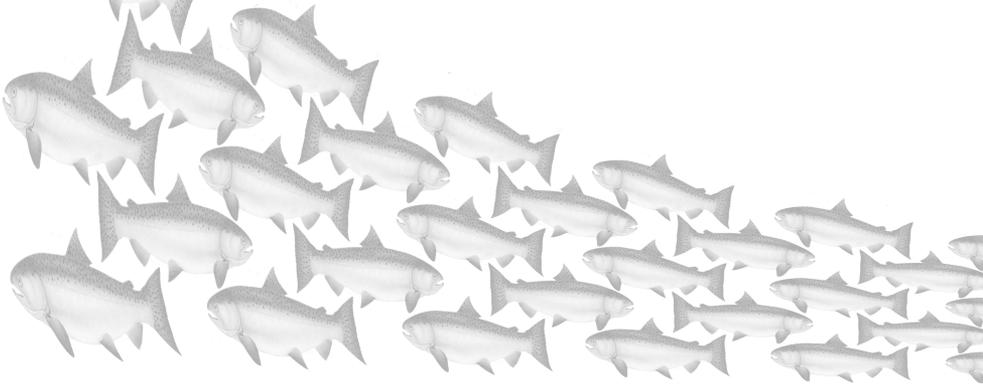


Bringing Back Spring Chinook & Winter Steelhead in the Molalla River Basin

A handbook
for
improving
fish habitat
conditions in
local streams



Willamette River Fish Recovery

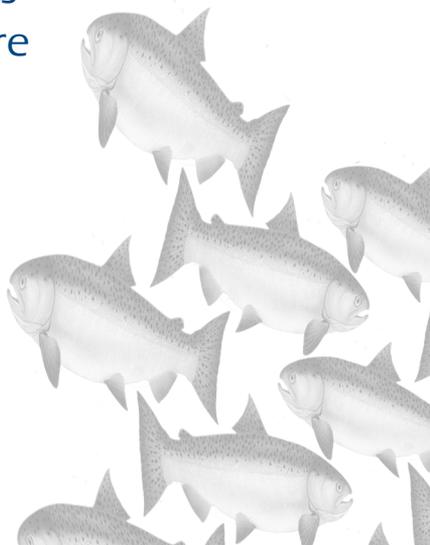
Willamette River Fish Recovery

This handbook provides guidance to help people identify and implement local habitat restoration actions that will aid recovery of spring Chinook salmon and winter steelhead in the Molalla River system.

It summarizes key direction from the **Upper Willamette River Conservation and Recovery Plan**.

It identifies the types of restoration needed to reach recovery, and describes projects that have already helped restore habitat conditions and habitat-forming processes.

Finally, it lists helpful resources that provide more information on watershed restoration and opportunities to join other partners on projects.



Bringing Back Spring Chinook & Winter Steelhead in the Molalla Basin



A handbook for improving
fish habitat conditions in local
streams



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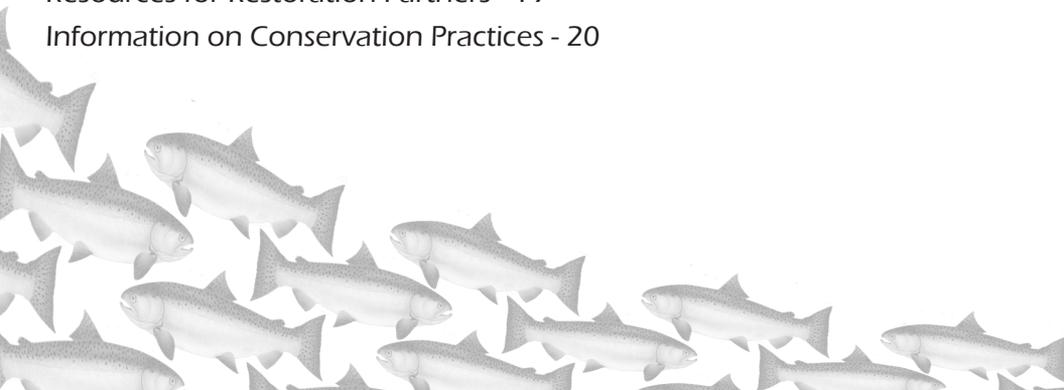
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The fate of Molalla spring Chinook salmon and winter steelhead lies at a crossroad. Compared to historical levels, very few fish return to spawn in the Molalla and Pudding basins. Both salmon and steelhead runs are listed as threatened under the Endangered Species Act, and are considered at risk for extinction.

