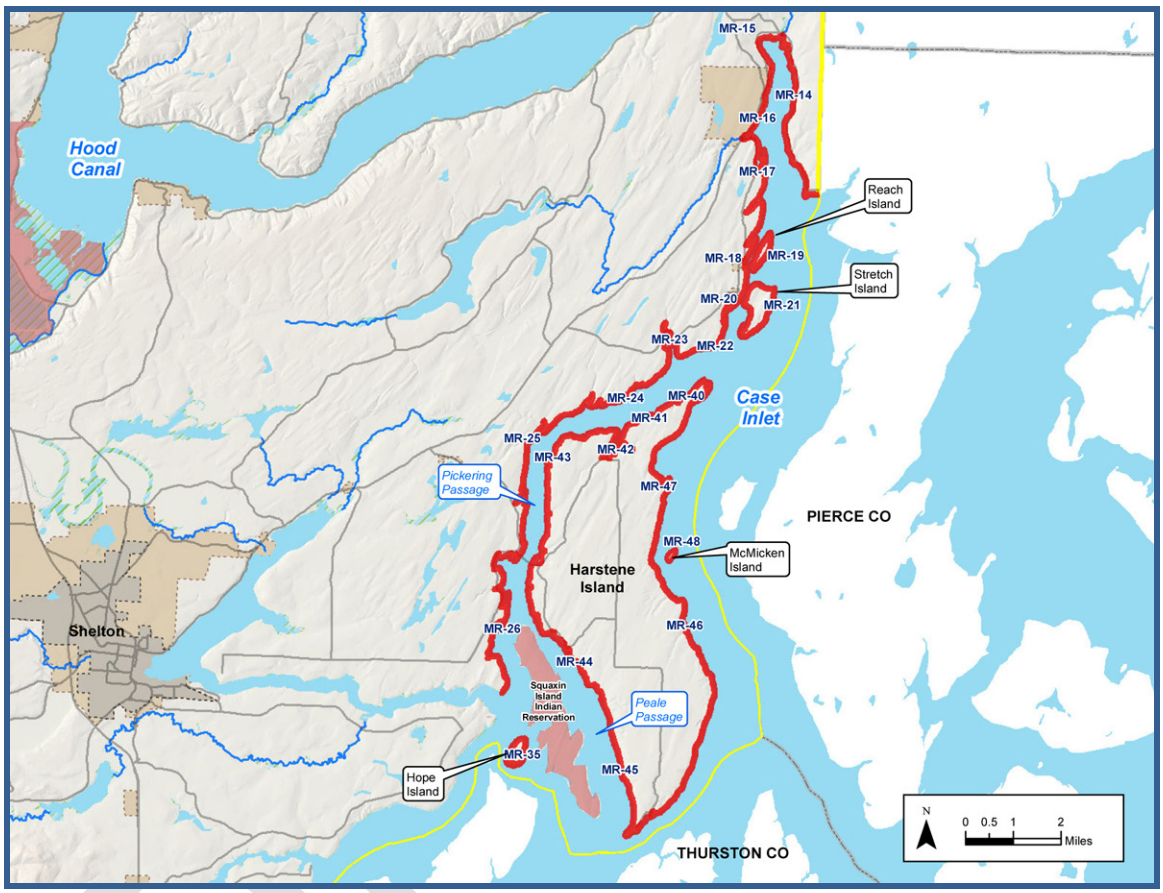
CHAPTER 5.
MARINE SHORELINES - SOUTH PUGET SOUND

Chapter 5 provides a discussion of the marine nearshore shorelines of South Puget Sound within Mason County, Washington. This section includes marine shorelines associated with Kennedy-Goldsborough Water Resource Inventory Area (WRIA) 14a. This chapter covers Case Inlet, Pickering Passage, Peale Passage, Harstene Island, Hammersley Inlet, Oakland Bay, Totten Inlet and Little Skookum Inlet. Marine shorelines are considered "shorelines of statewide significance."

Marine shorelines are described generally from north to south and arranged in three groupings: 1) Case Inlet, 2) Hammersley Inlet and Oakland Bay, and 3) Totten Inlet and Little Skookum Inlet. After a summary description of the marine areas, the reaches have been described in two page reach sheets that provide a summary of data per shoreline reach. Information displayed in the reach sheets is largely GIS data taken from a combination of state and county data sources. Data sources are described in Chapter 2.

5.1 Case Inlet, Pickering Passage and Peale Passage (including Harstene Island)



5.1.1 Physical Characterization and Modifications

Waves are the dominant driver of coastal geomorphic processes in the Case Inlet, Pickering Pass, and Peale Passage shoreline. This is exemplified by on or near shore (littoral) sediment transport occurring along most shores. Eroding bluff backed beaches supplies the nearshore with sediment that is then is transported down-drift to form the many varieties of depositional shoreforms found in the area. Accretion shoreforms commonly occur in this area including: barrier beaches, some of which embay estuaries and lagoons, cuspate forelands and tombolos (a sandbar that connects an island to the mainland or to another island). Open coastal inlets are also abundant throughout this part of Mason County.

Information on nearshore geomorphic processes (e.g., shoreform type, netshore drift, etc.) was derived in large measure from the Puget Sound Nearshore Ecosystem Restoration Program (PSNERP). The occurrence of nearshore stressors and degradation to nearshore processes was also analyzed and assessed by PSNERP. A composite measure of nearshore process degradation provides a summary of nearshore ecosystem conditions at the drift cell scale. The range of process degradation ranges from "not degraded", "least degraded", "less degraded", "moderately degraded", "more degraded" to "most degraded." These results can help to identify and focus protection and restoration strategies. Within Case Inlet, Pickering Pass, and Peale Passage overall process degradation was most commonly "least" and "less" degraded. Greater overall degradation ("more degradation") had occurred along the south shore of Stretch Island, along the westward shore up to Raft Island and along the shore west of the north shore of Squaxin Island. Raft Island was one of very few areas ranked as "most" degraded places in Mason County.

5.1.2 Water Quality

Water quality in South Puget Sound is degraded due to nutrient loading and historic land uses. This has resulted in low levels of dissolved oxygen, the presence of fecal coliform bacteria, and contaminants in sediments. Ecology is currently conducting a water quality study in the South Sound to identify the causes for low dissolved oxygen (Ecology, 2008). The study is designed to determine how both human activities and natural factors affect water quality in South Puget Sound. Low dissolved oxygen levels result in distress for marine organisms and cause fish kills. An excess of nutrients, including nitrogen, lead to low dissolved oxygen levels in the Sound. Discharges of nitrogen and nutrients from septic systems, wastewater treatment plants, agricultural runoff, and other man-made sources contribute to this problem. Based upon data collected from wastewater treatment plant discharges and from river inputs in both South Puget Sound and Central Puget Sound, it appears that high nitrogen loads are entering South Puget Sound from both local sources and from the more intensely developed areas of Central Puget Sound,

thereby affecting water quality (Ecology, 2011). Lack of natural flushing and water circulation in the South Sound serves to exacerbate water quality problems, especially during the warm summer months.

In Oakland Bay, sediments have been documented to be contaminated with chemicals and wood waste. Ecology is conducting the Oakland Bay Sediment investigation and has determined that dioxins are present in Oakland Bay and Shelton Harbor. Dioxin concentrations are above state standards and become much higher with increasing depth (from two to three feet) in these sediments (Ecology, May 2011). Plans to cleanup sediments and water quality are in development (http://www.ecy.wa.gov/programs/tcp/sites/oaklandBay/oaklandBay_hp.htm).

