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SHORELINE ANALYSIS REPORT

for Shorelines in the City of Bingen:
Columbia River

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SHORELINE ANALYSIS REPORT

FOR SHORELINES IN THE CITY OF BINGEN

1 INTRODUCTION

1.1 Background & Purpose

The City of Bingen (City) is located in Klickitat County, Washington. In 2013, the City obtained a grant from the Washington State Department of Ecology (Ecology) to complete a comprehensive update of its Shoreline Master Program (SMP), as required by the state legislature. One of the first steps of the SMP update process is for the City to inventory and characterize its “Shorelines of the State,” as defined by Washington’s Shoreline Management Act (Revised Code of Washington [RCW] 90.58).

This Shoreline Analysis Report presents the results of the inventory and characterization of Bingen’s Shoreline of the State. This report was prepared in accordance with the SMP Guidelines (Guidelines) (Washington Administrative Code [WAC] 173-26) and the SMP update scope of work promulgated by Ecology. Under the Guidelines, the City must identify and assemble the most current, applicable, accurate and complete scientific and technical information available.

1.2 Shoreline Jurisdiction

As defined by the Shoreline Management Act, Shorelines of the State include certain waters plus their associated “shorelands.” Waters designated as Shorelines of the State are rivers and streams whose mean annual flow is 20 cubic feet per second or greater; lakes whose area is greater than 20 acres; and marine waters. Shorelands are defined as:

Those lands extending landward for 200 feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward 200 feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of this chapter... Any county or city may determine that portion of a one-hundred-year-floodplain to be included in its master program as long as such portion includes, as a minimum, the floodway and the adjacent land extending landward two hundred feet therefrom... Any city or county may also include in its

master program land necessary for buffers for critical areas (RCW 90.58.030).

The ordinary high water mark is:

That mark that will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation as that condition exists on June 1, 1971, as it may naturally change thereafter, or as it may change thereafter in accordance with permits issued by a local government or the department: PROVIDED, that in any area where the ordinary high water mark cannot be found, the ordinary high water mark adjoining salt water shall be the line of mean higher high tide and the ordinary high water mark adjoining fresh water shall be the line of mean high water (RCW 90.58.030(2)(b)).

In Bingen, the Columbia River qualifies as a Shoreline of the State. A detailed discussion of how shoreline jurisdiction was developed for the City is included in Appendix A.

1.3 Study Area

The study area for this report includes all land within the City's proposed shoreline jurisdiction. In total, the City's proposed shoreline jurisdiction covers 54.8 acres of shorelands situated adjacent to 13,087 linear feet of shoreline. Furthermore, the study area includes relevant discussion of the contributing watershed.

2 CURRENT SHORELINE REGULATORY FRAMEWORK

This chapter reviews the current regulatory framework for development activities along the City's shorelines. During the SMP update, the City will consider local, state, and federal regulations to ensure consistency as appropriate and feasible, with the goal of streamlining the shoreline permitting process.

2.1 City Regulatory Framework

Shoreline development activities are subject to the City's existing SMP, critical areas ordinances, and zoning regulations, as well as other City regulations. The City's existing SMP and critical areas ordinances are discussed below.

The City adopted the 1990 version of the Klickitat County SMP in 1994 (the 1998 version of the Klickitat County SMP was never adopted by the City). The City continues to regulate its shorelines pursuant to this SMP.

Per Growth Management Act requirements, the City is required to designate and protect critical areas. Critical areas, as defined by the Growth Management Act (RCW 36.70A.030(5)), include wetlands, areas with a critical recharging effect on aquifers used for potable water, fish and wildlife habitat conservation areas, frequently flooded areas, and geologically hazardous areas. The City's critical areas ordinances are currently codified in Chapter 15.16 and Chapters 17.65 through 17.67 of the Bingen Municipal Code (BMC). The most recent update to these regulations was in 1997. The City is now seeking to complete an update of its critical areas ordinances in the near future.

The critical areas ordinances—the existing and eventually the updated versions—will continue to apply in the shoreline jurisdiction until the City adopts its updated SMP. Once the City adopts its updated SMP, only the critical areas regulations contained in the SMP will apply in the shoreline jurisdiction.

The critical areas regulations contained in the updated SMP are expected to be similar to those of the updated critical areas ordinances. Because the critical areas ordinances are being updated to include the best available science, minimal changes are expected to be needed to adapt the updated critical areas ordinances for inclusion into the SMP. However, some changes will be required due to technical differences between the Growth Management Act and the Shoreline Management Act.

The City's current critical areas regulations do not include any buffers specific to water features (such as creeks). However, per BMC 17.65.020(C.), where a fish and wildlife habitat area is on or adjacent to a development site, a minimum separation of up to 50 feet may be required for regulated uses. Fish and wildlife habitat areas identified in the Bingen Comprehensive Plan are those fish habitat areas associated with Jewett Creek and the Columbia River and their riparian areas.

For wetlands, the City specifies standard wetland buffers in BMC 17.67.060(A.). These buffers are summarized below in Table 2-1.

Table 2-1. Standard wetland buffers specified by critical areas regulations.

| Wetland Category | Buffer |
|------------------|------------------------------|
| I | High-intensity use: 300 feet |
| | Low-intensity use: 200 feet |
| II | High-intensity use: 200 feet |
| | Low-intensity use: 100 feet |
| III | High-intensity use: 100 feet |
| | Low-intensity use: 50 feet |
| IV | High-intensity use: 50 feet |
| | Low-intensity use: 25 feet |

2.2 State Regulatory Framework

Key components of the state regulatory framework that may be pertinent to development in the City’s shorelines include the Shoreline Management Act, the Hydraulic Code, and Section 401 of the Clean Water Act, Water Quality Certification. Other components that may be relevant include the Growth Management Act, State Environmental Policy Act, Watershed Planning Act, Water Resources Act, Salmon Recovery Act, and case law.

