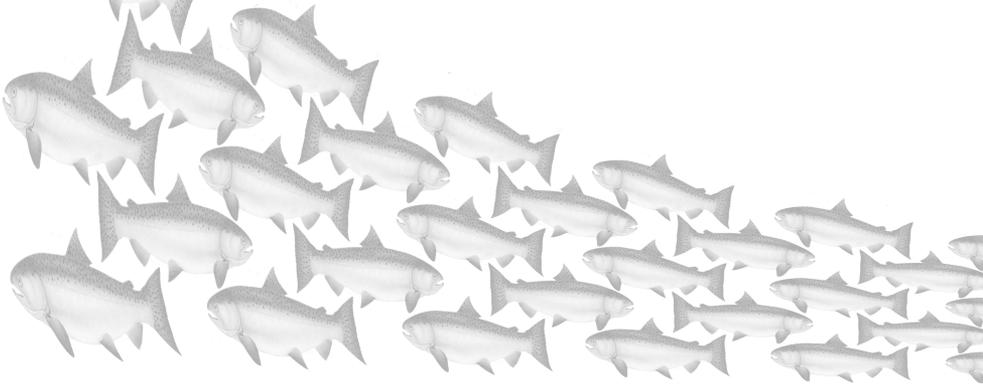


Bringing Back Spring Chinook Salmon in the Middle Fork Willamette Basin

A handbook
for
improving
fish habitat
conditions in
local streams



Willamette River Fish Recovery

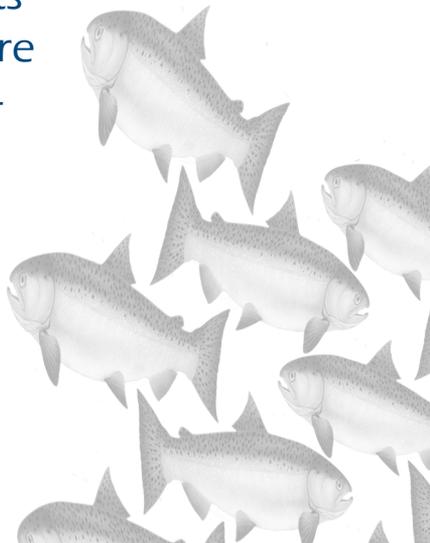
Willamette River Fish Recovery

This handbook provides guidance to help people identify and implement local habitat restoration actions that will aid recovery of spring Chinook salmon in the Middle Fork Willamette 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 in the Middle Fork Willamette River Basin



A handbook for improving
fish habitat conditions in local
streams



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Middle Fork Willamette



WATERSHED
COUNCIL



The fate of the Middle Fork Willamette's spring Chinook population lies at a crossroad. Compared to historical levels, very few fish return to spawn in the Middle Fork Willamette Basin. The salmon run is listed as threatened under the Endangered Species Act, and considered at risk for extinction.



This handbook shows where and how you can help restore habitat conditions for spring Chinook in the Middle

Fork Willamette watershed. We can work together to make sure the fish population remains 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 Middle Fork Willamette 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.

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



Oregon Department of Fish and Wildlife



Why are the fish in trouble?

Salmon face many risks during their complex, wide-ranging life cycle. They are anadromous, moving from habitats in the Middle Fork Willamette to the Willamette and Columbia rivers, the ocean, and then back.

Decades of human activities have hurt the fish. Chinook salmon remain vulnerable to a variety of threats, from those in headwater streams to the open ocean.

Today, the three largest threats to Upper Willamette River Chinook salmon are hydropower/flood control dam development and operations, habitat alteration and competition with hatchery fish. Additionally, climate change, disease, predation and past overfishing play a role.

