

Department of Ecology
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City of Roy

Cumulative Impacts Analysis

Muck Creek and Muck Lake

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FINAL DRAFT

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Chapter 1: Introduction

A. Department of Ecology Direction and Guidance

The Shoreline Management Act (SMA) guidelines require local shoreline master programs to regulate new development to “achieve no net loss of ecological function.” The guidelines (WAC 173-26-186(8)(d)) state that:

“To ensure no net loss of ecological functions and protection of other shoreline functions and/or uses, master programs shall contain policies, programs, and regulations that address adverse cumulative impacts and fairly allocate the burden of addressing cumulative impacts.”

The guidelines discuss the concept of net loss in more detail in WAC 173-206-201(2)(c).

The City of Roy’s updated Shoreline Master Program (SMP) will contain goals, policies and regulations that prevent degradation of ecological functions relative to the existing conditions as documented in the *City of Roy Shoreline Master Program Shoreline Inventory and Characterization: Muck Creek and Muck Lake Shorelines*. For those projects that result in degradation of ecological functions, the required mitigation must return the resultant ecological function back to the baseline, as illustrated in the figure below.

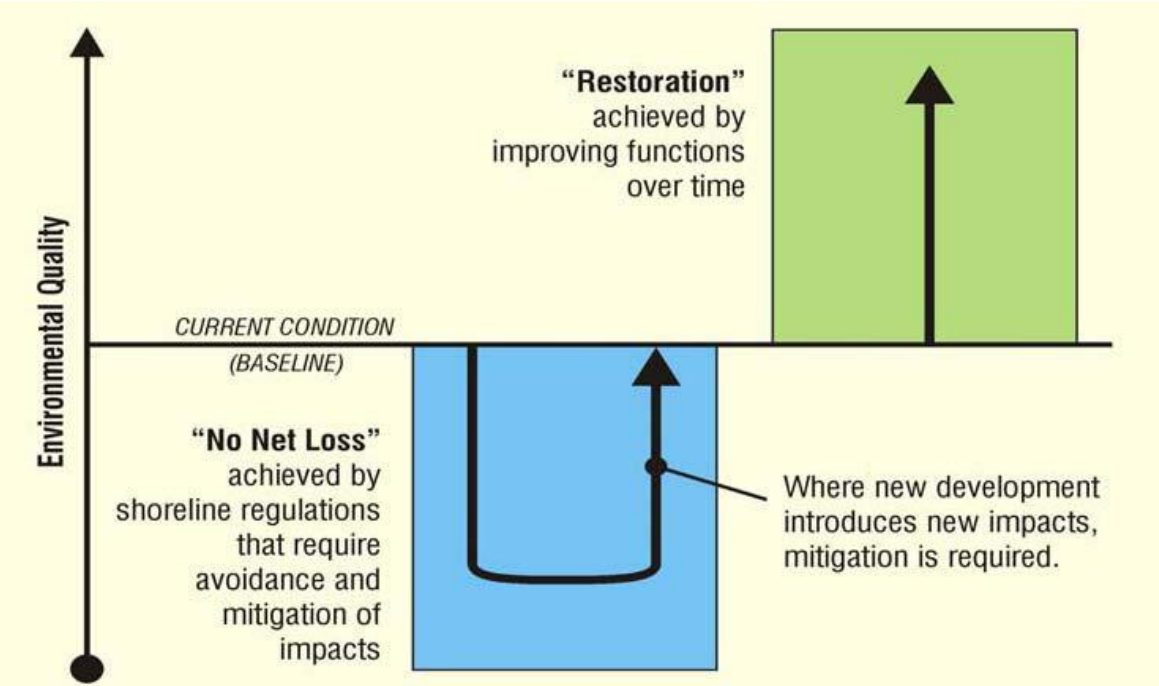


Figure 1 - Source: Department of Ecology

The City of Roy must be able to demonstrate that it has accomplished that goal through an analysis of cumulative impacts that might occur through implementation of the updated SMP. Evaluation of such cumulative impacts should consider:

- (i) Current circumstances affecting the shorelines and relevant natural processes;
- (ii) Reasonably foreseeable future development and use of the shoreline; and
- (iii) Beneficial effects of any established regulatory programs under other local, state, and federal laws.”

As outlined in the *Shoreline Restoration Plan* that will be prepared as part of the City of Roy SMP update, the SMA also seeks to restore ecological functions in degraded shorelines. This cannot be required by the SMP at a project level, but Section 173-26-201(2)(f) of the Guidelines note that “...master programs shall include goals and policies that provide for restoration of such impaired ecological functions.” The *Shoreline Restoration Plan* will have a discussion of SMP policies and other programs and activities in the City of Roy that contribute to the long-term restoration of ecological functions relative to the baseline condition.

For those portions of Muck Creek and Muck Lake that are within the City of Roy, the following analysis summarizes the existing conditions, anticipated development, relevant SMP and other regulatory provisions, and the expected net impact on ecological function.

B. Relationship to SEPA

The State Environmental Protection Act (SEPA) requires an assessment of environmental impacts. This cumulative impact analysis is a supplement to the environmental review done under SEPA and is intended to address cumulative rather than isolated or individual impacts that might not be considered otherwise as part of the environmental checklist.

The SEPA review process is intended to provide a list of possible environmental impacts that may occur because of a project or change in policy. This helps identify potential impacts that may need to be mitigated, conditioned, or this may result in the denial of a project or proposal. This cumulative impact analysis is intended to look at impacts as a whole based on whether or not multiple similar projects collectively result in gradual, but significant impacts. While SEPA looks at impacts by topic and the effects they may have as a whole for the project area, the cumulative impacts analysis examines impacts that may result from multiple projects over time.

C. Assumptions

This analysis considered foreseeable impacts over time. Impacts are examined in the Muck Creek and Muck Lake shoreline jurisdictions as completed in the existing SMP document and in the *City of Roy Shoreline Master Program Shoreline Inventory and Characterization*. In

addition, site-specific impacts are expected to be addressed on a case-by-case basis during individual project reviews. This analysis corresponds with the three proposed shoreline environment designations.

