

Department of Ecology  
Grant No. G1000017



# City of Gold Bar No Net Loss Report

*Skykomish River, Wallace River, and May Creek*

Prepared by:



AHBL, Inc.

2215 North 30<sup>th</sup> Street, Suite 300  
Tacoma, WA 98403

**FINAL DRAFT**

March 8, 2013



# Contents

Chapter 1: Introduction.....	2
A. Department of Ecology Direction and Guidance.....	2
Chapter 2: Inventory and Characterization .....	5
A. Skykomish River .....	5
B. Wallace River .....	7
C. May Creek.....	10
Chapter 3: Shoreline Use Analysis .....	19
Chapter 4: Shoreline Designations.....	21
A. High Intensity.....	21
B. Shoreline Residential.....	21
C. Urban Conservancy .....	22
D. Natural .....	22
E. Aquatic.....	23
Chapter 5: Goals and Policies.....	25
A. Policies .....	25
B. Regulations.....	26
C. Restoration Opportunities .....	26
Chapter 6: Cumulative Impacts Analysis .....	31
Chapter 7: Conclusions Regarding No Net Loss.....	33



# List of Tables

Table 1: Skykomish River – Summary of Baseline Conditions ..... 5  
Table 2: Wallace River – Summary of Baseline Conditions ..... 7  
Table 3: May Creek – Summary of Baseline Conditions – Segments 2 and 3 ..... 10  
Table 4: May Creek – Summary of Baseline Conditions – Segments 4 and 5 ..... 14  
Table 5: May Creek – Summary of Baseline Conditions - Segment 6 ..... 17  
Table 6: General Restoration Opportunities ..... 27

# List of Figures

Figure 1: SMP updates - Achieving no net loss of ecological function. Source: Dept. of Ecology ..... 3

# Chapter 1: Introduction

## A. Department of Ecology Direction and Guidance

This report demonstrates how the recommended shoreline management measures in the goals, policies, and recommendations, together with the findings of the *Cumulative Impacts Analysis* and the *Restoration Plan* are reflected in the proposed City of Gold Bar Shoreline Master Plan (SMP) update and how this achieves no net loss of ecological functions in the shoreline of Gold Bar.

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

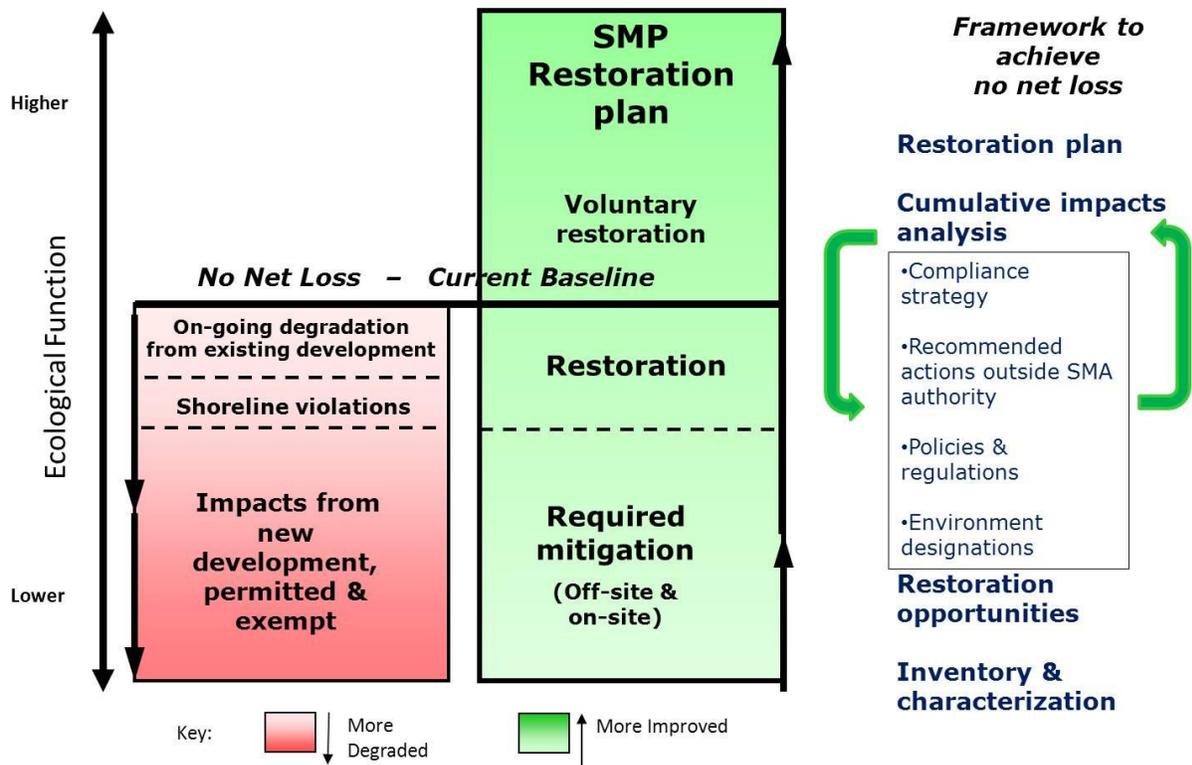
“To ensure no net loss of ecological functions and protection of other shoreline functions and/or uses, master programs shall contain policies, programs, and regulations that address adverse cumulative impacts and fairly allocate the burden of addressing cumulative impacts.”

WAC 173-26-176(2) states that:

“Permitted uses in the shoreline shall be designed and conducted in a manner that minimizes in so far as practical, any resultant damage to the ecology and environment of the shoreline area...”

The guidelines note that no net loss is achieved primarily through regulatory mechanisms, including mitigation requirements, but restoration incentives and voluntary actions are critical to achieving no net loss as well.

The proposed SMP requires that proponents of shoreline development fully mitigate impacts caused by their proposed development and although they are not required to improve conditions over and above the impacts of their development action, they may elect to implement elements of the *Restoration Plan* as mitigation for shoreline development if appropriate. Citizens, agencies, and other groups may also elect to implement portions of the *Restoration Plan* irrespective of any proposed development activity or requirement to mitigate impacts. Components of the *Restoration Plan* can also be implemented as part of future capital improvement plans. These actions will help ensure conditions improve over time, which may be necessary for achieving no net loss or the overall goal of improving shoreline functions. This distinction is illustrated in Figure 1 below.



**Figure 1: SMP updates - Achieving no net loss of ecological function. Source: Dept. of Ecology**

The shoreline regulations in the proposed SMP address stormwater, hydrology, and water quality in the shoreline jurisdiction. In addition, the proposed SMP includes critical area regulations that protect steep slopes, wetlands, streams, and their buffers and vegetation conservation regulations, as well as the aquatic environments of City’s shoreline. The combination of regulations, mitigation, and restoration help provide a high margin of error, ensuring no net loss over the long-term. Along the Skykomish River, the BNSF railroad tracks continue to cause the greatest impact to the aquatic and nearshore environments and are not subject to local regulations and needs to be addressed at the state level.