Several portions of the South Puget Sound within Mason County are listed as Category 5 on the 303(d) list of impaired waters (Ecology, 2008). Category 5 waters require the preparation of a Total Maximum Daily Load (TMDL) to address water quality concerns.

- Case Inlet – Category 5 listing for fecal coliform bacteria (four reaches), dissolved oxygen (one reach) and PCBs (one reach).
- Pickering Passage – Category 5 listing for fecal coliform (one reach) and PCBs (one reach). Category 2 listings (several reaches on eastern and western shores) for dissolved oxygen.
- Harstene Island – Category 5 listing for PCBs; and
- Hope Island and McMicken Island - Category 2 listings for fecal coliform bacteria and dissolved oxygen (Ecology, 2008).

5.1.3 Critical or Priority Habitat and Species

Critical or priority habitats and species identified within the Mason County shoreline jurisdiction of Case Inlet, Pickering Passage, and Peale Passage are covered in this section; including Marine Reaches (MR): MR 14-26, MR 35, and MR 40-48. Discussion of the mapped habitats and species follows, with select quantitative data only located in the reach sheets, where noted.

Case Inlet, Pickering Passage, and Peale Passage are mapped as supporting many priority salmonid species (WDFW, 2010; Table 5-1).

Table 5-1. Fish species documented for Case Inlet, Pickering Passage, and Peale Passage

Common Name	Scientific Name	Habitat Use	Federal Listing	State Listing
Coastal cutthroat trout	*Oncorhynchus clarki clarki*	Presence/Migration	~	~
fall Chinook salmon	*Oncorhynchus tshawytscha*	Presence/Migration	Threatened	Candidate
fall Chum salmon	*Oncorhynchus keta*	Known spawning and Presence/Migration	~	~
summer Chum salmon	*Oncorhynchus keta*	Known spawning	Threatened	Candidate
Coho salmon	*Oncorhynchus kisutch*	Known spawning and Presence/Migration	Concern	~
Rainbow trout	*Oncorhynchus mykiss*	Presence/Migration	~	~
winter Steelhead trout	*Oncorhynchus mykiss*	Presence/Migration	Threatened	~

Critical habitat has been designated for the Puget Sound Evolutionarily Significant Unit (ESU) Chinook salmon for all reaches covered in this section, with the exception of MR 14. This designation extends upstream to the point of tidal influence. Critical habitat has also been designated for the Southern Resident killer whale Distinct Population Segment (DPS) for all reaches covered in this section, extending to waters deeper than 20 feet (USFWS, 2010).

Forage fish and other priority marine fish species are abundant in the marine shorelines of South Sound in Mason County (WDFW, 2010). Habitat areas for herring, sand lance, smelt and other fish are documented in the PHS data in terms of linear miles or acres of habitat. Approximately 5.7 acres of herring holding habitat is mapped for MR 48, while approximately 6.3 acres of spawning habitat is mapped for MR 26 (WDFW, 2010). Sand lance spawning habitat is mapped for several reaches (WDFW, 2010; see reach sheets). Smelt is mapped as spawning along the nearshore for many of the reaches located in this section (WDFW, 2010).Essential fish habitat for rock sole is mapped for the following reaches (WDFDW, 2010): 725 feet of MR 22; 1,064 feet of MR 24, 992 feet of MR 25, 4,212 feet of MR 26, 4,767 feet of MR 35, 1,389 feet of MR 43, 207 feet of MR 44, 5,855 feet of MR 45, and 10,508 feet of MR 46.

Shellfish beds for geoduck, hardshell clam, and oyster are mapped for numerous reaches (WDFW, 2010; see reach sheets). Eelgrass and kelp beds are also mapped for many reaches (WDNR, 2008; see reach sheets).

Priority species occurrences are mapped for pigeon guillemot along MR 48 and for purple martin along MR 42. Bald eagle species occurrences are located along MR 17, MR 22, MR 24, MR 35, MR 43, MR 46, and MR 48. Bald eagle buffer is mapped for several of the reaches covered in this section (WDFW, 2010). Wetlands are mapped along the nearshore for all reaches located in this section (NWI, 1989).

5.1.4 Land Use

Land use along Case Inlet is predominately single-family residential. The remaining areas are mostly classified by the Mason County Assessors as vacant lands. Properties are generally armored with few docks or piers. Public access is available along state-owned tidelands, Watson Wildwood View County Park (verify), Allyn Waterfront Park, Allyn Kayak Park, and state-owned beaches and bridges. There are also several public boat launches managed by port districts (Mason County Department of Parks and Trails, 2006).

Reaches along Pickering Passage have a mix of residential and vacant land uses. There are more docks/piers and bridge crossings over stream mouths than in Case Inlet. Public access includes Mason County-owned Latimer's Landing Boat Launch and Latimer's Landing Overflow Parking. Both parks have public boat launches (Mason County Department of Parks and Trails, 2006).

Harstene Island has a mix of residential; parks, open space and recreation areas; forestry; and vacant land uses. Residential development and vacant lands are located throughout the island. Forestry land uses are concentrated mostly along the southern portion of the island. Most of the reaches have a limited number of properties with hard armoring and overwater structures. Public access includes state-owned Jarrell Cove State Park and Harstene Island State Park. The parks are mainly undeveloped but provide moorage, trails, and beach access (Mason County Department of Parks and Trails, 2006).

McMicken Island and Hope Island are predominately in parks, open space and recreational use, although the Mason County Assessor classifies Hope Island's as 100 percent vacant. Washington State Parks manages McMicken Island State Park and Hope Island Park. Both parks are undeveloped and accessible only by boat (Mason County Department of Parks and Trails, 2006).

Reach Island is almost entirely in residential land use. Public access is limited to property associated with Reach Island Bridge, managed by Washington State. Stretch Island is predominately in residential land use with remaining properties classified as vacant. Public access is available at Stretch Point State Park, managed by Washington State Parks. The park is mostly undeveloped but has mooring buoys for boat access (Mason County Department of Parks and Trails, 2006).

5.1.5 Land Cover

According to the GAP 2009 data, the dominant land cover type for Case Inlet is conifer dominated forests, at 45 percent. The next highest percent cover is provided by harvested forest (17 percent). The third highest percent land cover type is beach shore and sand at 11 percent. Developed land comprises eight (8.0) percent of the overall land cover of Case Inlet shorelines. Additional information on land cover by reach is summarized on the reach sheets for Case Inlet, Pickering Passage and Peale Passage.

According to the PNPTC 2011 data set, the dominant land cover type of Case Inlet is forest cover at 49 percent. The next highest percent cover is provided by non-forest (33 percent). The third highest land cover type is off-shore at 10 percent, and other natural vegetation comprises 8 percent of the overall land cover.

5.1.6 Summary of Key Management Issues

[PLACEHOLDER]

5.1.7 Reach Analysis

An analysis by shoreline reach is given in the following section. Reach sheets are provided corresponding to specific shorelines as listed below:

- Case Inlet (Reaches 14-18, 20, 22) and Pickering Passage (Reaches 23-26);
- Harstene Island (Reaches 40 -47);
- McMicken Island (Reach 48);
- Hope Island (Reach 35);
- Reach Island (Reach 19); and
- Stretch Island (Reach 21).

