and Resulting Impacts



**Alter or remove native vegetation**



**Develop impervious surfaces**



**Recreational activities**

### Increased water temperatures

- Water temperatures increase without proper shade
- Warm water can stress and delay timing of spawning salmon
- Prolonged exposure to warm water can damage or kill salmon eggs

### Altered or damaged habitat

- Trampling vegetation, walking off of designated pathways to streams, or using unauthorized ATV crossings can lead to loss of vegetation and damage to habitat
  - » Human traffic can destroy salmon eggs and fry if people or vehicles cross over spawning sites, reducing salmon populations

### Reduced nutrient availability

- Reduced or altered plant organic matter change the nutrients available in streams
- Altered riparian vegetation composition changes the species of insect foraging those leaves, affecting the diet of juvenile fish

### Increased water velocity

- Without riparian vegetation, there are fewer rough surfaces to slow water velocity
  - » Increased water velocity results in eroded streambanks, loss of property, and fewer protected slow-water areas for salmon

### Destabilized streambanks

- Turf grass's shallow root systems alone cannot adequately hold together streambanks
  - » Fewer roots to hold soil together results in destabilized streambanks and an increase in erosion
  - » Erosion could lead to streambank collapse

### Increased flooding and flood damage

- Without riparian vegetation, there are fewer rough surfaces to slow water velocity
  - » Increased water velocity results in eroded streambanks and loss of property

### Increased sedimentation

- Less riparian vegetation increases the sedimentation of water, which results in destroyed or reduced fish spawning grounds and decreases the quality of gravel beds where fish eggs develop
  - » Salmon fry waiting to emerge from nests could be buried
  - » Sediment irritates fish gills, reducing their oxygen intake

- Buildings and paved surfaces reduce the soil's ability to absorb water, which increases water volume, causing more sediment to enter streams
  - » Surface runoff carries sediment into water
- Recreational activities (such as using trails or boating) can add sediment to waterways

### Increased water pollution

- Less riparian vegetation allows pollutants from surface runoff to enter waterways and degrade water quality and fish habitat
- Increased impervious surfaces (paved areas) lead to increased runoff pollution and flood potential without native vegetation to slow the runoff water and filter pollutants

# Best Practices

## The most cost-effective approach is prevention!

Prevent alteration of riparian areas and minimize impacts to our creeks, streams, rivers and lakes that provide valuable salmon habitat.

In many places in the Mat-Su Basin, salmon and their habitats are healthy so protective measures, like reservations of water, sustainable land management, voluntary land protection and individual behaviors can prevent degradation. In other places, restoration is necessary to re-establish healthy streambanks and productive habitat.

### GOAL: Conserve riparian areas

| Individual landowner actions  | Public and private land recommendations   |   |
|---|---|---|
| <ul style="list-style-type: none"> <li>Keep a continuous buffer of native trees, shrubs, and grasses near streams; do not modify or remove existing native vegetation.</li> <li>Leave woody debris in water.</li> <li>Minimize bank and vegetation trampling by using single access points to waters and utilizing elevated and light-penetrating walkways and ramps to access shoreline fishing and boat docks.</li> <li>Store snow from driveways on grassy areas away from the stream so pollutants can be filtered from the melted water.</li> <li>Securely store and properly dispose of oil, grease, chemicals and pesticides.</li> </ul> | <ul style="list-style-type: none"> <li>Riparian buffers or setbacks are corridors adjacent to streams, rivers and lakes where limited use or development occurs in order to protect and benefit both wildlife and landowners.                             <ul style="list-style-type: none"> <li>» Buffers prevent erosion and protect property during flooding.</li> </ul> </li> <li>The Mat-Su Borough requires a riparian setback for structures to be a minimum of 75 feet from the ordinary high-water line. The larger the setback, the greater the benefits will be. Recommended buffer widths based on riparian functions include:<sup>2</sup> <ul style="list-style-type: none"> <li>» Erosion control: buffer of 30-98 feet</li> <li>» Fish habitat: buffer of 30-230 feet to control stream temperature</li> <li>» Wildlife habitat: buffer of 33-164 feet</li> </ul> </li> <li>Allow unobstructed fish passage in streams and creeks.                             <ul style="list-style-type: none"> <li>» Utilize methods such as properly installed culverts to allow passage.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>Minimize bank and vegetation trampling by using single access points to waters and utilizing elevated and light-penetrating walkways and ramps to access shoreline fishing and boat docks.</li> <li>ATV stream crossing recommendations include:<sup>3</sup> <ul style="list-style-type: none"> <li>» Only cross salmon streams at authorized crossings.</li> <li>» Cross at existing crossings, or at a low banked area with a rocky bed and drive slowly.</li> <li>» Check for adult fish and gravel nests before crossing and avoid spawning areas.</li> <li>» Cross at a right angle to the flow.</li> <li>» Do not drive up and down streams.</li> <li>» Ride at least 10 feet from the edge of a stream to protect streambank vegetation.</li> </ul> </li> </ul> |

