Resilience – The capacity of a community to anticipate, plan for, and mitigate the risks—and seize the opportunities—associated with environmental and social/economic change.

Prepared for
Partners of the North Santiam Watershed

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1 INTRODUCTION AND VISION STATEMENT

The Partners of the North Santiam Watershed (Partners or Partnership) is a collaboration of local, state, federal, and tribal entities; local and regional businesses; nonprofit entities; and other committed stakeholders that rely on the well-being of the North Santiam River Watershed (NSW), and that seek to play an active role in its continued health and vitality. For many years, the various Partners have worked both independently of one another and on project-by-project collaborations to improve watershed conditions for the good of the local ecosystems and the good of the communities that rely on them for clean water, recreation, and a robust economy. These efforts led to the realization that, by working in a more coordinated manner, the Partners could achieve greater synergy through shared learning, marshaling of shared expertise and resources, and collective strategic planning and implementation. Therefore, starting in spring of 2015, the Partners of the North Santiam Watershed was formed with the following overarching vision in mind:

The North Santiam River Watershed is made more resilient by Partners implementing coordinated actions to restore ecological processes that maintain habitat for species while supporting and improving social and economic interests in local communities.

This North Santiam Watershed Resiliency Action Plan (Plan) is intended to lay out the approach that the Partners will take to carry out the overarching vision. It describes and defines the vision and scope of the Partnership, how the Partners will work together, the key issues in the NSW, and the path to addressing these issues. The Plan is the result of 14 Partner meetings, 1 mapping workshop, and many one-on-one planning discussions totaling over 600 volunteer hours. It relies on the many watershed assessments, subbasin plans, and other studies that have been conducted for the NSW by the Partners as well as others. Detailed descriptions of watershed conditions are provided in those various reports, but they are only briefly summarized in this Plan in order to provide context for the goals, values, and objectives laid out in the Plan.

It is important to note that the Partners have agreed that all actions outlined in the Plan depend on volunteer participation by the Partners and other interested stakeholders (e.g., willing watershed landowners). Furthermore, the Partners are not precluded from conducting projects on their own and outside of the Partnership.

2 DESIRED OUTCOMES AND GOALS

This section provides an overview of the Plan’s desired outcomes and goals. These are reiterated in Section 9 along with detailed objectives and actions to achieve the goals and desired outcomes.

Ecological Goal: Address the key limiting factors affecting the focal targets of Clean and Ample Supply of Water, Healthy Aquatic Habitats, Healthy Riparian Systems, and Healthy Terrestrial Habitats by conserving and enhancing the ecological processes upon which they rely. Emphasis will be on, but not constrained to, the focal areas identified in this Plan. Achievement of all of
the following objectives will depend on willing voluntary actions taken by local stakeholders, including private landowners, and local, county, state, federal, and tribal entities.

Social Goal: Promote landowner stewardship, public awareness, technical capacity, and institutional collaboration regarding the NSW’s natural resources. Actions include recruiting landowners to implement restoration projects, developing shared conservation messaging, hosting workshops and training sessions to educate community members, and hosting community stewardship projects to promote public volunteer investment in improving the natural resources of the NSW.

Economic Goal: Increase and maintain investment in the NSW to support local communities, and promote and protect the natural resources upon which they depend. Planning studies for projects that might eventually be included as future CIPs (ecological or economic) are also included as part of this goal.

### 3 GEOGRAPHIC SCOPE

In this Plan, the terms watershed, subwatershed, and subbasin are used to define drainage areas of ever decreasing sizes. For example, watershed is used when referring to the overall Plan area (i.e., North Santiam River Watershed), subwatershed refers to the fifth-field hydrologic unit codes (HUCs) listed below, and subbasins refers to the smaller drainage areas within the fifth-field HUCs. The use of this terminology is intended to provide consistency within this document; however, it is recognized that these terms are often used interchangeably in the literature.

The geographic scope for this Plan includes the entirety of the NSW, from the crest of the Cascade Mountains on the east side of the watershed downstream to the confluence with the South Santiam River Watershed on the west side of the basin (Figure 1). In addition, this Plan includes the subwatersheds of the Santiam River below the confluence of the North and South Santiam rivers to the confluence with the Willamette River (Figure 2). This Plan area includes six fifth-field subwatersheds, as noted in Table 1. A brief synopsis of each fifth-field subwatershed is provided in Appendix A.

#### Table 1. Plan Area Fifth-Field Subwatersheds and Hydrologic Unit Codes

<table>
<thead>
<tr>
<th>Fifth-Field Subwatershed</th>
<th>Fifth-Field Hydrologic Unit Code (HUC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper North Santiam</td>
<td>1709000501</td>
</tr>
<tr>
<td>Breitenbush</td>
<td>1709000502</td>
</tr>
<tr>
<td>Detroit Reservoir/Blowout Creek</td>
<td>1709000503</td>
</tr>
<tr>
<td>Middle North Santiam</td>
<td>1709000504</td>
</tr>
<tr>
<td>Little North Santiam</td>
<td>1709000505</td>
</tr>
<tr>
<td>Lower North Santiam</td>
<td>1709000506</td>
</tr>
</tbody>
</table>
Figure 1. Vicinity Map

[PLACE HOLDER, INSERT Figure 1 Vicinity Map]
Figure 2. North Santiam Watershed Overview Map

[PLACE HOLDER, INSERT Figure 2 North Santiam Watershed Overview Map]
4 HISTORY OF WATERSHED PLANNING COLLABORATION

The North Santiam River Basin has a long history of stakeholder groups convening around shared natural resource management objectives. With the interconnected (triple bottom line) themes of ecological, social and economic health common across the individual Partner organization’s mission statements it is evident that collaboration is the most efficient course of action (Partner Organization mission statements can be found in Appendix X). Over the years, stakeholders have shown a commitment to improving the health of the watershed, to enhance collective thinking and continue to take action to design, prioritize and seek funding for activities that will improve watershed/community resiliency. The following provides a summary of the active local and regional stakeholder working groups whose goals and objectives align with this action plan.

4.1 WATERSHED STAKEHOLDER GROUPS

4.1.1 North Santiam Watershed Council (NSWC)

Like most all watershed councils in Oregon, the North Santiam Watershed Council (NSWC) was originally formed as a result of a state statute (ORS 541.350 (1995). The NSWC receives financial support from the Oregon Watershed Enhancement Board (OWEB) and other funders for providing project based restoration grants. All of the members of the NSWC are local volunteers who share an interest in improving the health of the watershed in partnership with landowners. The Council intends its governing body to include a diverse range of geographic areas and community interests in the watershed in order to engage a balance of interested and affected persons within the watershed as required by ORS 541.910(2).

NSWC Mission: “Providing opportunities for stakeholders to cooperate in promoting and sustaining the health of the watershed and its communities.” The NSWC plans and facilitates projects to improve water health based on scientific analysis in partnership with private and public county, state and federal organizations. Within these limits, the purposes of North Santiam Watershed Council include the following:

- To promote citizen awareness around the importance of clean and plentiful water in their communities.
- To provide information, education and learning opportunities about watershed concerns.
- To conserve and improve the water quality and quantity in the river and stream networks of the North Santiam Watershed.
- To maintain healthy, well-functioning natural and human communities within the watershed.
- To enhance biodiversity by protecting and/or restoring natural areas including the preservation of fish and wildlife habitat.

4.1.2 North Santiam Forest Collaborative (NSFC)

Since 2011, the NSWC assisted with the formation and facilitation of the North Santiam Forest Collaborative (NSFC). The NSFC and the USFS staff were able use grant funds to engage the local watershed stakeholders in the restoration planning needs assessment process for the
Breitenbush River Subbasin, located in the headwaters of the North Santiam Basin. Through this process, a diverse range of stakeholders were brought together to openly discuss pressing issues and concerns related to how the shared public lands should be managed. Through the “All Lands,” forest collaborative approach the USFS will be able to implement projects that are more widely vetted and ultimately supported.

NSFC Mission: “to draw upon the knowledge base of a diverse collaborative to identify and address the issues and opportunities that will ultimately improve the ecosystem function and resilience of the headwaters of the North Santiam River Watershed while contributing to the economy and job market of the North Santiam Canyon.”

As noted above, the NSFC focused its early efforts on the Breitenbush Subbasin a major tributary to the Upper North Santiam River. The Breitenbush Watershed is 108 square miles and 69,119 acres. The USFS Staff and NWFC have identified over 40 restoration projects ranging from elk meadow/sugar pine enhancement & creation, small diameter timber thinnings, trail repair and realignment, road repair, fish passage barrier removal, fuels reduction, recreation site improvement, bank stabilization and invasive species vegetation management, etc. Projects development by the NSFC have been incorporated into this action plan.

4.1.3 Partners of the North Santiam Watershed (PNSW or PNS)

In 2015, watershed stakeholders formed the Partners of the North Santiam Watershed (Partners) resiliency action planning workgroup. The Partners consist of local, non-governmental, county, state, federal and tribal natural resource landowners and managers who have been working together in the watershed for at least 5 to 8 years. Historically, the land managers and natural resource specialists in the watershed worked independently with limited collaboration. However, as resources and funding opportunities became more scarce, collaboration between the partners increased substantially. Partners have come together and successfully leveraged funding and resources to restore riparian areas, remove fish passage barriers, improve instream fish habitat complexity, monitor projects and educate community members throughout the watershed. The Partners are developing a climate-informed Resiliency Action Plan to provide a coordinated, strategic implementation plan that will enable the Partners to prioritize and address the known limiting factors influencing the watershed’s ecological, social, and economic systems. A final “working” plan should be complete by late spring of 2018. With the action plan as a roadmap, the Partners are focusing on implementing high-priority restoration and capital improvement projects that will address factors affecting water quality and recovery of native fish populations.

4.1.4 North Santiam Drought Contingency Plan Task Force

In April 2013, watershed stakeholder surveyed identified water availability (quantity/drought emergency) as their highest priority of concern (2013 North Santiam Basin Summit). In response to this input, the NSWC collaborated with the Santiam Water Control District and other local watershed partners during the fall of 2015 to create a Drought Contingency Plan for the North Santiam Basin. Eleven partners including City of Salem, City of Stayton, Stayton Fire, Linn SWCD, Marion County, Marion SWCD, NORPAC Foods, Inc., North Santiam Watershed
Council, Oregon Department of Agriculture, Oregon Department of Environmental Quality and Oregon Department of Forestry participated to help develop the drought plan. In the winter of 2016, a local stakeholder task force formed to help guide the development of a watershed-scale plan. As required by the BOR grant, the Plan tries to answer the following three questions:

1) How will we recognize the next drought in the early stages?
2) How will drought affect us?
3) How can we protect ourselves from the next drought?

To answer these questions, the irrigation district and its partners created a task force charged with developing a North Santiam Basin Drought Contingency Plan in 2016. The goal of the drought plan is to build long-term resiliency to drought in order to minimize impacts to the communities, local economies, and the critical natural resources within the watershed.

After identifying the watershed assets vulnerable to drought, the task force developed a list of potential mitigation actions that could help reduce risks and impacts before drought. The drought task force is now seeking funds to implement the key actions outlined in the drought contingency plan. Given that the Partners action plan addresses building watershed resiliency, including resiliency to drought, several drought mitigation projects identified by the North Santiam Drought Task Force are included in this plan. These two groups are working closely together to leverage efforts and resources.

**4.1.5 Federal Lakes Recreation Committee for Detroit Lake (F.L.R.C.D.L.)**

In 2003, the Federal Lakes Recreation Committee for Detroit Lake (FLRCDL) formed as a 501c3 nonprofit with a mission of: “Working together to maintain sustainable recreation and economic stability in the Detroit Lake area.” The FLRCDL is a community-based organization through which those interested in Detroit Lake recreation collaborate with federal, state, county and local agencies to:

- Unite a group of people focused on development of resources in the Detroit Lake Recreation Area for the benefit of the recreating public, area businesses, and local citizens.
- Assume a leadership role of encouraging, promoting, and protecting year-round recreational opportunities in the Detroit Lake Recreation Area.
- Make recreation a higher priority for Detroit Lake.
- Advance the Detroit Lake Recreation Area through creativity, innovation, and cooperation.
- Identify and close the gap between Detroit Lake Recreation needs and services through volunteerism and the acquisition and use of federal, state, local government, and private grants.
- Create an environment of success for the Detroit Lake Recreation Area as part of the Federal Lakes Study.
- Routine quarterly meetings of the general membership of the Federal Lakes Recreation Committee for Detroit Lake are considered desirable to maintain continuity, foster communication as well as stimulate interest; and shall be held at the hour and day designated by the Board of Directors.
The FLRCDL brings together a wide array of people and agencies to help understand the issues and opportunities that present themselves as it relates to the USACE dam operation and how it affects the Detroit Lake Recreation Area.

4.1.6 North Santiam Basin Summit Annual Meeting

In 2009 a North Santiam Watershed Collaborative Planning initiative was started, when the City of Salem and the North Santiam Watershed Council (NSWC) asked Oregon Consensus to conduct a neutral assessment of the potential for collaboration relating to water management in the North Santiam Basin. The assessment consisted of interviews with parties representing a range of perspectives on issues and concerns related to water management. Since 2009, the City of Salem and the NSWC have been holding an annual basin summit, attended by the Partners and other stakeholders, to assess and discuss critical watershed issues that could impact the watershed ecosystem and the people who depend on it. To date, topics covered include watershed data management, emergency spill response, flooding, drought, and watershed-scale planning.

