ISLAND COUNTY
SHORELINE MASTER PROGRAM UPDATE

Cumulative Impacts Analysis

March 2013

Island County

ESA

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CHAPTER 1 INTRODUCTION

1.1 Purpose of the Report

Island County is updating its Shoreline Master Program (SMP) in accordance with the Shoreline Management Act (SMA) and implementing regulations[1]. As part of this SMP update effort, the County is required to evaluate the cumulative impacts of "reasonably foreseeable future development" to verify that proposed policies and regulations for shoreline management are adequate to ensure "no net loss" of shoreline ecological functions. WAC 173-26-186(8) directs that master programs "include policies and regulations designed to achieve no net loss of those ecological functions." The proposed Island County SMP provides standards and procedures to review, through established permitting processes, subsequent use or development proposals for their potential to impact shoreline resources. The purpose of this report is to assess the cumulative impacts that would result from development and activities in the shoreline over time under the provisions contained in the County's SMP. This report is prepared as a requirement of the Island County grant agreement with the state funding agency, Washington Department of Ecology (SMA Grant No. G1100007). This report is based upon guidance provided in Ecology's SMP Handbook, specifically Chapter 4 – No Net Loss of Shoreline Ecological Functions and Chapter 17 – Cumulative Impacts Analysis.

The cumulative impacts to be addressed in this report are those expected to result from future development, redevelopment, and uses within the SMA shoreline jurisdiction and regulated by the SMP (December 27, 2012). Cumulative impacts that may result from development outside the shoreline jurisdiction are not considered in this report.

1.2 State Requirements

According to the state shoreline guidelines outlined in WAC 173-26, Part III, Island County is required to evaluate and consider cumulative impacts of 'reasonably foreseeable future development' on the shorelines of the state as follows[2]:

To ensure no net loss of ecological functions and protection of other shoreline functions and/or uses, master programs shall contain policies, programs, and regulations that address adverse cumulative impacts and fairly allocate the burden of addressing cumulative impacts among development opportunities. Evaluation of such cumulative impacts should consider:

- current circumstances affecting the shorelines and relevant natural processes;
- reasonably foreseeable future development and use of the shoreline; and
- beneficial effects of any established regulatory programs under other local, state, and federal laws.

This Cumulative Impacts Analysis uses these three considerations as a framework for evaluating the potential long-term impacts on shoreline ecological functions and processes that may result from development or activities under the SMP over a twenty-year time frame for consistency

[1] RCW 90.58 and WAC 173-26

[2] WAC 173-26-186(8)(d))

with local government Growth Management Act comprehensive plans. This analysis recognizes that cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

1.3 Report Contents

This report provides a planning-level assessment of the potential cumulative impacts that can be expected to occur if the SMP is adopted, approved and implemented. The assessment is limited to cumulative impacts of reasonably foreseeable future development in areas subject to SMA jurisdiction. There are approximately 207 miles of regulated marine and lake shorelines in Island County. Marine shorelines include the waters offshore of the two major islands of Whidbey and Camano and seven small islands out to the centerline of the surrounding waterbodies; and five lakes on Whidbey Island and one on Camano Island. There are also approximately 7,748 acres landward of the ordinary high water mark (OHWM) of these waters that potentially may be regulated by the SMP (these areas are known as shorelands).

This analysis is focused on those uses or developments that have the greatest potential for adverse impacts when considered collectively over the long-range planning horizon. Those uses and developments include residential development and associated activities such as armoring, dock and pier construction, and vegetation clearing; aquaculture; and utility and transportation facilities. Signs are regulated under the SMP but are not considered in this context based on their limited size and effect on shoreline ecological functions.

According to the shoreline guidelines, the assessment of cumulative impacts occurs at both the **planning stage** (when an SMP is being developed) and at the **permitting stage** or the time individual development proposals are reviewed (once an SMP is adopted and implemented). The guidelines suggest that impacts of 'commonly occurring and planned development' be assessed at the planning stage 'without reliance on an individualized cumulative impacts analysis.' In contrast, developments that cause unforeseeable or uncommon impacts cannot be reasonably identified at the time of SMP development and should be evaluated via the shoreline permit process to ensure that all impacts are addressed and that there is no net loss of ecological function after mitigation.[3]

The objective of this Analysis is to evaluate whether commonly occurring shoreline uses and developments within the county will result in cumulative impacts to shoreline ecological functions. The Analysis assists in determining whether the SMP will result in a *net* loss of shoreline ecological functions compared to 'baseline' conditions. No net loss means that impacts may occur, but adequate measures are in place within the overall shoreline program to mitigate them such that the post development conditions are no worse *overall* than pre-development conditions. For this analysis, the baseline conditions are the conditions that are generally identified and described in the Shoreline Inventory and Characterization Report (ESA, March 2012).

Standards and procedures are at the core of any SMP. These are essential for evaluating the effects of specific development actions on a case-by-case basis at the time individual shoreline

[3] WAC 173-26-201(3)(d)(iii)

development proposals are reviewed. These project-level analyses will allow site-scale factors to be considered in the assessment of baseline conditions to supplement the inventory information available for the County. To achieve no net loss, the SMP requires each project to mitigate impacts by avoiding, then minimizing adverse effects, then replacing impacted resources through compensatory mitigation efforts. The SMP requires that avoidance, minimization and compensatory mitigation be employed at the project scale to ensure no net loss of ecological functions on a site-by-site basis.

Appendix A has a series of tables that cite specific provisions in the Island County Shoreline Master Program (per Section 1.1 date above) and the Restoration Plan (Island County, December 2012) that have the potential to affect shoreline ecological functions. The tables are organized such that a brief overview of: 1) current conditions; 2) likely future changes; 3) ecological functions at risk; 4) the effects of SMP policies and regulations; and 5) expected future performance is provided for marine waters (grouped into three geographic areas) and freshwater waterbodies by shoreline environment designation. Additional descriptions of the contents of Appendix A are included in Chapter 2 Methodology.

CHAPTER 2 METHODOLOGY

Determining whether the Island County SMP results in cumulative impacts over time is a multi-step process that was undertaken in the manner described below. This process is outlined in the Ecology SMP Handbook, Chapter 17 Cumulative Impacts Analysis (May 2010).

Step 1: Identify existing shoreline ecological functions. Identifying shoreline ecological functions is a requirement of the Ecology guidelines (WAC 173-26) and is described as follows:

> *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 in varying degrees and scales, and that produce the landscape and habitats as they exists at any time. Ecological functions are the work performed or role played individually or collectively within ecosystems by these components.* (WAC 173-26-201)

Existing ecological functions in the county are documented by waterbody and reach in the Inventory and Characterization report (ESA, March 2012) and summarized in Chapter 3 below.

A summary of existing conditions was provided for each waterbody and corresponding shoreline environment designation in Appendix A that included qualitative descriptions of the following features:

1. Hydrology
2. Associated wetlands and high value wetlands;
3. Water quality;
4. Priority Habitat and Species Use;
5. Riparian habitat quality;
6. Shoreline modifications; and
7. Land use.

In addition, representative indicators of principal ecological functions were quantitatively prepared as part of this analysis and summarized for each waterbody and corresponding shoreline environment designation and include the following functions and related GIS data sources:

Table 2-1. Indicators of Principal Ecological Functions

Indicator	Functions Affected	GIS Data Source	Comment
Armoring	**Habitat**-Riparian and aquatic habitat, sediment supply. Input of organics, prey base, & large woody material. Structure for habitat life needs.	PSNERP, 2009	Marine only
Culverts	**Habitat** – Instream functions. **Water quality**.	Island County, 2006	
Overwater structures	**Habitat**. **Water quality**-toxics	WDNR, 2010	
Impervious surfaces	**Water quality** – removal of toxics, sediment, phosphorous and pathogens through adsorption, filtration and retention. Removal of nitrogen through denitrification. Temperature regulation. **Water quantity** – water storage and flow regulation and reduction in downstream flooding. **Habitat** - formation of habitat structure from LWM, vegetation communities and sediment type/channel configuration that support habitat life needs. Input of organics	NLCD-CCAP, 2006	>10% impervious surface
Roadways	**Water quantity.** **Water quality.** **Habitat**- connectivity	Island County roads, 2009/2010	
Protected lands	**Water quality–**sediment, phosphorus & toxic filtration, conversion, and/or retention; temperature regulation. **Water quantity**-flow regulation. **Habitat**- Riparian and aquatic habitat, sediment supply. Input of organics, prey base, & LWM. Structure for habitat life needs.	CommEn Space, 2004	Washington public lands database, parks, Federal lands

Indicator	Functions Affected	GIS Data Source	Comment
Priority habitat species	**Habitat** – structure for habitat life needs.	WDFW PHS Species, 2011	Bald eagle, common loon, western toad, black oyster catcher, purple martin, osprey, great blue heron
Eelgrass	**Habitat** – structure for habitat life needs, including food and shelter for many species.	WDNR Eelgrass Surveys Puget Sound, 2010	Marine only
FEMA Floodplain	**Water quality** – removal of toxics, sediment, phosphorous and pathogens through adsorption, filtration and retention. Removal of nitrogen through denitrification. Temperature regulation. **Water quantity** – water storage and flow regulation and reduction in downstream flooding. **Habitat** - formation of habitat structure from LWM, vegetation communities and sediment type/channel configuration that support habitat life needs. Input of organics and prey base.	FEMA, 2007	
Forest Cover	**Water quality**–sediment, nutrients & toxic filtration, conversion, and/or retention; temperature regulation. **Water quantity**–flow regulation. **Habitat**-structure for habitat life needs; input of organics & large woody material.	GAP, 2009	Level I land cover types: forest and woodland systems
Riparian Vegetation	**Water quality**–sediment, phosphorus & toxic filtration, conversion, and/or retention; temperature regulation. **Water quantity**–flow regulation. **Habitat**-input of organics, prey base, & LWM. Structure for habitat life needs.	GAP, 2009	Level III land cover types split into native and non-native/disturbed categories: natives include north pacific, temperate pacific and unconsolidated shore categories and non-natives/disturbed include cultivated cropland, developed, disturbed, non-specific, harvested forest, and pasture/hay categories

Indicator	Functions Affected	GIS Data Source	Comment
Wetlands	**Water Quality** – Wetlands filter pollutants and store sediment. **Water Quantity** – Affect groundwater storage and flow regulation. **Habitat** – Affects habitat structure, results in loss of wetland vegetation communities that support habitat life needs.	Island County, 2006 GAP, 2009	Combination of County Wetlands and GAP Level I land cover types (riparian and wetland systems)
Puget Sound Nearshore Ecosystem Restoration Project Degradation Score	**Hydrology and sediment movement**	PSNERP Overall Degradation Score, 2010	

Step 2: Determine reasonably foreseeable future development. A parcel-based lands analysis was conducted to determine the number of vacant parcels and parcels with the potential to subdivide. A full build-out scenario as allowed by the applicable zoning district was used to assess the high-impact scenario of future residential development. A qualitative assessment of residential redevelopment and water-dependent development using a 20-year planning horizon was also conducted. Future development is described in Chapter 4 below. Additional information on the methodology used in this step is included in Appendix B.

Step 3: Determine potential impacts associated with foreseeable development. Step 2 established the amount of residential development the county is likely to see along its shorelines. Step 3 examined the typical impacts that could result from such development as well as other foreseeable uses and developments, as described in Chapter 4.

Step 4: Determine ecological functions at risk. Step 4 compares current conditions and reasonable foreseeable future development to determine ecological functions at risk. Ecological functions at risk are grouped into hydrologic, vegetation, and habitat. The categories are consistent with WAC 173-26-201(3)(d)(i)(C).

Step 5: Determine how impacts will be adequately avoided or mitigated. This step describes the regulations in the SMP that would serve to mitigate potential impacts associated with foreseeable development, with a particular focus on mitigating impacts that would affect ecological functions at risk. This involved addressing the following:

- Are the proposed shoreline environment designation protective of existing ecological functions?
- Are the allowed and conditionally allowed uses appropriate for each shoreline environment designation?
- Are the shoreline buffers, setbacks and critical area buffers protective of existing ecological functions?

- What other regulations in the SMP serve to protect ecological functions at risk and are they adequate to address all potential impacts?

Step 6: Evaluate incremental impacts. This analysis addresses incremental impacts anticipated from development and other activities in the shoreline after mitigation is applied as development occurs. Even with mitigation, development can cause numerous minor impacts to shoreline functions which cumulatively could have adverse impacts. According to Ecology's SMP Handbook (Ecology, 2010), restoration activities included in the Shoreline Restoration Plan should be considered in determining whether the SMP will address cumulative impacts and achieve no net loss. Programmatic restoration measures were identified for each waterbody in Appendix A and considered when determining the overall impact of foreseeable development on existing shoreline ecological functions.

Step 6: Describe beneficial effects. Various existing local, state and federal plans and programs were reviewed to determine if ecological functions and processes would be restored or improved when new development occurs.

Step 7: Explain how the SMP will deal with unanticipated impacts. The final step describes uses and developments that may have unanticipated or uncommon impacts within the shoreline and how the SMP will address such impacts, such as through site-specific analysis or the conditional use permit process. These impacts were considered throughout the development of the updated SMP and will continue to be considered with implementation of the programs during the shoreline permit review process.

CHAPTER 3 EXISTING CONDITION OF ECOLOGICAL FUNCTIONS

The Shoreline Inventory and Characterization (ESA, March 2012) report identifies existing conditions and evaluates the ecological functions and processes in Island County's shoreline jurisdiction. There are approximately 196 miles of marine shoreline in Island County. Whidbey Island, the largest island in Puget Sound, is approximately 35 miles long and 169 square miles and has 143 miles of marine shoreline. Camano Island is approximately 18 miles long, 40 square miles and has approximately 52 miles of shoreline. There are seven other islands, much smaller in size than Whidbey Island and Camano Island. The county also has approximately 11 miles of freshwater lake shoreline, including five lakes on Whidbey Island and one on Camano Island. The county is located within one Water Resource Inventory Area, or WRIA: the Island watershed (WRIA 6). All marine shorelines lying waterward of the line of extreme low tide are designated as "shorelines of statewide significance." The lakes in Island County are not considered shorelines of statewide significance because they are all less than 1,000 acres in size.

3.1.1 West Whidbey

3.1.1.1 Physical characterization

The Strait of Juan de Fuca shores of Whidbey Island are the most exposed shores of the Puget Sound and are heavily influenced by wind and wave driven processes. The shores of West Whidbey are largely encompassed within one large net shore-drift cell with northward drift. The shores of West Whidbey in general incur the most rapid erosion rates in the county and are predominantly bluff backed beaches (43%) and barrier beaches (34%).

On the other hand, the Admiralty Inlet shorelines of Whidbey Island form a complex, crenulated shoreline with more embayments and variable fetch than along the Strait of Juan de Fuca. This has resulted in the development of eight net shore-drift cells and associated depositional landforms including barrier lagoons and estuaries, such as Bush Point and Lake Hancock (Keuler 1988). The direction of drift is influenced by the shore orientation and maximum fetch.

3.1.1.2 Biological characterization

Seven coastal lagoons are mapped and inventoried along West Whidbey Island's shoreline, including Swan Lake and adjoining wetland areas, Perego's Lagoon (a closed barrier lagoon), Crockett Lake and adjoining wetland areas, Admiral's Lagoon, Hancock Lake (a large, intact open coastal lagoon), Bush Point Lagoon (highly modified with surrounding residential development), and Deer Lagoon (partially diked adjoining Useless Bay), as well as several other smaller features. Several short stream segments drain to the marine shoreline. On the Strait of Juan de Fuca, this occurs primarily through Cranberry Lake and Swan Lake. There are several large wetland complexes associated with the shorelines of West Whidbey Island, and several mapped salmonid streams, with one in Reach West Whidbey 8 documented as a spawning stream for salmonids.

Nearshore aquatic habitats and associated coastal lagoons provide habitat that supports a broad assemblage of fish and wildlife species including forage fish populations and habitat for anadromous salmon. All marine nearshore areas are probably utilized for rearing and as

migratory corridors for anadromous salmonids throughout the Strait of Juan de Fuca and Admiralty Inlet shorelines (Beamer, EM, et al., 2006). The entire nearshore extent of the Whidbey's shorelines is designated as Critical Habitat for Chinook salmon; and the Cultus Bay shoreline is designated Critical Habitat for bull trout.

The aquatic areas of West Whidbey Island support red sea urchin habitat, and geoduck, Dungeness crab, and hardshell clams. Eelgrass and kelp areas and areas supporting forage fish are mapped intermittently throughout the shoreline.

