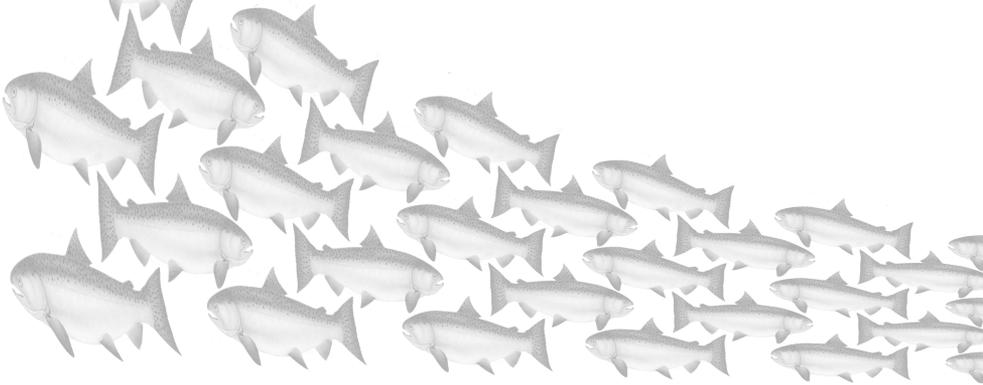


Bringing Back Spring Chinook & Winter Steelhead in the North Santiam Basin

A handbook
for
improving
fish habitat
conditions in
local streams



Willamette River Fish Recovery

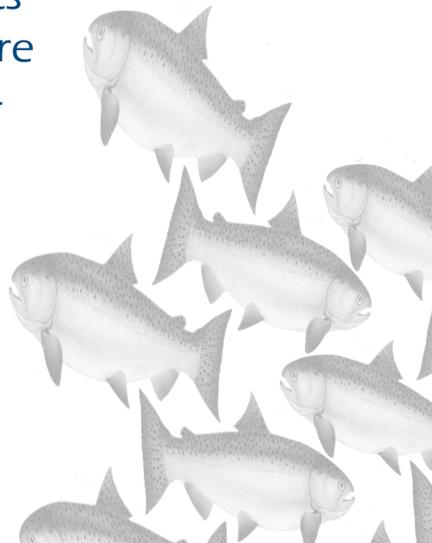
Willamette River Fish Recovery

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 North Santiam basin.

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 North Santiam Basin



A handbook for improving
fish habitat conditions in local
streams



Contents

The fate of North Santiam Spring Chinook
Salmon & Winter Steelhead - 2

Falling on hard times - 3

Why are the fish in trouble? - 4

What makes Upper Willamette Chinook Salmon
& Steelhead so unique? - 5

North Santiam River yesterday and today - 6

Recovering our Salmon & Steelhead - 7

Ways you can restore a healthy watershed - 8

Types of habitat restoration - 8

Using Best Management Practices - 9

Recovery actions for every life stage - 10

Recovery actions for Chinook Salmon &
Steelhead in the North Santiam Basin - 12

Examples of successful restoration - 16

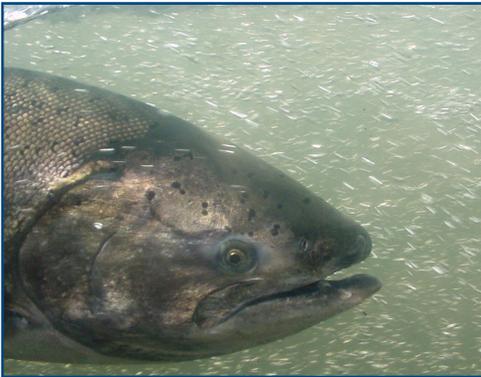
Resources for restoration partners - 19

Information on conservation practices - 20



The fate of North Santiam spring Chinook salmon and winter steelhead lies at a crossroad. Compared to historical levels, very few fish return to spawn in the North Santiam Basin. 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 North Santiam 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 North Santiam and 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 this special heritage.



