City of Entiat – Shoreline Inventory and Biologic Critical Areas Reconnaissance

Entiat, Washington

for

City of Entiat

August 9, 2010

GEOENGINEERS

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1.0 INTRODUCTION

1.1. Shoreline Management Act of 1971 (Chapter 90.58 RCW)

1.1.1. Shoreline Jurisdiction

2.0 APPROACH

2.1. Assessment Area

2.2. Available Information Review

2.3. Shoreline Inventory

2.3.1. Land Use Patterns

2.3.2. Biologic Critical Areas

2.3.3. Other Areas of Interest

2.4. Shoreline Opportunity Areas

3.0 RESULTS

3.1. Available Information

3.1.1. Geology and Soils

3.1.2. Wetlands

3.1.3. Habitat Conservation Areas: Streams and Rivers

3.1.4. Priority and Listed Species

3.2. Shoreline Inventory

3.2.1. Land Use Patterns: Columbia River (Reach A) Segment 1 - Residential

3.2.2. Land Use Patterns: Columbia River (Reach A) Segment 2 - Light Industrial

3.2.3. Land Use Patterns: Columbia River (Reach A) Segment 3 - Mixed Land Use

3.2.4. Land Use Patterns: Columbia River (Reach A) Segment 4 - Park

3.2.5. Land Use Patterns: Entiat River (Reach B) Segment 5 - Open Space

3.2.6. Wetlands

3.2.6.1. Reach A - Columbia River

3.2.6.2. Reach B - Entiat River

3.2.7. Habitat Conservation Areas: Streams and Rivers

3.2.8. Priority and Listed Species

3.2.9. Other Areas of Interest

3.3. Shoreline Opportunity Areas

4.0 INFORMATION GAPS

5.0 SHORELINE MASTER PROGRAM PLANNING OPTIONS

6.0 LIMITATIONS

7.0 REFERENCES
LIST OF FIGURES

Figure 1. Vicinity and Assessment Area
Figure 2. Soils, Geology and NWI Wetland: Reach A – Columbia River
Figure 3. Soils, Geology and NWI Wetland: Reach B – Entiat River
Figure 4. Photopoints
Figure 5. Land Use Patterns
Figure 6. Biologic Features and Other Areas of Interest: Reach A – Columbia River
Figure 7. Biologic Features and Other Areas of Interest: Reach B – Entiat River

APPENDICES

Appendix A. Photopoint Figures
 Figures A-1 through A-78: Photopoints 1 through 78

Appendix B. Draft USFS Entiat Outdoor Learning Center Design

Appendix C. FEMA Map
1.0 INTRODUCTION

The City of Entiat (City) retained GeoEngineers, Inc (GeoEngineers) to assess shoreline resources and associated biologic critical areas within the City’s Urban Growth Area (UGA). The purpose of the inventory was to provide the City with baseline, site-specific information to assist with updating of the Shoreline Master Program (SMP). In addition, we understand that data collected may also be used by the City to assist with planning for its proposed Waterfront Development project (City of Entiat 2009a, 2009b).

1.1. Shoreline Management Act of 1971 (Chapter 90.58 RCW)

The general purpose of the Shoreline Management Act (SMA, Chapter 90.58 Revised Code of Washington, RCW) is to provide for the management of the shorelines of the state by planning for and fostering all reasonable and appropriate uses while protecting the physical and aesthetic qualities of natural shorelines. A statutory framework is provided in the Act to assist local governments in developing shoreline master programs (SMPs). These serve as standards for the regulation of shoreline development in the absence of a master program to be used along with the policy of RCW 90.58.050, as criteria for state review of local master programs under RCW 90.58.090 (Washington State Shoreline Master Program Guidelines 2003 Washington Administrative Code 173-26).

The SMP is both a planning and regulatory instrument. Primary goals of the SMP are to: 1) balance and integrate the objectives and interests of local citizens; 2) address the full variety of conditions of the shoreline; 3) guide planning and regulatory measures for adjacent land use; and 4) address conditions and opportunities of specific shoreline segments by classifying the shorelines into “environment designations.” A local government may account for different shoreline conditions by assigning an environmental designation to each distinct shoreline reach in its jurisdiction. These designations commonly reflect the existing condition of the shoreline in terms of development and planned development, community plans and overall human interaction with the shoreline reach. An environment designation system provides a framework for regulatory control over shoreline development. It is important that local goals, policies, and regulations reflect specific shoreline land uses, the biological and physical character and limitations of the shoreline, and goals and aspirations of the local community for its future development. SMA defines six general shoreline environmental designations (Natural, Rural Conservancy, Aquatic, High-Intensity, Urban Conservancy, Shoreline Residential) representing a range of development options, from high to low intensity (WAC 173-26-211(5)). During the SMP update process, jurisdictions have the opportunity to select from these general environment designations that fit local conditions. As an alternative, local jurisdictions may explain why general designations were not utilized, and create new environment designations that better achieve the requirements of the SMA.

1.1.1 Shoreline Jurisdiction

Entiat’s shoreline jurisdiction currently includes areas within the City limits that are 200 feet landward of the ordinary high water mark (OHWM) of waters that have been designated as “shorelines of statewide significance” or “shorelines of the state.” [SMA, chapter 90.58.030(2)(f), definition of “shorelands"] (Figure 1). In addition, shoreline jurisdiction may extend waterward from
the OHWM to the middle of navigable water bodies (e.g., Columbia River/Lake Entiat) (RCW 35.21.160). These definitions of shoreline jurisdiction were established in 1972 as described in Washington Administrative Code (WAC) 173-18. "Shorelines of statewide significance", as they specifically pertain to rivers east of the Cascade range, are defined as rivers or streams from the point at which the stream reaches a mean annual flow (MAF) of 200 cubic feet per second (cfs) or greater, or the portion downstream from the first 300 square mile of drainage area (WAC 173-18-040). "Shorelines of the state" are generally described as shorelines of all other streams or rivers from the point at which the stream reaches 20 cfs MAF or greater and lakes with a surface area greater than 20 acres, or as superseded by the official list contained within a shoreline master program approved by the Washington Department of Ecology (Ecology).

SMA specifies three situations where local shoreline jurisdiction extends beyond the designated 200-foot limit. These situations involve floodways, "associated" wetlands and river deltas. In areas of the City where floodways extend beyond the OHWM, the City's shoreline jurisdiction would include the floodway plus 200 feet landward of the floodway. Associated wetlands are also included in the shoreline jurisdiction if they are in proximity to and either influence or are influenced by the shoreline. SMA jurisdiction extends to the associated wetland boundary with an option to extend jurisdiction to the edge of the associated wetland buffer. The entire wetland is associated if any part of it lies within the area 200 feet from either the OHWM or floodway. River deltas associated with shorelines of the state are also considered associated, except for lands protected from floodwaters by authorized flood control devices [RCW 90.58.030(2)(f)].

Within the Urban Growth Area (UGA) boundary of the City of Entiat, two rivers meet the criteria of being both "shorelines of the state" and "shorelines of statewide significance": the Columbia River and the Entiat River.

2.0 APPROACH

This shoreline inventory specifically documents conditions throughout approximately 4.5 miles of shoreline within the City of Entiat Urban Growth Area (UGA, Figure 1). To summarize existing information, GeoEngineers collected and synthesized existing maps, plans, surveys, studies, inventories, and other published information and data applicable to the City's shorelines. Where necessary information was not available, a data gap was noted. A comprehensive list of the publications and studies used is presented in the references section at the end of this report.

A five day field inventory of land use, critical areas, vegetation conditions, and shoreline modifications was conducted as part of the inventory process to spot-check and supplement published information. Specific methods and data used to complete the inventory are described in more detail in the following subsections.