4.2 MID-WILLAMETTE BASIN COLLABORATION

4.2.1 Molalla-Pudding, French Prairie, North Santiam Subbasins Local Advisory Committee

In 1993, the Oregon Legislature passed the Agricultural Water Quality Management Act directing Oregon Department of Agriculture (ODA) to develop plans to prevent and control water pollution from agricultural activities and soil erosion; to achieve water quality standards; and to adopt rules as necessary (ORS 568.900 through ORS 568.933). Senate Bill 502 was passed in 1995 to clarify that ODA is the lead agency for regulating agriculture with respect to water quality (ORS 561.191). The Area Plan and Area Rules were developed and subsequently revised pursuant to these statutes. Between 1997 and 2004, ODA worked with Local Advisory Committees (LAC’S) and Soil & Water Conservation Districts (SWCD) to develop Area Plans and Area Rules in 38 watershed based Management Areas across Oregon. Since 2004, ODA, LACs, SWCDs, and other partners have focused on implementation including:

- Providing education, outreach, and technical assistance to landowners.
- Implementing projects to improve agricultural water quality.
- Investigating complaints of potential violations of Area Rules.
- Conducting biennial reviews of Area Plans and Area Rules.
- Monitoring, evaluation, and adaptive management.
- Developing partnerships with state and federal agencies, tribes, watershed councils, and others.

The implementation of the Molalla-Pudding, French Prairie, North Santiam Agriculture Water Quality Area Plan is accomplished through an Intergovernmental Agreement between ODA and the Marion, Clackamas, and Linn SWCDs. The LAC was formed in 2000 to assist with the development of the Area Plan and associated regulations, and with subsequent biennial reviews. The director of ODA approved the Area Plan and associated regulations. Since approval, the LAC met in 2004, 2006, 2008, 2010, 2014 and 2017 to review the Area Plan and associated regulations. The biennial review process includes an assessment of progress toward achieving the goals and objectives in the Area Plan.
4.2.2 Marion Water Quality Advisory Committee

In July of 2010, the Marion County Board of Commissioners formed the Marion Water Quality Advisory Committee (MWQAC). The MWQAC was created to provide a forum for input to Marion County staff and recommendations to the Marion County Board of Commissioners with regard to stormwater and water quality education, regulation, and county programs with accordance with the current Marion County Stormwater Management Plan and Total Maximum Daily Load Implementation Plans. The eleven-member committee is comprised of six members-at-large and five community stakeholders. Currently the committee has member representation from the Marion SWCD, Home Builders Association, Marion County Agricultural Industry, North Santiam Watershed Council, a local developer and an at-Large Position.

4.2.3 Linn & Marion County Natural Resources Conservation Service (NRCS) Local Working Group

Every year, the Linn & Marion Natural Resources Conservation Service (NRCS) agencies host a Local Work Group (LWG) meeting where farmers, landowners, conservation partners and other members of the community discuss the natural resource needs for the county. Based on feedback from those meetings, NRCS updates the county’s Long Range Plan and develops new Conservation Implementation Strategies (CIS’s) to address those resource concerns.

The locally driven CIS process helps the local NRCS staff better target its time and energy. The NRCS looks at its partner’s contribution towards solving resource issues to see if the NRCS will have the support within a CIS to be successful in addressing the identified concerns. This partnership often results in improving leveraging of funding from Partner contributions. As a result of the collaborative partnerships, the NRCS is able to achieve measurable outcomes from the group designated CIS’s.

For the Marion County LWG, the Stayton/Sublimity CIS is one example of great collaborative implementation. The Marion County NRCS staff were able to reach many landowners and address water quantity concerns and improve water quality. This in turn helped set priorities in the Wetland Reserve Program, now the ACEP-Wetland Reserve Easement, which in turn gave support toward the delisting of the Oregon Chub.

4.2.4 Marion County Weed Control District

Marion County, through Ordinance 1255, established the Marion County Weed Control District (MCWCD) in March of 2006, pursuant to ORS 569.360. By establishing the local weed control district, the county has the authority to work with private landowners to assist them in controlling noxious weeds on their lands.

4.2.5 Marion County Weed Control District, Marion SWCD and North Santiam Watershed Council Collaboration

Since 2008, the MCWCD, Marion SWCD, and NSWC have been and continue to work together to reach out to stream side landowners to conduct weed surveys and educate landowners throughout the Marion County side of the North Santiam Watershed as well as in the Upper Mill Creek subbasin. In 2009-2010 the entire North Santiam River from Idanha to the confluence with the South Santiam and the Santiam River to the Willamette River (on the
Marion County side) was surveyed for specific targeted weeds. Portions of Valentine Creek, Alder Creek and Mill Creek near Stayton were also surveyed in 2010. Knotweed surveys were done in Detroit and Idanha on both the Marion and Linn County sides in 2012. In 2014-2015 the Santiam Water Control District Waterways, including the Salem Ditch, Main Canal, Marion Ditch and Power/Station Canal reaches were surveyed. After the weed survey data was collected, the three organizations leveraged resources to reach out to and educate county landowners on the importance of removing and preventing nonnative, invasive vegetation from taking over riparian and aquatic habitats.

Outreach has been in the form of reports to landowners, newspaper articles, local workshops, direct mailings and local invasive species pulls. In 2018, the Marion County Weed Control District, Marion SWCD and NSWC staff again worked collaboratively to submit a 2018 Oregon State Weed Board Grant. The grant was awarded and will be used to assist the Marion County Weed Control District to improve the county’s weed control district capacity since their longtime staff person took another job. The grant funds and partners will work to help train Marion County road crews on invasive species identification and mapping, and to conduct invasive plant surveys along Upper Mill Creek near Stayton. Some of the grant funds will also be used to treat yellow flag iris found during the 2014-2015 weed surveys along the Salem Ditch.

4.2.6 Mid-Willamette Cooperative Weed Management Area (CWMA)

Around 2002-2003, several enthusiastic weed management stakeholders came together with the goal of setting up an effective weed management networking community with the idea of developing Cooperative Weed Management Areas (CWMA) across NW Oregon. The Mid Willamette CWMA got started with the main impetus being the control of Japanese Knotweed due to a large amount of funding available from Secure Rural Schools/Title II/PayCo/Payments to Counties/O&C monies. Once this funding became available the participating stakeholders looked at Northwest Oregon in its entirety and discussed reasonable boundary options for several CWMAs. The boundaries created were based not only on geography, but also on established working relationships. The Marion, Polk and Yamhill Counties folks were already working together. Even though the geographic boundary was “kind of funky” for possible partnered projects on the ground - the relationships for education/outreach, and sharing of weed management information seemed to meet the active weed management partners needs in the Mid-Willamette Valley. (Personal Communication with Hibler & Holm, 2018)

5 WATERSHED CHARACTERIZATION OVERVIEW

This section of the Plan provides a brief overview of overall watershed characteristics, with topics divided into water (quality and quantity), aquatic habitat, riparian/wetland/floodplain habitats, terrestrial habitat, socioeconomic conditions, and climate change risks. The discussion below is intended to provide a high-level overview of key watershed characteristics and issues. The information is based on the detailed evaluations of watershed conditions that have been conducted by many entities over the years. A list of plans and assessments used to inform the Partners planning process is provided in Appendix B.
The NSW drains approximately 766 square miles of land, with the upper watershed characterized by steep, forested uplands predominantly in public ownership and flat alluvial lowlands predominantly in private ownership (E&S Environmental Chemistry 2002). The mainstem North Santiam River flows are primarily regulated by the Big Cliff and Detroit dams, which are operated by the U.S. Army Corps of Engineers (USACE). Population centers occur in several rural communities situated along the mainstem North Santiam River: Jefferson, Stayton, Lyons, Mehama, Mill City, Gates, Detroit, and Idanha. The City of Salem, although located outside of the watershed, diverts water from the river for use as its primary water supply.

### 5.1 WATER (QUALITY AND QUANTITY)

#### 5.1.1 Water Quality

Approved total maximum daily loads (TMDLs) in the North Santiam Watershed were completed in 2006 for bacteria, mercury, and stream temperature being too warm for cold water fish. The TMDLs specify the parameter reduction needed to meet water quality standards, and apply to the North Santiam River and tributaries. The North Santiam River and several tributaries are also 303(d) limited for not meeting water quality criteria for several other parameters. A summary of the DEQ most current waterbody 303(d) water quality limited parameters is provided in Table 2.

**Table 2. North Santiam Watershed 303(d) Water Quality Limited Parameters by Waterbody**

<table>
<thead>
<tr>
<th>Waterbody</th>
<th>Parameter</th>
<th>Criteria</th>
<th>Beneficial Uses</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marion Creek/Marion Lake</td>
<td>Aquatic Weeds or Algae</td>
<td>The development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life, or which are injurious to health, recreation or industry may not be allowed.</td>
<td>Aesthetics; Water supply; Water contact recreation; Fishing; Livestock watering; Drinking water</td>
<td>Water quality limited, 303(d) list, TMDL needed</td>
</tr>
<tr>
<td>North Santiam River/Detroit Reservoir</td>
<td>Aquatic Weeds or Algae</td>
<td>The development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life, or which are injurious to health, recreation or industry may not be allowed.</td>
<td>Fishing; Drinking water; Aesthetics; Livestock watering; Water supply; Water contact recreation</td>
<td>Water quality limited, 303(d) list, TMDL needed</td>
</tr>
<tr>
<td>Blowout Creek</td>
<td>Biological Criteria</td>
<td>Biocriteria: Waters of the state must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.</td>
<td>Aquatic life</td>
<td>Water quality limited, 303(d) list, TMDL needed</td>
</tr>
<tr>
<td>Breitenbush River</td>
<td>Biological Criteria</td>
<td>Biocriteria: Waters of the state must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.</td>
<td>Aquatic life</td>
<td>Water quality limited, 303(d) list, TMDL needed</td>
</tr>
<tr>
<td>South Fork Breitenbush River</td>
<td>Biological Criteria</td>
<td>Biocriteria: Waters of the state must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.</td>
<td>Aquatic life</td>
<td>Water quality limited, 303(d) list, TMDL needed</td>
</tr>
<tr>
<td>Waterbody</td>
<td>Parameter</td>
<td>Criteria</td>
<td>Beneficial Uses</td>
<td>Status</td>
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</tr>
<tr>
<td>North Santiam River</td>
<td>Dissolved Oxygen</td>
<td>Spawning: Not less than 11.0 mg/L or 95% of saturation</td>
<td>Salmon and steelhead spawning</td>
<td>Water quality limited, 303(d) list, TMDL needed</td>
</tr>
<tr>
<td>Santiam River</td>
<td>Dissolved Oxygen</td>
<td>Spawning: Not less than 11.0 mg/L or 95% of saturation</td>
<td>Salmon and steelhead spawning</td>
<td>Water quality limited, 303(d) list, TMDL needed</td>
</tr>
<tr>
<td>Santiam River</td>
<td>Mercury</td>
<td>Table 40 Human Health Criteria for Toxic Pollutants</td>
<td>Human health</td>
<td>Water quality limited, 303(d) list, TMDL needed</td>
</tr>
<tr>
<td>South Fork Breitenbush River</td>
<td>Sedimentation</td>
<td>The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry may not be allowed.</td>
<td>Aquatic life</td>
<td>Water quality limited, 303(d) list, TMDL needed</td>
</tr>
</tbody>
</table>

The NSW has 13 stream segments on the water quality limited list with approved TMDLs for exceeding the summertime water temperature criterion:

- Bear Branch
- Big Creek
- Blowout Creek
- Boulder Creek
- Chehulpum Creek
- Stout Creek
- Elkhorn Creek
- Little North Santiam River
- Marion Creek
- North Santiam
- Santiam
- Sinker
- Unnamed tributary to Marion Creek upstream of Detroit Reservoir

The most sensitive beneficial uses identified for the North Santiam subbasin for which these TMDLs are intended to protect are:

1) Resident fish and aquatic life
2) Salmonid spawning, rearing, and migration
3) Anadromous fish passage

Detroit Dam and Big Cliff Dam are part of a larger flood control, limited seasonal storage, hydropower generation and flow reregulating reservoir complex located in the upper subbasin. These dams affect water quantity, water quality, and beneficial uses in the mainstem North Santiam River and Santiam River. The dams also affect the reservoir water quality, since the dams impound water and trap nutrients, increasing chances of (1) warmer water temperature at the surface of the reservoir, and (2) algal blooms, toxic and non-toxic. A Total Maximum Daily
Load (TMDL) was prepared for the NSW as part of the greater Willamette River Basin TMDL (ODEQ 2006). The NSW stream temperature TMDL is focused on protecting cold water salmonids, specifically steelhead and salmon. Removal or disturbance of riparian vegetation is the primary nonpoint source activity affecting stream temperatures in this subbasin (NSWC 2014 and DEQ 2006). Detroit Lake, as well as Marion Lake, has experienced potentially toxic algal blooms over the past several years (May 2007, May 2015, and June 2017) and is 303(d) water quality limited for toxic algae (Table 2). The most sensitive beneficial uses for this listing are Water supply; Water contact recreation; Fishing; Livestock watering; Drinking water and Aesthetics. The blooms have been considered “harmful algal blooms”, occasionally resulting in a lake advisory by the Oregon Health Authority. The most sensitive beneficial use for the mercury TMDL and 303() mercury limited on Santiam River is human health for fish consumption. Dissolved Oxygen and biological Criteria are also identified limitations that can impair aquatic life. Sedimentation has the potential to impair drinking water supply and aquatic habitat. The TMDLs are pending for these parameters.