Several state agencies (e.g. Ecology, Washington State Department of Fish and Wildlife, Washington State Department of Natural Resources) are involved in implementing these laws or own shoreline areas. Ecology reviews all shoreline projects that require a shoreline permit, but has specific regulatory authority over shoreline conditional use permits and shoreline variances. The Washington State Department of Natural Resources is charged with protecting and managing the use of state-owned aquatic lands. Projects waterward of the ordinary high water mark require review by this agency to establish whether the project is on state-owned aquatic lands (Washington State Department of Natural Resources recommends that all proponents of a project waterward of the ordinary high water mark contact them to determine jurisdiction and requirements). Other agency reviews of shoreline developments are typically triggered by in- or over-water work, discharges of fill or pollutants into the water, or substantial land clearing. State laws can play an important role in the design and implementation of a shoreline project, ensuring that impacts to shoreline functions and values are avoided, minimized, and/or mitigated.

Summaries of key components of the state regulatory framework follow.

2.2.1 Shoreline Management Act

The Shoreline Management Act promotes planning along shorelines and coordination among governments. The legislative findings of the Shoreline Management Act state:

The legislature finds that the Shorelines of the State are among the most valuable and fragile of its natural resources and that there is great concern throughout the state relating to their utilization, protection, restoration, and preservation. In addition it finds that ever increasing pressures of additional uses are being placed on the shorelines necessitating increased coordination in the management and development of the Shorelines of the State. The legislature further finds that much of the Shorelines of the State and the uplands adjacent thereto are in private ownership; that unrestricted construction on the privately owned or publicly owned Shorelines of the State is not in the best public interest; and therefore, coordinated planning is necessary in order to protect the public interest associated with the Shorelines of the State while, at the same time, recognizing and protecting private property rights consistent with the public interest. There is, therefore, a clear and urgent demand for a planned, rational, and concerted effort, jointly performed by federal, state, and local governments, to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines (RCW 90.58.020).

While protecting shoreline natural resources by regulating development, the Shoreline Management Act also aims to plan for and foster "all reasonable and appropriate uses" (RCW 90.58.020).

The Shoreline Management Act is implemented by locally adopted SMPs. While an SMP must comply with the Guidelines, the Guidelines offer considerable flexibility for a jurisdiction to tailor its SMP to address the specific conditions and needs of the local community.

2.2.2 Hydraulic Code

RCW 77.55, the Hydraulic Code, gives the Washington State Department of Fish and Wildlife the authority to review, condition, and approve or deny "any construction activity that will use, divert, obstruct, or change the bed or flow of state waters." These activities may include stream alteration, culvert installation or replacement, among others. Through a permit called a Hydraulic Project Approval, the Washington State

Department of Fish and Wildlife can condition projects to avoid, minimize, restore, and compensate for adverse impacts.

2.2.3 Clean Water Act – Section 401

Section 401 of the federal Clean Water Act allows states to review, condition, and approve or deny certain federally permitted actions that result in discharges to state waters, including wetlands. In Washington, Ecology is the state agency responsible for administering Section 401. Ecology's primary aim is to ensure that state water quality standards and other aquatic resource protections standards are met. Actions within watercourses or wetlands within the shoreline zone that require a Section 404 permit (see Subsection 2.3.2 below) also need Section 401 Water Quality Certification.

2.3 Federal Regulatory Framework

Key components of the federal regulatory framework that may be pertinent to development in the City's shorelines include the Rivers and Harbors Act, Sections 402 and 404 of the Clean Water Act, and the Endangered Species Act. Other components that may be relevant include the National Environmental Policy Act, Anadromous Fish Conservation Act, Clean Air Act, Coastal Zone Management Act, National Historic Preservation Act, and the Migratory Bird Treaty Act.

A variety of agencies (e.g. U.S. Army Corps of Engineers, National Marine Fisheries Service, U.S. Fish and Wildlife Service) are involved in implementing these laws. Review by these agencies of shoreline development in most cases is triggered by in- or over-water work, or discharges of fill or pollutants into the water. Federal regulations can play an important role in the design and implementation of a shoreline project, ensuring that impacts to shoreline functions and values are avoided, minimized, and/or mitigated.

Summaries of key components of the federal regulatory framework follow.

2.3.1 Rivers & Harbors Act

Section 10 of the Rivers and Harbors Act of 1899 provides the U.S. Army Corps of Engineers with authority to regulate activities that may affect navigation of "navigable" waters. The Columbia River in the Bingen area is designated as a "navigable" water. Proposals to construct new or modify existing over-water structures, to excavate or fill, or to "alter or modify the course, location, condition, or capacity of" navigable waters must be reviewed and approved by the U.S. Army Corps of Engineers.

2.3.2 Clean Water Act – Section 402 & Section 404

Major components of the Clean Water Act include Section 402 and Section 404.

Section 402 of the Clean Water Act required the establishment of the National Pollutant Discharge Elimination System. The National Pollutant Discharge Elimination System is similar to Section 401 (discussed above in Subsection 2.2.3), and applies to ongoing point-source discharge. Examples of discharges requiring National Pollutant Discharge Elimination System permits include municipal stormwater discharge, construction-related stormwater discharge, wastewater treatment effluent, and discharges related to industrial activities. Permits include limits on what can be discharged, monitoring and reporting requirements, and other provisions designed to protect water quality.

Section 404 of the Clean Water Act provides the U.S. Army Corps of Engineers, under the oversight of the Environmental Protection Agency, with the authority to regulate discharge of dredged or fill material into waters of the U.S., including wetlands. The extent of the U.S. Army Corps of Engineers' authority and the definition of fill have been the subject of considerable legal activity. As applicable to the City's shoreline jurisdiction, however, it generally means that the U.S. Army Corps of Engineers must review and approve most activities in water and wetlands. These activities may include wetland fills, in-water and wetland restoration, and culvert installation or replacement, among others. The U.S. Army Corps of Engineers requires projects to avoid, minimize, and compensate for impacts.

2.3.3 Endangered Species Act

Section 9 of the Endangered Species Act prohibits "take" of listed species. Take has been defined in Section 3 as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The take prohibitions of the Endangered Species Act apply to everyone, so any action that results in a take of listed fish or wildlife would be a violation of the Endangered Species Act and is strictly prohibited. Per Section 7 of the Endangered Species Act, activities with potential to affect federally listed or proposed species and that require federal approval, receive federal funding, or occur on federal land must be reviewed by the National Marine Fisheries Service and/or U.S. Fish and Wildlife Service via a process called "consultation." For example, activities requiring a Section 404 permit (see Subsection 2.3.2 above) require such consultation if these activities occur in waters with listed species.