2.1. Assessment Area

The City of Entiat is located in North Central Washington at the confluence of the Columbia and Entiat Rivers in Chelan County, Washington. US Highway 97-A follows the right (west) bank of the Columbia River and Entiat River Road (Hwy 19) follows the left (north) bank of the Entiat River, both in close proximity to the landward boundary of the assessment area.
The shoreline inventory conducted by GeoEngineers focused on shorelines within the Urban Growth Area (UGA) of the City of Entiat. The assessment area illustrated in Figure 1 generally includes areas 200 feet landward of the Columbia River and lower Entiat River shorelines.

2.2. Available Information Review

GeoEngineers researched existing information on soils, geology, wetlands, streams, fisheries use/presence, plus priority and listed wildlife species documented in the vicinity of City of Entiat UGA boundaries. For mapping purposes, digital hydrography (streams) data was obtained from the United States Geological Survey (USGS 1999), digital geology data was obtained from the Washington State Department of Natural Resources (WDNR) Division of Geology and Earth Resources (WDNR 2008a) and with permission from City of Entiat, digital data for the City of Entiat City Limits and Urban Growth Area was obtained from the City of Entiat. In addition, digital data obtained from the National Wetlands Inventory (NWI) Geodatabase (USFWS 1987), and the National Resource Conservation Service (NRCS) Soil Survey Geographic Database (NRCS 2009a) was used for mapping wetlands and soils.

Additional information on soils, critical areas, streams, fish distribution and priority and listed fish and wildlife species was obtained from the Web Soil Survey (NRCS 2009b), Hydric Soils List for Washington State (NRCS 2009c), Chelan County Critical Areas maps (Chelan County 2010), the WDNR Forest Practices Application Review System (FPARS) (WDNR 2008b), the Washington State Department of Fish and Wildlife (WDFW) SalmonScape mapping application (WDFW 2003) and WDFW Priority Habitats and Species maps and data (WDFW 2010). Priority species, habitats, habitat use and other biologic inventory and assessment information was also obtained from the following reports:

- Entiat Watershed Plan (CCCD 2004);
- Detailed Implementation Plan (CCCD 2006);
- Waterfront Master Plan published by the City of Entiat (2009a);
- Waterfront Subarea Plan (City of Entiat 2009b);

Other miscellaneous available assessment and planning information were used where appropriate. For example, we obtained and reviewed a copy of the Draft Shoreline Inventory and Analysis Report published by Chelan County (2009) and consultants. As part of the document review, we obtained copies of and evaluated selected maps illustrating vegetation along City of Entiat shorelines.

The City of Entiat Critical Areas Regulations (City of Entiat 2009c; Entiat Municipal Code [EMC] 17.10) were reviewed for information on stream and wetland buffer requirements. The Shoreline Management Act (SMA) (RCW 90.58) and the Shoreline Master Program (SMP) Guidelines (WAC 173-26) were reviewed for information on SMP planning options.
2.3. Shoreline Inventory

A field team conducted a shoreline inventory within the assessment area between May 10 and 14, 2010. The inventory focused on the shoreline riparian areas and biologic critical areas. The reconnaissance included an inventory of riparian vegetation, identification of fish and wildlife habitat areas, and identification of habitat use by priority species observed in the area. A secondary service provided as part of the inventory was identification of other areas of interest and shoreline use opportunity areas.

To simplify the shoreline assessment process, we divided the shoreline jurisdiction into two reaches (A and B, Figure 1). The approach to dividing the shoreline into two distinct reaches was based on the two distinct river systems. Reach A was further subdivided into segments (1 through 4) based on distinctions between existing land use and the level of ecological function provided by each segment. Table 1 identifies the reach location name, provides a reach identifier, river mile, approximate length and approximate area of each of the shoreline reaches. The shoreline jurisdiction, as previously discussed, is defined as: shorelands extending 200 feet landward from the OHWM with the Columbia and Entiat Rivers, and includes any wetlands associated with these two rivers.

**TABLE 1. CITY OF ENTIAT SHORELINE ASSESSMENT AREA REACHES**

<table>
<thead>
<tr>
<th>Location</th>
<th>Reach</th>
<th>River Mile</th>
<th>Approximate Shoreline Length (foot)</th>
<th>Approximate Shoreline Area (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbia River</td>
<td>A</td>
<td>483.7-487.2</td>
<td>19,000</td>
<td>90</td>
</tr>
<tr>
<td>Entiat River</td>
<td>B</td>
<td>0 - 1.0</td>
<td>4,300</td>
<td>20</td>
</tr>
</tbody>
</table>

2.3.1. Land Use Patterns

During the shoreline inventory, a Geographic Positioning System (GPS) unit was used to develop point and polygon data to broadly define and categorize shoreline features and land use patterns within the assessment area. Photographs and GPS points were taken along the Columbia and Entiat River shorelines. At each photopoint, two photographs were taken. The first photograph was aimed perpendicular to the shoreline illustrating the riparian vegetation, other areas of interest, and degree of shoreline use at the inventory point. The second photograph was aimed parallel to the shoreline illustrating the relative uniformity of riparian vegetation type, shoreline slope, substrate/soil condition, and degree of shoreline use. Photos of the shoreline along the Columbia River illustrate a downstream view (Reach A). In order to provide a continuous photo record, pictures of the Entiat River shoreline were aimed upstream (Reach B).

2.3.2. Biologic Critical Areas

The shoreline inventory was also conducted to assess biologic resources, including riparian vegetation, wetlands, as well as priority habitats and species. Reconnaissance services were conducted to confirm or suggest refinement of National Wetland Inventory (NWI)-mapped wetlands, identify the location of any unmapped wetlands or streams, confirm or identify shoreline resources including fish-bearing waters, identify fish and wildlife species and habitat areas, and identify
priority animal species and habitat (including listed salmonid species). The information was also intended to be collected in a manner that could later be compared with draft shoreline inventory maps and documentation published by Chelan County (2009).

Vegetation areas and species assemblages were identified by the field team and recorded with photographs and in field notes. For the purpose of this assessment, certain areas exhibiting uniform ecologic function were characterized as vegetation communities. Two criteria were used to define a community. First, the predominant plant species or species assemblage needed to be contiguous throughout the area assessed. Second, the habitat or ecological function of the plant community needed to be contiguous for the assessed area. For example, if an area was found to be predominantly comprised of black cottonwood (Populus trichocarpa) within the riparian zone of a river, the area was identified as a riparian vegetation community.

The field team also identified the location of other biologic critical areas and related features on field maps and in field notebooks to broadly represent any wetland/shoreline or priority habitats/species features identified within the assessment area. Preliminary wetland/shoreline critical area mapping was completed utilizing existing map information. Hand-drawn features were later transferred to a digital format for mapping purposes, to the extent that features could be published on maps. Please note, Priority Habitat and Species (PHS) data received from WDFW cannot be published on maps.

2.3.3. Other Areas of Interest

As part of the shoreline inventory, the field team identified other areas of interest within the assessment area including general shoreline condition, shoreline modifications (e.g., breakwaters), shoreline structures (e.g., docks and boat launches), shoreline development (e.g., residential, commercial or industrial). These other areas of interest were identified to provide baseline inventory of non-biologic features within the City's shoreline jurisdiction that may be modified through future action in a manner that improves ecologic function and/or public access.

This information was also intended to be collected in a manner that could later be compared with draft shoreline inventory maps and documentation published by CCNRP (2009), and with future shoreline inventories.

