

APPENDIX A

SHORELINE INVENTORY, CHARACTERIZATION, AND CUMULATIVE IMPACTS REPORT

I. INTRODUCTION

The Skagit River drains an area of 3,140 square miles and flows for 162 miles from its headwaters in the Cascade Mountains, through low-lying valleys, and finally through the broad Skagit Delta to Puget Sound. The Skagit River is the largest in the Puget Sound basin and possesses the most abundant and diverse populations of salmon, steelhead trout, and bull trout in the region. It is the sixth largest drainage on the west coast of the continental United States.

A. EXTENT OF CITY SHORELINES

Mount Vernon's shorelines regulated by the Shoreline Master Program (SMP) are limited to those portions of the Skagit River "Big Bend Reach" that occur within the City's corporate limits. This encompasses approximately seven miles of the river's shoreline. Shoreline regulatory jurisdiction within Mount Vernon varies in width as shown in Figure A-1 dependent upon the proximity of wetlands within and adjacent to the Shoreline Management Act-mandated 200-foot jurisdiction area and flood-prone areas between the ordinary high water mark (OHWM) and topographic or manmade features that mark the landward edges of the 100-year floodplain.

Mount Vernon and the Skagit River are located on a large alluvial plain that was created by geological forces including glacial advance and retreat, hydrology, and periodic vulcanization. As such, the portions of the Skagit River within the City's jurisdiction are adjacent to floodplains. A comprehensive summary of flooding and flood history in the Mount Vernon area is provided on pages 9 through 13 of the Skagit River Big Bend Reach Habitat Restoration Feasibility Study, December 2004, prepared by the Skagit River System Cooperative. [Note: Information on current FEMA floodplain mapping is available from the Mount Vernon Community and Economic Development Department]

B. SCIENTIFIC AND TECHNICAL INFORMATION

In preparing the SMP, the City identified and assembled the most current, accurate, and complete scientific and technical information available. Information was collected from a variety of sources including City plans and studies, Skagit River watershed plans and studies from the Washington Department of Ecology and local planning groups, Dike Districts, private plans, and aerial photographs. Prior to incorporation into the shoreline inventory, the context, scope, magnitude, significance, and potential limitations of the information was considered. For a complete list of resources, see Appendix D of the SMP.

During the public participation process, additional information was provided by property owners and the several Dike Districts having jurisdiction over shorelines within Mount Vernon (Dike Districts 1, 3, and 17).

Due to the amount of information available, the consistency of the data, and the contained nature of the shorelines within the City, it is assumed that the SMP provisions are based on analyses of accurate information that can be readily verified on a case-by-case basis at the time a land use action is proposed.



Figure A-1
Mount Vernon Shoreline Jurisdiction

II. SHORELINE MASTER PROGRAM INFORMATION SOURCES

This Shoreline Master Program relies substantially on existing information that has been developed since the year 2000. Following is a list of the primary sources used in this Report. A complete list of the resources used in the SMP, with a description of the information provided, is provided in Appendix D.

- River Basin Analysis of the Skagit and Samish Basins: Tools for Salmon Habitat Restoration and Protection, February 2000
- Skagit River Shoreline Inventory & Restoration Plan, June 2003
- Edgewater Park Restoration Project – Phase I, September 2003
- Skagit River Big Bend Reach Habitat Restoration Feasibility Study, December 2004
- Mount Vernon Downtown Flood Protection Alternatives, Draft EIS, January 2007
- Final EIS: Mount Vernon Downtown Flood Protection Alternatives, July 2007
- Mount Vernon Downtown Flood Protection Biological Assessment, December 2007
- Downtown and Waterfront Master Plan, July 15, 2008
- City of Mount Vernon 2005 Comprehensive Plan (as amended)
- City of Mount Vernon 2008 Parks, Recreation & Open Space Plan
- Aerial Photographs, 2003, 2007, and 2009

There has been little change in the conditions of the Skagit River shoreline or in the level of development and land use mix in adjacent upland areas during the time these sources of information were being developed. This has been confirmed by a comparative review of the aerial photographs and discussions with staff and consultants familiar with the City's development. As a result, the assumption in this SMP is that these information sources remain valid for shoreline planning purposes.

In addition, the Big Bend Reach of the Skagit River has undergone extensive environmental study over the last decade by both public and private organizations, assessing existing conditions, restoration potential, and impacts from known plans and projects. At this time, there are no identified information gaps that would affect the development of SMP goals, policies, and regulations. Site specific information would be provided during the normal permitting of individual projects.

III. SHORELINE INVENTORY SUMMARY

The City's Skagit River shoreline has been divided into four geographic units for purposes of the shoreline inventory and characterization of conditions. The units represent locations where landscape processes, land use, river function, and habitat exhibit more or less similar attributes. These units are generally based on the six inventory areas defined in the 2003 Skagit River Shoreline Inventory & Restoration Plan (Inventory), prepared by Graham Bunting & Associates. Adjustments have been made in the width of the units of the inventory to include adjacent upland areas. While not necessarily part of the City's Shoreline Management Zone (SMZ), activities on adjacent uplands have potential for affecting shoreline conditions and functions.

Most of the information summarized below is from the Inventory. The Inventory was organized around three groups of categories: physical, biological, and man-made. Environmental baselines were determined for each category in each inventory unit. These, in turn, are based on an assessment of individual features that either provide or impact ecological functions within those categories. Individual features are discussed further in the Characterization of Ecological Functions section of this SMP.

What follows is a descriptive summary of the physical conditions found on and adjacent to the City's shorelines organized by inventory unit.

A. INVENTORY UNIT #1:

Location: East bank of the Skagit River from river mile (RM) 18 downstream to RM 16.25, from Mount Vernon's northerly limit south to the east edge of the railroad right-of-way at the railroad bridge. Included is the adjacent floodplain and upland between the river and Hoag Road. [Figure A-2]

Description: This is the most significant section of the Skagit River shoreline within Mount Vernon where there is a direct connection between the river and adjacent floodplain (see also discussion of Lions Park North in Unit #4, below). There is a relatively intact band of trees and riparian vegetation at the shoreline that extends the entire length of this reach, widening at the north end, to form a significant stand of floodplain forest at the area known as Ten Dollar Bar. Several existing wetlands are located at the south end of this unit. Historically, this area had a more extensive complex of wetlands and back channels providing freshwater fish habitat. Lindegren Creek enters the Skagit at the south end of this inventory unit.