3 ECOSYSTEM CONDITIONS

3.1 Climate

Bingen is located in the transition zone between the relatively moist, marine-influenced climate of western Washington and the semiarid regions east of the Cascade Range. Atmospheric pressure differentials between the region's two climates create near constant winds in the Columbia Gorge (City of Bingen 1997). Bingen receives on average 30 inches of precipitation per year.

3.2 Geology

Bingen is located in the southwest corner of the Columbia Basin physiographic province (Figure 3-1), a vast area in eastern Washington, southwestern Idaho, and northern Oregon. The following description of the province is derived from Lasmanis' *Geology of Washington* (1991).

The province is characterized by incised rivers and streams, extensive plateaus, and anticlinal ridges rising to 4,000 feet above sea level. The Columbia Basin province is best defined by the areal extent of the Miocene Columbia River Basalt Group rocks. Data about what lies under the basalts are sparse. In the western portion of the Columbia Basin, the flows of the Columbia River Basalt Group have been folded into a series of giant anticlines that strike east-west to southeast-northwest. This region is called the Yakima Fold Belt subprovince. The anticlines have steep dips north of the fold axis and overturned beds in numerous locations. The south flanks of the anticlines have gentle dips. Folding was initiated during middle to late Miocene time and has continued to this day.

During the Pleistocene, the Cascade Range began to uplift with the eruption of hundreds of volcanoes. As the mountains rose, the Columbia River carved out a deep gorge.

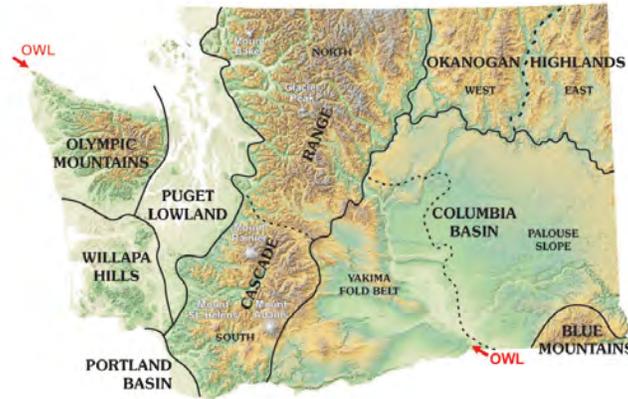


Figure 3-1. Physiographic provinces of Washington, including the Columbia Basin.

3.3 Geography, Topography & Drainage Patterns

Bingen is located in the White Salmon subbasin (WRIA 29b) of the Wind-White Salmon Water Resource Inventory Area (WRIA 29). Within the City, Jewett Creek and Dry Creek drain to the Columbia River. Jewett Creek is a small creek that runs south through the western half of Bingen. Dry Creek is an intermittent stream that flows through the City into Jewett Creek just north of the railroad tracks. The lower portion of Dry Creek is directed through a flume or pipe. Both streams flow through roughly 250 yards of pipe located under the SDS Lumber Company's mill site before entering the Columbia River.

The Columbia River is the largest river in the Pacific Northwest, and the fourth largest river in the U.S. by volume. The Columbia River watershed originates in Canada, and the drainage area of over 258,000 square miles includes areas of Washington, Oregon, Montana, Idaho, Wyoming, and Nevada. The hydrology of the Columbia River basin reflects the interaction of topography, geology, and climate. Most of the drainage of the Columbia River falls as snow in the Rocky Mountains and Cascade Range. Annual peak discharges occur in the spring (April to June) and generally result from snowmelt in the interior subbasin. Historically, flood flows peaked at 1.2 million cubic feet per second (Simenstad et al. 2011). Today, as a result of dam regulation, discharges at the mouth of the river range from 100,000 to 500,000 cubic feet per second (Neal 1972, Marriott et al. 2002).

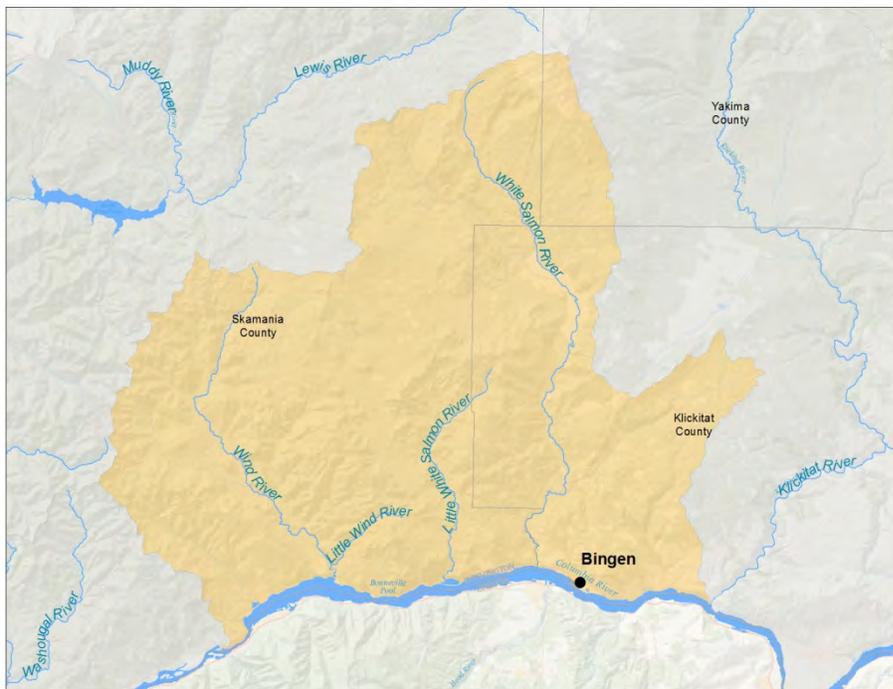


Figure 3-2. Wind-White Salmon Water Resource Inventory Area.