2.4. Shoreline Opportunity Areas

Opportunity areas were identified and are summarized in this document. Areas deemed as potentially suitable for future restoration, development, public access and protection were noted. Areas identified in other reports and plans as potential future public access sites including the Entiaqua Trail (connecting Entiat Park and existing trail) the Entiat Outdoor Learning Center, and the Entiat Waterfront Development project were evaluated for suitability based on existing shoreline conditions at the site, and on proposed land use.
3.0 RESULTS

3.1. Available Information

Digital and hard-copy information was assembled and reviewed prior to initiation of field inventory. Figure 2 provides an illustration of the map product data collected for soils, geologic formations and NWI wetlands in the Columbia River (Reach A) portion of the assessment area. The soils, geologic formations and NWI wetlands in the Entiat River (Reach B) are illustrated in Figure 3.

Available literature, including draft SMP update efforts of Chelan County (2009, 2008), the Entiat Watershed Plan (CCCD 2004), Detailed Implementation Plan (CCCD 2006), Salmon Recovery Plan (Andonaegui 2000), Waterfront Master Plan (City of Entiat 2009a), Waterfront Subarea Plan (City of Entiat 2009b) were reviewed and relevant portions are referenced in this document.

3.1.1. Geology and Soils

GeoEngineers previously provided geologic, soils, and preliminary geotechnical assessment information for the area, as summarized in the Waterfront Subarea Plan (City of Entiat 2009b). An excerpt regarding geology follows:

We reviewed a U.S. Geologic Survey (USGS) geologic map for the project area, “Geologic Map of the Chelan 30 Minute by 60 Minute Quadrangle, Washington” by R.W. Tabor et al (1987). The site lies within an area mapped as flood gravel. Alluvium and terrace gravel are also mapped in the vicinity.

The flood gravel is described as deposits of catastrophic floods in the Columbia River Valley which consist mainly of terrace gravels with large boulders. This unit can have associated fields of large boulders and giant current dunes. Terrace gravel is mapped nearby and consists of moderately sorted cobbles and pebble gravel. Alluvium is mapped nearby and consists of moderately sorted cobbles and gravel along the Columbia River. This unit may also include poorly sorted gravelly sand.

Biotite hornblend to hornblend biotite tonalite, and tonalite gneiss are mapped west of the site area. This rock unit is part of the Entiat Pluton of the Chelan Complex of the Late Cretaceous. The bedrock material ranges from tonalite to quartz diorite to granodiorite. Clasts observed in the field were consistent with the map units.

Our assessment of soils in the area as summarized in the Waterfront Subarea Plan (City of Entiat 2009b) indicated that soils in the area are the result of high energy alluvial/flood deposits. Test pits and observations of excavations in the area as part of the Waterfront Subarea Plan support this finding. Soils were well-drained dense, fine to coarse gravel with fine to coarse sand cobbles, and occasional boulders.

Figures 2 and 3 provide illustrations of geology and soils in the assessment area. The NRCS characterizes these materials using six soil map units (NRCS 2009b). Table 3-1 summarizes these units.
<table>
<thead>
<tr>
<th>NRCS Soil Map Unit</th>
<th>Description / Drainage / Erosion</th>
<th>Soil Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cashmont gravelly sandy loam (0-15% slopes)</td>
<td>Well drained, moderately coarse soils on terraces, formed in alluvial and colluvial material of granite, gneiss, schist, and basalt origin. Permeability: moderately rapid. Runoff: medium (most runoff occurs during thunderstorms and snow melt). Water erosion hazard: moderate (high if irrigated) Used for orchards, vineyards, hay, pasture, and wildlife habitat. This soil is on terraces and foot slopes. It is similar to Cashmont gravelly sandy loam (above) except that it has a nongravelly surface layer. Runoff: very slow (slow if irrigated) Water erosion hazard: none to slight (slight if irrigated) Available moisture capacity: 6 - 7&quot; Used mostly for orchards.</td>
<td>Surface layer (21&quot;) is dark-gray gravelly sandy loam Subsoil (7&quot;) is brown gravelly sandy loam Substratum (extends to a depth of 60&quot;) is pale-brown gravelly sandy loam</td>
</tr>
<tr>
<td>Cashmont sandy loam (0-3% slopes)</td>
<td>Same as Cashmont gravelly sandy loam</td>
<td></td>
</tr>
<tr>
<td>Beverly gravelly fine sandy loam (0-3% slopes)</td>
<td>The Beverly series consists of well-drained, moderately coarse textured and coarse textured soils that formed in recent alluvium. This nearly level soil is near streams on low terraces. Moisture capacity: 4&quot; Beverly soils are used for apple and pear orchards, hay, pasture, and wildlife habitat.</td>
<td>Surface layer (5&quot; thick) is grayish-brown fine sandy loam about. Subsoil (12&quot; thick) is grayish-brown fine sandy loam. Substratum (7&quot; thick) is brown very gravelly sandy loam. Above layers are underlain by gravel, cobblestones, and sand at a depth of 24 inches.</td>
</tr>
<tr>
<td>Beverly very gravelly loamy fine sand</td>
<td>Same as Beverly gravelly fine sandy loam</td>
<td></td>
</tr>
<tr>
<td>Pogue very stony fine sandy loam, 0-45% slopes</td>
<td>The Pogue series consists of somewhat excessively drained, moderately coarse textured soils that formed in glacial outwash derived mainly from quartz-bearing rocks. This soil is on terrace remnants near the Columbia River and along dissected drainageways of hummocky terraces. Where these soils are not cultivated, vegetation is mainly big sagebrush, needle-and-thread, bluebunch wheatgrass, bluegrass, and bitterbrush. Runoff: slow to rapid Soil blowing hazard: slight Water erosion hazard: slight to high Available moisture capacity: 4 to 5&quot;</td>
<td>Surface layer (6&quot; thick) is grayish-brown fine sandy loam that is gravelly or very stony in places. Subsoil (11&quot; thick) is brown fine sandy loam. Substratum (13&quot; thick) is brown gravelly fine sandy loam. At a depth of 30 inches, outwash sand and gravel underlie these soils.</td>
</tr>
</tbody>
</table>
NRCS Soil Map Unit: Terrace Escarpments

Description / Drainage / Erosion: Terrace escarpments consist of steep to very steep terrace breaks that are scattered throughout Chelan County. Vegetation consists of bunchgrass and scattered brush. Associated with Pogue, Burch, and Cashmere soils. Used by wildlife and are a source of sand and gravel.

Soil Profile: A typical area consists of a thin layer of surface soil over glacial outwash of sand, gravel, and cobbles/stones.

Notes:
1. Sources of soils information include (NRCS 2009b and NRCS 2009c).

None of the soil units (or soil unit inclusions) identified in Table 3-1 are characterized as hydric class (soils formed in wetlands) (NRCS 2009c). This finding is consistent with results of our assessment of available wetlands information, as summarized in the following section.

3.1.2. Wetlands

Review of National Wetland Inventory (NWI) maps produced very little evidence of wetlands or potential wetlands in the assessment area. No wetlands were identified on NWI maps in the assessment area along the western shore (right bank) of the Columbia River/Lake Entiat (Figure 2) (USFWS 1987). NWI maps did, however, identify deepwater habitat in the area. The NWI characterizes and describes wetlands following the Cowardin Classification System (Cowardin et al. 1979; Ecology 1997) and identifies the Columbia River/Lake Entiat and portions of the mouth of the Entiat River as permanently flooded, lacustrine limnetic (lake deepwater habitats), unconsolidated bottom wetlands (L1UBHH).