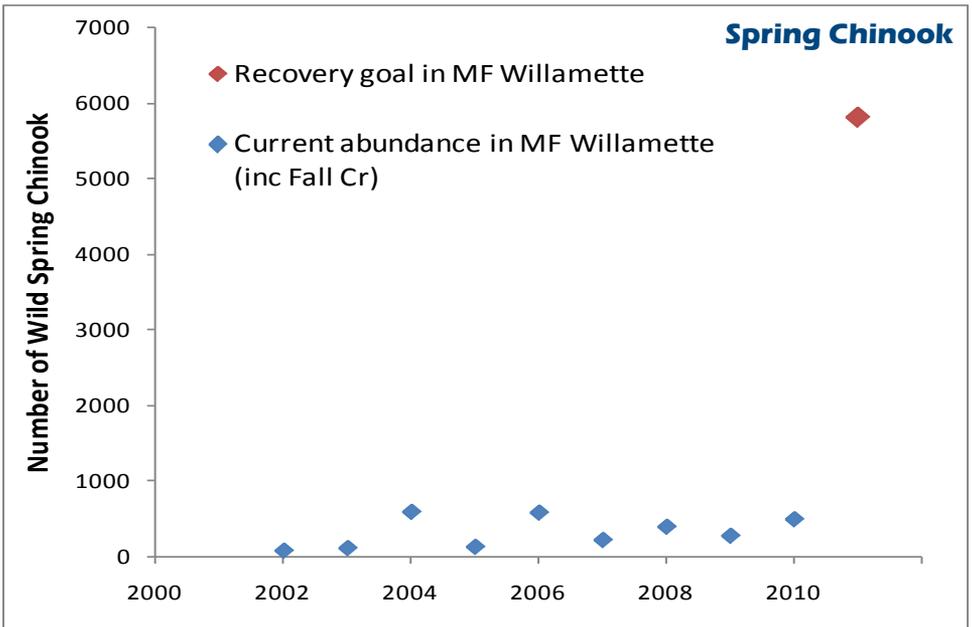
Spring Chinook

Current Status:

At **Very High Risk** (40% or more chance) of extinction in 100 years.

Recovery Goal:

Move population to **Low Risk** (5% or less chance) of extinction in 100 years.



What makes Upper Willamette Chinook Salmon so unique?

Chinook salmon in the Middle Fork Willamette and other Upper Willamette River subbasins hold genetic characteristics that set them apart from other species of salmon.

Historically, Upper Willamette Chinook salmon developed a unique run time and other attributes compared to their relatives in the lower Willamette and Columbia rivers. Willamette Falls historically restricted upstream migration during part of the year, and adult Chinook could only ascend the falls in the spring when stream flows were high. The falls restricted upstream migration in summer and fall when flows were low. The spring Chinook spawned and reared in the Middle Fork Willamette and other Upper Willamette basin tributaries that flow from the snowfields of the Cascade Mountains.



Willamette Falls, Salem Library Historic Photo Collection

The Middle Fork Willamette in the past

The Middle Fork Willamette River system once provided highly complex habitat conditions for Chinook salmon. Before the dams, the lower Middle Fork would swell with flows of up to 40,000 cfs from snowmelt and rainwater, and then spread the water across its healthy, connected floodplain through a system of shifting, braided channels.



Salem Library Historic Photo Collection



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 Middle Fork Willamette today

Today, changes in the Middle Fork Willamette watershed greatly affect the Chinook population. Several large dams restrict fish access to healthy habitat in the upper basin and influence downstream flow and temperature patterns. They also limit large wood delivery to lower reaches. Many valuable floodplain features such as islands, sloughs, and braided channels remain along the river below Dexter Dam, but changes in timing and magnitude of floods has affected the establishment of cottonwood and other plant species. Fewer mature riparian forests and wetlands exist.



Dexter Dam

Recovering our Salmon

A watershed that supports a healthy salmon population 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. It makes 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 Chinook salmon and other fish 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 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 Middle Fork Willamette 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.