Due to current adopted land use regulations and current land use, it is assumed that only one shoreline area in the City has significant redevelopment potential. This is the property next to Muck Lake that is currently used for agricultural use and is zoned Mixed Use. Other areas, such as the existing residential and commercial development near Muck Creek, are likely to see more slow and incremental changes associated with on-going uses, with no further subdivision of property or intensification of uses. This is discussed in detail later in this document.

D. Document Roadmap

This cumulative impacts analysis summarizes the existing conditions in the two shorelines within the City of Roy: Muck Creek and Muck Lake. It details the potential impacts and risks to shoreline functions and processes, identifies anticipated development in each shoreline and how the SMP regulations would address this development, discusses how other local, state and federal regulations would address these potential impacts, and describes the net effect on ecological functions and processes. A cumulative impacts table for Muck Creek and Muck Lake shoreline jurisdictions is included in Appendix A. The tables describes the relationship between ecological function, potential alteration, resources at risk, and proposed SMP regulations and non-regulatory measures designed to assure no net loss at a minimum.

Chapter 2: Existing Conditions

The following summary of existing conditions in the City of Roy's two shoreline areas and the relevant natural processes is based on the final *City of Roy Shoreline Master Program Shoreline Inventory and Characterization* prepared by AHBL in July 2010 and additional analysis needed to perform this assessment. The full report includes a more in-depth of discussion of the topics below.

A. Muck Creek

1. Shoreline Environments

The entire upland shoreline jurisdiction associated with Muck Creek is proposed to be designated as Shoreline Residential.

2. Land Use

Within the 200-foot upland portion of the Muck Creek shoreline jurisdiction, approximately 24.78% is developed as single-family residential housing, 4.58% is developed as commercial or industrial property, 12.80% is developed as the Roy City Park, and 57.84% is either City of Roy right-of-way developed as roads or a single-track rail line owned by the BNSF railroad. The Muck Creek shoreline jurisdiction currently has three zoning designations: Commercial (9.78%), Single Family Residential (82.75%) and Multi-Family Residential (7.47%). Future land uses, as indicated by the current designations in the Comprehensive Plan, include Commercial, Park, Single Family Residential and Multi-Family Residential.

The proposed shoreline environmental designation reflects both the existing conditions and potential future uses along Muck Creek, which are not likely to change in intensity or use from current conditions. Designation of single-family areas as Shoreline Residential reflects the City's intent to continue to encourage this use in the future and recognizes the existing nature of this area. Allowing existing non-water-oriented commercial without direct access to the shoreline areas to continue to function under the Shoreline Residential designation reflects the City's intent to encourage this use for the future and recognizes the urban; more developed and modified nature of this area.

3. Parks and Open Space/Public Access

The Roy City Park serves as the main public access site to Muck Creek. The park is located near the northwest corner of the City, and is located on both the north and south banks of Muck Creek, with a pedestrian bridge over the stream connecting the

two sides of the park. The City provides the public the ability to rent the park for private activities, including the old Roy City Library building, which was moved to the park in 1996. Parking is provided north of Water Street West.

A portion of the Muck Creek channel and floodway is also located within the Water Street West and Warren Street rights-of-way. The Warren Street Bridge crosses Muck Creek and provides passive visual access to Muck Creek.

4. Shoreline Modifications

Impervious surfaces within the City of Roy Muck Creek shoreline jurisdiction include roads and building footprints. Roads include Water Street, Ronge Street, James Street, Warren Street, and a small section of Highway 507. There is also a gravel parking lot north of Water Street for Roy City Park access, and a BNSF railroad grade and bridge crossing Muck Creek east of Warren Street.

Three bridges over Muck Creek are located within the City of Roy. One is a pedestrian bridge within the City Park, one is a road crossing for Warren Street, and one is the railroad crossing.

At the time of this report, the Warren Street Bridge over Muck Creek is in the design phase for future reconstruction. The project, led by Pierce County and identified as CSM 6152, proposes the removal of the existing bridge and reconstruction of a new bridge and approach roadways, which could include both Warren Street and Water Street. The right-of-way for Water Street is located within the shoreline jurisdiction, and runs parallel to the south bank of Muck Creek.

5. Biological Resources and Critical Areas

a) Geologically Hazardous Areas

There are no geologically hazardous areas in the Muck Creek shoreline jurisdiction.

b) Flood Hazard Areas

The Muck Creek 100-year floodplain falls entirely within the shoreline jurisdiction. Based on the maps, besides the three bridges, no built structures are found within the floodplain in City limits.

According to Chapter 5 of the Muck Creek Basin Plan, the City of Roy had some flooding problems during storm events in the mid 1990s that resulted in the flooding of properties adjacent to the Roy City Park and Muck Creek. The problems were remedied through channel clearing of Muck Creek, including the removal of reed canary grass to increase flood storage and clearing of a blocked culvert located under Highway 507. A similar effort cleared Muck Creek upstream of Muck Lake.

c) Wetlands

There are no mapped wetlands associated with Muck Creek. However, any currently undocumented wetlands located within or adjacent to the City, and which are associated to the shoreline, would also be subject to the City's SMP regulations and Critical Areas Ordinance (CAO).

d) Streams

That portion of Muck Creek within the City discharges from the southwest edge of Muck Lake and travels through the City.

e) Other Fish and Wildlife Habitat Conservation Areas

Priority Habitats and Species:

Anadromous fish habitat is a wildlife conservation area of concern. According to the Washington State Department of Fish and Wildlife (WDFW), anadromous fish habitat is present in all waters in and near the City including Muck Creek. Muck Creek is a known spawning area for Coho Salmon and Winter Chum Salmon. Additionally, Muck Creek up to and including the stream channel located within the City Park is known rearing habitat for Winter Steelhead. Winter Steelhead are known to be present upstream of the park. Steelhead is listed as a federal Threatened Species and a state Candidate Species. Resident Cutthroat Trout are also located in Muck Creek.