There has been little development within this unit. At the south end, immediately east of the railroad bridge between Hoag Road and the river, there are several single-family homes. Historic uses within the floodplain have been primarily agriculture and the seasonal flooding has discouraged conversion to other types of land uses. As a result, less than 5 percent of this unit is encumbered with impervious surfaces. There is an approximately 1,900 foot long segment of levee between the shoreline and Hoag Road.

The majority of the properties in this unit have been purchased by Nookachamps LLC, which has established a wetland mitigation bank (the Nookachamps Wetland Mitigation Bank) and is implementing a restoration plan at the site. This is discussed in more detail in the Appendix B of the SMP, "Shoreline Restoration Planning."

B. INVENTORY UNIT #2:

Location: Along the south bank of the river from RM 16.24 to RM 15.25, starting at the west edge of the railroad right-of-way at the railroad bridge and proceeding downstream to approximately 1,200 feet west of the Interstate 5 bridge. The inventory area includes the properties between the shoreline and Stewart/Hoag Road. [Figure A-2]



Figure A-2
Inventory Units 1 and 2

Description: The bank of the Skagit River within Inventory Unit #2 is armored with riprap its entire length. A levee that prevents direct connection to the historic floodplain is located immediately adjacent to the shoreline. There are no tributaries or wetlands that connect to the river within this unit and no intact riparian vegetation.

The land between the levee and Stewart/Hoag Road has historically been an area of development. Ownership is private, Dike District, and City. There are three river crossings: at the railroad, at Riverside Drive, and at Interstate 5. Between the railroad and Riverside Drive, development consists primarily of single-family structures on large lots. There are, however, undeveloped lots between the developed parcels.

West of Riverside Drive, the City owns a large parcel of land that is used for stormwater control, a storage garage, and has paved surfaces for parking and access. West of I-5 to the City limit, development consists of an existing recreational vehicle park and a commercial establishment, which is surrounded by parking. Impervious surfaces within this unit currently account for approximately 50 percent of the land area.

C. INVENTORY UNIT #3:

Location: West bank of the river from approximately RM 12 to RM 10.5, starting at the City boundary at Dunbar Road and proceeding downstream past the Division Street bridge to the westerly City boundary at Edgewater Park. [Figure A-3]

Description: This unit contains a natural shoreline area known as Young's Bar, which is privately-owned land, and the City's Edgewater Park. The levee in this unit has been set back from the shoreline from 150 feet at the north end of the unit to approximately 1,000 feet at the south end of Edgewater Park at the City's west boundary. The levee setback in the vicinity of the Division Street Bridge ranges from 300 to 400 feet. During high flows, connectivity to the floodplain is restricted to the area waterward of the levee. There are no tributaries entering the river in this unit.

This unit offers a variety of habitats. There is large woody debris (LWD) at the upstream end of the unit adjacent to Young's Bar and accumulations of it south of the Division Street Bridge along the Edgewater Park shoreline. A large stand of trees is located at the north end of the unit and a well-established riparian zone extends south into Edgewater Park just north of the bridge. Approximately 800 feet south of the bridge another riparian zone begins that extends to the south end of the park and west beyond the City limits into the adjacent Goodrich Bar. A floodplain forest exists between the levee and the shoreline on Goodrich Bar and the southern portion of Edgewater Park.

A significant amount of the development in West Mount Vernon occurs immediately adjacent to and landward of the levees on either side of West Division Street. Land uses are retail and other commercial establishments along West Division Street, with residential uses located north and south of the commercial core.

Recreational use within this unit consists of both active and passive activities associated with Young's Bar and the Park. Young's Bar is an extensive sand bar located just north of the park along the shoreline. Although this is private property, it is regularly used by the community for fishing, sunbathing, and shoreline access.

Edgewater Park has been developed to provide both active recreational use and conservation of on-site riparian habitat. The active use portion of the park is approximately 28 acres and includes a playground, picnic area, covered stage, three multi-use ballfields, restrooms, and 150 parking spaces. A boat launch with 14 boat trailer parking stalls is located at the south end of the active use area. Primitive campsites that are used seasonally, usually in conjunction with special events, are also located at the south end of the Park. The park includes about 38 acres of wetland and woodland conservation area at the south end along the river. This area has been restored to include re-establishment of a historic back channel for salmon habitat enhancement.

The Mount Vernon 2008 Parks, Recreation & Open Space Plan notes that both Young's Bar and Goodrich Bar would be logical extensions of Edgewater Park. Both are characterized by having forested riparian habitat, natural shoreline, and sand bar accretion that could support additional off-channel salmon refuge and rearing habitat.