The NSW is included in the Oregon Department of Agriculture (ODA) Molalla-Pudding-French Prairie-North Santiam Subbasin Agricultural Water Quality Management Plan, which provides guidance for the local agriculture community on how to meet water quality TMDL’s set by the Oregon Department of Environmental Quality (DEQ) while maintaining agricultural viability. Plan objectives include reducing, minimizing, and controlling water pollution from agricultural activities and soil erosion to achieve applicable water quality standards.

5.1.2 Water Quantity

The NSW contains two of the 13 dams the USACE manages in the Willamette Basin: Detroit and Big Cliff. The Detroit and Big Cliff Dams provide annual water storage during the non-flood control season, generates hydropower, and between May and September provides summer recreation opportunities with the formation of Detroit Lake. In addition, the North Santiam River serves as a drinking water source to 18 communities (with an approximate combined population of 204,352) through surface and groundwater sources (NSWC 2014). The City of Salem, the second largest city in the State of Oregon, serving a population of 192,000 residents daily, gets a hundred percent of its drinking water from the North Santiam Watershed.

Water rights in the NSW have been issued for a variety of uses, including industrial, agricultural, domestic, municipal, and hydroelectric power generation. The largest water appropriations in the NSW are for irrigation and municipal use; about 35 percent of consumptive water use (excluding power rights) in the lower and middle reaches is associated with municipal water rights; and 44 percent is associated with irrigation water rights (NSWC 2014). The U.S. Bureau of Reclamation (USBR) currently holds water rights for 1.64 million acre-ft of water stored during the non-flood control season irrigation purposes.

Water Resource Department (OWRD) adopted minimum perennial stream flows in the NSW below the dams to support aquatic life and minimize pollution, and established restrictions on new surface water appropriation to maintain these minimum perennial stream flows. OWRD has established instream water rights for the protection of fisheries and aquatic life, and for pollution abatement; however, these instream water rights are junior to most other water rights (NSWC 2014).
Since the NSW contains two USACE dams and is an important basin for ESA listed salmon and steelhead recovery, the USACE is required to implement a suite of actions determined necessary to protect ESA-listed Upper Willamette River Spring Chinook salmon and Upper Willamette River Winter Steelhead ESUs. Key actions which apply for all of the project dams covered under the 2008 Opinion include:

- Meeting ramp rates and flow targets for the Willamette River mainstem and tributaries.
- Interim operations to improve conditions for fish passage, spawning, incubation and rearing are being conducted until permanent solutions can be developed and completed.

As part of meeting their BiOp requirements, the USACE prepares a Willamette Fish Operations Plan (Conservation Plan) for the conservation release season (April/May-October). This plan is drafted annually in the spring, in coordination with the Flow Management Water Quality Team (FMWQQT), and finalized in May and an update is given and coordinated through WFPOM. The Conservation Plan describes how the authorized project purposes will be accomplished during the conservation season based on the water supply forecast. The plan calls for setting operational flow targets at Salem beginning on April 1, based on a storage forecast (e.g. adequate, insufficient) for mid-May (May 10-20) (Willamette Fish Operations Plan, 2018). The high value and often cases competing uses for the water of the North Santiam River underlines the importance for the watershed stakeholders to work together in managing this limited resource.

**5.2 AQUATIC HABITAT**

The federal Endangered Species Act (ESA) defines and lists species that are “Threatened” and “Endangered.” The tributaries and mainstem of the NSW support a wide range of native fish including: spring Chinook salmon (*Oncorhynchus tshawytscha*) (ESA Threatened), winter run steelhead (*Oncorhynchus mykiss*) (ESA Threatened), resident rainbow trout (*Oncorhynchus mykiss*), coastal cutthroat trout (*Oncorhynchus clarki clarki*) (Species of Concern), Pacific lamprey (*Lampetra tridentata*) (Species of Concern), brook lamprey (*Lampetra richardsonii*), Oregon chub (*Oregonichthys crameri*) (recently delisted from the ESA Endangered and Threatened Species List), mountain whitefish (*Prosopium williamsoni*), northern pikeminnow (*Ptychocheilus oregonensis*), and largescale sucker (*Catostomus macrocheilus*). Bull trout (*Salvelinus confluentus*) are thought to have once resided in the watershed. The last verified observation of bull trout in North Santiam basin was in 1945 (Goetz 1989). By the 1970’s Bull trout were documented as extirpated.

Aquatic habitats of the NSW also support a wide variety of water-dependent wildlife, including: beaver (*Castor Canadensis*), river otter (*Lontra Canadensis*), northern red-legged frog (*Rana aurora*), Cascades frog (*Rana aurora*), coastal tailed frog (*Ascaphus truei*), Oregon spotted frog (*Rana pretiosa*), Western pond turtle (*Actinemys marmorata*), Oregon slender salamander (*Batrachoseps wrighti*), and Cascade torrent salamander (*Rhyacotriton cascadae*).

Aquatic habitat conditions vary widely throughout the watershed as a result of its landscape position in the watershed and hydrogeomorphic conditions, as well as historic impacts of mining, agriculture, forestry, and urban and land use practices. Throughout the watershed, stream flows have been altered by barriers (e.g., roads, dams, and culverts) and water
diversions, resulting in reduced water flow and oftentimes impeding fish and wildlife migration. Low summer flows limit juvenile rearing habitat, and sudden increases in diversion rates can entrap and strand juveniles rearing in the vicinity. The effects of diversion-caused flow reductions in the mainstem North Santiam are somewhat offset during July through September by releases of stored water from the Detroit Lake and Big Cliff reservoirs to meet minimum flow objectives; however, during drought conditions, these releases can be compromised.

Historically, the Santiam River Watershed (i.e., inclusive of the North and South Santiam watersheds) provided 60 percent of winter steelhead and approximately one-third of the spring Chinook salmon production for the entire Willamette Basin (E&S Environmental Chemistry 2002). The Upper Willamette River (UWR) Chinook salmon and winter steelhead are both listed as Threatened under the federal ESA. Anadromous fish are considered an “indicator species,” which means their decline could signify a decline in overall watershed health. Implementing restoration actions that address salmonid population declines could build watershed resiliency, which could in turn result in sustainability of the water and land resources that humans rely on to support the local economy and communities.

National Marine Fisheries Service (NMFS), in its 2008 Biological Opinion (BO) for the Willamette Valley Project (13 federal dams and reservoirs in the Willamette River watershed authorized by the Flood Control Act of 1936), determined that reduced flows and elevated water temperatures are considered key threats to the survival of both listed salmonid species (NMFS 2008). The BO identifies operational actions within the NSW to mitigate the impacts of Detroit and Big Cliff dams, such as flow and temperature modifications.

The BOR contracts to sell stored water impounded by the USACE dams in the NSW, thus providing a regulatory nexus to require protective measures for fish for diversions associated with those federal water contracts.

Groundwater Limited Areas established by the OWRD and identified in Oregon Administrative Rules set limitations on future groundwater use in specified areas to those uses related to meeting individual family needs. This designation is intended to protect existing water rights by preventing excessive groundwater declines, restoring aquifer stability, and preserving aquifers with limited storage capacity for designated high public value uses. There are three Groundwater Limited Areas in the NSW: (1) Stayton-Sublimity, (2) South Salem Hills, and (3) Kingston.

### 5.3 Riparian Habitat (Riparian/Wetland/Floodplain Habitats)

Riparian, wetland, and floodplain habitats in the NSW follow two broad patterns. These habitats in the upper portions of the watershed tend to be relatively intact; however, they do experience a degree of impact from recreation, paved and dirt roads, agricultural runoff, and other similar land uses. This pattern contrasts with the lower portions of the watershed, which have experienced land clearing and drainage alteration to a much greater extent.

Historically, the North Santiam River boasted vast floodplain forests within the lower watershed, with multiple, dynamic side channels. The North Santiam River also contained significant runs of UWR spring Chinook salmon and winter steelhead, and the river remains a
key target basin for the recovery of these ESA-Threatened species. However, current habitat conditions are significantly lacking, because the majority of the high-quality spawning habitat is located above major fish passage barriers (namely Detroit and Big Cliff dams). While native fish and wildlife species reside in the floodplain habitats of the Lower North Santiam River, quality habitat is limited due to channel simplification, installation and maintenance of flood and channel migration control structures, and conversion of floodplain forests to agricultural fields. In addition, the reduction of high peak flows, as a result of flood control management, reduces recruitment of floodplain forest habitats.

5.4 TERRESTRIAL HABITATS

Terrestrial habitats in the NSW consist of valley bottomland habitats (e.g., oak savanna, oak woodland, and prairie), forest habitats of the western hemlock zone (dominated by Douglas fir [Pseudotsuga menziesii], western hemlock [Tsuga heterophylla], and western red cedar [Thuja plicata] that are typically found from the edge of the valley floor up to 3,000 feet elevation. Above 3,000 feet elevations is the cooler Pacific silver fir zone, which is composed of Pacific silver fir (Abies amabilis), noble fir (Abies procera), Douglas fir, and western hemlock (BLM 1997). The NSW is also at the northern end of the range of sugar pine (Pinus lambertiana)(USFS 1996).

Since Euro-American settlement began in the mid-1800s, oak savanna, oak woodland, and prairie habitats have been significantly reduced in the Willamette Valley. Consequently, many of the plant and animal species associated with these habitats have become threatened or endangered, including Bradshaw’s lomatium (Lomatium bradshawii), Willamette Valley daisy (Erigeron decumbens), Nelson’s checker-mallow (Sidalcea nelsoniana), Kincaid’s lupine (Lupinus sulphureus), and Fender’s blue butterfly (Icaricia icarioides fenderi). Limiting factors include land use conversion to agriculture and/or urban development, conifer encroachment, commercial logging operations, and the absence of fire. The loss of habitat structure has also occurred because the large-diameter oaks that make up part of the oak savanna and oak woodland habitats require a long time to grow.

5.5 SOCIOECONOMIC CONDITIONS

The watershed consists of small, rural communities typically located along the mainstem of the North Santiam River and near the Detroit Lake Reservoir. Salem, Oregon’s capital and a major urban center, is located outside of the watershed but has its drinking water supply intake at Geren Island on the North Santiam River. Economic activity in the watershed is primarily focused on timber harvesting, agricultural production, and related industrial activities. Tourism and recreation are also important contributors to the local economy (e.g., fishing, hunting, camping, sightseeing, biking, and boating) (E&S Environmental Chemistry 2002). Urban development and commercial and industrial activities are more prevalent in Salem.

The North Santiam Canyon (Canyon) extends about 30 miles along the North Santiam River and includes six small communities: Lyons, Mill City, Gates, Detroit, Mehama, and Idanha. The Canyon serves as a tourist destination and a major corridor for commerce and transportation to central Oregon (E&S Environmental Chemistry 2002). Within the Canyon, business development is hampered by inadequate infrastructure and basic community facilities (Mid-Willamette Council of Governments 2014). For example, Mill City is the only community out of the five
jurisdictions with a centralized wastewater treatment facility. Unfortunately, development of wastewater treatment facilities is constrained by the Three-Basin Rule (Oregon Administrative Rule 340-041-0350), which significantly limits construction of treatment facilities along the North Santiam River (Mid-Willamette Council of Governments 2014). Traffic volumes have increased through the Canyon as tourism and recreation have become more popular in the area; however, current infrastructure remains a limiting factor (Mid-Willamette Council of Governments 2014). Increased recreation use also puts additional stress on public use facilities (e.g., trailheads and camping sites).

The USACE operates Detroit and Big Cliff dams, which are located along the North Santiam River. These dams and the associated Detroit Lake Reservoir provide important recreation opportunities and flood control. However, at times, the Detroit Lake Reservoir experiences potentially toxic algal blooms and low water conditions, both of which can adversely affect recreation and its associated economic benefits. On the other hand, required minimum flows provide a measure of security for downstream agricultural and municipal water supply intakes, as well as a cool water source for aquatic organisms.

5.5.1 Developing the Economic “Water Story” for the North Santiam Watershed

After identifying the watershed assets vulnerable to drought during the stakeholders 2015-2017 North Santiam Drought Contingency planning efforts, the North Santiam Drought Task Force developed a list of potential mitigation actions that could help reduce risks and impacts before drought. However, missing from the vulnerability assessment is the critical information that captures the economic data, in particular related to the industries dependent on the water resource of the basin both in and surrounding the watershed.

To develop a comprehensive watershed resiliency plan, data on direct economic impacts of droughts on the region’s economy (agricultural production, other water-dependent manufacturing, and recreation-based businesses), communities (continued growth and economic development), and watersheds (habitats, species, and ecosystem services) is needed. Without this information, it will be difficult (if not impossible) to garner the consensus necessary to propose, finance and build infrastructure projects that will lead to greater resiliency throughout the Willamette River Basin.