Crockett Lake and Deer Lagoon are designated as Important Bird Areas (IBAs) by the Audubon Society (Cullinan, 2001). The brackish lagoons, adjacent marine beaches, associated wetlands, and surrounding riparian and upland areas provide significant habitat for numerous bird species, including high densities of autumn migrating shorebirds and raptors (following shorebirds as prey). Winter habitat is provided for bald eagles and duck species. The Audubon Society has documented 213 bird species in the Crockett Lake area (Cullinan, 2001).

3.1.1.3 Shoreline Use patterns

Land use throughout West Whidbey Island shorelines is characterized by a mix of state and federally owned facilities and property (mostly facing the Strait of Juan de Fuca), low to moderate density residential development and public facilities, public parks, and open space areas. Publicly owned and managed areas range in character from undeveloped parks areas within Fort Casey State Park and reserves (Smith and Minor Islands) to military facilities (Naval Air Station Whidbey Island) and the ferry terminal facility in Keystone Harbor. Residential uses on the shoreline facing the Strait of Juan de Fuca are mostly located between Point Partridge and Swan Lake. Residential development on Admiralty Inlet shorelines occurs behind high bluff areas and along low-banks, with high density pockets of development occurring at Lagoon Point, Bush Point, and Sandy Hook along the east side of Cultus Bay.

Areas of modification are limited along the shoreline facing the Strait of Juan de Fuca but do occur on Admiralty Inlet. Where shoreline residential development occurs in front of shoreline slopes, or in lower bank areas, bulkheads and other armoring are prevalent. Numerous overwater structures providing private residential moorage are located within the Lagoon Point and Sandy Hook communities; these are the only two areas where high densities of private recreational piers are common along the entire West Whidbey Island shoreline. No overwater structures occur along the Strait of Juan de Fuca marine reaches, a result of the high wave and wind energy associated with the shoreline, which makes dock design and maintenance challenging and expensive.

3.1.2 East Whidbey

3.1.2.1 Physical Characterization

The Northeast Whidbey shorelines, including the Deception Pass Islands, are unique due to the proximity to Deception Pass and the strong tidal currents that flow through the area as well as the Skagit River delta. Maximum fetch is from the south, resulting in primarily northward net shore-drift. Southerly exposure is precluded by the north shore of Camano Island resulting in more moderate erosion rates than found in other areas of Whidbey Island. Common shoreforms

include bluff backed beaches, barrier beaches and embayments. The Deception Pass area at the north end of Whidbey Island, and the small islands in that area of the county, have the only rocky shoretypes found within the County.

The Oak Harbor and Penn Cove shorelines of Whidbey Island are some of the more complex, protected shores of Whidbey Island. Shore orientation is variable resulting in more complex patterns of net shore-drift. Penn Cove is far more protected than Oak Harbor, but areas consist of bluff backed beaches with intermittent embayments of variable size.

The Saratoga Passage and Holmes Harbor shorelines of Whidbey Island have moderate exposure, which is largely dependent on shore orientation. Similar to the rest of Whidbey these shores are predominantly bluff backed beaches, barrier beaches and various embayment shoreforms. Key physical processes include a relatively long net shore drift cell with northward drift. Many bluff backed beaches throughout this area are feeder bluffs that supply sediment to down drift barrier beaches. Glacial till overlying glacial outwash and drift dominates the bluffs in the southern end of this reach and transitions to glaciomarine drift to the north.

The Possession Sound shorelines of southeast Whidbey Island are predominantly comprised of bluff backed beaches with fewer areas of barrier beaches. The greatest exposure is found along the southeast shore across Possession Sound from the Snohomish River delta with less exposure to the north along Saratoga Passage on the northeast facing side of this reach. Drift on the southern end of this reach is northward and drift on the north end of this reach is southward resulting in a barrier beach created at Sandy Point. The bluffs in this reach are dominated by a mixture of till and glacial outwash overlying glacial drift.

3.1.2.2 **Biological Characterization**

Marine shorelines along East Whidbey Island provide habitat for outmigrating anadromous salmonids as well as numerous other fish and wildlife species. Coastal lagoons located throughout the east side of the island are presumed to be providing habitat to juvenile salmonids. East Whidbey marine shorelines along Possession Sound provide juvenile rearing habitat for Chinook salmon. The nearshore areas of Northeast Whidbey Island provide important juvenile salmon habitat due to migratory patterns extending out from the Skagit River estuary, located on the opposite shoreline. Dozens of streams drain to the marine shoreline; however, only one is documented as supporting Coho salmon and cutthroat trout.

Aquatic areas along Possession Sound provide habitat for waterfowl, forage fish, Dungeness crab, hard shell clams, pandalid shrimp, and gray whale (seasonal feeding habitat), as well as bald eagle nesting sites. The bedrock shorelines of Deception Pass (including the Deception Pass Islands) support red sea urchin and Dungeness crab, and kelp and eelgrass beds. Holmes Harbor shorelines provide habitat for forage fish and pandalid shrimp habitat, including contiguous eelgrass habitat. Oak Harbor and Penn Cove shorelines support forage fish and hardshell clam habitat.

Penn Cove includes eight subtidal aquatic beds, including eelgrass, and supports a rich population of benthic invertebrates, including extensive mussel beds and numerous clam species. The cove is also important as a winter foraging area for aquatic birds. The site supports an

assemblage of species associated with marine foraging areas, including 26 species of ducks, loons, and grebes. The area is used by wintering black turnstones, feeding and resting surfbirds, peregrine falcons, merlins, nesting bald eagles, and nesting great blue herons. In some years, black turnstone counts have been the highest of all the U.S. Christmas bird counts. (Cullinan, 2001). Penn Cove is a well known commercial shellfish growing area, primarily for mussels, but also for oysters and hardshell clams.

3.1.2.3 Shoreline Use Patterns

Deception and Strawberry Islands are part of Deception Pass State park and are undeveloped. Ben Ure Island is largely undeveloped, with some modification at the eastern and western ends associated with private residences. Land use along East Whidbey shorelines is predominately residential development with park areas located in Northeast Whidbey Island. The three incorporated areas of the county, Oak Harbor, Coupeville, and Langley, and the one other unincorporated area within an urban growth boundary (Freeland), are all located along the east side of Whidbey Island. Residences are located on both low-lying areas near the shore, and atop steep bluffs. Riparian conditions are less altered in areas behind coastal bluffs than those areas with low-bank residential development. Higher levels of shoreline armoring occur in low-bank areas than bluff backed beach reaches. Dense residential development occurs in the Mariners' Cove canal community, Snakelum Point, Harrington Lagoon, Race Lagoon, along Hidden Beach Drive, Sandy Point, and shorelines extending north (for approximately 1.6 miles) and south (for approximately 1 mile) from the Clinton Ferry terminal.

3.1.3 Camano Island

3.1.3.1 Physical Characterization

The Skagit River and Stillaguamish River estuaries and Port Susan shorelines on the eastern and northern sides of Camano Island are predominantly comprised of delta with bluff backed beaches and barrier beaches farther to the north and south of the delta influence. Physical processes are dominated by the influence of the river deltas and two relatively short drift cells on the north and south ends of the area. The southern drift cell is located east of Livingston Bay and exhibits eastward drift toward the delta. The north drift cell is located east of Brown Point on the northern tip of Camano Island and also exhibits eastward drift. The bluffs in the southern drift cell are composed of sandy glacial outwash with a till and glaciomarine drift overlying. Bluff-derived sediment supplies down-drift barrier beaches adjacent to the delta. The northern drift cell has a similar lithology with till overlying sandy glacial outwash.

The Saratoga Passage shorelines of Western Camano Island are predominantly bluff backed beaches. Wind and wave exposure is greatest to the south along most of Saratoga Passage, with some lesser northern exposure. Northward net shore-drift predominates much of the area, resulting in bluff derived sediment feeding down-drift (northern) shores. Theses bluffs are primarily composed of glacial outwash gravels and sands overlying older drift and some glaciomarine drift. Landslides are common on these shorelines.

3.1.3.2 **Biological Characterization**

The Camano Island marine shorelines of Skagit Bay and Port Susan generally face east, facing two significant estuaries draining mainland Skagit County and Snohomish County. The proximity of these estuary areas makes the eastern Camano shorelines important for outmigrating and rearing juvenile salmonids, including anadromous bull trout populations. Significant portions of the estuary wetland areas have been modified by agricultural land uses, especially through diking.

The Camano Island marine shorelines along Saratoga Passage have less coastal lagoon or associated wetland area than Eastern Camano Island and shorelines of Whidbey Island. Several coastal lagoons do occur on the shoreline, including the largest for the island's Saratoga Passage shoreline along Elger Bay. The marine shorelines along Saratoga Passage provide juvenile rearing habitat for Chinook salmon, other anadromous salmonids, as well as numerous other species.

Numerous short, coastal drainages flow on both sides of Camano Island to the marine shorelines; most have no documented salmonid use, but additional studies are under way and may reveal wider use by salmonids. The stream draining to Triangle Cove from Kristoferson Lake and the stream draining Carp Lake do support salmonids, providing juvenile rearing habitat.

Aquatic areas and associated shorelines additionally provide habitat for waterfowl, forage fish, Dungeness crab, hard shell clams, pandalid shrimp, harbor seals, and gray whale (seasonal feeding habitat), as well as bald eagle nesting sites.

3.1.3.3 **Shoreline Use Patterns**

Land use patterns along the eastern marine shorelines of Camano Island are varied between the northern, central, and southern extents:

- The northern shoreline use pattern includes extensive agricultural area intermixed with large-lot (5 to 10 acre) rural development. Two communities of dense (approximately 1/4 acre lots) shoreline residential development are also located along the Port Susan (Juniper Beach community) and Livingston shorelines.
- The central portions of Camano's east-facing marine shoreline are more intensely developed, with higher density shoreline residential development occurring both behind and fronting bluffs. Bluff fronting (low bank) residential development occurs within several disconnected communities, including fronting Triangle Cove, around the Camano Country Club, and Tillicum Beach area (where a boat ramp provides public access). Lot sizes in these areas generally range from 1/6 to1/4 acre in area, with some lots even smaller. Hard shoreline armoring in bluff fronting communities is common. Residential development occurring behind bluffs generally occurs on larger lots, ranging from 1/3 to over an acre in size (depending on area). Residential development occurring behind bluffs in this middle segment generally includes significant clearing of forested vegetation landward of steep slope areas.

- The southern portion of Camano's east facing shoreline (extending along Port Susan to and around Camano Head) is far less developed, with no bluff fronting residential development. Rural development occurring behind coastal bluffs occurs on larger (5 acres or more) lots, with more contiguous and mature forest compared to the middle segment.

The west-facing shorelines of Camano Island have varied shoreline use patterns that can also be characterized in four segments:

- Camano Head shoreline areas southeast of Elger Bay include primarily rural development with large residential lots and development occurring behind coastal bluffs (limited areas of bluff fronting small scale development– approximately 45 developed lots).
- An area of dense residential development occurs along the east shoreline of Elger Bay, where low bank residential development commonly includes shoreline bulkheads. Agricultural uses occur to the north of the bay and the associated coastal lagoon.
- To the northwest of the Elger Bay, shoreline use is dominated by Camano Island State Park and Cama Beach State Park, which include large forested area and some beachfront development.
- To the north of Cama Beach State Park, dense single-family residential development occurs throughout the shoreline area extending almost interrupted to the Utsalady community at the north end of the Island. For approximately 1.8 miles north of Onamac Point shoreline uses are rural, with significant intact forest remaining adjacent to the shoreline and through steep slope and bluff areas (CAM10).

3.1.4 Freshwater Lakes

3.1.4.1 Physical Characterization

Five freshwater lakes in SMA jurisdiction are found in rural areas of Whidbey Island: Cranberry, Deer, Dugualla, Goss, and Lone Lakes. Kristoferson Lake is the only freshwater lake on Camano Island within shoreline jurisdiction. Of these, Cranberry Lake and Dugualla Lake were once brackish or saltwater marshes or coastal lagoons. In the 20th century, the outlets of these lakes were modified to restrict tidal influence and establish the systems as primarily freshwater.

Deer, Goss, Kristoferson and Lone Lakes are not located near marine shorelines, but rather are in or near the headwaters of their respective drainages. Deer Lake does not have mapped streams flowing to the lake. The outflow generally flows east to the marine shoreline south of Clinton. Goss Lake has three intermittent streams that contribute minor inflow early in the year and there is no surface outlet. Kristoferson Creek drains to Kristoferson Lake and continues south to Triangle Cove. A small dam at the south end of the Kristoferson Lake controls outflow and the lake level. Lone Lake is fed by three small inlets and drains to Useless Bay through Deer Lagoon.

3.1.4.2 **Biological Characterization**

Deer, Goss, and Lone Lakes were once surrounded by tall conifer forests and wetlands. Today, the shorelines of Deer and Goss Lakes are largely developed and the shorelines have been partially cleared. The shorelines of Lone, Cranberry, Kristoferson and Dugualla Lakes are abutted by wetlands on much or all of the shorelines. In some areas the riparian forests and wetlands abutting portions of these lakes have been cleared for agricultural use.

Four of the six lake systems support salmonid populations (coho, coastal cutthroat and/or chum). Salmonids use Dugualla and Lone Lakes as well as the both upstream areas and the outflows downstream. The Goss Lake basin is also mapped with salmonid use, extending to just below the outlet of the lake. Kristoferson Lake and the outfall stream support anadromous salmonid use No salmonid use is documented within Cranberry and Deer Lakes.

All lakes on Whidbey Island have waterfowl concentrations, and Kristoferson Lake on Camano Island provides habitat for wood ducks.

3.1.4.3 **Shoreline Use Patterns**

The shorelines of Deer and Goss Lakes are largely developed with detached single family residences. Kristoferson, Lone, Cranberry and Dugualla Lakes have agricultural uses along portions of their shorelines. Kristofferson also has wetlands and riparian forest adjacent. Cranberry has residential uses, wetlands, and the largely forested Deception Pass State Park adjacent.

CHAPTER 4 REASONABLE FORESEEABLE DEVELOPMENT AND POTENTIAL IMPACTS

This chapter describes reasonable foreseeable development that is likely to occur during the next 20 years and associated impacts that have the potential to negatively affect ecological functions identified in Chapter 3.

Ecology guidelines require the inclusion of reasonably foreseeable development as part of the cumulative impacts analysis (WAC 173-26-186). According to the Ecology Handbook (Chapter 17 Cumulative Impacts Analysis, 2010), reasonably foreseeable development is development that is likely to occur during the next 20 years based on the proposed shoreline environment designations, proposed land use density and bulk standards, and current shoreline development patterns.

4.1 Residential Development

4.1.1 Reasonably Foreseeable Future Residential Development

A GIS analysis was conducted to document the foreseeable development that may occur along shorelines in the county. Since a large portion of shorelines in Island County are currently in residential use (40 percent) and are zoned for residential use (63 percent), the analysis focused on the potential for residential development. There is development potential associated with most properties in the shoreline; however, vacant properties and subdividable properties have the most potential to cause impacts to shoreline ecological functions. Redevelopment of existing properties, on the other hand, often provides opportunities to improve conditions.

Appendix B - Methodology describes the steps used in determining properties that are vacant and subdividable. Portions of vacant and subdividable properties that were 100 percent encumbered by mapped wetlands or steep slopes were not considered developable in this analysis.

Table 4-1 shows the results of this analysis countywide. There are 588 vacant parcels in Island County's shoreline jurisdiction. Since there are approximately 9,422 existing parcels in or partially in shoreline jurisdiction, vacant parcels account for 6 percent of the total number of shoreline parcels. There are 188 subdividable parcels in Island County's shoreline jurisdiction, 2 percent of the total number of shoreline parcels. Three percent of the total shoreland area in Island County is considered vacant and 6 percent is considered subdividable. See Figure 1 for the geographic distribution of vacant and subdividable parcels.

