Greater Oregon City Watershed Council **Watershed Action Plan** | May 2010

ICF INTERNATIONAL

GREATER OREGON CITY WATERSHED COUNCIL WATERSHED RESTORATION ACTION PLAN

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Acronyms and Abbreviations

BMPs	best management practices
GOCWC	Greater Oregon City Watershed Council
NRCS	Natural Resources Conservation Service
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OWEB	Oregon Watershed Enhancement Board
OWRD	Oregon Water Resources Department
ROTC	Reserve Officers' Training Corps
SM	stream mile
SWCD	Soil and Water Conservation District
UGB	Urban Growth Boundary
USFWS	U.S. Fish and Wildlife Service

Introduction and Purpose

This action plan will serve as a guide for the Greater Oregon City Watershed Council (GOCWC) in its selection, implementation, and monitoring of projects in the Greater Oregon City Watershed over a 10-year period. The action plan describes:

- How GOCWC will engage in a long-term, science-based program to advance adaptive and accountable restoration within the Greater Oregon City subwatersheds: Abernethy Creek, Beaver Creek, and Willamette Tributaries.
- The GOCWC restoration priorities and strategies to reduce historical and current threats to watershed health and to restore streams, fish populations, and water quality.
- The range of activities that the GOCWC will engage in, including public outreach and education, restoration, and monitoring.
- A framework and roadmap for increasing the pace and improving the effectiveness of watershed restoration by implementing voluntary watershed restoration projects and landowner education.

The action plan builds on background information and restoration rationale outlined in the *Greater Oregon City Watershed Assessment* (ICF International 2010). The assessment described the characteristics of the three subwatersheds; provided detailed information on the watershed's physical characteristics, fish populations, streamside vegetation, and water quality; and delineated the threats that impair the viability of the watershed.

Watershed and Subwatershed Overview

This section summarizes information from the *Greater Oregon City Watershed Assessment* (ICF International 2010).

The watershed assessment area encompasses the stream network for three subwatersheds: Abernethy Creek, Beaver Creek, and Willamette River (Figure 1).

- Abernethy Creek enters the Willamette River at river mile 25.3 and is tidally influenced at its confluence with the river. Lower Columbia River anadromous (i.e., residing in the ocean as adults and returning to rivers and streams to spawn) runs of coho salmon and steelhead trout are present in this subwatershed.
- Beaver Creek, of which Parrott Creek is a large tributary, enters the river above Willamette Falls at river mile 31.4; this system is not tidally influenced. Because Beaver Creek is above the falls, which historically blocked some fish runs, this stream is part of the Upper Willamette River system. The Beaver Creek subwatershed contains resident cutthroat trout and Pacific lamprey and may now be accessible to Upper Willamette River steelhead.
- The Willamette River subwatershed consists of small tributaries that begin within the Oregon City Urban Growth Boundary (UGB) and flow over steep-sided bluffs directly into the river. These small streams are very high gradient and do not contain fish with the exception of lower channel habitats within the Willamette River floodplain. Fish occupy the lower floodplain portions of these small streams during high-flow periods.

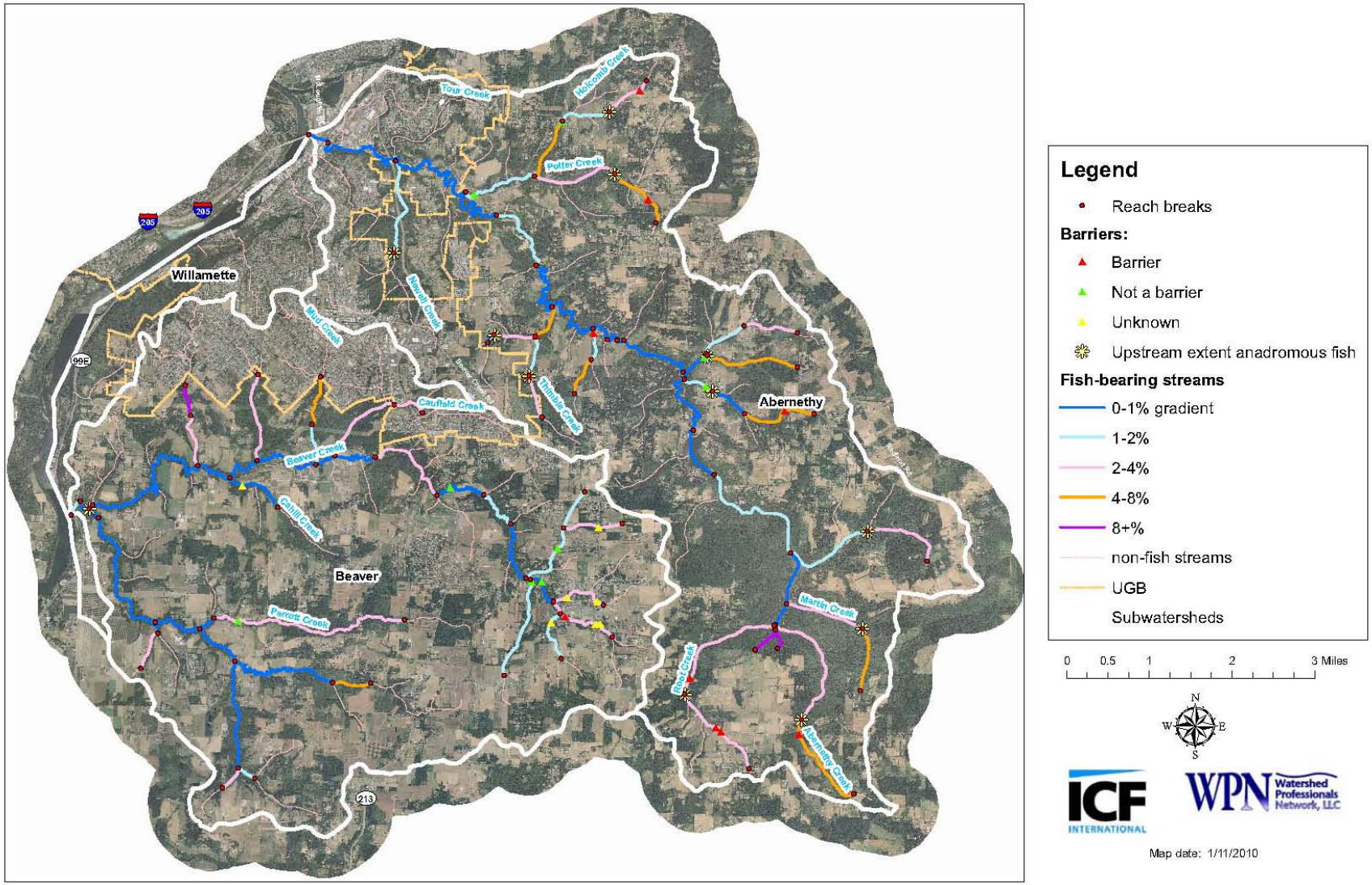
The watershed assessment area is within the Willamette River Basin in western Oregon. Abernethy and Beaver creeks begin at elevations of about 1200 feet above mean sea level and flow generally in a northwesterly direction to join the Willamette River. Because the entire watershed assessment area is within the low elevation portions of the Willamette Valley, there are no mountainous areas to capture winter snowpack. Consequently, most precipitation comes from rainfall. The largest quantities of rainfall occur between October and November; very little precipitation occurs during the summer and early fall, when stream flows are at their lowest.

The watershed assessment area encompasses 44,353 acres (Table 1). The Abernethy Creek and Beaver Creek subwatersheds are similar in size (21,573 and 20,083 acres, respectively); the Willamette subwatershed is the smallest (2,697 acres). The headwaters of Abernethy and Beaver creeks are largely in unincorporated Clackamas County. Approximately 17% of the watershed assessment area is within the Oregon City UGB). A significant portion of the Abernethy subwatershed, primarily the lower stream channel, is within the UGB (16%). A somewhat smaller portion of the Beaver Creek subwatershed is within the UGB (13%), primarily small streams that originate in Oregon City and flow north into Beaver Creek. Most of the Willamette River subwatershed is within the UGB (59%).

Table 1. Greater Oregon City Watershed Assessment Subwatershed Acreages and Proportions within the Oregon City Urban Growth Boundary

Subwatershed	Total Area Acres (Square Miles)	Oregon City UGB Acres (Square Miles)	Percentage within Urban Growth Boundary
Abernethy	21,573 (33.71)	3,471 (5.42)	16%
Beaver	20,083 (31.38)	2,562 (4.00)	13%
Willamette	2,697 (4.21)	1,596 (2.49)	59%
Total	44,353 (69.30)	7,629 (11.92)	17%

Figure 1. Watershed Assessment Area Base Map



Watershed Conditions, Limitations, and Opportunities

This section summarizes information from the *Greater Oregon City Watershed Assessment* that describes watershed conditions, factors limiting fish populations and water quality, and opportunities for restoration.

Conditions and Limitations

Urbanization, roads, and other land uses have modified stream habitat, riparian vegetation, fish populations, and water quality within the watershed assessment area. Table 2 summarizes the watershed conditions for the subwatersheds based on the watershed assessment.

The Abernethy Creek, Beaver Creek, and Willamette River subwatersheds have been dramatically altered over the years as a result of urbanization, agriculture, and other land uses. The greatest limitations to watershed health and fish populations within the three subwatersheds include:

- Water quality issues: temperature and sedimentation
- Stormwater from Oregon City headwater streams: modifications in water quality and flow patterns
- Stream habitat quality: channels incised and disconnected from floodplain; scarcity of wood in the channel limiting complex habitats
- Fish passage barriers on Abernethy Creek and Beaver Creek and tributaries
- Riparian areas: modified vegetation composition and narrowed corridor; weedy conditions prevail in many areas
- Water flow: water withdrawals probably reducing water flow during the late summer and early fall

Information is available on the general health of streams and riparian areas in the watershed assessment area; however, detailed, site-specific information for key watershed characteristics is limited, particularly for fish habitat and water quality. For example, no comprehensive inventory of fish habitat throughout the channel network exists; such an inventory would delineate the presence of pools and the quantity of large wood in the channel. Similarly, almost no water quality data exists for key parameters such as water temperature. Because of these data limitations, it is difficult to develop restoration actions that focus on the issues limiting fish populations and water quality for sections of the stream network or a specific landownership.

Collecting baseline information on stream habitat and water quality should be the GOCWC's first priority. Data collection efforts should use existing protocols, such as the Oregon Department of Fish and Wildlife (ODFW) Aquatic Habitat Inventory and the Oregon Department of Environmental Quality (ODEQ) stream temperature collection methods.

Opportunities

The GOCWC, in collaboration with landowners and other partners, should focus actions to improve watershed conditions on the following strategic areas and opportunities.