3.4 Key Species & Habitats

In the Bingen area, the mainstem Columbia River provides habitat for over 37 fish species in 13 families. Eight Endangered Species Act-listed salmonids migrate, or were known to migrate historically, through the middle Columbia River (Klickitat Lead Entity 2012). These species include:

- Snake River fall Chinook salmon
- Snake River spring/summer Chinook salmon
- Snake River sockeye salmon
- Snake River steelhead
- Upper Columbia River steelhead
- Upper Columbia River spring Chinook salmon
- Middle Columbia River steelhead
- Columbia River chum salmon

Coho salmon, cutthroat trout, rainbow trout, and steelhead occurrence is documented in Jewett Creek. The National Marine Fisheries Service's *ESA Salmon Recovery Plan for the White Salmon River Watershed* (2013) indicates that the gradient of the creek becomes impassable at the bluffs, so the entire portion of Jewett Creek accessible to anadromous fish is within City limits. No fish use is reported for Dry Creek.

Much of the floodplain in Bingen has been developed and little wetland is mapped in shoreline jurisdiction. Wetlands, along with riparian habitats and floodplains, provide a broad range of critical functions for water quality and habitat. Water quality functions include filtration of nutrients, bacteria, sediment, and other contaminants (Naiman and Decamps 1997, Mayer et al. 2007). Functions important to fish and wildlife habitats include microclimate regulation, invertebrate and detrital food sources for juvenile fish, shaded cover, and woody debris recruitment (Naiman and Decamps 1997). Floodplain habitats act as an extension of riparian areas. Floodplains often include off-channel rearing habitats and wetlands, and they provide pulses of organic detritus and insect prey following flood events.

Protection of salmonid habitat must include consideration of the condition and extent of water-related resources as well as upland processes that influence aquatic habitat (Knight 2009). Land cover has a significant effect on water flow through a watershed. A loss of forested vegetation cover associated with development is correlated with increased high flows, increased variability in daily streamflow, reduced groundwater recharge, and reduced summer low flow conditions (Burgess et al. 1998, Jones 2000, Cuo et al. 2009). Changes in hydrology related to development are generally associated with soil compaction, draining, and ditching across the landscape, increased impervious surface cover, and decreased forest cover (Moore and Wondzell 2005).

Table 3-1 lists priority habitat and species associated with the City’s shoreline area. Maps 11 and 12 in Appendix B shows the location of these species and habitats.

Table 3-1. Priority habitats and species within the shoreline areas of Bingen.
(Source: Washington State Department of Fish and Wildlife, 2014)

| Category | Species/Habitats | State Status | Federal Status |
|-----------------|--------------------------|--------------|--|
| Fish | Bull Trout/Dolly Varden | Candidate | Threatened |
| | Chinook Salmon | Candidate | Threatened (Upper Columbia Spring run is Endangered) |
| | Chum Salmon | Candidate | Threatened |
| | Coho Salmon | | Threatened – Lower Columbia |
| | Cutthroat | -- | -- |
| | Pink Salmon | -- | -- |
| | Sockeye Salmon | Candidate | Endangered – Snake River |
| | Steelhead | Candidate | Threatened |
| Birds | Waterfowl Concentrations | -- | -- |
| Wetlands | Palustrine Wetland | -- | -- |

3.5 Land Use & Current Shoreline Condition

Human influences have resulted in substantial changes to the shoreline of the Columbia River. Dam operations have reduced the frequency of spring freshets, which historically helped maintain floodplain habitat connectivity and aided the migration of juvenile salmon. Today, over-bank flows and associated large woody debris recruitment and sediment transport processes have been substantially reduced.

Bingen was platted in 1892 by Theodore Suksdorf and named after Bingen-on-the-Rhine, Germany. The town was incorporated in 1924 (Becker 2006). Figure 3-3 shows Bingen Point as it existed before the creation of the Bonneville Pool. With the construction of the Bonneville Dam in 1937, large portions of Bingen's waterfront property were submerged and Bingen Lake was inundated by the Columbia River. A series of dikes were constructed to isolate Bingen Lake from the river and form the western edge of Bingen Harbor. The Port of Klickitat dredged the harbor and used the fill to raise the elevation in the area that was to become Marina Park. Fill material from construction at Bonneville Dam in 1992 was used to fill the area west of Bingen Harbor and east of Bingen Lake (Port of Klickitat 2013).



Figure 3-3. The Bingen Point area (prior to 1937) before the creation of the Bonneville Pool. State Route 14 and the BNSF rail line are shown running from the lower left toward the upper right of the photograph. A relatively small Bingen Lake is shown draining into a winding channel that would later be opened to the Columbia River, creating the entrance to Bingen Harbor.
(Source: Port of Klickitat, 2013)

The Port of Klickitat began development at the present-day Bingen Point Business Park in the mid-1980s (Figure 3-4). The Port has 52 acres at Bingen Point available for light industrial and commercial uses (Gann 2010).



Figure 3-4. Bingen Point Business Park and Bingen Harbor, 2007.
(Source: Ecology)

Today, the predominant land use along Bingen’s shoreline is associated with SDS Lumber Company, one of the largest employers in Klickitat County (Figure 3-5). The facility is an integrated lumber mill that receives logs for processing into lumber, plywood and wood chips. It occupies approximately 180 acres of land on a terrace adjacent to the Columbia River. Operations include docks for mooring and loading barges, log rafting and storage, and a water intake pump house and condenser outfall. The facility discharges to the Columbia River.



Figure 3-5. City of Bingen and SDS Lumber Company, 2007.
 (Source: Ecology)

Underwood Fruit and Insitu are also important area employers (“City of Bingen, home page” 2014). Insitu, a Boeing subsidiary that designs and fabricates unmanned aircraft, recently opened a new facility on Port of Klickitat property. This facility is expected to employ around 180 workers.

According to the Washington State Office of Financial Management’s most recent estimate, in April 2014 Bingen had a population of 730. Decennial census population figures for Bingen since its incorporation are shown in Table 3-2. In the most recent two decades, the City on average added between three and four persons per year.