Table 4-1. Number of Vacant and Subdividable Parcels and Land Area in Island County

Property Classification	Parcels		Acres	
	Number of Parcels	% of Total Shoreline Parcels	Amount in Area	% of Total Shoreline Area
Vacant properties	587 parcels	7%	250 ac	3%
Subdividable properties	197 parcels	2%	473 ac	6%

Parcels classified as vacant have the potential to develop with an additional 587 residential units county-wide, assuming one residential unit is developed on each vacant parcel. Based on the underlying zoning, the 197 subdividable parcels have the potential to develop into 1,345 lots. Each of the future lots is assumed to have the potential to develop with one new single-family residence. Future potential lots reflect the number of future lots that have some portion of the parent parcel within shoreline jurisdiction (see Appendix B for more information). It is important to note that the potential for new residential units on vacant and subdividable lands **do not** take into account the following:

- land that would be constrained by critical areas and their buffers, other than parcels where the shoreline portion of the parcel is entirely wetlands or steep slope areas;
- land necessary to build supporting infrastructure (roads, stormwater ponds, septic drain fields);
- land that does not have access to potable water;
- land that would not have the ability to provide septic treatment (such as properties which fail the percolation test);
- the likelihood of actual development in the next 20 years (typically referred to as the market factor); or
- the potential for some of these new lots to be located outside of shoreline jurisdiction.

Therefore, the number of future residential units summarized in this analysis is likely higher than would actually occur. Because the factors listed above cannot be reliably assessed with available information, this analysis therefore provides an estimate of impacts that is somewhat greater than would actually occur.

4.1.1.1 New Residential Development on Vacant Lands in each Shoreline Environment Designation

Table 4-2 shows the amount of vacant properties that are located in the shoreline jurisdiction, organized by shoreline environment designations (SED). The Shoreline Residential (SR) designation includes the subtypes of SR Canal Community and SR Historic Beach Community. The percentage values are calculated by dividing the total amount of vacant land located in each SED by the total amount of shorelands in that same SED. For example, 1 percent of all properties in the Natural designation are classified as vacant. Over half of all land considered vacant is located in the Rural Conservancy designation, with vacant properties totaling 141 acres.

Table 4-2. Vacant Parcels and Vacant Acres by SED (Percent of Total SED)

Shoreline Environment Designation	Number of Vacant Parcels	% of Total SED Parcels	Vacant Shoreland (acres)	% of Total SED Area
Natural	87	6%	62	2%
Rural Conservancy	284	9%	141	5%
Urban Conservancy	3	6%	1	4%
Shoreline Residential	213	5%	46	4%
High Intensity	0	0%	0	0%
TOTAL	**587**	**7%**	**250**	**3%**

Table 4-3 shows the number of new potential residential units organized by shoreline environment designation. The percentage of residential units is calculated by dividing the number of units in each shoreline environment designation by the total number of new units. The purpose of this calculation is to indicate the distribution of new residential units across each designation.

Table 4-3. Potential Residential Units on Vacant Parcels by SED (Percent of Total Residential Units)

Shoreline Designation	Residential Vacant Properties	
	Number of Potential Units	Percentage of Total Potential New Units
Natural	87	15%
Rural Conservancy	284	48%
Urban Conservancy	3	1%
Shoreline Residential	213	36%
High Intensity	0	0%
TOTAL	**587**	**100%**

There is the potential for 588 additional residential units to be developed along county-wide SMA shorelines. A majority of residential units would likely occur in the Rural Conservancy designation followed by the Shoreline Residential designation.

4.1.1.2 New Residential Subdivision by SED

Table 4-4 shows the amount of subdividable properties that are located in the shoreline jurisdiction, organized by shoreline environment designations. The percentage values are calculated by dividing the total amount of subdividable land located in each SED by the total amount of shorelands in that same SED. For example, 5 percent of all properties in the Natural

designation are classified as subdividable. Subdividable properties include parcels that extend outside of the shoreline jurisdiction; therefore new lots from subdivision of these lands would not all necessarily be in shoreline jurisdiction.

Table 4-4. Subdividable Parcels and Acres by SED (Percent of Total SED)

Shoreline Environment Designation	Number of Subdividable Parcels	% of Total SED Parcels	Subdividable Shoreland (acres)	% of Total SED Area
Natural	33	2%	167	5%
Rural Conservancy	80	2%	252	9%
Urban Conservancy	17	31%	8	23%
Shoreline Residential	66	2%	45	4%
High Intensity	1	7%	1	6%
TOTAL	**197**	**2%**	**473**	**6%**

More than half of the subdividable land area in the shoreline is located in the Rural Conservancy designation, with vacant properties totaling 252 acres.

As mentioned earlier, one hundred and ninety-seven parcels with the potential to subdivide were assumed to have the potential to subdivide up to the zoning limit on density. Table 4-5 shows the number of new potential residential lots organized by shoreline environment designation. The percentage of residential lots is calculated by dividing the number of lots in each shoreline environment designation by the total number of new lots. The purpose of this calculation is to indicate the distribution of new residential lots across each designation.

Table 4-5. Potential New Residential Lots on Subdividable Lands by SED (Percent of Total Residential Lots)

Shoreline Designation	Subdividable Properties	
	Number of Potential Lots	Percentage of Total Lots
Natural	420	31%
Rural Conservancy	544	40%
Urban Conservancy	66	5%
Shoreline Residential	306	23%
High Intensity	9	1%
TOTAL	**1,345**	**100%**

There is the potential for 1,345 new residential lots along county-wide SMA shorelines. Each new residential lot would presumably be developed with one new residential unit, resulting in

1,345 new residential units. The Rural Conservancy designation would have the greatest number of new units, followed by the Natural designation.

4.1.2 Reasonably Foreseeable Residential Redevelopment

Based on past development patterns as reported by the Island County Building Official, approximately ten percent of the existing housing stock along Island County's shorelines are expected to redevelop in the next twenty years (personal communication, Stewart 2012). As of 2010, there were an estimated 8,300 housing units located at least partially within the shoreline jurisdiction. Should ten percent of the existing housing units redevelop in the next twenty years, approximately 830 residences would be redeveloped, that is, either replaced altogether or expanded to such a degree that they would be regulated as new development.

4.1.3 Potential Impacts of Residential Development

Construction of a single-family residence, when carefully sited outside of critical areas and shoreline buffers, does not typically result in major adverse effects on shoreline resources. When residential development is allowed in critical area buffers or shoreline buffers, either as reconstruction of existing, legal nonconforming developments or new developments under reduced critical area or shoreline buffer scenarios, mitigation for buffer impacts is required. When considered as a whole, however, the suite of activities and alterations associated with residential development across the county shorelines can cause cumulative effects on shoreline resources. Most of the effects are caused by uses commonly associated with residential development including construction of primary residences and associated (also called "appurtenant") structures, site clearing and grading, construction of driveways, removal of shoreline vegetation, use of fertilizers and other chemicals, alteration of natural drainage pathways, construction of docks/piers, bulkheads, boating activities and the like. These actions typically cause a variety of impacts that affect shoreline ecological processes and can cause cumulative damage to fish and wildlife species and their habitats. Table 4-6 provides a summary of common effects to shoreline resources associated with residential development.

Table 4-6. Common Effects to Shoreline Resources from Residential (Re)Development

Development Activity	Ecological Functions Affected	Potential Impacts[4]
Vegetation clearing	• Shoreline Vegetation • Habitat	• Simplification of habitat structure due to removal of large wood, overhanging branches, and boulders • Reduced bluff and beach stabilization, and increased erosion • Decreases in terrestrial food supply, shading, and protection from overhead predators due to clearing of marine riparian vegetation • Increased water temperatures due to loss of shoreline vegetation • Increased beach substrate temperatures during summer low tides • Decreases in terrestrial food sources • Habitat fragmentation and disruption of wildlife travel corridors • Increased incidence of invasive species due to site disruption
Shoreline armoring	• Hydrologic • Habitat	• Loss of backshore habitat • Changes in beach substrate character and downcutting • Loss of substrate appropriate for eelgrass and kelp attachment or growth • Substrate change from altered wave energy & other physical processes • Changes in juvenile salmonid prey diversity and abundance due to alterations in beach substrate and structure • Altered marine shellfish settlement and growth due to changes in sediment loads and size
Creating impervious surfaces & lawn	• Habitat	• Increased pollutant load due to lakes and marine waters from non native landscaping requiring use of fertilizers and pesticides
In-water recreational activity	• Habitat	• Changes to substrate, increased forage fish egg mortality, and fish avoidance from propeller wash and grounding of boats during low tides • Substrate change and fish use impacts (avoidance) during low tides from propeller wash and grounding • Increased injury (lesions, tumors) to salmon and reduced prey and habitat due to water quality degradation from increased stormwater runoff and wastewater discharges • Chemical changes to the water column attributed to terrestrial and aquatic activities – directly affecting shellfish species and plankton (a major shellfish food source) • Introduced predator/parasite species
On-site septic systems	• Habitat	• Eutrophication due to leaky/failing septic systems reducing eelgrass cover due to increased shading from ulvoids and epiphytes • Contamination of shellfish harvest areas by increased nutrients & bacteria • Algal blooms in lakes due to increased nutrients and bacteria
Noise and lighting	• Habitat	• Changes in fish and wildlife behavior patterns

Shoreline armoring is a concern with many types of shoreline development but is especially common with residential development along Island County marine and freshwater shorelines. Shoreline property owners have traditionally attempted to protect their land against the erosive effects of wind, waves and currents using conventional wood, concrete or riprap structures.

[4] The list of potential impacts is adapted from Protecting Nearshore Habitat and Functions in Puget Sound: An Interim Guide (EnviroVision et al., 2007)

However, bulkheads can disrupt sediment generation and adversely affect shoreline morphology and habitat functions, including habitat fragmentation, loss of migratory corridors, and degradation of foraging habitat. Bulkheads and other types of fills can also force juvenile salmon into deeper water, where the risk of predation may be significantly higher.

Removal of shoreline vegetation, which often accompanies residential development, decreases terrestrial food sources, and reduces shade and large woody debris recruitment potential. It can also result in shifts in micro-climate (such as increased water temperatures due to loss of shoreline vegetation, increased marine beach substrate temperatures during low tide in summer), reduced bluff (marine) and beach stability, and increased erosion.

Residential and associated recreational uses of the shorelines pose additional threats to shoreline functions. Potential impacts on shorelines include noise impacts to fish and wildlife, lighting impacts, spreading invasive and exotic species of plants, and disruption to habitat from domestic animals and human presence. Additional potential impacts to shorelines where motorized water craft are allowed include increased wave energy and shoreline erosion, re-suspension of contaminated sediments and/or increased turbidity caused by propeller scour, and possible introduction of chemical pollutants from boat emissions.

4.1.3.1 New Development

Many areas with the greatest potential for new shoreline residential development are characterized with largely intact ecological functions. As such, without appropriate planning and management tools, new development has significant potential to degrade the shoreline environment. New development within areas that were previously vacant or used as private timberland can reduce native vegetation, including reduction of intact buffer width and riparian alterations for shoreline access, landscaping, and view corridors, increase impervious surfaces, and present new potentials for future shoreline stabilization.

4.1.3.2 Redevelopment

On the most intensively developed shoreline areas, older dwellings, many of which were built as seasonal cabins, can be expected to be remodeled or replaced with larger structures and used for more of the year. Regulations for these communities already vary in terms of density, and each has a character that is unique in some way. However, as described above, each community has a fairly consistent distance between structures and the water's edge, and most have little native vegetation adjacent to the water. The proposed regulations would generally not allow structures to be constructed substantially closer to the shoreline than is the pattern in the area, although some waterward expansion could be allowed. As discussed above, most cases would require vegetation enhancement at the water's edge proportional to the scale of the development.

Some redevelopment could occur in less dense areas, but the regulations establish buffers and setbacks that will ensure that existing riparian vegetation is retained. Key risks associated with redevelopment of shoreline properties include increased impervious area and vegetation clearing. Given the limited amount of vegetation in most of the older residential areas, and the requirement to provide enhancement, vegetation clearing for redevelopment is not likely to affect shoreline functions cumulatively. Impervious areas could increase, but the regulations do provide an upper limit not currently present in the SMP.

Redevelopment also provides an opportunity to improve degraded functions, such as riparian restoration, removal of hard-shoreline armoring (bulkheads or riprap), or other actions which are not likely to occur if expansion of the uses on the site are not allowed. Typical redevelopment of a single family home includes installation of a new septic system. Construction of new dwellings on some of the waterfront spits have necessitated new, off-site septic systems that resulted in improved water quality. Thus the opportunity to redevelop provides an incentive to invest in a more sustainable pattern of development than would be allowed if strict rules simply cemented the existing pattern in perpetuity.

4.2 Aquaculture

4.2.1 Reasonable Foreseeable Future Aquaculture Development

Aquaculture is a preferred use of the shoreline (RCW 90.58.020, WAC 173-26-201(2)(d), and WAC 173-26-241(3)(b)(i)(A)) and in most cases is water-dependent. It includes a broad array of activities such as the commonly known salmon net pens, floating shellfish culture, and commercial geoduck farms and other less known activities such as culturing seed in a small barge in an urban marina. The first use of floating shellfish culture in Washington state began in 1975 with mussel raft culture in Penn Cove. Current floating shellfish culture on rafts or longlines include oysters, mussels, and scallops. New aquaculture methods and processes continue to be developed.

Existing commercial aquaculture in Island County is in the form of shellfish culture mostly concentrated in Penn Cove. Penn Cove is a well known commercial shellfish growing area, primarily for mussels as well as oysters and hardshell clams. Future aquaculture development is anticipated to occur in Penn Cove and could occur in Holmes Harbor and Port Susan provided any existing water quality issues are addressed. There have been no recent permit applications for installing new shellfish aquaculture facilities in Island County.

Concern has been raised about the potential for cultivation of non-native fish, especially Atlantic Salmon, which occurs elsewhere in Puget Sound, and which carries risks of introducing pathogens that could impact native salmonid species, including species that are listed as threatened or endangered. In response to these concerns expressed during local public hearings, a report from Kenneth M. Brooks and Conrad V.W. Mahnken submitted by a fisheries expert, and based on the Island County Regional Aquaculture Study and EIS, the Island County Board of County Commissioners voted to continue the existing restriction prohibiting net pens within 12 statute miles from salmon bearing rivers, and to not allow Atlantic Salmon for net pen aquaculture. The EIS page I-6 states that "Introduction of exotic species which can reproduce and are dominant over naturally occurring species may cause long-term adverse impacts." Fish species that meet the SMP criteria would be considered and could be located in Penn Cove and Holmes Harbor consistent with terms of a shoreline conditional use permit.

4.2.2 Potential Impacts of Aquaculture

Aquaculture has the potential to cause adverse ecological impacts because it can disturb aquatic vegetation and substrates, introduce non-native organisms, introduce chemicals/nutrients, and require use of predator control devices which can harm birds and other wildlife. Aquaculture can also impact the visual and aesthetic qualities of the shoreline and potentially disrupt recreational

use. These effects may be more likely to occur with large-scale or intensive commercial operations than with recreational beach culturing or hand-harvest.

In Island County, all marine waters are classified as critical saltwater habitat, due to the presence of critical salmonid habitat, but there are also many other critical habitat components present, and typically any given area will have at least two or three components. These can include kelp and eelgrass beds, forage fish spawning areas, coastal lagoons and estuaries, and other features. As with other shoreline uses and development, aquaculture may have potential impacts on critical saltwater habitats that will be subject to permit limits and conditions or mitigation. Potential impacts would vary depending on project details and site specific conditions and would need to be evaluated during application review. For this reason, aquaculture development requires preparation of a site-specific biological site assessment and habitat management plan, in addition to complying with NPDES, DNR leasing, and other requirements that apply.

Aquaculture can also have beneficial effects on the shoreline. For example, clams, mussels and oysters contribute to improved water quality through filter feeding and provide habitat for other marine organisms. The net effect of aquaculture use on shoreline ecology depends on a variety of factors including the location of the aquaculture farm, the species cultivated, and the growing and harvest methods.

4.3 In-water Development

4.3.1 Reasonably Foreseeable Water-dependent

Existing single family docks and piers are generally sparse on marine shorelines, due in many areas to wind and wave conditions that make such structures costly and in some cases unsafe for moorage. On shallow beaches and tideflats, such structures would need to be so long that they are too costly for single family development. However, there are concentrations of docks in three marine areas: Sandy Hook, Lagoon Point on Whidbey Island, and the Camano Island Country Club lagoon. Docks are also common on Goss Lake, Deer Lake, and Lone Lake. Moorage buoys are common around Camano Island, and in a few areas of eastern Whidbey Island, with more concentrated buoy moorage in Honeymoon Bay and Holmes Harbor. Future dock construction is expected to be located in areas already developed with existing docks and buoys such as those areas described above. This is because remaining areas of Whidbey and Camano Island are not conducive to dock or pier construction due to wind and wave energy. Dock reconstruction is also expected, although it is not possible to estimate the degree to which this will occur.