Oregon Department of Fish and Wildlife



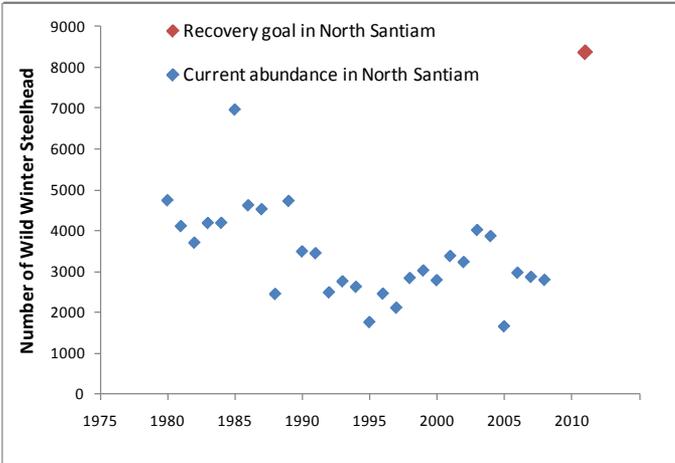
Why are the fish in trouble?

Salmon and steelhead face many risks during their complex, wide-ranging life cycle. They are anadromous, moving from the North Santiam 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, predation and past overfishing play a role.

Winter Steelhead



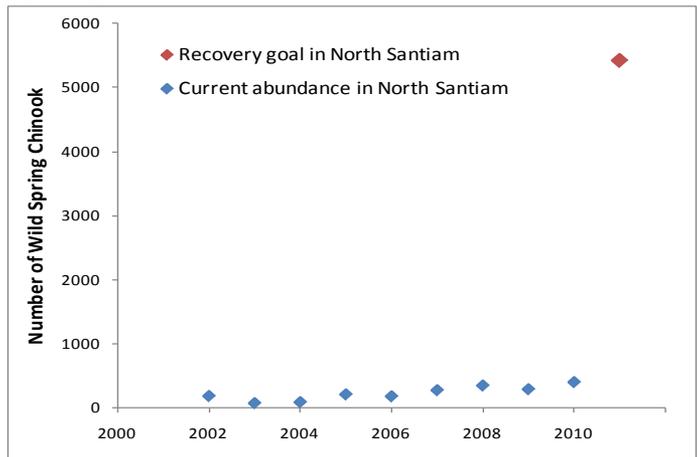
Winter Steelhead Current Status:
At **Low Risk** of extinction in 100 years.

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 **Low Risk**

Spring Chinook



What makes Upper Willamette Chinook Salmon & Steelhead so unique?

Salmon and steelhead in the North Santiam 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 North Santiam in the past

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

Flooding occurred almost yearly in the basin, with peak flows ranging up to 58,000 cfs. The flows cut through the steep upper river canyon and spilled across the lower river's extensive floodplain. They created complex, interconnected stream channels. They fed wetlands and riparian areas.



Salem Library Historic Photo Collection



Bands of mature forests buffered the river system and covered much of the upper watershed. The trees contributed large quantities of wood to stream channels, forming pools and creating hiding and feeding cover for adult and juvenile fish. Riparian vegetation shaded the stream channels and kept water cool for fish production.

The North Santiam today

Changes in the North Santiam watershed greatly affect salmon and steelhead today. Two large dams, Big Cliff and Detroit, now limit fish passage and influence downstream flow and temperature patterns. They also limit sediment, bedload and large wood delivery to lower reaches. Few mature riparian forests and wetlands exist in the lower basin. Remaining riparian areas are often in poor to fair shape.