Table 3-2. City of Bingen population by year.
 (Source: U.S. Decennial Census)

| Year | Population |
|------|------------|
| 2010 | 712 |
| 2000 | 672 |
| 1990 | 645 |
| 1980 | 679 |
| 1970 | 671 |
| 1960 | 636 |
| 1950 | 736 |
| 1940 | 600 |
| 1930 | 365 |

4 SHORELINE INVENTORY & ANALYSIS

This chapter discusses the inventory and analysis of Bingen’s shorelines, and consists of two sections. Section 4.1, *Shoreline Inventory and Analysis Methodology*, reviews why and how the inventory and analysis was conducted. Section 4.2, *Shoreline Inventory and Analysis Results*, presents the results of the inventory and analysis.

4.1 Shoreline Inventory & Analysis Methodology

4.1.1 Inventory

The shoreline inventory is intended to document the existing conditions in the City’s shorelines. At a minimum, local jurisdictions must gather the inventory elements listed in the Guidelines (at WAC 173-26-201(3)(c)), to the extent that information is relevant and readily available.

Information collected for Bingen’s shoreline inventory principally included watershed and other basin documents, regional studies, scientific literature, aerial photographs, and geographic information systems data from a variety of providers.

Table 4-1 lists relevant inventory elements for which spatial data were available. The table also describes the spatial information gathered for each of the required inventory elements, and identifies data limitations and assumptions. Map figures provided in the Inventory Mapfolio (Appendix B) depict the various inventory elements listed in the table.

Table 4-1. Shoreline inventory elements and information.

| Inventory Element | Information Gathered, Map | Data Source | Limitations/Assumptions |
|-----------------------|----------------------------|---|--|
| Critical areas | 100-year floodplain, Map 1 | Federal Emergency Management Agency, 1998 | <ul style="list-style-type: none"> Floodplain based on federal models, and may contain some inaccuracies |
| | Wetland, Map 7 | National Wetland Inventory, 2013 | <ul style="list-style-type: none"> Useful for broad-scale assessment of potential wetlands Based on interpretation of multi-spectral imagery Many wetlands are not identified by mapping; mapped wetlands may not meet wetland criteria Not to be used in place of site-specific studies |

| Inventory Element | Information Gathered, Map | Data Source | Limitations/Assumptions |
|-----------------------------|--|---|---|
| Geology | Geologic hazards, Map 10 | Washington State Department of Natural Resources, 2010 | <ul style="list-style-type: none"> • Requires site-specific review to verify presence/absence of geologic hazards |
| | Soils, Map 9 | U.S. Department of Agriculture's Natural Resources Conservation Service; ArcGIS Map Service | <ul style="list-style-type: none"> • Useful for broad-scale natural resource planning and management • Not to be used in place of site-specific studies |
| | Surficial geology, Map 8 | Washington State Department of Natural Resources, 2010 | <ul style="list-style-type: none"> • Based on broad-scale geologic classifications • Useful for broad-scale assessment of geologic conditions • Not to be used in place of site-specific studies |
| Habitats and species | Washington State Department of Fish and Wildlife priority habitats & species regions, Map 11 | Washington State Department of Fish and Wildlife, 2014 | <ul style="list-style-type: none"> • Washington State Department of Fish and Wildlife maps do not capture every priority species location or habitat, particularly for rare species or species that use shoreline habitats seasonally or intermittently • Absence of mapping information does not indicate absence of a particular species • The number of documented species may reflect the relative amount of past survey efforts |
| | Priority habitats and species occurrence, Map 12 | | |
| Land cover | Percent impervious, Map 5 | National Land Cover Database, 2011 | <ul style="list-style-type: none"> • Based on interpretation of multispectral imagery at 30 by 30 meter cell resolution • Useful for broad-scale assessment, not useful for accurate characterization of fine-scale data (e.g. parcel level, species composition) • May overestimate or underestimate coverage when type of coverage within cells is mixed • 2011 data may not accurately reflect current conditions |
| | Land cover classification, Map 6 | | |

| Inventory Element | Information Gathered, Map | Data Source | Limitations/Assumptions |
|-------------------------------------|---|---|---|
| Land use patterns | Current land use, Map 2 | Klickitat County, 2014 | <ul style="list-style-type: none"> Land use classification derived from Klickitat County parcel data and assessor land use codes and descriptions Gross-scale characterization (e.g. residential, trade and services) Useful in assessing existing intensity and type of development at broad-scale planning level Land use data may not be updated as frequently as other property information |
| | Ownership type, Map 3 | Klickitat County; The Watershed Company, 2014 | <ul style="list-style-type: none"> For parcels that intersect proposed shoreline jurisdiction only |
| Public Access and Recreation | Park, Map 4 | The Watershed Company, 2014 | |
| | Boat launch, Map 4 | Washington State Recreation and Conservation Office, 2011 | <ul style="list-style-type: none"> Data compilation includes Washington State Recreation and Conservation Office and Washington State Department of Fish and Wildlife boating data |
| Shoreline Modifications | Overwater structures, Map 13 | Washington State Department of Natural Resources, 2007 | <ul style="list-style-type: none"> Structures digitized from one meter resolution color orthophotos taken between 2002 to 2006 by either the Washington State Department of Natural Resources or the U.S. Department of Agriculture National Agricultural Imagery Program |
| | Levee, Map 13 | Ecology, 2010 | <ul style="list-style-type: none"> Statewide dataset |
| Water Quality | Water quality assessment categories, Map 14 | Ecology, 2012 | <ul style="list-style-type: none"> Washington State's 2012 Water Quality Assessment |
| Facilities | Ecology regulated facilities, Map 14 | Ecology | <ul style="list-style-type: none"> Data derived from Ecology's Facility/Site Database and reflect locations regulated by different agency programs |
| Infrastructure | Transportation, Map 15 | Klickitat County | |
| | Utilities, Map 15 | Klickitat Public Utility District | |

| Inventory Element | Information Gathered, Map | Data Source | Limitations/Assumptions |
|----------------------|---|---|---|
| Surface water | Other stream, All maps | National Hydrography Dataset, 2012 | <ul style="list-style-type: none"> • Small, intermittent or ephemeral streams may not be identified |
| | Other stream – flume or piped segment, all maps | The Watershed Company, 2014 | <ul style="list-style-type: none"> • Approximate location of lower Dry Creek |
| | SMP shoreline, all maps | National Hydrography Dataset, 2012; The Watershed Company, 2014 | <ul style="list-style-type: none"> • Only identifies waters that may be subject to the Shoreline Management Act • Feature ordinary high water marks are derived from heads-up digitization based on 2009 National Agricultural Imagery Program aerial with reference to the 2012 National Hydrography Dataset Major Areas dataset |

4.1.2 Inventory Data Gaps

Table 4-2 identifies notable data gaps in the shoreline inventory. While the data identified in the table would be beneficial, a substantial quantity of information about Bingen’s shorelines was available to aid in the development of this report.