According to WDFW Priority Habitats and Species Database, oak canopies dominate portions of the City. Oaks are a priority habitat within Pierce County. Portions of the priority oak habitat are located within the City of Roy shoreline jurisdiction. In addition, the riparian corridor adjacent to the City Park contains oak habitat and individual oak trees are scattered throughout the City.

According to the WDFW Bald Eagle Territory History Database, and the WDFW Priority Habitats and Species Database, there are two bald eagle nest and habitat located along the entire length of Muck Creek, which includes Pierce County and the City of Roy jurisdictions. In the City of Roy, Muck Creek is mapped as containing bald eagle buffer management zones but no nest sites.

f) Critical Aquifer Recharge Areas

The majority of land within the City of Roy, including the entire shoreline jurisdiction of Muck Creek, is located within an Aquifer Recharge Area. Additionally, there are two drinking water wells located within the City. The wellhead protection areas are not within the shoreline jurisdiction of Muck Creek.

B. Muck Lake

1. Shoreline Environments

The upland shoreline jurisdiction of Muck Lake is proposed to be designated as Urban Conservancy environment (90.74%). The open water areas of Muck Lake within the City of Roy are proposed to be designated as Aquatic (9.26%), consistent with WAC 173-26-211(5)(c).

2. Land Use

Within the 200-foot upland portion of the Muck Lake shoreline jurisdiction, approximately 33.70% is developed as agriculture use and 66.30% is open space or critical areas. The Muck Lake shoreline jurisdiction is currently zoned Mixed Use. As indicated by the current designation in the Comprehensive Plan, the future land use is Planned Unit Development.

Proposed shoreline environmental designations reflect both the existing conditions and potential future uses along Muck Lake. Designation of the shoreline jurisdiction as Urban Conservancy in the proposed SMP is consistent with the City of Roy Comprehensive Plan and with the City's CAO. Urban Conservancy provides greater ecological protection for this shoreline, which is less developed and has the highest level of ecological function of any shoreline in the City.

3. Parks and Open Space/Public Access

There is currently no public access to Muck Lake in the City of Roy. Standards for the dedication and improvement of public access, as noted in the SMP guidelines found in WAC 173-26-221(4)(d)(iii), were examined as part of Task 3 of the SMP update.

4. Shoreline Modifications

There does not appear to be any impervious surfaces or overwater structures within the shoreline jurisdiction of Muck Lake within the City limits. One known fish barrier was located within the City's shoreline jurisdiction, located east of where Lacamas Creek enters Muck Lake. The barrier was modified in 2002 by replacing a non-fish passable culvert with a bridge (WDFW Site ID 810083). No other known fish barriers are located within the City.

5. Biological Resources and Critical Areas

a) Geologically Hazardous Areas

No geologically hazardous areas are found in the Muck Lake shoreline area. According to Pierce County, the City of Roy contains areas of potential freshwater erosion adjacent to Muck Lake.

b) Flood Hazard Areas

The Muck Lake 100-year floodplain falls entirely within the shoreline jurisdiction. Based on aerial maps, no built structures are found within the floodplain in City limits.

According to the Chapter 5 of the Muck Creek Basin Plan, the City of Roy had some flooding problems during storm events in the mid 1990s that resulted in the flooding of properties adjacent to Lacamas Creek outside of the shoreline jurisdiction and upstream of Highway 507. The problems were remedied through channel clearing of Muck Creek including the removal of reed canary grass to increase flood storage, and clearing of a blocked culvert located under Highway 507. A similar effort cleared Muck Creek upstream of Muck Lake.

c) Wetlands

According to the National Wetland Inventory and the Pierce County Wetland Inventory, the Muck Lake fringe wetlands are associated wetlands and considered regulated Waters of the State. Additionally, any currently undocumented wetlands located within or adjacent to the City, and which are associated with the shoreline, would also be subject to the City's SMP regulations and CAO.

d) Streams

Muck Creek discharges at the southwest edge of Muck Lake and travels through Pierce County before re-entering the City to the west. Lacamas Creek discharges to the Lake at the southeast lake edge.

e) Other Fish and Wildlife Habitat Conservation Areas

Priority Habitats and Species:

According to the WDFW, anadromous fish habitat is present in all waters in and near the City including Muck Lake and Lacamas Creek. Lacamas Creek is a known spawning area for Coho Salmon and Winter Chum Salmon. Winter Steelhead are known to be present upstream of the Roy City Park and presumed to be present in Muck Lake and Lacamas Creek. Steelhead are listed as a federal Threatened Species and a state Candidate Species. Resident Cutthroat Trout are also located in Muck Lake.

According to WDFW Priority Habitats and Species Database, oak canopies dominate portions of the City. Oaks are a priority habitat within Pierce County. Portions of the priority oak habitat are located with the City of Roy shoreline jurisdiction. In addition, individual oak trees are scattered throughout the City. However, oaks identified in the Muck Lake shoreline are no longer present.

According to the WDFW Bald Eagle Territory History Database, and the WDFW Priority Habitats and Species Database, there are two bald eagle nests located along

the entire length of Muck Creek. Muck Lake and the mouth of Muck Creek within the shoreline jurisdiction are mapped by the WDFW as being within bald eagle buffer management zones.

f) Critical Aquifer Recharge Areas

The majority of land within the City of Roy, including the entire shoreline jurisdiction, is located within an Aquifer Recharge Area. Additionally, there are two drinking water wells located within the City. The wellhead protection areas are not within the shoreline jurisdiction of Muck Lake.

Chapter 3: Ecological Functions and Processes at Risk

The intent of the City of Roy SMP is to assure, at a minimum, no net loss of ecological functions necessary to sustain shoreline natural resources. The following subsections outline specific ecologic functions of the City of Roy's shoreline jurisdiction and related processes that are at risk and must be protected by the SMP.

A. Nutrient Delivery and Removal

Nutrient delivery and removal can result from a variety of processes that take place in the City of Roy. This would include runoff and irrigation from agricultural uses, landscaping, and land clearing. These processes lead to an excess of nutrients being released into Muck Creek and Muck Lake. Ditching in the area has also reduced connectivity between wetlands, caused the loss of wetlands and has caused alterations to nutrients in runoff.