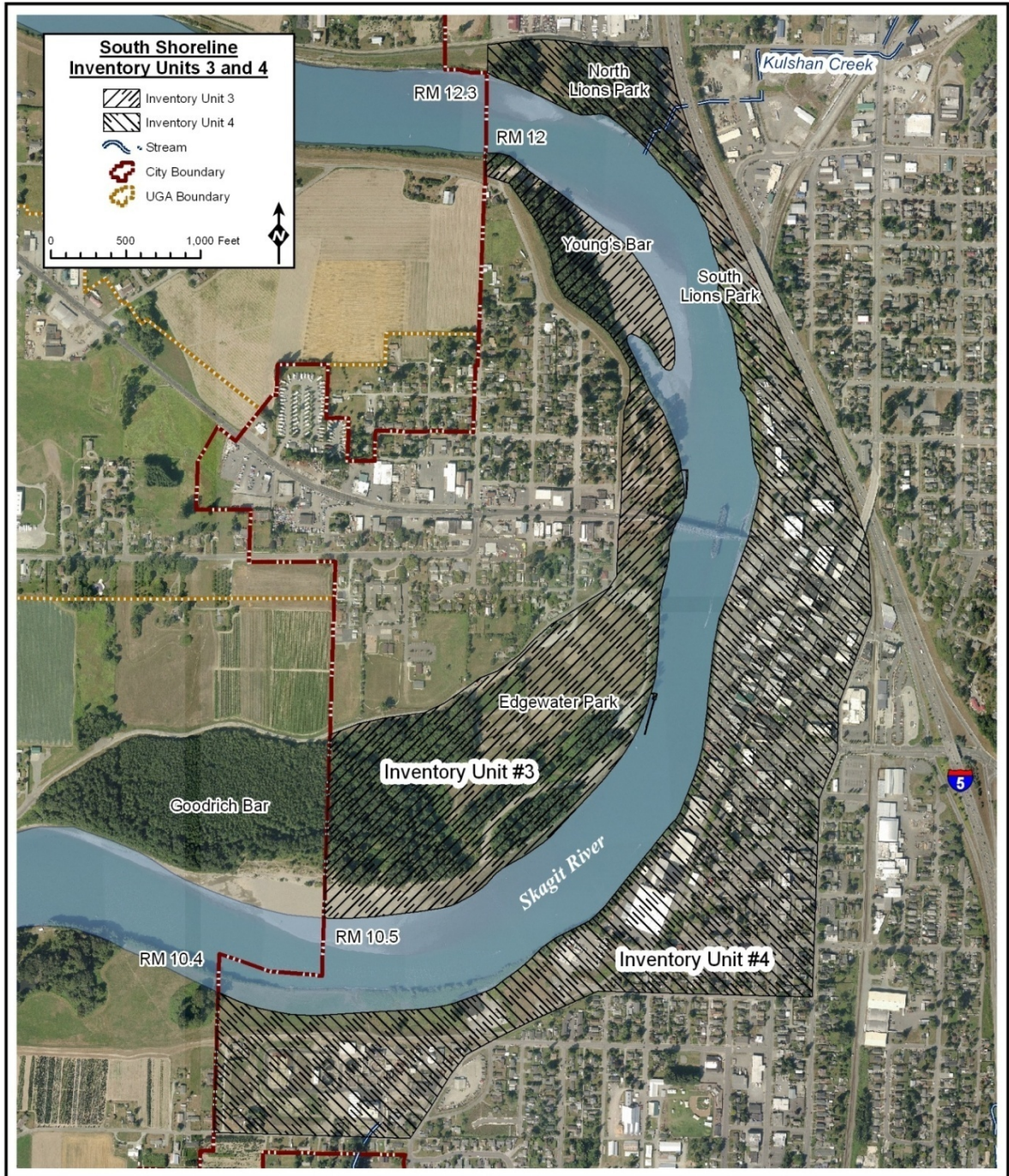


Figure A-3
Inventory Units 3 and 4

D. INVENTORY UNIT #4:

Location: East bank of the river from RM 12.3 to RM 10.4, starting at the north end of Lions Park North and proceeding downstream past the Division Street Bridge to the City boundary just west of Riverview Lane. This unit includes the adjacent Downtown located between the river and Interstate 5 to the east and the areas waterward of Britt Road and Dike Road at the south end of the unit. [Figure A-3]

Description: North of Division Street this unit has a range of shoreline types. The portion just north of the Division Street Bridge is low in plant diversity and high in adjacent development. The upstream portion has a greater diversity of plants and includes a remnant of floodplain forest within the batture at Lions Park North. Kulshan Creek enters the Skagit River at Lions Park.

Immediately north of Division Street, there is a mixture of auto-oriented retail and office uses with on-site surface parking. Between these commercial uses and Lions Park South are auto-oriented businesses that have surface parking adjacent to the river, an armored riverbank, levee, and trail. The 1.6 acre Lions Park South is located on a high bank shoreline overlooking the river and Downtown. It has been developed with a kiosk, picnic shelters and tables, a multipurpose trail, playground and restrooms, RV dump station, and 33 parking spaces. The 15.4 acre triangular-shaped portion of the park, Lions Park North, has a low bank shoreline as one leg of the triangle, a levee along the north, and I-5 along the third side to the east. The site is dominated by a remnant floodplain forest within the batture. Old pilings and similar structural remnants, which date from when the Park was a site for loading goods and moorage, are visible along the riverfront. Lions Park North has been improved with dirt trails and a 2.5 acre open space, but sees relatively light use, except by day hikers.

South of Division Street, the area within the Shoreline Management Zone (SMZ) is dominated by a revetment, built over an armored, sloped bank that provides flood risk reduction to the City's Downtown and surface parking for 350 vehicles.

Moving south beyond the Downtown, the shoreline is protected by riprap and a levee from Kincaid Street south and west to the city limit. The levee setback from the river varies from approximately 150 feet at the north to between 300 and 400 feet at the south end of this unit.

The area south of Downtown is a mix of industrial and commercial uses, surface parking, and residential. South to Section Street is a neighborhood in transition that has a mix of auto-oriented commercial, institutions, residences converted to businesses, vacant land, surface parking, government offices, and multi-family and single-family residences. Between Section Street and Hazel Street, immediately east of First Street, land uses are primarily residential. South of Kincaid Street, a large cold storage facility is located between the river and the levee and farther south, the wastewater treatment plant is immediately landward of the levee.

IV. CHARACTERIZATION OF ECOLOGICAL FUNCTIONS

The concept of ecological functions recognizes that any ecological system is composed of a wide variety of interacting physical, chemical, and biological components that are interdependent to varying degrees and scales and that produce the landscape and habitats as they exist at any given time. Ecological functions are the work performed or role played individually or collectively within ecosystems by these individual components. Managing shorelines for protection of their natural resources depends on sustaining the functions provided by:

- **Ecosystem-wide processes**, such as those associated with the flow and movement of water, sediment and organic materials, the presence and movement of fish and wildlife, and the maintenance of water quality.
- **Localized individual components and processes**, such as those associated with shoreline vegetation, soils, water movement through the soil and across the land surface, and the composition and configuration of the beds and banks of water bodies.

The loss or degradation of the functions associated with ecosystem-wide processes and localized individual components and processes can significantly impact shoreline natural resources and may also adversely impact human health and safety. Shoreline master programs are required to address ecological functions associated with applicable ecosystem-wide processes, and localized individual components and processes identified in the ecological systems analysis described in WAC 173-26-201(3)(d)(i).

Most shoreline areas, even substantially developed or degraded ones, still retain some level or type of ecological function. For example, even though there is little off-channel habitat or spawning and rearing habitat along the City's shorelines, the Skagit main-stem is a critical fish migration corridor. Ecosystems are also interconnected. For example, the life cycle of anadromous fish depends upon the viability of freshwater, marine, and terrestrial shoreline ecosystems, and many wildlife species depend on the health of both terrestrial and aquatic environments. Therefore, the SMA policies for protecting and restoring ecological functions generally apply to all shoreline areas, not just those that remain relatively unaltered.