- During flood events the Willamette River creates a backwater area in Abernethy Creek as far upstream as Holcomb Creek, which creates a winter rearing area for Willamette Basin salmon and steelhead populations during floods.
- Abernethy Creek and key tributaries are important for coho, steelhead, and lamprey migration, rearing, and spawning.
- With the elimination of the fish passage issue at Sevick Pond, Beaver Creek is now accessible to Upper Willamette steelhead and lamprey.
- Habitat in the lower watershed within Oregon City and the surrounding areas, particularly in Newell Creek and Holcomb Creek, represents some of the highest quality salmon and steelhead habitat in the Portland area.
- The Metro property in the Newell Creek watershed and the Holcomb Creek area is a focus area for Metro's protection and restoration efforts.
- Oregon City is strategically located, with headwater streams within the city limits draining into all three subwatersheds and thus influencing water quality and fish habitat in downstream areas.

Table 2. A Summary of Watershed Conditions in the Watershed Assessment Area

Location	Condition Summary
Abernethy Creek Subwatershed	• Abernethy Creek and tributaries are important habitat for lower Willamette River populations of coho and steelhead and other native fish species • Riparian vegetation composition is modified and the corridor is narrowed; weedy conditions prevail in many areas • Fish passage barriers are present, with several on the mainstem • Stream habitat is simplified with limited wood • Most of lower Abernethy Creek is within Oregon City • During flood events, the Willamette River creates a backwater area in Abernethy Creek as far upstream as Holcomb Creek • Important migration corridor for coho, steelhead, and lamprey • Winter rearing area for Willamette Basin salmon and steelhead populations during floods • Water quality issues: temperature, sedimentation, and stormwater • The stream channel is incised and disconnected from the floodplain • The headwaters of Newell Creek are within Oregon City • Metro property in the Newell Creek watershed and Holcomb Creek is a focus area for protection and restoration • Newell and Holcomb creeks are important for coho, steelhead, and lamprey spawning and rearing and contain areas with high quality habitat
Oregon City Headwater Streams encompassing all subwatersheds	• Headwater streams originate in Oregon City and flow into all three subwatersheds • Large area of impervious surfaces • Water quality issues: sedimentation and stormwater • Streams within the Willamette Subwatershed do not have fish use, with the exception of the lower portions within the Willamette River Floodplain
Beaver Creek Subwatershed	• Beaver Creek, Parrott Creek, and tributaries are now accessible to steelhead and lamprey • Water quality issues: sedimentation (other conditions are unknown) • Water withdrawals are probably reducing water flow during the late summer and early fall • Riparian vegetation composition is modified and the corridor is narrowed; weedy conditions prevail in many areas • Fish passage barriers are present • Fish passage conditions are unknown at many road crossings • Stream habitat conditions are unknown • Sevick Dam washed out in the January 2, 2009, flood; upstream areas are now accessible to fish • A large quantity of sediment is exposed in the drained Sevick Pond area, which will become a weedy area • The channel is down-cutting through the sediments and may create fish passage issues

Watershed Restoration Strategy and Priorities

Roni et al. (2002) outlines an approach for prioritizing restoration projects. The strategy builds on key principles of watershed function and conservation biology. The first component is to focus efforts on protecting existing areas with high quality habitat. The second component is to indentify, based on the watershed assessment, the factors that are limiting water quality and fish populations. Combing these components creates an integrated watershed improvement strategy for the GOCWC, which focuses on activities that will protect and restore watershed processes that are essential for the creation and maintenance of fish habitat and water quality.

Based on this prioritization approach (Roni et al. 2002), the GOCWC watershed restoration strategy focuses on the following types of projects.

- **Protecting high quality habitats.** High quality habitats for salmon, trout and other species "anchor" the restoration effort and provide core areas that can be enhanced and then reconnected to the whole watershed through restoration actions. This strategy is centered on a key principal of conservation biology, which emphasizes the importance of protecting habitats that are better functioning while restoring degraded habitats.
- **Restoring fish passage.** Restoring fish passage is a high priority because it has a very high probability of success and it provides immediate access to historic habitat.
- **Restoring hydrologic and water quality processes because these actions help maintain and restore aquatic habitat.** Hydrologic processes include sediment delivery to stream channels, water flow regimes (low and high flows), and can be affected by stormwater management and water withdrawals. Riparian areas also affect hydrologic and water quality processes by providing floodplain connections, shading streams, and providing large wood that contributes to complex stream habitat.
- **Restoring instream flows.** Engaging in instream restoration projects, such as placement of instream large wood, which are best implemented in conjunction with reconnection of isolated high quality habitats and projects to restore watershed processes.
- **Educating landowners and other watershed stakeholders** on actions they can take to protect and restore the watershed.

The GOCWC will pursue this strategy through the following methods:

- Engaging in assessment and monitoring projects to better understand stream habitat quality, key areas for restoration (e.g., areas with riparian weeds), and water quality (e.g., water temperature patterns);
- Working with local jurisdictions, including Oregon City and Metro, to protect and restore key high quality habitat areas;
- Engaging landowners and jurisdictions in voluntary restoration projects;
- Educating landowners on best management practices and approaches for restoring habitat on their property; and
- Tracking trends in habitat, water quality, and stream flow as restoration proceeds.

GOCWC Restoration Project Accomplishments

The action plan will build on the GOCWC's restoration project accomplishments, described below, and expand efforts into new geographic areas and project types.

Abernethy Phase I

The GOCWC was awarded a $6,650 grant from the Oregon City/Metro Enhancement Fund for the Abernethy Phase I project. The project enhanced the riparian corridor along Abernethy Creek from Main Street to just east of the Washington Street Bridge. The project area covers four tax lots, which are owned by the Oregon Department of Transportation (ODOT), Oregon City, and Historic Properties LLC.

Two volunteer events were held (one in 2006 and one in 2007) to remove garbage, including debris remaining from the residence that was demolished on the Oregon City parcel, and nonnative invasive vegetation, including Himalayan blackberry, Clematis spp., English ivy, nightshade, laurel, English hawthorn, and holly.

Two planting events were held (one in 2006 and one in 2007) to revegetate the area with native riparian species. The long-term goal of the planting was to develop a structurally complex corridor that would provide habitat for wildlife and shade for Abernethy Creek. Subsequent volunteer events have been held to remove nonnative, invasive plants.

Abernethy Phase II

The GOCWC was awarded a $14,285 grant from the Oregon City/Metro Enhancement Fund for the Abernethy Phase II project. The project is located west of Washington Street on Oregon City park land. The GOCWC coordinated efforts to remove invasive species, plant natives, and mulch the ground along Abernethy Creek at Abernethy Park in Oregon City. This project supports the long-term goal of plant survival and successful establishment of a structurally complex corridor that will provide habitat for wildlife and shade for Abernethy Creek.

The bulk of the project was completed in 2008. Clackamas County Corrections' crews removed much of the invasive plants in the spring/summer. Students from Springwater Elementary Environmental Charter School and Oregon City High School Junior Reserve Officers' Training Corps (ROTC) planted 300 plants along the banks and slopes of the creek. The Junior ROTC volunteers also removed 40 cubic yards of invasive plants and 5 cubic yard of roofing material from the park. Echo Valley Natives nursery donated plants, Oregon City provided tools, and the National Guard provided a warming tent. The students had a lot of fun and learned about the value of riparian areas.

Tooze Pond

The GOCWC was awarded a $3,500 grant from the Oregon City/Metro Enhancement Fund for the Tooze Pond project. The project area includes two parcels. The northern perimeter of the pond is owned by Oregon City and the southeastern parcel is privately owned by City Councilmember Dan Tooze and contains a permitted dammed lake in Cauflield Creek just west of Highway 213. The majority of the project area lies beneath BPA power lines.

In 2008, 1 ton of garbage and nonnative, invasive vegetation, including Himalayan blackberry and Japanese knotweed, was removed from the site. Because of past harassment issues (e.g., garbage, rock throwing, BB guns directed at glass bottles and wildlife) associated with the residents of the apartment complex to the north, a strip of blackberries was left along the northern perimeter of the project area to limit human access from the north.

The site, which lies within an environmentally sensitive area, zoned by Oregon City as a Water Quality Resource Overlay, was degraded. Restoration of the riparian vegetation will support its ability to improve water quality and protect slope stability. Trees and shrubs improve water quality by reducing rapid stormwater runoff, increasing water infiltration, allowing groundwater recharge, and shading streams. Fish, such as cutthroat trout, and macroinvertebrates inhabiting Caufield Creek will benefit from any improvements to water quality. Waterfowl, wading birds, osprey, and wetland songbirds that frequent the pond will benefit from additional structure, cover, and prey base as the plants mature. In addition to providing wildlife habitat, the trees and tall shrubs will improve air quality and provide noise attenuation.

Coniferous trees and native dogwoods were planted along the northern perimeter of the project area, wherever possible, to buffer the pond from the adjacent development and to provide cover and shade for a remnant population of cutthroat trout. The property owner actively managed this project.

Younger Project

The Younger project was conducted by ODFW, the Younger family, and the GOCWC, with a $51,615 grant from Oregon Watershed Enhancement Board (OWEB). The project is on Potter Creek less that 0.33 mile upstream of the confluence of Holcomb and Potter creeks at 15822 Neibur Road near Oregon City. Potter Creek is a perennial tributary of Abernethy Creek that supports winter steelhead, Coho salmon, Pacific lamprey and cutthroat trout populations. Twin 48-inch culverts under the Younger's driveway were creating a barrier to upstream juvenile fish passage and hindering passage of adult salmon in the stream.

The grant application was submitted to OWEB, in 2008. In January 2009, rains washed out the culverts and the driveway, which provided the sole access to property owner's home.

The project, completed in 2009, replaced the twin culverts with a 13-foot-wide, 5-foot, 1-inch-tall, 46-foot-long bottomless arch pipe. Native plants and trees were planted on the slopes adjacent to the area of work. The OWEB grant covered engineering design, removal of the existing structure, purchase and installation of the crossing structure.

SOVL's Lower Abernethy Creek Project

The GOCWC is partnering with a local non-profit, SOLV, on a restoration project along lower Abernethy Creek. The project is currently in the planning stages. The project objectives center on floodplain modifications, weed control, and riparian restoration along a 0.13-mile length of Abernethy Creek and adjoining Park Place Creek. The project will reduce streambank erosion, improve the stream's access to the floodplain, and increase native vegetation and the riparian tree canopy.

Yodis Property: Potter Creek Fish Passage Project

The project replaced two culverts that were blocking fish passage, removed a small diversion dam, and created a wetland and side channel on the Potter Creek between stream miles (SM) 1.26 and 1.45. The project, completed in 2006, opened up 0.52 mile of fish spawning and rearing habitat; created riffles and pools in the area adjacent to where the diversion dam was removed; created 250 feet of stream-side channel area; and restored 0.5 acre wetland habitat. The following project partners provided funding or other support: the Yodis family, U.S. Fish and Wildlife Service (USFWS), Natural Resources Conservation Service (NRCS), OWEB, ODFW, and Clackamas Soil and Water Conservation District (SWCD). Total project cost was $131,500.