At the mouth of the Entiat River, the NWI identifies a Lacustrine littoral (lake edge) unconsolidated wetland with portions that are permanently and seasonally flooded (L2USCH) (Figure 3) (USFWS 1987). Within the channel migration zone of the Entiat River near the western edge of the City of Entiat boundary4, three riverine wetlands are identified by NWI with classifications of riverine, upper perennial, unconsolidated shoreline with seasonal inundation (R3USC) and riverine, upper perennial, unconsolidated bottom that is permanently flooded (R3UBH).

3.1.3. Habitat Conservation Areas: Streams and Rivers

Within Chelan County, sections of the Columbia River that constitute a shoreline are as follows:

From the Okanogan County line on the Columbia River (Sec.6, T28N, R24E) downstream along the Douglas/Chelan County line to Kittitas County (Sec.5, T20N, R22E). The flow exceeds 200 cfs MAF at Okanogan-Chelan County line." (WAC 173-18-080[3]). Within Chelan County, sections of the Entiat River that constitute a shoreline are as follows "From the Wenatchee National Forest boundary (Sec.29, T28N, R19E) downstream (excluding all federal properties) to mouth at the Columbia River (Sec.17, T25N, R21E). The 200 cfs MAF point begins at Wenatchee National Forest boundary." (WAC 173-18-080[4]).

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4 R3UBH - permanently flooded Riverine Upper Perennial wetland with an unconsolidated bottom substrate; R3USC - seasonally flooded Riverine Upper Perennial wetland with an unconsolidated shore substrate;
Chelan County critical areas maps (Chelan County 2010) and the WDNR FPARS mapping application (WDNR 2008b) identify a non-fish bearing stream flowing under Hwy 97 and into the Columbia River/Lake Entiat, approximately 900-1000 feet southeast of the northern city limits boundary on the shoreline. WDFW’s SalmonScape application (WDFW 2003) maps the stream as ending (flow going subsurface or drying out) approximately 1500 feet west of the Columbia River/Lake Entiat. The Chelan County critical areas maps (Chelan County 2010), SalmonScape (WDFW 2003), and the WDNR FPARS mapping application (WDNR 2008b) have records of a stream flowing within Dey Canyon, along Saskia Way and under Entiat River Road (Hwy 19) to its confluence with the Entiat River approximately 1800 feet upstream of the Entiat River mouth at Hwy 97. The Chelan County Critical Areas maps (Chelan County 2010) and the WDNR FPARS mapping application (WDNR 2008b) classify this stream as fish-bearing.

Streams and rivers verified during the field reconnaissance are discussed in Section 3.2.7.

3.1.4. Priority and Listed Species

Portions of the Columbia and Entiat Rivers that are within the assessment area support populations of Upper Columbia River spring and summer-run Chinook salmon (Oncorhynchus tshawytscha), Upper Columbia River summer steelhead (Oncorhynchus mykiss), bull trout/Dolly Varden (Salvelinus confluens), and rainbow trout (Oncorhynchus mykiss) (WDFW 2003; WDFW 2010). Coho salmon (Oncorhynchus kisutch), sockeye salmon (Oncorhynchus nerka) are also found within the assessment area, although native stocks of coho are deemed extinct and sockeye are either migrating to Lake Ososyoos or have strayed from the Lake Wenatchee population. The Entiat River also supports a population of Westslope cutthroat trout (Oncorhynchus clarki lewisi) and other popular sport fish species. Spring-run Upper Columbia River chinook salmon are protected as Endangered and Upper Columbia River steelhead and bull trout/Dolly Varden are protected as Threatened under the U.S Endangered Species Act (NMFS 2008; USFWS 2007).

All the fish species discussed above are on the WDFW Priority Habitats and Species List (WDFW 2010; WDFW 2008). With the exception of cutthroat trout and rainbow trout, the above fish species are listed or a candidate species for listing in the State of Washington (WDFW, 2008). Data from WDFW’s priority habitats and species program indicates that there was an observation of a Rio Grande Wild Turkey (Meleagris gallopavo) near the assessment area (WDFW, 2010). Wild turkeys are a Washington State priority species based on their recreational value as a game species. The assessment area contains areas of "regular concentration" for priority species such as waterfowl, mule deer (Odocoileus hemionus hemionus) and Bald eagle (Halaeetus leucocephalus). In addition, there are more than one Golden Eagle (Aquila chrysaetos) nests within a half-mile of the Columbia River shoreline, although none were identified within the assessment area (WDFW 2010).

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2 Columbia River distinct population segment.
3 Areas that are commonly or traditionally used by a group of animals on a seasonal or year-round basis.
3.2. Shoreline Inventory

The shoreline photographic inventory produced 78 photopoints in total (Figure 4). Two photographs were taken at each photopoint (Appendix A, Figure A-1 through A-78). Reach A was subdivided into four segments based on the primary land use, as summarized in Table 3-2 and illustrated in Figure 5. Given the relatively short length of the Entiat River within City of Entiat’s shoreline jurisdiction, and the uniformity of land use and shoreline conditions within this reach, no further subdivision of Reach B was necessary for shoreline characterization as indicated in Table 3-2 and illustrated in Figure 5).

**TABLE 3-2. EXISTING LAND USE PATTERNS WITHIN THE CITY OF ENTIAT SHORELANDS ASSESSMENT AREA.**

<table>
<thead>
<tr>
<th>Location</th>
<th>Primary Land Use</th>
<th>Figures</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment 1 – North City of Entiat along the Columbia River</td>
<td>Residential</td>
<td>A-1 to A-20</td>
<td>Shoreline provides access for residents, and has been modified for human use and development (e.g., docks, bulkheads).</td>
</tr>
<tr>
<td>Segment 2 – North-Central City of Entiat along the Columbia River</td>
<td>Light Industrial</td>
<td>A-21 to A-34</td>
<td>Although Light Industrial is the primary land use within this part of the assessment area, the immediate shoreline shows little modification from industrial uses. Vegetation is largely shrub-scrub.</td>
</tr>
<tr>
<td>Segment 3 – Central City of Entiat along the Columbia River</td>
<td>Mixed – Open Space, Residential and Light Industrial</td>
<td>A-35 to A-38</td>
<td>Although this part of the assessment area has a variety of uses, the immediate shoreline shows little modification from uses. Vegetation is largely shrub-scrub with some intact riparian vegetation.</td>
</tr>
<tr>
<td>Segment 4 – South City of Entiat along the Columbia River</td>
<td>Park</td>
<td>A-39 to A-50</td>
<td>The shoreline along Entiat Park exhibits a park landscape and provides access for the public. The shoreline resources (including aquatic) have been modified through decades of human use.</td>
</tr>
<tr>
<td>Segment 5 – Lower Entiat River</td>
<td>Open Space</td>
<td>A-51 to A-78</td>
<td>The shoreline and riparian area along the lower Entiat River provides aquatic, wetland, riparian, and terrestrial habitat.</td>
</tr>
</tbody>
</table>

The City of Entiat shoreline along the Columbia River (Reach A) transitions from residential use at the northern portion of the shoreline to open space riparian areas adjacent the light industrial and mixed zones, to altered shoreline adjacent the Entiat Park and along the Columbia River shoreline adjacent US-97A and the railroad. The lower Entiat River (Reach B) retains riverine, riparian and wetland habitats and provides for the ecological functions to maintain those habitats, in spite of significant historic changes in hydrology and sediment transport regimes associated with construction and operation of Rocky Reach dam. More detailed descriptions of land use, shoreline condition, shoreline and biologic resource features for each reach and segment are summarized as follows.
3.2.1. Land Use Patterns: Columbia River (Reach A)

Segment 1 - Residential

The residential area at the north end of Reach A (Segment 1; Figure 4, photopoints 1 through 20) exhibit some of the most obvious effects of human use of the shoreline (Table 3-2). Rockeries, concrete bulkheads, gabion-basket bulkheads as well as docks, a personal boat launch and hardened shoreline access points are all common within this segment of Reach A (Appendix A, Figures (Appendix A, Figures A.1 to A.20).