CASE INLET - REACH 14

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
4.0 MI (ROCKY PT/ NORTH BAY)	SPU 3130, SPU 3131, SPU 3132	94.8 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 96% (91 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

2% erosion, 21% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 61% bluff backed beaches, 39% barrier beaches. Net shore drift -northward drift from Rocky Point to Point Victor.

NEARSHORE PROCESS DEGRADATION (MAP 17)

Mostly moderately degraded with very small section of less degraded shoreline.

LAND COVER (MAP 15)

18% developed, 36% mud flat, 26% forest, 15% wetland, 5% floodplain/riparian (GAP, 2009);

Riparian vegetation: 27% forest cover, 66% non-forest, 2% off-shore, 5% other natural vegetation (PNPTC, 2011).

HABITATS AND SPECIES (MAP 8)

29.1 acres of hardshell clam habitat. 2,011 lineal feet of patchy eelgrass.

Wetlands – 8.7 acres of mapped wetland (9.1% of reach); wetland habitat types include estuarine intertidal aquatic bed, emergent, rocky shore, and unconsolidated shore.

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Case Inlet and Dana Passage, 303(d) listings (Category 5) for fecal coliform and dissolved oxygen (Ecology, 2008).

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Cover – Residential (84%), remaining 16% is a mix of Vacant, Aquaculture; Forestry, Parks, Open Space, and Recreation Areas. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Two roads serve as tidal barriers. Overwater structures in the reach include: 1 upland bridge, 2 buildings, and 9 buoys and floats. Shoreline armoring is mapped along 55% of the reach. According to aerial imagery (2009), aquaculture is present in the southern part of the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural.

Existing SED – Urban Residential (86%) and Rural (14%).

PUBLIC ACCESS (MAP 14)

North Bay Tidelands, managed by Washington Department of Natural Resources (DNR), provides public access to 18% of total linear shoreline miles. Northeast Case Inlet Tidelands, managed by WDFW provides public access to 10% of total linear miles. Mason County manages Watson Wildwood View County Park, a 63 acre undeveloped site that is near the reach (Mason County Department of Parks and Trails, 2006).

IMPERVIOUS SURFACES (MAP 16)

27% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show residential development along the reach.

AREAS OF SPECIAL INTEREST

According to the Ecology facilities/sites database, there are no listed contaminated sites.

Medium sediment supply with no nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists six inventoried pre-contact sites and one inventoried pre-contact village within this reach. Resource probability mapping suggests there is a moderate to very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Restore trees to riparian zone.

Revegetate shoreline (Anchor, 2004).

Remove bulkheads or replace with natural logs.

Replace riprap protecting road with LWD.

Realign road corridor.

Remove remnant pilings.

Remove potential filled areas/dike.

KEY MANAGEMENT ISSUES

Priority rearing area for juvenile salmonids from Sherwood and Coulter Creeks with an eelgrass bed near reach and large mudflat located in the reach (Anchor, 2004).

CASE INLET - REACH 15

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
1.6 MI (NORTH BAY)	SPU 3130, SPU 3131	37.7 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10) Floodplain - 44% (17 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	**HAZARD AREAS (MAP 12)** 8% erosion, 3% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7) Shoreform - 91% large open coastal inlet, 9% barrier beaches. Net shore drift -predominantly no appreciable drift at the head of Case Inlet, northward drift in a small area along the southern extent of the west shore.	**NEARSHORE PROCESS DEGRADATION (MAP 17)** Moderately degraded.
LAND COVER (MAP 15) 18% developed, 4% mud flat, 17% forest, 32% wetland, 30% floodplain/riparian (GAP, 2009); Riparian vegetation: 44% forest cover, 26% non-forest, 10% off-shore, 19% other natural vegetation, 0.5% water (PNPTC, 2011).	**HABITATS AND SPECIES (MAP 8)** 18.6 acres of hardshell clam habitat. Wetlands – 2.4 acres (6.4% of reach); wetland habitat types include estuarine intertidal aquatic bed and estuarine intertidal emergent.

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Case Inlet and Dana Passage (North Bay), 303(d) listing (Category 5) for fecal coliform bacteria.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Forestry (31%), Residential (25%), Vacant (22%), remaining 22% is a mix of Aquaculture and Transportation. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

There are 6 instances in the reach where mapped road(s) serve as tidal barriers. Overwater Structures in the reach include: 1 upland bridge, 1 building, 1 buoy\float, and 1 small dock. No shoreline armoring is mapped along the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – Conservancy (56%), Rural (40%), and Urban Residential (4%).

PUBLIC ACCESS (MAP 14)

North Case Inlet, managed by WDFW, provides public access to 34% of total linear miles in the reach.

IMPERVIOUS SURFACES (MAP 16)

18% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show a small amount of residential development in the western part of the reach.

AREAS OF SPECIAL INTEREST

No Ecology-listed contaminated sites.

A portion of the reach (0.5 MI) with medium sediment supply and no nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

There are no listed cultural resources or state or federally listed historic properties. Resource mapping suggests there is a low to moderate-high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Remove remnant pilings (Anchor, 2004).

Remove potential filled areas/dike.

KEY MANAGEMENT ISSUES

Priority rearing area for juvenile salmonids from Sherwood and Coulter Creeks with a large mudflat located in the reach (Anchor, 2004).

Conserve emergent marsh and mudflat habitat types (Anchor, 2004).

CASE INLET - REACH 16

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
1.9 MI (ALLYN)	SPU 3130	48.1 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10) Floodplain - 4% (2 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	**HAZARD AREAS (MAP 12)** 11% erosion, 14% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7) Shoreform - 77% bluff backed beaches, 18% open coastal inlets, 5% barrier beaches. Net shore drift - predominantly northward drift.	**NEARSHORE PROCESS DEGRADATION (MAP 17)** Moderately degraded.
LAND COVER (MAP 15) 38% developed, 8% mud flat, 15% forest, 11% wetland, 28% floodplain/riparian (GAP, 2009); Riparian vegetation: 30% forest cover, 47% non-forest, 19% off-shore, 4% other natural vegetation, 0.5% water (PNPTC, 2011).	**HABITATS AND SPECIES (MAP 8)** 20.3 acres of hardshell clam beds. 697 linear feet of patchy eelgrass. Wetlands – 3.7 acres (7.7% of reach); wetland habitat types include estuarine intertidal aquatic bed and estuarine intertidal emergent.

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Case Inlet and Dana Passage, 303(d) listing (Category 5) for fecal coliform bacteria.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use –Residential (49%), Vacant (24%), remaining 26% is a mix of Aquaculture; Parks, Open Space; and Recreation Areas; Commercial, Utilities, Forestry; and Transportation. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater Structures in the reach include: 1 upland bridge and 1 large dock. Shoreline armoring is mapped along 61% of the reach. There are no mapped tidal barriers in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – County: Rural Residential (5%). Allyn UGA: Single Family Residential (68%), Village Commercial (14%), remaining 13% is a mix of Multi Family Residential and Public Open Space. Comprehensive Plan Designations – Urban Growth Area (95%) and Rural (5%). Existing SED – Urban Residential (42%), Urban Commercial (36%), and Rural (22%).