Detroit Dam

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
7

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

Six general types of actions are needed to repair habitat conditions in the North Santiam watershed:

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 reduce soil erosion and protect water quality



Fencing out livestock allows riparian areas to recover



Rotating crops minimizes soil disturbance

Recovery actions for every stage of the Salmon & Steelhead lifecycle

Spawning

- Reduce the high pre-spawning mortality of adult salmon holding through the summer
- Re-establish salmon & steelhead in historic habitat above Big Cliff , Detroit Dams
- Manage the hatchery fish spawning in the wild to low levels

Migrating Adults

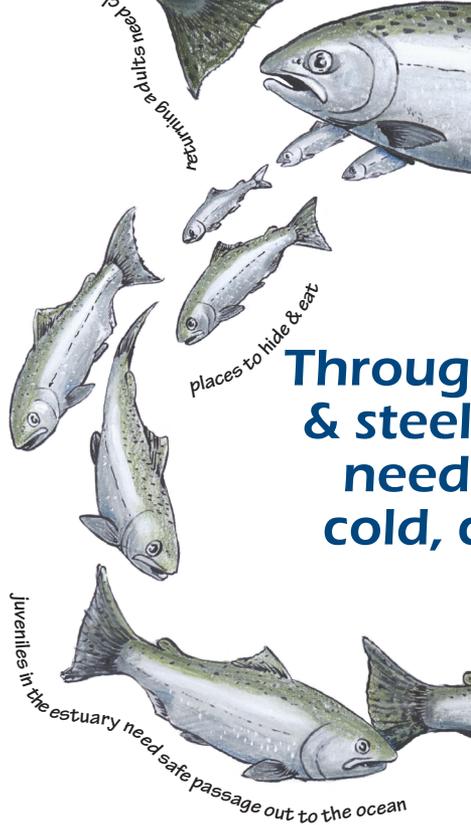
- Re-establish salmon & steelhead in historic habitat above Big Cliff , Detroit Dams
- Establish effective upstream passage of migrating adult fish through all dams and reservoirs
- Manage fishing at current lower levels to allow for recovery



places to rest & hide on the way home

Restoration and recovery actions are needed every stage

spawners need clean g



places to hide & eat

Through & steel need cold, c

gravel & plenty of room to nest



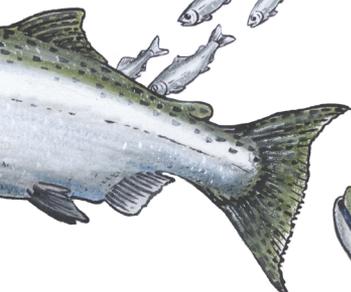
parr need pools, shade, places to hide & lots of bugs to eat

ion
very
are
at
ge.

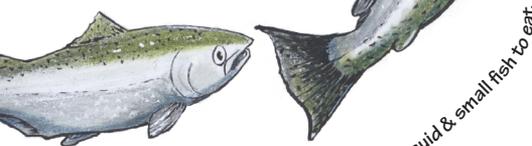


carcasses
fertilize
the stream

smolts need fast, safe passage to the estuary



h life, salmon
head always
abundant,
clean water.



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

Incubation

- Reduce impacts from altered water temperature below Big Cliff and Detroit Dams during egg incubation
- Reduce fine sediment loads that impair incubation gravels

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
- Establish effective downstream passage of juvenile fish through all dams and reservoirs