B. Groundwater Flow

Groundwater flow within the City of Roy shoreline areas has been altered by development and infrastructure resulting in disrupted interactions between the Muck Creek and Muck Lake ecosystems and the hyporheic zone within the City, but especially upstream in Pierce County. Overbank flooding and hyporheic flows in the floodplain areas are important processes in the Muck Creek basin. These surface and subsurface water flow processes support the hydrology of existing wetlands and Muck Creek and Muck Lake ecosystems.

Development causes greater areas of pollution generating impervious surfaces by paving, creating non-pollution generating surfaces with building construction, and compacted soil. In addition, development removes vegetation that would intercept and treat runoff. All of these factors lead to greater surface runoff and lower infiltration rates, which result in a lower level of aquifer recharge. Wetlands are useful in slowing surface water runoff and storing surface waters in addition to storm water detention facilities that are required in the development of land.

C. Surface Water Flow

Ditching and channelization of streams and filling of wetlands has intercepted and altered surface water flows, resulting in altered flow and lower infiltration rates. This

has resulted in increased storm water runoff and increased peak flow and velocities. Ditching, channelization and clearing vegetation from floodplains and aquatic resources can affect hyporheic flows if not protected; these flows are needed to support existing and potential wetlands as well as Muck Creek and Muck Lake.

D. Sediment Delivery and Removal

Sediment delivery and removal in the City of Roy has been affected by land clearing and urban development in the area. Conversion of forested and prairie lands to agriculture, timber harvesting, road construction, and development have all changed the sediment transport processes in the area around the City of Roy. Increased impervious surfaces and altered hydrology from new developments in the area could also potentially alter sediment processes.

E. Fish and Wildlife Habitat

Fish and wildlife habitat is affected by urban developments, road construction; culverts, loss of riparian cover, and stream bank alterations. Important habitat elements for fish include – riparian cover, large woody debris, passage for migration, clean water, spawning habitat, off-channel habitat, forage habitat, and food sources. There are several areas of spawning habitat in the City of Roy shoreline areas, and rearing habitat has been identified in Muck Creek and Muck Lake within the City of Roy. Alteration of these habitats, loss of wetlands and riparian areas reduce the habitat areas for many species including small mammals, amphibians, reptiles, birds and other aquatic and terrestrial species.

Chapter 4: Foreseeable Development in Shoreline Environments

A wide range of possible actions may result in cumulative impacts to the shoreline environment. Consistent with the SMA guidelines, an evaluation of cumulative impacts on ecological functions considers reasonably foreseeable future development and use of the shoreline that is regulated by the shoreline master program, as well as actions that are caused by unregulated activities and development exempt from permitting.

The focus of foreseeable development is on those actions that have been identified as potential impacts to the shoreline environment and that are or would be foreseeable based on past development patterns, dependent on shoreline regulations. This section provides a description of how elements of the SMP address the potential impacts of reasonably foreseeable development, including exempt and unpermitted development.

A. Muck Creek

Muck Creek contains a modified stream corridor crossed by pedestrian, road and railroad bridges. Much of this section of the Creek has been modified in some manner, which has affected some in-stream habitat, but there is no shoreline armoring outside of the bridge structures. There is the potential for unmapped wetlands.

Shoreline Residential is the one shoreline environment designation along Muck Creek.

1. Patterns of Shoreline Activity

No record exists of any shoreline permits being issued since incorporation.

2. Residential Development

Under current City zoning, more than 80% of the Muck Creek shoreline jurisdiction is zoned Single Family Residential (SFR) District in all or portions of eight properties. Single-family residential development could occur in the SFR at a maximum of five dwelling units per gross acre. The minimum lot size in the SFR is 7,200 square feet when served by City water and public sewer or the lot size required by the Tacoma - Pierce County Health Department for septic systems, whichever is larger. Currently, sewer does not serve the City of Roy and there are no plans in place to provide sewer in the City. Given the existing development pattern, the maximum number of dwelling units, and the lack of sewer in the immediate future, it not expected that the intensity or type of land use would change.

In the Multi-Family Residential (MFR) zoning district, multi-family residential development could occur in the MFR at a maximum of twenty dwelling units per gross acre. The portions of four properties zoned MFR are separated from Muck Creek by properties developed with single-family residences under SFR zoning and developed right-way. As noted above, currently, sewer does not serve the City of Roy and there are no plans in place to provide sewer in the City, so it is not likely that density could be reached in the Muck Creek shoreline area. Given the existing development pattern and the lack of sewer in the immediate future, it not expected that the intensity or type of land use would change.

Under the Shoreline Master Program, in Chapter 4 - Shoreline Use Provisions, development in the Shoreline Residential designation would require a 200-foot Shoreline Setback from the Ordinary High Water Mark (OHWM) based on CAO requirements. This setback may be reduced by measures indicated in the CAO. The existing properties that are zoned MFR are not outside this 200-foot OHWM setback. Single-family and multi-family residential uses would be permitted outright.

3. Commercial, Industrial, and Utility Development

In the Commercial (C) zoning district, commercial development could occur on portions of four properties in the Muck Creek shoreline jurisdiction at a maximum of impervious surface coverage of 85% for structures and other impervious surfaces combined. The two properties that are zoned Commercial are separated from Muck Creek by properties developed with single-family residences under SFR zoning and developed right-way. Given the existing development pattern, it not expected that the intensity or type of land use would change much from the existing land uses.

Under the Shoreline Master Program, in Chapter 4 - Shoreline Use Provisions, development in the Shoreline Residential designation would require a 200-foot Shoreline Setback from the OHWM setback based on CAO requirements. This setback may be reduced by measures indicated in CAO. A variety of commercial and retail uses would be permitted outright.

4. Recreational Development

In the SFR and MFR zoning districts, passive parks are allowed outright. These include, but are not limited to open spaces; landscaped or natural areas; recreational trail systems; picnic areas; gardens; arboretums; viewpoints and related structures. Active parks including, but not limited to: hard and soft surface play areas; playground equipment; outdoor sports courts; lighted fields; swimming pools; and outdoor stages are allowed as a conditional use. Given the existing development pattern, it not expected that the uses in the existing Roy City Park would change much from the existing land uses.