PUBLIC ACCESS (MAP 14)

WDFW provides water access near the Sherwood Creek stream mouth. Northwest Case Inlet Tidelands and North Case Inlet, managed by WDFW, provide public access to 10% of total linear miles in the reach. Allyn Waterfront Park is managed by Port of Allyn and provides 400 feet of waterfront access (4% of total linear miles of reach). The park provides moorage at the Allyn Dock, and has two launch ramps, picnic area, gazebo, basketball court and parking facilities. Allyn Kayak Park, also managed by Port of Allyn, provides access to the water, has a sandy beach and interpretive and historic signage. (Port of Allyn, 2011; Mason County Parks and Trails, 2006; Mason County Parks and Recreation, 2008).

IMPERVIOUS SURFACES (MAP 16)

26% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show residential development and roads, particularly in the southern part of the reach.

AREAS OF SPECIAL INTEREST

No Ecology-listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists six inventoried pre-contact sites within this reach. This reach includes the Allyn Church at 18510 State Route 3, which is listed on the Washington Historic Register. Resource probability mapping suggests there is a high to very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Realign road corridor

Remove bulkheads or replace with natural logs

Revegetate shoreline

Improve public access (e.g., placement of trash cans, erosion control measures) (Anchor, 2004).

KEY MANAGEMENT ISSUES

Priority area for juvenile salmonids from Sherwood and Coulter Creeks with a large mudflat located in the reach (Anchor, 2004).

Restoration would improve the mouth of Sherwood Creek and enhance the initial estuarine habitats encountered by juvenile salmonids outmigrating from the major salmon-bearing tributary (Anchor, 2004).

CASE INLET - REACH 17

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
5.0 MI	SPU 3125, SPU 3126, SPU 3127, SPU 3128, SPU 3129, SPU 3130	106.9 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10) Floodplain - 19% (21 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	**HAZARD AREAS (MAP 12)** 6% erosion, 10% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7) Shoreform - 29% barrier beaches, 24% barrier estuary, 23% open coastal inlets, bluff backed beaches, 2% artificial shoreforms. Net shore drift - predominantly northward drift, small areas of southward drift at the north and south ends.	**NEARSHORE PROCESS DEGRADATION (MAP 17)** Moderately degraded.
LAND COVER (MAP 15) 13% developed, 2% beach, 7% mud flat, 66% forest, 8% wetland, 3% floodplain/riparian (GAP, 2009); 39% forest cover forest, 44% non-forest, 9% off-shore, 9% other natural vegetation (PNPTC, 2011)	**HABITATS AND SPECIES (MAP 8)** 10.8 acres of hardshell clam habitat. Wetlands – 5.8 acres (5.5% of reach); wetland habitats include estuarine intertidal aquatic bed, emergent, and unconsolidated shore.

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Case Inlet and Dana Passage, 303(d) listed (Category 5) for fecal coliform bacteria and dissolved oxygen (offshore).

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (60%), Vacant (24%), remaining 26% is a mix of Aquaculture; Parks, Open Space; and Recreation Areas; Commercial, Utilities, Forestry; and Transportation. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

There are 7 instances in the reach where mapped road(s) serve as tidal barriers. Overwater structures in the reach include: 14 buoys and floats, 7 small docks, Grapeview Loop Road bridge and 1 large dock. Shoreline armoring is mapped along 33% of the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural.

Existing SED – 100% Urban Residential.

PUBLIC ACCESS (MAP 14)

Northwest Case Inlet Tidelands, managed by WDFW, provides public access to 36% of total linear miles in the reach.

IMPERVIOUS SURFACES (MAP 16)

16% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show residential development and roads, particularly in the NW part of the reach.

AREAS OF SPECIAL INTEREST

No state-listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists three inventoried pre-contact sites within this reach. Resource probability mapping suggests there is a moderate to very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Remove bulkheads to the south of the spit or replace with natural logs (Anchor, 2004).

Replace culvert with a bridge spanning the stream; Realign road corridor

Improve public access (e.g., placement of trash cans, erosion control measures)

Remove riprap bulkhead or replace with natural logs

KEY MANAGEMENT ISSUES:

Restoration in this area would improve the mouth of Sherwood Creek and enhance the initial estuarine habitats encountered by juvenile salmonids outmigrating from the major salmon-bearing tributary (Anchor, 2004).

Conserve emergent marsh and sand spit habit types (Anchor, 2004).

CASE INLET - REACH 18

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
1.0 MI (GRAPEVIEW)	SPU 3124, SPU 3125, SPU 3126	22.3 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10) Floodplain - 1.8% (0.4 acre) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	**HAZARD AREAS (MAP 12)** 10% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7) Shoreform - 56% open coastal inlet, 23% barrier beaches, 20% bluff backed beaches. Net shore drift - converging cells, large area of no appreciable drift along the protected shore west of Reach Island.	**NEARSHORE PROCESS DEGRADATION (MAP 17)** More degraded.
LAND COVER (MAP 15) 23% developed, 7% beach, 59% forest, 10% wetland (GAP, 2009); 24% forest cover forest, 68% non-forest, 8% off-shore (PNPTC, 2011)	**HABITATS AND SPECIES (MAP 8)** 413 feet of sand lance spawning habitat. 276 linear feet of patchy eelgrass. Wetlands – 0.3 acre of estuarine intertidal unconsolidated shore (1.4% of reach).

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Case Inlet and Dana Passage, 303(d) listed (Category 5) for fecal coliform bacteria and dissolved oxygen (offshore).

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (83%), remaining 17% is a mix of Vacant, Industrial; Parks, Open Space, and Recreation Areas; and Aquaculture. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 5 buoys and floats, 3 small docks, Reach Island Bridge that provides access to Reach Island, and 1 large dock. Shoreline armoring is mapped along 100% of the reach. There are no mapped tidal barriers in the reach. Grapeview Fair Harbor Marina provides private moorage, covered moorage, and 350' of guest dock space (Fair Harbor Marina, 2011).

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – County: Rural Residential (86%). Grapeview Hamlet: Mix of Rural Residential, Rural Commercial, and Rural Industrial (14%). Comprehensive Plan Designations – Rural (86%) and Hamlet (16%). Existing SED – 100% Urban Residential.

PUBLIC ACCESS (MAP 14)

Two boat launches, managed by the Port of Grapeview and the Port of Shelton, provide public access in this reach. Public access is also available on property associated with Reach Island Bridge, managed by Washington State.

IMPERVIOUS SURFACES (MAP 16)

5% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show residential development and roads; a marina in the southern part of the reach.

AREAS OF SPECIAL INTEREST

No Ecology-listed contaminated sites.

Medium sediment supply with no nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists two inventoried pre-contact sites within this reach. The reach also shares the inventoried early historic Treasure Island Bridge site with Marine Reach 19 (Reach Island). Resource probability mapping suggests there is a high to very high probability of finding unknown artifacts.

OPPORTUNITY AREAS (MAP 23)

Revegetate shoreline (Anchor, 2004).

