4.2 Lynch Creek

General Information

<table>
<thead>
<tr>
<th>WRIA (MAP 2)</th>
<th>Watershed (MAP 2)</th>
<th>Basin (MAP 2)</th>
<th>Length</th>
</tr>
</thead>
</table>
| WRIA 11      | Nisqually         | Ohop Creek Basin | Town: 0.68 miles  
UGA: 0.79 miles  
Total: 1.77 miles |
Physical Resources

<table>
<thead>
<tr>
<th>Topography (Map 5)</th>
<th>Soils (Map 8)</th>
<th>Floodplain/Floodway (Map 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean elevation within the basin is 1,060 feet, with a maximum of 3,720 feet and a minimum of 360 feet at the mouth of the basin (WPN, 2002). Lynch Creek with the Town’s SPA ranges in elevation from approximately 850 feet at the eastern boundary of the Town UGA to approximately 525 feet at the confluence with Ohop Creek.</td>
<td>1. Barneston gravelly coarse sandy loam, 0-6% slopes</td>
<td>Floodplains and floodways are associated with Lynch Creek. Both are relatively narrow and are mapped within 200 feet of the creek’s centerline.</td>
</tr>
<tr>
<td></td>
<td>2. Barneston gravelly coarse sandy loam, 6-15% slopes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Barneston gravelly coarse sandy loam, 30-45% slopes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Chehalis silt loam</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Rock outcrop</td>
<td></td>
</tr>
</tbody>
</table>

Channel Migration

Full channel migration zone identification has not occurred for the portion of Lynch within the Town’s SPA. A general assessment of the potential for channel migration provided by Ecology determined that there is high potential for channel migration in the lowest reach of Lynch Creek where the channel flows through peat deposits, and a moderate to high potential for migration in the alluvial deposits in the lower 1,500 feet of the stream (Olson, 2009). As noted on Map 5 (Hydrology), the 1% annual chance floodplain is used as a proxy for the channel migration zone for the purposes of this report.

Surface Hydrology (Map 5)

Lynch Creek is one of two primary tributaries of Ohop Creek. The headwaters of the stream originate on a ridge at approximately 3,000 feet in elevation. Lynch Creek has one named tributary stream: Burg Creek, which joins Lynch Creek east of the Town’s UGA boundary. Lynch Creek flows into Ohop Creek within the Town’s boundary. Approximately 1.9 discontinuous miles of Lynch Creek flow through the Town and the Town’s UGA; weaving in and out. There are roughly 1.7 miles of the creek with the Town and UGA. Two unnamed tributary creeks enter the mainstem of the creek within this area.

Other Hydrologic Features

- Lower Lynch Creek receives stormwater runoff from a large portion of Eatonville via a large ditch. Ohop Lake acts as a sediment trap. Therefore, Lynch Creek is an important sediment source for lower Ohop Creek.

- Stormwater from Eatonville’s stormwater collection system is released into Lynch Creek. This addition of stormwater may increase the “flashiness” of the creek, with higher peak flows that occur sooner after the rain event. It may also convey suspended solids, bacteria, nutrients, and other common urban runoff constituents to Lynch Creek (ESA Adolfson, 2008).
At approximately river mile (RM) 1, there is a natural falls on Lynch Creek. The lower portion of the creek (RM 0.2 – 0.9) has a higher gradient relative to other streams in the lower Ohop Creek subbasin (WPN, 2002).

### Water Quality

According to the 2008 Washington State Water Quality Assessment (Ecology, 2009), there are no 303(d) listings for Lynch Creek within the Town’s SPA. According to the 2004 Washington State Water Quality Assessment (Ecology, 2004), Lynch Creek was not listed for any water quality impairments. Lack of inclusion in the assessment does not indicate that the waterbody is not impaired; smaller streams are often not sampled and may not reflect degraded water quality standards.

Lynch Creek receives discharge from the Town of Eatonville’s stormwater collection, which contributes to a sediment load that is 17% above background values in the stream (WPN, 2002). Forestry practices in the upper watershed have also been listed as a probably cause of the elevated levels of total suspended solids (TSS) within the stream.

Most of the Town’s stormwater drains north to an outfall in Lynch Creek (Map 5). The Pierce County Basin Plan (2008) has identified this outfall as a potential source of bacteria, phosphorus and suspended solids that enter Lynch and Ohop Creeks.
Biological Resources

## Critical Areas

The Town’s critical areas code (EMC 15.16) regulates five types of critical areas, which are described below:

### Wetlands (Map 5)

Four wetlands are mapped along Lynch Creek. All four straddle the Town and/or UGA boundary. A series of three wetlands (4.7, 6.4, and 14.7 acres from east to west) are located between the Town’s eastern boundary and an area approximately a quarter mile past Lynch Creek Rd E. There is also a wetland mapped near the northern Town boundary (~ 7 acres) at the confluence of Ohop Creek.