In the summer of 2017, the Oregon Business Council (OBC) as part of their Rural Economic Vitality Project (REV) project partnered with the NSWC, Marion SWCD, Marion County and the City of Salem to develop the economic water story for the North Santiam Watershed. The process which began in the fall of 2017 involves the following:

1) Collecting economic and recreational data that captures the untold story of economic and recreational activity throughout the watershed
2) Collect relevant data from other water basins that can help describe water significance and economic values in the Willamette Valley/North Santiam Watershed.
3) Integrate the ecological data already collected by the Partners of the North Santiam and from other land managers in the basin to produce a unified story of water in the watershed.
By combining the above efforts and working together we will help grow consensus among watershed stakeholders for steps that will promote greater resiliency throughout the basin.

5.6 CLIMATE CHANGE

The Oregon Climate Change Research Institute (OCCRI) has projected that temperature increases in Oregon (under continued increasing greenhouse gas emissions) will be between 3° and 7° Fahrenheit (F) by the 2050s and 5° to 11°F by the 2080s (OCCRI 2017). Although the effects on precipitation are somewhat uncertain and annual totals are unlikely to change significantly in the short term, annual precipitation patterns are likely to change, resulting in wetter winters and longer, drier summers.

Based on data gathered on April 1 of each year (which is typically the date the snowpack is at its peak level), annual snowpack in the Oregon and Washington Cascade Mountains has shown a 20 percent decline since 1950. Nolin and Daly (2006) mapped the impact of temperature increases on mountain snowpack. They documented that rising temperatures are shifting winter and early spring precipitation in the Cascades from snowfall to rainfall, resulting in decreased snowpack and earlier snowmelt. Mountain snowpack provides a source of delayed runoff to the headwaters of the North Santiam River and its tributaries, but it is likely to be less reliable in the future.

Diminished snowpack and more winter rain, without additional storage capacity, could mean less water for agriculture, power generation, municipal water supplies, recreation, and ecosystems. With the predicted increase in average regional temperatures, a decrease in annual snowpack, and a change in the timing of snowmelt/rain runoff, the likelihood of the Willamette Valley (including the NSW) experiencing drought more frequently will increase. These are precisely the conditions experienced in Oregon during the 2015 water year (OCCRI 2017), which led to drought conditions in the NSW.

Higher air temperatures ultimately lead to higher water temperatures. These higher water temperatures will put additional stress on aquatic resources, including listed salmonid species. Potentially toxic algae outbreaks could also be exacerbated.

In addition, according to the 2014 National Climate Assessment (NCA) (Melillo et al. 2014), temperatures in the Pacific Northwest forests are also experiencing the effects of climate change; forest temperatures have increased 1.3° F from 1895 to 2011. According to the Oregon Department of Forestry (ODF), 2014 was the worst year for forest fires on state-protected land in Oregon in 60 years because of drought and the increased number of lightning strikes. In addition, during the 20-year period (1996–2016), a total of 54,000 acres of wildfires occurred on the Willamette National Forest (WNF). In 2017 alone, the WNF had 70,000 acres of wildfires (per communication with Grady McMahan, USFS District Ranger). The NCA report also noted that the rising temperatures and reduced precipitation will not only increase the risk of wildfire, it will also increase the frequency of insect infestations and tree disease.
6 ANALYSIS OF CONSERVATION AND RESTORATION NEED

Based on the watershed characterization provided in Section 5, and the likelihood of significant disruptions to watershed conditions due to climate change, the Partnership embarked on an innovative approach to analyzing the watersheds’ resiliency trajectory using available GIS data and regional climate resiliency modeling. This relatively new prioritization model that synthesized both current and predictive GIS data, was originally developed in the Rogue River Basin by Bonneville Environmental Foundation and Jill Ory Consulting as part of that Basin’s Partnership planning efforts in 2014-15. It proved useful in the discussion of long-term prioritization of actions across a basin or watershed, in the context of climate change impacts. With the method developed and model already partially produced in the Willamette Basin as well, the Watershed Council secured support from Meyer Memorial Trust to advance the same analysis in the North Santiam. BEF worked with Sandra Coveny, LLC to replicate the model approach specifically for the North Santiam, utilizing locally available data combined with other relevant regional datasets. Detailed information about each HUC -6 in the Watershed, as well as broad unifying themes of conservation and restoration need were identified through the watershed analysis process.

6.1 WATR MODEL GIS ANALYSIS

To assess potential watershed resiliency, the planning effort employed the use of the GIS modeling tool dubbed “WATR” through this planning process, in reference to the four large scale focal targets of Water, Aquatic habitats, Terrestrial habitats, and Riparian habitats on which the model is built. Appendix D shows the Geographic Information System (GIS) datasets and sources that were utilized to aggregate and score each of the four categories to estimate the overall likely condition of each sixth-field HUC in the NSW, ranking them from 1 (least resilient) to 5 (most resilient). The mix of data sets represent a diversity of both existing conditions, as well as predictive modelling efforts completed by others based on the A1B mid-range climate scenario for the years 2040 to 2050 (depending on data layer).

The results of the modeling, shown in Figure 3. WATR Model Results

[PLACE HOLDER, INSERT Figure], are consistent with the Partners’ understanding of the NSW and the conditions described in this Plan. Generally speaking, the upper subbasins are more resilient than the lower subbasins as a result of more intensive land uses and greater hydrologic alterations in the lower subbasins. The range of scoring for the various HUC’s helped the partners to determine which areas and activities were needed to help “move the needle” towards more resilient watershed conditions. The focal areas and actions identified in Sections 8 and 9 were informed in part by an understanding of each HUC’s expected resiliency.
Figure 3. WATR Model Results

[PLACE HOLDER, INSERT Figure 3 WATR Model Results]
6.1.1 WATR Model Limitations

Some additional work on the WATR model in the North Santiam should be completed in the future to both address the sixth-field HUCs bordering Detroit Lake and the mainstem River below the dams. The model showed the lake bordered subbasins to be in relatively poor condition, when in reality they are well forested and in generally good condition. It is believed that the model underrated these subbasins because of the lake itself, which is an unnatural water feature that provides relatively low habitat value for native species. For the mainstem River below the dams, the predictive temperature modeling for the streams provided by the NORWEST data set should be replaced with the modeling completed by the USGS for temperature in a 2040 or 2050 climate scenario of mid-range emissions levels. NORWEST’s model did not account for regulated river systems. Additional discussion of WATR model results is provided later in this Plan, in Section 8, Plan Focal Areas.

6.2 EMERGING CONSERVATION AND RESTORATION THEMES

Several broad themes regarding the need for conservation and restoration in the NSW are apparent. These needs are summarized below and are then further outlined in Section 5.1, which provides a conceptual model for the NSW that includes the Plan’s focal targets, limiting factors, and strategies. Overlaying each of the themes described below is the consideration of climate change, with future change generally anticipated to exacerbate existing issues, thus further highlighting the need to foster a resilient NSW.

Water Quality and Quantity Concerns: Water quality is adversely affected by loss of intact riparian vegetation and land use alterations in the watershed, which have resulted in higher than desired stream temperatures (nine stream segments on 303(d) list for summertime water temperature), and poses risks for excessive sediment and nutrient loading. Detroit Lake has experienced nuisance algae blooms during the past few years, which is detrimental to both aquatic life and recreational use of the lake. In-stream flows are poorly protected, because instream water rights are junior to other water rights in the watershed. Improving upon current conditions would benefit native aquatic ecosystems and the species that rely on them, benefit local communities by ensuring quality drinking water, and support the local economy including recreation, agricultural production and processing, and other uses that rely on a high-quality water supply.

Loss of High Functioning Native Habitats and Effects on Associated Species: The NSW has experienced extensive land alterations compared to conditions during pre-Euro-American settlements, resulting in a notable loss of high functioning native habitats. Although this is most evident in the lower portion of the watershed, where much of the land has been converted from native habitats to agricultural production and rural development, historical forest practices have also had an effect on forest habitats and stream conditions in the upper watershed. Of particular note is the loss of native valley habitats including oak woodland, oak savannah, and prairie habitats. Loss of native wetland, riparian, and floodplain habitat, as well as a reduction in instream habitat complexity are other notable changes. Habitat loss, road development, and dams have disrupted historical migration corridors for fish and wildlife. As previously noted, the Santiam River Watershed (i.e., inclusive of the North and South Santiam Watersheds) provided 60 percent of winter steelhead and approximately one-third of the
spring Chinook salmon production for the entire Willamette Basin (E&S Environmental Chemistry 2002). Despite the loss of native habitats and species declines, the NSW is still a biologically diverse area, overlapping with six Oregon Conservation Strategy (ODFW 2016) Conservation Opportunity Areas (COAs) that support six strategy habitats, and 45 strategy species (see Appendix E for details). Conservation and restoration of native habitats will support recovery of listed fish species as well as other native and culturally important fish species (e.g., lamprey), restore native valley and mid- to high-elevation forest habitats and associated species, and protect and provide linkages between remaining high-quality habitats, including Oregon Conservation Strategy habitats and species.

**Socioeconomic Concerns:** The NSW provides many resources that benefit its local communities, including water for drinking and industry, outdoor recreational opportunities, and productive working lands (such as agriculture and timber). Therefore, there is a compelling need to manage these resources in a sustainable manner that is resilient to the risks and challenges present in the watershed. Some examples of these risks and challenges include protection of safe drinking water supplies, the need for clean water to support recreation and industry, and regulatory restrictions driven by ESA listings and the ODEQ Three Basin Rule. Climate-related risks are also important to consider, and include drought, flood, fire hazard, and climate change.

### 7 CONSERVATION AND RESTORATION APPROACH

This Plan focuses and connects conservation and restoration activities in select areas, and encourages recovery of the processes that will promote system resiliency incrementally over time. The Plan integrates approaches and prioritizations proposed for: preserving biodiversity in the face of climate change (Buttrick, et al., 2015), salmonids via cold water refugia (Isaak et al., 2015), restoring salmon habitat in a changing climate, (Beechie et al., 2012), setting restoration priorities (Beechie et al., 2008), selecting restoration techniques and priorities (Roni et al., 2002), and riparian restoration in a changing climate (Seavy et al. 2009)). It incorporates variable landscape management approaches, and considers some areas as novel ecosystems (Mores et al., 2014, Hobbs et al., 2014).

To support a focused approach to addressing the conservation and restoration needs described above, the Partners developed a list of focal targets for the Plan and the limiting factors associated with each target. Strategies were then developed to address the limiting factors. These items are described below, along with an approach to prioritizing individual projects and programs to be included in the Plan.

#### 7.1 NSW CONCEPTUAL MODEL, FOCAL TARGETS, AND LIMITING FACTORS

The NSW is part of the larger Willamette River Watershed. As such, this Plan recognizes its connection with, and is informed in part by, the Willamette River Initiative and it’s Willamette Model Watershed Program. The conceptual model developed for the Willamette Model Watershed Program is provided in Appendix F for reference. The Partners used this conceptual model to inform their own specific to the NSW. The Partners also applied their local knowledge of the NSW, as well as the many past watershed assessments and studies conducted for the Plan area. For ease of use and understanding by the Partners and other local stakeholders, a
simple table-style conceptual model was developed and is provided below in Table 3 Error! Reference source not found., which lists the focal targets, limiting factors, and strategies developed for this Plan. The focal targets and limiting factors are described in Sections 5 and 6, above. A discussion of the strategies proposed to address the focal targets and limiting factors is provided below in Section 7.2.
### Table 3. North Santiam Watershed Focal Targets, Limiting Factors, and Strategies

<table>
<thead>
<tr>
<th>Focal Targets</th>
<th>Limiting Factors 1</th>
<th>Strategies</th>
</tr>
</thead>
</table>
| Clean and Ample Supply of Water                       | • Elevated water temperatures  
• Algae blooms in Detroit Lake  
• Erosion/sediment load for land management practices  
• Untreated urban runoff  
• Water diversions and withdrawals  
• Instream water rights are junior to most other uses  
• Competing demands for water storage and releases from dams | Capital Improvement Project (CIP)  
Non-Capital Improvement Project (Non-CIP) |
| Healthy Aquatic Habitats                              | • Loss of instream habitat complexity and side channels  
• Loss of beaver as keystone species  
• Reduced floodplain connectivity  
• Road encroachment  
• Siltation  
• Migration barriers  
• Water diversions and withdrawals  
• Historical splash damming, channel impacts  
• Invasive species  
• Elevated water temperatures  
• Instream water rights are junior to most other uses | |
| Healthy Riparian Systems (Riparian, Wetland, and Floodplain Habitats) | • Loss of beaver as keystone species  
• Reduced connectivity to stream network/altered drainage patterns  
• Invasive species  
• Land conversion – native habitat to agriculture and developed land | |
| Healthy Terrestrial Habitats                          | • Land conversion – native habitat to agriculture and developed land  
• Invasive species  
• Fire suppression  
• Loss of habitat connectivity | |
| Strong Social Systems – Engaged Communities           | • Lack of common shared vision and leadership  
• No clear governance structure for cooperative voluntary efforts  
• Lack of resources to improve communities  
• Lack of shared measurement systems to unite community efforts | |
| Resilient and Diverse Economy                         | • Lack of job sector diversity (former timber focus, now tourism)  
• Inadequate infrastructure in the Canyon area  
• Three Basin Rule limits new wastewater infrastructure  
• Fire risks (timber industry, recreation, wildland urban interface)  
• Climate risks (drought, flooding, climate change)  
• Detroit Lake water level management and algae bloom issues (i.e., risks to recreation sector)  
• Endangered Species Act (ESA)-related restrictions  
• Community water supply risks | |

* = Strategy addresses the focal target and associated limiting factors.