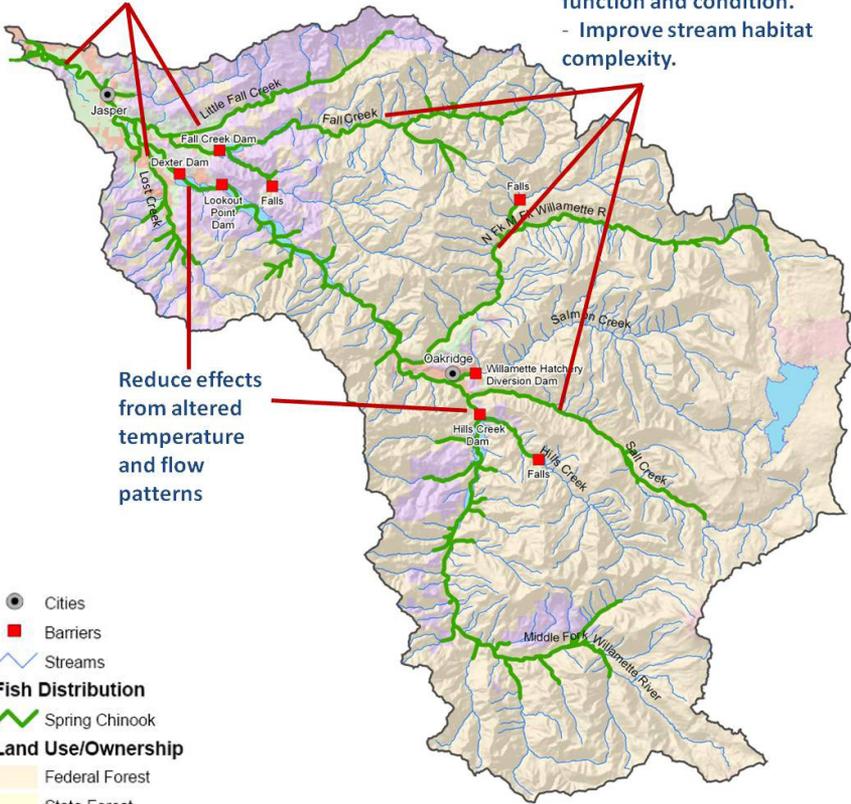
Middle Fork Willamette Watershed Council

Recovering Chinook Salmon in the Middle Fork Willamette Basin

Protection and Restoration Actions

Protect & restore riparian and stream complexity for juvenile & adult rearing & migration

- Protect & restore ecological function and condition.
- Improve stream habitat complexity.



Reduce effects from altered temperature and flow patterns

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



Recovery Actions for every stage of the Salmon Lifecycle

Spawning

- Reduce the high pre-spawning mortality of adult Chinook holding through the summer
- Re-establish Chinook salmon in historical habitat above dams and other barriers
- Manage the hatchery fish spawning in the wild to low levels

Migrating Adults

- Re-establish salmon in historical habitat above Dexter, Lookout Point, Hills Creek, and Fall creek dams
- Manage fishing at current lower levels to allow for recovery



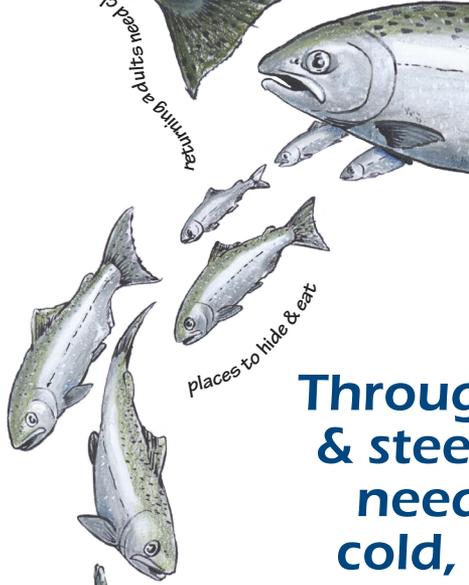
passage upstream

returning adults need clean & safe passage upstream



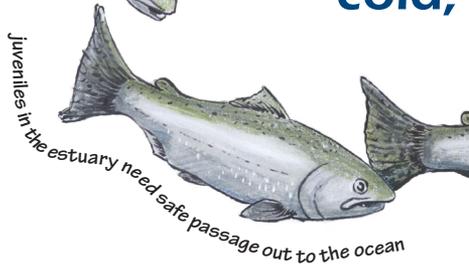
spawners need clean g

Restoration and recovery actions are needed every stage



places to hide & eat

Through & steel need cold,



juveniles in the estuary need safe passage out to the ocean

gravel & plenty of room to nest



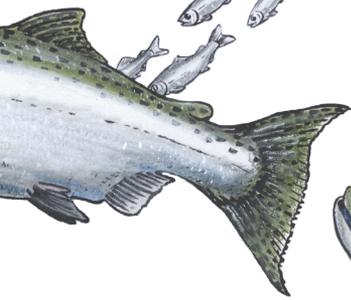
parr need pools, shade, places to hide & lots of bugs to eat

ion
very
are
at
age.