Saling Property: Potter Creek Fish Passage

The project replaced two side-by-side culverts that were blocking fish passage with a bridge on the Potter Creek at SM 0.85. The project, completed in 2006, opened up 0.4 mile of fish spawning and rearing habitat. The following project partners provided funding or other support: the Saling family, USFWS, NRCS, OWEB, ODFW, and Clackamas SWCD. Total project cost was $146,000.

Clackamas Soil and Water Conservation District's Holcomb Creek Fish Passage Project: Schmitz Property

The project replaced three side-by-side culverts that were blocking fish passage with a bridge on the Holcomb Creek at SM 0.82. The project, completed in 2009, opened up 1.9 miles of fish spawning and rearing habitat. Clackamas County SWCD wrote and administered the grant. The following project partners provided funding or other support: NRCS, OWEB, and ODFW. Total project cost was $75,600.

City of Oregon City's Redland Road Project

The City replaced a 6-by6-foot, concrete box culvert that was blocking fish passage with a 15-foot span metal arch pipe on Holcomb Creek at SM 0.22. The project, completed in 2003, opened up 0.6 mile of fish spawning and rearing habitat. The following project partners provided funding or other support: ODFW, USFWS, U.S. Forest Service, U.S. National Marine Fisheries Service, OWEB, Clackamas County, For the Sake of the Salmon, Portland General Electric Salmon Friendly Power Program, Northwest Resource Conservation and Development Board.

The following action plan priorities were determined based on the watershed assessment findings and the restoration strategy.

- Assess baseline conditions
- Protect and restore key tributary anchor habitats
- Enhance Oregon City stormwater quality and quantity
- Enhance habitat in the Beaver Creek–Parrott Creek confluence area
- Improve fish passage
- Improve habitat in the lower portions of Abernethy Creek
- Address water flows during the summer and early fall
- Educate watershed residents and stakeholders and conduct outreach to landowners
- Evaluate project success

These priorities provide a framework for selecting projects and the development of the GOCWC's annual work plan. The GOCWC should implement actions as much as possible within the geographic focus areas depicted in Figure 2 and described within each action plan priority. That said, the GOCWC should to continue to work with landowners who propose restoration projects, regardless of the location of the project, if the project is designed to address issues that are constraining fish habitat and water quality. The restoration strategy provides a framework for evaluating the merits of all projects, including those initiated for locations outside of the geographic focus areas.

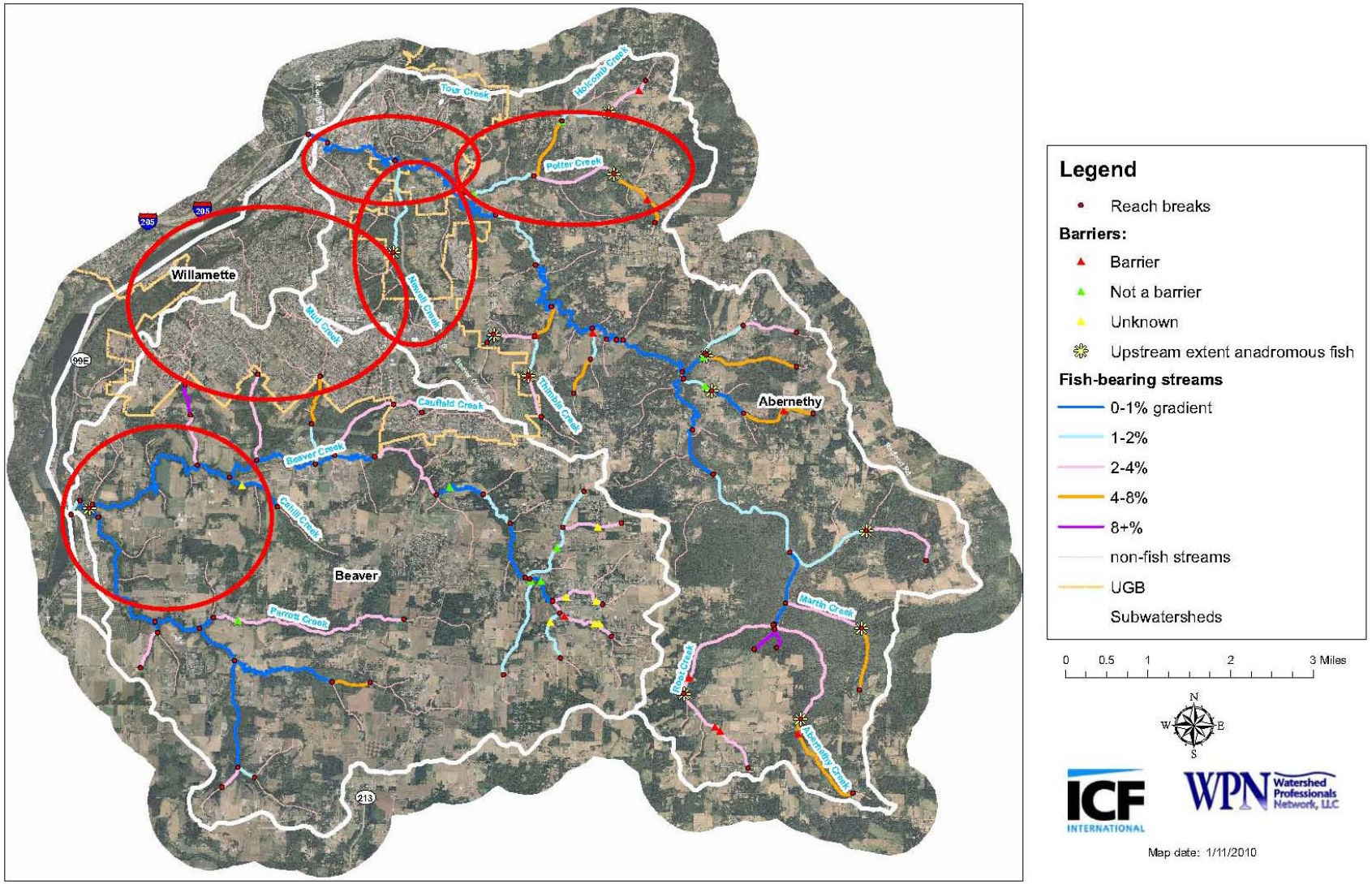
The following section describes the rationale, project categories, and geographic focus areas for each action plan priority.

Assess Baseline Conditions

Rationale

The *Greater Oregon City Watershed Assessment* provides information on the natural processes, current management practices, and land uses that influence stream habitat, fish populations, and water quality in the watershed assessment area. The assessment was based on limited information; key data were unavailable, particularly for stream habitat, water quality, and water quantity. Additional information on baseline conditions is necessary to identify specific locations and actions for restoration projects. Establishing this baseline data is the essential first step for the action plan. It will guide future project planning and provide the foundation for tracking changes in watershed conditions over time.

Figure 2. Geographic Focus Areas (circled) for Action Plan Implementation



Focus Areas

- Fish-bearing streams in the Abernethy and Beaver Creek subwatersheds.
- High quality habitat areas in lower Abernethy Creek that have not been inventoried, particularly the Holcomb Creek and Potter Creek systems.
- Fish passage barriers within the Beaver Creek subwatershed and on the mainstem of Abernethy Creek.
- Inventorying habitat conditions in the area within and below Sevick Pond (see section below for description).

Actions

- Conduct aquatic habitat inventories with according to ODFW protocols.
- After obtaining landowner cooperation, work with volunteers to monitor water temperatures according to ODEQ protocols.
- Work with the Oregon Water Resources Department (OWRD) to establish methods to assess streamflows during the late summer and early fall and to identify ways to restore them in key problem areas.
- With volunteers and landowner cooperation, work with Oregon City to monitor stormwater quality.

Partnerships

- ODFW
- ODEQ: 319 program grant funding
- OWRD
- OWEB: grant Funding
- Oregon City

Protect and Restore Key Tributary Anchor Habitats: Newell Creek and the Holcomb Potter Creek systems

Rationale

Newell Creek and the Holcomb Creek and Potter Creek systems, in the lower portions of the Abernethy Creek subwatershed (Figures 3 and 4), contain some of the highest quality stream and riparian habitat in the Abernethy Creek subwatershed. Historically, these tributary streams were important to the health of Abernethy Creek fish populations; the current presence, though at reduced population levels, of steelhead, coho, Pacific lamprey, and cutthroat trout in these stream means the streams could still support health populations. Opportunities exist in these systems to protect existing high quality aquatic and riparian habitat and to restore areas with poor habitat. It is also important to address issues in this area that are contributing to degraded habitat and water

quality, including stormwater runoff from Oregon City into Newell Creek and invasive weeds that are present and spreading throughout the system.

The reasons for focusing habitat protection and restoration on the Newell Creek and Holcomb/Potter Creek systems include:

- Within the context of the Portland metropolitan area and the lower Willamette river fish runs, Newell Creek and the Holcomb Creek/Potter Creek system provide important habitat for coho and steelhead spawning and rearing.
- Large portions of Newell Creek, particularly the middle portions, have high quality fish and riparian habitat.
- Metro manages over 300 acres in Newell Creek Canyon as open space, which offers opportunities for expanded protection and restoration. This acquisition is part of a larger strategy to protect natural corridors and uplands along the mainstem of Abernethy Creek and its major tributaries (particularly Holcomb and Potter creeks) to protect water quality and wildlife habitat.
- The presence of native fish and the relatively large size of the undeveloped land bordering the Newell Creek make the canyon area and Metro property biologically notable.
- Some sections of the Newell Creek aquatic and riparian habitat are degraded, particularly the lower and upper portions, providing opportunities to restore habitat and expand high quality habitat out from the middle sections.
- Water quality conditions in Newell Creek and the Holcomb Creek/Potter Creek system are unknown, but these streams appear to contribute cooler water to the system and provide areas of cold water were native fish can reside when water temperatures are elevated in Abernethy Creek.
- Stormwater from Oregon City appears to be contributing sediment to Newell Creek.
- Areas of Newell Creek and the Holcomb/Potter system contain degraded riparian vegetation and invasive weeds.

Focus Areas

- Newell Creek and tributaries (Figure 3): stream habitat restoration in the lower and upper fish-bearing sections and rectification of stormwater runoff issues in the headwater streams within Oregon City that affects downstream fish-bearing areas.
- Holcomb Creek, Potter Creek, and fish-bearing tributaries (Figure 4).

Actions

Newell Creek:

- Field inventory riparian weeds, particularly knotweed throughout system.
- Remove riparian weeds, plant native vegetation, and expand width of corridor.
- In the lower and upper sections of the creek, improve channel complexity by adding wood.
- Address stormwater issues through projects and outreach in headwater areas in collaboration with Oregon City.

- Monitor water temperature, sediment, and other water quality conditions.