Table 4-2. Inventory data gaps.

| Data Gap | Comment |
|--------------------------------|--|
| Channel migration zone | Channel migration zone data was not available. The 100-year floodplain may be used as a proxy for the channel migration zone except where areas are separated from the channel by a legally existing artificial structure. |
| Shoreline stabilization | Citywide data were not available for shoreline stabilization, such as riprap. To address this data gap, a visual assessment of shoreline stabilization using aerial photography was incorporated into the analysis of ecological functions. However, visual assessment may underestimate the extent of armoring. |

4.1.3 Reach Delineation

For purposes of the shoreline inventory and analysis, the City’s shoreline was broken down into two segments or “reaches.” One reach covers the Columbia River shoreline; the other reach covers the shoreline of Bingen Harbor (see Figure 4-1).



Figure 4-1. Shoreline reaches.

4.1.4 Analysis of Ecological Functions

Building upon the more quantitative inventory information, the more qualitative analysis of ecological functions was structured according to the four major function categories identified in the Guidelines: hydrologic, hyporheic, shoreline vegetation, and habitat. These four primary functional categories were further broken down into relevant functions identified in WAC 173-26-201(3)(d)(i). Table 4-3 outlines the ecological functions that apply to the City's proposed shoreline jurisdiction.

Table 4-3. Framework for analysis of shoreline ecological functions.

| | |
|----------------------------------|--|
| Hydrologic Functions | Transport and/or storage of water and sediment |
| | Energy attenuation ¹ |
| | Development of pools, riffles, and gravel bars |
| | Recruitment and transport of large woody debris and organic material |
| | Removal through wetland filtration of excess nutrients and toxic compounds |
| Vegetative Functions | Temperature regulation |
| | Provision of large woody debris and other organic matter ² |
| | Filtering excess nutrients, fine sediment, and toxic substances |
| | Bank stabilization |
| Habitat Functions | Physical space and conditions for life history |
| | Food production and delivery |
| Hyporheic Functions ³ | Water and sediment storage, cool water refugia and maintenance of base flows |
| | Support of vegetation |

¹ Vegetated uplands help to desynchronize flooding impacts downstream. Broad, vegetated floodplain wetlands help slow and disperse flood flows. Vegetative root structure stabilizes shoreline soils and limits excessive erosion.

² Riparian forested vegetation provides a source of large woody debris recruitment, and provides organic matter in the form of leaves, branches, and terrestrial insects.

³ The hyporheic zone is an area beneath and parallel to a surface water source/body, such as a river, stream, or lake, comprised of the sediments in which shallow groundwater and surface water mix and flow. The flow in this zone is an important factor in surface and groundwater interchanges, affecting things like fish spawning, pollutant concentrations, and water purification processes.

4.1.5 Analysis of Land Use

A requirement of the Guidelines is an analysis of shoreline use (WAC 173-26-201(3)(d)(ii)). A major reason for this is to ensure uses consistent with WAC 173-26-201(2)(d), which states that local governments, when determining allowable uses and resolving use conflicts within shoreline jurisdiction, must apply, in order, the following preferences and priorities:

1. Reserve appropriate areas for protecting and restoring ecological functions to control pollution and prevent damage to the natural environment and public health. In reserving areas, local governments should consider areas that are ecologically intact from the uplands through the aquatic zone of the area, aquatic areas that adjoin permanently protected uplands, and tidelands in public ownership. Local governments should ensure that these areas are reserved consistent with constitutional limits.
2. Reserve shoreline areas for water-dependent and associated water-related uses. Harbor areas, established pursuant to Article XV of the state constitution, and other areas that have reasonable commercial navigational accessibility and

necessary support facilities, such as transportation and utilities, should be reserved for water-dependent and water-related uses that are associated with commercial navigation unless the local governments can demonstrate that adequate shoreline is reserved for future water-dependent and water-related uses and unless protection of the existing natural resource values of such areas preclude such uses. Local governments may prepare master program provisions to allow mixed-use developments that include and support water-dependent uses and address specific conditions that affect water-dependent uses.

3. Reserve shoreline areas for other water-related and water-enjoyment uses that are compatible with ecological protection and restoration objectives.
4. Locate single-family residential uses where they are appropriate and can be developed without significant impact to ecological functions or displacement of water-dependent uses.
5. Limit nonwater-oriented uses to those locations where the above described uses are inappropriate or where nonwater-oriented uses demonstrably contribute to the objectives of the Shoreline Management Act.

In preparing the analysis of land use, the following factors were considered:

- Existing land use
- Future land use
- Land ownership
- Water-oriented uses
- Public access locations
- Historical or archaeological sites
- Use conflicts

4.2 Shoreline Inventory & Analysis Results

4.2.1 Inventory

Table 4-4 provides an at-a-glance summary of select inventory information described in Table 4-1. The inventory information is organized according to the reaches described in Subsection 4.1.3, Reach Delineation.