Marina space outside of incorporated areas is limited to three facilities in Cornet Bay at the north end of Whidbey Island. There are also numerous public and private boat launch ramps on both Camano and Whidbey Islands.

Ferry docks operated by Washington State are located at in unincorporated areas at Keystone and Clinton, and there are no plans to expand these facilities.

4.3.2 Potential Impacts of In-Water Development

Overwater and in-water structures including docks, piers, mooring buoys, boating launches and marinas primarily affect aquatic processes, species, and habitats by changing light conditions,

wave energy, substrate size and type, and water quality (Nightingale and Simenstad 2001). Artificial nighttime lighting can have affects on predators and juvenile fish (Simenstad et al. 1999, Rich and Longcore 2005). Within lake systems, overwater and in-water structures (in Island County, limited to docks, mooring buoys, floats, and boat ramps) are associated with similar impacts. Overwater structures affect the following processes and functions:

1. Substrate modification due to piling placement and grounding of boats, floats and/or structures;
2. Reduced light levels can affect photosynthesis and therefore growth and reproduction of phytoplankton and benthic vegetation;
3. Changes in plant species composition and abundance affect aquatic food webs;
4. Reduced light levels, and particularly sharp boundaries between light and shade, affect fish feeding, predator avoidance, schooling, and migration behaviors;
5. Reduction or loss of eelgrass and kelp beds in marine environments due to shading by over-water structures or anchor-line dragging in the case of moorage buoys;
6. Altered wave energy and sediment transport dynamics (e.g., scour areas), changing substrate size and stability, which in turn can affect communities of benthic animals and forage fish spawning;
7. Diminished wave energy due to close placement of pilings, causing finer sediments to fall out of suspension where they normally would remain in transport. Reduced wave energy associated with pilings can also prevent natural transport of larger sediments;
8. Substrate disturbance and increased turbidity during construction of structures;
9. Contaminant leaching from construction materials (e.g., creosote piles) into sediments and the water column,
10. Water quality degradation resulting from marina development such as boat engine exhaust, sewage discharge, fuel spills, and stormwater runoff from adjacent parking lots;
11. Increased artificial nighttime lighting, which can attract predators potentially exposing juvenile fish to greater levels of predation, alter movement and migratory behavior of juvenile fish, including salmonids, and affect reproductive behavior of night-spawning forage fish.

4.3.3 Utility and Transportation Facilities

Development of utility corridors and roads can involve direct impacts to important habitats associated with marine and lake shorelines, including associated wetlands, marshes, and barrier beaches. Facilities have historically required shoreline fill and armoring, and when developed in coastal floodplain areas – or other areas susceptible to sea level rise – present future potential for armoring. Utility and road facilities may also disrupt wildlife migratory corridors, contribute pollutants to marine and lake aquatic environments, and increase sediment deposition in shoreline waters. Surface water runoff from roads can increase pollutant loading of heavy metals, oils and grease in nearby waters.

4.3.4 Exempt Activities

There are several developments or activities that would be exempt from obtaining a shoreline substantial development permit under the SMP, although in some cases, a conditional use permit may be required. Some of the most common developments and activities that are considered exempt include: single-family development and appurtenances, normal protective bulkheads associated with single-family development, agricultural practices, dock modification below the threshold criteria for fair market value, vegetation clearing and maintenance, and restoration projects. Exempt activities are required to comply with the SMP goals, policies, and conservation measures even though a permit is not required. Of these only those that would require a federal permit (Section 10 or Section 404) require a letter of exemption from the County that verifies the project would conform. For projects that require County permits, including clearing, grading, and most construction, the County reviews the projects for compliance with the SMP before the permit is issued. Other exempt activities are enforced only on complaint basis.

Impacts associated with single-family development, bulkheads, and docks are described in the section above. Existing agriculture practices such as grading for cultivation removes riparian vegetation, affecting water quality functions (e.g., temperature) and nutrient inputs to aquatic environment (e.g., excessive nutrients from fertilizers; lack of nutrients and food sources overhanging vegetation. Irrigation facilities (e.g., diversions, channels, pumps, dikes) would alter hydrologic processes (timing and volume of flows) and drainage patterns. Irrigation systems would divert water, reducing water quantity downstream.

Restoration projects could benefit shoreline processes such as improving riparian zone habitat, restoring historic tidal connectivity with associated wetland features, improving fish access and passage in coastal streams – and for some Island County basins, to and upstream of SMP regulated lakes.

4.3.5 Uses Requiring a Conditional Use Permit or Variance Process

Developments that have impacts that cannot be anticipated or are considered uncommon, which cannot be reasonably identified during the SMP planning process, are typically allowed only with approval of a conditional use permit. Evaluation under the conditional use permit process ensures that all impacts are addressed and that there is no net loss of ecological function after mitigation. Local governments make decisions on Shoreline Conditional Uses, but these decisions need review and approval by Ecology and provide opportunities for citizens to provide input into Ecology's decision and provides for the opportunity to appeal final decisions to the State Shorelines Hearing Board.

For example, impacts and effects from marine renewable energy facilities are still emerging due to their uncommon use in the region. Known potential impacts include those described above for other types of in-water development, where facilities require piers, in-water utilities, or other in-water structures or fill. Other less known impacts due to noise or other disruptions to the subtidal environment may potentially include impacts to subtidal and pelagic habitats and wildlife, including numerous species of fish and marine mammals. Requiring this use to obtain a conditional use permit would help identify and address such impacts during the permit process.

Developments that do not comply with bulk and dimensional standards in the SMP, or cannot adhere to the standards in the SMP including the provisions to protect critical areas could only be

allowed if a shoreline variance permit is approved. Shoreline variances for overwater structures are very rare. Variances for single family development are the most common types, and are typically granted for unusually constrained sites to allow a reasonable level of development as compared with similarly-sized lots in the same SED. Evaluation under the variance process must ensure that all impacts are addressed through mitigation. The shoreline variance process also elevates final decision-making to Ecology with statewide opportunity to for involvement in hearings and appeals.

4.3.6 Illegal Activity

Illegal actions or violations that may or may not be known or remedied via enforcement often cause significant impacts on ecological functions and processes. A dock built illegally, vegetation removed from a buffer, or unreported spills of pollutants could adversely affect shoreline ecological functions. Illegal grading or construction of bulkheads, or construction of structures without permits or mitigation, can cause harm to shoreline resources. Without enforcement, impacts from such activities would not likely be mitigated. Once identified by the local government, illegal actions are expected to be corrected through enforcement and it is assumed that after-the-fact mitigation would be required as part of that enforcement.

CHAPTER 5 ECOLOGICAL FUNCTIONS AT RISK

This chapter describes the shoreline ecological functions most at risk from development, based on the findings of the Shoreline Inventory and Characterization report and the reasonable foreseeable development described in Chapter 4. It also describes how development would affect ecological functions.

5.1.1 Water Quality

Water quality in the nearshore and marine waters of Island County is affected by inputs of nutrients and organic matter from adjacent uplands, streams, rivers, and groundwater seeps, as well as from nearshore bottom sediments and mixing with deeper ocean waters via upwelling and estuarine circulation. Water quality may also be locally affected by the impacts of contamination from discrete events, such as spills of chemicals or other hazardous substances directly onto a shoreline or into a contributing flow pathway.

In general, inputs from natural sources of nitrogen and phosphorus – two key components of water quality - are several orders of magnitude greater than anthropogenic sources in Puget Sound (Harrison et al., 1994). However, in highly developed areas of the Puget Sound, anthropogenic inputs have been shown to far exceed what can be contributed naturally (Fagergren et al., 2004 study of the Hood Canal, for example).

As new development and redevelopment occurs along Island County's freshwater and marine shorelines, potential for water quality degradation will occur. New or more intense uses within shoreline areas, no matter the existing riparian condition, may have potential to impact water quality functions that occur naturally as surface waters and shallow groundwater filters through these areas. New development and changes in land cover, including areas entirely outside of shoreline jurisdiction, may alter both natural processes that maintain water quality and increase sources of anthropogenic water contaminants. Existing and new development utilizing septic systems is an additional threat to water quality, especially where systems occur along or within narrow shoreline riparian zones.

5.1.2 Water and Sediment Movement

Many of the broad physiographic processes identified by Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) as being most important to the creation, maintenance, and function of Puget Sound's shoreline ecosystems are associated with water and sediment movement, including the following processes (from Clancy et al., 2009). For each process, key threats from foreseeable shoreline development in Island County are identified.

- **Sediment input** - Delivery of sediment from bluff, stream, and marine sources into the nearshore; sediment input interacts with sediment transport to control the structure of beaches. **Key threats** include shoreline armoring (disconnecting bluff sources of sediment) and changes in contributing basins (elimination of forest cover and increases in impervious surface) occurring both within and outside of the shoreline environment. New residential development, including subdivision, is closely associated with threats to

sediment input, and is the most commonly foreseeable future development throughout the County's shoreline jurisdiction.

- **Sediment transport** - Bedload and suspended transport of sediments and other matter by water and wind along (longshore) and across (cross-shore) the shoreline; process strongly influences the longshore structure of beaches. **Key threats** include shoreline modifications that break the continuity of sediment transport, such as piers, groins, and armored shoreline fill. While these threats currently existing along the Island County shoreline – primarily in High Intensity designated areas, as well as the Freeland Shoreline and some Shoreline Residential Areas – foreseeable future development of piers, groins, and armored shoreline fill is limited.
- **Erosion and Accretion of Sediments** - Deposition and settling (accretion) of non-suspended and suspended sediments / organic matter (respectively) on marsh and other intertidal wetland surfaces; processes are responsible for creation and maintenance of barrier beaches (e.g., spits) and tidal wetlands. **Key threats** include shoreline modifications that break the continuity of sediment transport, such as piers, groins, and armored shoreline fill, as well as shoreline development that requires dredging. While these threats currently existing along the Island County shoreline – primarily in High Intensity designated areas, as well as the Freeland Shoreline and some Shoreline Residential Areas – foreseeable future development of piers, groins, and armored shoreline fill is limited.
- **Tidal Flow** - Localized tidal effects on water elevation and currents, differing significantly from regional tidal regime mostly in tidal freshwater and estuarine ecosystems. **Key Threats** to tidal flow are limited due to the large scale of change required for substantial impact (far greater than potential impacts associated with residential development, for example), however diking and fill / armoring waterward of ordinary high water has the potential to impact this process. While existing modifications to tidal flow processes occur – primarily at Deer Lagoon, Crocket Lake, Dugualla Lake, and within Reach 1 of the Camano Island shoreline – future development that would require new threats to tidal flow processes is not anticipated.
- **Distributary Channel and Tidal Channel Formation and Maintenance** – Processes influence the formation and maintenance of pocket estuaries, marshes, and mudflats along the County's shorelines. **Key threats** include shoreline modifications that break the continuity of sediment transport within pocket estuaries and marshes, including dikes, dredging, and fill waterward of ordinary high water. While there are existing modifications to this marine process– primarily at Deer Lagoon, Crocket Lake, Dugualla Lake, Swantown Lake, and the lagoon along South Beach Drive within Reach CAM03 (Port Susan shoreline of Camano Island) – future development that would increase threats or create new treats is not anticipated.
- **Freshwater Input** - Freshwater inflow from surface (stream flow) or groundwater (seepage) in terms of seasonal and event hydrography. Freshwater input affects the pattern of salinity, water quality and chemistry, and sediment and soil moisture content across the nearshore. **Key threats** include riparian zone degradation and changes in contributing basins (elimination of forest cover and increases in impervious surface) occurring both within and outside of the shoreline environment. Some level of alteration

occurs within each of the numerous contributing basins throughout the County. Areas of higher existing alteration include agricultural areas and the following areas:

- On Whidbey Island: areas surrounding Oak Harbor and Naval Air Station Whidbey Island, Coupeville and Ebey's Landing, Greenbank and adjacent to the Holmes Harbor shoreline extending north, areas Surrounding Deer Lagoon and Useless Bay, the Langley vicinity, and Clinton; and the following areas;
- On Camano Island: the 'Camano Island' community vicinity, the Utsalady area, the areas surrounding Triangle Cove and Smith Lake, and the entire northeast portion of the island.

The water and sediment movement processes detailed above are relevant to marine shoreline ecological functions and condition. Two of these processes are also relevant to maintenance of the County's six lake shorelines – sediment input and freshwater input. The threats to these processes are also similar, including new shoreline armoring, riparian zone degradation, and changes in contributing basins (elimination of forest cover and increases in impervious surface) occurring both within and outside of the shoreline environment.

5.1.3 Habitat

Development and shoreline modification have significant potential to impact shoreline and aquatic habitats. Common mechanisms of impact include habitat elimination (eg: riparian clearing, wetland fill, shoreline fill, construction of an overwater structure across forage fish spawning areas), degradation (alterations to immediately adjacent areas; disturbances within habitats), fragmentation, and indirect impacts (for example, hydrologic and water quality changes from newly developed impervious surfaces). Specific habitat types and potential impacts are detailed in the following sections.

5.1.3.1 Riparian Zones, Including Coastal Bluffs

A diverse assemblage of wildlife species are associated with riparian habitat zones, both within the marine and lacustrine shoreline environments. Along significant portions of Island County's marine shoreline, riparian zones include bluff habitat, which provide unique nesting habitat for several bird species (including bank swallow, pigeon guillemot, and belted kingfisher).

The habitat quality of existing riparian zones in Island County varies, and is influenced by the amount of disturbance to the native vegetation. Development and redevelopment can be a direct threat to these habitats. Common impacts include:

- Simplification of habitat structure due to removal of large wood, overhanging branches, and boulders
- Reduced bluff and beach stabilization, and increased erosion
- Decreases in terrestrial food supply, shading, and protection from overhead predators due to clearing of riparian vegetation
- Impacts to adjacent aquatic and nearshore habitats, including increased water temperatures due to loss of shoreline vegetation, reduction in organic input, and increased substrate temperatures
- Habitat fragmentation and disruption of wildlife travel corridors
- Increased incidence of invasive species due to site disruption

5.1.3.2 Marine Tidal and Subtidal Habitats

Marine tidal and subtidal habitats support an array of terrestrial and aquatic organisms. These habitats are diverse along the Island County marine shoreline, and include the following:

- **Pocket and barrier beaches** - Areas with unconsolidated sediments that are moved, sorted, and reworked by waves and current, supporting shorebirds and mammals (otter, seals, and other species), shellfish and crustaceans, and numerous fish species (including forage fish).
- **Tidal flats** – The County's tidal flats (Livingston Bay, Juniper Beach, Cultus Bay – among other areas) are highly productive habitats, supporting high primary productivity and a diverse assemblage of benthic invertebrates and fish. Algal production on the surface of tide flats is an important source of food for prey items of salmonids and other fish.
- **Kelp and eelgrass** – Kelp is a macro-algae and eelgrass is a marine seagrass. Both form dense beds in the lower intertidal and subtidal zones that are highly productive habitats that support crustaceans, fish species (including forage fish and salmonids), and sea birds
- **Coastal lagoons and marshes** - Salt marsh vegetation traps and stabilizes sediments. Lagoons and marshes provide complex, branching networks of tidal channels where juvenile salmonid feed and take refuge from predators, and provide habitat connections to riverine and marine environments.

There are numerous threats to marine tidal and subtidal habitats. Along the Island County shoreline, the most prevalent threats are the indirect impacts of shoreline development and shoreline stabilization. These habitats rely on functioning nearshore processes, including bluff erosion, barrier beach formation, and sediment movement. Alterations to the shoreline, primarily through shoreline armoring, have affected these processes in the county, and additional alteration could further degrade these habitats. Less common direct threats include development of new overwater or in-water development including those requiring tidal fill, piers, floats, or boat ramps.

Sea level rise is expected to affect marine tidal and subtidal habitats, as well as other low-lying areas of shoreland that are already mapped as coastal floodplain. Sea level rise will result in landward migration of the shoreline due to wave action and the addition of sediment from associated bluffs (Johannessen and MacLennan, 2007). Sand beaches associated with estuaries (e.g. Arrowhead Beach on Camano) are particularly vulnerable to sea-level rise, and losses of 50 percent could occur in this century (NWF, 2007). Sea level rise is expected to affect tidal sand and mud flats, resulting in expected expansions in estuary areas (e.g. Port Susan Bay) and conversion of freshwater and estuarine marshes to tidal flats (NWF, 2007). See Section 3.7 of the Inventory and Characterization Report for additional discussion of sea level rise and associated implications.