This handbook shows where and how you can help restore habitat conditions for Molalla spring Chinook and winter steelhead. We can work together to make sure the fish populations remain healthy for future generations.



The full list of recovery actions for the fish is provided in the recently completed Upper Willamette River Conservation and Recovery Plan, available at: www.oregonexplorer.info/willamette.

Falling on hard times

At one time hundreds of thousands of salmon and steelhead returned to spawn in the Molalla and its major tributary, the Pudding River, as well as other Upper Willamette River tributaries. Over the last 100 years the runs have fallen on hard times.

An alarmingly small number of spring Chinook salmon now spawn here. In 1800, approximately 300,000 spring Chinook returned to the Upper Willamette basin. By 1940, only 40,000 spring Chinook returned each year. By 2008 the number had declined to less than 5,000 wild spring Chinook.

Although in better shape, the winter steelhead population is also now at risk. The run has declined from 25,000 historically to about 5,000 today.

These salmon and steelhead are part of our natural heritage, symbolizing the health of this special place we live in. We do not want to lose these unique fish populations.

A 31-inch steelhead caught in Butte Creek, the spring of 1988

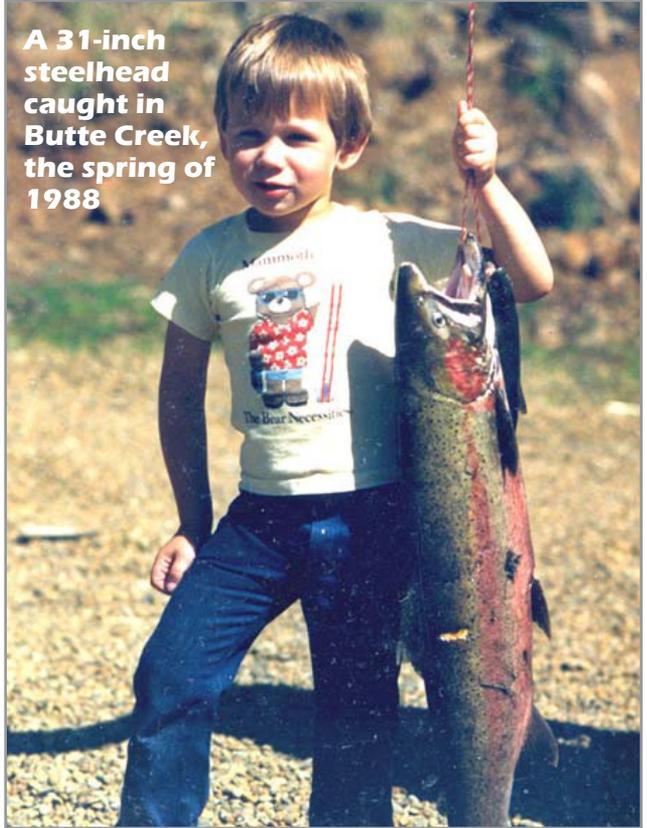


Photo: S. Daily



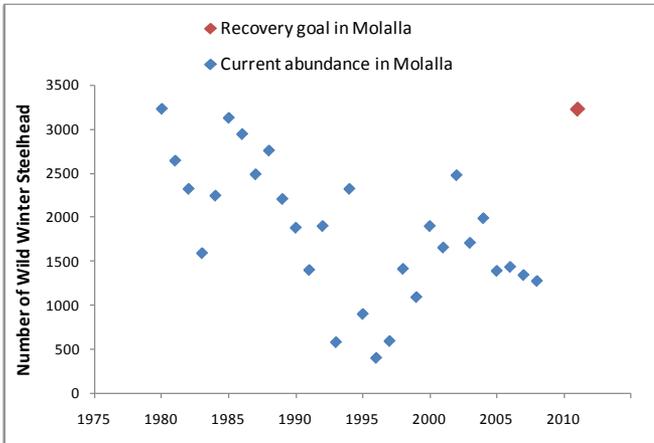
Why are the fish in trouble?