Holcomb and Potter creeks (Figure 4):

- Remove riparian weeds, plant native vegetation, and expand the width of the corridor.
- Field inventory riparian weeds, particularly knotweed.
- In selected areas, improve channel complexity by adding wood.
- Monitor water temperatures.
- Address fish passage barriers.

Partnerships

- Metro: collaboration to restore habitat in the Newell Creek canyon area and to expand protection efforts into the Holcomb Creek/Potter Creek systems.
- Metro: grant funding
- Oregon City: coordinate stormwater management projects and public outreach activities.
- OWEB: grant funding

Figure 3. Newell Creek Action Area

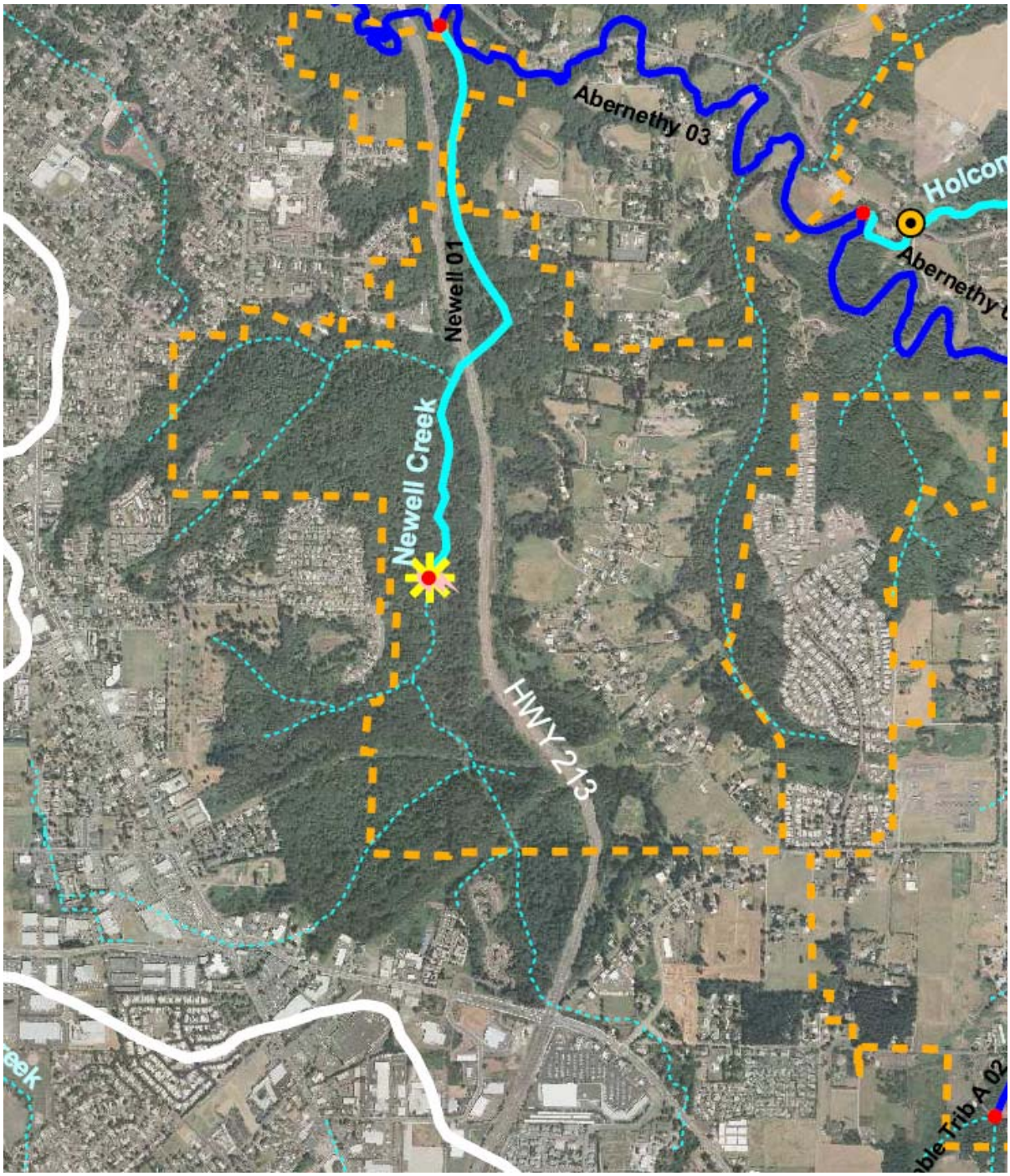
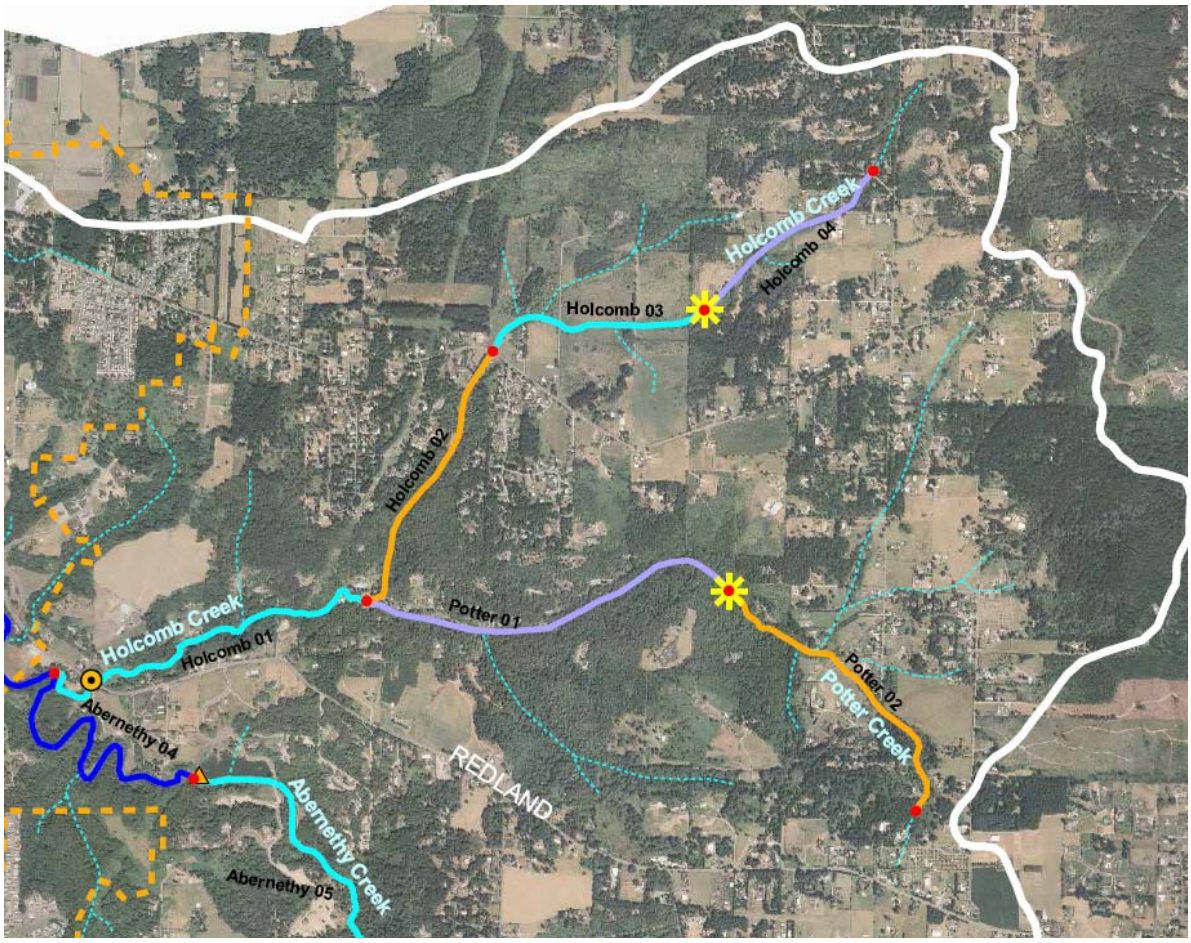


Figure 4. Holcomb and Potter Creek Action Area



Enhance Oregon City Stormwater Quality and Quantity

Rationale

Oregon City is strategically located, with headwater streams within its city limits that drain into all three subwatersheds: Abernethy, Beaver, and Willamette Tributaries (Figure 5). As a result, land use practices within the city strongly influence water quality and fish habitat in downstream areas.

A large area of the city is covered in impervious surfaces (roofs, pavement, and other areas that do not absorb rainfall). The amount and distribution of impervious surfaces has significant implications for watershed health. Unless steps are taken to control runoff, rainfall on in areas with impervious surfaces does not infiltrate into the ground. Instead, it rapidly runs off as stormwater into streams, negatively affecting streamflows, water quality, fish populations, and stream habitat. The Willamette subwatershed, which has the highest proportion of area within Oregon City, has the most impervious surfaces (22%). In addition, individual streams (e.g., Newell Creek, which has headwaters within Oregon City) can have a much greater proportion of the drainage area in impervious surfaces.

An impervious surface area of 5% of the watershed appears to be a threshold for negative effects on streams and fish populations. Negative effects can include increased flows during flood events, sedimentation, and other water quality concerns. The *Greater Oregon City Watershed Assessment* (ICF International 2010) classified reaches as follows by percent impervious surface in contributing area (Figure 6):

- 5% or less—good
- 5–10%—fair
- greater than 10%—poor

Based on these classifications, reaches that drain Oregon City are the most affected overall by impervious surfaces. This includes Newell Creek, a key tributary to Abernethy Creek that contains high quality habitat and significant steelhead and coho salmon populations.

Oregon City is taking active steps to control and monitor stormwater conditions. The City directs new developments to employ best management practices (BMPs) such as bioswales, wetland areas, and other facilities that retain stormwater and minimize water quality problems. In addition, the City has an ongoing monitoring program that assesses, evaluates, and reports on stormwater quality status and trends.

Focus Areas

- All areas within the Oregon City UGB (Figure 5).

Actions

- Work with Oregon City staff on public outreach efforts that educate landowners and other residents on actions they can take to minimize stormwater issues, including maintaining functioning riparian areas and taking steps to reduce erosion.
- Collaborate with Oregon City staff to identify and work with landowners on voluntary projects to improve stormwater conditions, including planting native riparian vegetation and efforts to reduce erosion.
- Work with Oregon City staff to identify, fund, and implement stormwater retention areas, including installing bioswales and creating wetland areas.
- Collaborate with Oregon City to monitor stormwater water quality conditions.