A. BIG BEND REACH ECOSYSTEM CHARACTERISTICS

The Skagit River Big Bend Reach Habitat Restoration Feasibility Study was completed for the City in December 2004. The study examines the conditions and potential for restoring fish habitat from between the confluence of Nookachamps Creek downstream to the Skagit Forks. It includes characterizations of the Big Bend Reach as a whole and discussions of historical conditions, which provide information for examination of past/future shoreline cumulative impacts, discussed in this SMP. The Big Bend Reach is used here as the relevant geographic area for discussion of ecosystem-wide conditions and functions.

B. REACH MORPHOLOGY

Within this reach, the river occupies a single channel, with levees framing the shorelines. The reach has a sinuosity that has been maintained in place by the presence of levees for at least the last 60 years and, more likely, for the last 100. The right bank is lined continuously with riprap that forms the toe of the levees for the entire length of the study reach. The left bank is lined almost continuously downstream with riprap beginning just east of the railroad bridge.

The Skagit in this reach is in transition from a meandering river to a deltaic system. The river retains features of both systems in the study reach. The meandering river upstream is gravel-bedded, highly sinuous, and steep, while the river downstream is very low-gradient, distributary in nature, with mid-channel bars common, and with sand the predominant sediment size.

The area adjacent to the river channel has characteristics typical of two very different landforms. At the large bend in the river above downtown Mount Vernon, “ridge and swale” topography can be seen. This landform is characterized by numerous low ridges, which parallel meander bends. It represents previous locations of point bars and shows the lateral growth and accretion of the bars. This feature is part of a meandering stream system. The extent of the ridge and swale topography indicates a sustained pattern of point-bar accretion. The feature is approximately 1 mile wide, while in the direction of accretion it is at least 1.5 miles long.

Downstream at approximately Edgewater Park, the features of a delta become more evident. Multiple distributary channels are evident on topographic maps of the area, starting at about RM 12.5. Irregular topography immediately west of the study reach is indicative of overflow channels and former distributary channels. This topography consists of discontinuous depressions that both parallel the main channel and radiate away from it. These features have been highly modified by past agricultural activities.

Portions of the project reach are also tidally influenced. While the effect of tides has been reported to reach to Downtown Mount Vernon, the tidal influence in this reach is minimal, and probably only happens during extreme high-tide events. Tides have a much greater effect downstream from where the river splits into the North and South Forks.

C. LARGE WOOD

Large woody debris and logjams, once extremely common in the Lower Skagit River, had a significant effect on river morphology, flow conveyance, and flood inundation. Large wood fall into the river would have provided areas of refuge and rearing habitat. However, clearing and development has basically eliminated these structural habitat components from the river within this reach.

Due to the size of the river main-stem and force of the flows experienced through this section of the river, wood must be of extremely large diameter and length to be considered stable. It is estimated that any given tree would need to be at least 28 inches or greater in diameter to have any chance of remaining stable through this reach. Currently the reach has no significant accumulations of large woody debris. Individual pieces found at Young's Bar could be considered potential key members. Additionally, there are some accumulations of imbedded LWD in the vicinity of Goodrich Bar. These accumulations can be seen during low water conditions and may be remnants of the historic log jams once located at these sites.

Large woody debris does not play a significant role in the existing channel dynamics. It has not been present in quantities sufficient to affect channel formation since the early 20th century. Generally, LWD is only found piled against bridge abutments and buried in sediment on the few point bars present in the reach. There are only two small areas with recruitable LWD, both near Downtown Mount Vernon. However, the river channel averages about 500 feet wide in this reach and LWD is not expected to affect river processes significantly unless large logjams form.

D. FLOODPLAIN FOREST

Floodplain forests used to be present throughout the reach, but due to over a century of agriculture and other development they now exist only in patches between the levees and the river's edge. Floodplain forests in the study area are generally very similar and have an age range of 40 to 52 years, and are comprised of predominantly black cottonwood. The number of live overstory trees ranges from 130-160 stems per acre with a tree area of 200-250 square feet per acre, which is typical of a moderately aged forest. One notable exception was a mixed stand of conifer and hardwoods in the vicinity of Britt Slough. This mature stand had approximately 100 trees per acre, with a tree area of around 600 square feet per acre. In this case, a grove of mature red cedars contributed a significant portion of the tree volume. At the other end of the scale, the lowest density data was retrieved from a former clear-cut area at Goodrich Bar. Here the forest is less than 20 years old, has 775 trees per acre, and a tree area of only 103 square feet per acre.

There are no floodplain forest lands of long-term significance within the city boundaries of Mount Vernon. In determining whether forest land is primarily devoted to growing trees for long-term, commercial timber production on land that can be economically and practically managed for such production, the following factors are considered: (a) the proximity of the land to urban, suburban, and rural settlements; (b) surrounding parcel size and the compatibility and intensity of adjacent and nearby land uses; (c) long-term local economic conditions that affect the ability to manage for timber production; and (d) the availability of public facilities and services conducive to conversion of forest land to other uses.

E. EDGE CONDITIONS

Of the almost 125,000 feet of edge habitat along the Skagit River in the Big Bend Reach study area, six condition classes are identified. Most of the edge habitat, over 78,000 ft, falls within a “modified edge” type. A “hardened bank” condition, which includes features such as large riprap, rubble, bridge pilings, and piers occurs on both sides of the river, with greater occurrence on the right bank. An additional modified feature, identified as “bar/riprap,” stretches 390 ft between two bar features on the left bank. “Bar” conditions along this stretch of the river compose about 24,300 ft with approximately half occurring on each bank. “Non-hardened bank” conditions cover 21,500 ft, most of which occurs on the left bank (14,500 ft). Lastly, “backwater” conditions are found in two locations along the right bank and cover approximately 550 ft of edge habitat.

F. FLOODPLAIN

It is estimated there are a total of 1,340 acres of available floodplain throughout the entire study area located between the river and existing levees. The study designates the floodplain by categories based on elevation above mean water level (MWL). Approximately 80 acres are Category One (0-5 feet relative to MWL, largely exposed bars), 475 acres are Category Two (5-10 feet relative to MWL), 125 acres are Category Three (10-15 feet relative to MWL), and 660 are Category Four (15-20 feet relative to MWL). The strongest relationship to off-channel habitat is found in Category Two.

G. SHORELINE WETLANDS

Wetlands associated with the floodway are limited to areas within the batture. Wetlands associated with the non-diked floodplain are within the Natural environmental designation at the Nookachamps Mitigation Bank.