Aerial photograph and field survey data indicate that the vegetative community within the residential zone is predominantly landscaped lawn and garden, sparsely interspersed with ponderosa pine (Pinus ponderosa) and willow (Salix sp.). Aquatic and shoreline/riparian habitats within the area are most significantly influenced by operation of Rocky Reach dam. The previously free-flowing section of the Columbia River presently serves as a hydroelectric project and flood control reservoir with significant fluctuations in water levels on hourly and seasonal time steps. With construction and operation of the dam, habitat was essentially changed from a lotic (riverine) to a lentic (lake) environment.

The landscape environment and shoreline hardening within the residential area appear to be a response to erosion associated with reservoir fluctuations. The previous riverine and riparian shoreline habitat presently exhibits a condition more representative of a lake habitat.

3.2.2. Land Use Patterns: Columbia River (Reach A)

Segment 2 - Light Industrial

Land use within the north-central portion of the Reach A (Segment 2) is characterized as light industrial (Table 3-2; Figure 4, photopoints 21 through 34). Although light industrial is the primary land use, the shoreline, riparian area and aquatic habitat show little or no modification or impact from industrial uses (Appendix A, Figures A.21 to A.34).

Aerial photograph and field survey results indicate a riparian corridor within Segment 2 that is naturally narrow (approximately 15 to 50 feet) due to the steep bank and arid north central Washington environment. The thin reed canarygrass (Phalaris arundinacea) and willow riparian edge quickly transitions to upland shrub-steppe habitat dominated by cheat grass (Bromus tectorum), sagebrush ( Artemisia tridentata) and bitterbrush ( Purshia tridentata). As was observed in Segment 1, aquatic and shoreline/riparian habitats in Segment 2 are most significantly influenced by construction and operation of Rocky Reach Dam. The previous free-flowing section of the Columbia River has been replaced by a condition more representative of a lake habitat. Canada goose (Branta canadensis) nest boxes were observed on a string of islands on the west (right) bank of the Columbia River within this assessment area. Nest boxes that had level nesting
surfaces were being used by Canada Geese at the time of the assessment. Several nest boxes appearing to be unmaintained did not have level surfaces or cover. Canada geese were not observed to be using these structures.

Approximately one mile of Columbia River shoreline within Segment 2 is planned for public access through the development of the proposed City of Entiat Waterfront Project (City of Entiat 2009a, 2009b). The Waterfront Development Project is envisioned to provide mixed use development of city-owned property including facilities supporting boating, waterfront public access, bicycling, pedestrians, and automotive traffic. The City envisions a trail being constructed that connects the Waterfront Development project in Segment 2 to Entiat Park in Segment 4.

### 3.2.3. Land Use Patterns: Columbia River (Reach A)

**Segment 3 – Mixed Land Use**

A small portion of the assessment area located centrally along the Columbia River shoreline (Segment 3, Table 3-2) was observed to have a mix of land uses transitioning between open space, Light Industrial, municipal and residential land uses (Figure 4, photopoints 35 to 38) including the City of Entiat Wastewater Treatment Plant (Appendix A, Figures A-35 and A-38). The shoreline along this segment showed mixed effects of land use on the shoreline and ecologic functions.

Aerial photograph and field survey results indicate a riparian corridor within Segment 3 that is relatively narrow (approximately 15 to 50 feet) for a variety of reasons. Portions of Segment 3, like Segment 2, are steep banks with low annual precipitation in the arid north central Washington environment (for example see Appendix A, Figure A-37). The thin reed canarygrass, willow and smooth sumac (Rhus glabra) riparian edge quickly transitions to upland shrub-steppe habitat dominated by cheat grass, sagebrush and bitterbrush. Other areas of Segment 3 have narrow riparian edges that quickly transition to lawn and landscape (for example see Appendix A, Figure A-38).

As was observed in Segment 1 and 2, aquatic and shoreline/riparian habitats in Segment 3 are most significantly influenced by construction and operation of Rocky Reach Dam. The previous free-flowing section of the Columbia River has been replaced by a condition more representative of a lake habitat.
3.2.4. Land Use Patterns: Columbia River (Reach A)
   Segment 4 – Park

Land use within the southern portion of Reach A (Segment 4; Figure 4, photopoints 39 to 51) is characterized as Park (Table 3-2). The shoreline, riparian area and aquatic habitat within Segment 4 was historically modified as a result of inundation of the former location of the City of Entiat and adjacent lands following construction and operation of Rocky Reach dam. The majority of Segment 4 is managed lawn and landscape associated with Entiat Park (Appendix A, Figures A-39 to A-51).

Aerial photograph and field survey results indicate a riparian corridor within Segment 4 that is variable, but relatively narrow (generally 5 to 50 feet). The width of the riparian area is influenced by both natural and human influences. The riparian zone at the north end of Entiat Park (Appendix A, Figure A-39) is a relatively robust combination of trees and shrub-scrub habitat. Tree species include black cottonwood and willow with a shrub component that includes smooth sumac and red osier dogwood (Cornus sericea). One pocket wetland was identified at the north end of Entiat Park adjacent the Entiat Museum (Figure 6). Although the area adjacent to this pocket wetland has an abandoned road bisecting the riparian corridor, this area exhibits some of the best aquatic, wetland, and riparian habitat along the entire Reach A shoreline.

The riparian zone in the cove and beach area of the park (Figure 4, photopoints 40 through 42; Appendix A, Figures A-40 through A-42) is largely non-existent. The shoreline is actively managed as lawn and is generally landscaped down to the OHWM. The riparian area in the remainder of Entiat Park (Figure 4, photopoints 43 through 48) was generally narrow (5 to 50 feet) with a mixture of trees and shrub-scrub habitat. Portions of this shoreline have been hardened, presumably to avoid erosion (for example, see Appendix A, Figures A-43 and A-46). Hawthorn (Crataegus douglasii) and willow were the most prevalent plant species along the Entiat Park shoreline.

As was observed in Segments 1 through 3, aquatic and shoreline/riparian habitats in Segment 4 are most significantly influenced by construction and operation of Rocky Reach Dam. The previous free-flowing section of the Columbia River has been replaced by a condition more representative of a lake habitat. Aquatic and shoreline habitat along Entiat Park was most notably impacted by inundation of the former City of Entiat and roads when the Rocky Reach dam was constructed. Portions of road and building foundations remain intact along the Entiat Park shoreline and below the OHWM (Appendix A, Figure A-44). Asphalt, concrete and rusted metal hardware were observed within Segment 4 between points 39 and 48 (Figure 4). An abandoned asphalt roadway bisecting portions of the riparian zone was observed to continue subsurface between points 40 and 44, and then going back sub-surface in a downstream direction at point 48 (Figure 4).

All of Segment 4 (greater than one mile) of Columbia River shoreline is either presently used for, or is planned for public access through enhancement of Entiat Park and development of the Entlaqua
trail (City of Entiat 2009a, 2009b). Entiat Park and the Entiaqua trail are envisioned to provide facilities supporting boating, waterfront public access, bicycling, and pedestrian traffic.

3.2.5. Land Use Patterns: Entiat River (Reach B)
Segment 5 – Open Space

Existing land use in the reach can be characterized as primarily Open Space/Recreation (Figure 5). A narrow riparian corridor exists between the Entiat River shoreline and Entiat River Road at the westernmost portion of the reach. At the Entiat River kiosk the riparian and floodplain opens up into a fairly robust and diverse combination of aquatic, wetland, riparian and terrestrial habitats, bisected by an existing and publicly accessible trail. This wider river bottomland floodplain and riparian zone is located midway within the reach. The area adjacent the bridge near the confluence of the Entiat and Columbia Rivers exhibits hydrologic, geomorphic and ecologic attributes more closely aligned with Lake Entiat and operation of Rocky Reach dam than with the Entiat River.