5.1.3.3 Streams and Freshwater Wetlands

Numerous relatively short streams drain to the marine shorelines of Island County, several of which drain from the six lakes in the shoreline jurisdiction. Freshwater wetlands are associated

with both marine and lacustrine shorelines. Streams, as well as associated freshwater wetlands, draining to the marine shoreline commonly support both anadromous and resident salmonids. Although few streams in Island County have documented salmonid use, additional studies currently underway are expected to identify more extensive salmonid use. Streams provide aquatic habitat for numerous other fish (sculpin, dace, stickleback) and invertebrate (crawfish, stoneflies, caddis flies) species. Freshwater wetland habitats support an assemblage of bird, terrestrial mammal, and amphibian species.

Direct threats to streams and freshwater wetlands are largely managed throughout Island County by implementation of Critical Areas protections, which requires protective buffers and highly limits the types of uses that can impact or occur within a stream or wetland area. However, some modifications are still allowed (for public facilities, stormwater outfalls, and utilities, for example – especially where other alternatives with less impact are not available). Like riparian zones, streams and freshwater wetlands are also threatened by adjacent development, both through fragmentation and indirect impacts.

5.1.4 Hydrology

Hydrologic processes operate via two main pathways: infiltration and groundwater recharge. In healthy watersheds, precipitation infiltrates the soil and moves down slope (or laterally) as subsurface flow, feeding streams, lakes, and wetlands, before eventually discharging to the marine shoreline (either via stream mouths, associated wetlands, or as shallow groundwater).

Surface runoff and peak flows are inversely correlated to infiltration and recharge so development actions that reduce infiltration increase the magnitude and frequency of runoff and peak flow events. Two of the most fundamental development actions in this regard are the conversion of pervious surfaces to impervious surfaces and the loss of mature forest cover.

CHAPTER 6 EFFECTS OF ISLAND COUNTY SHORELINE MASTER PROGRAM

6.1 Shoreline Designations

6.1.1 Methodology

Preliminary shoreline environment designation criteria were developed by reviewing the existing designation system under Island County's current shoreline master program (SMP), the Ecology Guidelines (WAC 173-26-211) and the Shoreline Inventory and Characterization findings. Consistent with the Ecology Guidelines, the shoreline environment designations were generally applied based on:

- the existing use pattern;
- the biological and physical character of the shoreline being considered for development; and
- the goals and aspirations of community as expressed through comprehensive plans

The preliminary designation criteria were incorporated in *Section 17.05A.060 Shoreline Environment Designations and Maps* of the SMP. The criteria are included below and will be used to apply designations to future shorelines:

Areas designated **High Intensity** should include only areas that currently support water-dependent uses related to commercial boatyards and marinas, transportation or navigation facilities, or are suitable and needed to accommodate similar water-oriented uses in the next twenty years.

Areas designated **Shoreline Residential** should meet one or more of the following criteria:

- Areas inside County-adopted rural areas of more intense development, if they are characterized by predominantly single family or multi-family residential development or are planned and platted for residential development, but are not predominantly covered by wetlands, stream corridors, or annually flooded areas and when any of the following characteristics apply:
    - Areas that are legally subdivided for residential use at a density of one or more units per acre and are not constrained by inadequate water supply and the inability to dispose of sewage due to soil conditions or lot sizes; or
    - Areas developed with or planned for moderate to high impact recreational uses.
- Shoreline Residential-Canal Communities are higher density residential areas adjacent to manmade lagoons that have historical platting and development patterns no longer allowed by zoning or the SMP.
- Shoreline Residential-Historic Beach Communities are existing marine waterfront lots that are developed with residences thirty feet or less from the ordinary high water mark (OHWM).

Areas inside urban growth areas and non-municipal urban growth areas should be designated **Urban Conservancy** if any of the following characteristics apply:

- They are suitable for water-related or water-enjoyment uses;
- They include open space, floodplains, or other sensitive areas that should not be more intensively developed;
- They have potential for ecological restoration;
- They retain important ecological functions, even though partially developed; or
- They have the potential for development that is compatible with ecological restoration.

Areas designated **Rural Conservancy** should meet one or more of the following criteria:

- The shoreline is generally undeveloped or currently supporting lesser intensity resource-based uses, such as agriculture, forestry, or recreational uses, or is designated agricultural or forest lands pursuant to RCW 36.70A.170;
- The shoreline supports human uses but subject to environmental limitations, including steep slopes presenting erosion and slide hazards, wetlands, streams, areas prone to flooding, or contains areas that cannot provide adequate water supply or sewage disposal;
- The shoreline supports or can support low impact outdoor recreational activities;
- The shoreline has aesthetic, cultural, historic, or recreational qualities of regional of regional or statewide importance;
- The shoreline is predominantly low density residential use; or
- The shoreline has low intensity water-dependent uses.

Areas designated **Natural** should meet one or more of the following criteria:

- Areas that are generally free from development, including shoreline modifications, structures, roads, and high intensity agricultural uses, or have the potential to regain natural conditions with minimal or no restoration activity;
- Areas critical for the support of priority, threatened or endangered species;
- Areas of waterfowl and other bird concentration;
- Areas where the shoreline, whether minimally disturbed or intact, represents an ecosystem type or geologic feature that is of particular scientific or educational interest;
- Forested riparian areas predominantly composed of native vegetation with diverse plant communities, multiple canopy layers, and the presence of large woody debris available for recruitment to adjacent water bodies;
- Areas of shoreline-associated wetlands with generally intact buffers;
- Salt marsh areas that are intact or, if previously used for agriculture, are capable of being restored;

- Feeder bluffs without existing development above or below the slope, or development that is sufficiently set back from the top of slope so that the slope can function normally without endangering the development;
- Undisturbed estuaries or accretional spits;
- Areas unable to support new development or uses without significant adverse impacts to ecological functions, or that possess serious development limitations or human health and safety risks due to the presence of environmental hazards related to flooding, erosion or landslides and similar occurrences; or
- For areas designated due to the presence of specific habitat features, the designated areas should be large enough to protect the value of the habitat resource.

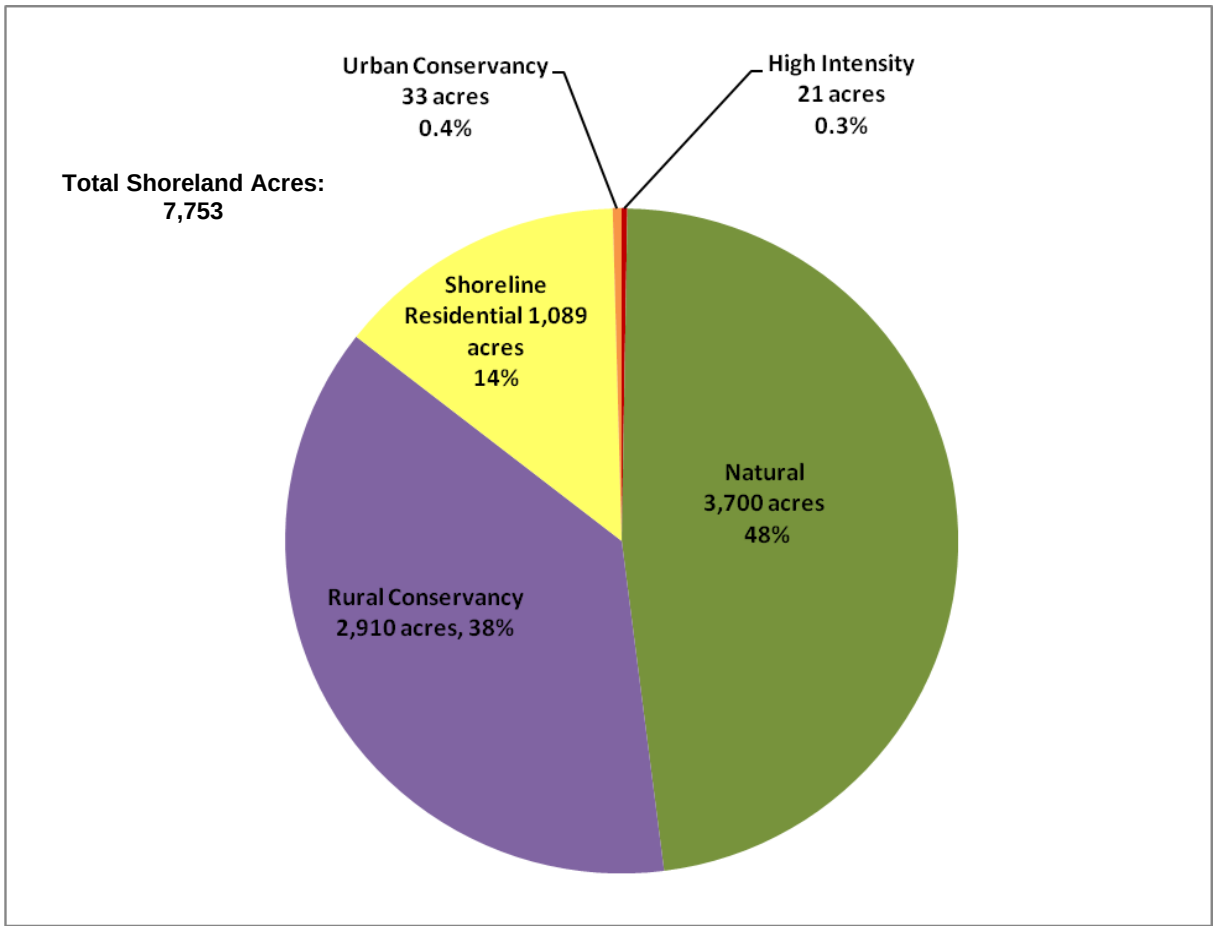
Areas designated **Aquatic** should meet one or more of the following criteria:

- All saltwater areas waterward of the OHWM, including estuarine channels and coastal lagoons, other than those designated High Intensity.
- All SMA jurisdiction freshwater lakes waterward of the OHWM.

6.1.2 Proposed Shoreline Environment Designations

Overall, the most prevalent designation in the proposed designation system is Natural (48 percent). Figure 6-1 indicates the shoreline designations that were assigned to the County's shorelines by percentage of total shoreland acreage. The Aquatic designation is not represented in these acreage totals.

Figure 6-1. Percentage and Acres of Shoreland by Proposed Shoreline Designation



The SED system is designed so that the uses allowed on each shore segment are generally appropriate considering the ecological condition and sensitivity of the land and water, as well as the community land use vision reflected in the zoning.

The type and intensity of uses allowed in areas designated Natural, Rural Conservancy, Urban Conservancy and Shoreline Residential are specified in the updated Shoreline Master Program.

For each SED, the Island County SMP identifies:

- Permitted uses and developments – These are uses and developments that are consistent with the SMA. Such uses/developments require a shoreline substantial development permit or a shoreline conditional use permit. (A letter of exemption is required for projects that are considered exempt from shoreline permit requirements but which require Federal Rivers & Harbors Act Section 10 permits and/or Federal Clean Water Act section 404 permits, which are the permits typically required for docks, piers, bulkheads associated with single family residences. The letter of exemption process is an added check to ensure that the proposed location and design meets all of the requirements of the SMP.)

- Prohibited uses and developments – These are uses and developments that are inconsistent with the SMA in the specified SED, and cannot be allowed through any permit or variance.
- Minimum shoreline buffers and setbacks – Vegetative buffers and setbacks are established for each shoreline environment designation, with the exception of the Aquatic designation. Buffers and setbacks are intended to protect shoreline ecological functions while supporting other priority uses of the shoreline.

6.1.3 Impacts Addressed

Permitted, conditional, and prohibited uses are established for each shoreline environment designation in a manner that limits impacts to ecological functions while allowing for appropriate development in the shorelines of Island County.

There are several land uses or activities that have been prohibited in certain shoreline designations due to their potential to have a substantial impact to shoreline ecological functions or public health and safety. For example, mining activities are prohibited in all designations. This avoids the immediate and long term impacts associated with mining such as removal of riparian vegetation; increased rates of sedimentation; leaching of pollutants; and degradation of water quality. Mobile home parks, floating homes and houseboats, and non-water-dependent industry are also prohibited in all designations.

Conditional land uses are activities that may be allowed in specific instances as long as the impacts of the use do not result in an overall degradation of the quality or health of the shoreline environment. Many of the shoreline designations outline a variety of conditional uses including but not limited to boat launches, float plane docks, marinas, aquaculture, ferry terminals, vehicular routes, utilities, dikes, grading, and groins and jetties. These uses warrant a higher level of scrutiny due to variations in project proposals, location, and their potential for impacts to shoreline ecological functions, public health, and safety.

6.2 General SMP Provisions

According to the Ecology Guidelines, SMPs are required to establish general provisions for all uses, developments, and activities without regard to the specific environment designation. These general requirements are located in Chapter 17.05A.090, .100 and .110 Shoreline Use and Development Regulations (Section A- O) and center around 15 elements.

Table 6-1. Shoreline Use and Development Regulations

Code Section	Code Section Name	Summary of Regulations	Ecological Impacts Addressed
17.05A.090A	General Shoreline Development Standards	Clearing, grading, filling, or alteration of natural drainage features and landforms must be limited to the minimum necessary. Surfaces cleared of vegetation and not developed must be replanted and maintained in perpetuity. Other standards limit construction of shoreline defense and stabilization measures and flood protection works; require avoidance or minimization of impacts to Wildlife Habitat Conservation Areas; and prohibit the release of solid and liquid waste, untreated effluents, oil, chemicals, and construction debris into the water.	**Hydrologic** and **water quality** processes occurring within the shoreline environment are protected through avoidance or minimized; Natural process and functions associated with **coastal floodplains**; Impacts to **marine habitats**, **associated streams and wetlands**
17.05A.090B	Archaeological, Historic and Cultural Resources	Permittees must immediately stop work should human remains or archaeological resources be encountered during site disturbance, excavation or development. Permits issued in areas known to be archaeologically significant or having the potential for the presence of archaeological resources must provide for a site inspection and report by a professional archaeologist.	Not applicable
17.05A.090C	Environmental Protection and Critical Areas	Shoreline developments and uses will be sited, designed, constructed, and conducted in a manner that maintains shoreline ecological processes and functions, and protects the natural character of the shoreline. Uses and developments shall provide a level of protection equal to or better than countywide critical areas regulations and result in no net loss of ecological functions. The mitigation sequence is incorporated in an approach based on conducting biological site assessment and habitat mitigation plans.	Critical areas including critical saltwater and freshwater habitat.
17.05A.090D	Shoreline Buffers, Building Setbacks and Impervious Surface Limits	Marine, lake, and steep slope buffers, and setbacks and impervious surface limits are established for each shoreline environment designation (see Appendix A for more details). Buffers range from 0' to 130'. Residential development, including principal structures and all associated impervious surfaces, must be located landward of the shoreline buffer plus building setback. Native vegetation within shoreline buffers must be maintained in a natural, undisturbed, undeveloped and well-vegetated condition. Buffers that do not have native plants may be maintained in their existing condition until the site is developed	Marine riparian zones; Shoreline vegetation (both within and outside of marine riparian zones); Indirect impacts to marine tidal and subtidal habitats.

Code Section	Code Section Name	Summary of Regulations	Ecological Impacts Addressed
17.05A.090D cont.		or redeveloped. When new uses or developments are proposed on sites where vegetation is lacking within the buffer, the Shoreline Administrator may require buffer enhancement proportionate to the impact of the development. As a general guideline, the percentage of the buffer to be enhanced should equal the percentage increase in impervious lot coverage on the site outside the buffer. The applicant must monitor and provide annual reports for a period of 5 years. Vegetative cover of 90% (unless modified by the Shoreline Administrator) must be met by the fifth growing season or additional plantings may be required. Trails up to five feet in width and beach access structures are allowed in the buffer. If buffers for shorelines or critical areas are contiguous or overlapping, the buffers and setbacks that are the most protective of shoreline resources shall apply. Building setbacks from the shoreline buffer range from 20' to 45' and may include the following: 1) Up to 20% impervious surface area; 2) Structures less than 30 inches in height; and 3) One garden shed and one storage structure over 30 inches in height. Impervious surface limits range from 10% to 80% and are calculated as a percentage of lot area within shoreline jurisdiction.	
17.05A.090E	Shoreline Setback and Buffer Modifications	On lots where the area outside the shoreline buffer, setback, and side setbacks (per zoning standards) and critical area buffer is less than 2,200 square feet, development may extend into the building setback provided: a) The maximum building footprint is no larger than 2,200 square feet. b) Lot consolidation would not alleviate the nonconformity. c) The proposed development has utilized the maximum portion of the lot outside the shoreline buffer, building setback, critical areas, and critical area buffers before extending into the building	Provides minimal development allowances for constrained lots while still providing protection for riparian zones, shoreline vegetation, and associated habitats.