H. SUMMARY OF ECOSYSTEM CONDITIONS

Natural functions on the Skagit Delta below Mount Vernon are estimated to be 69 percent degraded from historic levels. The Skagit Basin has also been identified as being limited for Coho winter habitat, with winter rearing habitat concentrated in the few remaining side-channel sloughs on the river floodplain. The largest loss in habitat area and juvenile production for Coho salmon has occurred in side channel and distributary sloughs, resulting in winter and summer production losses of up to 52 percent from historic levels. Many of these habitat areas were once located in the Big Bend Reach area, including at Mount Vernon.

Levee construction and upland habitat conversion have resulted in the loss of almost all floodplain wetlands in the Mount Vernon jurisdiction. Levees confine the river and have eliminated the majority of backwater and off-channel sloughs that provided key habitat for salmonids, cavity nesting ducks, dabbling ducks, swans, beavers, and other riparian fauna. In Mount Vernon nearly all of the agricultural uplands have been converted to housing and other urban land uses.

Modification of the Skagit River shoreline began in the 1860s and by the early 1900s nearly all of the river's shoreline from Sedro-Woolley downstream to Skagit Bay had been confined and stream banks hardened in some fashion, typically with levees and/or rip-rap. Consequently, at Mount Vernon, the river occupies a single channel, with levees framing the majority of the shorelines. The river channel has remained relatively stable since the turn of the last century. While the river does continue to occasionally flood adjacent lands, the presence of the levee system constrains any actual migration of the main-stem itself. For planning and policy purposes it is assumed that the river's main stem will continue to be confined within the limits of the existing levee system.

I. CITY SHORELINE ECOLOGICAL FUNCTIONS

The Shoreline Inventory and Restoration Plan completed in 2003, provides a snapshot of the condition of ecological functions provided along the City's shorelines. As noted earlier, there has been little change in shoreline and near upland development since the inventory was prepared, so the results of the inventory are considered current for planning purposes.

As a whole, the portion of the Skagit River flowing through Mount Vernon serves an important function, acting as a migration corridor between the river estuary and up-river spawning habitats. Every salmonid must pass through the City twice over the course of its life, as a juvenile and as an adult. Along these lower reaches of the river there is only a limited amount of potential habitat, which is evident from looking at City maps and aerials. These small areas are disproportionately significant as refuge places and are particularly valuable because of the overall habitat scarcity within this reach.

Table A-1 summarizes the ecological functional conditions of the City's shorelines by inventory unit. Ten features are presented in the table as being representative of the functions evaluated in the inventory. They are summarized below:

- **Stream bank:** refers to the relative stability of the shoreline, erosion potential, and whether it is hardened or natural.
- **Flood Plain Connectivity:** the degree to which the river has connectivity to adjacent floodplains.
- **Over-Wintering Habitat:** refers to features that allow juvenile salmon refuge from high river flows. Physical features include riparian zone vegetation, large angular riprap, and woody debris.
- **Large Woody Debris (LWD):** any large piece of relatively stable woody material having a diameter of over a foot and a length of about 10 feet that intrudes into the river channel.
- **Side Channel Restoration:** presence of a side channel and/or the degree to which there is potential for re-establishing off-channel rearing habitat and refuge.

- **Plant Diversity:** based on the relative mix and abundance of herbs, shrubs, and mixed deciduous and evergreen trees. Shoreline plant communities provide a variety of functions including input of organic material into the river, bank stability and erosion control, and recruitment of LWD.
- **Wetlands:** presence or absence of wetlands.
- **Open Space:** presence or absence of significant open space along the river, including parks, preserves, and private properties.
- **Physical Barriers:** refers to barriers to upstream migration into Skagit tributaries.
- **Riparian Reserve:** refers to the presence or absence of an intact riparian and adjacent upland plant community.

All of these features were rated into four categories:

- **Properly Functioning (PF):** indicates that, in general, the feature is providing acceptable levels of functions.
- **Function at Risk (FAR):** indicates the feature is degraded within the inventory unit and that restoration could improve functioning.
- **Not Properly Functioning (NPF):** typically indicates the feature is absent or that other features are negatively impacting the functional attributes.
- **Not Applicable (N/A):** Does not apply in the situation

These ratings are presented in the following **Table A-1**.

Table A-1 Summary of City Shoreline Ecological Features and Functions

	INVENTORY UNIT			
FEATURE	#1	#2	#3	#4
Stream Bank	PF – stable natural	PF – riprap bank is stable	PF – stable riprap and natural	PF – mostly stable riprap
Floodplain Connectivity	PF	NPF	PF – limited to within levee setbacks	NPF
Refuge	FAR → PF - currently poor access from river , but will become functional with restoration of Nookachamps Preserve.	FAR – minimal, only refuge is found in large riprap and vegetation zone	FAR/PF – only Edgewater Park has a functioning side channel, the result of restoration.	NPF – restoration constrained by presence of revetments; potential exists at Lions Park
Over-wintering Habitat	FAR – limited due to lack of access for fish	NPF – no habitat available for fish or terrestrial species	FAR – opportunities for habitat exist on Young’s and Goodrich Bars	NPF - restoration constrained by presence of revetments; potential exists at Lions Park
Large Woody Debris (LWD)	FAR → PF – current lack of LWD, but will be installed as part river bank restoration.	FAR – LWD accumulation is associated with two of the bridges located in the flow channel	FAR – accumulations not very complex	NPF – limited riparian zone
Side Channel Restoration	FAR for current conditions; high potential for side channel restoration	NPF – no potential for restoration	FAR – could be improved on Young’s and Goodrich Bars	NPF – no opportunity available due to adjacent development; limited potential at Lions Park.
Plant Diversity	PF – shoreline contains a significant strip of mature trees. Floodplain forest to be restored.	NPF – riparian zone is narrow and not complex	PF – Young’s Bar and Edgewater Park contain a mix of riparian vegetation.	FAR – north at Lions Park and south of the revetments may have potential
Wetlands	PF	NPF – no wetlands	FAR – wetland restoration potential exists near shore	NPF – no wetlands
Open Space	PF	None	PF	FAR
Physical Barriers	PF – restoration of historic back-channel fish habitat part of Nookachamps Wetland Mitigation Bank	N/A - no tributary	N/A – no tributary	PF – barrier removed at Kulshan Creek in Lions Park
Riparian Reserve	PF	NPF – no riparian reserve for LWD or trees on waterward side of levee	PF	NPF
Sand Bar Accretion	None	None	PF – Young’s Bar and a portion of Goodrich Bar.	None

V. CUMULATIVE IMPACTS REVIEW

The discussions below provide an overview and summary of historic shoreline conditions and activities that have impacted the shoreline over time, and the likely cumulative effects of SMP goals and regulations, along with known plans and development activities.