Remove unnecessary bulkheads or replace with natural logs

KEY MANAGEMENT ISSUES

CASE INLET - REACH 20

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
0.8 MI	SPU 3120, SPU 3122, SPU 3123, SPU 3124	18.4 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10) Floodplain - 8% (1 acre) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	**HAZARD AREAS (MAP 12)** 11% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7) Shoreform - 55% barrier beaches, 48% bluff backed beaches. Net shore drift - two cells converge at the Stretch Island bridge, convergence zones on the east and west shores have lead to a development of a tombolo or isthmus.	**NEARSHORE PROCESS DEGRADATION (MAP 17)** Moderately to more degraded.
LAND COVER (MAP 15) 25% developed, 14% beach, 53% forest, 8% wetland, 1% floodplain/riparian (GAP, 2009); 27% forest cover forest, 53% non-forest, 10% off-shore, 11% other natural vegetation (PNPTC, 2011).	**HABITATS AND SPECIES (MAP 8)** 587 linear feet of sand lance spawning habitat. Wetlands – 1.0 acre (5.2% of reach); wetland habitat types include estuarine intertidal aquatic bed and unconsolidated shore.

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Case Inlet and Dana Passage, 303(d) listed (Category 5) for fecal coliform bacteria and dissolved oxygen (offshore).

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (90%); remaining 10% is a mix of Vacant; Parks, Open Space, and Recreation Areas; and Aquaculture. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 2 small docks and Stretch Island Bridge. Shoreline armoring is mapped along 62% of the reach. There are no mapped tidal barriers in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – 100% Urban Residential.

PUBLIC ACCESS (MAP 14)

Public access is available to property associated with Stretch Island Bridge, managed by Washington State.

IMPERVIOUS SURFACES (MAP 16)

26% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show residential development within most of the reach.

AREAS OF SPECIAL INTEREST

No contaminated sites listed by Ecology.

Medium sediment supply with no nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists one inventoried pre-contact site within this reach. Resource probability mapping suggests there is a high to very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Revegetate shoreline (Anchor, 2004).

Remove unnecessary bulkheads or replace with natural logs

KEY MANAGEMENT ISSUES

CASE INLET - REACH 22

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
2.7 MI	SPU 3120, SPU 3121, SPU 3122	56.1 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10) Floodplain - 6% (3 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	**HAZARD AREAS (MAP 12)** 8% erosion, 36% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7) Shoreform - 47% bluff backed beaches, 43% barrier estuaries, 10% barrier beaches. Net shore drift - predominantly northeastward drift, no appreciable drift on the leeward shore.	**NEARSHORE PROCESS DEGRADATION (MAP 17)** Least degraded.
LAND COVER (MAP 15) 19% developed, 20% beach, 50% forest, 5% wetland, 6% floodplain/riparian (GAP, 2009); 41% forest cover forest, 43% non-forest, 11% off-shore, 5% other natural vegetation (PNPTC, 2011).	**HABITATS AND SPECIES (MAP 8)** 939 linear feet of patchy kelp beds. Wetlands – 5.9 acres (10.5% of reach); wetland habitat types include estuarine intertidal aquatic bed and unconsolidated shore.

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Case Inlet and Dana Passage, 303(d) listed (Category 5) for fecal coliform bacteria, dissolved oxygen, and PCBs in fish tissue (offshore).

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (77%) and Vacant (23%). Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 10 small docks, 1 upland bridge, and 1 building. Shoreline armoring is mapped along 15% of the reach. There are no mapped tidal barriers in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – County: 100% Rural Residential. Comprehensive Plan Designations – 100% Rural (86%). Existing SED – 100% Urban Residential.

PUBLIC ACCESS (MAP 14)

DNR manages a beach near Grapeview in the southeast portion of the reach, accounting for 13% of total linear miles. Public access is available at this site.

IMPERVIOUS SURFACES (MAP 16)

17% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show residential development interspersed with forested areas throughout the reach.

AREAS OF SPECIAL INTEREST

No contaminated sites listed by Ecology.

High sediment supply with moderate nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists one inventoried pre-contact site within this reach. Resource probability mapping suggests there is a high very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

KEY MANAGEMENT ISSUES

Conserve feeder bluff (Anchor, 2004).

Conserve tributary mouth with emergent marsh habitat

PICKERING PASSAGE - REACH 23

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
2.0 MI (MCLANE COVE)	SPU 3118, SPU 3119, SPU 3120	49.2 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 42% (20 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

11% erosion, 72% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 74% open coastal inlet shoreforms, 26% bluff backed beaches.

Net shore drift - no appreciable drift for much of the northern extent of McLane Cove, a few short converging cells in the northeast cove of the embayment.

NEARSHORE PROCESS DEGRADATION (MAP 17)

Least degraded.

LAND COVER (MAP 15)

13% beach, 78% forest, 9% wetland (GAP, 2009);

Riparian vegetation: 65% forest cover, 23% non-forest, 9% off-shore, 3% other natural vegetation (PNPTC, 2011).

HABITATS AND SPECIES (MAP 8)

Wetlands – 2.5 acres (5.0% of reach); wetland habitat types include estuarine intertidal unconsolidated shore.

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Pickering Passage, 303(d) listing (Category 5) for fecal coliform bacteria. Testing conducted in the cove.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land use – Residential (48%), Vacant (22%), Forestry (18%), and Aquaculture (3%). Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 6 small docks, East Grapeview Loop Road bridge and 1 building. No shoreline armoring or tidal barriers are mapped in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – 100% Urban Residential.

PUBLIC ACCESS (MAP 14)

There are no public access areas mapped in the reach.

IMPERVIOUS SURFACES (MAP 16)

9% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show scattered residential development throughout the reach.

AREAS OF SPECIAL INTEREST

No contaminated sites listed by Ecology.

Medium sediment supply with high nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists two inventoried pre-contact sites within this reach. Resource probability mapping suggests there is a moderate-high to very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Realign road corridor (Anchor, 2004).

KEY MANAGEMENT ISSUES

Conserve tributary mouth habitat (Anchor, 2004).

PICKERING PASSAGE - REACH 24

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
4.5 MI	SPU 3110 THROUGH SPU 3118	107.0 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 11% (11 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

70% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 84% bluff backed beaches, 8% open coastal inlet, 4% barrier beaches, 4% barrier estuary. Net shore drift - predominantly northeastward, several cells converge along the western portion of the north shore of Pickering Pass.

NEARSHORE PROCESS DEGRADATION (MAP 17)

Mostly least degraded, some less degraded and narrow reach of not degraded shoreline.

LAND COVER (MAP 15)

7% developed, 26% beach, 63% forest, 4% wetland (GAP, 2009);

Riparian vegetation: 41% forest cover, 24% non-forest, 20% off-shore, 15% other natural vegetation (PNPTC, 2011).

HABITATS AND SPECIES (MAP 8)

11,506 linear feet of patchy kelp beds.

Wetlands – 5.4 acres (5.0% of reach); wetland habitat types include estuarine intertidal aquatic bed and unconsolidated shore.

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Pickering Passage, 303(d) listing (Category 5) for PCBs (offshore) in fish tissue. One Category 2 listing for dissolved oxygen, which indicates some evidence of water quality problems associated with that parameter.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (75%), Vacant (21%), remaining 4% is a mix of Agriculture, Aquaculture, and Forestry. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 4 buildings, 3 small docks, and 1 buoy. Shoreline armoring is mapped along 18% of the reach. There are no mapped tidal barriers in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – 100% Urban Residential.

PUBLIC ACCESS (MAP 14)

There are no public access areas mapped in the reach.

IMPERVIOUS SURFACES (MAP 16)

9% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show scattered residential development throughout the reach.

AREAS OF SPECIAL INTEREST

According to the Ecology facilities/sites database, there are no listed contaminated sites.