Under the Shoreline Master Program, in Chapter 4 - Shoreline Use Provisions, recreational development would be permitted outright.

5. Overwater Structures

Muck Creek is not navigable. Based on Table 3 of Chapter 5 of the SMP - Shoreline Modification Provisions, overwater structures such as piers, docks, or floats are not allowed in Muck Creek. Other than bridges for motorized and nonmotorized uses, which would be allowed under the Shoreline Residential designation as a Conditional Use Permit, no overwater structures would be permitted under the regulations contained in Chapters 4 and 5 of the proposed SMP. In the immediate future, the only anticipated overwater structures would be potential replacement of the Warren Street Bridge.

6. Shoreline Stabilization

According to aerial photos and site visits, there is no shoreline armoring along Muck Creek within the City of Roy. In the Shoreline Residential designation, based on Table 3 of Chapter 5 of the SMP - Shoreline Modification Provisions, restoration and enhancement, soil bioengineering, and structural stabilization would be allowed outright, bulkheads would be allowed as a conditional use while groins, riprap and weirs would be prohibited.

B. Muck Lake

1. Patterns of Shoreline Activity

No record exists of any shoreline permits being issued since incorporation.

2. Residential Development

There is no residential development currently in the Muck Lake shoreline area. While the City of Roy's Mixed Use (MU) District allows some level of residential development, such development in Muck Lake shoreline area is not allowed under the Urban Conservancy environmental designation pursuant to Table 1 - Permitted, Conditional and Prohibited Uses in Chapter 4 of the SMP.

3. Commercial, Industrial, Utility and Agricultural Development

There is no commercial, industrial and utility development currently in the Muck Lake shoreline area, only agricultural fields in the southern portion of the shoreline area. There are no structures in the Muck Lake shoreline area in the City of Roy. While the City of Roy's Mixed Use (MU) District allows some level of commercial, industrial and utility development, such development in Muck Lake shoreline area is not allowed under the Urban Conservancy environmental designation pursuant to Table

1 - Permitted, Conditional and Prohibited Uses in Chapter 4 of the SMP. New agricultural uses would be permitted outright in the Urban Conservancy environmental designation.

4. Recreational Development

There is no recreational development currently in the Muck Lake shoreline area. While the City of Roy's Mixed Use (MU) District allows some level of recreational development, only a passive park is permitted outright, while water-oriented recreational use is allowed as a conditional use in Muck Lake shoreline area under the Urban Conservancy environmental designation. This is pursuant to Table 1 - Permitted, Conditional and Prohibited Uses in Chapter 4 of the SMP.

5. Overwater Structures

There are no overwater structures currently in Muck Lake. Based on Table 3 of Chapter 5 of the SMP - Shoreline Modification Provisions, under the proposed SMP standards for Muck Lake, overwater structures such as piers, docks, or floats are not allowed in Muck Lake. Transportation use, such as bridges, including pedestrian bridges, would not be allowed in the Urban Conservancy or Aquatic environmental designations, based on Table 1 of Chapter 4 of the SMP - Shoreline Use Provisions.

6. Shoreline Stabilization

According to aerial photos, there is no shoreline armoring along Muck Lake within the City of Roy. Based on aerial photos, the Muck Lake within the City's jurisdiction is natural shoreline. Based on Table 3 of Chapter 5 - Shoreline Modification Provisions of the City of Roy SMP, in the Urban Conservancy environmental designation, restoration and enhancement and soil bioengineering would require a Conditional Use Permit, while structural stabilization, bulkheads, groins, riprap, and weirs would be prohibited. In the Aquatic environmental, restoration and enhancement would be the only shoreline stabilization measure allowed and would require a conditional use permit.

Chapter 5: State, Local and Federal Regulations

A. City of Roy Shoreline Master Program

As discussed in detail in Chapter 4, the SMP has been put together after consideration of reasonably foreseeable development and how this development could impact the functions and processes that are potentially at risk that were discussed in Chapter 3. In addition to the specific details provided in these previous sections, this section provides a brief overview of the entire shoreline master program and how it generally addresses the protection of ecological functions and processes from cumulative impacts. The section is intended to put the SMP regulations within context of the other regulations that apply to this area.

The first level of protection provided by the SMP is the recognition of three different shoreline environment types in the City of Roy: Shoreline Residential, Urban Conservancy, and Aquatic. These environments were assigned based primarily on existing and proposed land uses, which implicitly encompasses differing levels of ecological functions and different probabilities and potentials for improvements of ecological functions, as well as the location of critical areas and their buffers.

The Shoreline Residential Environment is very developed with residential uses, with reduced structure setbacks, increased shoreline modifications, and high imperviousness, as well as limited commercial uses on lands zoned for that purpose under Roy City Code (RCC) Title 11, which are functionally separated from Muck Creek by existing streets. This area is intended to allow these uses to continue, along with encouraging environmental enhancement of degraded functions through redevelopment incentives.

The Urban Conservancy Environment has been designated in those areas around Muck Lake that (a) have high or moderate environmental functions, (b) have limited to no existing development, and (c) are susceptible to negative impacts. Improvement of public access is a high priority along with enhancement of ecological function. The Aquatic Environment within the OHWM for Muck Lake will protect the functions of the lake.

The proposed SMP contains numerous policies, with supporting regulations intended to protect the ecological functions of the shoreline and maintain, at a minimum, the current level of function. Major sections of the proposed SMP are referenced and summarized in Table 1 below and in more detail in the Cumulative Impact Analysis Table in Appendix A.