Salmon and steelhead face many risks during their complex, wide-ranging life cycle. They are anadromous, moving from the Molalla River system to the Willamette and Columbia rivers, the ocean, and then back.

Decades of human activities have hurt the fish. Salmon and steelhead are vulnerable to a variety of threats, from those in headwater streams to the open ocean.

Today, the three largest threats to Upper Willamette River salmon and steelhead are hydropower/flood control, habitat alteration and competition with hatchery fish. Additionally, climate change, disease,

Winter Steelhead



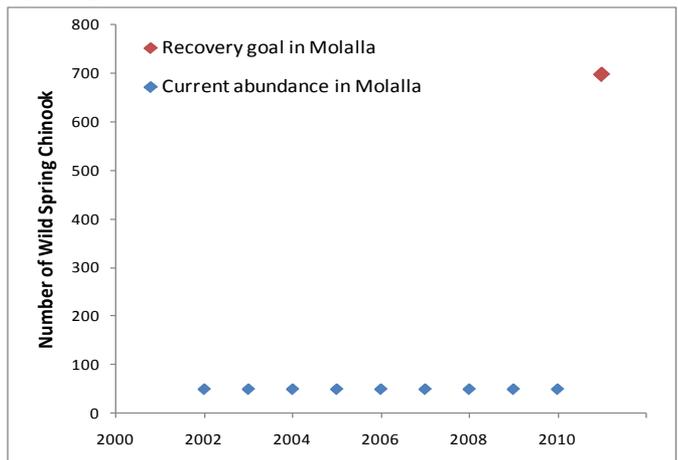
Winter Steelhead Current Status:
At **Low Risk** of extinction in 100 years.

Recovery Goal:
Move population to **Very Low Risk**

Spring Chinook Current Status:
At **Very High Risk** of extinction in 100 years.

Recovery goal:
Move population to **High Risk**

Spring Chinook



What makes Upper Willamette Chinook Salmon & Steelhead so unique?

Salmon and steelhead in the Molalla and other Upper Willamette River subbasins hold genetic characteristics that set them apart from other species of salmon and steelhead.

Biologists believe Upper Willamette Chinook developed unique attributes because Willamette Falls historically restricted upstream migration into the Upper Willamette during part of the year. Adult Chinook could only ascend the falls in the spring when stream flows were high, and their migration upstream was restricted in summer and fall when flows were low.

The same flow conditions at Willamette Falls also served as an isolating mechanism for Upper Willamette steelhead. Most winter steelhead enter the Willamette River in January and February, and ascend to spawning areas in the upper basin in late March or April. This unique run timing reflects the fact that, before construction of a fish ladder at Willamette Falls in the early 1900s, flow conditions allowed steelhead to ascend the falls only during late winter and spring.



Willamette Falls, Salem Library Historic Photo Collection

The Molalla in the past

The Molalla River system once provided highly complex habitat conditions for salmon and steelhead populations.

The river system was dynamic, and streamflows responded quickly to changes in runoff during the seasons. Streamflows swelled with snowmelt and rainwater, and then spread across the flat lower floodplain through a complex array of interconnected channels. They fed extensive wetlands and riparian areas.



Salem Library Historic Photo Collection



Mature forests lined the river system and contributed large quantities of wood to stream channels, forming pools and creating hiding and feeding cover for adult and juvenile fish. The lower watershed's network of channels provided quiet backwaters, alcoves and side channels for fish production. The meandering channels were shaded by mature riparian vegetation, keeping the water cool for fish.

The Molalla today

Changes in the Molalla watershed greatly affect salmon and steelhead today. The greatest habitat changes have occurred in the lower subbasin. Roads and other structure now restrict channel movement along many stream reaches. Loss of wood from the streams limits pool formation and habitat diversity. Many wetlands are gone and remaining riparian areas are often in poor to fair condition.

Recovering our Salmon & Steelhead

A watershed that supports healthy salmon and steelhead populations is one of the most important gifts we can pass on to future generations.

The health of our salmon populations reflects the health of our watersheds. A healthy watershed can improve water quality, help reduce storm runoff, attract wildlife, and increase a landowners options for managing their lands, making a community a better place to live and work. So improving conditions for fish health also benefits our local communities.

When we restore our salmon runs, we also improve the health of our rivers, lands, communities and economies.