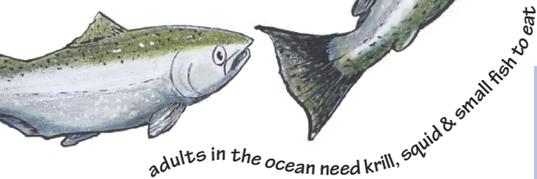


carcasses
fertilize
the stream

smolts need fast, safe passage to the estuary



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



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

Incubation

- Reduce unnatural water temperature effects below dams
- Increase supplies of gravel and other material below dams

Juvenile Migration

- Improve downstream survival of juvenile fish through reservoirs and dams
- Keep adequate levels of water in the stream throughout the summer

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

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**

Key Recovery Actions for Chinook Salmon in the Middle Fork Willamette River 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, confluence and off-channel habitats to stream channel, particularly in moderate gradient streams. 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. 	
<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 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. Reduce impervious surfaces that increase peak flows. 	
<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 hatchery fish on productivity and diversity of wild population 	<ul style="list-style-type: none"> Promote wild zone above Fall Creek and Lookout Point dams Promote conservation strategy. Develop a reintroduction program and implement above dams. Mark all hatchery fish. 	

	Priority Locations	Results
		<ul style="list-style-type: none"> • Protects and conserves core fish habitats • Increases egg-to-smolt survival; improves habitat access; reduces prespawning mortality; increases spawning escapement
	<ul style="list-style-type: none"> • Lower reaches of Hills, Lost and Little Fall creeks, lower Middle Fork Willamette, lower reaches of lower Middle Fork Willamette tributaries 	<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"> • Lower Middle Fork Willamette, lower Lost Creek, lower Coast Fork Willamette River 	<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"> • Lost Creek, Little Fall Creek 	<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"> • Hills, Lost and Little Fall creeks; Middle Fork Willamette and lower tribs; Salt Creek, North Fork Middle Fork Willamette, Lost Creek, Fall Creek above Fall Creek Dam 	<ul style="list-style-type: none"> • Reduces summer water temperatures • Increases egg-to-smolt survival, improves habitat access, reduces prespawning mortality, improves spawning escapement
	<ul style="list-style-type: none"> • Lower Middle Fork Willamette watershed; Lost Creek 	<ul style="list-style-type: none"> • Increases occurrence of peak flows • Improves summer flows • Increases egg-to-smolt survival, improves habitat access, reduces prespawning mortality, improves spawning escapement
	<ul style="list-style-type: none"> • Little Fall Cr tribs; Lost Cr tribs (Wagner, Middle, etc); Wallace Cr; Winberry Cr; Middle Fork Willamette tribs (Rattlesnake, etc.); Hills Cr tribs 	<ul style="list-style-type: none"> • Increases habitat access • Restores use of historical habitat
	<ul style="list-style-type: none"> • Population-wide 	<ul style="list-style-type: none"> • Helps protect genetic diversity • Reduces effects of hatchery fish on the productivity and diversity of the wild population

Examples of Successful Restoration

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

Little Fall Creek Habitat Restoration



Challenge:

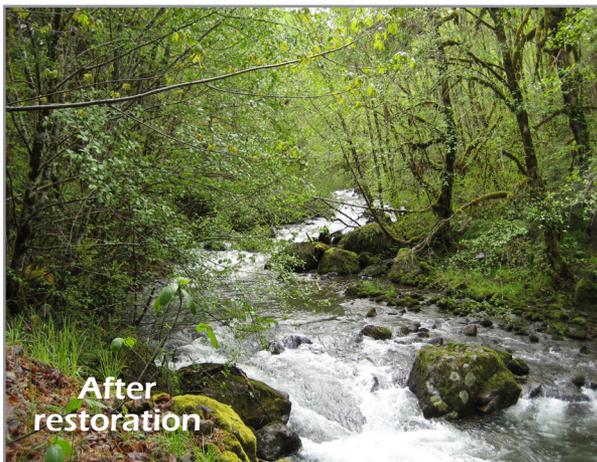
Little Fall Creek watershed contains some of the best spring Chinook habitat in the Middle Fork Willamette watershed. Stream survey results show that low stream channel complexity and limited spawning gravel now limit spring Chinook production in Little Fall Creek.

Solution:

The Middle Fork Willamette Watershed Council has secured funds and is working closely with landowners and agencies to design and implement a channel enhancement project for Little Fall Creek. Surveys are underway and will be followed by placement of large wood and boulders.