Table 1. Summary of Shoreline Master Program Policies and Regulations

SMP Chapter with SMP Goal, Policy or Regulation	Purpose of SMP Provision	Key General Ecological Functions Protected
Chapter 2: <i>Shoreline Environments</i>	<p>Defines and maps the shoreline jurisdiction in the City and defines and maps the environment designations of all the shorelines of the state in the City. Policies and regulations specific to the three designated shoreline environments (Shoreline Residential, Urban Conservancy, and Aquatic) are detailed in this chapter.</p> <p>Specifically, the environments are the key to providing appropriate and specific regulations to ensure no net loss in both developed and undeveloped areas with high functions.</p>	All, with focus on preserving and enhancing shoreline ecological functions.
Chapter 3: <i>General Policies and Regulations</i>	<p>Sets forth the general policies and regulations that apply to uses, developments, and activities in all shoreline areas of the City.</p> <p>Specifically, it contains the requirement that all development and uses meet no net loss, and provides specific standards for areas such as critical areas, vegetation conservation, and water quality.</p>	All, with focus on no net loss, critical areas, vegetation and water quality and quantity.
Chapter 4: <i>Specific Shoreline Use Policies and Regulations</i>	<p>Sets forth policies and regulations governing specific categories of uses and activities typically found in shoreline areas. The policies and regulations cover the following uses and activities: Agriculture, Aquaculture, Boating Facilities, Commercial Development, Forest Practices, Industry, In-Stream Structures, Mining, Recreational Development, Residential Development, Transportation and Parking, and Utilities (Primary and Accessory).</p> <p>Specifically, it contains the requirement that all specific shoreline uses meet no net loss.</p>	All, with specific focus on the unique aspects of specific uses that require specific and unique requirements to assure no net loss.
Chapter 5: <i>Shoreline Modification Activity Regulations</i>	Provides policies and regulations for those activities that modify the physical configuration or qualities of the shoreline area, such as shoreline stabilization, clearing and grading, dredging and fill, and overwater structures.	All, with focus on protecting habitat, water quality and water quantity.

SMP Chapter with SMP Goal, Policy or Regulation	Purpose of SMP Provision	Key General Ecological Functions Protected
	Specifically, it contains the important shoreline modification matrix that describes what modifications are allowed in each environmental designation.	

B. Beneficial Effects of Other Established Regulatory Programs

1. Other Laws and Programs

A number of established local, state, and federal laws and regulatory programs provide beneficial effects on shorelines, besides the SMP and the state shoreline jurisdiction. City regulations and programs include the Critical Areas Ordinance, Comprehensive Plan, Flood Damage Regulations, Retention and Protection of Significant Trees Regulations, Stormwater Regulations, and Parks Plan. The City of Roy is currently working on updating its stormwater manual and other efforts related to NPDES Phase II stormwater compliance under the federal clean water act. These efforts will have major positive impacts on water quality and water quantity in the shoreline jurisdiction of the City of Roy. This will affect the full range of related functions.

State and federal regulations and programs include the Growth Management Act (GMA), SEPA, Regulatory Reform (ESHB 1724), Clean Water Act, Public Trust Doctrine, and Aquatic Lands. In addition, numerous regional programs provide benefits to the City’s shoreline. These include the Nisqually River Watershed Phase 1 Report and Nisqually River Watershed (WRIA 11) Management Plan.

Through its planning goals, the Growth Management Act (GMA) encourages economic development that is consistent with adopted comprehensive plan and that is within the capacities of the State’s natural resources. In addition, the GMA requires local governments to maintain and enhance natural-resource-based industries, including anadromous fisheries and agricultural industries. Policies that give preference to development that is dependent on the economic resources of the shoreline, including anadromous fisheries and agriculture, would be consistent with these GMA goals. Discouraging intense economic development in critical salmon spawning areas would be consistent with other GMA goals for protecting fish and wildlife habitat, and protecting the environment. Encouraging water-enjoyment uses in appropriate locations would further GMA's directive to increase access to natural resource lands and water.

The Comprehensive Plan directs the general development of the City and the Roy City Code (RCC) guides the character and quality of development relative to shoreline features, especially through critical areas regulations, landscaping regulations and significant tree protection regulations.

2. Washington Department of Fish and Wildlife

The Washington Department of Fish and Wildlife has jurisdiction of in- and over-water activities up to and including the ordinary high water mark, as well as any other activities that could “use, divert, obstruct, or change the bed or flow of state waters.” These activities in the City of Roy include, but are not limited to, installation or modification of shoreline stabilization measures and accessory structures such as culverts, and bridges and footbridges. These types of projects must obtain a Hydraulic Project Approval from WDFW, which will contain conditions intended to prevent damage to fish and other aquatic life, and their habitats. In some cases, the project may be denied if significant impacts would occur that could not be adequately mitigated.

3. Washington Department of Ecology

The Washington Department of Ecology may review and condition a variety of project types in the City of Roy, including any project that requires a shoreline Conditional Use Permit or Shoreline Variance, and any project that disturbs more than 1 acre of land. Project types that may trigger Ecology involvement include shoreline modification proposals and wetland or stream modification proposals, among others. Ecology’s three primary goals are to: 1) prevent pollution, 2) clean up pollution, and 3) support sustainable communities and natural resources. Their authority comes from the State Shoreline Management Act, Section 401 of the Federal Clean Water Act, the Federal Water Pollution Control Act, the Federal Coastal Zone Management Act of 1972, the State Environmental Policy Act, the Growth Management Act, and various RCWs and WACs of the State of Washington.

4. U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (Corps) has jurisdiction of in- and over-water activities up to and including the ordinary high water mark, as well as any associated wetlands. These activities in the City of Roy include, but are not limited to, installation or modification of shoreline stabilization measures and accessory structures such as culverts, and bridges, footbridges and restoration activities.

These types of projects must obtain a Section 404 Clean Water Act permit, which will contain conditions intended to prevent damage to Waters of the United States including Muck Lake and Muck Creek. In some cases, the project may be denied if significant impacts would occur that could not be adequately mitigated. As a federal agency, any activity within Corps jurisdiction that could affect species listed under the Federal Endangered Species Act must be consulted with the National Marine

Fisheries Service and the U.S. Fish and Wildlife Service. These agencies ensure that the project includes impact minimization and compensation measures for protection of listed species and their habitats.