# Chapter 2: Inventory and Characterization

The City’s approximately 4.82 miles of shoreline encompassing 187.2 acres of shoreline jurisdiction was divided into eight segments for planning purposes, based broadly on the level of ecological functions and existing land uses within each segment. The *Shoreline Analysis Report* describes existing conditions within each segment. The following tables provide a summary of existing conditions for the Skykomish River, Wallace River, and May Creek.

## A. Skykomish River

**Table 1: Skykomish River – Summary of Baseline Conditions**

<b>Shoreline Segment</b>	1
<b>Segment Description</b>	Skykomish River – Right Bank along southern edge of city limits
<b>Approximate Area (acres)</b>	23.0
<b>Percent of Shoreline Area</b>	12.3%
<b>Land Use</b>	<p>Segment 1 extends along the right bank of the Skykomish River from the westward extension of 164th Street to the southward extension of Nugget Road. The only portions of the floodplain of the Skykomish River that are in the City’s shoreline jurisdiction are those portions of the floodplain that are located within the City limits. The rest of the floodplain of the River in this vicinity is within unincorporated Snohomish County and the lands fall under the jurisdiction of the County’s shoreline program. The portions in the City’s shoreline jurisdiction are intact upland habitat at the north and south ends of Segment 1. The central area between the east and west portions of Segment 1 is immediately adjacent to the Burlington Northern Santa Fe (BNSF) Railroad and US 2, and not within the floodplain, therefore it’s not within shoreline jurisdiction (see Figure 1a in Appendix B of the <i>Shoreline Analysis Report</i>).</p> <p>Three different land uses are within Segment 1. They are undeveloped riparian forest, residential and transportation. Two residential parcels are within this segment with only one residence built on the properties. The Burlington Northern Railroad and US 2 travel approximately 3,400 feet through portions of this Segment, as the City limits boundary vary</p>

<b>Shoreline Segment</b>	1
	<p>through this section.</p> <p>Informal public access to the Skykomish River is gained via Railroad Avenue Park, on the south side of US 2, and crossing the BNSF railroad tracks. Segment 1 is zoned as Commercial Business at the western end of the Segment and as Residential (R12500) at the eastern end of the Segment.</p>
<b>Critical Areas</b>	<p>The majority of Segment 1 has a relatively undisturbed bank that is dominated by undeveloped riparian forest in the northern and southern portions. Approximately 1,000 feet in the central portion of Segment 1 consists of the railroad bed being immediately adjacent to the river in an area where the riverbank appears to have eroded over time.</p> <p>Wetlands and hydric soils are identified in the southern portion of this Segment on the Comprehensive Plan's Figure 8 while this report's Figure 2 in Appendix B of the <i>Shoreline Analysis Report</i> does not identify any wetlands within Segment 1. Hydric soils connect May Creek to the Skykomish River at the southern end of this Segment (NRCS 2010). Although there were no wetlands mapped for the <i>Shoreline Analysis Report</i>, there may still be wetlands onsite, which will be identified on a project-by-project basis at the time of land use action.</p> <p>Chinook, steelhead, Coho, pink, Bull trout, and chum are identified by WDFW in the Skykomish River, making this water body a WDFW priority habitat. The riparian buffer of the Skykomish River is considered a Fish and Wildlife Habitat Conservation Area.</p> <p>Frequently Flooded Areas (100 year flood), as identified by the Comprehensive Plan, coincide with the extent of wetland and hydric soils. This report's Figure 3 in Appendix B of the <i>Shoreline Analysis Report</i> identifies the northern portion of the segment as a Frequently Flooded Area.</p>
<b>Shoreline Modifications</b>	<p>The BNSF railroad and U.S. 2 constrain the Skykomish River to the north with hardened banks. This constraint reduces channel complexity of the Skykomish River and can increase the maintenance of these transportation facilities due to the possibility of increased erosion caused by the Skykomish River.</p>
<b>Wastewater and Stormwater Utilities</b>	<p>There appears to be only one residential septic system in this segment. The remainder of the segment has not been constructed.</p>

<b>Shoreline Segment</b>	1
	Infiltration is the citywide approach for the management of stormwater. There is a data gap for a topographic survey to analyze runoff yet, it appears that water that does not infiltrate will run off directly into the Skykomish River.
<b>Opportunity Areas</b>	<p>Enhancement opportunities within this segment are numerous. Opportunities include: encourage residents to maintain native vegetation and limit clearing and disturbances for properties with shoreline frontage; provide appropriate wastewater treatment for residences and businesses to prevent water contamination; encouraging regular inspections, maintenance and pumping of septic systems in order to keep the septic systems operating properly; educate the public of the value for the Skykomish River in its natural state.</p> <p>Privately owned parcels abut the Skykomish River; consequently, restoration opportunities are concentrated on private properties. Encouraging private landowners to consider bulkhead removal and shoreline enhancement projects, including installation of native vegetation, could enhance these areas. New construction should be discouraged from installing bulkheads or other forms of shoreline modification and shorelines that are more natural should be encouraged.</p>

## B. Wallace River

**Table 2: Wallace River – Summary of Baseline Conditions**

<b>Shoreline Segment</b>	7	8
<b>Segment Description</b>	From Left Bank at east City Limit to unincorporated property around Moonlight Drive	From unincorporated property around Moonlight Drive to west City Limit
<b>Approximate Area (acres)</b>	7.8	19.3
<b>Percent of Shoreline Area</b>	4.2%	10.3%
<b>Land Use</b>	There are five parcels with one residence within this 0.5 mile-long Segment. Zoning is Residential 12500. Based on aerial photography, the residence	There are 13 parcels along this segment. The zoning includes one Public Space & Park (Salmon Run Park), four Residential 12500, eight Residential 9600 and the 399th