A. PRE-EUROPEAN SETTLEMENT

Information regarding conditions in the lower Skagit Basin prior to European settlement comes from land surveys conducted by the Government Land Office. Early mapping of the lower river indicates that it was considerably more complex than it is today, consisting of numerous channels, immense accumulations of wood debris, and vast wetlands across its extensive floodplain. The 90,000+ acre floodplain was comprised primarily of forested floodplain and scrub-shrub wetlands and, along the lower reaches of the river, estuarine habitat. Prior to European settlement, the river frequently crested its banks and inundated the large wetlands that extended across the Skagit / Samish Valley.

Prior to European settlement, large wood debris and logjams were common in the Lower Skagit River and in the near vicinity of Mount Vernon. Logjams had a significant effect on river morphology, flow conveyance, and flood inundation. Logjams diverted flows and raised water elevations to create and sustain side channels and large areas of surrounding forested floodplain and wetlands. Snags, logjams, and beaver activity formed pools and provided complex cover and hydraulic refugia for the runs of Skagit River salmon.

B. EUROPEAN SETTLEMENT

Large scale European settlement of the Skagit started in the mid 19th century with the arrival of permanent settlers on Fidalgo Island. The late 1800s brought homesteaders to the upper reaches of the Skagit with the first settlement at Mount Vernon in 1870 and in Burlington in 1890.

Logjam clearance by settlers began in about 1871. The removal of the logjams was said to have increased flows and flood heights in the Fir Island area while flood heights west of Mount Vernon were decreased with the removal of the logjams. With the opening of the river, large-scale steamboat navigation began on the Skagit. Piers were constructed at numerous locations on the river downstream from Sedro Woolley, remnants of which are still visible today. By the 1890s the river had been mostly cleared of wood debris and partially diked. Gold-seekers pushed up river in the 1890s and large-scale logging started at about the same time.

Up until the mid-1960s, federal “snag boats” were used on a regular basis to remove accumulated logs that got hung up on bridge pilings. More than 35,000 snags were removed from the Skagit River between 1881 and 1910. In addition, over 5,000 trees were cut from the river banks by 1910. The rate of snag removal and tree-cutting decreased dramatically after about 1910.

Channel and floodplain modifications have dramatically changed the land use pattern in the valley. Over several decades during the late 19th and early 20th centuries, a system of levees and drainage systems continued to be constructed to make the cleared and drained land suitable for crop production. The rich soil has fostered an agricultural community of family farms known for flower bulbs, crop and dairy production, and vegetable seed.

C. CURRENT ECOSYSTEM CONDITIONS

The city's shorelines reflect the legacy of substantial modification over a period of more than a hundred years. The current landscape setting of the Mount Vernon shoreline is a result of the interaction of natural landscape processes and human interventions that have occurred in the Skagit River system as a whole. Anthropogenic changes to the river system such as land clearing and draining of the floodplain for agriculture and settlement, the removal of wood and large log jams, and regulation of water flow in the river have led to the need for local infrastructure such as levees, revetments, and other hydromodifications, to support and protect urbanization and other development.

In addition to modification by levees and similar structures, the Skagit shoreline at several locations in Mount Vernon is armored with rip-rap. To accommodate the levees and land-side development most, if not all, of the shoreline vegetation has been removed. Therefore most riverine shoreline ecological functions are either degraded from historic conditions or are absent altogether, resulting in the loss and isolation of large segments of riparian and wetland habitat critical to the various life stages of salmon.

D. LEVEES AND REVETMENTS

The dominant feature of the Skagit River shoreline in Mount Vernon is the presence of the extensive and nearly continuous system of dikes/levees and revetments. Flood risk reduction systems are a permanent feature of the City's shoreline and adjacent upland environments. Where they separate the upland portion of the SMZ from the river, development is typically backed up to the dike on its landward side. However, this condition only accounts for 24 percent of the City's total shoreline, and will be further reduced when the levee at the north end of the City is relocated inland.

There are three dike districts within Mount Vernon and their collective long-term goal is to rebuild and reconfigure the dike system such that much of the area within the City historically impacted by flooding will be protected. This will allow recertification of the affected areas and their removal from the FEMA 100-year floodplain maps.

Lands that are isolated between the river's edge and the levees/dikes or revetments are collectively called the "batture". A majority of the City's shorelines occur within the batture, as well a majority of the shoreline jurisdiction. In the three bridges area at the north end of the City and along the downtown waterfront, levees and revetments are located within the SMZ.

E. CRITICAL AREAS

The City conducted three critical area inventories during the development and subsequent implementation of its Critical Areas Ordinance (CAO). These studies have been used to identify the type and location of critical areas within the shoreline environment. They include:

- “*Wetland and Stream Inventory*”, Shannon & Wilson, January 2000.
- “*Assessment of Waters/Wetland Ecosystem Conditions and Functions*” L.C. Lee et al, January, 2007.
- “*Mount Vernon Stream Study*”, WSP, 2008.

The result is that statutory critical areas on the City’s shorelines are limited by type, extent, and previous development. Within the SMP jurisdiction, critical areas consist of the main stem of the Skagit River, associated wetlands, and fish and wildlife habitat conservation areas. There are no known non-aquatic resource lands, geologically hazardous areas, or designated aquifer recharge areas. Floodplains are regulated under Chapter 15.36 MVMC, “Floodplain Management Standards.”

The Skagit River is designated as having shorelines of statewide significance and, as such, is a Type S stream under the Department of Natural Resources waters typing system. The river reaches that flow through the City provide fish passage as the primary ecological function.

The shoreline critical areas identified in the referenced studies all occur within the batture, or within the active floodplain at the north end of the City where there is no levee. No critical areas were identified within areas of the SMP jurisdiction landward of a levee or revetment. This is due to those lands having been developed with uses that back up to and abut the levees or revetments.

One wetland, at the south end of Edgewater Park, was part of the restoration of that segment of shoreline and adjacent upland. The restoration included re-establishment of an historic side-channel as a refuge for migrating fish. Other potential jurisdictional wetland areas are located outside of the SMZ within the river’s active floodplain. Of note is the Nookachamps Wetland Mitigation Preserve, the construction of which will result in restoration of historic wetlands and their hydrologic connection to the river. Wetlands are regulated under the provisions found in Appendix ‘C’ of the Shoreline Master Program.