John McMillian



Lance Kruzic

Ways you can help to Restore a Healthy Watershed

Recovering the salmon and steelhead populations—and maintaining this recovery for future generations—requires hard work and commitment by local communities and landowners.

The fish are very sensitive to changes in their ecosystems. They need streams with:

- abundant cold water,
- plenty of clean gravel,
- pools where they can find shelter and food,
- unhindered access to spawning and rearing areas.

Their health depends greatly on how lands and waters are managed.

People can aid salmon and steelhead recovery with good stewardship of land, using water wisely, and by implementing projects that will improve habitat conditions.



Types of Habitat Restoration

Actions needed to repair habitat conditions in the Molalla/Pudding watershed fall into six general categories:

1. Restoring riparian areas and vegetation communities,
2. Restoring floodplains and reconnecting side channels and wetlands,
3. Improving stream habitat complexity and stability,
4. Increasing stream flow,
5. Improving water quality,
6. Removing or replacing culverts and other structures that block fish passage.

Using Best Management Practices

Best management practices (BMPs) reduce the footprint of land use activities that can damage the environment. Landowners benefit from using sound conservation practices because healthy soil and good water quality are two of their most valuable assets.

BMPs include conservation practices or combinations of practices and management measures that:

- Distribute livestock so areas are not damaged by overuse,
- Reduce animal waste, toxins, and sediment,
- Protect trees and vegetation in sensitive areas,
- Minimize soil disturbance and maintain vegetative cover on uplands,
- Prevent adverse impacts to surface and ground water,
- Employ proper use of chemical herbicides within critical areas.



Buffer strips catch and filter sediment, reducing soil erosion

Fencing out livestock allows riparian areas to recover



Recovery Actions for every stage of the Salmon & Steelhead Lifecycle

Spawning

- Increase number of holding pools for prespawning salmon.
- Reduce harassment of adult salmon holding through the summer
- Manage the hatchery fish spawning in the wild to low levels

Migrating Adults

- Reduce prespawning mortality of Spring Chinook
- Manage fishing at current lower levels to allow for recovery



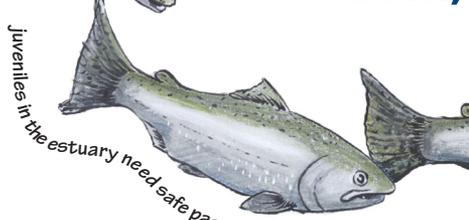
passage upstream

places to rest & hide on the way home

returning adults need clean & safe passage



places to hide & eat



juveniles in the estuary need safe passage out to the ocean



spawners need clean g

Restoration and recovery actions are needed every stage

Through & steel need cold,

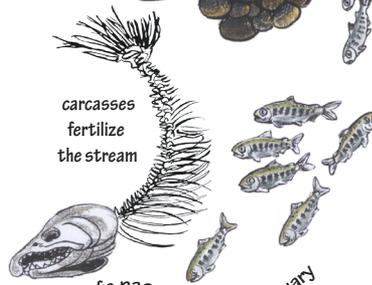
travel & plenty of room to nest



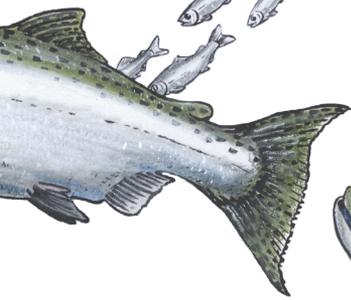
parr need pools, shade, places to hide & lots of bugs to eat

ion
very
are
at
age.

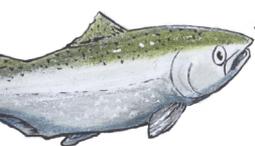
carcasses
fertilize
the stream



smolts need fast, safe passage to the estuary



gh life, salmon
elhead always
d abundant,
clean water.



adults in the ocean need krill, squid & small fish to eat

Incubation

- Reduce fine sediment loads that impact egg survival and development during incubation

Juvenile Migration

- Improve survival of rearing juvenile fish by improving riparian and stream habitat
- Keep adequate levels of water in the stream throughout the summer
- Restore water quality to reduce exposure to toxins in lower basin and Willamette River