Wetland buffers range from 35 feet to 300 feet depending on wetland typing and intensity of proposed use (EMC 15.16.124).

### Critical Aquifer Recharge Areas (Map 5)

Two critical aquifer recharge areas are mapped in the Town of Eatonville. One of them is located along the valley floor of the Ohop Valley. Approximately 0.3 miles of Lynch Creek are located with this CARA.

### Floodplains (Map 5)

Floodplains are mapped along Lynch Creek through the Town and its UGA. The mapped floodplain is relatively narrow in the Town’s SPA. It does not exceed 200 feet from the stream centerline on either bank of the creek within the Town or its UGA.

### Geological Hazardous Areas (Map 9)

Geological Hazardous Areas in the Town of Eatonville are defined by EMC 15.16.161 and are mapped in the Town’s Lynch Creek SPA (Map 9). As shown on Map 9, there are two landslide hazard areas in the Town’s SPA. One is located in the northeast corner of the UGA and the other on either side of the creek in the west end of the Town’s SPA. The creek also flows through seismic hazard areas near the confluence with Ohop Creek.

### Habitat Conservation Area

All waters of the state including rivers, streams, and watercourses within jurisdiction of the State of Washington are considered habitat conservation areas in the Town of Eatonville.

Lynch Creek is classified as a Type F (fish-bearing) stream and has a 150-foot standard buffer width (EMC 15.15174).
### Shoreline Vegetation/Riparian Vegetation

The Ohop Creek Restoration Project (ongoing) is currently restoring riparian vegetation to a significant portion of the Ohop Creek SPA. Pre-restoration project riparian conditions were assessed for Ohop Creek and a small portion of Lynch Creek, roughly a half mile upstream of the confluence, as part of the Ohop/Tanwax/Powell Watershed Analysis (Nisqually Indian Tribes, 1998). The assessment included the following descriptions of riparian vegetation of Lynch Creek: “Riparian stands included medium sized stands of hardwoods, and mixed hardwood/conifer that were sparse in areas. Stands were not of an adequate size and density to provide functional wood development.”

Other data sources indicate that Lynch Creek flows through commercially-owned timberlands, to rural residential areas and hobby farms throughout the lower mile of the stream (WPN, 2002). There are localized areas of residential encroachment into the riparian zone along the lower reaches of Lynch Creek; however, the remainder of the riparian area is comprised of second-growth hardwoods. LWD is sparse in the lower reaches of the stream (Kerwin, 1999).

### Wildlife Habitats (Map 6)  
According to WDFW PHS data (WDFW 2009a), the only mapped priority habitat associated with Lynch Creek is Riparian zones.

### Fisheries (Map 6)  
According to WDFW PHS (WDFW, 2009) and SalmonScape (WDFW, 2010) data Lynch Creek supports the following fish species:

1. Channel Catfish
2. Winter Chum
3. Sockeye Salmon
4. Resident Cutthroat Trout
5. Coho Salmon
6. Fall Chinook
7. Pink Salmon
8. Winter Steelhead

- There is a natural falls located at RM 1.0 of the stream that blocks upstream fish access. In addition, the steep gradient in the lower reach of the stream serves as a limiting factor for spawning (WPN, 2002).

- Beyond the Town and UGA limits, there are several other priority habitat areas associated with Lynch Creek including the White River elk range; Ohop Creek riparian corridor areas which are comprised of an assortment of conifer, mixed trees, and broadleaf shrub riparian habitat; a small waterfowl concentration area; upper Nisqually River bald eagle use area; and Ohop Creek wetland areas, comprised of forested, riparian, shrub, and agricultural wetlands (WDFW, 2007).

- In Lynch Creek, major problems affecting salmon survival include the high sediment load, reduced channel stability and habitat diversity (due to some reduction in the amount of instream wood and simplification of the channel and its disconnection from the floodplain in some areas) and a loss of
pool habitat compared to presumed historic conditions (ESA Adolfson, 2008).

- Accentuated high flows and increased “flashiness” of flow (i.e., quicker in-stream flow responses to rainfall events and higher peak flows) compared to presumed historic conditions in Lynch Creek reduce survival of salmon and trout in the creek (ESA Adolfson, 2008).