1. Climate change will have an overarching effect on all focal targets.
7.2 STRATEGIES TO ADDRESS LIMITING FACTORS

As shown in Table 3, this Plan includes 17 strategies by which to address limiting factors and ultimately achieve the desired focal target outcomes. Strategies have been grouped into capital improvement project (CIP) and non-capital improvement project (non-CIP) categories. Each strategy is briefly described below.

7.2.1 CIP Strategies

**Fish Passage**: These efforts are intended to improve access to high-value habitat and support stream processes (e.g., sediment and wood transport). Example project types include replacements of culverts with fish-friendly structures, water diversion screening, and dam removal or fish ladder improvements.

**Flow Protection and Restoration**: This strategy includes improvements to support the restoration of stream flows to functional levels in all priority streams or waterways, where achievable, in order to support fish, water quality, and channel and floodplain processes, and to buffer the impacts of climate change.

**Instream Habitat Enhancement**: This strategy entails improving habitat conditions within existing or reconnected stream channels, through actions such as placement of large wood, improvement of channel complexity, and installation of engineered log jams. Projects conducted in conjunction with riparian, wetland, and floodplain restoration projects are highly desirable. Likewise, improvements that utilize beaver-driven and other natural processes are favored over short-term fixes.

**Riparian Restoration (Riparian, Wetland, and Floodplain Habitats)**: Activities will include increasing the native canopy cover and diversity (e.g., native plantings), and improved stream/wetland/floodplain connectivity to support aquatic ecosystems health and wildlife corridor functions. Floodplain restoration at pinch points or where floodwater storage can be enhanced to reduce the flood risk to downstream landowners or support groundwater recharge is desirable. Note that invasive vegetation control associated with site preparation of riparian, wetland, and floodplain restoration projects is assumed in this objective, whereas invasive vegetation control in previously restored and/or existing conservation areas is included as its own objective (Invasive Vegetation Control) below.

**Upland Valley Habitat Restoration (Dry and Wet Prairie, Oak Savanna, and Woodland)**: This strategy is intended to increase the resiliency and health of oak woodlands, oak savannah, upland grasslands, and wet prairie habitats by promoting a mosaic of such habitats across the landscape to promote habitat diversity and protect rare habitats and associated species. Promoting the use of controlled burns as a management tool, where safe and appropriate, is desired.

**Lake Restoration**: Projects under this strategy could include improvements to shoreline habitats (e.g., plantings, addressing erosion issues) as well as to other lake habitats (e.g., placement of wood debris in lakebeds).
**Invasive Vegetation Control:** This strategy is intended to cover previously restored sites, existing conservation areas, and similar sites that might be experiencing invasive plant infestations, but it is not intended to otherwise include wholesale replanting, earthwork, or similar major restoration activities.

**Upland – Agriculture:** Upland agricultural objectives focus on improvement of water quality (e.g., runoff) in support of beneficial uses (e.g., drinking water supply, fish and wildlife, recreation). Projects could entail reducing excess irrigation runoff, best management practices to reduce erosion and capture sediment before it reaches streams, nutrient management, and minimization of use of streams and riparian corridors by livestock (e.g., riparian fencing and controlled crossing locations). Projects that introduce stream bank revegetation and tree plantings to improve water quality (e.g., temperature) may be included in this strategy if included as part of a larger farm management strategy or may be included in the “Riparian Restoration Strategy”. Agriculture-related water quantity matters (e.g., efficiency and cost improvement projects) are included in the “Flow Protection and Restoration” strategy described above.

**Upland – Forestry:** This strategy includes management of forestlands, including supporting infrastructure, to improve water quality and quantity (e.g., erosion control management), species diversity, and overall forest health. In addition, habitat improvements on forestlands could include non-forest habitats (e.g., meadow habitats), timber thinning to improve forest health and reduce fire hazard, management actions for key species or ecosystems (e.g., sugar pine restoration), and other similar activities.

**Upland – Urban/Stormwater:** This strategy would improve water quality and quantity management by increasing the implementation of effective best management practices for stormwater management from urban runoff.

**Land Conservation:** This strategy is focused on purchase or set-aside of new acreage of native habitats. Habitat improvements are covered under other objectives. The intent is to help ensure that high-quality habitats remain intact and instream flow rights are preserved or increased. There is a strong desire by the local land trusts and tribes to increase riparian/floodplain corridors and high-priority/high-biodiversity terrestrial habitats (e.g., oak woodlands and prairie) in conservation ownership and/or management (private or public).

### 7.2.2 Non-CIP Strategies

**Planning (future CIPs):** CIPs can often require a good deal of upfront planning and coordination. This strategy supports such planning efforts, which could include feasibility studies, preliminary design, stakeholder workshops, and other types of project planning activities.

**Social – Stewardship Engagement:** This Plan cannot succeed without support from the NSW community. This strategy therefore focuses on community engagement and would include activities such as development of education and promotion materials, community engagement events, training sessions, outreach to landowners, and other similar activities.
**Economic – Funding Resiliency:** This strategy entails securing funding and promoting Partner activities that provide for a diverse and resilient economic base within the NSW. Economic activities that address the Plan’s focal targets and overlap with the CIP strategies listed above are of particular interest.

**Accountability and Monitoring of Progress:** To ensure the success of the Plan, it will be critical to monitor progress, and learn and share both positive and negative outcomes. This strategy entails tracking Plan efforts with respect to the vision, goals, and objectives laid out in the Plan. This strategy will support the Plan monitoring efforts described in Section 10, Plan Monitoring – Evaluating Success.

**Maintenance and Operation Practices:** This strategy includes actions to foster sharing of best practices among Partners and other stakeholders.

**Organizational Alignment:** This strategy includes actions to foster coordination and alignment of Partner activities.

### 7.3 PRIORITIZING PLAN ACTIONS

Addressing focal targets and limiting factors will ultimately entail implementation of relevant projects and programs that fall within the previously described CIP and non-CIP strategies. These actions could be carried out by a single entity or by multiple entities. Ultimately, it is the desire that actions carried out by Partner entities be tracked collectively to provide a dashboard of activities and progress throughout the watershed. Importantly, actions proposed by individual Partners or collaborations should be reviewed by the Partnership as a whole in an effort to prioritize actions to be included in an annual work plan.

The Partners developed six criteria to support the prioritization of proposed actions within this Plan. The Partners agreed that these criteria would be used in a qualitative manner to help each Partner entity determine on its own if its individual projects are appropriate for inclusion in the Plan. These criteria would again be used in a qualitative manner to inform a group review/discussion of all projects submitted for inclusion in the Plan. It was agreed that using these criteria in a quantitative manner (i.e., creating a scoring scheme) would be difficult because of the wide variety of project types.

The six prioritization criteria are:

1. **Action is in alignment with the Plan’s vision, goals, and objectives:** This criterion is fairly straightforward. Essentially, Partners should be submitting only those CIPs that are in alignment with the Plan’s current vision, goals, and objectives, while recognizing that the vision, goals, and objectives—particularly the more detailed objectives—could change over time.

2. **Action lies within a Plan geographic focal area:** For the Plan, focal areas are defined as those areas in which any of the following occur and there is Partner agreement to include them:
   - Areas where there is active/extensive Partner participation.
• Areas identified in Partner plans as key focal areas (e.g., identified as source water priority areas and areas with high viability for species recovery)
• Areas where the WATR model or other studies point to the need for a geographically defined and focused effort

A discussion of focal areas in the watershed included in this current Plan is provided in Section 8.

3. **Cost/Benefit:** This criterion will weigh the cost/benefit ratio from one project to another. However, since accuracy of cost estimates and associated benefits will vary between projects, this criteria will likely be based more on a best professional judgement review and discussion among the Partners than on a detailed numerical analysis. Partners may use a relative scale for comparing cost/benefit ratios, such as the following, with “1” being the most favorable and “4” the least favorable:

   1 – lower cost-higher benefit
   2 – higher cost-higher benefit
   3 – lower cost-lower benefit
   4 – higher cost-lower benefit

There are likely to be exceptions and nuances not captured by this ranking scheme, but those exceptions would be worked out as part of group discussions.

4. **Action supports conservation of most vulnerable resources in the basin:** The project supports recovery of listed fish, and species and habitats included in the Oregon Conservation Strategy (e.g., oak woodland and prairie) or that are of cultural significance (e.g., lamprey).

5. **Action can likely be funded:** The project is highly likely to meet the funding requirements of one or more grant providers or is likely to be self-funded as part of the budgets of Partner entities.

6. **Action supports socioeconomic and other non-CIP goals and objectives:** CIPs that provide the opportunity for incorporating non-CIPs allow for multiple objectives to be met, and encourage broader Partner and community participation.

8 **PLAN FOCAL AREAS**

Based on the criteria described above (particularly criteria number 2), along with the analysis of conservation and restoration need provided in Section 1, the Partners identified five focal areas to include in the Plan. The focal areas define geographic areas in which Partner efforts will be encouraged; however, it is acknowledged that not all activities will be bound by these focal areas. A discussion of why these areas have been chosen is provided below. A map of the focal areas is provided in Figure 4. Focal Areas

**PLACE HOLDER, INSERT Figure**, which also highlights individual Partner involvement within each focal area.
Figure 4. Focal Areas

[PLACE HOLDER, INSERT Figure 4 North Santiam Watershed Focal Areas]
8.1 BREITENBUSH SUBWATERSHED FOCAL AREA

The Oregon Conservation Strategy (ODFW 2016) highlights the Breitenbush subwatershed as a COA, citing the following special features: (1) connects Bull of the Woods Wilderness and Mount Jefferson Wilderness areas; (2) includes Critical Habitat Units (CHUs) for Northern Spotted Owl; (3) contains several rare plant species; and (4) is a site for UWR spring Chinook salmon, UWR winter steelhead, and bull trout reintroduction. According to the United States Forest Service (USFS) (Robert Gentry, pers. comm. 2017), the Breitenbush drainage represents a significant cold water refugia for anadromous fish. The North Fork Breitenbush has more than 5 miles of the highest quality spawning and rearing habitat for salmonids above the dams. Additionally, Breitenbush is an important recreation resource, and therefore projects that protect resources from recreation activities are important.

The Breitenbush subwatershed was also chosen as a focus area by the North Santiam Forest Collaborative in 2015. The collaborative identified and prioritized more than 40 restoration projects, including: 7 recreation projects areas, 11 trail projects, 4 wildlife habitat projects, 9 culvert replacement projects, 3 road improvement projects, 3 fuel reduction project areas, and 4 projects aimed at improving forest health and resiliency.

The Breitenbush subwatershed focal area generally was scored as “most resilient” by the WATR model, with only the Lower Breitenbush subbasin scoring moderately high (Figure 3. WATR Model Results).

Table 4. WATR Model Resiliency Score Results for Breitenbush Subwatershed Focal Area (stream miles)

<table>
<thead>
<tr>
<th>Component</th>
<th>1 Low Resiliency</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 High Resiliency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water (stream miles)</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>75</td>
<td>54</td>
</tr>
<tr>
<td>Aquatic (stream miles)</td>
<td>0</td>
<td>74</td>
<td>17</td>
<td>29</td>
<td>16</td>
</tr>
<tr>
<td>Terrestrial (stream miles)</td>
<td>0</td>
<td>6</td>
<td>42</td>
<td>60</td>
<td>27</td>
</tr>
<tr>
<td>Riparian (stream miles)</td>
<td>2</td>
<td>33</td>
<td>34</td>
<td>49</td>
<td>17</td>
</tr>
</tbody>
</table>

8.2 LITTLE NORTH SANTIAM SUBWATERSHED FOCAL AREA

The Oregon Conservation Strategy (ODFW 2016) highlights the Little North Santiam River Area as a COA, citing the following special features: (1) a portion is designated as a Scenic Waterway that is adjacent to the Opal Creek Wilderness, which is an important habitat connector between the West Cascades and the Willamette Valley, and it provides habitat for
many cold water species and mature forest species; (2) the Little North Santiam subbasins serve as a water source protection area for the City of Salem; and (3) the USFS notes that the area is primarily a recreation resource, and therefore projects that protect natural resources from high recreation use are of importance. Examples of concerns to the USFS include bank erosion, sedimentation, and riparian native vegetation loss.

The U.S. Bureau of Land Management (BLM) particularly highlights the importance of the Middle Little North Santiam subbasin for supporting listed UWR winter steelhead and UWR spring Chinook salmon, as well as Pacific lamprey and coastal cutthroat trout. This subbasin has a relatively high density (miles/watershed area) of habitat with high intrinsic potential (low gradient, wide floodplains) on BLM-managed lands, and is the second-highest priority 6th field watershed identified for restoration in the Cascades Field Office of the Northwest Oregon District BLM (BLM 2015). The Sinker Creek confluence and Elkhorn Golf Course reach of the Little North Santiam subwatershed have high potential for restoration and partnering opportunities.