Shoreline Segment	7	8
	<p>appears to be located approximately 100 feet from the channel. There is a narrow riparian fringe of vegetation along the south (left) bank of the river through this Segment. Most of the vegetation has been removed for residential or hobby farm activities.</p>	<p>Avenue SE right-of-way. There are five built residences within Segment 8. The bridge at the 399th Avenue SE right-of-way crossing over the Wallace River is concrete and steel construction. The river has heavy recruitment of large woody debris; as evidenced by a large logjam located at the west end of the Segment visible on the 2010 aerial on-line.</p>
<p><b>Critical Areas</b></p>	<p>This segment does not include any mapped wetlands or hydric soils according to the City's Comprehensive Plan (2005). Additionally, neither NWI nor NRCS soils information maps wetlands or hydric soils in Segment 7. Although there were no wetlands mapped for the <i>Shoreline Analysis Report</i>, there may still be wetlands onsite, which will be identified on a project-by-project basis at the time of land use action.</p> <p>Numerous fish species are identified by WDFW as using the Wallace River making the River, and thus Segment 7 a WDFW priority habitat. Fish species identified as using the Wallace River within the City limits include Chinook, Coho, pink, chum, Bull trout, and steelhead (Figure 6 in Appendix B of the <i>Shoreline Analysis Report</i>) (WDFW 2010). Portions of this Segment are also identified in the City's Comprehensive Plan (Figure 6) as Harlequin Duck Breeding Area and riparian areas. The riparian buffer of the Wallace River is considered a</p>	<p>This segment does not include any mapped wetlands or hydric soils according to the City's Comprehensive Plan (2005). Additionally, neither NWI nor NRCS soils information maps wetlands or hydric soils in Segment 8. Although there were no wetlands mapped the <i>Shoreline Analysis Report</i>, there may still be wetlands onsite, which will be identified on a project-by-project basis at the time of land use action.</p> <p>Numerous fish species are identified by WDFW as using the Wallace River making the River, and thus Segment 8 a WDFW priority habitat. Fish species identified as using the Wallace River within the City limits include Chinook, Coho, pink, chum, Bull trout, and steelhead (WDFW 2010). The riparian buffer of the Wallace River is considered a Fish and Wildlife Habitat Conservation Area.</p> <p>The majority of Segment 8 is identified as being in the 100-year flood zone, as shown in Figure 3 of the <i>Shoreline Analysis Report</i>.</p>

<b>Shoreline Segment</b>	7	8
	<p>Fish and Wildlife Habitat Conservation Area.</p> <p>The western portion of Segment 7 is identified as being in the 100-year flood zone, as shown in Figure 3 of the <i>Shoreline Analysis Report</i>.</p>	
<b>Shoreline Modifications</b>	<p>The developed property appears to have removed native vegetation from approximately three-quarters of an acre.</p>	<p>A 400-foot clearing spans the River downstream of the 399th Avenue SE crossing. It is unknown if this clearing is used for agricultural or other purposes. There is also a crossing culvert or bridge at 399th Avenue SE.</p>
<b>Wastewater and Stormwater Utilities</b>	<p>There is one residential septic system and no known stormwater facilities in Segment 7.</p>	<p>There are approximately five built residences within the shoreline area, each with a septic system. No roadway stormwater facilities exist within the shoreline area yet there is a subdivision on May Creek Court, which has curb and gutter. This subdivisions stormwater facility outfall and treatment is unknown.</p>
<b>Opportunity Areas</b>	<p>Per Figure 2 of the City's Comprehensive Plan, the proposed PSE Trail will cross diagonally from the northwest to the southeast through Segment 7. Installation of the trail will create an opportunity for public access to and education regarding the Wallace River. Because most of the canopy appears to be intact in this Segment, property owners should be encouraged to maintain canopy coverage within shoreline area, specifically shading the watercourse. Areas where the canopy has been reduced, restoration plantings of native</p>	<p>Salmon Run Park may be developed to accommodate public access. If the park is developed, it may be used to exhibit LID and Green Building techniques and approaches to building within the shoreline.</p> <p>Primarily privately owned parcels abut this segment of the Wallace River; consequently, the restoration opportunities are concentrated on private properties. Encouraging private landowners to implement shoreline enhancement projects, including installation of native vegetation, could enhance these areas. New construction should be discouraged from</p>

<b>Shoreline Segment</b>	7	8
	<p>shrubs could enhance riparian functions.</p> <p>Privately owned parcels abut this segment of the Wallace River; consequently, the restoration opportunities are concentrated on private properties. Encouraging private landowners to implement shoreline enhancement projects, including installation of native vegetation, could enhance these areas. New construction should be discouraged from installing bulkheads or other forms of shoreline modification and shorelines that are more natural should be encouraged. As development occurs, other opportunities in the shoreline area could include educational signage and outreach regarding the river. If warranted, buffer enhancement around the river would provide improved water quality, habitat, and volunteer opportunities within the City.</p>	<p>installing bulkheads or other forms of shoreline modification and shorelines that are more natural should be encouraged. As development occurs, other opportunities in the shoreline area could include educational signage and outreach regarding the river. If warranted, buffer enhancement around the river would provide improved water quality, habitat, and volunteer opportunities within the City.</p> <p>Restoration or development at the City owned properties along this segment of the Wallace River should focus on shoreline restoration using native plants. If new facilities are constructed on any City owned properties, the City should consider LID and green building techniques for the buildings and parking areas. There may be opportunities for enhancing street ends for improved public access. Other opportunities in the shoreline area could include educational signage and outreach regarding the river. If warranted, buffer enhancement around the river would provide improved water quality, habitat, and volunteer opportunities within the City.</p>

### C. May Creek

**Table 3: May Creek – Summary of Baseline Conditions – Segments 2 and 3**

<b>Shoreline Segment</b>	2	3
<b>Segment Description</b>	Right Bank from East City Limits to 1st Street	May Creek

<b>Shoreline Segment</b>	2	3
<b>Approximate Area (acres)</b>	18.0	64.3
<b>Percent of Shoreline Area</b>	9.6%	34.4%
<b>Land Use</b>	<p>Segment 2 is zoned as Residential (R9600 and R12500) with the closest built structures located between 85 and 100 feet from the channel. Approximately 500 feet of shoreline is occupied by a plant nursery at the extension of Gilmore Lane. There are no known public access points along this Segment. The current shoreline designations are rural and suburban.</p>	<p>The 1st Avenue West right-of-way and numerous single-family residential properties are the land uses in this segment. The right-of-way runs approximately 1,400 feet through Segment 3. Segment 3 is zoned as Residential (R12500 and R9600) and Public Spaces and Parks (PSP). The current shoreline designation is suburban. No areas within this portion of the Segment that provide formal shoreline access points. There is a potential for access at the intersection of May Creek and 1st Street, where the area is currently used as an informal access point. A portion of two parcels that are zoned as PSP is located within the shoreline jurisdiction boundary, but the park (Prospector Park) does not provide access to May Creek.</p>
<b>Critical Areas</b>	<p>This segment does not include any mapped wetlands or hydric soils according to the Comprehensive Plan (2005), NWI (2010), or the NRCS Soil Survey (2010). However, based on aerial photography, there is a large forested wetland complex located on the right bank of May Creek just south of 1st Street. It also appears that a side channel engages when May Creek experiences high flows. Although there were no wetlands mapped for the <i>Shoreline Analysis Report</i>, there may still be wetlands</p>	<p>This segment does not include any mapped wetlands or hydric soils according to the Comprehensive Plan (2005), NWI (2010), or the NRCS Soil Survey (2010). Although there were no wetlands mapped for the <i>Shoreline Analysis Report</i>, there may still be wetlands onsite, which will be identified on a project-by-project basis at the time of land use action.</p> <p>Steelhead, Coho, and chum are identified by WDFW in May Creek, making May Creek a WDFW priority habitat. Bull trout are mapped as</p>