Other locations identified as potential critical areas included the confluence of both Lindegren and Kulshan Creeks with the Skagit River, Young’s Bar north of Edgewater Park, and the recently restored side-channel fish habitat at the south end of Edgewater Park. These areas have been identified, respectively, on Figures B-7, B-3, B-4, and B-5 of Appendix B of the SMP.

F. SHORELINE ACCESS AND VIEWS

As noted above, the levees/dikes and revetments separate upland uses from the shoreline. This impacts both the ability to provide physical access to and views of the shoreline. In the three bridges area at the north end of the City the levee runs parallel to the shoreline and splits the SMZ between the batture and adjacent uplands. As a result, there is no direct physical access to the shoreline and because of the height of the levee there are no views from the adjacent upland uses.

In West Mount Vernon, the levee is setback considerable distances from the shoreline, with intense development occurring landward. The levee height eliminates views from these upland uses, but both access and views are provided for at Edgewater Park.

Along the downtown shoreline, the revetment parallel to the river and elevated above both the river and the downtown core along First Street, effectively blocks views from both the street and downtown buildings, with a few exceptions where there may be views available from taller buildings. Visual access, but not direct physical access, is available from the top of the revetment. During 2009, the City conducted a series of Downtown Design Guidelines workshops, which included a study of downtown views and the impacts of a range of building heights. Given the overall lack of existing views it was determined that the fifty-five foot height limit identified for downtown redevelopment would not adversely affect views of the shoreline. The redevelopment of the downtown shoreline will result in improved public visual access to the river, including removing the existing parking atop the revetments and developing a waterfront pedestrian promenade, a public plaza, open spaces at street ends and other public amenities. Private redevelopment will be required to modulate structures to reduce impacts of massing and provide for water-enjoyment via pedestrian access, where practical.

G. SHORELINE USE ANALYSIS

Future new shoreline development potential is extremely limited since there are few vacant parcels within the Shoreline Management Zone. These consist of parcels, primarily zoned for residential or commercial use, located between Lindegren Creek and the I-5 Bridge along Hoag and Stewart Roads. Virtually every other shoreline parcel has been developed to an urban or recreational use, with the exception of the shoreline north of Lindegren Creek adjacent to the Nookachamps Wetland Mitigation Bank. This means that the majority of future development activities will be in the form of redevelopment of existing lots and structures. Streets and roads have been constructed and major utilities installed, limiting future infrastructure-related activities in the shoreline to primarily maintenance and upgrade.

There are approximately 29,850 lineal feet of Skagit River shoreline within the City's corporate boundaries. Uses on the shoreline can be grouped into four general categories and are briefly described below.

1. Areas where there is no dike/levee or revetment on or near the shoreline or in the adjacent upland and where there are no significant structures, roads and other infrastructure: This condition is found in north Mount Vernon, where there is an approximately 7,300 foot reach of shoreline adjacent to the active floodplain that comprises the Nookachamps Wetland Mitigation Bank. This reach accounts for 24 percent of the City's shorelines. This area will be kept in preserve and will allow for limited passive recreation use and public access to the shoreline.
2. Areas of significant open space within the batture: These include the entire shoreline on the west side of the river across from Downtown; Lions Park North; and the vacant/undeveloped properties south of the Dairy Valley plant to the City boundary. Uses include both active and passive recreation consistent with a shoreline location (e.g. small craft launch) in Edgewater Park, Lions Park, and informal use of Young's Bar, which is private ownership. The Washington Department of Fish and Wildlife has land and a boat launch immediately north of Young's Bar and additional property south of Edgewater Park. The properties south of Dairy Valley are vacant and unlikely to develop to an intense use since they are in the floodplain between the river and levee. Taken together, these areas account for 40 percent of the City's shorelines.
3. Area of single-family residential development: This is found only in north Mount Vernon, between Lindegren Creek and the Riverside Drive Bridge. This 3,450 foot reach accounts for 12 percent of the City's shorelines. Between the railroad bridge and Riverside Drive bridge all but a few of the residences are separated from the river by a levee. About half of these properties have been acquired by Dike District #17, which is pursuing a long term plan to acquire the rest of these residential properties, so the levee can be relocated upland closer to the Hoag/Stewart Roads right-of-way.
4. Areas of more intense urban development, characterized by a mix of uses including residential, retail, commercial, office, and industrial: These areas are found from the Riverside Drive Bridge west to the City limits in north Mount Vernon, and the shoreline adjacent to Downtown from Lions Park south to the Dairy Valley property. In the Downtown area, dikes and levees are typically located near the river's edge, with development backed up to them. As noted above, the levee along Stewart/Hoag Roads will probably be relocated, but at present it separates existing uses from the shoreline. Urban mixed-use accounts for approximately 24 percent of the City's shoreline.

As noted above, large segments of the shoreline are in some type of open space use, characterized by having connectivity to at least part of the adjacent floodplain. They account for approximately 76 percent of existing shoreline land use. The nature of the ownerships (much of it public) and uses on these shorelines, their connectivity to the floodplain, underlying zoning restrictions, and restoration potential preclude intense urban uses from developing in these shoreline areas.

When Dike District #17 is able to acquire the land to relocate the levee farther from the river along Stewart/Hoag Roads, open space uses would account for a higher percentage of the City's shorelines. This would also result in a corresponding reduction of both residential uses and more intense urban uses along the City's shorelines.

There are no water-dependent or water-related businesses or transportation facilities located on the City's shoreline. In addition, there is no viable potential for such uses to develop in Mount Vernon. This is due to the following factors:

1. Currently, 76 percent of the City's shorelines are areas where commercial, industrial, and transportation facilities would be prohibited from development, due to the underlying zoning. That figure will increase to 82 percent in the future when the levee at the north end of the City is relocated further upland.
2. In those areas of the shoreline where water-dependent commercial, industrial, and transportation uses would be allowed, dikes, levees, and revetments separate such uses from the shoreline. These flood risk reduction structures have been in place for much of the City's history, and current plans for the downtown and waterfront include removing revetments and relocating portions of levees closer to the shoreline to protect downtown properties. Flood risk reduction measures represent a significant investment and will continue to be a permanent feature of the City's shorelines.

Since water-dependent and water-related commercial, industrial, and transportation uses are unlikely to develop in the future, the City is pursuing policies and regulations that provide for non-water oriented uses to remain and encourage redevelopment in the shoreline areas where such uses are allowed. Development or redevelopment will be required to provide facilities for water-enjoyment such as boardwalks and viewpoints.