Additionally, the Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead (UWR Recovery Plan) (ODFW and NMFS 2011) includes a habitat objective of prioritizing restoration of moderate-gradient stream reaches in the North Santiam River basin to increase habitat complexity in order to provide juvenile fish refugia during high flows, and to augment other channel-forming processes, and other habitat and water quality actions in the UWR Recovery Plan. In particular, the UWR Recovery Plan identifies the Little North Santiam River as a good candidate stream for achieving this restoration objective. The UWR Recovery Plan suggests accomplishing stream and floodplain restoration by increasing instream habitat complexity through the addition of large wood and by implementing bank stabilization actions.

The UWR Recovery Plan also recommends providing for long-term restoration of salmon and steelhead habitat by planting, protecting, maintaining, and restoring native riparian vegetation, and thereby increasing the amount of shade.

The Little North Santiam subwatershed focal area was scored between “moderate” and “moderately high resilient” by the WATR model.

![PLACE HOLDER, INSERT Figure](Figure 3. WATR Model Results)

Table 5 provides a detailed breakdown of scoring for each component of the model. The subbasins making up this focal area generally have low levels of development, with the majority of the land in public and private forestry management. Public forestlands also provide important recreational resources. Therefore, strategies proposed for this focal area will generally focus on maintenance of high-quality stream and riparian corridors, and enhancement, restoration, and land conservation of select stream reaches. Limiting the disturbance of high-quality habitats from recreational activities will also be an important strategy.

**Table 5. WATR Model Resiliency Score Results for Little North Santiam Subwatershed Focal Area (stream miles)**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low Resiliency</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>High Resiliency</strong></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
### 8.3 Middle North Santiam Subwatershed Focal Area (Mehama and Lyons Vicinity Upstream to Big Cliff Dam Vicinity)

A significant amount of high-quality spawning gravels get trapped behind the Big Cliff and Detroit dams. The NSWC has identified tributaries within the Middle North Santiam subwatershed focal area as having a significantly higher ecological importance to the North Santiam stream system, because they are the highest reaches below the dams that provide spawning and rearing habitat for migrating Chinook, coho, and steelhead, and are the main hydrologic systems providing sediment bedload and large wood material into the middle reaches of the North Santiam River system above the Little North Santiam River confluence. Some of the key areas within this focal area are:

**Rock Creek Subbasin**

The Rock Creek subbasin is considered an aquatic anchor within Oregon’s Santiam State Forest (ODF 2012). It contains high-quality aquatic habitat for Chinook salmon and steelhead, on the local ODF land base (approximately 77 percent of the subbasin is owned by ODF). With this designation, ODF policy dictates additional stream buffer widths along fish-bearing and non-fish-bearing streams within the subbasin.

**Snake-Deford Subbasin**

The Snake-Deford subbasin, located in Mill City, consists of two forks (Snake Creek and Deford Creek) that originate in steep, forested uplands. The Snake-Deford drainage is one of three tributaries in the Middle Reach North Santiam (i.e., the area just downstream of the Detroit and Big Cliff dams down to Lyons), and portions of it are identified as essential salmonid habitat for UWR chinook and steelhead. The NSWC Restoration Action Plan (NSWC 2014) identifies side channels and tributaries below the high-head dams as high priorities for salmonid habitat restoration. The primary restoration focus for the NSWC is to remove fish passage barriers and to provide access to potential habitat for anadromous fish, restore habitat complexity through large wood placement, reconnect the streams with their floodplains, and restore riparian vegetation to provide shade and future wood recruitment.

**Little Sweden Conservation Area**

The Confederated Tribes of Warm Springs (CTWS) acquired the Little Sweden Conservation Area, a 183-acre property located just below Big Cliff Dam in Marion County, through the Willamette Wildlife Mitigation Program. The Little Sweden Conservation Area is made up of a significantly diverse range of critical habitats for numerous species that are ESA-listed, or listed in the Oregon Conservation Strategy (2016), and Northwest Power and Conservation Council Willamette Sub-basin Plan. Notable, local historical records show Warm Springs Tribal members using the unique rock outcrops that exist along this reach for dip netting fish. Along with the access to fishing resources found on the property, there are numerous other natural resources.
of cultural significance that will be targeted for management by Tribal members, including camas, hazel, black-tailed deer, elk, and bear, to name a few. The CTWS’s overall vision for this property is to fully restore the ecological functions to all habitats, which in turn will benefit the species that rely on these habitats to thrive. The CTWS’s immediate goals and objectives are to finalize the Little Sweden Management Plan.

**Sardine Creek Area**

Sardine Creek, which flows into the North Santiam River just east of Big Cliff Dam and into Big Cliff Reservoir, is considered an aquatic anchor within Oregon’s Santiam State Forest, with approximately 43 percent of the area under ODF management (ODF 2012). It contains high-quality habitat for amphibians and cutthroat trout. With this designation, ODF policy dictates additional stream buffer widths along fish-bearing and non-fish-bearing streams within the subbasin.

The Middle North Santiam subwatershed focal area scored “moderately high” for resiliency by the WATR model (Figure 3. WATR Model Results). Table 6 provides a detailed breakdown of scoring for each component of the model. A large portion of this focal area lies within the Santiam State Forest, which, as noted above, has several subbasins and drainages that provide important, high functioning native habitats. Therefore, strategies proposed for this focal area will generally focus on maintenance of high-quality stream and riparian corridors, and enhancement, restoration, and land conservation of select stream reaches and surrounding habitats (e.g., Little Sweden Conservation Area).

| Table 6. WATR Model Resiliency Score Results for Middle North Santiam Subwatershed Focal Area (stream miles) |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------|---|---|---|---|
| 1 Low Resiliency | 2 | 3 | 4 | 5 High Resiliency |
| Water (stream miles) | 0 | 0 | 17 | 32 | 1 |
| Aquatic (stream miles) | 0 | 29 | 2 | 14 | 5 |
| Terrestrial (stream miles) | 10 | 22 | 14 | 5 | 0 |
| Riparian (stream miles) | 0 | 17 | 18 | 14 | 0 |

**8.4 LOWER NORTH SANTIAM SUBWATERSHED FOCAL AREA (WILLAMETTE CONFLUENCE UPSTREAM TO MEHAMA AND LYONS VICINITY)**

The Lower North Santiam subwatershed focal area is an area with a great deal of Partner activity. This focal area is at the heart of agricultural production in the Plan area and includes the majority of population centers within the NSW, while also containing a wealth of natural resource assets.

The Oregon Conservation Strategy (ODFW 2016) highlights the Lower North Santiam subwatershed focal area as containing two COAs: the Santiam Confluences COA and the Kingston Prairie-Scio Oak Pine Savana COA. The Santiam Confluences COA contains, at the lower end of the North Santiam River, Wiseman Island, which represents one of the largest
blocks of relatively intact floodplain habitat in the valley. This area also includes the Chahalpam and Chankawan Wildlife Areas, two large parcels of land acquired through a partnership between Bonneville Power Administration, Oregon Department of Fish and Wildlife, Western Rivers Conservancy, and the Confederated Tribes of Grand Ronde. Both properties are now owned and managed by the Confederated Tribes of the Grand Ronde Community of Oregon. The Chahalpam Wildlife Area is 462 acres and is located along 2 miles of the Lower North Santiam River, upstream of Wiseman Island. The Chankawan Wildlife Area is a 411-acre parcel located east of Stayton, just upstream of the Geren Island, location of the City of Salem’s drinking water facility. The Grand Ronde Tribe’s sole purpose for acquiring these lands is to permanently protect intact riparian, wetland, and off-channel habitat from development, and to improve fish and wildlife habitat in the Lower North Santiam subwatershed. The Santiam Confluences COA provides important habitat for riparian birds, reptiles, salmonids, Pacific lamprey, and Oregon chub, as well as Oregon oak savanna and grasslands.

The Kingston Prairie-Scio Oak Pine Savana COA is noted as having the following special features: native prairie, wet prairie, and oak savanna habitats that support rare plants (Bradshaw’s lomatium [Lomatium bradshawii], Willamette daisy [Erigeron decumbens var. decumbens], Oregon larkspur [Delphinium oreganum], and white-topped aster [Sericocarpus rigidus]) and grassland birds, with the COA being designated a grassland bird conservation area. The Nature Conservancy’s Kingston Prairie Preserve, where there are ongoing efforts to maintain the native prairie vegetation, is found in the Kingston Prairie-Scio Oak Pine Savana COA.

**Bear Branch Creek Subbasin**

The Bear Branch Creek subbasin, located within the Lower North Santiam Subwatershed, has been identified as a focal area by the Linn Soil & Water Conservation District, the NSWC, and the Greenbelt Land Trust. Approximately 13 square miles of land, primarily agricultural and rural residential, make up the land area that drains into Bear Branch Creek. Bear Branch has high potential to provide abundant rearing habitat for salmon spawned in the NSW upstream of the confluence with Bear Branch (Demeter Design 2010). The Santiam River/Willamette River confluence has been identified as a focal area, both as part of the U.S. Fish and Wildlife Service (USFWS) Willamette Valley Conservation Area study, Strategic Habitat Conservation in Oregon’s Willamette Valley (USFWS 2017) and the North Santiam River Watershed Assessment, Lower and Middle Reach Subwatersheds (E&S Environmental Chemistry 2002). In 2009, the NSWC selected the Bear Branch to be one of three subbasins in the watershed to take part in the Willamette Model Watershed Program, a regional program designed to help improve watershed health at a subbasin scale.

**Stout Creek Subbasin**

The NSWC also chose Stout Creek as a high priority tributary to take part in the Willamette Model Watershed Program. Stout Creek enters the mainstem just above the town of Stayton and above the Geren Island Water Treatment Facility, where the City of Salem gets its drinking water. Thus, the input from Stout Creek helps to provide clean drinking water for City of Salem residents. Approximately 11 square miles of land, primarily rural residential and commercial forestry, make up the land area that drains into Stout Creek. Stout Creek exhibits relatively intact riparian zones, especially in the upper watershed, moderate water quality, and a large potential for providing and enhancing fish habitat.
Valentine Creek Subbasin

Valentine Creek subbasin was the third tributary chosen by the NSWC to be part of the Willamette Model Watershed Program. Valentine Creek enters the mainstem just above the town of Stayton, and just below the Upper Bennett Dam and the Geren Island Water Treatment Facility. Approximately 22 square miles of land, primarily agricultural and rural residential, make up the land area that drains into Valentine Creek. Valentine Creek is important for its salmonid rearing potential; however, it currently has limited spawning habitat. In addition, stream shade is relatively low throughout the majority of the Valentine Creek stream network; with warm water from the creek most likely contributes to the temperature issues in the North Santiam, which is on the ODEQ 303(d) list of water quality impaired waterbodies for exceeding summer stream temperature standards (Demeter Design 2010).

The Lower North Santiam subwatershed focal area had the widest range of WATR model scores of all of the focal areas: The scores for the subbasins in this focal area ranged from “moderately high resilient” to “least resilient” (Figure 3). Table 7 provides a detailed breakdown of scoring for each component of the model. The overall scoring generally represents a transition from forested foothills to valley farm lands and higher levels of development. The majority of land in this focal area is in private ownership. Strategies proposed for this focal area will generally focus on restoring and enhancing stream corridors, addressing water quality and quantity issues, and conserving and restoring valley bottom habitat.

Table 7. WATR Model Resiliency Score Results for Lower North Santiam Subwatershed Focal Area (stream miles)*

<table>
<thead>
<tr>
<th>Component</th>
<th>1 Low Resiliency</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 High Resiliency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water (stream miles)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>30</td>
<td>6</td>
</tr>
<tr>
<td>Aquatic (stream miles)</td>
<td>6</td>
<td>20</td>
<td>10</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Terrestrial (stream miles)</td>
<td>6</td>
<td>7</td>
<td>15</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Riparian (stream miles)</td>
<td>7</td>
<td>20</td>
<td>7</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

* The mainstem of the Lower North Santiam River is not included in these totals because of model limitations related to water temperature associated with reservoir releases.

8.5 DETROIT LAKE FOCAL AREA

The Detroit Lake focal area consists of the lake itself plus the upland perimeter bordering the lake. The lake is a manmade reservoir that serves multiple and sometimes competing uses including flood control, power generation, boating and other recreational uses, and storage of conservation releases. Appendix C provides the water control diagram for the lake, which guides the lake water level management. Detroit Dam, which formed Detroit Lake, was constructed in 1953. Normal reservoir elevations range between 1,450 to 1,564 feet, with highest elevations in the summer and lowest elevations in the winter (Kock et. al. 2015). Big Cliff Dam is located approximately 2.5 miles downstream and serves as a re-regulating dam to manage fluctuating discharges due to power demand. Both dams are operated by the Corps as part of the thirteen dams and reservoirs that comprise the Willamette Valley Project (USFS 2018).
Tourism is an important contributor to the local economy, with nearly 500,000 visitors to the lake during the peak summer season (USFS 2011). Popular activities include fishing, boating, water skiing, swimming, camping, and picnicking (USFS 2018). The lake is a stop along the Mt. Jefferson section of the Oregon Cascades Birding Trail (USACE 2018). Recreation facilities include boat ramps, camp grounds, and day-use areas operated by the U.S. Forest Service and Oregon Department of Parks and Recreation, as well as two privately owned marinas. In late summer, early fall through spring, the water levels on Detroit and Big Cliff lakes are frequently drawn down to the point where boat launches are no longer available (USFS 2018). Access to boat ramps during drought years can result in earlier lack of access to boat launches in part due to lake drawdown from water release requirements (e.g. Willamette Project BiOp) to meet downstream water quality (e.g. temperature) and quantity obligations (e.g. maintain adequate flow at City of Salem water intake at Geren Island)(GSI and DEA 2018).