<b>Shoreline Segment</b>	2	3
	<p>onsite, which will be identified on a project-by-project basis at the time of land use action.</p> <p>Steelhead, Coho, and chum are identified by WDFW in May Creek, making May Creek a WDFW priority habitat. Bull trout are mapped as being located in May Creek, but downstream of the City limits. The riparian buffer of May Creek is considered a Fish and Wildlife Habitat Conservation Area.</p> <p>Segment 2 is identified as being in the 100-year flood zone, as shown in Figure 3 of the <i>Shoreline Analysis Report</i>.</p>	<p>being located in May Creek, but downstream of the City limits. The riparian buffer of May Creek is considered a Fish and Wildlife Habitat Conservation Area.</p> <p>Segment 3 is identified as being in the 100-year flood zone, as shown in Figure 3 of the <i>Shoreline Analysis Report</i>.</p>
<b>Shoreline Modifications</b>	<p>It is unknown if areas of the bank along Segment 2 have been modified by the installation of boulders or other bulkhead-like structures. Publicly available aerial photos indicate the channel is in a fairly natural state (Google Earth 2010).</p>	<p>Using publicly available aerial photography, Segment 3 of May Creek appears to have little channel modification and maintains several natural bends. The concrete and steel structure of the 1st Street Bridge over May Creek was built in 2007.</p>
<b>Wastewater and Stormwater Utilities</b>	<p>There are many residential septic systems in this Segment associated with the residential housing. There are no known stormwater facilities along Segment 2. This indicates that storm flows either infiltrate or flow directly into adjacent water bodies.</p>	<p>All homes in Segment 3 utilize septic systems.</p> <p>On the right bank, the adjacent right-of-way (May Creek Road) is approximately 50 feet away from May Creek in some areas. No stormwater facilities direct roadway runoff into May Creek.</p>
<b>Opportunity Areas</b>	<p>Based on review of current aerial photographs and the lack of City owned property, it would appear that the opportunity areas for restoration are on private properties. In areas with modified shorelines, private homeowners should be educated and</p>	<p>Vacant parcel in Segment 3 provide opportunity for the City to purchase lands if there is a willing seller and if City funds are available, that could be used for public access and/or stormwater control for the neighborhood. As with all Segments, encouraging</p>

Shoreline Segment	2	3
	<p>encouraged to remove shoreline armoring and replaced with native vegetation. New construction should discourage the installation of shoreline armoring. Homeowner education should also focus on discouraging the use of chemicals on lawns and shrubs as well as the importance of maintaining shoreline vegetation.</p> <p>As development occurs, other opportunities in the shoreline area could include educational signage and outreach regarding the creek. If warranted, buffer enhancement around the creek would provide improved water quality, habitat, and volunteer opportunities within the City.</p>	<p>homeowners to retain riparian vegetation, replant with native plant material, and removal of invasive vegetation (i.e. Himalayan blackberry and Japanese knotweed etc.) is always desirable.</p> <p>Primarily privately owned parcels surround this segment of May Creek; consequently, the restoration opportunities are concentrated on private properties. Encouraging private landowners to implement shoreline enhancement projects, including installation of native vegetation, could enhance these areas. New construction should be discouraged from installing bulkheads or other forms of shoreline modification and shorelines that are more natural should be encouraged. As development occurs, other opportunities in the shoreline area could include educational signage and outreach regarding the creek. If warranted, buffer enhancement around the creek would provide improved water quality, habitat, and volunteer opportunities within the City.</p> <p>Restoration or development at the City owned properties along this segment of May Creek should focus on shoreline restoration using native plants. If new facilities are constructed on any City owned properties, the City should use LID and green building techniques for the buildings and parking areas. There may be opportunities for enhancing street ends for improved</p>

<b>Shoreline Segment</b>	2	3
		public access. Other opportunities in the shoreline area could include educational signage and outreach regarding the creek. If warranted, buffer enhancement around the creek would provide improved water quality, habitat, and volunteer opportunities within the City.

**Table 4: May Creek – Summary of Baseline Conditions – Segments 4 and 5**

<b>Shoreline Segment</b>	4	5
<b>Segment Description</b>	Tributary/Wetland between Skykomish River and May Creek and left bank at north end of Shelby Street development	Left Bank from the extension of Green Lane to the west edge of the Community Business Zone
<b>Approximate Area (acres)</b>	33.6	9.2
<b>Percent of Shoreline Area</b>	17.9%	4.9%
<b>Land Use</b>	<p>Segment 4 is comprised of May Creek as it enters the City from the Cascade foothills to the east, as well as a wetland complex that acts like a tributary emptying into May Creek from the south near Hwy 2. It may be that this wetland complex is an historical meander channel of the Skykomish but it has not carried river flows for a very long time. In current conditions there is no surface connection between this wetland complex and the river southwest on the other side of the highway.</p> <p>Segment 4 is zoned primarily as Residential 12500 with small areas of General Commercial and PSP.</p>	<p>Segment 5 is zoned primarily as Community Business with a small portion as Residential (R9600). Approximately 60 mobile homes are located on the parcel located within this Segment, although not all of the mobile homes are located within the shoreline jurisdiction. Several mobile homes located within this Segment are situated within 35 to 45 feet of the channel. The northeastern portion of the Segment remains undeveloped but it may be the location of the mobile home parks septic drainfield (mostly mowed grass). There is no known public access to May Creek located within Segment 5.</p>