Code Section	Code Section Name	Summary of Regulations	Ecological Impacts Addressed
17.05A.090E cont.		setback. d) Buffer enhancement is provided consistent with 17.05A.090.G. Existing residential structures located within the shoreline buffer or building setback may be expanded within the building setback provided that a) through d) listed above are met. Existing residential structures located within shoreline buffer or building setback may be replaced within the same footprint and location provided buffer enhancement is provided per 17.05A.090.G. Existing residential structure in the RC environment located within the buffer may be modified or expanded provided: a) Expansion is located landward of the rear foundation wall (wall furthest from the water) of the existing structure. b) Lot consolidation would not alleviate the nonconformity. c) Buffer enhancement is provided consistent with 17.05A.090.G. Any development proposed within a shoreline buffer or building setback must be consistent with the following: a) A geologic analysis is prepared that indicates shoreline stabilization for the life of the structure will not be needed; b) The residence is located outside geologic hazard areas; and c) Measures are taken to mitigate adverse impacts, including vegetation enhancement in the buffer or setback area, and using low impact development techniques.	
17.05A.090F	Common Line Setback and Shoreline Buffer Reduction	New and expansion of single-family residences are allowed in the shoreline buffer or setback where there are existing residences adjacent to the project site (within 100 feet) that are nonconforming to the shoreline buffer or building setback. The proposed structure may be built up to a common line drawn between the waterside corners of the facades of each adjacent residential structure. If the common line setback allows the placement of a residence in the shoreline buffer, the area of the buffer must not be reduced by more than 50%.	Provides minimal infill development allowance while still maintaining or improving existing levels of protection for riparian zones, shoreline vegetation, and associated habitats.

Code Section	Code Section Name	Summary of Regulations	Ecological Impacts Addressed
		Enhancement is required when the residence is placed in the shoreline buffer or building setback consistent with 17.05A.090.G.	
17.05A.090G	Shoreline Buffer Enhancements Required	In cases where residential structures (including impervious surfaces) are permitted in the shoreline buffer or building setback, enhancement must be provided as follows: a) If the expansion is greater than 200 square feet and adds impervious surface to the building setback, an equal area of the shoreline buffer must be enhanced with native vegetation. b) If the expansion is greater than 200 square feet and adds impervious surface to the shoreline buffer, an equal area of the shoreline buffer must be enhanced with native vegetation. If impervious surface is removed from the shoreline buffer or building setback, the square feet of removed impervious surface may be deducted from the total of new impervious surface area for which enhancement is required.	
17.05A.090H	Shoreline Buffer Enhancement Standards	When buffer enhancement is a required condition of development, an approved Landscape Enhancement Plan is required. buffer areas must be enhanced with native species, noxious weeds removed, existing impervious surfaces removed from the enhanced buffer, 90% vegetative cover achieved within 5 years, and for lots less than 50 feet in width, enhancement must occur adjacent to the OHWM for at least 20 lineal feet, for lots 51-100 feet in width, enhancement must occur adjacent to the OHWM for at least 25 lineal feet, and for lots greater than 100 feet in width, enhancement must occur adjacent to the OHWM for at least 25% of the width. Monitoring for at least 5 years after planting is required.	Improves riparian zone functions
17.05A.090I	Modification of Shoreline Buffer and Setback Requirements to Encourage Restoration	If an existing bulkhead is removed and replaced with softshore stabilization, the shoreline buffer (or setback for Lagoon Communities) may be reduced by the distance that the setback moves landward, to a maximum 50% reduction in buffer width. A bulkhead removal and shoreline restoration plan must be approved by the Shoreline Administrator.	Provides minimal infill development and redevelopment allowance while improving riparian zone and sediment movement processes and functions
17.05A.090L	Flood Hazard Reduction	New or expanded development that would require flood control works within a stream, channel migration zone, floodway or coastal flood zone is prohibited. Flood control	Natural process and functions associated with **coastal floodplains**;

Code Section	Code Section Name	Summary of Regulations	Ecological Impacts Addressed
		works are allowed only when they are necessary to protect existing development and non-structural flood hazard reduction measures are not feasible.	
17.05A.090M	Public Access	Public access requirements are established for all shoreline developments except for proposals involving four or less residential lots or units.	Not applicable
17.05A.090N	Water Quality and Quantity	All development in the shoreline must comply with the current edition of the Department of Ecology's Stormwater Management Manual. Dock and pier components that come into contact with the water must consist of non-toxic materials that will not adversely affect water quality or aquatic plants or animals. Low impact development techniques must be considered to the greatest extent feasible throughout the various stages of development.	Requires consideration of water quality / hydrologic functions; overtime will maintain or improve these processes over existing conditions.
17.05A.100D 17.05A.110B	Boating Facilities	Controls for number, dimensions, placement and shading. New restrictions on marinas. Requires joint facilities for new multi-family residential, commercial and industrial uses. Requires/encourages public access depending on type of new development. New controls for mooring buoys. Separate standards for SR-Canal Community.	Improves protection of critical saltwater and freshwater habitat. Shading and water quality (toxics).
17.05A.110E	Breakwater and Jetties	Restricted to public access or water-dependent use. Subject to a geotechnical report and Biological Site Assessment. Replacement of existing structures will be regulated as new structures.	Improves protection of critical saltwater and freshwater habitat. Reduce disruption of sediment movement.
17.05A.110D	Dredging	Addresses maintenance dredging and disposal of dredged material.	Improves protection of critical saltwater and freshwater habitat.

Because this Analysis is focused on identifying cumulative impacts to shoreline ecological functions, the following discussion examines in more detail the requirements centered around how the critical areas and vegetation conservation requirements in the Island County SMP address the guideline requirements. Specific use requirements (found in Chapter 17.05A.100) for residential and aquaculture uses are reviewed in addition to shoreline modification requirements (found in Chapter 17.05.110) for shoreline stabilization.

6.2.1 Critical Areas Regulations (Section 17.05A.090.C)

Critical area protections must be included in the SMP per Ecology Guidelines. SMPs are required to incorporate protections for critical areas that assure no net loss of shoreline ecological functions necessary to sustain shoreline natural resources. Critical area regulations for wetlands are adopted by reference in Section 17.05A.090.C.14. Regulations for geologically hazardous areas are established in Section 17.05A.090.C.12 which focuses mainly on requiring development to be consistent with Chapters 11.02 and 11.03 ICC. Fish and wildlife habitat conservation area regulations are established in Section 17.05A.090.C.13.

Critical area buffers are required to protect critical areas such as wetlands, geologically hazardous areas, and fish and wildlife habitat conservation areas. As an overview, critical area buffers for landslide hazard areas, fish and wildlife habitat conservation areas, and wetlands are shown in Table 6-2.

Table 6-2. Summary of buffer requirements for critical areas

Critical Area		Standard Buffer
Landslide Hazard Area or Steep Slope	11’ to 30’ tall slope	50 foot setback from slope Less than 50 foot setback requires a geotechnical report
	31’ to 50’ tall slope	75 foot setback from slope Less than 75 foot setback requires a geotechnical report
	51’ or taller slope	100 foot setback from slope Less than 100 foot setback requires a geotechnical report
Fish and Wildlife Habitat Conservation Area	Critical saltwater habitats	Development must not intrude into, over, or within 10’ from eelgrass meadows and kelp beds except when there is no feasible alternative, alignment or location and the development would result in no net loss of the plant species and habitat. New docks, bulkheads, bridges, fill, floats, jetties, utility crossings shall only be allowed for water-dependent uses, public access, or ecological restoration.

Critical Area		Standard Buffer
Fish and Wildlife Habitat Conservation Area cont.	Nesting Sites and Territory	Heron – 1,000 foot buffer for non-residential and 300 foot buffer for residential Osprey – 600 foot buffer for non-residential and 200 foot buffer for residential Bald Eagle – Demonstration of compliance with all applicable federal laws and regulations.
	Washington Natural Heritage Program Areas	Significant communities dominated by Big Leaf Maple, Douglas Fir – Natural vegetation 50 feet landward of the top of banks and bluffs ten feet or higher must be retained
	Type S stream (shoreline of the state)	150 foot buffer
	Type F Stream (known to be used by fish)	100 foot buffer
	Type Np Stream (perennial stream, no fish present)	50 foot buffer
	Type Ns Stream (seasonal stream, no fish present)	50 foot buffer
Wetlands	Bogs, coastal lagoon, delta estuary and other estuarine wetlands	30'-250' (range dependent on land use intensity)
	Habitat buffers	75'-300'(range dependent on land use intensity, presence of wetland outlet, and habitat function score)
	Water quality buffers	20'-175'(range dependent on land use intensity, presence of wetland outlet, and wetland category)
	Sloped lots	Buffers may be increased at multipliers of 1.3, 1.4, 1.5 depending on the slope gradient

6.2.1.1 **Activities allowed in buffers and structure setbacks**

Buffers are generally required to be left undisturbed but there are some exceptions that allow for buffer reduction. Setbacks may be cleared or modified and may include accessory structures. Setback reductions are also allowed with enhancement of degraded buffer or setback vegetation.

Alternative setbacks to the minimum established landslide hazard area setbacks may be provided by a geotechnical engineer based on the geology, bluff retreat rates, seismic activity and other

considerations. Land disturbing activities are allowed within geologically hazardous areas provided a geotechnical engineering report is submitted to the County and approved.

Stream buffers may be reduced by up to 25 percent if the lot buildable area is less than 2,200 square feet once the applicable buffers and setbacks have been deducted from the total lot area. An area of the remaining buffer equal to two times the area removed from the standard buffer must be enhanced using native vegetation or installed habitat features. Up to 20 percent of the standard stream buffer area can be disturbed with non-native landscaping and pervious, pedestrian trails. Stream buffer averaging is also allowed provided the width is not reduced by more than 25 percent and the total buffer area remains unchanged.

Wetland buffers may be reduced by the County Hearing Examiner when a property owner of a ten (10) acre or larger existing lot is unable to achieve the base density allowed under the zoning code due to the requirements of the critical areas chapter.

The Island County Shoreline Master Program (SMP) strengthens these protections in shoreline areas with minimum marine buffers measured from the OHWM that range from 20 to 125 feet in width, depending on the shoreline environment designation (SED). For the three canal communities, no shoreline buffer would be required which is consistent with current conditions. The SMP also establishes steep slope buffers measured from the top of bluff that range from 30 to 50 feet in width for slopes greater than 40% and exceptional feeder bluffs. Shoreline lakes are protected with a lake buffer ranging from 30 to 130 feet in width. A building setback measured from the landward edge of the buffer is also required and ranges from 20 to 45 feet in width. The SMP clarifies the need for retaining existing vegetation and replacing with native vegetation if that cannot be avoided or minimized. Because the SMA has the goal of encouraging the types of uses that need a water location, such as boating facilities, allowances are provided for those types of uses to encroach into this buffer area with adequate mitigation to achieve no net loss of shoreline functions.

6.2.1.2 Relationship of Shoreline Buffer and Setbacks to Critical Area Buffers

The intent of establishing shoreline buffers and structure setbacks for each SED is to ensure that structures in the shoreline area are placed a suitable distance from the OHWM to protect existing ecological functions, views, and public safety. Critical area buffers, where applicable, are intended to protect aquatic habitats and priority species as well as protect water quality. The two requirements work concurrently to ensure that ecological functions are maintained while achieving the other SMA goals of encouraging public access and water-dependent uses.

Generally speaking, the more protective the SED, the larger the shoreline buffer provided. For example, the lake buffer for areas located in the Natural designation must equal 130 feet. Areas located in a Shoreline Residential designation have a smaller lake buffer of 30 feet.

6.2.1.3 Adequacy of structure setbacks and critical area regulations

The adequacy of shoreline buffers and critical area regulations were reviewed for each shoreline designation and waterbody. Also, where the critical area buffer is greater than the shoreline buffer then the critical area buffer would apply, since it is the more restrictive standard. The

adequacy of shoreline buffers and critical area regulations in the shoreline jurisdiction have been evaluated at a broad planning level to support the review of the SMP for cumulative impacts.

Impacts Addressed

Numerous fish and wildlife species are found in Island County, including marine mammals, forage fish, waterfowl and marine birds, and shellfish. Multiple fish and wildlife species in Island County shorelines have been listed as Threatened or Endangered under federal laws. The species listed below were determined through a review of species information provided by various sources listed at the end of this document, the USFWS, NMFS, and on habitat information provided by Washington Department of Fish and Wildlife (USFWS, 2012; NMFS, 2012; WDFW, 2012). Table 6-3 shows ESA regulated species that occur within Island County.

Table 6-3. Listed Threatened and Endangered Species in Island County

Common Name	Scientific Name	ESA Status *	Jurisdiction
Puget Sound Evolutionarily Significant Unit (ESU) Chinook Salmon	*Oncorhynchus tshawytscha*	Threatened	NMFS
Puget Sound Distinct Population Segment (DPS) Steelhead	*Oncorhynchus mykiss*	Threatened	NMFS
Coastal-Puget DPS Bull Trout	*Salvelinus confluentus*	Threatened	USFWS
Canary Rockfish	*Sebastes pinniger*	Threatened	NMFS
Yelloweye Rockfish	*Sebastes rubberrimus*	Threatened	NMFS
Boccaccio Rockfish	*Sebastes paucispinis*	Endangered	NMFS
Southern DPS North American Green Sturgeon	*Thaleichthys pacificus*	Threatened	NMFS
Steller Sea Lion	*Eumetopias jubatus*	Threatened	NMFS
Humpback Whale	*Megaptera novaeangliae*	Endangered	NOAA Fisheries
Southern Resident Killer Whale	*Orcinus orca*	Endangered	NOAA Fisheries
Marbled Murrelet	*Brachyramphus marmoratus*	Threatened	USFWS

∗ **Threatened**: Species are likely to become endangered within the foreseeable future. **Endangered:** Species that is in danger of extinction throughout all or a significant portion of its range.

Marine mammal haulouts have been mapped by WDFW offshore of Camano Island in Skagit Bay, near Livingston Bay, Near Baby Point (East Whidbey), on Smith and Minor Islands, and on Double Bluff Point (West Whidbey). Documented forage fish spawning beaches are concentrated on the east shore of Whidbey Island and most beaches on Camano Island outside of the estuarine-influenced areas along the island's northeast shoreline (English Boom to Livingston Bay). Limited forage fish spawning is also documented along the west shores of Whidbey Island. Waterfowl concentrations are associated with bays and estuarine areas. Major areas include Cranberry Lake, Dugualla Bay, Crocket Lake, Lake Hancock, Deer Lagoon, and the Skagit and Stillaguamish delta areas of Camano Island. Shellfish beds and commercial and

recreational harvest beaches are found in Port Susan Bay, Penn Cove, and Admiralty Bay, among others.

Buffers, setbacks and vegetation conservation areas serve to protect aquatic habitats, maintain water quality, and provide overall protection for fish and wildlife. Riparian areas are the transitional zones between aquatic and terrestrial environments. These areas provide physical separation from marine waters or freshwater lakes and proposed development so that urban runoff is minimized and functions associated with riparian vegetation is retained. Improving the conditions of degraded buffers through enhancement to allow redevelopment can improve fragile aquatic areas and ecological functions.

6.2.2 Mitigation sequencing (17.05A.090.C.7)

Mitigation sequencing is a common hierarchical protocol for avoiding and minimizing environmental impacts. Mitigation sequencing is a requirement per WAC 173-26-201(2)(e) that directs all proposed uses and developments to avoid environmental impacts of a proposal and where unavoidable, include measures to minimize and mitigate those impacts in compliance with the Shoreline Master Program and other applicable regulations. Mitigation sequencing is a requirement in the Island County SMP and can be found in Section 17.05A.090.C.7.

6.2.2.1 Impacts Addressed

In instances where impacts to ecological functions have the potential to occur all reasonable efforts must be taken to avoid, and where unavoidable, minimize and mitigate impacts such that no net loss of shoreline ecological functions is achieved.

In mitigation sequencing, possible adverse impacts should be avoided altogether by not taking a certain action or parts of an action, or by moving the action. For example, a development project that may impact a wetland habitat associated with a lake or marine shoreline might be required to avoid construction activities that will directly impact (vegetation removal or draining) or indirectly impact (increased sedimentation or runoff) the wetland habitat. By simply avoiding critical areas no future compensatory mitigation will be required.