Estuary

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

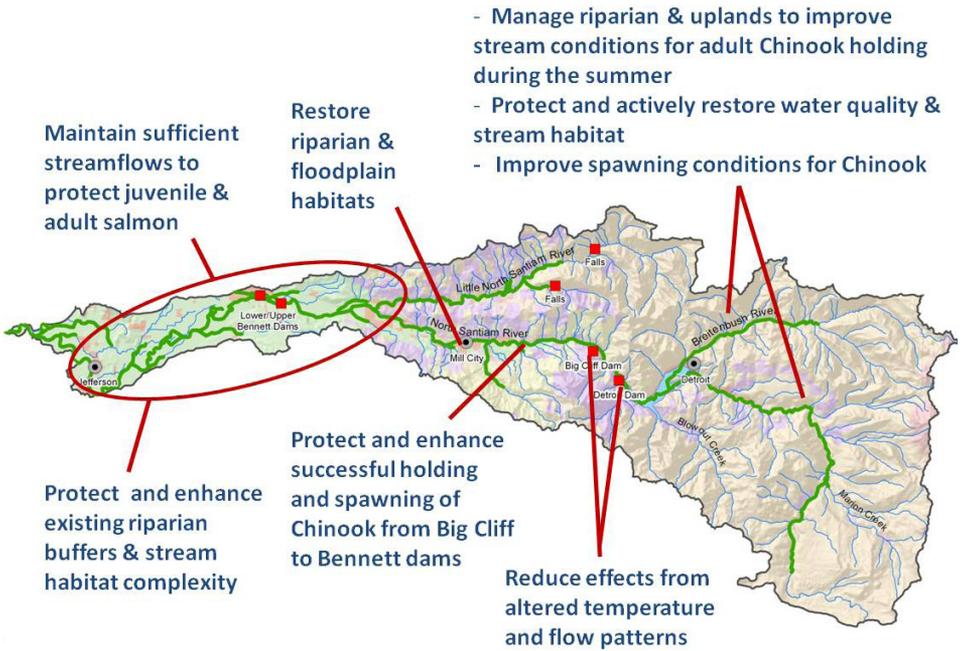
Ocean

- Manage fishing at levels to allow for recovery

Illustration by Blane Bellerud

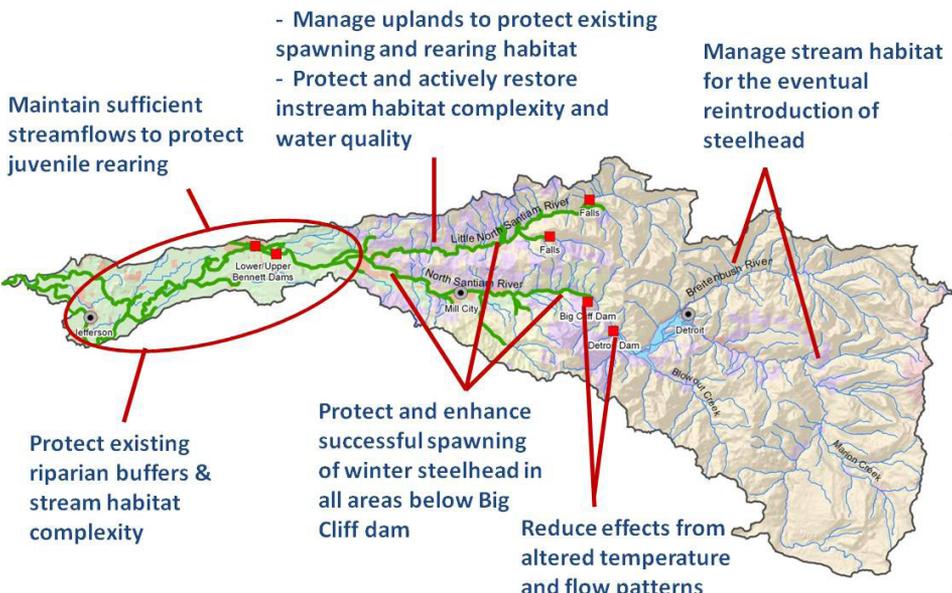
Recovery Actions for Chinook Salmon &

North Santiam Spring Chinook Protection and Restoration Actions



Steelhead in the North Santiam Basin

North Santiam Winter Steelhead Protection and Restoration Actions



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

Recovery Actions for Chinook Salmon & Steelhead in the North Santiam 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 appropriate landowners and stakeholders. Increase education and outreach. 	
<ul style="list-style-type: none"> Degraded riparian areas and conditions 	<ul style="list-style-type: none"> Protect healthy riparian buffers in core spawning and rearing 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 channel, wetland, confluence and off-channel habitats to stream channel. Enhance/restore seasonal wetlands. Apply Best Management Practices. 	
<ul style="list-style-type: none"> Stream habitat lacks complexity 	<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 habitat. 	
<ul style="list-style-type: none"> Degraded water quality (high water temps, pollutants, fine sediment) 	<ul style="list-style-type: none"> Protect and expand cool water zones in summer, especially for adult Chinook and juvenile steelhead Restore native riparian forests and vegetation Apply Best Management Practices to upslope land management. 	
<ul style="list-style-type: none"> Altered flows restrict habitat use, increase water temperatures 	<ul style="list-style-type: none"> Designate instream flow targets. Implement water conservation measures. Acquire/lease water rights. Improve irrigation conveyance, efficiency. Restore headwater 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 from hatchery fish on population traits and productivity 	<ul style="list-style-type: none"> Reduce hatchery fish in spawning areas. Promote wild zone above Detroit Dam. Promote hatchery conservation strategy. Mark all hatchery fish. 	

Priority Locations	Results
<ul style="list-style-type: none"> North Santiam River and tributaries, including Little North Santiam River 	<ul style="list-style-type: none"> Protects and conserves core fish habitats Improves egg-to-smolt survival, reduces prespawning mortality, increases spawning escapement
<ul style="list-style-type: none"> North Santiam R. and tributaries, (Bear Branch, Valentine, Stout, Snake, Deford, Elkhorn, Chehulpum, Little North Santiam, Boulder, Blowout, Breitenbush and Marion) 	<ul style="list-style-type: none"> Protects and improves stream health and complexity, and water quality Improves egg-to-smolt survival, increases habitat access, reduces prespawning mortality, increases spawning escapement