<b>Shoreline Segment</b>	4	5
	There are no known public access points to May Creek or its tributary.	
<b>Critical Areas</b>	<p>This segment does not include any mapped wetlands, but does include hydric soils according to the Comprehensive Plan (2005), NWI (2010), or the NRCS Soil Survey (2010). The hydric soils are mapped along the tributary that is located between Highway 2 and May Creek. Although there were no wetlands mapped for this analysis report, there may still be wetlands onsite, which will be identified on a project-by-project basis at the time of land use action.</p> <p>Steelhead, Coho, and chum are identified by WDFW in May Creek, making May Creek a WDFW priority habitat. Bull trout are mapped as being located in May Creek, but downstream of the City limits. The riparian buffer of May Creek is considered a Fish and Wildlife Habitat Conservation Area.</p> <p>Segment 4 is identified as being in the 100-year flood zone, as shown in Figure 4 in the <i>Shoreline Analysis Report</i>.</p>	<p>This segment does not include any mapped wetlands or hydric soils according to the Comprehensive Plan (2005), NWI (2010), or the NRCS Soil Survey (2010). Although there were no wetlands mapped for this analysis report, there may still be wetlands onsite, which will be identified on a project-by-project basis at the time of land use action.</p> <p>Steelhead, Coho, and chum are identified by WDFW in May Creek, making May Creek a WDFW priority habitat. Bull trout are mapped as being located in May Creek, but downstream of the City limits. The riparian buffer of May Creek is considered a Fish and Wildlife Habitat Conservation Area.</p> <p>Segment 5 is identified as being in the 100-year flood zone, as shown in Figure 3 in the <i>Shoreline Analysis Report</i>.</p>
<b>Shoreline Modifications</b>	Using publicly available aerial photography, Segment 4 does not appear to have significant shoreline modifications or armoring.	During a review of publicly available aerial photography, the northeastern portion of Segment 5 appears to have a dense tree and shrub canopy (Google Earth 2010).
<b>Wastewater and Stormwater Utilities</b>	The northern portion of one housing development (Shelby Street) is located within the shoreline jurisdiction for Segment 4. The housing development is	The location of the drainfield for the septic systems associated with the numerous mobile homes is unknown. However, it may be located in a portion of the

<b>Shoreline Segment</b>	4	5
	<p>located near the left bank of May Creek, near the eastern City limits. As with all housing in Gold Bar, these homes are also use septic tanks for wastewater.</p> <p>The development on Shelby Street utilizes storm sewer piping, catch basins, curb &amp; gutter, and ponds for treatment of stormwater.</p>	<p>northeastern section of Segment 5 that is mowed lawn. There are no known stormwater facilities along Segment 5, either indicating that storm flows infiltrate or flow directly into adjacent water bodies.</p>
<b>Opportunity Areas</b>	<p>The wetland/tributary located south of May Creek presents an excellent opportunity for conservation of a large piece of land of unknown size if there is a willing seller and if City funds are available. This area could be used for educational purposes and provide public access for wildlife viewing.</p> <p>Primarily privately owned parcels surround this segment of May Creek; consequently, the restoration opportunities are concentrated on private properties. Encouraging private landowners to implement shoreline enhancement projects, including installation of native vegetation, could enhance these areas. New construction should be discouraged from shoreline armoring. As development occurs, other opportunities in the shoreline area could include educational signage and outreach regarding the creek. If warranted, buffer enhancement around the creek would provide improved water quality, habitat, and volunteer opportunities within the City.</p> <p>Restoration or development at the</p>	<p>The Community Business parcel at 501 US 2 has a 5-acre portion to the north that is undeveloped (except maybe a septic drain field). If there is a willing seller and if City funds are available, this parcel could provide an opportunity for public access to May Creek as well as restoration opportunity to replace what is now mowed lawn. It is highly encouraged that the currently forested riparian area in the northeastern portion of Segment 5 be maintained.</p> <p>Privately owned parcels surround this segment of May Creek; consequently, the restoration opportunities are concentrated on private properties. Encouraging private landowners to implement shoreline enhancement projects, including installation of native vegetation, could enhance these areas. New construction should be discouraged from installing bulkheads or other forms of shoreline modification and shorelines that are more natural should be encouraged. As development occurs, other opportunities in the shoreline area could include educational signage</p>

<b>Shoreline Segment</b>	4	5
	publicly owned properties along this segment of May Creek should focus on shoreline restoration using native plants. If new facilities are constructed on any publicly owned properties, the City should use LID and green building techniques for the buildings and parking areas. Other opportunities in the shoreline area could include educational signage and outreach regarding the creek. If warranted, buffer enhancement around the creek would provide improved water quality, habitat, and volunteer opportunities within the City.	and outreach regarding the creek. If warranted, buffer enhancement around the creek would provide improved water quality, habitat, and volunteer opportunities within the City.

**Table 5: May Creek – Summary of Baseline Conditions - Segment 6**

<b>Shoreline Segment</b>	6
<b>Segment Description</b>	Left Bank from west edge of the Community Business Zone to west City Limit (current agriculture land)
<b>Approximate Area (acres)</b>	12.0
<b>Percent of Shoreline Area</b>	6.4%
<b>Land Use</b>	One parcel covers most of this segment and it is zoned Residential 12500. A small parcel is Residential 7200. There is a narrow riparian fringe of trees and shrubs along roughly half of this Segment; the majority of the stream channel does not have a woody buffer. The interior of the large parcel appears to be perhaps a wetland based on the presence of surface water standing in the fields from an aerial dated 2010 available online. There is no known public access to May Creek in Segment 6.
<b>Critical Areas</b>	This segment does not include any mapped wetlands or hydric soils according to the City’s Comprehensive Plan (2005). Additionally, neither NWI nor NRCS soils information maps wetlands or hydric soils in Segment 8. Although there were no wetlands mapped for this analysis report, there may still be wetlands onsite, which will be identified on a project-by-project basis at the time of land use action.

<b>Shoreline Segment</b>	6
	<p>Numerous fish species are identified by WDFW as using May Creek making the Creek a WDFW priority habitat. Fish species identified as using May Creek within the City limits include Coho, chum, and steelhead (Figure 6 in Appendix B of the <i>Shoreline Analysis Report</i>) (WDFW 2010). Bull trout are noted as using May Creek, but the extent of their habitat is located downstream of City limits. The riparian buffer of May Creek is considered a Fish and Wildlife Habitat Conservation Area.</p> <p>Segment 6 is identified as being in the 100-year flood zone, as shown in Figure 3 in the <i>Shoreline Analysis Report</i>.</p>
<b>Shoreline Modifications</b>	<p>There is one single-family residence in Segment 6 and it appears that the land has been cleared for agriculture. The channel of May Creek appears rather straight through this Segment, indicating that there may have been channel modifications, however, this has not been field confirmed.</p>
<b>Wastewater and Stormwater Utilities</b>	<p>There is one residential septic system and no known stormwater facilities in Segment 6.</p>
<b>Opportunity Areas</b>	<p>The entire Segment is comprised of a 13.52-acre parcel. Should the City decide to purchase this parcel in the future, potential uses include public access to May Creek, habitat restoration, stormwater control, and Community Park. It is adjacent to US 2, with direct access to the highway, which also makes it a potential tourist park.</p> <p>A privately owned parcel abuts this segment of May Creek; consequently, the restoration opportunities are concentrated on private property. Encouraging the private landowner to implement shoreline enhancement projects, including installation of native vegetation, could enhance this area. New construction should be discouraged from installing bulkheads or other forms of shoreline modification. As development occurs, other opportunities in the shoreline area could include educational signage and outreach regarding the creek. If warranted, buffer enhancement around the creek would provide improved water quality, habitat, and volunteer opportunities within the City.</p>

## Chapter 3: Shoreline Use Analysis

Existing land use in the City's shoreline jurisdiction includes a mixture of residential, commercial, and open space. With the exception of the City's Skykomish River shoreline, within the City's shoreline jurisdiction the majority of land use is single-family residential. Within Segment 1, the Skykomish River, the predominant existing or planned land uses are small commercially zoned parcels and the BNSF railroad main line with isolated pockets of undeveloped natural area that not likely to develop. Within Segments 2 through 6, May Creek, the majority of land use is single-family residential or mobile homes with a number of undeveloped sites, and small amount of commercial land uses within the shoreline jurisdiction. Within Segments 7 and 8, the land use is primarily single family residential with some vacant parcels zoned for single-family residential development.