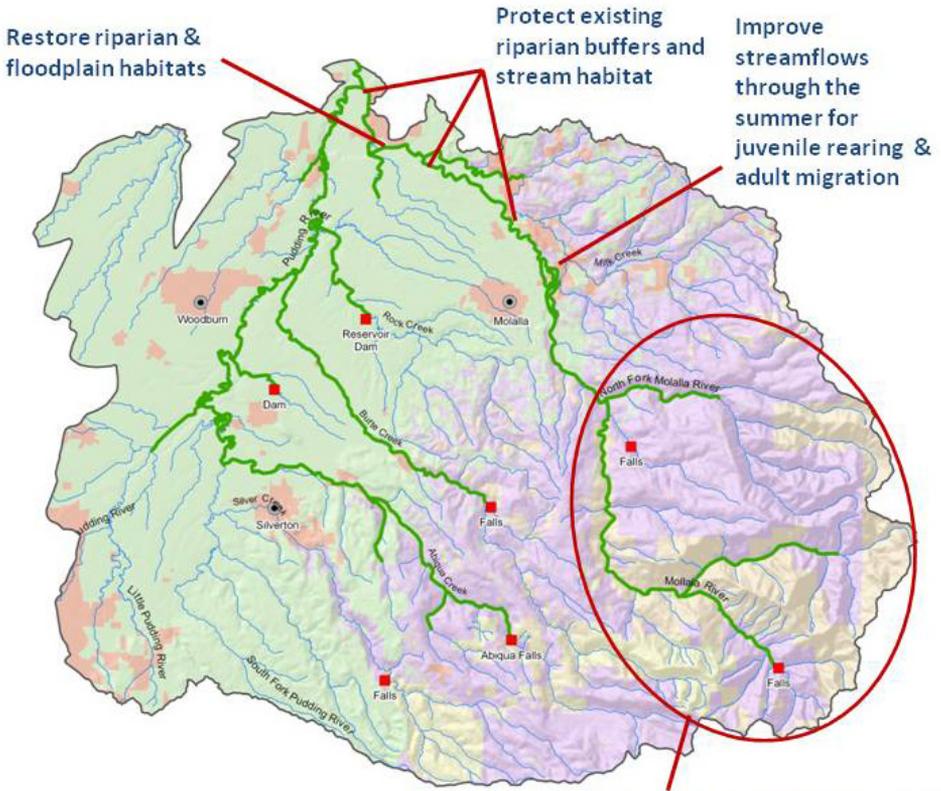
Estuary

- Restore habitat and water quality in the estuary
- Reduce unnaturally high bird predation on juvenile salmon