Given decades of conversion and use along much of the City's shoreline and the substantial investments made over time to those uses, particularly Downtown, the development pattern, general mix of land uses, and infrastructure are essentially established and in place. While this has had significant cumulative impacts to the City's shoreline functions up to this point, the limited new development potential that remains suggests there is, in general, a reduced potential for future significant impacts.

H. ENSURING NO NET LOSS

SMP goals, policies, and regulations have been developed to ensure a no net loss goal. Public and private restoration projects have and will continue to improve the ecological functions along significant sections of the Skagit shoreline. Provisions for restoration, improved stormwater controls, and enhancement during development and redevelopment should, over time, provide an incremental lift in shoreline functions. Below is a brief description of the environmental designations and general statements about SMP goals and regulations contributing to the goal of "no net loss." (For a complete discussion about environmental designations and designation maps, see the Shoreline Master Program Section IV, "Shoreline Environmental Designations.")

1. Natural Environment

This designation is primarily located between Lindegren Creek and the north City/County boundary, adjacent to the Nookachamps Wetland Mitigation Bank. The Wetland Bank construction will restore historic back-channels and wetlands in the floodplain and restore hydraulic connectivity to the river. Although a trail for public access is planned, SMP goals, policies, and regulations prohibit higher intensity development or use in this area. Restoration of this area will provide a significant lift in ecosystem-wide shoreline functions.

Areas at Young's Bar, the Kulshan Creek confluence at Lions Park North, the Lindegren Creek confluence, and the south shoreline edge of Edgewater Park are also designated Natural Environment. Past and future restoration of the riparian environment and ecological functions in these areas, including re-establishing an historic forested wetland and associated back-channel at Edgewater Park, will increase ecosystem-wide shoreline functions.

2. Urban Conservancy

This designation includes portions of Lions Park South, Edgewater Park and adjacent parcels on the west side, those shoreline areas located between the ordinary high water mark and the levee in the three bridges area to the north, and those parcels that are south of the Dairy Valley plant to the City boundary in the southwest. All these locations exist between a levee and the river. SMP goals, policies, and regulations prohibit higher intensity uses within this designation. Active recreation is allowed provided that shoreline impacts are mitigated and/or provide for restoration/enhancement of ecological functions.

3. Shoreline Residential

Residential development on the City's shoreline is limited to a stretch of the river less than $\frac{3}{4}$ mile in length, between Lindegren Creek and the Riverside Drive Bridge. Between the railroad bridge and Riverside Drive Bridge residential lots are functionally separated from the river's edge by levees. East of the railroad bridge, residential development is at a higher elevation and not at risk from flooding. Land west of the railroad bridge may be acquired by the Dike District in the future, for levee relocation. SMP goals, policies, and regulations limit more intense uses.

4. Urban Mixed-use

At the north end of the City this designation occurs between the Riverside Drive Bridge and the City boundary to the west. Uses in this area are functionally separated from the river by a levee. It is intent of Dike District #17 to also acquire these properties for future levee relocation.

This designation also occurs north of the levee at Lions Park North, from Lions Park South along the Downtown waterfront to south of the Dairy Valley plant and City-owned land immediately to the south. In these locations ecological functions are severely limited due to past development. The designation also reflects the existing conditions and built nature of this shoreline area and is consistent with the Comprehensive Plan and Downtown and Waterfront Master Plan.

Existing and allowed uses include residential, retail, commercial, and industrial. SMP goals, policies, and regulations allow for the continuation of these uses. These properties may redevelop to mixed-use in the future and provide for water-enjoyment use (e.g. boardwalk, trail) to increase public access. Redevelopment may require upgrades to on-site stormwater facilities.

I. CUMULATIVE IMPACTS CONCLUSION

The Skagit River shorelines located within the City's corporate boundaries are characterized by significant modifications that have occurred since European settlement in the area began in the late-1800s. Most of the adjacent floodplain that historically contained complex waters/wetland systems and habitats was drained and filled for agricultural purposes early in the City's history and later converted to urban uses. A system of levees/dikes and revetments has been constructed to protect adjacent properties from seasonal flooding. This flood risk reduction system is a dominant physical feature effecting shoreline functions, visual and physical access, restoration potential, and planning.

Historic activities along the City's shorelines have resulted in cumulative impacts that have significantly impacted ecological functions. Most of these functions have been degraded to varying degrees, with many absent altogether along certain segments of the City's shoreline. The existing development pattern and land uses are unlikely to change significantly, but controlling how redevelopment occurs on the shorelines will reduce the potential for continued impact to shoreline functions.

As noted, over 76 percent of the City's shoreline environments are in some form of open space, and are designated as either Natural or Urban Conservancy. Intense urban development and uses are prohibited within these designations, and there is additional restoration potential within these environments (see Appendix B).

The remaining 24 percent of the shorelines contain a mix of urban uses and are essentially fully developed. Future relocation of the levee along Stewart/Hoag Roads will reduce that down to approximately 12 percent, and add more lands to the batture and Urban Conservancy designation, with potential for additional restoration of some shoreline functions.

As with many cities founded during the nineteenth century along rivers, Mount Vernon's downtown does not focus on its waterfront. The redevelopment of the waterfront, anticipated to occur in tandem with the introduction of more effective flood risk reduction measures, provides the opportunity to rectify this situation by expanding public accessibility to the shoreline. The Downtown and Waterfront Master Plan will improve public access to the river the full length of Downtown Mount Vernon. The shoreline, from north of the Division Street bridge south beyond the Commercial Cold Storage industrial area, will eventually be accessible to the community by means of a public walkway between the floodwall and the Skagit River.

The facilities that will make this feasible and the amenities that will make it attractive to the public will be provided during the course of waterfront and downtown redevelopment. Although the flood risk reduction element will be financed with public funds, private investment will make the vision of a "public waterfront" a reality.

The Downtown and Waterfront Master Plan, the Shoreline Master Program and its associated development standards, and the Downtown Design Guidelines each serve a purpose with the underlying single goal of ensuring that future development enhances the quality of life for the Mount Vernon community.

Based on the analyses and discussions above it is anticipated that the cumulative impacts of implementation of the SMP will result in an improved shoreline environment, both from the standpoint of providing greater public access and enjoyment, and achieving the goal of no net loss of ecological functions.