# Chapter 4: Shoreline Designations

New environment designations were developed based on a review of existing development patterns, biological and physical characteristics of the shoreline, and goals and aspirations of the community as expressed through the City’s Comprehensive Plan and Washington State’s Shoreline Guidelines (WAC 173-26-211). The five environment designations include either the upland property 200 feet inland from the Ordinary High Water Mark (OHWM) or water areas lying waterward of the OHWM.

## A. High Intensity

The High Intensity shoreline environment designation consists of shoreline areas that currently support high intensity uses related to commerce or transportation or are suitable for high intensity water-oriented uses. The purpose of the High Intensity shoreline environment designation is to provide for high intensity water-oriented commercial, transportation, and industrial uses while protecting existing ecological functions and restoring ecological functions in areas that have been previously degraded. The High Intensity shoreline environment designation is assigned to those areas directly south of State Route 2 to the railroad tracks as well as an area extending approximately from Powell Lane to Smeltzer Road along the south bank of May Creek.

## B. Shoreline Residential

The Shoreline Residential shoreline environment designation consists of shoreline areas that are predominantly single-family or multi-family residential development or are planned and platted for residential development. The Shoreline Residential shoreline environment designation is designed to provide for residential uses where necessary facilities for development can be provided. An additional purpose is to provide public access and recreational uses.

The Shoreline Residential shoreline environment includes the following areas:

1. The south bank of the Wallace River from the western city limits to the first area of unincorporated Snohomish County;
2. Portions of May Creek, extending from the northwest city limits along the north and south banks to First Street, excluding a portion of the south bank designated as High Intensity shoreline environment designation;
3. The south bank of May Creek from First Street east until the Urban Conservancy shoreline environment designation just before the creek makes a tangent to the south;

4. The south bank of May Creek from the eastern City limits until the Urban Conservancy shoreline environment designation just before the creek makes a tangent to the south; and
5. A small portion exists along the north bank of May Creek south of May Creek Place surrounded on three sides by the Urban Conservancy shoreline environment designation.

## C. Urban Conservancy

The Urban Conservancy shoreline environment designation consists of those shorelines and shoreland areas that most closely match the following characteristics:

1. They are suitable for water-related or water-enjoyment uses;
2. Areas containing extensive forested and recreational uses;
3. They are open space, flood plain, wetland or wetland buffer, stream buffer or other sensitive areas that should not be more intensively developed;
4. They have the potential for development that is compatible with ecological restoration;
5. Areas with existing non-water dependent shoreline development that will not be expanded;
6. They have potential for ecological restoration;
7. Areas that retain important ecological functions, even though partially developed; or
8. Newly annexed areas where there is no designation.

The purpose of the Urban Conservancy shoreline environment designation is to protect and restore ecological functions of open space and other sensitive lands where they exist in urban and developed settings, while allowing a variety of water-oriented uses and uses consistent with effective environmental management. The designation will provide for ecological protection and rehabilitation in relatively undeveloped shoreline areas anticipated for or containing existing forested area, agricultural, recreation, and open space uses and limited development suitable to lands characterized by ecological and flood hazard constraints.

The Urban Conservancy shoreline environment designation is assigned to the shoreline areas along the north bank of May Creek from 1<sup>st</sup> Street East to the City boundary, and along the south bank of the Wallace River from the City's boundary with Snohomish County to the easternmost City boundary.

## D. Natural

The Natural shoreline environment designation consists of those shorelines and shoreland areas that most closely match one of the following three characteristics:

1. The shoreline is ecologically intact and therefore currently performing an important, irreplaceable function or ecosystem-wide process that would be damaged by human activity;
2. The shoreline is considered to represent ecosystems and geologic types that are of particular scientific and educational interest; or
3. The shoreline is unable to support new development or uses without significant adverse impacts to ecological functions or risk to human safety.

The Natural shoreline environment designation is assigned to protect those shoreline areas within the City that are relatively free of human influence or that include intact or minimally degraded shoreline functions intolerant of human use. It is placed on portions of the shoreline areas along the Skykomish River south of the existing railroad tracks as well as the east and west banks of the south fork of May Creek.

## **E. Aquatic**

The Aquatic shoreline environment designation consists of all lands waterward of the OHWM. The Aquatic shoreline environment designation is assigned to protect, restore, and manage the unique characteristics and resources of the areas waterward of the OHWM. All lands waterward of the OHWM in the Skykomish River, Wallace River, and May Creek is placed in the Aquatic shoreline environment designation.



# Chapter 5: Goals and Policies

The four purposes of the proposed SMP are:

1. To carry out the responsibilities imposed on the City by the Washington State SMA (RCW Chapter 90-58).
2. To promote the public health, safety, and general welfare, by providing a guide and regulation for the future development of the shoreline resources of the City.
3. To further, by adoption, the policies of RCW Chapter 90-58, and the goals of this Master Program.
4. To comply with the SMP Guidelines (WAC Chapter 173-26), including a particular focus on regulations and mitigation standards to ensure that development under the proposed SMP will not cause a net loss of ecological functions.

## A. Policies

To support implementation of the proposed SMP, specific policies were developed for each of the shoreline designations as well as for particular shoreline uses and resources. The following are the general categories for which policies were developed.