Ocean

- Manage fishing at levels to allow for recovery

Molalla Spring Chinook Protection and Restoration Actions

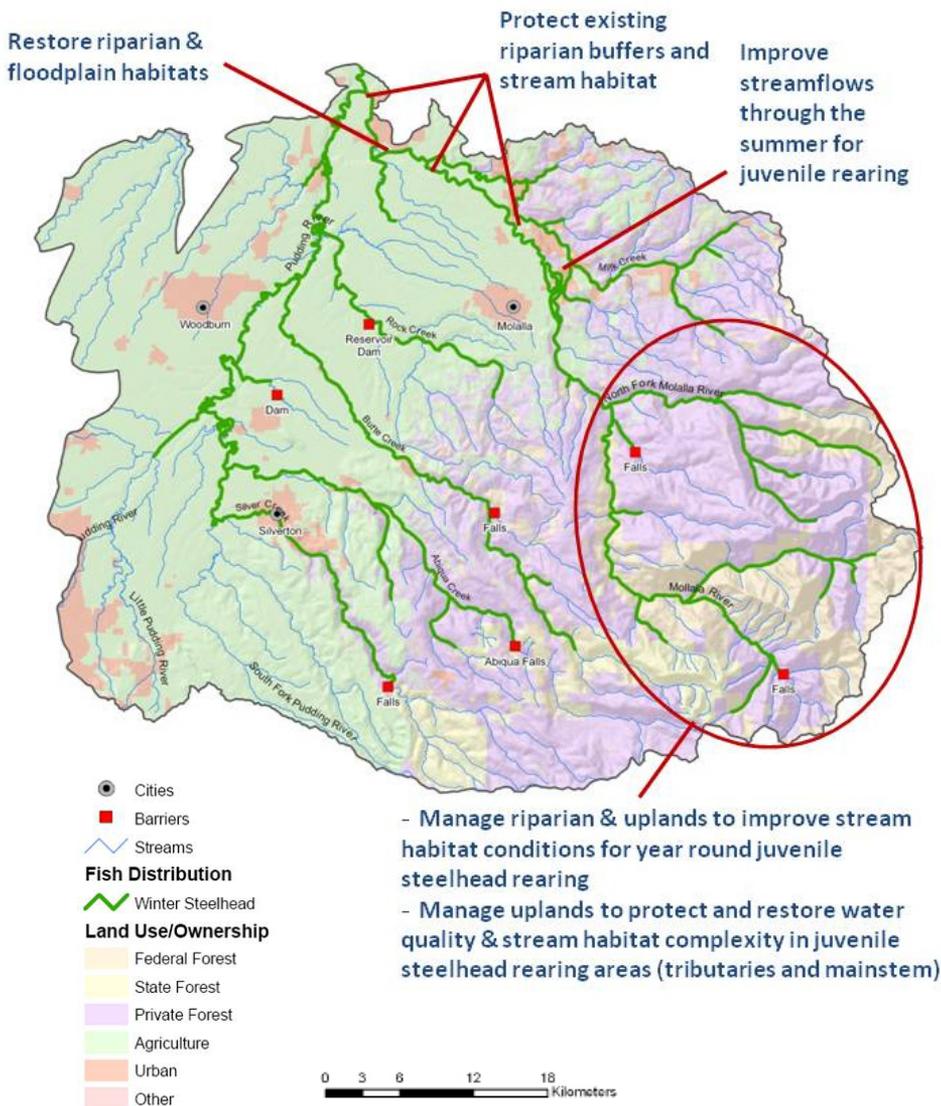


- Cities
- Barriers
- ~ Streams
- Fish Distribution**
- Spring Chinook
- Land Use/Ownership**
- Federal Forest
- State Forest
- Private Forest
- Agriculture
- Urban
- Other

- Manage riparian & uplands to improve mainstem Molalla River conditions for adult Chinook holding during the summer and spawning in the fall
- Manage uplands to protect and restore water quality & stream habitat complexity in juvenile rearing areas (tributaries and mainstem)



Molalla Winter Steelhead Protection and Restoration Actions



Recovery Actions for Chinook Salmon and Steelhead in the Molalla Basin

Problems	Solutions
<ul style="list-style-type: none"> • Core fish habitat needed to support recovery remains vulnerable to future degradation 	<ul style="list-style-type: none"> • Identify core functioning habitats that need greater protection to support recovery. • Protect core sites through management, acquisition and conservation. • Develop cooperative agreements with landowners and stakeholders. • Increase education and outreach.
<ul style="list-style-type: none"> • Riparian areas and vegetation communities are degraded 	<ul style="list-style-type: none"> • Protect healthy intact riparian buffers in core habitat areas. • Restore native riparian vegetation communities. • Develop Habitat Conservation Plans with landowners and stakeholders. • Apply Best Management Practices.
<ul style="list-style-type: none"> • Floodplains and side channels are not connected to streams 	<ul style="list-style-type: none"> • Reconnect side channels, wetlands and off-channel habitats to stream channels. • Enhance/restore seasonal wetlands. • Apply Best Management Practices.
<ul style="list-style-type: none"> • Stream habitat lacks complexity (including deep pools and large wood) 	<ul style="list-style-type: none"> • Increase holding pools for adult Chinook. • Restore natural channel form and bank stability. • Add stable wood and other large debris. • Apply Best Management Practices on upslope lands to reduce damage to stream.
<ul style="list-style-type: none"> • Degraded water quality (high water temps, pollutants) 	<ul style="list-style-type: none"> • Protect and expand cool water zones in summer, particularly for Chinook adults and juvenile steelhead. • Restore native riparian forests and vegetation • Apply Best Management Practices.
<ul style="list-style-type: none"> • Altered flows restrict habitat use, increase water temperatures 	<ul style="list-style-type: none"> • Implement water conservation measures. • Improve irrigation conveyance, efficiency. • Restore sources of cool, clean water. • Release flows from dam to meet targets.
<ul style="list-style-type: none"> • Dams, culverts, diversions and other barriers block/impair access to historical habitat 	<ul style="list-style-type: none"> • Improve adult access to areas above dams. • Improve downstream passage in reservoir. • Remove/replace barriers, especially in wadeable stream reaches. • Screen irrigation diversions.
<ul style="list-style-type: none"> • Adverse effects of out-of-basin hatchery Chinook stock. 	<ul style="list-style-type: none"> • Change existing hatchery stock due to lack of population improvement. • Promote hatchery conservation strategy as key limiting factors are fixed.