Aerial photograph and field survey data indicate that Reach B is predominately a river bottomland open space. The riparian zone has a mixed overstory of soft-wood including black cottonwood and willow, a variety of shrub-scrub species including Nootka rose (Rosa nutkana), redosier dogwood, and smooth sumac, and an understory of sedges, grasses and groundcover typical in an arid landscape. Two potential wetland areas were identified midway along the left bank of the Entiat River within Reach B (Figure 7).

The lower Entiat River shoreline within Reach B is accessible to the public. A gravel parking area near the kiosk (Figure 4, photopoints 66 through 70) has been managed by the City as river access. An existing trail connects the parking area to the Entiat River and Columbia River confluence area (Appendix A, Figures A-59 through A-70). Chelan PUD is obligated to assist with the funding of the Entiaqua trail to be located between the southern end of Entiat Park (Appendix A, Figure A-48) and the existing trail along the Entiat River (Appendix A, Figure A-59). Essentially, this would connect the lower Entiat River to Entiat Park.

3.2.6. Wetlands

3.2.6.1. REACH A – COLUMBIA RIVER

The available information section of this document identifies one NWI-mapped, large, permanently flooded, Lacustrine limnetic (lake deepwater habitats) characterized as unconsolidated bottom wetland (L1UBHH) associated with the Columbia River/Lake Entiat (Figure 2). Field inspection of the Columbia River/Lake Entiat NWI mapped habitat area was generally consistent with a Cowardin (1979) classification of L1UBHH, used for dammed major river channels in that the area was:

1. Situated in a topographic depression (historic Columbia River channel),

2. Lacked trees, shrubs, persistent emergent plant species, emergent mosses or lichens with greater than 30% coverage, and
(3) Had a surface areas exceeding 8 ha (20 acres).

Ecologic functions of this system have been modified from riverine to large open water lake habitat, as a result of hydroelectric reservoir development and operation. The majority of the shoreline area inspected transitioned rapidly from shoreline to deepwater habitat, devoid of wetland plant indicator species. Substrates in deepwater habitats are considered nonsoil because the water is too deep to support emergent vegetation. Therefore, the deepwater habitats do not meet the criteria of traditional wetlands, but are included in this section of the report given the importance of considering an overall ecological approach to classification, consistent with the Cowardin classification system.

One, small associated wetland was identified in Reach A (Columbia River) in Segment 4 (Park) at the north end of Entiat Park adjacent the Museum (Figure 6). This wetland was not delineated or categorized. However, this wetland appeared to be approximately 2000 square feet (less than 0.1 acres) with wetland buffers likely covered by the shoreline buffer. As this wetland resides in a swale connected to the north end of the cove adjacent Entiat Park, within the reservoir drawdown zone, it would likely have a Cowardin classification of L2USCH.

3.2.6.2. REACH B –ENTIAT RIVER
Available NWI Information also identified three wetlands within the channel migration zone of the Entiat River near the western edge of the City of Entiat boundary (Figure 3), as summarized in section 3.1.2. Observations of the shoreline within this reach revealed the OHWM of the Entiat River to be located along the toe of the slope of the shoreline immediately adjacent to Entiat River Road. Riverine wetlands noted on NWI maps were located, therefore, waterward of the OHWM. Similarly, the wetland classified on NWI maps as L2USCH was identified as being waterward of the OHWM. This is not surprising as the feature appears to have hydrology significantly influenced by operation of the Rocky Reach dam.

Two potential, small associated wetlands were identified in Reach B (Entiat River) in Segment 5 during the field reconnaissance (Figure 7). The potential wetlands were noted in the same location as the NWI-mapped wetland identified as L2USCH, located mid-way along Segment 5 (Figure 3). These potential wetlands were not delineated or categorized. However, each wetland appeared to be approximately 10,000 square feet (less than 0.25 acres) with wetland buffers likely covered by the shoreline buffer. While the Cowardin classification of L2USCH may apply, it did not appear that the potential wetlands covered as large an aerial extent as the NWI-mapped area suggests.

3.2.7. Habitat Conservation Areas: Streams and Rivers

Field reconnaissance focused on known shoreline associated with the Columbia and Entiat Rivers within the City of Entiat Urban Growth Area (UGA), defining the assessment area as mapped in Figure 1. Both rivers meet the criteria of being waterbodies of statewide significance. Both waterbodies are known to provide habitat and to serve as migratory passage corridors for salmon, steelhead, and bull trout which are protected under the US Endangered Species Act. Existing

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4 According to EMC 17.108(5)(b), the minimum width of a wetland buffer, as measured from the wetland edge is 75 feet for Category I and II wetlands and 25 feet for Category III and IV wetlands.
shoreline management protections for known aquatic habitat conservation areas, via buffers, are summarized in Table 3-3.

### TABLE 3-3. STREAMS AND RIVERS WITHIN THE CITY OF ENTIAT SHORELANDS ASSESSMENT AREA.

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Stream Type</th>
<th>Required Buffer Width (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbia River/Lake Entiat</td>
<td>Level 1 Critical, Aquatic Habitat Conservation Area, Shoreline</td>
<td>75 (60)²</td>
</tr>
<tr>
<td>Entiat River</td>
<td>Level 1 Critical, Aquatic Habitat Conservation Area, Shoreline</td>
<td>75 (60)²</td>
</tr>
</tbody>
</table>

Notes:
1. EMM 17.10C.020(2) Classifications – Fish and Wildlife Habitat Conservation Areas.
2. “Land divisions within designated aquatic habitat conservation areas shall require a minimum lot frontage along the protective buffer or shoreline of 100 feet, measured in a straight line, and required buffer areas shall be dedicated as open space tracts, nonbuildable lot(s), buffer areas and/or common areas, with ownership and control transferred to a homeowner’s association.” EMM 17.10C.050(11c)
3. EMM 17.10C.050(11a) General Standards – Aquatic Habitat Conservation Areas. Buffer width for major development (buffer width for minor development).

During the field reconnaissance staff inspected shorelines for other waterbodies that may form shorelines of the state. Section 3.1.3 presents information regarding habitat conservation areas and the potential for finding and assessing other rivers and streams in the City of Entiat UGA. Available literature and maps suggest that a stream may be found flowing into the Columbia River at a point approximately 900-1000 feet southeast of the northern city limits boundary on the shoreline. No such stream was found, and no shoreline assessment was made of the area.

Available literature suggests that a stream may be found flowing into the Entiat River approximately 1800 feet upstream from the Entiat and Columbia River confluence, originating from Dey Canyon (Chelan County 2010; WDFW 2003). No such stream was found. Had such a stream existed, it would have been observed around photopoint 64 (Appendix A, Figure A-64, Figure A-64a). Field staff observed perched stormwater culverts in the lower Entiat River during the reconnaissance. One perched, dry and partially obstructed culvert was found at a point near the Entiat and Columbia River confluence at photopoint 56 (appendix A, Figure A-56). No stream or visible drainage system was found to be associated with the culvert. Similarly, a perched, dry culvert was observed by field staff at a point approximately 3000 feet upstream from the Columbia and Entiat River confluence. No stream or visible drainage system was found to be associated with the culvert.

The Columbia River and Entiat River were, therefore, the only shorelines assessed and identified as having habitat conservation area values.