Partnerships

- Oregon City
- ODEQ: grant funding through the 319 program

Figure 5. Oregon City Headwater Streams Action Area

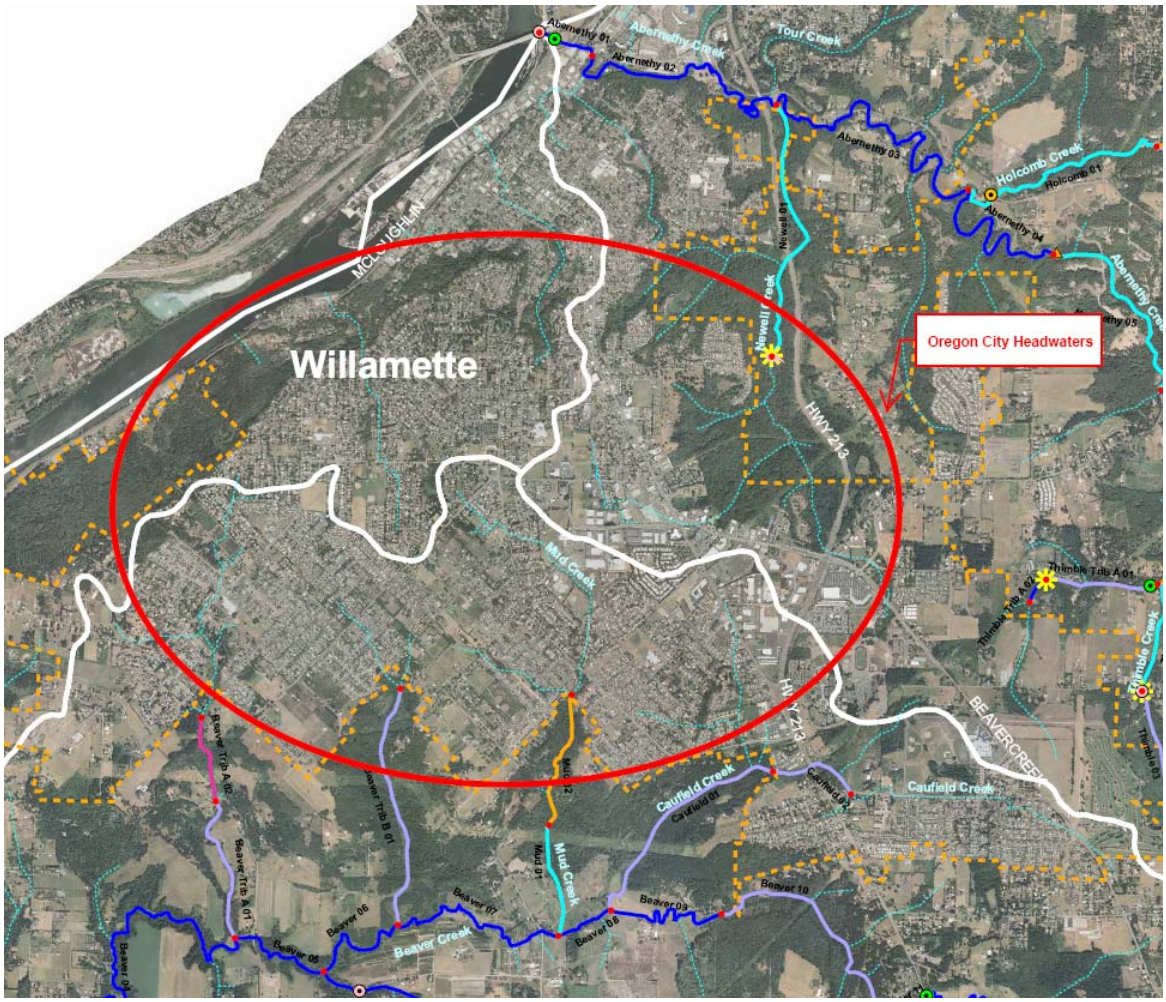
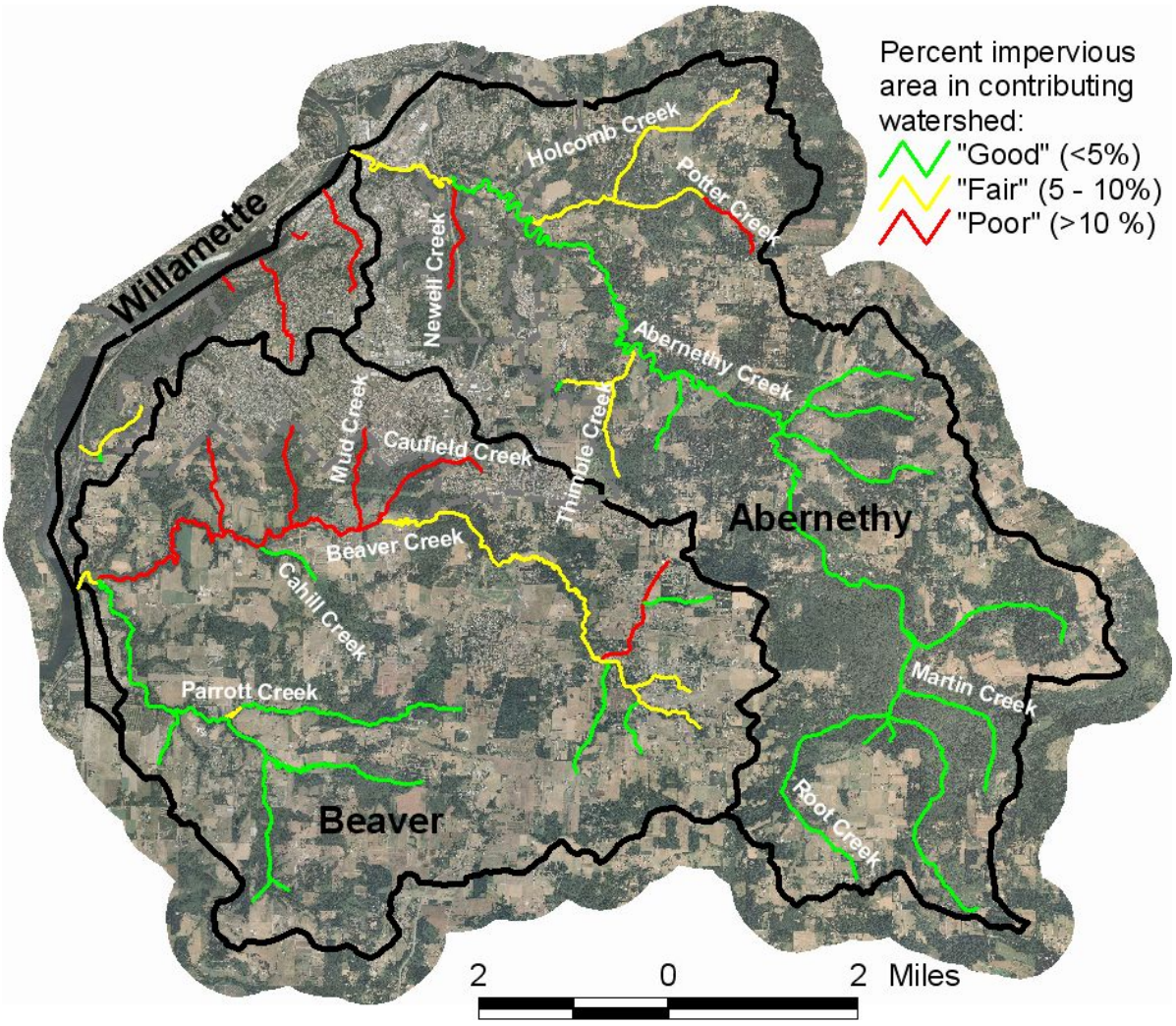


Figure 6. Percent Impervious Surface for the Contributing Watershed Area Upstream of the Midpoint of Each Stream Reach



Enhance Habitat in the Beaver Creek–Parrott Creek Confluence

Rationale

A dam near the confluence of Beaver and Parrott creeks created an impoundment, Sevick Pond, which backed up water in the area upstream and blocked fish access. Sevick Pond covered approximately 12 acres including the junction of Parrott and Beaver creeks. This dam remained in place until the January 2, 2009, flood. In this flood, Beaver Creek eroded the northern portion of dam, creating a channel that is passable to fish.

The Beaver Creek subwatershed is now accessible to steelhead and Pacific lamprey. Because steelhead will quickly move into new habitat, it is expected that that they will recolonize the system for spawning and juvenile rearing. Unfortunately, because no information is available on fish habitat

quality in the Beaver Creek subwatershed, it is not possible to predict the capability of the stream network to support steelhead or resident cutthroat trout populations.

Because Sevick Pond captured substantial sediments, the stream channel is now down-cutting through these sediments. As the stream erodes this large volume of sediment into the channel, a "headcut" in the deep sediments has developed. This headcut creates a steep fall over the sediments that could block upstream fish movement in the channel, but a field inventory would be necessary to confirm the ability of fish to pass through this area. In addition to the possible fish passage issue, the large quantity of sediment exposed in the drained Sevick Pond will evolve into a weed-infested area in the absence of efforts to control weeds and plant native vegetation.

The draining of Sevick pond and the new accessibility of the Beaver Creek subwatershed to anadromous fish presents an area for focused restoration actions in the Beaver Creek–Parrott Creek confluence area. Opportunities in this area to work with landowners to assess conditions and identify and pursue restoration projects include the following:

- Sedimentation is a water quality issue in the Sevick Pond area, but other water quality conditions (e.g., water temperature) are unknown.
- Water withdrawals are probably reducing water flow during the late summer and early fall; it is important to assess streamflow conditions during this period and work with landowners on voluntary mechanisms to reduce water withdrawals.
- Riparian vegetation composition is modified and the corridor is narrowed; weedy conditions prevail in many areas.
- Fish passage conditions are unknown at many road crossings.
- Stream habitat conditions are unknown.

Focus Areas

- The area surrounding the Beaver Creek–Parrott Creek confluence (Figure 7).
- Sevick pond area (Figure 8).

Actions

- Remove riparian weeds, plant native vegetation, and expand width of corridor.
- Field inventory riparian weeds, particularly knotweed.
- Address fish passage barriers and assess unknown barriers at road crossings.
- Educate landowners on riparian area management and sediment-reduction actions.
- Explore opportunities to increase streamflows through voluntary actions.
- Collaboration with the landowner to develop a plan to restore the drained Sevick pond area with native vegetation.
- Study the Sevick Pond sediment accumulation and develop a plan to control sedimentation, reduce weeds, plant native vegetation, and maintain fish passage.