Medium sediment supply with high, moderate, and low nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists two inventoried pre-contact sites within this reach. Resource probability mapping suggests there is a high to very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Remove floats in stream channels (Anchor, 2004).

Remove bulkheads or replace with natural logs.

Revegetate the shoreline.

KEY MANAGEMENT ISSUES

Priority area targeting mainland tributary inlets that provide good conservation opportunities that could be enhanced by implementing restoration activities (Anchor, 2004).

Conserve tributary mouth and emergent marsh habitat types.

Protect bluffs and riparian zone.

PICKERING PASSAGE - REACH 25

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
4.4 MI	SPU 3108, SPU 3109, SPU 3110, SPU 3111, SPU 3112	101.7 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)	HAZARD AREAS (MAP 12)
Floodplain - 13% (13 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	26% erosion, 38% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7)	**NEARSHORE PROCESS DEGRADATION (MAP 17)**
Shoreform - 48% bluff backed beaches, 23% barrier beaches, 12% barrier estuary, 14% open coastal inlet, 2% barrier lagoon. Net shore drift - predominantly northward, areas of no appreciable drift at the embayments, a short cell with southward drift located north of the Jones Creek embayment.	Mostly less degraded, with intermittent areas of least degraded shoreline.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

21% developed, 12% beach, 49% forest, 14% wetland, 3% floodplain/riparian (GAP, 2009);

Riparian vegetation: 29% forest cover, 47% non-forest, 15% off-shore, 10% other natural vegetation (PNPTC, 2011).

HABITATS AND SPECIES (MAP 8)

1,000 linear feet of sand lance spawning habitat. 1,648 feet of patchy kelp beds.

Wetlands – 13.2 acres (13.0% of reach); types include estuarine intertidal aquatic bed, emergent, and unconsolidated shore.

WATER QUALITY (MAP 13)

Pickering Passage, Category 2 listing for fecal coliform bacteria.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (69%); Vacant (21%); remaining 10% is a mix of Forestry; Parks, Open Spaces, and Recreation Areas; Agriculture and Aquaculture. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

There are 3 locations mapped in the reach where tidal barriers exist: 2 road instances and 1 fill. Overwater structures in the reach include: Harstene Island Bridge and 1 large dock. Shoreline armoring is mapped along 27% of the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – 100% Urban Residential.

PUBLIC ACCESS (MAP 14)

Public access is available at property associated with Hartstene Island Bridge, managed by Washington State. Latimer's Landing Boat Launch, managed by Mason County, has a public boat launch and associated parking (Mason County Parks and Trails, 2006).

IMPERVIOUS SURFACES (MAP 16)

25% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show scattered residential development throughout the reach.

AREAS OF SPECIAL INTEREST

No contaminated sites listed by Ecology.

Part of reach (0.8 MI) has medium sediment supply with low nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists three inventoried pre-contact sites within this reach. Resource probability mapping suggests there is a high to very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Remove bulkheads or replace with natural logs (Anchor, 2004).

Revegetate stream corridor and delta with native trees.

KEY MANAGEMENT ISSUES:

Portions of this reach are priority area consisting of mainland marshes not associated with stream mouths. Marshes are in good condition that provide important habitat for juvenile salmonids (Anchor, 2004).

Portions of this reach contain mainland tributary inlets that provide good conservation opportunities

Conserve intact riparian zone.

Conserve emergent marsh and forest spit habitats.

PICKERING PASSAGE - REACH 26

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
5.8 MI	SPU 3102, SPU 3103, SPU 3104, SPU 3105, SPU 3106, SPU 3107, SPU 3108	124.3 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 21% (26 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

57% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 56% bluff backed beaches, 19% barrier beaches, 17% open coastal inlet, 7% barrier lagoon. Net shore drift - predominantly northward drift, no appreciable drift in areas where drift cells commonly converge.

NEARSHORE PROCESS DEGRADATION (MAP 17)

North shore is less degraded, central shore is more degraded and south shore is moderately degraded.

LAND COVER (MAP 15)

11% developed, 15% beach, 58% forest, 12% wetland, 4% floodplain/riparian (GAP, 2009);

Riparian vegetation: 41% forest cover, 41% non-forest, 7% off-shore, 12% other natural vegetation (PNPTC, 2011)

HABITATS AND SPECIES (MAP 8)

6.3 acres of herring spawning habitat. 1,759 acres of sand lance spawning habitat. 3.7 acres of hardshell clam. 1,320 LF of patchy kelp beds.

Wetlands – 6.7 acres (5.4% of reach); wetland habitat types include estuarine intertidal aquatic bed, emergent, and unconsolidated shore.

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Pickering Passage, 303(d) listing (Category 5) for fecal coliform bacteria.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (80%), Vacant (17%), remaining 3% is a mix of Forestry, Parks, Open Space, and Recreation Areas. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 24 small docks, 9 buoys and floats, 5 bridges and 3 large docks, and 2 buildings. Shoreline armoring is mapped along 43% of the reach. No tidal barriers are mapped in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – Rural Residential (97%) and Rural Tourist (3%). Comprehensive Plan Designations – 100% Rural. Existing SED – Urban Residential (97%) and Rural (3%).

PUBLIC ACCESS (MAP 14)

Public access is available at South Graham Point and Latimer's Landing Overflow Parking, both managed by Mason County. Latimer's Landing Overflow Parking is a community park that is 2.5 acres in total size. The park has a boat launch and fishing access (Mason Co. Parks and Trails, 2006).

IMPERVIOUS SURFACES (MAP 16)

14% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show residential development interspersed with forested areas throughout the reach.

AREAS OF SPECIAL INTEREST

No contaminated sites listed by Ecology.

The reach (0.6 MI) has medium sediment supply and low nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists two inventoried pre-contact sites within this reach. Resource probability mapping suggests there is a very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Remove bulkheads or replace with natural logs (Anchor, 2004).

Remove floating dock that ground at low tide.

Replace culvert with a bridge spanning the stream/delta.

Revegetate shoreline and conserve intact riparian zones.

KEY MANAGEMENT ISSUES

Portions of this reach are priority area consisting of mainland marshes not associated with stream mouths. Marshes are in good condition that provide important habitat for juvenile salmonids (Anchor, 2004).

Conserve emergent marsh, mudflat habitat, and forest spit habitats.

HARSTENE ISLAND - REACH 40

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
3.3 MI	SPU 3213, SPU 3214, SPU 3215	71.2 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 19% (14 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

3% erosion, 52% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 80% bluff backed beaches, 11% barrier beaches, 9% barrier lagoon.

Net shore drift - predominantly northward drift.

NEARSHORE PROCESS DEGRADATION (MAP 17)

Mostly less degraded, with some least degraded shoreline.

LAND COVER (MAP 15)

7% developed, 18% beach, 73% forest, 3% wetland (GAP, 2009);

Riparian vegetation: 46% forest cover, 18% non-forest, 19% off-shore, 17% other natural vegetation, 0.5% water (PNPTC, 2011)

HABITATS AND SPECIES (MAP 8)

0.8 acres of geoduck and 12.1 acres of hardshell clam habitat. 3,708 lineal feet of patchy kelp beds.

0.79 acre of estuarine intertidal unconsolidated shore wetland mapped (1.2% of reach).