Table 4-4. Summary of shoreline inventory, by reach.

| Reach Characteristic | Columbia River Reach | Bingen Harbor Reach |
|--------------------------|---|---|
| Area, length | 51.1 acres 11,864 feet | 3.7 acres 1,223 feet |
| Land Use Patterns | <p><i>Current Land Use</i></p> <ul style="list-style-type: none"> • Manufacturing: 50.5 acres / 99% <p><i>Shoreline Ownership</i></p> <ul style="list-style-type: none"> • SDS Company LLC: 50.0 acres / 98% • Klickitat County Port District 1: 0.7 acre / 1% • Private – Others: <1 acre / 1% | <p><i>Current Land Use</i></p> <ul style="list-style-type: none"> • Manufacturing: 3.7 AC / 100% <p><i>Shoreline Ownership</i></p> <ul style="list-style-type: none"> • SDS Company LLC: 3.7 acres / 100% |
| Land Cover | <p><i>Impervious Surfaces</i></p> <ul style="list-style-type: none"> • Developed, Open Space: 1.5 acres / 3% • Developed, Low Intensity: 11.2 acres / 25% • Developed, Medium Intensity: 10.0 acres / 22% • Developed, High Intensity: <1 acre / 2% <p><i>Vegetation</i></p> <ul style="list-style-type: none"> • Herbaceous: 18.6 acres / 42% • Emergent Herbaceous Wetland: 2.1 acres / 5% • Barren Land: <1 acre / 0% | <p><i>Impervious Surfaces</i></p> <ul style="list-style-type: none"> • Developed, Low Intensity: 1.5 acres / 40% • Developed, Medium Intensity: 2.1 acres / 56% <p><i>Vegetation</i></p> <ul style="list-style-type: none"> • Emergent Herbaceous Wetland: <1 acre / 4% |
| Critical Areas | <p><i>Critical Areas</i></p> <ul style="list-style-type: none"> • Floodplain: 36.0 acres / 70% • Wetlands: 0 acres | <p><i>Critical Areas</i></p> <ul style="list-style-type: none"> • Floodplain: 3.5 acres / 94% • Wetlands: <1 acre / 1% |

4.2.2 Analysis of Ecological Functions

Building upon the inventory information, Table 4-5 presents the results of analysis of ecological functions for the Columbia River Reach and Bingen Harbor Reach.

In brief, the Columbia River Reach covers the shoreline adjacent to the SDS Lumber Company facilities. The property is located on a partially manmade spit and industrial

activities occur throughout the site. Ecological function in the reach is limited due to the hardened shoreline, lack of upland connectivity, and water-dependent industrial uses.

The Bingen Harbor Reach covers the eastern edge of the harbor that is located within City limits. For most of the reach, shoreline jurisdiction does not extend to the ordinary high water mark. The land is owned and operated by the SDS Lumber Company. The Port of Klickitat owns Bingen Harbor and maintains a small marina with boat launch. Only four percent of the reach is identified as undeveloped land.

Table 4-5. Summary of ecological functions, by reach.

| Process | Function | Notes |
|-------------------|--|---|
| Hydrologic | Moderate water and sediment transport | <i>Columbia River Reach</i> Shoreline armoring and dredge and fill material along the extent of the reach minimizes the potential for instream habitat complexity and reflects wave energy. SDS Lumber Company water-dependent facilities, including piers, docks, and barge loading/unloading infrastructure alter instream hydrology. |
| | Attenuate flow energy | |
| | Development and maintenance of complex habitat features | <i>Bingen Harbor Reach</i> Shoreline armoring and impervious surfaces along the reach limit the potential for habitat complexity and other hydrologic functions. |
| Vegetation | Regulate temperature | <i>Columbia River Reach</i> Riparian vegetation is limited to a thin strip adjacent to the bank in places. SDS Lumber Company constructed an infiltration pond/bioswale between the river and the log deck at the western end of the reach to help address runoff from water applied to the logs. Another bioswale occurs along the barge staging and storage area at an overflow discharge point. |
| | Large woody debris and organic matter recruitment | |
| | Filtration of upland inputs | <i>Bingen Harbor Reach</i> The National Wetlands Inventory identifies a small portion of a freshwater emergent wetland within the reach. In general, herbaceous and scrub-shrub riparian vegetation is limited to a thin strip adjacent to the shoreline and is located outside of the waterward boundary of the reach. |
| | Bank stabilization | |
| Habitat | Space and conditions supporting fish and wildlife, including priority habitats and species | <i>Columbia River Reach</i> Industrial uses of the shoreline and water quality issues limit the habitat value of the reach. Fish presumably access Jewett Creek through a 24-inch pipe that discharges into the Columbia River within the reach. Open water at the western end of the reach may provide habitat for waterfowl. <i>Bingen Harbor Reach</i> This reach is almost entirely developed, limiting potential habitat value. |

| | | |
|------------------|---|---|
| Hyporheic | Water storage, cool water refugia, and filtration | <i>Columbia River Reach</i> Armored banks and impervious surfaces limit hyporheic function in the reach. |
| | Support of vegetation | <i>Bingen Harbor Reach</i> Armored banks and impervious surfaces limit hyporheic function in the reach. |

4.2.3 Analysis of Land Use

Land in both reaches is predominantly owned by the SDS Lumber Company and used for the operation of its integrated lumber mill. Multiple water-dependent uses, including barge loading/unloading; log watering and dewatering; log rafting and storage; and water intake and outfall, occur within the Columbia River Reach. The SDS Lumber Company is required by its National Pollutant Discharge Elimination System Industrial Stormwater General Permit to prepare and implement a spill plan to prevent, contain, and control spills or unplanned discharges of oil and petroleum, designated Dangerous Waste or Extremely Hazardous Waste, or other materials which may become pollutants or cause pollution upon reaching state waters (Parametrix 2011).

Bingen’s shoreline appears to be zoned entirely Industrial, and future land use is expected to be consistent with this designation.

No shoreline historical or archaeological sites or public access locations were identified in Bingen’s shoreline jurisdiction. However, Bingen Point Business Park, located just outside the City limits, includes two parks with shoreline access: Sailboard Park and Marina Park. No potential for use conflicts was identified.

5 SHORELINE MANAGEMENT RECOMMENDATIONS

This chapter sets forth recommendations for translating the inventory and analysis information presented in the previous chapters of this report into SMP environment designations, policies, and regulations. In addition to these recommendations, the updated SMP should meet all applicable requirements of the Shoreline Management Act and the Guidelines.