#### 3.2.3. Priority and Listed Species

Section 3.1.4 provides a summary of priority and listed species in the assessment area, based on literature review. During the field reconnaissance, field staff noted the presence of any priority habitats and/or species other than those published in the literature. No known priority or listed plant, bird, amphibian or reptile species were observed during the field reconnaissance.
Salmonid habitat use areas in the Columbia and Entiat Rivers were noted based on observations of use, or based on prior observations by field or City of Entiat staff. These areas are noted on Figure 6 and 7. Juvenile salmonids were observed to be rearing in a section of the Columbia River at the north end of Entiat Park (Figure 6). Fish were observed using the transition zone between the shallow-riparian area and deepwater habitat, so species could not be identified.

Juvenile fish of various species were also observed using rearing habitat in the lower Entiat River (Figure 7, salmonid rearing). Fish species was not identified. Further, adult salmonid holding and spawning areas are known to be in the area (Figure 7), and emergence from redds in the area may have been one source of juvenile fish observed to be rearing in the confluence area.

3.2.9. Other Areas of Interest

As part of the shoreline inventory, the field team identified other areas of interest including general shoreline condition, shoreline modifications (e.g., revetments and breakwaters), shoreline structures (e.g., docks and boat launches), shoreline and shorelands development (e.g., residential, commercial or industrial).

Segment 1 of the Columbia River reach was classified as residential (Figure 5) because almost the entire shoreline showed evidence of residential development. As might be expected in a residential area, the shoreline had been modified to support shoreline access and use of the waterfront. A large percentage of the Segment 1 shoreline was observed to be modified with bank hardening and clearing of riparian vegetation (Figure 6). Field staff observed 1.6 docks, at least one boat ramp and the majority of the shoreline was observed as having some form of hardening (bulkhead, gabions, rockery, riprap). Residences along the shoreline appeared to be of both recent and past construction.

Shoreline modifications, structures or development within Segment 2 of Reach A (Figure 5) were not observed. Although the majority of this segment was classified as Light Industrial, because of active gravel operations, the Entiat River shoreline within the assessment area showed no signs of modifications. Rather, field staff could not differentiate between areas of open space and areas with gravel operations during the shoreline inventory. Therefore, no “other areas of interest” were noted in Segment 2 (Figure 6).

Shoreline use and modifications were among the reasons why Segment 3 was made a distinct segment within Reach A. A combination of shoreline modification associated with the Wastewater Treatment Plant and residential development in the area just north of Entiat Park resulted in some shoreline modification and development of shoreline structures. One dock was observed by field staff, although the air photograph (Figure 6) shows two docks in Segment 3. In addition, some modification of shoreline vegetation was observed around the WWTP and residential area. A wooden staircase and shoreline access was observed at one point (Appendix A, Figure A-37), just downstream from the WWTP. Generally the shoreline was observed to be in reasonable condition.
with few shoreline modifications associated with residential shoreline access and development of the WWTP.

Entiat Park and a steep bank leading to the railroad line approaching the Columbia and Entiat River make up the shoreline within Segment 4 (Figure 5). This shoreline was historically modified through the development of the park and railroad line. However, these developments occurred prior to the area becoming shoreline. The construction and operation of Rocky Reach dam resulted in inundation of the historic City of Entiat, previously located within Segment 4. Many of the shoreline modifications within this segment are remnants of the old town building foundations and roadways (Figure 6). Some modern shoreline modifications include lawn and landscape development in the park (Appendix A, Figure A-40 and A-41), a dock in the Entiat Park cove (Appendix A, Figure A-41), a boat ramp and dock (Appendix A, Figure A-46) and rock/riprap used to harden the shoreline in response to erosion (Figure 6).

Very few shoreline modifications or other areas of interest were found in Segment 5 (Lower Entiat, Reach B). Riprap has been used to armor the toe of the slope around US 97-A and the railroad line. Similarly, some riprap and rock has been used to protect steep slopes adjacent the Entiat River and Entiat River road. Otherwise, Segment 5 (lower Entiat River) is generally a well functioning habitat and aquatic ecosystem.

3.3. Shoreline Opportunity Areas

There are opportunities to protect and restore shoreline functions while maintaining or enhancing public access in each of the assessment area reaches. The following provides a brief outline of opportunities:

1. Columbia River (Reach A), Segment 1 is and will likely remain a residential area. The area seems to be nearly fully developed. There are opportunities to enhance shoreline functions through modification of existing shoreline treatments. Existing bulkheads, gabion baskets, rockeries and riprap structures could be enhanced or replaced with softer shoreline treatments including live vegetation plantings and large woody debris-based structures. An opportunity to plan for and implement modifications to existing structures and/or construction of new shoreline modifications may be forthcoming with the recent proposal by others to raise the Lake Entiat pool elevation by three feet (Susan Driver, pers. comm. 2010). Such a pool raise would change the shoreline inundation area in Segment 1, potentially overtopping and eroding residential shoreline if alternative treatments to existing hardened structures are not planned, designed and installed.

2. Columbia River (Reach A), Segment 2 is a Light Industrial area, but may be converted to mixed use. Segment 2 includes shoreline associated with the proposed Entiat Waterfront Development Project (City of Entiat 2009a, 2009b). The existing shoreline has steep banks, but would likely be modified as part of the proposed Waterfront Development project. The city is already planning for enhancements of the riparian area and ecological functions as part of the Waterfront Development project. This project is likely the single greatest opportunity to enhance public shoreline access within the city of Entiat. Any potential impacts to ecological functions not mitigated by planned enhancements associated with the project would likely require mitigation. With such a large percentage of
the shoreline within Segment 2 generally functioning in a natural condition following inundation of the area from Rocky Reach dam operation, there is considerable physical space and linear shoreline available for enhancements.

3. Columbia River (Reach A), Segment 3 is a mixed use area with limited shoreline modification and little opportunity for enhanced shoreline public access or enhancement of ecologic function. Opportunities to plan for, design, and implement projects in anticipation of a potential 3 foot pool elevation increase could be implemented in residential and WWTP areas in Segment 3, as described for residential areas in Segment 1.

4. Columbia River (Reach A), Segment 4 is and will likely remain park land use. Planned improvements to the existing Entiat Park and adjacent areas, funded by the Chelan County Public Utility District (Chelan PUD) as mitigation for ongoing operation of the Rocky Reach dam presents an immediate opportunity for the entire Segment 4 area. Similarly, the Chelan PUD is obligated to provide improvements to public access along the Columbia River shoreline south of Entiat Park, through development of a trail underneath the Highway 97A bridge connecting Entiat Park with the Entiaqua Trail. The trail would connect Entiat Park to existing trail and public access areas in the lower Entiat River (Segment 5). Through enhancement of Entiat Park and creation of trail, there are immediate opportunities to enhance both ecologic functions and public access to the Columbia River/Lake Entiat shoreline. Facilities associated with the enhanced park and trail are anticipated to support boating, waterfront public access, bicycling, and pedestrian traffic while enhancing aquatic and riparian habitat.

5. Entiat River (Reach B), Segment 5 is and will likely remain recreation and open space land use. Planned improvements, by the City of Entiat, to the existing trail and development of the Entiat Outdoor Learning Center (Appendix B) present near-term opportunities for enhancement of public access and ecologic functions in Segment 5. Facilities associated with the enhanced trail and Entiat Outdoor Learning Center are anticipated to support waterfront public access, bicycling, environmental education, and pedestrian traffic while enhancing aquatic and riparian habitat.

By implementing all the above opportunities, the City of Entiat could connect the lower Entiat River (Segment 5) via trails to Entiat Park (Segment 4), the existing mixed use area (Segment 3) and Segment 2 if the Entiat Waterfront Development project is developed. This would result in over 3 miles of continuous shoreline access to the public. In the process, ecologic functions could not only be protected, but enhanced.