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Pickering Passage, 303(d) listing (Category 5) for fecal coliform bacteria.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Parks, Open Space, and Recreation Areas (44%); Residential (28%); Vacant (20%); remaining 8% is a mix of Forestry; Aquaculture; and Transportation. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

There are 2 instances in the reach where mapped road(s) serve as tidal barriers. Overwater structures in the reach include: 1 upland bridge and 1 small dock. Shoreline armoring is mapped along 14% of the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – 100% Rural.

PUBLIC ACCESS (MAP 14)

There are no public access areas mapped in the reach.

IMPERVIOUS SURFACES (MAP 16)

21% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show residential development interspersed with forested areas throughout the reach.

AREAS OF SPECIAL INTEREST

No Ecology-listed contaminated sites.

A portion of the reach (1.3MI) has exceptional sediment supply and high nearshore connectivity. High sediment supply with high nearshore connectivity also present in the reach (<0.1MI) (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists one inventoried pre-contact site within this reach. Resource probability mapping suggests there is a high to very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Remove bulkheads and riprap or replace with natural logs (Anchor, 2004).

Remove road along top of the spit.

Revegetate shoreline.

Replace tires making up the breakwater with natural logs.

KEY MANAGEMENT ISSUES

Portions of this reach are priority area that has exceptional supply of sediments that remain well connected to the nearshore. Shoreline includes largely intact riparian vegetation (Anchor, 2004).

Conserve bluffs and intact riparian corridors.

HARSTENE ISLAND - REACH 41

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
1.7 MI	SPU 3212, SPU 3213	41.4 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 80% (31 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

66% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 87% bluff backed beaches, 7% open coastal inlet, 6% barrier beaches. Net shore drift - predominantly northeastward drift, a short cell with southwestward drift at Indian Cove.

NEARSHORE PROCESS DEGRADATION (MAP 17)

Least degraded.

LAND COVER (MAP 15)

2% beach, 96% forest, 2% wetland (GAP, 2009);

Riparian vegetation: 74% forest cover, 12% non-forest, 7% off-shore, 7% other natural vegetation (PNPTC, 2011).

HABITATS AND SPECIES (MAP 8)

1,000 linear feet of sand lance spawning habitat. 35.4 acres of hardshell clam. 5,685 linear feet of patchy kelp beds.

1.1 acre of estuarine intertidal unconsolidated shore wetland mapped (2.7% of reach).

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Pickering Passage, 303(d) listing (Category 5) for fecal coliform bacteria and PCBs (tissue).

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (53%); Parks, Open Space, and Recreation Areas (29%); and Vacant (19%). Ownership – Private (91%) and Public (9%).

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 1 large dock. Shoreline armoring is mapped along 18% of the reach. No tidal barriers are mapped in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – 100% Rural.

PUBLIC ACCESS (MAP 14)

A portion of Jarrell Cove State Park is located in this reach. See Reach 42 for more information.

IMPERVIOUS SURFACES (MAP 16)

5% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos show a marina at Indian Cove in the northern part of the reach; the rest of the reach is mostly forested with scattered single-family residences.

AREAS OF SPECIAL INTEREST

No Ecology-listed contaminated sites.

High sediment supply with high nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

There are no listed cultural resources or state or federally listed historic properties. Resource mapping suggests there is a very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Protect existing forested riparian zone.

Replace tires making up the breakwater with natural logs (Anchor, 2004).

Remove bulkheads or replace with natural logs.

Revegetate shoreline.

KEY MANAGEMENT ISSUES

Protection of existing forested riparian areas.

Portions of this reach are priority area with riparian vegetation and unmodified shoreline that could contribute to maintaining high functioning habitat for juvenile salmoinds. Area provides important early estuarine rearing habitat for outmigrants (Anchor, 2004).

HARSTENE ISLAND - REACH 42

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
2.5 MI (JARRELL COVE)	SPU 3211, SPU 3212	59.0 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10) Floodplain - 42% (25 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	**HAZARD AREAS (MAP 12)** 10% erosion, 33% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7) Shoreform - 82% open coastal inlet. 18% bluff backed beaches. Net shore drift - southward drift along the western shore, large area of no appreciable drift in the bayhead of the cove, northeastward drift along the northeastern shore.	**NEARSHORE PROCESS DEGRADATION (MAP 17)** Least degraded.
LAND COVER (MAP 15) 3% developed, 11% beach, 71% forest, 7% wetland, 8% floodplain/riparian (GAP, 2009); Riparian vegetation: 61% forest cover, 27% non-forest, 7% off-shore, 5% other (PNPTC, 2011).	**HABITATS AND SPECIES (MAP 8)** 500 LF of sand lance spawning habitat. 35.3 acres of hardshell clam habitat. 210 LF of kelp beds. Wetlands – 11.8 acres (20.0% of reach); wetland habitat types include estuarine intertidal aquatic bed, emergent, and unconsolidated shore.

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

One Category 2 listing for fecal coliform bacteria, which indicates some evidence of water quality problems associated with that parameter.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (54%); Parks, Open Space, and Recreation Areas (24%); Vacant (12%); remaining 10% is a mix of Transportation; Forestry; and Aquaculture. Ownership – Private (80%) and Public (20%).

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 6 small docks, 4 large docks, and 1 buoy. Shoreline armoring is mapped along 8% of the reach. No tidal barriers. Jarrell Cove Marina is located across from Jarrell Cove State Park. The marina has 70 slips and a fuel dock (Sail the Net.com, 2011).

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – Rural Residential (96%) and Rural Tourist (4%). Comprehensive Plan Designations – 100% Rural.

Existing SED – 100% Rural.

PUBLIC ACCESS (MAP 14)

Jarrell Cove State Park, managed by WA State Parks, and surrounding Jarrell Cove beach, managed by WDNR, account for 30% of total linear miles in this reach. Jarrell Cove State Park has 22 campsites, 2 docks with 680 feet of moorage, 14 mooring buoys, hiking and biking trails, volleyball field and a badminton area. The total park size is 106 acres, a portion in this reach. Harstene Island State Park is an 310-acre undeveloped park with 3,100 feet of tidelands(Mason County Parks and Trails, 2006; WA State Parks, 2011).

IMPERVIOUS SURFACES (MAP 16)

10% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show a marina on the NW side of Jarrell Cove; the central part of the reach is single-family residential development, while the NE is forested.

AREAS OF SPECIAL INTEREST

No Ecology-listed contaminated sites.

A portion of the reach (0.2 MI)has high sediment supply with high nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists one inventoried pre-contact site within this reach. Resource probability mapping suggests there is a very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Protect existing forested riparian zone and revegetate shoreline with native vegetation.

Remove bulkheads or replace with natural logs (Anchor, 2004).

Remove float that grounds at low tide.

KEY MANAGEMENT ISSUES

Portions of this reach are priority area with riparian vegetation and unmodified shoreline that could contribute to maintaining high functioning habitat for juvenile salmonids. Area provides important early estuarine rearing habitat for outmigrants (Anchor, 2004).