Partnerships

- Clackamas County SWCD
- OWEB: grant funding

Figure 7. The Beaver and Parrott Creek Confluence Action Area

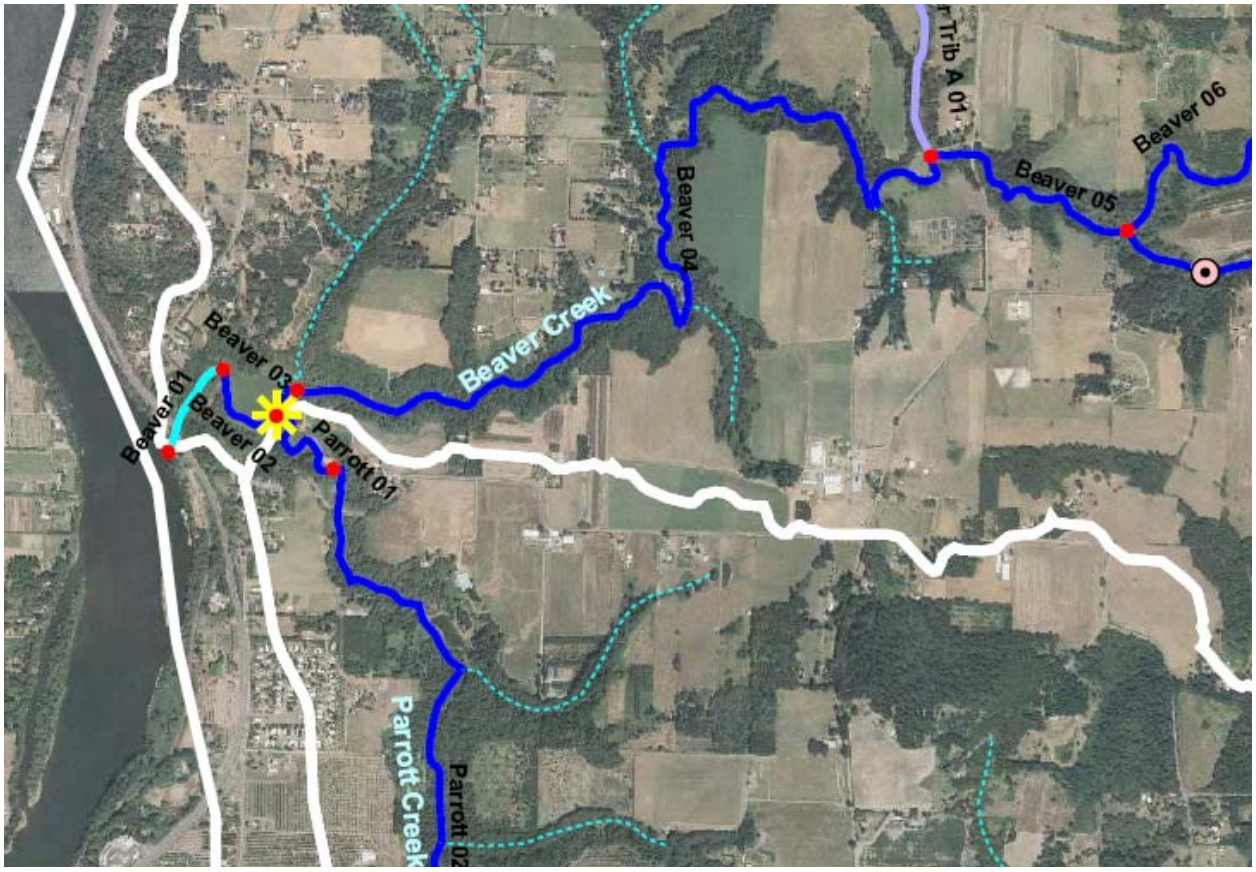
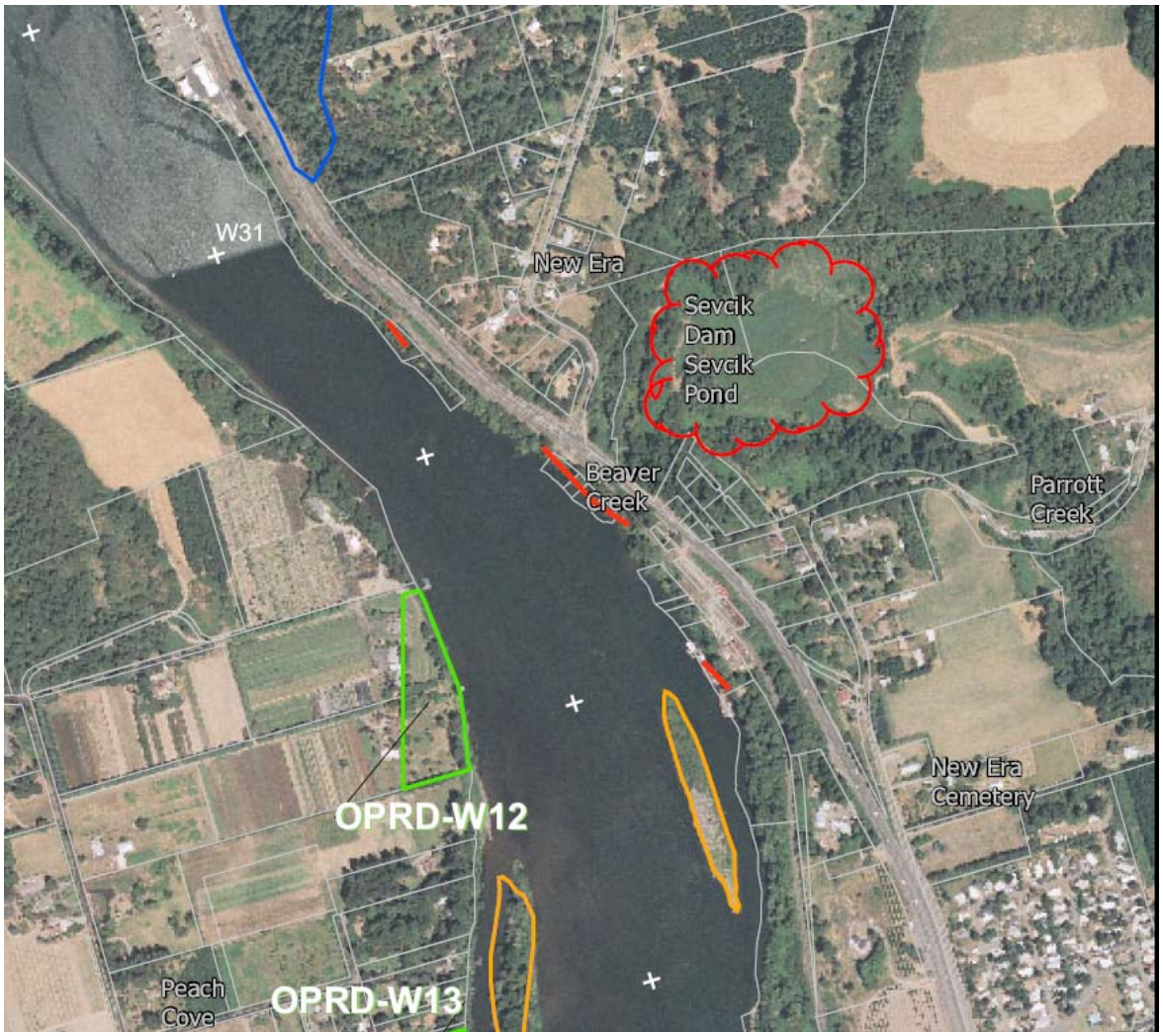


Figure 8. The Sevick Pond Site, Lower Beaver Creek Subwatershed



Source: Oregon State Parks and Oregon Watershed Enhancement Board 2008 (aerial photo), note that Sevick pond is spelled incorrectly in source map.

Improve Fish Passage

Rationale

Fish passage barriers on Abernethy Creek, Beaver Creek, and tributary streams can pose a significant problem for fish populations. Dams and road crossing culverts are examples of fish passage barriers in the watershed assessment area. Fish move around the stream network through the different phases of their life cycle and in response to changing conditions. Fish passage barriers, prevent fish from accessing important areas for spawning or from moving into cool tributary streams when Abernethy Creek or Beaver Creek warm during the summer months.

Fish passage barriers can totally block fish movement during all times or they can partially block movement during periods of high or low flows. Partial fish passage barriers can significantly slow the migration of coho and steelhead through the system. Fish will often hold in pools at the base of a

barrier waiting for conditions to change. This can delay migration and create problems such as stress on the fish, which provide opportunities for poaching and predation.

Dams, which are often constructed in streams to impound water for irrigation or recreation, can impede fish passage if fish ladders or other mechanisms are not in place. Several dams on Abernethy Creek may present obstacles to fish passage. The Hidden Lake water diversion dam just upstream from Holcomb Creek may be a fish passage barrier, but its status needs to be confirmed. The Beaver Lake dam on upper Abernethy Creek has a fish ladder in place. Although fish passage at this ladder has not been studied, some evidence shows that it impedes adult coho and steelhead movement into spawning and rearing streams above the lake.

The Sevick Pond dam on lower Beaver Creek washed out in the January 2, 2009, flood event. Because Sevick Pond captured substantial sediments, the stream channel is now down-cutting through these sediments. As the stream erodes this large volume of sediment into the channel, a "headcut" in the deep sediments has developed. This headcut creates a steep fall over the sediments that could block upstream fish movement in the channel, but a field inventory would be necessary to confirm the ability of fish to pass through this area.

Fish passage at many of the road crossings (primarily culverts) in the watershed assessment area has been evaluated using the ODFW criteria. Table 2 provides the fish passage status for 14 road crossings in the Abernethy Creek subwatershed and 13 road crossings in the Beaver Creek subwatershed. Most of the road crossings were inventoried by ODFW or Clackamas County, and their fish passage status is known. The road crossing inventory is comprehensive for Abernethy Creek subwatershed, but a number of crossings have not been assessed for fish passage (i.e., designated as unknown) in the Beaver Creek subwatershed.

With the absence of the Sevick Pond dam and its barrier to fish passage, upper Willamette steelhead and Pacific lamprey can now access the Beaver Creek subwatershed. Little is known about the status of fish passage in Beaver and Parrott creeks. Because it is now accessible to anadromous fish, this subwatershed should be the focus of fish passage assessments.

In addition to the road crossings identified below in Table 3, ICF evaluated fish passage for the Abernethy Creek culvert under Highway 99. This culvert is important because it is the first obstacle that salmon and steelhead encounter upon entering Abernethy Creek. The evaluation of fish passage through the Highway 99 culvert is based on the culvert diameter, length, and gradient, the characteristics of the weirs, and flow conditions in Abernethy Creek. The weirs appear to provide some fish passage at lower flows, though the jump height exceeds the 6-inch ODFW fish passage criterion and may impede juvenile fish. Adult salmon and steelhead do pass through the culvert, though they may have difficulty during very high-flow conditions when water velocities exceed fish swimming abilities. Upstream access does not appear to be severely limited, because fish have been observed.