As previously noted, the lake has experienced potentially toxic algal blooms over the past several years (May 2007, May 2015, and June 2017) and is 303(d) water quality limited for toxic algae, with “harmful algal blooms”, occasionally resulting in a lake advisory by the Oregon Health Authority. Preliminary observations suggest a potential link between water quality changes associated with a high pH (occasionally a pH of 9), high D.O when algae is proliferating, and high turbidity readings (Brandin Krempasky, pers. l comm. 2018). However, studies are needed to better understand the causes and potential solutions to this problem.

Areas bordering the lake consist of developed roadways and park facilities, as well as undisturbed forested slopes. The developed and heavy use areas present potential stormwater runoff and erosion issues. In-lake habitat quality is relatively low due to lack of structure and cover for aquatic organisms that results from management of the lake as a reservoir.

9 PLAN GOALS AND OBJECTIVES

The goals and objectives provided below are intended to take into account the focal targets, limiting factors, and strategies described previously in this Plan, and to guide the Partners to well-defined, measurable actions. Three goals have been developed to cover ecological, social, and economic desires for the NSW. Each goal then includes several defined and measurable objectives, and each objective includes at least one associated action (i.e., a project or program that has been included in the CIP or non-CIP lists—see Appendix G).

The CIPs represent projects that are ripe for implementation (planning and conceptual design is complete; however, detailed design, construction bid documents, and/or permits might still need to be obtained). Potential future CIPs still in the planning phase are included in the non-CIP list under the goal and objectives. The intent is that these projects would eventually be pulled into the CIP list. The Partners will meet quarterly, or as needed, to review progress, and the CIP and non-CIP lists will be updated annually. The Plan update process is further described in Section 10.4, Plan Schedule and Update Process.

The goals, objectives, and actions, unless otherwise stated, assume a 2025 completion time frame based on a Plan implementation start date of roughly January 1, 2018. Plan efforts, including landowner outreach, are to be implemented in the Plan focal areas or in other important areas that have been identified through this planning process. Because this Plan is
considered a living document, it is anticipated that some objectives and associated actions will be further refined over time.

9.1 ECOLOGICAL

Goal: Address the key limiting factors affecting the focal targets of Clean and Ample Supply of Water, Healthy Aquatic Habitats, Healthy Riparian Systems, and Healthy Terrestrial Habitats by conserving and enhancing the ecological processes upon which they rely. Emphasis will be on, but not constrained to, the focal areas identified in this Plan. Achievement of all of the following objectives will depend on willing voluntary actions taken by local stakeholders, including private landowners, and local, county, state, federal, and tribal entities.

The objectives to achieve this goal are:

Objective ECO-1: Protect and improve water quality by implementing Upland – Urban Stormwater, Upland – Forestry, and Upland – Agriculture strategies affecting runoff from a minimum of 248 acres of the watershed. Flow protection, and restoration of riparian, wetland, and floodplain habitats would also support this objective, but these strategies are addressed within the separate habitat objectives below. (Note: The Rock Creek bridge replacement Short Creek debris flow projects will reduce sediment loads to downstream waters. Although important for reducing impacts to aquatic habitat and community water supply, these benefits are difficult to quantify. They are included in the Actions listed below but not included in the numeric outputs listed above.)

Action ECO-1.1: Implement the Upland Forestry projects focused on drainage/sediment reduction issues included in the 2018 CIP list.

Action ECO-1.2: Implement the Upland Urban stormwater projects included in the 2018 CIP list to address runoff from a minimum of 248 acres.

Note: Currently, no upland agricultural projects are included in the CIP list. The Marion and Linn Soil and Water Conservation Districts and the Natural Resources Conservation Service are currently working independently with landowners on these types of projects. This note serves as a placeholder until future projects are identified and incorporated into this Plan.

Objective ECO-2: A minimum of (number to be determined) cubic feet per second (cfs) of flows will be protected and/or restored within the focal areas. This objective will be further refined and implemented upon completion of studies included in the non-CIP list.

Action ECO-2.1: Continue implementation of Santiam Water Control District’s irrigation automation system, as noted in the 2018 CIP list. At least five of the roughly ten planned Santiam Water Conservation District system improvements will be implemented.

Note: Additional actions that allow more water to remain instream, particularly during low-flow months, might be included at a later date. Actions such as water rights trading are being evaluated as part of the NSW Drought Contingency Plan.

Objective ECO-3: Improve access and conditions to a minimum of 17.4 miles and 366 acres of stream corridors, with emphasis in focal areas. Strategies likely to be used to meet this objective include: Fish Passage; Instream Enhancement; Riparian, Wetland, and Floodplain
Restoration; and Invasive Vegetation Control. Land Conservation and Flow Protection and Restoration strategies would also support this objective, but they are addressed as their own standalone objectives. (Note: Improvements to Lower Bennett Dam and North Channel Spillway fish ladders are not included in the numeric outputs above, but are included in the actions listed below. These projects will improve access to the hundreds of miles of suitable habitat upstream of these structures; however, since passage currently occurs, but is not up to current fish passage criteria standards, it is difficult to put a numeric value to the overall benefit. These structures are listed as priority ODFW fish barriers. Similarly, several assessment projects are proposed that will result in additional fish passage, instream, and/or riparian improvements whose numeric benefits have not been defined yet. These projects are also included in the actions listed below.)

**Action ECO-3.1:** Implement the fish passage projects included in the 2018 CIP list to achieve a minimum of new or improved access to 10.4 stream miles (mileage value does not include benefits from proposed fish ladder improvements that would occur as part of this action).

**Action ECO-3.2:** Implement the instream enhancement projects included in the 2018 CIP list to achieve a minimum of 7 miles of instream habitat improvements.

**Action ECO-3.3:** Implement the riparian, wetland, and floodplain restoration projects included in the 2018 CIP list to achieve a minimum of 315 acres of restored habitats.

**Action ECO-3.4:** Implement the invasive vegetation projects generally focused along stream corridor habitats included in the 2018 CIP list to achieve a minimum of 51 acres of invasive species control in previously restored or otherwise intact habitats.

**Objective ECO-4:** Improve 2.69 shoreline miles of Detroit Lake and improve in-lake habitat conditions.

**Action ECO-4.1:** Implement the Detroit Lake shoreline improvement projects included in the 2018 CIP list to achieve a minimum of 0.19 shoreline miles of habitat improvements and 2.5 shoreline miles of road decommissioning improvements.

**Action ECO-4.2:** Implement the in-lake habitat improvement project included in the 2018 CIP list.

**Objective ECO-5:** Restore and enhance (number to be determined) acres of terrestrial habitats (i.e., valley bottom habitats and mid- to high-elevation conifer forests) by conducting the following actions:

**Action ECO-5.1:** Implement the valley habitat projects included in the 2018 CIP list within priority subbasins or other key corridors

**Action ECO-5.2:** Implement the Upland Forestry projects that are focused on habitat/timber management and are included in the 2018 CIP list within priority subbasins or other key areas.

**Action ECO-5.3:** Implement the invasive vegetation projects generally focused on terrestrial habitats (may include a portion of riparian areas too) included in the 2018 CIP list within priority subbasins or other key corridors.
Objective ECO-6: Conserve, through purchase, conservation easement, or similar protection mechanisms, (number to be determined) acres of native habitats that support ESA-listed, Oregon Conservation Strategy, and/or culturally important species.

   Action ECO-6.1: Implement the land conservation projects included in the 2018 CIP list, as well as take advantage of additional opportunities as they arise, within priority subbasins or other key corridors.

   9.2 SOCIAL

Goal: Promote landowner stewardship, public awareness, technical capacity, and institutional collaboration regarding the NSW's natural resources. Actions include recruiting landowners to implement restoration projects, developing shared conservation messaging, hosting workshops and training sessions to educate community members, and hosting community stewardship projects to promote public volunteer investment in improving the natural resources of the NSW.

The objectives to achieve this goal are:

Objective SOC-1: Secure commitment from willing and committed landowners along the mainstem and tributaries to support restoration of their riparian areas, remove passage barriers, manage their water rights for water quality and fish recovery, and/or improve the health of their riparian forests. Work with partners to seek funding needed to conduct outreach, develop projects, and write grants.

   Action SOC-1.1: Recruit four landowners per year through 2025.

   Action SOC-1.2: Apply for one stakeholder engagement/landowner outreach capacity grants per biennium.

Objective SOC-2: Continue existing and develop new shared strategies for public awareness and media campaigns associated with promoting clean rivers and water conservation over the next seven years, to galvanize support for preserving and restoring the NSW (in conjunction with economic objectives below) beginning in the fall of 2017.

   Action SOC-2.1: Continue efforts on existing campaigns, “Know your Water Source” and “Respect the River Campaign.”

   Action SOC-2.2: Further the campaigns currently in the development stage into the implementation stage (“NSW Drought Mitigation and Response” and “Clean Rivers Coalition” messaging).

Objective SOC-3: Conduct public outreach and educational events to promote stewardship and active engagement in strengthening the resiliency of the NSW.

   Action SOC-3.1: Hold a minimum of two community meetings per year (throughout the watershed) to inform the public of the Partners’ efforts, and to gather feedback and input from the public.

   Action SOC-3.2: Increase the level of local community stewardship engagement by holding a minimum of two annual community service projects (SOLVE Cleanups, ivy pulls, etc.) that
improve the appearance of communities and enhance the environment. Share the Partners’ story and efforts with the public at these events.

**Action SOC-3.3**: Plan and offer one community workshop and/or training opportunity per quarter (urban, farm, and forestry – best management practices, etc.). Share the Partners’ story and efforts with the public at these meetings. Incorporate natural resource themes related to drought (water management) and fire/fire risk (forest health), which are galvanizing community topics, to integrate the message of implementing watershed restoration and building resiliency.

### 9.3 ECONOMIC

**Goal**: Increase and maintain investment in the NSW to support local communities, and promote and protect the natural resources upon which they depend. Planning studies for projects that might eventually be included as future CIPs ( ecological or economic) are also included as part of this goal.

The objectives to achieve this goal are:

**Objective ECON-1**: Research the creation of a Santiam Basin Fund. A portion of funds could be used to build an endowment for restoration and would be used to support partners in the implementation of this Plan. The Partners will support one another in the grant application efforts to work towards Plan goals.

**Action ECON-1.1**: Increase and diversify funding from outside stakeholders, foundations, and non-local agencies by a total of $200,000 annually by 2020 through intensive marketing and coordinated challenge-based asks.

**Action ECON-1.2**: Increase the capacity of the watershed to attract and accommodate new jobs by promoting the investment in a minimum of two public infrastructure-type projects annually (parks, trails, roadside stops along river, sanitation, roads, stormwater treatment, etc.). One example would be the development of the North Santiam Water Trail.

**Objective ECON-2**: Complete an evaluation of the value of water and watershed resiliency to NSW stakeholders. To develop a comprehensive watershed resiliency plan, data on direct impacts of droughts on the region’s economy (agricultural production, other water-dependent manufacturing, and recreation-based businesses) and communities (economic, social, and environmental health) is needed. Without this information, it will be difficult (if not impossible) to garner the consensus necessary to propose, finance, and build infrastructure projects that will lead to greater resiliency throughout the Willamette River Basin.

**Action ECON-2.1**: In the summer of 2017, the NSWC began working with the Oregon Business Council and ECONorthwest on a project that will tell the “economic water story” (referred to as the North Santiam Project) and help build a “business case” for investing in projects that will improve watershed resiliency. The analysis will involve the implementation of the following major analytical tasks:

- **Describe Current Water Supplies** — The economic analysis begins by telling the water story for the North Santiam Basin. This description includes information on sources of
supply (e.g., snowpack, rainfall, and groundwater), timing of supplies, changes in supply over time, regulations on water use in the basin, and projections of future supplies.

- **Describe Current Water Uses/Demands** — The demand side of the basin’s water story includes information on water rights, water use by type (e.g., irrigated agriculture, Tribal, recreation, fisheries, municipal), and the economic value or benefits of water use (e.g., revenues, employment, and tax payments).

- **Describe Water Constraints** — This task focuses on describing the basin’s water limitations or constraints that make future economic or municipal planning uncertain. The Drought Contingency Task Force developed a high level assessment.

- **The purpose of this task is to show the extent to which the competition for available water could harm basin economies, communities, and watersheds.**

- **Describe the North Santiam Project** — This task focuses on the specifics of the North Santiam Project (the economic “water story”), describing how the “water story” will help address the basin’s water constraints, and the economic costs of the North Santiam Project.

- **Describe Returns on Investing in the North Santiam Project** — This task focuses on describing the economic benefits of the North Santiam Project by type of beneficiary or water stakeholder, comparing the its benefits and costs, and describing the returns on investing in the North Santiam Project in ways that capture the diversity of water stakeholders, beneficiaries, and funding sources.

- **Describe Benefits Beyond the Project Area** — This task focuses on describing the benefits of the North Santiam Project that extend outside of its immediate study area to beneficiaries (e.g., habitats, Tribal members, businesses, workers, and recreationists,) in the broader Willamette River Basin.