When adverse impacts to ecological functions are unavoidable, the magnitude or severity of the impact resulting from an activity should be minimized. This may include reducing or eliminating the adverse impact by preservation and maintenance operations that occur during the life of the action. Minimizing impacts to a project location would include implementing design alternatives or strategies that require less in-water work, timing of work to occur within the dry season or during 'fish / salmon work windows,' silt fences, straw waddles, and other BMPs to reduce soil erosion and retain water quality in or adjacent to a critical area, in addition to replanting cleared areas to ultimately reduce or abate the severity of the development action.

When avoiding or minimizing impacts is unfeasible, compensation for the impact must be provided through mitigation actions. This includes reseeding or replanting impacted areas, restoring water quality and quantity, or otherwise restoring the ecological function. Mitigation sites should be monitored and maintained until they have recovered to a state of no net loss of shoreline ecological functions.

6.2.3 Vegetation Conservation Regulations (Section 17.05A.090.K)

According to Ecology Guidelines, master programs must include "planning provisions that address vegetation conservation and restoration, and regulatory provisions that address conservation of vegetation; as necessary to assure no net loss of shoreline ecological functions and ecosystem-wide processes, to avoid adverse impacts to soil hydrology, and to reduce the hazard of slope failures or accelerated erosion" (WAC 173-26-221(5)(b)).

Island County's SMP includes provisions for vegetation conservation in their Shoreline Use and Development Regulations (Section 17.05A.090.K). These provisions must be met by any use, development, or activity regardless if a shoreline permit is required or not. The focus of these provisions is to ensure that existing vegetation, especially native vegetation, within the SMA shoreline jurisdiction is retained. If removal is necessary it is to be minimized and mitigated. Pruning vegetation is also subject to specific standards while tree topping is outright prohibited.

6.2.3.1 Impacts Addressed

As noted in Chapter 4 of this Analysis, riparian zones along marine and freshwater shorelines provide a broad suite of ecological function. In addition to wildlife habitat, riparian are essential to maintaining water quality (filtration and processing of contaminants); fine sediment control by reducing the speed and force of runoff; inputs of large woody debris (LWD); shade and microclimate to reduce water temperature; litter fall/organic matter inputs, including insects; hydrology and slope stability; and fish and wildlife habitat. Other functions provided by riparian areas include recreation, cultural and aesthetic resources, and providing protection from threats of flood hazards.

Land use and development resulting in diking, draining, introduction of contaminants and non-native invasive species, loss of woody vegetation, and the isolation of associated wetland or marsh habitats has reduced the range of functions provided by Island County riparian areas. Further impairment of these functions can affect water quality and quantity, wildlife habitat, slope stability, and in-stream habitat. Protection of riparian vegetation is important for maintenance and improvement of water quality and habitat conditions, such as those necessary for juvenile salmon survival, along both lake and marine shorelines.

6.2.4 Shoreline Stabilization Regulations (Section 17.05A.110.A)

Regulations for shoreline stabilization are organized in six different categories: 1) all shoreline stabilization; 2) existing structural shoreline stabilization; 3) new or expanded structural shoreline stabilization; 4) applications for shoreline stabilization; 5) design regulations; and 6) shoreline restoration or beach enhancement.

Applicants for all shoreline stabilization proposals must demonstrate that the erosion creating the need for shoreline stabilization is not caused by upland conditions on the project site; the least impacting alternative type is being proposed; new land waterward of the OHWM is not being created; construction will not substantially disrupt beach feeding action or littoral drift on marine feeder bluffs; and protection of residential yards, lawns and landscaping is accomplished only through upland drainage control, vegetation protection, enhancement and replacement, relocation of structures or improvements, and beach nourishment.

Regulations for existing structural shoreline stabilization are split between developments located outside canal communities and inside canal communities. Outside of canal communities, existing structural shoreline stabilization may be replaced in kind (or with softer shoreline stabilization measures) if there is a demonstrated need to protect public transportation infrastructure, essential public facilities, or primary structures from erosion caused by currents, tidal action or waves. The replaced structure must perform the same stabilization function as the existing structure and must not encroach waterward of the OHWM except for residences occupied prior to 1992 where limited waterward encroachment may be allowed. In canal communities, existing bulkheads may be replaced provided the replacement structure performs the same stabilization function as the existing structure; and the replacement structure is aligned horizontally and vertically with the predominant line and height formed by other bulkheads on the same shoreline. The Shoreline Administrator may approve a standard permit for each canal community.

New or expanded structural shoreline stabilization is limited to certain shoreforms, waterbodies, uses and developments. All new or expanded structural shoreline stabilization must demonstrate that erosion from waves or currents is expected to cause damage to a primary structure or appurtenance within three years; nonstructural measures are not feasible; the proposal is the minimum necessary; and other properties would not be adversely affected by changing rates of sediment, redirecting wave energy, or impounding/redirecting of floodwater or tidal action.

New or expanded structural shoreline stabilization is prohibited in low energy environments, including lakes, bays and accreting marine shores. New or expanded structural shoreline stabilization is permitted on spits, hooks, bars, and barrier beaches only when demonstrated that construction is absolutely necessary for protection of existing primary structures and appurtenances and is consistent with the mitigation sequencing requirement.

In addition to these limitations described above, new or expanded structure shoreline stabilization may be allowed for the following uses or developments:

- restoration or remediation projects;
- public transportation infrastructure;
- essential public facilities;
- water-dependent use;
- existing primary structure or appurtenance that would be damaged within three years by erosion from currents or waves, as documented by a geotechnical analysis;
- residential lot developed with a single-family where the adjacent lots on both sides have legally established bulkheads, provided the distance between existing bulkheads does not exceed 120 feet; the proposed stabilization structure is located landward of the OHWM, the proposed shoreline stabilization would link the adjacent bulkheads; and known forage fish habitat would not be adversely affected.

Permit applications must include technical evidence that the proposed shore defense structure will perform as designed. Specific requirements established for groins, jetties, and normal protective bulkheads.

Design requirements include a preference for structures that dissipate wave energy. Bulkheads must be designed to permit the passage of surface or groundwater. A professional geotechnical analysis is required for all new or expanded shoreline stabilization structures.

Beach enhancement is only allowed for restoration, enhancement or maintenance of natural resources, or as a means to replace an existing shoreline stabilization structure.

6.2.4.1 Impacts Addressed

Regulations provide considerable limitation on new and expanded shoreline stabilization structures, which will significantly limit future impacts to the marine nearshore environment. New stabilization will not occur in shoreline environments where unnecessary for the purposes of protection from waves and currents, including many low energy environments along the marine shoreline and all lake shorelines. For marine shorelines, low energy environments are often associated with valuable marsh, lagoon, tidal flat, and barrier beach habitats; prohibiting new structural shoreline stabilization in these environments will maintain water and sediment transport processes supporting these habitats.

The SMP does not include an outright prohibition on new structural shoreline stabilization along feeder bluff shorelines, but it does implicitly prohibit such stabilization through standards that require that natural erosion and sedimentation processes not be adversely affected. One recommendation is that this prohibition could be more explicit.

Limitations and design standards for all shoreline stabilization, including provisions for replacement shoreline stabilization, ensure that where stabilization is determined necessary, impacts will be mitigated to the greatest extent feasible.

6.2.5 Residential Regulations (Section 17.05A.100.J)

The Residential development section establishes regulations limiting the type and density of residential subdivisions, structures and appurtenances. Residential development is prohibited seaward of the ordinary high water mark. Floating homes are also prohibited. Live aboard vessels and houseboats licensed as vessels are restricted to approved marinas. Density limits are established by shoreline environment designation: up to 1 unit per 5 acres is allowed in the Natural and Rural Conservancy designations and up to 4 units per acre are allowed in the Urban Conservancy and Shoreline Residential (SR, SR-Canal Community, SR-Historic Beach Community) designations. Residential development is prohibited in High Intensity.

Residential development in critical areas is restricted. Structures located on wetland areas or in areas subject to flooding or tidal inundation may be permitted only when the property qualifies for a variance and when flood proofing measures have been provided. Residential structures can be located in geologically hazardous areas when in compliance with the bluff setback standards in Chapter 11.02 (Clearing and Grading Requirements) or set back 50’ from the top of a bank greater than 100’ in height, whichever is more restrictive.

Residential development must comply with the shoreline buffer and setback standards and critical area buffers established in the SMP. However, there are various regulations that allow for

reduced buffers and setbacks, including Sections 17.05A.090E, 17.05A.090F, 17.05A.090I, and 17.05A.090J described in the table above

The ability to reduce a setback or buffer under a common line setback scenario is not expected to cause cumulative impacts, largely because it is most likely to be applied on small closely spaced lots in the Shoreline Residential environment where the marginal impacts would be minimal. It could produce unintended consequences in some other environments where the reduction in setback or buffer achieved by application of this rule could be much larger adjacent to structures that are non-conforming with the buffers, or where there is a transition between one environment and another. One recommendation is to consider reducing or eliminating these loopholes created by the rule.

New residential development and subdivisions must be designed and built in a manner that avoids the need for future shoreline stabilization, which means that demand for stabilization in the future would be limited to existing structures that are threatened by erosion.

Natural vegetation between the OHWM and the top of banks and bluffs that are ten feet or higher must be retained, except for view enhancement, removal of hazardous/diseased/damaged trees when they pose a threat to a permitted structure, or to allow for pedestrian waterfront access. In all SEDs thinning of trees is limited to no more than 25% of tree canopy in any 5-year period (see 17.05A.090.K.7). Tree limbing for up to 20% of the tree crown within the 150-foot buffer for the Natural designation is allowed for view corridor purposes.

The residential development section also establishes standards for beach access structures. Joint use beach access structures are preferred in areas along unstable slopes, marine feeder bluffs or other geologically hazardous areas. Beach access structures must be designed in a manner so as to not require shoreline stabilization or be located on unstable slopes or eroding bluffs. The structures must not interfere with normal littoral drift and movement of sediment.

6.2.5.1 Impacts Addressed

The regulations prevent many impacts caused by residential development by limiting the size, scale and location of residential structures and by restricting the types of accessory uses/structures that are allowed including docks, bulkheads, beach stairs and boathouses. In several instances, the program relies on incorporation of existing County standards. Water quality implications from residential development are addressed by stormwater management requirements, minimum requirements for new or expanded septic fields, and by protections for associated wetland areas provided by critical areas standards. These protections are further reinforced by SED-specific shoreline buffers and setbacks that will limit many new impacts to riparian zones.

Residential developments must comply with the shoreline buffer and/or setback and vegetation retention requirements noted above. The proposed buffers are a primary means of avoiding impacts to shoreline processes in both marine and lake shorelines. Riparian zones that support native vegetation provide habitat to a rich assemblage of wildlife. Minimizing development and vegetation clearing within these areas protects riparian habitat. In addition, all riparian zones provide some degree (depending on existing condition) of water quality and hydrologic functions

that are important to maintaining aquatic habitat; the proposed buffers and setbacks will provide significant protection for these functions.

Additional protective standards require that new residential development be designed to avoid the need for new structural shoreline stabilization, avoiding many potential impacts to nearshore processes – including sediment input and movement, water movement and organic input.

Along the Island County shorelines, the magnitude of potential impacts from residential use and development is substantially related to the number of parcels where single family residential development can occur. New development in the future will occur on undeveloped lots (as infill development) and on newly created lots where subdivision is allowed. Outside of required consistency with underlying zoning, The SMP provides density limits, requires that no lot may be created that would necessitate later shoreline stabilization, and requires that all lots have adequate room for development outside all required buffer and setback areas. It also requires that provisions be made for shared access to the shoreline to limit impacts from individual access, and where docks are proposed, that docks be shared.

6.2.6 Aquaculture Regulations (Section 17.05A.100.B)

Requirements for aquaculture activities range from application requirements to limitations on size and accessory activities. All aquacultural facilities and activities must be located and designed to avoid adverse impacts on eelgrass and macroalgae. Aquaculture proposals in Holmes Harbor are only permitted when the applicant can demonstrate that culture will not result in adverse environmental effects in this area of special concern. Proposals for aquacultural uses must demonstrate that they will not spread disease to native marine or aquatic life or establish new nonnative species which cause significant ecological impacts. Predator control must not involve the intentional killing or harassment of birds or mammals. Floating aquaculture developments are limited to 40 surface acres in any one location such as Penn Cove or Holmes Harbor.

Consistent with the County's existing SMP provisions, finfish facilities must not occupy more than two surface acres of water area. Fish net-pens may only include native species. The cultivation of non-native finfish (Atlantic salmon) is prohibited. Salmon net pen facilities must not be located closer than 12 statute miles from the mouth of Skagit, Stillaguamish and Snohomish Rivers to continue to protect significant anadromous fish runs. This current SMP policy restricts finfish facilities to locate in Penn Cove or Holmes Harbor and would continue this existing practice consistent with local circumstances.

Commercial geoduck aquaculture is allowed only where sediments, topography, land and water access support operations without significant clearing or grading. Aquaculture proposals that hydraulically, mechanically, or by commercial digging, displace or disturb bottom sediments must demonstrate that harm to aquatic habitat will be minimized or fully mitigated. Projects that include substrate displacement in intertidal estuarine environments such as Skagit Bay, Livingston Bay, or Port Susan are not permitted without an adequate Environmental Impact Statement incorporating a thorough baseline study of the surrounding marine environment.

6.2.6.1 **Impacts Addressed**

Proposed regulations are developed to address habitat and water quality impacts associated with aquaculture and to continue shellfish aquaculture in appropriate areas.

CHAPTER 7 BENEFICIAL EFFECTS OF RESTORATION PLAN

7.1 Restoration Projects

The Restoration Plan includes the following summary of ecosystem impairments and general restoration recommendations:

Table 7-1. Summary of Ecosystem Process Impairments and Restoration Recommendations

Ecosystem Process	Causes of Impairment to Ecosystem Process	Scale of Alterations (Basin or Reach)	Restoration Recommendations
Marine Nearshore			
Sediment Generation and Transport	Shoreline stabilization	Approximately 16% of the shoreline has been armored, scattered throughout most reaches of the marine shoreline.	Remove armoring where feasible, and provide incentives for replacing hard armoring with less damaging stabilization methods.
Hydrology	Diking of coastal lagoons and marshes for agriculture and freshwater lakes	Affects specific reaches, only, but over 4,000 acres of marshlands and lagoons have been converted to upland uses and lakes countywide.	Where feasible, restore tidal influence to marshes and lagoons by removing dikes, tide gates, and weirs.
Water Quality	Septic failure, agricultural runoff, sewage and stormwater outfalls	Although often caused by basin-wide changes such as loss of forest cover, effects on marine shorelines are localized, especially in coves and bays that have limited flushing action from tides and currents.	Enforce County health regulations regarding failing septic systems; Remove derelict structures that may contain hazardous substances, such as creosote treated piles.
Biological Resources	Numerous species of fish, mammals, birds, and plants are listed as threatened or endangered due to habitat loss or conversion (particularly loss of forest cover and loss of small estuary/saltmarsh habitat), water pollution, and excessive harvest (especially of salmonids).	Alterations are basin-wide, but degree of habitat conversion and loss varies widely among marine reaches.	Protect remaining intact habitat areas; Prioritize restoration of habitats like forage fish spawning, coastal lagoons, and mudflats; Provide incentives for habitat restoration and enhancement; Participate in regional efforts to manage for species recovery.

Ecosystem Process	Causes of Impairment to Ecosystem Process	Scale of Alterations (Basin or Reach)	Restoration Recommendations
Freshwater Lakes			
Hydrology	Damming of brackish lakes has converted some lakes fresh water; Extensive loss of forest cover has altered hydrology of most basins.	Damming affects specific lakes; forest cover loss is widespread and affects most lakes.	Consider reconversion of dammed lakes to tidally influenced waters where feasible; Protect wetlands and remaining riparian forest surrounding lakes, streams and wetlands.
Water Quality	Limited data available, but septic failure, agricultural runoff, sewage and stormwater outfalls all contribute to degraded water quality.	Most waterbodies have some impairment, but none are listed on 303(d) list.	Improve enforcement of existing health regulations for septic systems; improve sewage and stormwater systems outfalls; Implement farm conservation planning on agricultural lands to identify specific threats to water quality.
Biological Resources	Clearing of riparian and wetland vegetation for agriculture and development; excessive nutrient input and invasive plants causing eutrophic conditions in some lakes; stream culverts and weirs present fish barriers.	Alterations are basin-wide, but degree of habitat conversion and loss varies widely among lake reaches.	Protect remaining intact riparian forest; Provide incentives for habitat restoration and enhancement; Continue building inventory documentation.