1. Shoreline Environment Provisions (High Intensity, Shoreline Residential, Urban Conservancy, Natural, and Aquatic)
2. General Shoreline Provisions (Universally Applicable Policies and Regulations, Archaeological and Historic Resources, Critical Areas, Environmental Impacts, Flood Hazard Reduction, Public Access, Restoration, Shorelines of State-Wide Significance, Vegetation Conservation, and Water Quality and Quantity)
3. Shoreline Use Provisions (General Use Policies, Agriculture, Aquaculture, Boating Facilities, Civic, Commercial Development, Forest Practices, In-Stream Structural Use, Industry and Manufacturing, Medical, Mining, Parking, Recreational Development, Residential Development, Signs, Transportation Facilities, and Utilities (Primary and Accessory))
4. Shoreline Modification Provisions (General Modification Policies and Regulations, Shoreline Stabilization, Clearing and Grading, Dredging and Fill, and Overwater Structures)

## B. Regulations

The City of Gold Bar will prepare a draft ordinance related to the adopted of the updated SMP. The ordinance will amend Gold Bar Municipal Code (GBMC) Chapter 18.06 to reference the updated SMP, which contains new Shoreline Management Regulations in accordance with the SMA and best available science. Revisions to the Shoreline Management Regulations were designed to improve protection of shoreline ecological functions and management of the resources identified in the *Shoreline Analysis Report*. The revised regulations strengthen protection of natural resources within the shoreline management area in the following ways:

- The five new shoreline environment designations included in the proposed SMP and discussed above revise the existing environment designations as adopted by Gold Bar Ordinance No. 514 and identified in the City of Gold Bar SMP, 1974 and Snohomish County SMP, 1974. Based on the findings of the *Shoreline Analysis Report*, these shoreline environment designations more closely reflect current and proposed natural and developed conditions of the City's shorelines. The revised aquatic designations were created to provide protection and management of the unique characteristics found in the freshwater environments found in the City of Gold Bar.
- Provisions of the City's CAO that are not consistent with the SMA, RCW Chapter 90.85, and supporting WAC chapters, do not apply in the shoreline jurisdiction. Critical Area Regulations included in the proposed SMP meet current Ecology standards for critical area protection.
- Vegetation conservation is now required in the 200-foot shoreline management zone. In all shoreline areas, land clearing, grading, filling and alteration of natural drainage features and landforms is limited to the minimum necessary for development. Within all shoreline areas, tree removal is limited to the minimum necessary to accommodate proposed buildings, structures, and uses or to mitigate a hazard to life or property. Tree cutting plans need to be prepared for both subdivisions and short subdivision according to GBMC 16.12.080 as adopted or amended or the applicant may submit a tree replacement plan prepared by a qualified professional that demonstrates how no net loss will be achieved.
- New development requiring bulkheads or similar protection is discouraged. All new shoreline development are required to be located and designed to prevent or minimize the need for shoreline modification activities.
- New development on steep or unstable slopes shall be set back sufficiently to ensure that shoreline stabilization will not be needed during the life of the building or structure, as demonstrated by a geotechnical analysis prepared by a geotechnical engineer of related professional licensed and in good standing in the State of Washington.

## C. Restoration Opportunities

The City has identified several potential restoration opportunities that would assist in restoring shoreline processes and functions along the shorelines of the City of Gold Bar. Some of these

opportunities are listed in Table 6. Detailed descriptions of the projects identified by the City are included in the *Restoration Plan*.

**Table 6: General Restoration Opportunities**

<b>Restoration Opportunities</b>	<b>Description</b>
WRIA 7 Participation and Other Regional Coordination	<p>The City is a member of the Snohomish Basin Salmon Recovery Forum and was involved in the 2005 adoption of the <i>Snohomish River Basin Salmon Conservation Plan</i>, though it currently does not supply a representative to the Forum. The forum members are responsible for implementing the goals and policies of the <i>Snohomish River Basin Salmon Conservation Plan</i>.</p> <p>The City should work with volunteers to be a part of the forum’s activities.</p>
Stormwater Management and Planning	<p>As part of the new NPDES Municipal Stormwater Permit, the City is required to bring their stormwater regulations up to date and incorporate Low Impact Development as the first choice for stormwater management unless infeasible. This will support restoration efforts within the City’s shoreline jurisdiction.</p>
Public Involvement and Education	<p>The City’s Comprehensive Plan identifies several policy statements that encourage public involvement and education that can support voluntary restoration efforts. This will be especially important for restoration efforts on private property that make up the large majority of land with the City’s shoreline jurisdiction.</p>
Critical Areas Regulations	<p>Critical areas regulations are one important tool to help the City meet its restoration goals, but the current CAO does not reflect current Ecology requirements. To regulate critical areas found within the shoreline zone, the City should adopt regulations and policies in the updated SMP that meet the current state requirements for critical area protection and look for funding opportunities to revise its CAO to meet current state requirements.</p>
Unfunded WRIA 7 Restoration Projects	<p>The <i>Snohomish River Basin Salmon Conservation Plan</i> groups the watershed’s subbasins based on common characteristics of location, condition of watershed processes, and salmonid use, and assigns restoration priorities to each group. While the plan does not list any specific recommended projects within the city, Gold Bar is located at the intersection of three subbasins, each classified by the plan as having different restoration priorities.</p>

<b>Restoration Opportunities</b>	<b>Description</b>
	<p>Locally initiated restoration and enhancement projects should be designed to further these priorities.</p> <p><u>Upper Mainstem Skykomish – Mainstem Primary Restoration</u></p> <p>The highest restoration priorities in this subbasin group are prevention of further shoreline degradation, protection of floodplain areas, preservation of hydrologic and sediment processes, removal of manmade in-stream barriers, reconnection of off-channel habitat, and restoration of shoreline conditions and riparian habitat. Secondary priorities include addressing water quality impacts and enhancing in-stream structural components, such as large woody debris.</p> <p><u>May Creek – Mainstem Secondary Restoration</u></p> <p>The highest restoration priorities in this subbasin group are preserving and restoring hydrologic and sediment processes. This can be accomplished by preserving and restoring wetlands and forest cover, as well as removing impervious surfaces where possible. Secondary and tertiary priorities include protection of floodplain areas, removal of manmade in-stream barriers and restoration of fish and wildlife habitat in shoreline and riparian areas.</p> <p><u>Upper Wallace River – Headwaters Secondary Restoration</u></p> <p>The highest restoration priorities in this subbasin group are preserving and restoring hydrologic and sediment processes. This can be accomplished by preserving and restoring wetlands and forest cover, as well as removing impervious surfaces where possible. Secondary and tertiary priorities include protection of riparian habitat and multi-threaded streams, removal of manmade in-stream barriers and bank armoring, and placement of large woody debris in areas with degraded riparian conditions.</p>
Volunteer Opportunities	<p>The portion of May Creek and the Wallace River within the City could be enhanced on both public and private land by vegetation planting with a buffer of native trees and shrubs, particularly conifer species, as well as placement of large woody debris to enhance in-stream fish habitat. In cooperation with others, the City should pursue grant funding for a demonstration riparian habitat enhancement project to reduce non-native vegetation and increase shade-producing vegetation on city-owned property.</p>

Restoration Opportunities	Description
	Such a project could be used as an example for other projects in the shoreline. On privately owned property, restoration activities would need to be voluntary and acceptable to the landowner. Continued preservation and protection of the remaining functions would be appropriate as well. Control and monitoring of aquatic invasive vegetation should continue.