Priority Locations	Results
<ul style="list-style-type: none"> • Population-wide 	<ul style="list-style-type: none"> • Protects and conserves essential habitat for salmon recovery • Increases egg-to-smolt survival; improves habitat access; reduces prespawning mortality; increases spawning escapement
<ul style="list-style-type: none"> • Molalla River, mouth to confluence with North Fork Molalla River; North Fork Molalla; upper Molalla River; Table Rock Fork 	<ul style="list-style-type: none"> • Protects and improves stream health and complexity, and water quality • Increases egg-to-smolt survival; improves habitat access; reduces prespawning mortality; increases spawning escapement
<ul style="list-style-type: none"> • Population-wide 	<ul style="list-style-type: none"> • Improves stream health and flow • Restores off-channel, overwintering areas • Increases egg-to-smolt survival, habitat access, spawning escapement
<ul style="list-style-type: none"> • Molalla River, mouth to confluence with North Fork Molalla, Glen Avon Br. to Henry Cr.; above City of Molalla 	<ul style="list-style-type: none"> • Improves quality and depth of pools • Increases braided channels, diversity • Increases egg-to-smolt survival, improves habitat access, reduces prespawning mortality, improves spawning escapement
<ul style="list-style-type: none"> • Molalla, mouth to Henry Creek; Table Rock Fork; upper watershed 	<ul style="list-style-type: none"> • Reduces summer water temperatures • Improves watershed functions that maintain good water quality • Increases egg-to-smolt survival, improves habitat access, reduces prespawning mortality, improves spawning escapement
<ul style="list-style-type: none"> • Molalla R, mouth to NF Molalla; Trout Cr. 	<ul style="list-style-type: none"> • Provides minimum flow for fish passage • Improves summer flows • Increases egg-to-smolt survival, improves habitat access, reduces prespawning mortality, improves spawning escapement
<ul style="list-style-type: none"> • Molalla River at Shady Dell Creek (a Molalla River side channel); Irrigation Ditches #1, #2, and #3 	<ul style="list-style-type: none"> • Increases habitat access • Restores use of historical habitat
<ul style="list-style-type: none"> • Mainstem Molalla River 	<ul style="list-style-type: none"> • Allows hatchery program to jumpstart population to extent possible.

Examples of Successful Restoration

Many restoration efforts are already underway in the Molalla River watershed. Molalla RiverWatch, the Pudding River Watershed Council, local schools, landowners and others are working together to repair fish habitats and increase watershed health. The following examples illustrate how such efforts are working.

Molalla River side channel restoration

Challenge:

Side channel habitat in the Molalla River is limited. This Molalla River side channel lacked log structure or other suitable salmon and steelhead rearing habitat and refugia during high water.

Solution:

Molalla RiverWatch worked with landowners and OWEB to place three large wood structures along 1,000 feet of the side-channel to increase habitat complexity and provide off-channel rearing habitat for juvenile Chinook salmon, coho, native winter steelhead, and cutthroat trout. The project also replaced an in-stream ford crossing with a bridge (see next page).



Results:

The large wood provides cover for juvenile fish and substrate for aquatic insect colonization. The large wood has also increased the hydraulic complexity by creating deeper pools, areas of faster moving water, and deposition areas for gravel retention.

Molalla River side channel crossing

Challenge: With no other access, the landowner had to ford the stream channel to reach a barn and pasture land. The instream road reduced fish habitat quality and introduced sediment to the stream.



Solution:

The landowner worked with Molalla RiverWatch and obtained funding from OWEB to replace the in-stream ford crossing with a bridge. The channel crossing was abandoned. Molalla RiverWatch added large wood to restore instream habitat (see previous page).