- Lynch Creek is an important source of coarse gravels to the Ohop Creek system (Homza et al., 2002).
Plans and Built Environment

<table>
<thead>
<tr>
<th>Current Land Use Pattern</th>
<th>Current Shoreline Designations</th>
<th>Comprehensive Plan Land Use Designations (Map 10)</th>
</tr>
</thead>
</table>
| The general land use pattern in with the western portion of the Town’s Lynch Creek SPA is a mix of rural density residential development, agricultural areas and undeveloped areas. Land use in the eastern portion of the SPA (east of Lynch Creek Rd E) includes undeveloped lands, Eatonville airport, and the Lynch Creek Quarry. A narrow forested riparian corridor is maintained surrounding Lynch Creek. | **Town:** Shoreline Residential  
**UGA:** Conservancy (Pierce County) | According to the Town’s Comprehensive Plan, all of the lands in the western portion of the SPA are designated for single-family uses. Lands in the eastern portion (east of Lynch Creek Rd E) are designated for Aerospace uses and industrial uses. The aerospace and industrial designations are divided by the Tacoma Railroad tracks (Town of Eatonville, 2005). |

Current Zoning (Map 11)

<table>
<thead>
<tr>
<th>Zone</th>
<th>Town</th>
<th>UGA</th>
<th>Total (Town and UGA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acres in SPA</td>
<td>% of SPA</td>
<td>Acres in SPA</td>
</tr>
<tr>
<td>1.0</td>
<td>19.8</td>
<td>70%</td>
<td>19.8</td>
</tr>
<tr>
<td>C-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ind</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>18.9</td>
<td>58%</td>
<td>18.9</td>
</tr>
<tr>
<td>MU</td>
<td>2.8</td>
<td>9%</td>
<td>2.8</td>
</tr>
<tr>
<td>ROW</td>
<td>0.6</td>
<td>2%</td>
<td>11.1</td>
</tr>
<tr>
<td>SF-1</td>
<td>6.7</td>
<td>24%</td>
<td></td>
</tr>
<tr>
<td>SF-2</td>
<td>1.0</td>
<td>4%</td>
<td>1.0</td>
</tr>
<tr>
<td>SF-3</td>
<td>1.0</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>28.1</td>
<td>4%</td>
<td>32.8</td>
</tr>
</tbody>
</table>

Water-Oriented Uses

One of the three main goals of the Shoreline Management Act is to encourage water-dependent uses. The SMA establishes a preference for uses that are consistent with control of pollution and prevention of damage to the natural environment, or are unique to or dependent upon use of the states’ shorelines (RCW 90.58.020).
Water-oriented uses include those that are water-dependent, water-related or water-enjoyment. Examples of each are provided in Section 4-1. As noted above in Section 4-1, single-family residences, while not considered water-oriented uses, are given preference over other uses in the shoreline.

Water-oriented uses in the Lynch Creek SPA are limited and future demand for water-oriented uses (other than parks and trails) is expected to be relatively low. There are no commercially water-dependant uses along Ohop Creek. There are also no public swimming areas. Recreational uses such as swimming and fishing are considered water-dependant. While there are no established public facilities for these activities, they may occur on the creek (Map 12).

<table>
<thead>
<tr>
<th>Transportation/Roads/Bridges/Railroads (Map3)</th>
<th>Utilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are two bridges that cross Lynch Creek within the Town’s SPA. The first is at Ski Park Rd E and the second is Lynch Creek Rd E (see Exhibits 4-4 and 4-5). Both are clear span bridges with riprap below their abutments. Although not mapped, utility lines, most likely electrical and sewer, are evident crossing both bridges. The Tacoma Railroad also crosses the creek. The only other transportation infrastructure in the SPA are portions of residential streets that intersect the SPA.</td>
<td>Most of the Town’s stormwater drains to an open ditch which drains to Lynch Creek. The ditch begins just east of the intersection of Washington Ave S and Lynch Creek Rd NE and flows northwest to an outfall located outside the Town and UGA boundary north of SR 161 (R.W. Beck, 2003).</td>
</tr>
</tbody>
</table>

Exhibit 4-4 Ski Park Road Bridge
Cultural resources were reviewed as part of the Pierce County ICR (ESA Adolfson, 2009). Cultural resources identified within the Lynch Creek SPA included recorded pre-contact materials and campsites. Native American use of the Nisqually Basin area, by the Nisqually Tribe and neighboring tribes, included seasonal hunting and gathering campsites near Lynch Creek. Recorded artifacts include lithic scatters, charcoal deposits, and calcined bones. Subsistence harvest of anadromous fish (salmon and trout) and supplemental hunting of upland mammals occurred along Lynch Creek and throughout the watershed (ESA Adolfson, 2009). There are no historical structures within the Lynch Creek SPA that are identified on the State or National Register of Historic Places.