Chapter 6: Net Effect on Ecological Functions and Processes

As described above, the proposed SMP provides a substantially increased level of protection to shoreline ecological functions relative to the existing SMP. On its own, the proposed SMP is expected to protect shorelines within the City of Roy, resulting in no net loss of shoreline ecological function. In addition, the application of the SMP may improve ecological functions over time in several areas, including along Muck Creek and Muck Lake through restoration efforts and significant enhancement incentives in targeted areas, such as in the shoreline residential environment. State and federal regulations, acting in concert with this SMP, will provide further assurances of improved shoreline ecological functions over time. Together with the implementation of the Shoreline Restoration Plan over time, the SMP is expected to begin to address the enhancement and restoration of shoreline functions in those areas where they are currently impaired.

Appendix 1: Cumulative Impact Analysis Table

Table 2. Cumulative Impacts to Shoreline Environment – Muck Creek and Muck Lake

Shoreline Process and Function	Resource at Risk	Shoreline Alterations Impacting Processes and Functions	Proposed Restoration/Protection Measures and Draft SMP Policies and Regulations	Non-Regulatory Measures
<p><u>Process:</u> Nutrient/Pollutant delivery and removal</p> <p><u>Function:</u> Water quality</p>	<p>Muck Creek and its limited floodplain, riparian corridor and potential, undelineated wetlands.</p> <p>Muck Lake and its associated wetlands and floodplain.</p>	<p>Existing impervious surfaces increase delivery of nutrients to Muck Creek and Muck Lake.</p> <p>Existing ditching, draining and filling of wetlands.</p> <p>Clearing of riparian and lakeshore buffers.</p> <p>New development may result in additional impervious surfaces and may result in further impacts to existing aquatic resources at risk including associated wetlands.</p> <p><u>Degree of future cumulative impact:</u></p> <p>Potential increase in the number of residential lots adjacent to Muck Creek shoreline small, so future impacts should be low.</p>	<p><i>Proposed overall measures:</i> reduce impervious surface through LID measures, protect existing Muck Creek and Muck Lake resources and associated wetlands (including buffers) and restore riparian and lakeshore areas.</p> <p>The SMP incorporates the CAO protections for stream, lake, and wetlands with some minor amendments. If there is a conflict between the provisions of SMP and CAO, the provisions most protective of the shoreline jurisdiction shall apply, as determined by the City</p> <p>All shoreline uses and activities shall utilize best</p>	<p>Restore degraded wetlands.</p> <p>Restore degraded riparian and lakeshore areas through replanting with native species.</p> <p>Use Low Impact Development storm water controls.</p>

Shoreline Process and Function	Resource at Risk	Shoreline Alterations Impacting Processes and Functions	Proposed Restoration/Protection Measures and Draft SMP Policies and Regulations	Non-Regulatory Measures
		<p>Nutrient/pollutant processes and water quality functions within the City's shoreline from existing roadways and septic systems.</p> <p>New development south of Muck Lake outside of the shoreline area could affect Muck Lake and associated wetlands and their buffers, impact nutrient/pollutant processes and water quality functions in Muck Creek.</p>	<p>management practices (BMPs) to minimize any increase in surface runoff and to control, treat and release surface water runoff so that receiving water quality is not adversely affected during both construction and operation.</p> <p>The SMP specifically addresses water quality in Chapter 3: General Shoreline Provisions, policies and regulations for Water Quality and Quantity.</p> <p>The Comprehensive Plan addresses cooperation with the Tacoma - Pierce County Health Department in ensuring septic systems successfully prevent pollutants from entering groundwater.</p>	

Shoreline Process and Function	Resource at Risk	Shoreline Alterations Impacting Processes and Functions	Proposed Restoration/Protection Measures and Draft SMP Policies and Regulations	Non-Regulatory Measures
<p><u>Process:</u> Surface and Groundwater flow</p> <p><u>Function:</u> Reducing downstream flooding and erosion (surface storage), aquifer recharge and storage</p>	<p>Muck Creek and its limited floodplain, riparian corridor and potential, undelineated wetlands.</p> <p>Muck Lake and its associated wetlands and floodplain.</p>	<p>Existing impervious areas and clearing decrease infiltration recharge and subsurface storage and groundwater discharge to streams, lakes, and wetlands.</p> <p>Existing wetland fill, development in floodplain (including shoreline protective structures) reduces surface storage, overbank flooding and increased flooding frequency and duration.</p> <p>New development will remove forested areas and increase impervious cover. Additional impacts to surface storage functions may occur from shoreline fill and encroachment.</p> <p><u>Degree of future</u></p>	<p><u>Proposed overall measures:</u> Minimize impacts to surface and groundwater processes by employing nonstructural approach to reducing downstream flooding and erosion. This would include protecting and restoring wetlands.</p> <p>The SMP incorporates the CAO protections for stream, lake, and wetlands with some minor amendments. If there is a conflict between the provisions of SMP and CAO, the provisions most protective of the shoreline jurisdiction shall apply, as determined by the City</p> <p>The SMP specifically addresses water quantity</p>	<p>Restore degraded wetlands.</p> <p>Restore degraded floodplain, riparian and lakeshore areas through replanting with native species.</p> <p>Use Low Impact Development storm water controls.</p>

Shoreline Process and Function	Resource at Risk	Shoreline Alterations Impacting Processes and Functions	Proposed Restoration/Protection Measures and Draft SMP Policies and Regulations	Non-Regulatory Measures
		<p><u>cumulative impact:</u></p> <p>There is limited potential for new residential lots along Muck Creek so impacts in the future should be low.</p> <p>Residential development is not allowed in the Muck Lake shoreline area.</p>	<p>in Chapter 3: General Shoreline Provisions, policies and regulations for Water Quality and Quantity.</p>	
<p><u>Process:</u> Sediment Transport</p> <p><u>Function:</u> Sediment delivery and removal from area water systems</p>	<p>Muck Creek and its limited floodplain, riparian corridor and potential, undelineated wetlands.</p> <p>Muck Lake and its associated wetlands and floodplain.</p>	<p>Sediment delivery and removal processes have been affected by both natural and man-made factors.</p> <p>Logging and development in the watershed has altered the process of sediment transport. Converting forest vegetation to agricultural land, harvesting timber, mining, constructing roads, and development have altered or</p>	<p><u>Proposed overall measures:</u> minimize the delivery of sediment from land alterations through retention of natural vegetation, protection of riparian corridors, application of a comprehensive erosion and sedimentation control program and measures and proper siting of development.</p> <p>The SMP specifically addresses water quality in Chapter 3: General</p>	<p>Create incentive programs to conserve and retain native vegetation and restore native vegetation where none is present.</p> <p>Programs such as on-site density transfers and conservation easements could help protect these areas.</p>