Results:

Large wood and boulders will be added throughout the length of Little Fall Creek. Adding the structure will benefit Chinook by improving channel complexity, creating new holding pools, increasing feeding areas, and assisting with the trapping and retention of spawning gravels.



Restored habitat at Middle Fork Willamette and Lost Creek confluence

Challenge:

The confluence of the Middle Fork Willamette River and Lost Creek at Elijah Bristow State Park was once part of a historical floodplain that provided excellent fish habitat. The 30-acre historical floodplain forest was logged extensively in the mid-1900s and used for livestock grazing. Restoring the area is one of the highest priorities for the Middle Fork Willamette watershed.



During restoration

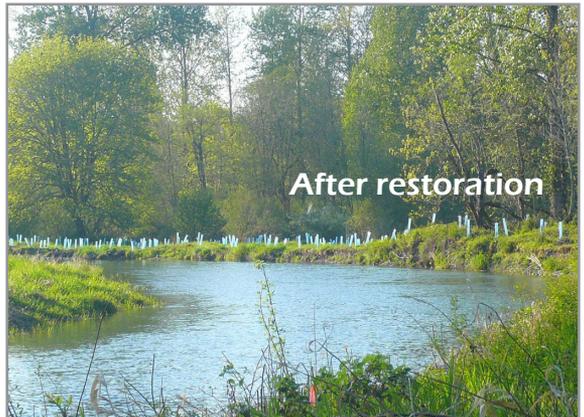
Aryana Ferguson

Solution:

In 2004 the watershed council, several other organizations, and hundreds of volunteers began restoring the area. The project involved extensive weed removal, planting of over 4,500 native trees, the installation of an innovative solar-powered irrigation system, and monitoring for Chinook, western pond turtle and red-legged frogs.

Results:

A healthy riparian corridor is growing at the confluence. Floodplain conditions continue to improve and build a strong connection with the Middle Fork Willamette and Lost Creek. The project is restoring off-channel and wintering habitat for Chinook. Habitat for western pond turtles and other wildlife is also improving.



After restoration

Eve Montanaro

Buck Creek Fish Passage

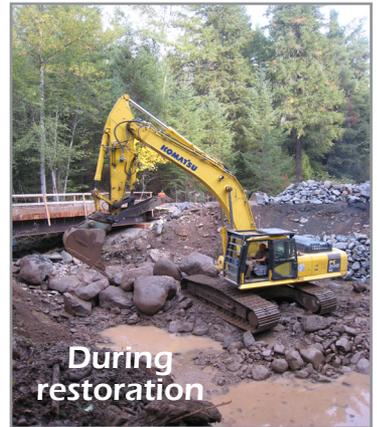


Challenge:

A 25-foot wide concrete box culvert on Buck Creek blocked passage of Chinook and bull trout to some of the highest quality habitat available in the watershed.

Solution:

In 2009 the watershed council partnered with the U.S. Forest Service to remove the barrier. They replaced the culvert with a bridge, opening 3.5 miles of habitat to chinook salmon and bull trout. They also reestablished the stream bed to flow naturally and unobstructed. Streambanks were stabilized and replanted with native vegetation.



Results:

Removing the culvert and replacing it with the bridge restored fish passage to high quality historical habitat in Buck Creek. It also restored the stream channel to a more natural condition.

Watershed Restoration Partners & Resources

For more information on watershed issues and restoration opportunities in the Middle Fork Willamette Watershed, visit the following links:

Middle Fork Willamette Watershed Council: The Middle Fork Willamette Watershed Council brings diverse stakeholders together to plan, implement and monitor watershed restoration projects. <http://www.mfwwc.org>

City of Eugene: The lower Middle Fork Willamette is near this large municipality. <http://www.eugene-or.gov/>

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

Lane Council of Governments: The agency provides planning, design and restoration experience. <http://www.lcog.org>

Lane County: For more information on Lane County programs. <http://www.co.lane.or.us/>

Oregon Department of Fish and Wildlife's South Willamette Watershed Page: ODFW is an important partner of the Middle Fork Willamette Watershed Council. <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>

Willamette National Forest: The national forest is an important partner on habitat restoration projects. <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 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 recovery in the Middle Fork Willamette Basin, contact the local watershed council:

Middle Fork Willamette



WATERSHED
C O U N C I L

**Middle Fork
Willamette Watershed
Council**

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