### 10 PLAN GOVERNANCE AND PARTNERSHIP STRUCTURE

This section of the Plan defines the roles and responsibilities of the Partners in implementing the Plan. As previously noted, the Partners have agreed that all of the actions outlined in the Plan are dependent on volunteer participation by the Partners and other committed stakeholders (e.g., willing landowners in the watershed). Furthermore, the Partners are not precluded from conducting projects on their own and outside of the Partnership. Current signed statements of Partnership are provided in Appendix H.

#### 10.1 SHARED APPROACH

To effectively carry out the Plan, the Partners agree to the following shared approach:

**Foster an inclusive and dedicated collaborative approach.** The actions chosen by the Partners will incorporate the knowledge and priorities of landowners, land managers (federal, state, Tribal, and local agencies), and interested stakeholders.
**Invest in long-term actions that build resiliency.** Activities implemented throughout the NSW will be mutually reinforcing and adequately funded to achieve success. Partners will define the short-term and long-term funding/investment needed to achieve the goals of the activities.

**Adaptively manage the implementation process.** Monitor activities and document lessons learned through centralized means in order to promote awareness and to learn from each other, which will lead to designing and implementing better projects with greater sustainable impacts.

**Optimize ecological, social, and economic benefits; minimize harm to other species.** The Partners will consider the broad impacts to all stakeholders of planned projects, and evaluate and phase implementation actions as needed.

**Communicate consistently with stakeholders and the public.** Share the Plan’s vision, progress milestones, and the role of stakeholders and the public in its success.

### 10.2 ROLES AND RESPONSIBILITIES

The NSWC Executive Director will be the lead convener for the Partnership. The NSWC Executive Director will maintain regular contact with all participating Partners. The NSWC will house and manage all shared documents (e.g., the Plan’s CIP list) and data (e.g., Plan GIS data). A Partnership Communication Plan has been developed to ensure that all Partners are informed of the actions and opportunities of the group. The NSWC Executive Director will be responsible for execution of the PNS Partnership Communication Plan (Appendix I).

All Partners participating in the Plan are responsible for ensuring effective internal communications within their organizations and providing updates to incoming staff during transitions. Partners will attend regularly scheduled meetings, provide timely input and feedback, and work in a collaborative manner. The Partners strive to operate by consensus and agree to do their best to consider the interests of all members. Consensus means that all members have expressed their point of view and no more than one member is unable to agree.

### 10.3 ORGANIZATIONAL NICHE MANAGEMENT

The concept of niche management is one that recognizes that the many entities involved in a common endeavor each brings its own set of special skills, organization missions or directives, and staffing capacity, and may work at different geographic scales or locations within a given Plan area. To foster effective coordination and planning, as well as an understanding of the breadth of abilities that each Partner entity provides individually and that the Partners together provide as a collective whole, an organizational resource table was developed (see Appendix J).

### 10.4 PLAN SCHEDULE AND UPDATE PROCESS

To coordinate effective implementation of the Plan, the following scheduled Partner actions will take place:

**Quarterly Meetings:** Partners will meet quarterly, particularly during the first few years. Quarterly meetings will include a status review of CIP and non-CIP projects and other agreements and plans relevant to the Partners. Interim Plan monitoring results (see Section 10,
Plan Monitoring – Evaluating Success) will be provided by the Partners before the meeting and then presented at the meeting.

**Annual Review:** A status report for the Plan will be prepared annually. The annual report will include, at a minimum, the following items:

- Status of projects being implemented over the past year, including summary of Plan monitoring results (see Section 10)
- Key project discussion highlights and challenges affecting Plan success (positive and/or negative)
- Updated CIP and non-CIP lists

**5-Year Plan Update:** The Plan is intended to be fully reviewed and updated every five years. The update process will entail a collaborative process that is similar to the initial Plan development.

### 11 COMPREHENSIVE AND SUSTAINED FUNDRAISING STRATEGY

To successfully carry out this Plan it will be necessary to develop a comprehensive and sustained approach to funding Partnership activities. A list (Table 8) of potential funding opportunities has been developed for the Plan and the Partnership will endeavor to pursue opportunities from these and likely other sources.

**Table 8 Potential Funding Sources for North Santiam Resiliency Plan Projects**

<table>
<thead>
<tr>
<th>Source</th>
<th>Type of Funding</th>
<th>Areas of Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marion County Tree Shading Program</td>
<td>County</td>
<td>Funding for plant material to be planted along riparian areas located on the Marion County side of the NSW.</td>
</tr>
<tr>
<td>Bonneville Power Administration Mitigation Funding Program</td>
<td>Federal</td>
<td>Land acquisition for fish and wildlife mitigation</td>
</tr>
<tr>
<td>US Bureau of Land Management (BLM) Title II Grants</td>
<td>Federal</td>
<td>Funding for natural resource projects designed to benefit the land and resources of the Bureau of Land Management (BLM).</td>
</tr>
<tr>
<td>US Bureau of Reclamation WATR Smart Grants</td>
<td>Federal</td>
<td>Water Quantity Planning and Management Grants</td>
</tr>
<tr>
<td>USDA Farm Service Agency Conservation Reserve Enhancement Program (CREP)-Cost Share Funding</td>
<td>Federal</td>
<td>Cost share program for agricultural lands taken out of production and set aside of riparian or wet prairie habitat improvement projects</td>
</tr>
<tr>
<td>USDA NRCS Conservation Innovation Grants</td>
<td>Federal</td>
<td>Agriculture Related Innovation</td>
</tr>
<tr>
<td>USDA US Forest Service Stewardship Contract Funds</td>
<td>Federal</td>
<td>Stewardship contract retained receipts can be used on projects that will benefit Federal land resources</td>
</tr>
<tr>
<td>Knutson Vandenberg (KV) Funds</td>
<td>Federal</td>
<td>Funds available for specific USFS Projects on Federal Land</td>
</tr>
<tr>
<td>Source</td>
<td>Type of Funding</td>
<td>Areas of Interest</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Arbor Day Foundation</td>
<td>Foundation</td>
<td>Funding for plant material</td>
</tr>
<tr>
<td>Ford Family Foundation</td>
<td>Foundation</td>
<td>Leadership Building Program</td>
</tr>
<tr>
<td>Meyer Memorial Trust</td>
<td>Foundation</td>
<td>Organizational Capacity &amp; Restoration Funding</td>
</tr>
<tr>
<td>National Fish &amp; Wildlife Foundation</td>
<td>Foundation</td>
<td>Funds projects that sustain, restore, and enhance our nation's fish, wildlife, and plants and their habitats.</td>
</tr>
<tr>
<td>Oregon Parks Foundation</td>
<td>Foundation</td>
<td>Supports acquisition, preservation, and restoration of public parks</td>
</tr>
<tr>
<td>Spirit Mountain Community Foundation</td>
<td>Foundation</td>
<td>Funding for environmental preservation projects in Linn &amp; Marion County</td>
</tr>
<tr>
<td>City of Salem Plant Material Donation</td>
<td>Local Government</td>
<td>Funds provided to the NSWC to cover plant material costs for riparian restoration projects located above Geren Island</td>
</tr>
<tr>
<td>City of Salem Watershed Grant</td>
<td>Local Government</td>
<td>Organizational Capacity &amp; Watershed Improvement Funding</td>
</tr>
<tr>
<td>One Tree Planted LLC</td>
<td>Nonprofit Donation</td>
<td>Funding for plant material</td>
</tr>
<tr>
<td>ODFW Salmon and Trout Enhancement Program Mini-Grants</td>
<td>State</td>
<td>Funds habitat restoration, education, monitoring and evaluation, fish culture</td>
</tr>
<tr>
<td>Oregon Dept. of Env. Quality 319 Grants</td>
<td>State</td>
<td>Water Quality</td>
</tr>
<tr>
<td>Oregon Watershed Enhancement Board (OWEB)</td>
<td>State</td>
<td>Restoration, Technical Assistance, Council &amp; SWCD Capacity</td>
</tr>
<tr>
<td>OWEB Small Grants</td>
<td>State</td>
<td>Small scale agricultural/riparian restoration projects focused on projects that will improve soil and water resource management</td>
</tr>
<tr>
<td>Marion SWCD Landowner Assistance Program Grants/ Cost Share Grants</td>
<td>SWCD Grant - Tax Base</td>
<td>Agriculture land management improvement activities, riparian restoration activities, weed management</td>
</tr>
<tr>
<td>Santiam Basin Fund</td>
<td>Creation of Endowment and/or Sponsorship Program</td>
<td>Under development: Would fund implementation projects in Santiam Basin</td>
</tr>
</tbody>
</table>
12 PLAN MONITORING – EVALUATING SUCCESS

Plan success will be evaluated via a tiered monitoring system, which will include the following main tiers:

- Project-level monitoring (to be carried out by individual entities)
- Partnership-level monitoring (to be carried out by the Partnership)
- Watershed indicators monitoring/long-term monitoring network (to be carried out by resource agencies, with Partners’ input as applicable)

Each tier of the monitoring system is described below.

12.1 PROJECT-LEVEL MONITORING

Project-level monitoring and evaluation will be carried out by the individual entities conducting each project. Monitoring results for project-level monitoring would eventually feed into Partnership-level monitoring.

The individual entity’s needs and the potential permitting and funding entity’s requirements would dictate the project-level monitoring requirements. They would typically entail monitoring during the project implementation period (e.g., monitoring of contractor work and as-built drawings), monitoring during an establishment period (e.g., annual riparian planting monitoring after installation for three to five years), and then potential long-term monitoring (e.g., once every five years after the initial establishment period). Monitoring might be similar but slightly modified for infrastructure-only-type projects, such as fish passage improvements that involve replacement of a culvert with a bridge.

12.2 PARTNERSHIP-LEVEL MONITORING

Partnership-level monitoring would include tracking of progress and overall success of projects included on the Plan’s CIP and non-CIP lists. This monitoring would be the responsibility of the Partnership, as carried out by the NSWC Coordinator/Executive Director as lead. The following typical milestones and issues would be tracked, with information provided by the entities conducting the projects:

- Funding status:
  - Has funding been applied for?
  - Has funding been received?
- Construction/implementation period:
  - Has implementation started?
  - Was project successfully completed?
  - Project metrics (stream miles, restoration acres, number of barriers removed, number of trees and shrubs planted, etc.)
  - Issues, lessons learned, and interim status updates for projects lasting more than one year
- Post-construction establishment period:
  - Middle and end of establishment period (on target, met/didn’t meet success criteria, and issues and lessons learned)
• Long-term monitoring:
  o Track information as it becomes available from each individual entity’s long-term monitoring efforts
  o Partnership will spot-check projects at years 10 and 15 after implementation

As projects begin to come on-line for tracking, the different Partnership-level monitoring stages should be identified and outlined on a master tracking schedule/spreadsheet. Updates to the tracking schedule should be provided to the NSWC Coordinator/Executive Director before each quarterly Partners’ meeting. This information can then be used to inform the Plan’s annual report.

12.3 WATERSHED INDICATORS MONITORING/LONG-TERM MONITORING NETWORK

Watershed indicators monitoring would consist of long-term monitoring networks and studies typically administered by resource and regulatory agencies such as the U.S. Geological Survey (USGS), USACE, DEQ, and others. In this sense, the Partners will mostly rely on the work conducted by others, but will also seek opportunities to further inform these efforts. The following types of efforts could be included:

• LIDAR-based riparian inventories (often conducted as part of temperature TMDL work)
• USGS, DEQ, and other agency monitoring networks for water quality and flows
• Oregon Department of Fish and Wildlife (ODFW), USACE, and other agency fish returns, spawning counts, and other similar data
• Willamette River Initiative Slices Model (Institute for a Sustainable Environment Lab, University of Oregon)
• Review of WATR model during each five-year Plan update cycle (the Partners would conduct this review, but they would rely on GIS input datasets managed by others)
• Project photo point monitoring (following OWEB Photo Point Monitoring Protocol)
• North Santiam Drought Task Force – Drought Monitoring

13 ADAPTIVE MANAGEMENT AND SUSTAINABILITY OF CONSERVATION EFFORTS

Section 10, Plan Governance and Partnership Structure, and Section 12, Plan Monitoring – Evaluating Success, are designed to work hand in hand to foster adaptive management, which is the process of continually evaluating and adjusting course as needed based on lessons learned. This feedback-loop approach allows the Plan monitoring efforts and ongoing Partner communications to learn from and improve upon past work in order to foster sustainable conservation efforts. In addition, the Plan’s emphasis on ecological, social, and economic goals fosters a positive feedback loop whereby each goal supports the other and results in greater overall benefits to the communities and their watershed than would be the case if only one of these goals were addressed.
14 LITERATURE CITATIONS


Isaak, D. NorWeST Project Dataset. August 2014.

http://www.fs.fed.us/rm/boise/AWAE/projects/NorWeST.html


Appendix A: HUC Descriptions
Appendix B: List of Supporting Plans and Assessments
Appendix C: Detroit Lake Water Control Diagram
Appendix D: WATR Model Information
Appendix E: Oregon Conservation Strategy
Conservation Opportunity Areas, Strategy Habitats, and Strategy Species Overlapping with the North Santiam Watershed
Appendix F: Conceptual Model for the Willamette Model Watershed Program
Appendix G: CIP and Non-CIP Lists
Appendix H: Statements of Partnership
Appendix I: Communications Plan
Appendix J: Partnership Resources