### GOAL: Restore riparian areas

Restoring riparian areas improves water quality, reduces erosion and excessive flooding, and provides critical fish habitat

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|---|---|--|
| <ul style="list-style-type: none"> <li>Replant native vegetation or allow natural vegetation to return to streambanks.</li> </ul> | <ul style="list-style-type: none"> <li>Stabilize banks utilizing bioengineering techniques as described in ADF&amp;G's <i>Streambank Revegetation and Protection</i><sup>4</sup> guide, as opposed to rip rap or sheet pile.</li> </ul> | <ul style="list-style-type: none"> <li>Remove invasive plant species and/or detrimental structures from riparian areas.</li> </ul> |
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#### What is the best way to protect my property from erosion?

The best erosion prevention strategy is to keep native stream vegetation. Plant roots naturally hold soil together, slow runoff, and disperse rainfall, all while maintaining benefits for fish and wildlife. Rock rip rap may provide some local protection from erosion, but it often transfers the erosion problem to another location. Rip rap allows sediment and pollutants to flow into the stream without being filtered by native vegetation, does not provide nutrients for fish, increases water velocity, and could ultimately contribute to declining fish populations.

#### Salmon swim in glacial streams, so why is sediment a problem?

Although Alaska salmon populations have evolved to thrive in glacier river systems with a degree of natural sediment levels, they are still vulnerable to sudden increases in sedimentation. This is particularly true in clear water streams and tributaries when large influxes of sediment enter into spawning and rearing habitats. This large input of material can clog gills, reduce or degrade available spawning habitat, suffocate or smother eggs, or reduce juvenile feeding success.<sup>5</sup>

#### References:

1. *Living Next to a Salmon Stream*. [http://greatlandtrust.org/wp-content/uploads/2014/10/2012-11-28-GLT-DRAFT-Living-Next-to-a-Salmon-Stream\\_v5\\_lores.pdf](http://greatlandtrust.org/wp-content/uploads/2014/10/2012-11-28-GLT-DRAFT-Living-Next-to-a-Salmon-Stream_v5_lores.pdf)
2. *Riparian Buffer Zones: Functions and Recommended Widths*. [http://www.eightmileriver.org/resources/digital\\_library/appendicies/09c3\\_Riparian%20Buffer%20Science\\_YALE.pdf](http://www.eightmileriver.org/resources/digital_library/appendicies/09c3_Riparian%20Buffer%20Science_YALE.pdf)
3. *Off Road Vehicle Crossings at Salmon Streams*. <https://www.adfg.alaska.gov/static/license/uselicense/pdfs/OffRoadVehicleCrossingsatSalmonStreams.pdf>
4. *Streambank Revegetation and Protection: A Guide for Alaska*. <https://www.adfg.alaska.gov/index.cfm?adfg=streambankprotection.main>
5. Kjelland, M.E., Woodley, C.M., Swannack, T.M. et al. *A review of the potential effects of suspended sediment on fishes: potential dredging-related physiological, behavioral, and transgenerational implications*. *Environ Syst Decis* 35, 334–350 (2015). <https://doi.org/10.1007/s10669-015-9557-2>

#### Additional information:

- *Building a Fish friendly Mat-Su Basin: Salmon-Safe Guidelines for Development in the Matanuska-Susitna Borough*. <http://matsusalmon.org/wp-content/uploads/2018/07/Building-a-Fish-Friendly-Mat-Su-Basin-June-2018-060118-6MB.pdf>
- *Conserving Salmon Habitat in the Mat-Su Basin: The Strategic Action Plan of the Mat-Su Basin Salmon Habitat Partnership*. 2013. <http://matsusalmon.org/wp-content/uploads/2012/10/2013-Strategic-Action-Plan.pdf>
- *The Role of Riparian Areas*. <https://www.adfg.alaska.gov/static/fishing/pdfs/sport/byarea/interior/publications/ripariandisplay.pdf>
- *Sharing the Edge: Copper River Landowner's Guide for Site Development and Fish Habitat Protection*. <https://copperriver.org/wp-content/uploads/2016/03/Landowners-Guide.pdf>