Shoreline Process and Function	Resource at Risk	Shoreline Alterations Impacting Processes and Functions	Proposed Restoration/Protection Measures and Draft SMP Policies and Regulations	Non-Regulatory Measures
		<p>accelerated sediment transport processes within the basin.</p> <p><u>Future Cumulative Impact:</u> Further sediment delivery into water systems without protective vegetation due to land clearing and development upstream of the City of Roy.</p> <p>Impacts from new development south of Muck Lake to wetlands and riparian areas outside of the shoreline could be significant.</p> <p>This may affect storage of surface waters in wetlands and floodplains in this basin, which in turn could affect flooding, and erosion functions within downstream shoreline areas along Muck Creek</p>	<p>Shoreline Provisions, policies and regulations for Water Quality and Quantity.</p> <p>Under Environmental Impacts in Chapter 3: General Shoreline Provisions, land clearing, grading, filling and alteration of natural drainage features and landforms must be limited to the minimum necessary for development.</p>	

Shoreline Process and Function	Resource at Risk	Shoreline Alterations Impacting Processes and Functions	Proposed Restoration/Protection Measures and Draft SMP Policies and Regulations	Non-Regulatory Measures
		and Muck Lake.		
<p><u>Process:</u> Habitat biodiversity <u>Function:</u> Fish and wildlife habitat, food production and delivery</p>	<p>Muck Creek and its limited floodplain, riparian corridor and potential, undelineated wetlands.</p> <p>Muck Lake and its associated wetlands and floodplain.</p>	<p>Important in-stream and lake habitat is available in Muck Lake and the Muck Creek system.</p> <p>Habitat functions are altered with development, logging, road construction, culvert installation, loss of riparian cover, and stream and lake bank modification.</p> <p>Habitat elements important to fish include riparian cover, large woody debris, passage for migration, clean water, and spawning habitat and forage habitat, and the availability of food sources.</p> <p>Alteration of forested (including oaks), shrub and herbaceous habitat,</p>	<p><u>Proposed overall measures:</u> protect and restore riparian and lake shore habitat, aquatic habitat and wetlands.</p> <p>The SMP incorporates the CAO protections for stream, lake, and wetlands with some minor amendments. If there is a conflict between the provisions of SMP and CAO, the provisions most protective of the shoreline jurisdiction shall apply, as determined by the City.</p> <p>Under Public Access in Chapter 3: General Shoreline Provisions, habitat enhancement is an important objective for the management of shoreline public access sites.</p>	<p>Restore degraded wetlands and aquatic system.</p> <p>This includes restoring degraded riparian, lakeshore and aquatic habitat by planting with native species and addition of habitat feature such as large woody debris and snags.</p> <p>Development density transfers and conservation easements.</p>

Shoreline Process and Function	Resource at Risk	Shoreline Alterations Impacting Processes and Functions	Proposed Restoration/Protection Measures and Draft SMP Policies and Regulations	Non-Regulatory Measures
		<p>loss of wetlands, stream and lakes reduce the overall habitat for wildlife species, including mammals, amphibians, reptiles, waterfowl, birds and other wildlife species.</p> <p>Habitat Connectivity is diminished as riparian cover is removed and aquatic systems are interrupted by culverts, bridges, bulkheads, riprap, filling, and dredging.</p> <p>Loss of habitat features such as large woody debris, snags, banks with overhanging vegetation and persistent woody vegetation decreases wildlife cover, denning, perching and nesting habitat.</p> <p><u>Future cumulative</u></p>	<p>Under Restoration in Chapter 3: General Shoreline Provisions, there is a policy that emphasizes increasing quality, width and diversity of native vegetation in protected corridors adjacent to riparian and lake habitats to provide safe migration pathways for fish and wildlife, food, nest sites, shade, perches, and organic debris. Strive to control non-indigenous plants or weeds that are proven harmful to native vegetation or habitats.</p> <p>Under Restoration in Chapter 3: General Shoreline Provisions, there is a policy to develop a public education plan to inform private property owners in the shoreline zone and in the remainder of the</p>	

Shoreline Process and Function	Resource at Risk	Shoreline Alterations Impacting Processes and Functions	Proposed Restoration/Protection Measures and Draft SMP Policies and Regulations	Non-Regulatory Measures
		<p><u>impacts:</u> Limited number of residential lots along Muck Creek, so future impacts should be low.</p> <p>Impacts from new development south of Muck Lake to wetlands and Muck Creek and Muck Lake shoreline could be significant.</p> <p>This may affect habitat and water quality functions within the City's shoreline.</p>	<p>City about the effects of land management practices and other unregulated activities (such as vegetation removal, pesticide/herbicide use, car washing) on fish and wildlife habitats.</p> <p>Under Shorelines of State-Wide Significance in Chapter 3: General Shoreline Provisions, there is a policy to protect and restore diversity of vegetation and habitat associated with shoreline areas.</p> <p>In the same section, there is a policy calling for all shoreline development to be located, designed, constructed and managed to avoid disturbance of and minimize adverse impacts to wildlife resources,</p>	

Shoreline Process and Function	Resource at Risk	Shoreline Alterations Impacting Processes and Functions	Proposed Restoration/Protection Measures and Draft SMP Policies and Regulations	Non-Regulatory Measures
			including spawning, nesting, rearing and habitat areas and migratory routes.	