4.0 INFORMATION GAPS

This shoreline inventory and critical areas reconnaissance was not intended to be, nor should it be construed as a complete shoreline inventory and analysis for the City of Entiat shoreline jurisdiction, under the SMA. Rather, it should be construed as a field-based assessment to be used to supplement and refine the SMA inventory and assessment completed by Chelan County (2010). Based on observations made, a number of data gaps could be addressed moving forward with use
of this information and that contained in the Chelan County (2010) document. A summary of these information gaps follows:

(1) Wetland delineations - Neither NWI wetlands, nor other potential wetlands identified by field staff were fully delineated during this shoreline assessment. Prior to development of projects, such as those summarized in Section 3.3, above, full wetland delineations and wetland rating should be completed to define the extent of these critical areas and determine the best means to avoid, minimize, and mitigate for any potential impacts.

(2) Ordinary High Water Mark (OHWM) delineations - Preliminary OHWM delineations were completed by GeoEngineers field staff in the Entiat Park area, and spot checks of OHWM were completed for other shoreline areas in the assessment area. OHWM delineations should be completed prior to proceeding with shoreline enhancements such as those summarized in Section 3.3, above.

(3) Other Critical Areas - Other critical areas such as geologic hazards, landslides, erosion, flood hazard, etc. should be evaluated for any project sites prior to project implementation.

(4) Floodplain analysis - FEMA mapping is incomplete in the City of Entiat project area\(^6\) (see Appendix C). Opportunities for landowners in the Columbia and lower Entiat River floodplains to obtain insurance coverage and for the Entiat community to manage the National Flood Insurance Program (NFIP) is limited by a lack of FEMA mapping in the area.

(5) Subsurface shoreline modifications - The location and extent of manmade material (asphalt, concrete, metal pipes, etc.) presently in the Columbia River below the OHWM is unclear. The location, extent and volume of material present in the Columbia River adjacent the City of Entiat shoreline could be assessed, and opportunities could be found to remove harmful material (e.g., asphalt) and enhance habitat as part of ongoing and proposed projects along the City of Entiat shoreline.

(6) Potential 3-foot pool rise - The potential effects of raising the Lake Entiat (Rocky Reach dam) pool by three feet should be assessed.

(7) Shoreline classifications - Shoreline classifications used as part of the Chelan County SMP update (Chelan County 2010) should be evaluated. The SMA and SMP update process allow for the use of alternative shoreline classifications, other than the general classifications offered by the Washington Department of Ecology. Use of shoreline classifications better suited to arid Easter Washington, would facilitate shoreline management by administrators and understanding of regulations by citizens.

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\(^6\) During several phone conversations, FEMA staff informed Susan Driver, City of Entiat Community Development Director that Chelan County is on the 2010 list for a new analysis (Flood Study). FEMA will update flood maps for Chelan County as soon as funding is available.
5.0 SHORELINE MASTER PROGRAM PLANNING OPTIONS

The Department of Ecology has divided the process of updating a Shoreline Master Program into six separate phases. Phase 1 involves establishing shoreline jurisdiction and creating a public involvement/participation plan. Phase 2 includes conducting a shoreline inventory, analysis and characterization. Phase 3 involves assigning environmental designations, developing policies and regulations, and conducting a cumulative impacts analysis. Phase 4 is restoration planning, and Phases 5 and 6 are local and state approval, respectively.

Local options exist for establishing shoreline jurisdiction along rivers. At a minimum the jurisdiction can extend 200 feet landward of the OHWM or the floodway, and would include associated wetlands and river deltas. Local jurisdictions can choose to use the 100-year (1% probability) floodplain as a jurisdictional boundary or the line 200 feet landward of the channel migration zone of the river (WAC 173-26-201(3)(c)(vii)). Local jurisdictions can also choose to expand shoreline jurisdiction to include the buffers of adjacent and associated critical areas (e.g., include buffers of associated wetlands) (RCW 90.58.030(2)(f)(ii)).

When developing an updated Shoreline Master Program, a local jurisdiction should classify shorelines into environmental designations based on ecological functions, existing land use patterns, community goals (e.g., Comprehensive Plan if it assures adequate infrastructure for shoreline uses) and on information generated during the inventory and characterization process (e.g., existing development, structures and modifications, and opportunities for preservation or restoration) (WAC 173-26-211(2)(a)).

When determining allowable uses and resolving use conflicts a local jurisdiction should apply preferences according to the following ranked list (WAC 173-26-201(2)(d)):

- Ecological functions
- Water-dependent uses
- Water-related uses
- Single family residential
- Limited non-water oriented uses

For Shorelines of Statewide Significance local jurisdictions should apply preferences according to the following ranked list (WAC 173-26-251(2)):

- Recognize and protect the statewide interest over local interest;
- Preserve the natural character of the shoreline;
- Result in long term over short term benefit;
- Protect the resources and ecology of the shoreline;
- Increase public access to publicly owned areas of the shorelines;
- Increase recreational opportunities for the public in the shoreline;
- Provide for any other element as defined in RCW 90.58.100 deemed appropriate or necessary.
A local jurisdiction may choose to create alternative environmental designations (e.g., Urban Resort, Waterfront District - Mixed Use) provided they are consistent with the purposes and policies of WAC 173-26-211(4) and 173-26-211(5). As an example, management policies for a mixed-use designation could include stipulating water-dependent uses on the first floor of a multi-unit development but allowing non-water-dependent uses on the second floor.

A local jurisdiction may use "parallel environments" to accommodate existing conditions (WAC 173-26-211(4)(c)(ii)). Parallel environments divide shorelines into different sections running parallel with the shoreline often to protect the immediate shoreline riparian area while allowing for upland development (e.g., designate Natural or Urban Conservancy directly adjacent to the shoreline and designate Shoreline Residential, High-Intensity or Mixed-Use, according to existing development, further landward).

6.0 LIMITATIONS

GeoEngineers has developed this Shoreline Inventory and Biologic Critical Areas Reconnaissance for the City of Entiat in general accordance with the scope and limitations of our proposal dated March 2, 2010. Within the limitations of scope, schedule and budget, our services have been executed in accordance with the generally accepted practices in this area at the time this report was prepared. No warranty or other conditions express or implied should be understood.

This report has been prepared for the exclusive use of the City of Entiat and authorized agents and regulatory agencies following the described methods and information available at the time of the work. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. The information contained herein should not be applied for any purpose or project except the one originally contemplated.

7.0 REFERENCES


Driver, Susan. 2010. Personal communication regarding information shared with the City of Entiat regarding a revised proposal to potentially raise the Rocky Reach dam pool by three feet.


Vicinity and Assessment Area
City of Entiat Shorelands Inventory
Chelan County, Washington

Figure 1

Notes:
1. The locations of all features shown are approximate. 2. This drawing is for information purposes.
   It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc.
   cannot guarantee the accuracy and content of electronic files. The master file is stored by
   GeoEngineers, Inc. and will serve as the official record of this communication. 3. It is unlawful to copy
   or reproduce all or any part thereof, whether for personal use or resale, without permission.
   Data Sources: Streams and Roads, ESRI software, Shaded Relief ESRI.
   State Plane Washington South FIPS 4601 (Feet)
   North American Datum 1983 North arrow oriented to grid north.
Legend

- Photo Points
- City of Entiat

Photographic Inventory
Photopoints

City of Entiat Shorelands Inventory
Chelan County, Washington

Figure 4
APPENDIX A
Photopoint Figures
APPENDIX B
USFS Entiat River Outdoor Learning Center
Conceptual Site Plan