There are no Town, county or state parks within the Town’s Lynch Creek SPA. Visual access is available at road crossings that include SR 161, Ohop Ski Park Rd, and Lynch Creek Rd E. The proposed Rim Rocks Nisqually-Mashel Trail, and the Tacoma Railroad right-of-way, could also provide access.
Known Sites with Toxic or Hazardous Materials

None identified by Ecology Confirmed and Suspected Contaminated Sites List (Ecology, 2009).

Shoreline Modification

No levees or other significant shoreline modifications are mapped along Lynch Creek. As reported in the Nisqually River Basin Plan (Pierce County, 2008), artificial confinement of the stream channel due to residential development restricts movement of the channel to some degree, but the channel is fairly stable. Confinement of the creek is typically produced by structural measures to protect upland property from erosion, such as concrete armoring or riprap. The photograph below (Exhibit 4-6) shows an example of shoreline armoring along the left bank of Lynch Creek, near the Ski Park Road Bridge. Because armoring is not mapped, the extent of these structures is not known. This represents a data gap.

Exhibit 4-6 Shoreline Armoring along Lynch Creek
Assessment of Ecological Functions

<table>
<thead>
<tr>
<th>Ecosystem Process / Shoreline Function</th>
<th>Level of Alteration</th>
<th>Restoration Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hydrology</strong></td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Runoff generated in the Town of Eatonville flows to Lynch Creek with minimal flow control measures. Much of Lynch Creek is low elevation, and therefore rain dominated, but the watershed does extend to the rain-on-snow dominated elevations.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>There is moderate potential to restore a more natural rainfall to runoff relationship within the Town of Eatonville. Retrofitting stormwater management measures could reduce flashiness of storm flows and reduce pollutant loading. Cool water from Lynch Creek has been identified as a key aspect for temperature moderation in lower Ohop Creek. Conservation potential is high for the Lynch Creek riparian corridor, which is an important source of coarse gravels to the Ohop Creek system.</td>
</tr>
<tr>
<td><strong>Hyporheic functions</strong></td>
<td>Moderate to low</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Residential development and road crossings have modified channel plan form and limited migration, especially in the lower portion near the confluence with Ohop Creek.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restoring hyporheic functions would typically involve large-scale restoration of channel-floodplain relationships and channel plan form with appropriate frequency and type of LWD. From a feasibility perspective, this type of project has higher potential in more altered areas with low levels of infrastructure, such as the lowest reach below Ski Park Road. This type of project is more challenging in areas with greater density of infrastructure.</td>
</tr>
<tr>
<td><strong>Shoreline Vegetation</strong></td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Riparian forest exists along the majority of Lynch Creek, gaps occur and width is very narrow in places.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restoration potential is high to close gaps and expand the width of riparian forest in places.</td>
</tr>
<tr>
<td><strong>Habitat</strong></td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Reduced habitat diversity due to reduction in</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>High potential to improve habitat diversity and key habitat</td>
</tr>
</tbody>
</table>
Management Issues and Opportunities

**Summary of Ecological Function and Management Issues**

Pierce County’s Nisqually River Basin Plan identified stream habitat and riparian area conditions based on the Nisqually Tribe’s Ecosystem Diagnosis and Treatment (EDT) model results (Pierce County, 2008). According to the EDT method, the major problems affecting salmon survival include the high sediment load, reduced channel stability and habitat diversity (due to reduction in the amount of instream wood and simplification of the channel and its disconnection from the floodplain in some areas), and a loss of pool habitat compared to presumed historic conditions. In addition, accentuated high flows and increased “flashiness” of flow (i.e., quicker in-stream flow responses to rainfall events and higher peak flows) compared to presumed historic conditions in Lynch Creek reduce survival of salmon and trout in the creek. The EDT analysis ranked Lynch Creek as a high priority for both restoration and preservation.

These results are generally similar to watershed-scale analysis performed for the Pierce County Shoreline Master Program – Restoration Plan (ESA Adolfson, 2008). This analysis suggested that protection and restoration were the highest priority for the Lynch Creek subbasin. The following summarizes the key factors affecting ecological functions in the Lynch Creek SPA:

- The lack of riparian vegetation along portions of Lynch Creek reduces shading along the stream, potentially resulting in increased stream temperatures and lowered dissolved oxygen. A lack of larger trees along the stream means less wood in the stream channel. In-channel wood is key to creating habitat, and supporting channel morphology similar to natural conditions.

- Removal of native riparian vegetation also increases the opportunity for non-native invasive plants such as reed canarygrass to become established. Reed canarygrass does not provide shade or woody material to the stream, and its aggressive growth prevents native trees and shrubs from becoming re-established in infested areas.