The inventory and analysis information presented in this report will also inform the forthcoming Shoreline Restoration Plan, a required component of the SMP update

process. As directed by WAC 173-26-201(2)(f), the Shoreline Restoration Plan will include “goals, policies and actions for restoration of impaired shoreline ecological functions.”

5.1 Environment Designations

5.1.1 Background

As outlined in the Guidelines (WAC 173-26-191(1)(d)) “shoreline management must address a wide range of physical conditions and development settings along shoreline areas. Effective shoreline management requires that the SMP prescribe different sets of environmental protection measures, allowable use provisions, and development standards for each of these shoreline segments.”

Under the Shoreline Management Act, different shoreline segments are regulated through the assignment of various “environment designations.” Environment designations can be thought of as system of shoreline zoning (though the standard underlying zoning still applies as well). The Guidelines recommend a classification system with six basic environment designations. These six environment designations are: Natural, Rural Conservancy, Aquatic, High-intensity, Urban Conservancy, and Shoreline Residential. However, the Rural Conservancy designation is not intended for cities. Jurisdictions may use these environment designations as applicable, or develop their own unique environment designations (provided they meet certain requirements).

There is substantial flexibility in the development and assignment of environment designations to a shoreline area; however, the Guidelines (WAC 173-26-211(2)(a)) direct that the development and assignment of environment designations be based on “existing use pattern, the biological and physical character of the shoreline, and the goals and aspirations of the community as expressed through comprehensive plans...”

5.1.2 Recommendations

The following recommendations are provided for the development and assignment of environment designations for Bingen’s shorelines:

- Use the classification system recommended in the Guidelines when assigning environment designations.
- Based on the findings of this report, a High-intensity designation appears appropriate for Bingen’s shorelines.

5.2 Policies & Regulations

Policies and regulations form the core of the SMP. The Guidelines address policies and regulations for three distinct topic areas: General Master Program Provisions (WAC 173-26-221), Shoreline Modifications (WAC 173-26-231), and Shoreline Uses (WAC 173-26-241). The following subsections discuss policy and regulation recommendations for each of these topic areas in turn.

5.2.1 General Provisions

Archaeological & Historic Resources

- Based on the contents of this report and local conditions, no recommendations are set forth beyond the guidance or requirements specified by the Guidelines.

Critical Areas

- The City's critical areas ordinance is currently being updated. Incorporate the updated critical areas ordinance into the SMP. Consider whether the updated critical areas ordinance should be incorporated into the SMP by direct inclusion, as an appendix, or by reference. Either of the first two methods is recommended. Adopting critical areas protections by reference would require that future changes to the City-wide critical areas ordinance be formally approved by Ecology as an SMP amendment.

Flood Hazard Reduction

- Based on the contents of this report and local conditions, no recommendations are set forth beyond the guidance or requirements specified by the Guidelines.

Public Access

- Based on the contents of this report and local conditions, no recommendations are set forth beyond the guidance or requirements specified by the Guidelines. Opportunities for physical public access are limited in Bingen given the industrial land use along the Columbia.

Shoreline Vegetation Conservation

- Based on the contents of this report and local conditions, no recommendations are set forth beyond the guidance or requirements specified by the Guidelines.

Water Quality, Stormwater & Nonpoint Pollution

- Based on the contents of this report and local conditions, no recommendations are set forth beyond the guidance or requirements specified by the Guidelines.

5.2.2 Shoreline Modification Provisions

Shoreline Stabilization

- Consider requiring a shoreline conditional use permit for any new hard shoreline stabilization.

Piers & Docks

- Regulations for piers and docks should be developed to provide applicants with as much predictability as possible, while still allowing for an appropriate amount of flexibility based on site-specific conditions and use specific needs.

Fill

- Based on the contents of this report and local conditions, no recommendations are set forth beyond the guidance or requirements specified by the Guidelines.

Breakwaters, Jetties, Groins & Weirs

- Consider prohibiting new breakwaters, jetties, groins, or weirs in the SMP, except where they are essential to restoration or maintenance of existing water-dependent uses.

Dredging & Dredge Material Disposal

- Establish provisions to allow for continued dredging while addressing long-term ecological issues.

Shoreline Habitat & Natural Systems Enhancement Projects

- Based on the contents of this report and local conditions, no recommendations are set forth beyond the guidance or requirements specified by the Guidelines.

5.2.3 Shoreline Use Provisions

Agriculture

- Based on the contents of this report and local conditions, no recommendations are set forth beyond the guidance or requirements specified by the Guidelines.

Aquaculture

- Based on the contents of this report and local conditions, consider requiring a conditional use permit for aquaculture.

Boating Facilities

- These provisions are geared towards public marinas and boat launches. Based on the contents of this report and local conditions, consider prohibiting boating facilities.

Commercial Development

- Commercial development is not currently planned or anticipated in Bingen's shoreline jurisdiction; consider prohibiting it or requiring a shoreline conditional use permit.

Forest Practices

- Per the Guidelines, the City's SMP should rely on the Forest Practices Act and its implementing rules, as well as the *Forest and Fish Report* for adequate management of commercial forest uses within shoreline jurisdiction.

Industry

- The SMP should recognize that the Shoreline Management Act indicates that shoreline alterations shall be given priority for industrial developments that are particularly dependent on their location on or use of the Shorelines of the State.
- Incorporate clear dimensional criteria for industrial development, such as setbacks/buffers.

In-stream Structural Uses

- Based on the contents of this report and local conditions, no recommendations are set forth beyond the guidance or requirements specified by the Guidelines.

Mining

- Mining is not currently present, planned or anticipated in Bingen's shoreline jurisdiction. Based on the contents of this report and local conditions, consider prohibiting mining in shoreline jurisdiction.

Recreational Development

- Based on the contents of this report and local conditions, no recommendations are set forth beyond the guidance or requirements specified by the Guidelines.

Residential Development

- Residential development is not currently present, planned or anticipated in Bingen's shoreline jurisdiction. Consider prohibiting residential development in shoreline jurisdiction.

Transportation & Parking

- Allow for maintenance and improvements to existing roads, parking areas, or other transportation facilities.

Utilities

- Allow for maintenance and improvements to existing utility facilities.

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