Results:

The bridge gave the landowner easier, year-round access to the barn and pasture land without driving through the stream. This allowed channel conditions to recover, improving riparian and instream habitat. It also reduced erosion and sediment inputs into the stream.



Molalla River riparian area restoration



Challenge:

Damaged riparian conditions on a reach of the Molalla River contributed to severe erosion along 500 feet of streambank. The reach was unstable and no longer connected to its floodplain.

Solution:

Molalla RiverWatch worked with the landowner, Clackamas SWCD, and ODFW to stabilize the streambank. OWEB provided funding and the landowner and volunteers provided in-kind match. The bank was terraced to reduce the slope and reconnect it to the floodplain. The Canby High School Oregon Youth Conservation Corp helped plant willows and cottonwood. The area was lined with straw bales and seeded with native grass seed to prevent runoff into the river.



Results:

The project restored bank stability along this reach of the Molalla River. Riparian vegetation shades the stream, provides food and cover for fish, and improves water quality.

Watershed Restoration Partners & Resources

For more information on watershed issues and restoration opportunities in the Molalla River Watershed, visit the following links:

Molalla RiverWatch: Molalla RiverWatch is a non-profit organization that brings volunteers together on watershed restoration projects for the Molalla River and its tributaries. The Oregon Watershed Enhancement Board recognizes RiverWatch as the watershed council for the Molalla. <http://molallariverwatch.org/>

Pudding River Watershed Council. Molalla RiverWatch neighbor in the Pudding watershed and a partner on projects.

Clackamas Soil and Water Conservation District: The SWCD provides technical assistance to help landowners address soil and water quality issues on their land. <http://www.conservationsdistrict.org/>

EPA Watersheds Page: More information on watershed basics. <http://water.epa.gov/type/watersheds/index.cfm>

Marion Soil and Water Conservation District: The SWCD provides technical assistance to help landowners address soil and water quality issues on their land. www.marionswcd.net

Molalla River Alliance: Non-profit, all-volunteer conservation group of civic and conservation organizations, public agencies, user groups, and local property owners dedicated to preserving water quality and sustaining the wildlife, fish and plants in the Molalla watershed. <http://www.molallariveralliance.org>

Mt. Hood National Forest: The national forest is an important partner in watershed restoration. <http://www.fs.usda.gov/mthood/>

Oregon Department of Fish and Wildlife's South Willamette Watershed Page: ODFW is an important partner on fish habitat restoration projects. <http://www.dfw.state.or.us/swwd.html>

Oregon Watershed Enhancement Board: For more information on Oregon watersheds and grant programs. <http://www.oregon.gov/OWEB/>

Willamette Basin Explorer: Make your own maps of local watersheds. <http://willametteexplorer.info/index.aspx>

Information on Conservation Practices

The following organizations provide help and information on conservation practices that protect and restore habitat.

USDA Natural Resource Conservation Service (NRCS) in Oregon provides free conservation planning assistance and offers grants for solving natural resource problems.: <http://www.or.urcs.usda.gov/>

Oregon Conservation Reserve Enhancement Program (CREP) is a cooperative venture between the State of Oregon and the USDA Farm Service Agency with support from local soil and water conservation districts. <http://www.oregon.gov/OWEB/CREP.shtml>.

Alberta Riparian Habitat Management Society, also known as 'Cows and Fish', provides advice for improving grazing and other uses of riparian areas to enhance landscape health. <http://www.cowsandfish.org/>

Salmon-Safe works with farmers to encourage the adoption of sustainable agricultural practices that protect water quality and native salmon. Operations endorsed by its independent professional certifiers are promoted with the Salmon-Safe label. <http://salmonsafe.org>

The Oregon Department of Forestry identified BMPs for private forest practices. <http://www.oregon.gov/ODF/privateforests/fpaBMP.shtml>.

Willamette River Fish Recovery



Dave Jepsen

To learn more about Salmon and Steelhead recovery in the Willamette Basin, visit: oregonexplorer.info/willamette/WillametteRecoveryPlanning

To learn more about how you can help with salmon and steelhead recovery in the Molalla watershed, contact Molalla RiverWatch or the Pudding River Watershed Council:



Molalla RiverWatch
Phone: 503-824-2195
Email: riverwatch@molalla.net

Pudding River Watershed Council
Phone: 503-422-2844



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