The following is a list of potential projects from the *Restoration Plan* that was created after assessing field conditions. It is intended to contribute to improvement of impaired functions.

1. Wallace River

Primarily residences, open space, and the presence of a bridge at 399th Avenue SE characterize the portion of the Wallace River within city limits. Shoreline modifications along the Wallace River consist of cleared vegetation along the shoreline and the aforementioned bridge. Restoration opportunities in this area include construction of the proposed PSE trail, documented in the City’s Comprehensive Plan, which would have recreational value and would provide public access to the shoreline. Additionally, Salmon Run Park, which is currently undeveloped, could be developed to provide shoreline recreation and public access, as well as highlight LID, Green Building, and other shoreline-compatible development techniques.

2. May Creek

As described in the *Shoreline Analysis Report*, the May Creek shoreline remains in a relatively natural state, except for some areas of cleared vegetation on agricultural lands near the western end of the City. No significant armoring or stream channelization has been observed. Preservation of the existing shoreline vegetation, tree canopy, and the shoreline ecological functions they provide should be a high priority along May Creek.

Due to the primarily private ownership pattern of the land along May Creek, most restoration and enhancement of shoreline functions will have to be conducted either voluntarily by private landowners or in public-private partnership with the City. Several parcels along May Creek would be good conservation acquisitions if City funds are available and the owners are willing to sell:

- The forested parcel located at the junction of May Creek and a tributary stream that connects to the Skykomish River to the south could provide public shoreline access and educational opportunities for wildlife viewing.
- The vacant parcel just west of 1st Street could be used for public access and/or stormwater management for nearby development.
- The mobile home park on US 2, near the western end of the City, has a large amount of open space in the rear of the property that could be used to provide public access to May Creek and restore native shoreline vegetation on what is currently a mowed lawn.

In addition to these property-specific opportunities, landowners throughout the May Creek reaches should be encouraged to preserve their existing shoreline vegetation and riparian habitat to prevent degradation of shoreline ecological function in these areas.

### 3. Skykomish River

As described in the *Shoreline Analysis Report*, the City's proposed SMP jurisdiction along the Skykomish River extends from the westward extension of 164th Street to the southward extension of Nugget Road and includes those portions of the Skykomish floodplain that fall within City limits. This area contains wetlands, hydric soils, and a riparian buffer classified by WDFW as a Fish and Wildlife Habitat Conservation Area.

Because of the presence of US 2 and the BNSF railroad, which cannot be realistically be altered, opportunities for enhancement and restoration in this area are focused primarily on education and assistance to property owners to maintain water quality in the Skykomish River and prevent further modification of the shoreline. Property owners should be encouraged to maintain their existing native vegetation and limit their clearing and ground disturbance. The City should provide adequate wastewater treatment in the area, including regular inspections of septic systems, and educate owners on the importance of preserving the natural shoreline of the Skykomish River and its water quality.

## Chapter 6: Cumulative Impacts Analysis

As described in the *Shoreline Analysis Report*, the City of Gold Bar is largely developed in residential uses. There are few opportunities for new development within shoreline jurisdiction, with the exception of Segments 7 and 8 along the Wallace River.

With the proposed SMP's substantially increased level of protection to shoreline ecological functions relative to the existing SMP, the condition of the shoreline of Gold Bar will be improved over time. The proposed SMP was developed to allow for increase protection while ensuring that shoreline functions and resources are considered and that shoreline mitigation for all required impacts occurs.

The analysis shows that as redevelopment occurs within the five environment designations there will be a net benefit to the shoreline in Gold Bar takes place. The potential for impacts due to future development in the shoreline has been reduced due to decreases in impervious surface coverage through LID measures, stronger protections for critical areas within the SMA jurisdiction than what is in the current CAO, and increased measures to protect water quality.

Within the Skykomish River shoreline, Segment 1, there will be little development. In addition, access points to the Skykomish River will be further limited without the specific support and assistance of BNSF.

Within the May Creek shoreline, Segments 2 through 6, changes in development will primarily be the result of redevelopment activities. Due to the existing environmental constraints of large lots and the few undeveloped lots in residential areas of the shoreline, it is anticipated that residential density will not increase significantly above current levels. The existing mobile home park may see substantial redevelopment into new commercial facilities, but the proposed SMP will provide substantially more protections than the current SMP as well as enhanced mitigation to replace the existing grassy area with native vegetation. On the limited number of vacant residential lots within the Wallace River, Segments 7 and 9, shorelines, development of residential structures will limited by the presence of floodplains.



## Chapter 7: Conclusions Regarding No Net Loss

The SMP update process has provided the opportunity to identify baseline environmental conditions, anticipate future impacts to shoreline resources, and provide restoration opportunities within the shoreline management area of the City of Gold Bar. Changes to the SMP were informed by the best technical information gathered during the update process. The proposed SMP provides a new system of shoreline environment designations that establishes more uniform management of the City's shoreline.

The system of shoreline environment designations and use regulations in the proposed SMP is consistent with the established land use pattern, as well as the land use vision planned for in the City's comprehensive plan, zoning, and other long-range planning documents. Based on this consistency, it is unlikely that substantial changes in the type of shoreline land uses will occur in the future. Furthermore, the use of aquatic designations will provide a means for protecting and managing the resources that are unique to the aquatic environments.

The updated development standards and regulation of shoreline modifications provides more protection for shoreline processes. The updated standards and regulations are more restrictive of activities that would result in adverse impacts to the shoreline environment. In addition, the *Restoration Plan* developed as part of the SMP Update provides the City with opportunities to improve or restore ecological functions that have been impaired because of past development activities. Furthermore, the proposed SMP is meant to compliment City, state and federal efforts to protect shoreline functions and values.

The City is required to monitor development under the proposed SMP to ensure no net loss. The *Restoration Plan* recommends that City staff track all land use and development activity, including exemptions, within shoreline jurisdiction, and incorporate actions and programs of City departments as well. It is suggested that staff assemble a report to coincide with Comprehensive Plan updates and, following the goals and objectives of the proposed SMP, the report could be used to determine whether implementation of the SMP is meeting the basic goal of no net loss of ecological functions relative to the baseline condition established in the *Shoreline Analysis Report*.

Based on assessment of these factors, the cumulative actions taken over time in accordance with the provisions outlined in the proposed SMP are not likely to result in a net loss of overall ecological functions from the existing baseline conditions within the shoreline management area of the City of Gold Bar. An overall improvement in ecologic functions is expected in the City of Gold Bar's shoreline due to restoration efforts proposed along the shoreline with redevelopment and shoreline enhancement.