Restoration opportunities listed in the Restoration Plan fall into general categories that are summarized in Table 7-2, along with the primary functions that would benefit from each category of restoration project.

Table 7-2. Summary of Restoration Opportunities and the Primary Functions That Would Benefit

Project type	Number of opportunities identified	Primary Benefits to Ecosystem Process or Functions
Piling removal	37	Restore sediment supply and transport, remove contaminants
Bulkhead removal	29	Restore sediment supply and transport
Fill removal	14	Restore sediment supply and transport
Groin removal	5	Restore sediment supply and transport
Stream mouth restoration	3	Restore sediment supply and transport, native vegetation
Fish access restoration	6	Restore sediment supply and transport, exchange of aquatic organisms, fish access
Dike removal or beaching	2	Restore tidal flow, exchange of aquatic organisms, detritus input/export
Lagoon restoration	8	Restore tidal flow, exchange of aquatic organisms, detritus input/export
Salt marsh restoration	10	Restore tidal flow, exchange of aquatic organisms, detritus input/export
Outfall replacement	3	Restore tideflat,, exchange of aquatic organisms, detritus input/export
Spartina removal	2	Restore native vegetation in sand and mud flat habitats

These restoration opportunities could be implemented to offset impacts from development, or could be developed independently to provide improvement in overall functions. Prioritization in the Restoration Plan is based on the rating system developed by Cereghino, et alia (2011) for the Puget Sound region, without regard to mitigating for any specific expected loss of function.

CHAPTER 8 BENEFICIAL EFFECTS OF ESTABLISHED PROGRAMS

A variety of other regulatory programs, plans, and policies work in concert with the Island County SMP to manage shoreline resources and regulate development near the shoreline.

8.1 Local Plans and Regulations

8.1.1 Long Range Plans

8.1.1.1 Island County Comprehensive Plan

The *Island County Comprehensive Plan* was adopted on September 28, 1998 and last amended on November 10, 2008. It contains goals, policies, and strategies for protection of the County's environmental resources. Twelve "land use categories" are described in the plan. These categories serve as the basis for more detailed zoning code designations. Land use categories for Island County are as follows:

- Urban Element Designations (Municipal Urban Growth Areas [Oak Harbor, Langley, Coupeville, and the Camp Casey Conference Center Existing Master Planned Resort])
- Rural Element Designations (Rural Center, Rural Village, Light Manufacturing, Rural Service, Airport, Rural Residential, Rural, Rural Forest, Rural Agriculture, Special Review District)
- Resource Lands (Commercial Agriculture and Mineral Lands Overlay)
- General Overlays and Critical Areas (Potential UGA Expansion Areas Overlay, Wetlands Overlay, Aquifer Recharge Areas, Fish and Wildlife Habitat Conservation Areas Overlay, Frequently Flooded Areas, Geologically Hazardous Areas (Steep/Unstable Slopes) Overlay, Shorelines Overlay, and Airport and Aviation Safety Overlay)

8.1.1.2 Impacts Addressed

During the development of shoreline environment designations as part of this SMP update process, comprehensive plan designations were examined to determine planned future uses and whether they would be in general alignment with existing shoreline ecological functions. Generally speaking, the comprehensive plan designations aligned with the findings of the Shoreline Inventory and Characterization report findings. Regulating the type and location of land uses in Island County ensures that development occurs in areas that would result in minimal impacts to existing shoreline ecological functions.

8.1.2 Local Regulations

8.1.2.1 Stormwater Management

Chapter 11.03 Stormwater and Surface Water of the Island County Code establishes standards to minimize degradation of water quality; control the sedimentation of streams, rivers, lakes, wetlands, and other surface water; control stormwater runoff originating on developing land; preserve the suitability of water for recreation and fishing; and fulfill the goals and requirements

of the Critical Areas Ordinance. The Island County Drainage Manual contains standards and technical guidance for complying with Chapter 11.03, and includes standards addressing detention and retention facility design and maintenance, erosion and sediment control practices, and recommendations for best management practices. Chapter 11.03 also requires mitigation for drainage impacts resulting from changes in the flow rate and quality of stormwater runoff. Impacts which must be mitigated include flooding, erosion, scouring, bank sloughing, and adverse impacts to aquatic habitat and water quality. Alternative standards are provided for developments proposing low-impact development standards.

Impacts Addressed

Stormwater regulations are designed to sustain water quality, quantity, and habitat in water bodies (i.e. creeks, streams, ponds, lakes, wetlands) in perpetuity. The SMP requires that developments, utilities, or landscape clearing activities are done in a sustainable manner and comply with the applicable requirements of the stormwater code. Stormwater regulations require best management practices (BMPs) (including but not limited to, silt fences, straw waddles, check dams, mulching, sediment traps, and channel lining) to prevent or reduce the movement of sediments, nutrients, or other pollutants from the land to surface or ground water. BMPs also protect water quality from potential adverse effects resulting from increased runoff rates. For example, straw waddles may be implemented on the down slope sides of a roadway project and will serve to impound water and sediments during a rainfall event until natural vegetation can be reestablished.

The goal of these regulations is to provide safe standards and protocol for the capture, storage, and the safe and beneficial release of stormwater runoff resulting from anthropogenic development activities.

8.1.2.2 **Clearing and grading**

Chapter 11.02 Clearing and Grading Requirements of the Island County Code provide minimum guidelines and standards regarding the alteration of land for the construction and development of properties. These regulations aid in controlling erosion, soil movement and water quality incident to clearing and grading activities and protecting public safety. The provisions are specifically designed to prevent erosion and sedimentation of surface water; control soil movement originating on developing land; maintain stable earth foundations; minimize adverse effects caused by alterations in surface water or ground water quality, quantities, locations, and flow patterns; promote site planning and construction practices that are consistent with natural topographic, vegetation, and hydrologic conditions; and protect public safety by reducing slope instability and potential for landslides. The regulations provide specifications for slope grade, fill placement and setback from property boundaries, drainage and terracing, and erosion control.

Impacts Addressed

Clearing and grading activities are required to be done in a manner that will not alter surface water drainage patterns and/or impact water quality, water quantity, or habitat on or adjacent to the project location. BMPs which serve to prevent or reduce the movement of sediments, nutrients, or other pollutants from the land to surface or ground water; or to otherwise protect

water quality from potential adverse effects must be implemented to preserve or protect critical areas and reduce erosive potential from near or adjacent projects. For example, silt fences must be placed between the grading and clearing activity and a critical area to capture and store water and sediment runoff.

Disturbed areas must be stabilized immediately and re-vegetated with native vegetation. Fill activities must be designed in a way to allow the infiltration of surface water into groundwater reservoirs, where such conditions existed prior to filling.

The goal of these regulations is to provide safe standards for the excavation, fill, and storage of materials that will result in minimal impacts to soils, water quality, or native vegetation

8.1.3 Voluntary Programs

8.1.3.1 Rural Stewardship Plan

Island County has developed a voluntary program that encourages property owners to protect water quality and habitat through the development of rural stewardship plans. Property owners of residential parcels that are one acre or larger and located within unincorporated Island County can voluntarily elect to develop a Rural Stewardship Plan which identifies conservation measures. In exchange for developing such a plan, Rural Stewardship participants qualify for front-of-line permit processing, and may choose either a reduction in property tax valuation, or a lowered land use intensity rating. Island County's Rural Stewardship Plan offers a broad range of conservation options for single family residential properties. Some are mandatory; others may be selected from a specific list to fit the landowner's goals and the property's characteristics.

8.2 State and Federal Regulations

A number of state and federal agencies may have jurisdiction over land or natural elements in shoreline jurisdiction. Local development proposals most commonly trigger requirements for state or federal permits when they propose work in or over waters of the state; impact wetlands or streams; potentially affect fish and wildlife listed under the federal Endangered Species Act (ESA); result in over one acre of clearing and grading; or affect the floodplain or floodway. As with local requirements, state and federal regulations may apply throughout the jurisdiction, but regulated resources are common within the City's shoreline jurisdiction. The most commonly applied state and federal regulations affecting shoreline-related resources are described briefly below:

Endangered Species Act: The federal ESA addresses the protection and recovery of federally listed species. The ESA is jointly administered by the National Oceanic and Atmospheric Administration (NOAA) Fisheries (formerly referred to as the National Marine Fisheries Service), and the United States Fish and Wildlife Service (USFWS).

Clean Water Act (CWA): The federal CWA requires states to set standards for the protection of water quality for various parameters, and it regulates fill, excavation, and dredging in waters of the U.S., including wetlands. Certain activities affecting wetlands in shoreline jurisdiction or work in the adjacent rivers may require a permit from the U.S. Army Corps of Engineers and/or

Washington State Department of Ecology under Section 404 and Section 401 of the CWA, respectively.

Federal Emergency Management Agency (FEMA) National Flood Insurance Program: Communities that participate in the National Flood Insurance Program receive federally backed flood insurance. In order to participate, a community must adopt and enforce floodplain management regulations to reduce future flood damage. The Federal Emergency Management Agency is responsible for mapping the country's flood hazard areas.

Hydraulic Project Approval (HPA): The Washington Department of Fish and Wildlife (WDFW) regulates activities that use, divert, obstruct, or change the natural flow of the beds or banks of waters of the state and which may affect fish habitat. Projects in the shoreline jurisdiction requiring construction below the ordinary high water mark could require an HPA from WDFW. Projects creating new impervious surface that could substantially increase stormwater runoff to waters of the state may also require approval.

Rivers and Harbors Act: Any work or project that may affect or obstruct navigable waters requires a Section 10 permit under the Rivers and Harbors Appropriation Act of 1899. The U.S. Army Corps of Engineers reviews and authorizes projects with either a standard individual permit, letter-of-permission, nationwide permit, or regional permit.

National Pollutant Discharge Elimination System (NPDES): Ecology regulates activities that result in wastewater discharges to surface water from industrial facilities or municipal wastewater treatment plants. NPDES permits are also required for stormwater discharges from industrial facilities, construction sites of one or more acres, and municipal stormwater systems that serve census-defined Urbanized Areas (more than 50,000 people and population densities greater than 1,000 per square mile).

8.2.1 Impacts Addressed

Regulations focused on preserving in-stream water quality, quantity, and habitat integrity include the Clean Water Act, the Hydraulic Project Approval, the Rivers and Harbors Act, and the National Pollutant Discharge Elimination System. These regulations require that any development or redevelopment must comply with protocol for avoiding or mitigating impacts to streams, creeks, rivers, lakes, wetlands, or other water bodies. For example, projects that will require in-channel work must comply with the protocol of the Hydraulic Project Approval process in addition to the Clean Water Act. In addition, the Endangered Species Act provides a framework for the preservation of endangered or threatened flora, fauna, or fish species and their associated habitat areas. This overarching regulation must be considered for any project that may adversely impact priority species habitat.

The Federal Emergency Management Agency National Flood Insurance Program and Rivers and Harbors Act address the removal of materials that may exacerbate flood conditions, and/or provide assistance in development or redevelopment in areas subjected to flooding. In addition to protecting public health and property these measures also assist in promoting preservation and restoration of floodplain habitat.

8.3 Restoration Efforts

Steps are being taken to restore habitats for the benefit of fish and wildlife. Several entities are currently supporting preservation and restoration of shorelines within Island County:

1. Island County (Public Works [includes Clean Water Utility and Parks], Public Health, Planning and Community Development, WSU Extension Beach Watchers, and Island County Marine Resources Committee)
2. Whidbey Camano Land Trust
3. Tulalip Tribes
4. Noxious Weed Control Board
5. Washington State Conservation Commission, the Whidbey Island Conservation District and the Snohomish Conservation District (Camano Is.)
6. Whidbey Audubon Society
7. Whidbey Watershed Stewards
8. Stilly-Snohomish Fisheries Enhancement Task Force

CHAPTER 9 CONCLUSIONS

The 2003 Ecology Shoreline Guidelines (as amended) require that SMP updates incorporate goals, policies and regulations managing growth and development in a manner that protects watershed processes and habitat conditions. This approach is necessary to achieve the goal of "no net loss," of shoreline ecological functions as required by WAC 173-26-186. The test of no net loss is a concept required in the shoreline guidelines to maintain existing functions and processes while providing opportunities for public access and for the development of water-dependent uses (WAC 173-26, Part III). This cumulative impacts analysis provides the basis to determine whether or not their specific program meets the test of "no net loss" of ecological functions.

The Island County SMP regulations provide a revised system of shoreline environment designations that establish more uniform management of the SMA shorelines,on a countywide basis. The new shoreline designation system derives from the conclusions from the Island County Shoreline Inventory and Characterization Report. In addition, the Island County SMP complements other County, state, federal, individual citizen and group efforts to protect shoreline functions and values. The Island County Shoreline Restoration Plan identifies opportunities to improve or restore ecological functions that have been impaired as a result of past development activities.

This analysis was guided by the three factors identified in the Ecology guidelines for evaluating cumulative impacts:

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

The tables in Appendix A provide an evaluation of the potential effect future development may have on existing shoreline ecological functions. The tables are organized in a manner similar to the Island County Inventory and Characterization Report. Marine areas are grouped into three geographic areas (West Whidbey, East Whidbey and Camano Islands) and freshwater lakes are included as a fourth separate table. Proposed shoreline environment designations are listed under each marine area and for the freshwater lakes. The following elements are described for each waterbody, organized by the proposed shoreline environment designation:

- Existing performance of shoreline ecological functions, as documented in the Shoreline Inventory and Characterization Report;
- The current performance of shoreline ecological functions (ranked low, moderate and high);
- Foreseeable future development, based on the buildable lands analysis described in Chapter 3 of this report; and

- Protective measures collectively assessed from Island County SMP together with the restorative provisions from the Restoration Plan.

Future performance was assessed for each geographic area and freshwater lakes under each shoreline environment designation based on the above elements. Conclusions on whether "no cumulative impacts", meaning no cumulative impacts to shoreline ecological functions, was achieved for each area/waterbody were made based on the existing performance of ecological functions from the Inventory Report, the projected residential development that may occur based on the analysis described in Chapter 3, the shoreline environment designation, and the level of protection that the regulations in the SMP would provide for existing ecological functions. Anticipated future performance is ranked as Potential for Cumulative Impacts of shoreline function and No Cumulative Impacts of shoreline function.

Based on our analysis of the SMP regulations, there would be no cumulative impacts that would lead to a net loss of ecological functions if the plan were implemented as proposed. Although no cumulative impacts are expected, there are a few recommendations that came to light as part of the cumulative impacts analysis.

1. Shoreline Environment Designation adjustments:
    a. Change the majority of the shoreland abutting Harrington Lagoon from SR to RC, because of the high habitat value this lagoon provides(documented Pigeon Guillemot nesting colonies, waterfowl concentration, herring spawning); this could be accomplished without making any structures nonconforming. Although the road would be in the buffer, the road would also be in the required wetland buffer and is even non-forming in SR.
    b. Change Kristoferson Lake from RC to Natural, because this lake provides rare wood duck nesting habitat; there is only one structure within the shoreline that would be affected and existing agriculture could continue. Due to its high habitat value, the wetland buffer for this lake and surroundings would likely exceed the shoreline buffer requirement for RC, possibly even for Natural.
    c. Change an exceptional feeder bluff in Reach EW04 from RC to Natural; this 1100-foot segment has intact vegetation and only one residential structure, along a steep unstable bluff that would likely not be developable under the CAO rules.
    d. Include a policy in the program to revisit the Dugualla Bay and Dugualla Lake shoreline environment designations should restoration occur. The high habitat value at present and even higher value if restored would likely mean buffer requirements greater than in RC and possibly greater than in Natural.
2. Use Matrix adjustments:
    a. Prohibit groins and jetties in lakes- these are not used in low energy environments like lakes and thus need not be allowed.
    b. Prohibit industrial uses in Aquatic; since the only place where expect in-water industrial use is allowed by underlying zoning is in the High Intensity environment, this would clarify expectations.

3. Development standard adjustments:
    a. Prohibit structural shoreline stabilization of exceptional feeder bluffs; the regulations as written would likely prohibit this anyway, but this would make that explicit.
    b. Prohibit use of the common line setback for UC, RC and Natural, or do not allow use of common line setback where there is a transition between two environments.
    c. Clarify that the string line setback and other setback/buffer reduction rules may not be used to reduce the steep slope buffer.

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