Table 3. Fish Passage Status and Location for Road Crossings in the Watershed Assessment Area

Subwatershed	Stream and Reach Location	Responsible for Inventory and ID Number	Fish Passage Status/Notes
Abernethy			
	Holcomb 01a Holcomb 01b	County 01	Not a barrier
	Potter 02a Potter 02b	County 04	Barrier
	Holcomb 02 Holcomb 03	County 02	Not a barrier
	Holcomb 04a Holcomb 04b	County 03	Barrier
	Thimble 01a Thimble 01b	County 05	Barrier
	Thimble 02 Thimble 03	County 06	Barrier
	Abernethy Trib A 01a Abernethy Trib A 01b	County 07	Barrier
	Abernethy Trib B 01a Abernethy Trib B 01b	County 08	Not a barrier
	Abernethy Trib C 01a Abernethy Trib C 01b	County 09	Not a barrier
	Abernethy Trib C 03a Abernethy Trib C 03b	County 10	Barrier
	Root 02a Root 02b	County 11	Barrier
	Root 03a Root 03b	County 12	Barrier
	Root 03b Root 03C	County 13	Barrier
	Abernethy 16a Abernethy 16b	County 14	Barrier

Subwatershed	Stream and Reach Location	Responsible for Inventory and ID Number	Fish Passage Status/Notes
Beaver			
	Parrott 05a Parrott 05b	ODFW 01	Not a barrier
	Cahill 01a Cahill 01b	County 15	Unknown
	Beaver 11a Beaver 11b	ODFW 02	Not a barrier
	Beaver Trib C 01a Beaver Trib C 01b	ODFW 06	Not a barrier
	Beaver Trib C Trib A 01a Beaver Trib C Trib A 01b	County 16	Unknown
	Beaver Trib D 01a Beaver Trib D 01b	ODFW 03	Not a barrier
	Beaver 15a Beaver 15b	ODFW 04	Not a barrier
	Beaver Trib E 01a Beaver Trib E 01b	County 17	Unknown
	Beaver Trib E 01b Beaver Trib E 01c	County 18	Unknown
	Beaver Trib F 01a Beaver Trib F 01b	County 19	Unknown
	Beaver 17a Beaver 17b	ODFW 05	Barrier
	Beaver 17b Beaver 17c	County 20	Unknown
	Beaver 17c Beaver 17d	County 21	Unknown

Focus Areas

- Hidden Lake water diversion dam on Abernethy Creek.
- Sevick Pond, lower Beaver Creek.
- Beaver Creek subwatershed.

Actions

- Assess fish passage at the Hidden Lake water diversion dam and identify options for addressing any issues.
- Assess fish passage, in combination with a comprehensive habitat assessment, in the Sevick Pond area and upstream; identify options for addressing any fish passage issues.
- Assess fish passage throughout the Beaver Creek subwatershed and identify options for addressing any fish passage issues. The fish passage assessment could be combined with the aquatic habitat inventory.

Partnerships

- ODFW
- Clackamas County

Improve Habitat in the Lower Portions of Abernethy Creek

Rationale

Backwatering of Abernethy Creek during high flows adds to the limited availability of off-channel habitat in the lower Willamette River and contributes to the success of fish spawned in other areas of the Willamette River basin. The loss of shallow, complex, off-channel habitat is a major limiting factor for salmon in the lower Willamette River. Restoration of urban streams, including Abernethy, Kellogg, Tryon, and Johnson creeks, is one of the few opportunities to improve this kind of habitat in the lower Willamette River. Potential habitat improvements to the backwater areas in Abernethy Creek would contribute to the recovery of listed coho and steelhead by increasing the extent and diversity of productive stream habitats that flow into the lower Willamette River.

The incised channel, limited complex pools, and minimal large wood in lower Abernethy Creek constrain the quality of seasonal rearing habitat. The channel incision has reduced stream access to the floodplain during flood events. The limited quantities of large wood in the channel, particularly long pieces in complex accumulations, and minimal stream connection to the floodplain have severely degraded fish habitat quality. Key reasons why it is important to pursue restoration actions in the lower Abernethy Creek area include the following:

- Most of lower Abernethy Creek is within Oregon City.
- During flood events, the Willamette River creates a backwater area in Abernethy Creek as far upstream as Holcomb Creek.
- Provides an important migration corridor for coho, steelhead and Pacific lamprey.
- Provides winter rearing for Willamette Basin salmon and steelhead populations during floods.
- Water quality issues include temperature, sedimentation, and stormwater runoff.
- Riparian vegetation composition is modified and the corridor is narrowed; weedy conditions prevail in many areas.
- The stream channel is incised and disconnected from the floodplain.
- Stream habitat is simplified with limited wood.

Focus Areas

- Lower Abernethy Creek (Figure 9).

Actions

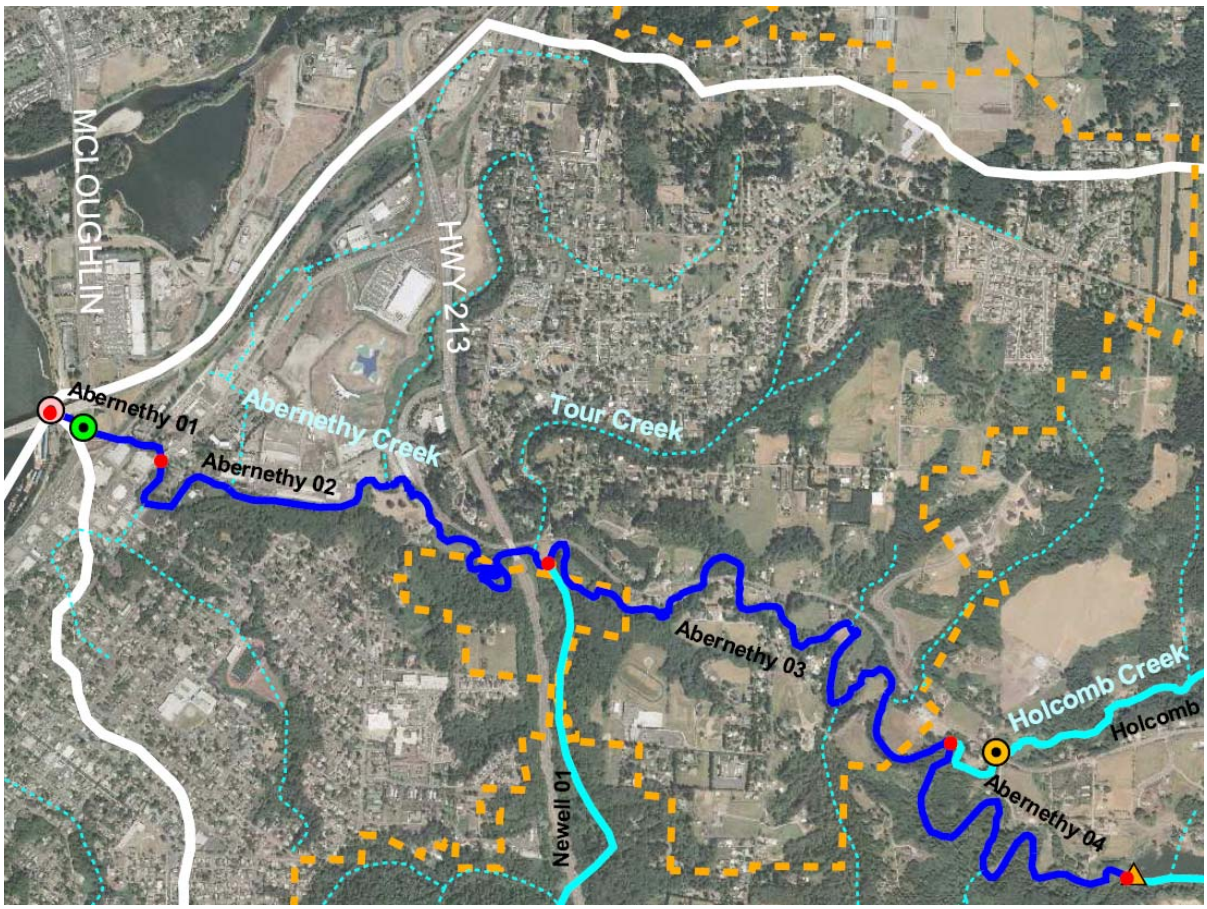
- Reconnect floodplain areas and add wood to the channel.
- Address stormwater issues in collaboration with Oregon City.

- Remove riparian weeds, plant native vegetation, and expand width of corridor.

Partnerships

- Oregon City

Figure 9. Lower Abernethy Creek Action Area.



Address Streamflows

Rationale

Withdrawing water from streams for agriculture, livestock, and other purposes can reduce streamflows and, in turn, affect the health of the aquatic environment. Reduced streamflows, particularly in the late summer and early fall when flows are naturally low, can increase water temperatures, reduce pool areas, and limit connectivity between stream habitats, all of which can adversely affect salmon, trout, and other aquatic organisms. The *Greater Oregon City Watershed Assessment* (ICF International 2010) found that water withdrawal activities were reducing low flows in Abernethy and Beaver creeks during the critical late summer and early fall period. It appears that the flow reductions are the greatest in Beaver Creek subwatershed, which includes Parrott Creek, although there is some uncertainty about the finding and it will need to be substantiated through

further assessment. With the recolonization of steelhead and Pacific lamprey in Beaver Creek, it is very important to understand and address the low flows in this system.

Voluntary incentives are in place to address water withdrawal issues, including temporary leasing of water rights. Water withdrawals, affected streamflows, and water rights are complex issues; the GOCWC should collaborate with OWRD to assess the water quantity issues in Beaver Creek subwatershed and develop a strategy for improving conditions during low-flow periods.

Focus Areas

- Beaver Creek subwatershed, including the Parrott Creek system (Figure 10).