- Most of the Town’s stormwater runoff is conveyed to an outfall in Lynch Creek. Stormwater runoff increases turbidity and other pollutants in the stream, as well as increasing peak flows. These impacts degrade water quality and habitat for aquatic life including salmon.

- Eventual redevelopment of the Lynch Creek Quarry site from a mining area to industrial uses presents an opportunity to restore shoreline functions in a significant portion of the watershed. The subarea plan for the site should include policies to restore riparian vegetation and minimize stormwater impacts during redevelopment.

Based on these existing conditions, the important management issues for the Lynch Creek are:

- Lack of riparian vegetation
- Stormwater impacts on the stream
- Potential new industrial development in the Lynch Creek Quarry subarea
Future Use Patterns and Potential Use Conflicts

Current land use in the Lynch Creek SPA consists of single-family developments within the western portion of the SPA and the airport and quarry in the eastern portion of the SPA. The Quarry is likely to operate for another 5-10 years after which the land is planned to be redeveloped into an industrial area. Lack of riparian cover, leading to a paucity of wood in the creek and stormwater impacts are the primary factors limiting shoreline functions.

A review of Pierce County assessor’s data and town zoning indicates that there is the potential for increased residential developed in the western portion of the SPA and the likelihood of increased development in the longer-term through the Lynch Creek Quarry subarea plan. Based on a review of Pierce County assessor’s land use data and Town zoning review, there are approximately 15 vacant parcels adjacent to the creek. Of these 14 are located in the western portion of the SPA, which is zoned for single family development. Some of these vacant parcels are subdivided lots that are part of an established housing development. Six parcels located west of Ski Park Road E are all at least twice the minimum lot size (9,600), meaning that the potential for subdivision and development exists.

There are two principal land uses in the east portion of the SPA. One is the airport and the other is the Lynch Creek Quarry. Some of the airports infrastructure may be located within the SPA and new development related to the airport is possible. The Aerospace zoning district also allows commercial, industrial, and residential uses. (EMC 18.04.185). Impacts to the creek from new development should be limited by the 150-foot Lynch Creek buffer.

The Quarry, located in the Town’s UGA, will likely operate for the next 5 – 10 years. In general quarry operations are located outside the 200-foot SPA and 150-foot Lynch Creek critical areas buffer.

The Town is currently developing a subarea plan for the area currently occupied by the Lynch Creek Quarry in the Town’s UGA. Under the Plan, 86 acres of the quarry would be annexed to the Town and zoned for industrial uses. The subarea is located between Lynch Creek and the Mashel River. The concept of the plan is to create industrial development clusters, separated by roads and green space corridors. While the subarea plan proposes to introduce new industrial uses to the area, it would also represent an opportunity for the Town to reclaim some of the quarry area and implement creek enhancement or restoration as part of any proposed development.

The owners of the quarry have submitted a conditional use permit to Pierce County for continued mining for the next 5-10 years. Implementation of the subarea plan and development would occur after cessation of mining activities. All proposed mining activities would be beyond the SPA (as measured by 200 feet from the OHWM). No shoreline permits were required.

Opportunities for Ecological Protection and Restoration

In general, enhancement and restoration efforts should focus on the processes and functions identified in this report. Specific opportunities will be described in more detail in the restoration plan. The Town should consider the following programmatic restoration measures:

- Aerial photographs indicate that riparian cover is lacking within 200 feet of the stream in some locations. Restoration of native riparian vegetation along Lynch Creek is important to improving shoreline conditions and functions. Several organizations are undertaking large-scale restoration along portions of Ohop Creek, including revegetation and control of invasive species. The Town
and private landowners could use this project as a model for restoration within the Lynch Creek SPA.

- Potential restoration measures could also include decommissioning forest roads; stabilizing slopes, implementing flow control measures to restore a more natural runoff hydrograph.

- The Town should consider reviewing its river and stream buffer standards to ensure protection and/or improvement of riparian corridors. This could take the form of modified vegetation conservation standards.

- The Town’s 2003 Draft Stormwater Management Program includes several recommendations that would also improve shoreline functions in the Lynch Creek SPA:
  
  - Retrofitting existing stormwater systems, perhaps as part of improvements required for new development;
  
  - Implementing a public education program about ways that residents can reduce non-point source pollution;
  
  - Regularly maintaining stormwater facilities such as catch basins; and
  
  - Exploring new approaches such as semi-pervious parking surfaces.

- Development under the Lynch Creek Quarry Subarea Plan also gives the Town the opportunity to improve riparian conditions along Lynch Creek and improve shoreline functions.