<ul style="list-style-type: none"> North Santiam River: near Stayton Bridge, downstream of Stayton, downstream of Mehama; historic side channels 	<ul style="list-style-type: none"> Improves stream health and flow Restores off-channel, overwintering areas Improves egg-to-smolt survival, increases habitat access, reduces prespawning mortality
<ul style="list-style-type: none"> Snake, Deford, Bear Branch, Stout, Rock, Mad, Sinker and Elkhorn creeks; Breitenbush R.; Little North Fork Santiam River; North Santiam 	<ul style="list-style-type: none"> Improves quality and depth of pools Increases braided channels, diversity Improves egg-to-smolt survival, reduces prespawning mortality, increases spawning escapement
<ul style="list-style-type: none"> North Santiam R. and tributaries, (Bear Branch, Valentine, Stout, Snake, Deford, Marion, Elkhorn, Chehulpum, Little North Santiam, Boulder, Blowout and Marion) 	<ul style="list-style-type: none"> Reduces summer water temperatures Improves watershed functions Improves egg-to-smolt survival, increases habitat access, reduces prespawning mortality, increases spawning escapement
<ul style="list-style-type: none"> Lower North Santiam River below dams; Rock and Stout creeks; headwaters 	<ul style="list-style-type: none"> Provides minimum flows for passage Improves summer flows Improves egg-to-smolt survival, increases habitat access, reduces prespawning mortality, increases spawning escapement
<ul style="list-style-type: none"> Big Cliff and Detroit dams; Lower Bennett Dam fishway; Santiam Water Control District canal; culverts on Little Rock, Mad, Valentine, and Cedar creeks and Sydney Ditch; Rock Cr. diversion 	<ul style="list-style-type: none"> Restores use of historical habitat Improves egg-to-smolt survival, increases habitat access, reduces prespawning mortality, increases spawning escapement
<ul style="list-style-type: none"> Population-wide 	<ul style="list-style-type: none"> Helps protect genetic diversity Improves egg-to-smolt survival, increases habitat access, reduces prespawning mortality, increases spawning escapement

Examples of successful restoration

Many restoration efforts are already underway in the North Santiam watershed. The North Santiam Watershed Council, local schools, landowners, various organizations, and individual volunteers are working together to repair fish habitats and increase watershed health. The following examples illustrate how such efforts are working.