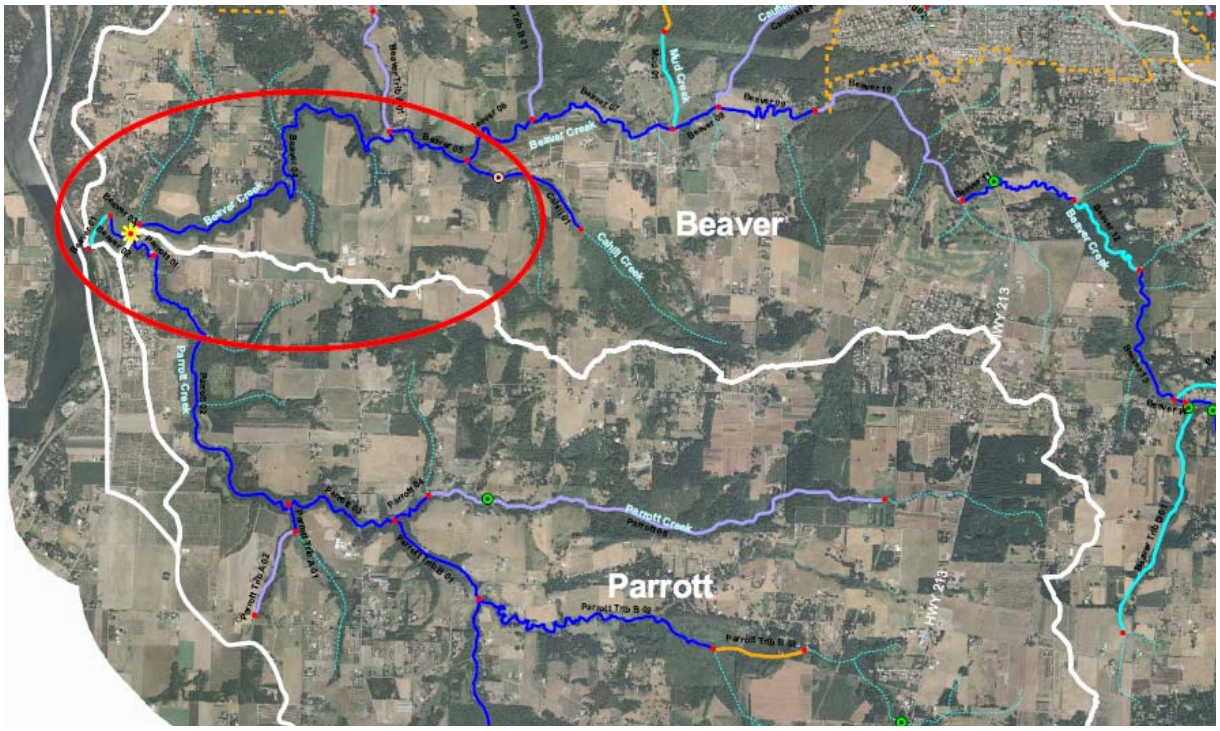
Actions

- Assess streamflow conditions and water right issues in collaboration with OWRD and ODFW.
- Develop a strategy, in collaboration with OWRD and ODFW, for addressing water withdrawals and maintaining adequate streamflows in.

Partnerships

- OWRD
- ODEQ
- Clackamas County Soil and Water Conservation District

Figure 10. The Beaver Creek Subwatershed and the Beaver and Parrott Creek Confluence Area



Education and Outreach to All Watershed Residents

Rationale

Successful restoration of the greater Oregon City watersheds depends on the goodwill, stewardship values, and participation of landowners and residents. Education and outreach builds community support and engages landowners and other residents in restoration projects. The watershed education and outreach effort complements all of the action plan strategies and actions, and serves as a tool for recruiting landowners and volunteers to participate in restoration projects.

The GOCWC can reach out to watershed residents through a variety of approaches including the following:

- Field tours of restoration activities
- Workshops and training on restoration activities and needs
- Speaking engagements with neighborhood groups and in other forums
- Printed and online informational materials to increase awareness on watershed issues and what individuals can do to improve the health of the watershed

Effective public education and outreach is a complex task. For that reason, it is recommended that the GOCWC develop a watershed education and outreach plan to guide its efforts. A number of Willamette Basin watershed councils have developed and implemented successful plans that can serve as examples. Development of the plan will take some time and in the interim, the GOCWC should continue to engage in outreach and education activities.

Focus areas

- Abernethy, Beaver, and Willamette Tributary subwatersheds.

Actions

- Engage in watershed outreach and education efforts in collaboration with partners.
- Develop an education and outreach plan and implement activities identified in the plan.

Partnerships

- Clackamas Soil and Water Conservation District
- Oregon City
- OWEB: grant funding
- SOLV

Project Phasing and Budgets

A number of factors control the GOCWC's capacity to plan and implement projects. It is anticipated that council staffing, project funding, and the ability to engage partner organizations and landowners will all increase over time. Figure 11 illustrates the proposed 10-year phasing of the action plan restoration strategies. Assessing baseline conditions and engaging landowners will help lay the foundation for future restoration actions.

Table 4 outlines year 1 action plan activities. The proposed activities will, by necessity, be modified based on grant funding levels, staffing, volunteer engagement, and landowner participation.

Figure 11. Restoration Action Plan Implementation Phasing

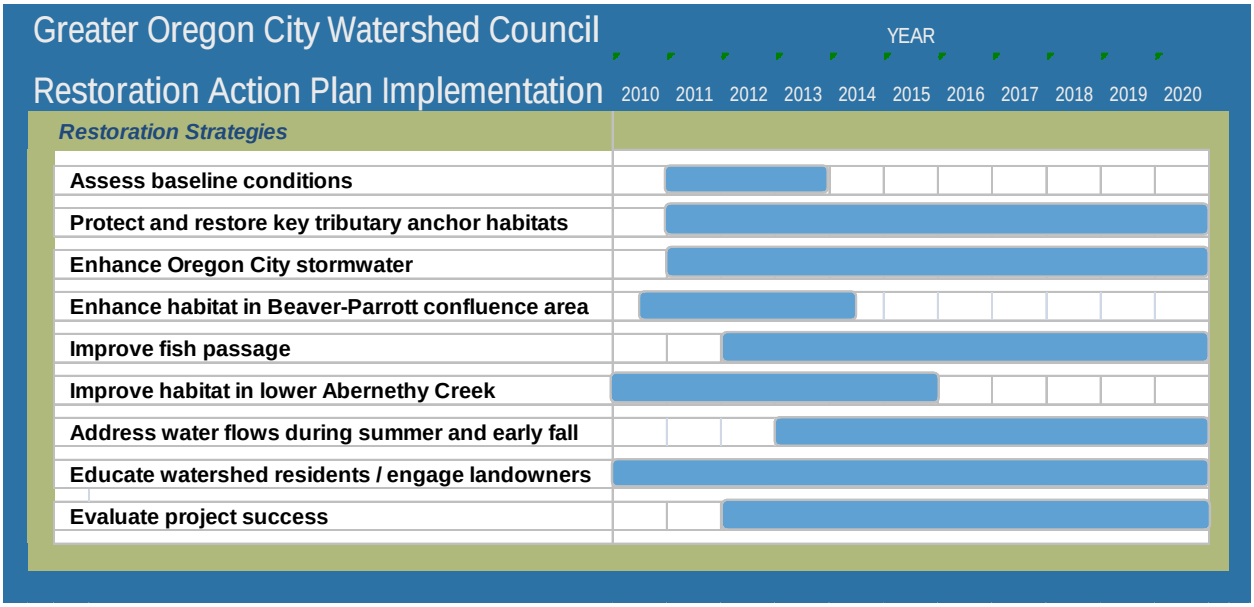


Table 4. Year 1 Restoration Action Plan Activities

Action Plan Component	Action	Estimated Cost	Notes
Protect and restore key tributary anchor habitats	Focus on Newell Creek and Holcomb Potter Creek systems		Work in partnership with Oregon City and Metro to identify restoration actions, volunteer activities, and public outreach approaches.
Assess baseline conditions	Aquatic habitat inventory (ODFW protocol)	$75,000	The Abernethy Creek subwatershed contains 38 miles of fish-bearing streams, 26 miles of which contain coho. The Beaver Creek subwatershed contains 32 miles of fish-bearing streams, though the extent of steelhead distribution is not known. The inventory will include assessing stream habitat, riparian conditions, and fish passage issues. ODFW aquatic habitat inventories cost approximately $1,500 per mile (Sanders pers. comm.). Estimated cost is for 50 miles of surveyed streams. Funding sources: OWEB; NOAA-Fisheries.
	Assess condition in the Sevick Pond Area	$50,000	Assess riparian conditions, sediment accumulation, and any potential fish passage barriers. Develop a channel, riparian and wetland restoration plan. Funding: DEQ EPA 319 program; OWEB; NOAA-Fisheries
	Assess fish passage at the Hidden Lake water diversion	$5,000	This dam should be examined by a fish passage specialist. If there is an issue, conceptual approaches to remedying the situation should be outlined. If a problem is identified, this assessment will lay the foundation for a grant to improve fish passage. Funding: OWEB; NOAA-Fisheries
Enhance habitat in Beaver-Parrott Confluence Area	Enhance habitat in the Sevick Pond Area	$60,000	Restore wetland, riparian, and channel habitats. Funding: OWEB
Improve habitat in lower Abernethy Creek	Cooperate with SOLV restoration project		Cooperate with SOLV on project implementation and public outreach. Plan landowner tours of the site.

Action Plan Component	Action	Estimated Cost	Notes
Watershed outreach & Education	Continue with ongoing outreach activities		Continue with current outreach activities, with an emphasis on geographic focus areas.
	Develop watershed outreach and education plan	$25,000	Develop a detailed public outreach and education plan in cooperation with Oregon City, Clackamas County SWCD and other partners. The plan should specify how outreach activities will help secure additional landowners to participate in restoration projects. Funding: DEQ EPA 319 program; OWEB.

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Sanders, Isaac. Fisheries Biologist. Oregon Department of Fish and Wildlife, Clackamas, OR. March 31, 2009—email.

Appendix A: Grant Funding Sources

Table A-1. Grant Funding Sources

Grant	Agency	Amount		Deadline	Website and Contact	Type of Projects Funded							
		Funds Available	Grant Range			Fish Passage	Water Quantity	Water Quality	Stormwater	Fish & Wildlife Habitat	Stream Restoration	Outreach & Education	Wetland Restoration
2010 Open Rivers Initiative	U.S. Department Commerce/NOAA	$6 Million	$100,000 – 3 Million	Nov 16	Steve Drescher; steve.j.drescher@noaa.gov http://www.nmfs.noaa.gov/habitat/restoration/projects_programs/crp/partners_funding/callforprojects3.html Also via grants.gov	X							
Oregon Watershed Enhancement Board (OWEB): Technical Assistance, Outreach, Education grants	Oregon Watershed Enhancement Board	$20 Million	$10,000–500,000		http://www.oregon.gov/OWEB/GRANTS/index.shtml Willamette Bain: Wendy Hudson 503-986-0061 wendy.hudson@state.or.us	X				X	X	X	X
North American Wetlands Conservation Act	U.S. Department of the Interior/ U.S. Fish and Wildlife Service		$1 Million	Mar, Jul & Oct	703-358-1784 or dbhc@fws.gov								X
Clean Water Act Section 319 Nonpoint Source Grant Program	Oregon Department of Environmental Quality		Varies	Varies	Lower Willamette Area: Doug Drake 503-229-5350 http://www.deq.state.or.us/wq/nonpoint/grants.htm			X	X		X	X	
Partners for Fish and Wildlife Program	U.S. Department of the Interior/ U.S. Fish and Wildlife Service	$9 Million	Up to $25,000	Sep 30	David Gordon: 703-358-2025 http://www07.grants.gov/search/search.do?&mode=VIEW&flag2006=false&oppId=47672					X	X		X
Whole Watershed Restoration Initiative	U.S. Department Commerce/NOAA		$20,000–100,000	Nov 20	Polly Hicks, 206-526-4861; polly.hicks@noaa.gov	X				X	X	X	
NOAA/American Rivers Partnership Funding	U.S. Department Commerce/NOAA		Up to $100,000	Apr & Nov	Jason Lehto, 206-526-4670; Jason.a.lehto@noaa.gov	X				X	X	X	