Mad Creek fish passage improved



Challenge:

Two old, undersized culverts restricted fish access in Mad Creek. The 3-foot drop created by the angle of the culverts carved two separate channels in the gravel bank, and was impassable for juvenile and most adult fish.

Solution:

The North Santiam Watershed Council and its stakeholders found funding to improve fish passage at the site. Linn County contracted for removal of the culverts and construction of a new bridge.



Results:

The project restored juvenile and adult steelhead passage in the reach. It opened almost four miles of once inaccessible habitat to spawning fish. It also reconnected the stream with its floodplain, and reduced erosion and the chance of road failure.

Hatch side channel restoration

Challenge:

Several undersized culverts restricted fish access and water flow to off-channel habitat in this North Santiam River side channel near Hatch airport. The side channel also lacked good fish habitat. Restoring side channel habitat is a high priority for salmon and steelhead recovery.



Solution:

Five landowners along the side channel partnered with the watershed council and others to restore fish passage and off-channel habitats. They replaced culverts, connected the channel to backwater areas, added large wood, and replanted native riparian vegetation. They also revised management practices on adjacent lands to support habitat restoration.

Results:

The project returned salmon and steelhead to the channel and increased habitat complexity. New riparian vegetation will help stabilize the banks and improve habitat. The watershed council continues to work with landowners to plant and maintain the site.



Snake-Deford habitat restoration



Challenge:

Degraded habitat conditions and water quality in Snake and Deford creeks near the town of Mill City restrict Chinook and steelhead production. Several undersized culverts restricted fish access.

Solution:

Six landowners are working with the watershed council and others to improve fish habitat and water quality in the creeks. They added large wood to increase habitat complexity and replaced old culverts to improve fish passage. They are fencing and restoring native streamside vegetation to provide shade and better floodplain connection.



Results:

Project efforts are improving habitat conditions and access in Snake and Deford creeks for steelhead and Chinook. The watershed council is working with additional landowners and the town of Mill City to integrate habitat and water quality improvements with land uses and stormwater management.

Watershed restoration partners & resources

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

North Santiam Watershed Council: Brings volunteers together on watershed restoration projects. <http://www.nisantiamwatershed.org>

City of Salem: Supporter of watershed restoration efforts. <http://www.ci.salem.or.us/>

City of Stayton: Supporter of watershed restoration efforts. <http://www.staytonoregon.gov>

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

Marion County: For more information on Marion County, including user-friendly mapping tools. <http://www.co.marion.or.us/>

Marion Soil and Water Conservation District: Provides technical assistance and funding. <http://www.marionswcd.net/>

Oregon Department of Fish and Wildlife's South Willamette Watershed District: ODFW partners with the watershed council on projects. <http://www.dfw.state.or.us/swwd>.

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

South Santiam Watershed Council: Watershed council neighbor to the south, and a partner on programs. <http://www.sswc.org/>

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

Willamette National Forest: A partner in habitat restoration and protection. <http://www.fs.fed.us/r6/willamette/>

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: <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>

Oregon Tilth is a nonprofit organization supporting and promoting biologically sound agriculture through education, research, advocacy, and certification. <http://tilth.org>.

Farm Service Agency. Provides funding and assistance through Conservation Reserve Enhancement Program. <http://www.fsa.usda.gov/FSA/>

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 North Santiam Basin, contact the local watershed council:



North Santiam Watershed Council

Phone: 503-930-8202

www.nsantiamwatershed.org

Email: [council@](mailto:council@nsantiamwatershed.org)

nsantiamwatershed.org



Credits:

Written by Lance Kruzic & Barbara Taylor

Graphics & Illustration: Blane Bellerud & Merlin Alix Smith