HARSTENE ISLAND - REACH 43

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
6.7 MI	SPU 3209, SPU 3210, SPU 3211, SPU 3212	158.1 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10) Floodplain - 88% (139 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	**HAZARD AREAS (MAP 12)** 39% erosion, 61% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7) Shoreform - 79% bluff backed beaches, 10% barrier beaches, 6% open coastal inlets, 4% barrier estuary. Net shore drift - predominantly northward drift, small area of no appreciable drift, small area of eastward drift.	**NEARSHORE PROCESS DEGRADATION (MAP 17)** Least degraded.
LAND COVER (MAP 15) 3% developed, 1% open water, 14% beach, 68% forest, 12% wetland, 2% floodplain/riparian (GAP, 2009); Riparian vegetation: 67% forest cover, 22% non-forest, 7% off-shore, 5% other (PNPTC, 2011)	**HABITATS AND SPECIES (MAP 8)** 1,300 linear feet of sand lance spawning habitat. 141 acres of hardshell clam and 4.5 acres of oyster beds. 9,808 feet of patchy kelp beds. Wetlands – 2.9 acres (1.8% of reach); includes estuarine intertidal aquatic bed.

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

One Category 2 listing for fecal coliform bacteria, which indicates some evidence of water quality problems.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use - Residential (55%); Vacant (36%); and remaining 9% is a mix of Forestry and Agriculture. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 5 small docks, 3 buoys and floats, and 1 upland bridge and the Harstene Island Bridge. Shoreline armoring is mapped along 11% of the reach. No tidal barriers are mapped in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural.

Existing SED – Rural (90%) and Conservancy (10%).

PUBLIC ACCESS (MAP 14)

DNR tidelands associated with Harstene Island beach and Jarrell Cove beach provide public access. Public access is also available to property associated with Hartstene Island Bridge, managed by Washington State. The beaches and bridge property account for 11% of total linear miles. 700 feet of WDNR trails pass through part of the reach.

IMPERVIOUS SURFACES (MAP 16)

10% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show stretches of intact forested interspersed with single-family residential development.

AREAS OF SPECIAL INTEREST

No Ecology-listed contaminated sites.

Part of reach (2.8 MI) has medium sediment supply with moderate and high nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists one inventoried pre-contact site within this reach. Resource probability mapping suggests there is a very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Protect existing forested riparian areas and revegetate shoreline with native plantings.

Remove bulkheads or replace with natural logs (Anchor, 2004).

Remove dock and boat removal structure.

KEY MANAGEMENT ISSUES

Protection of existing forested riparian areas.

Conserve feeder bluffs (Anchor, 2004).

Conserve stream delta, lagoon with emergent marsh and spit (Anchor, 2004).

HARSTENE ISLAND - REACH 44

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
2.6 MI	SPU 3208, SPU 3209	60.2 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY Floodplain - 93% (56 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	**HAZARD AREAS (MAP 12)** 3% erosion, 13% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7) Shoreform - 40% bluff backed beaches, 32% barrier lagoon. Net shore drift - predominantly northward drift, small area of eastward drift at the north end of the reach.	**NEARSHORE PROCESS DEGRADATION (MAP 17)** Mostly less degraded with small reach of more and least degraded shoreline.
LAND COVER (MAP 15) 1% developed, 40% beach, 53% forest, 6% wetland (GAP, 2009); Riparian vegetation: 66% forest cover, 30% non-forest, 1% off-shore, 3% other natural; vegetation, 0.5% water (PNPTC, 2011)	**HABITATS AND SPECIES (MAP 8)** 24.9 acres of hardshell clam. 442 linear feet of continuous and 3,922 feet of patchy kelp beds. 1.6 acres of estuarine intertidal unconsolidated shore wetland mapped (2.6% of reach).

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Squaxin, Peale and Pickering Passage, 303(d) listing (Category 5) for fecal coliform bacteria.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use - Residential (55%); Forestry (30%); remaining 15% is a mix of Vacant; Aquaculture; and Parks, Open Space, and Recreation Areas. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 2 small docks, 1 buoy, and 1 upland bridge. Shoreline armoring is mapped along 22% of the reach. There are no mapped tidal barriers in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – 100% Rural.

PUBLIC ACCESS (MAP 14)

There are 30 feet of WDNR trails that pass through a portion of the reach.

IMPERVIOUS SURFACES (MAP 16)

9% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show a mixture of forested areas and residences in the northern part of the reach, while the southern part of the reach contains more intact forest. A shellfish processing facility is located in the central part of the reach.

AREAS OF SPECIAL INTEREST

According to the Ecology facilities/sites database, there are no listed contaminated sites.

High sediment supply with moderate nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists three inventoried pre-contact sites within this reach. Resource probability mapping suggests there is a very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Protect existing forested riparian areas.

Create riparian buffer and set back shellfish operations (Anchor, 2004).

Revegetate shoreline with native plantings.

Remove pipe outfall depositing in tributary mouth.

KEY MANAGEMENT ISSUES

Protection of existing forested riparian areas.

Portions of this reach are priority area due to two tributaries that can provide favorable rearing conditions for juvenile salmonids outmigrants. Restoration opportunities could enhance water quality and prey productivity in the area as well as provide improved predator refuge habitat (Anchor, 2004).

HARSTENE ISLAND - REACH 45

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
3.7 MI (INCLUDING BRISCOE POINT)	SPU 3208, SPU 3221	76.1 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10) Floodplain - 99% (75 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	**HAZARD AREAS (MAP 12)** 54% erosion, 64% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7) Shoreform - 58% bluff backed beaches, 27% barrier beaches, 14% barrier lagoon shores. Net shore drift - predominantly northward drift.	**NEARSHORE PROCESS DEGRADATION (MAP 17)** Less degraded.
LAND COVER (MAP 15) 16% beach, 76% forest, 6% wetland, 2% floodplain/riparian (GAP, 2009); Riparian vegetation: 63% forest cover, 25% non-forest, 7% off-shore, 6% other natural vegetation (PNPTC, 2011)	**HABITATS AND SPECIES (MAP 8)** 2.7 acres of hardshell clam. 867 feet of patchy kelp beds. 1.7 acres of estuarine intertidal unconsolidated shore wetland mapped (2.2% of reach).

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Not listed as a 303(d) impaired waterbody.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use - Residential (53%); Forestry (34%); remaining 13% is a mix of Vacant and Aquaculture. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

There is 1 instance in the reach where a mapped road serves as a tidal barrier. Overwater structures in the reach include: 5 buoys and floats, 2 small docks, 2 bridges, and 1 building. Shoreline armoring is mapped along 15% of the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – 100% Rural.

PUBLIC ACCESS (MAP 14)

There are 270 feet of WDNR trails that pass through a portion of the reach.

IMPERVIOUS SURFACES (MAP 16)

2% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show stretches of intact forest interspersed with single-family residential development.

AREAS OF SPECIAL INTEREST

No Ecology-listed contaminated sites.

High sediment supply with moderate nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists two inventoried pre-contact sites within this reach. Resource probability mapping suggests there is a moderate-high to very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

- Protect existing forested riparian zone.
- Remove bulkheads or replace with natural logs (Anchor, 2004).
- Revegetate shorlein with native plantings (Anchor, 2004).

KEY MANAGEMENT ISSUES

- Protection of existing forested riparian areas.

HARSTENE ISLAND - REACH 46

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
6.9 MI	SPU 3208, SPU 3219, SPU 3220, SPU 3221	159.8 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)	HAZARD AREAS (MAP 12)
Floodplain - 2% (4 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	15% erosion, 75% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7)	**NEARSHORE PROCESS DEGRADATION (MAP 17)**
Shoreform - 73% bluff backed beaches, 22% barrier beaches, 4% barrier estuaries, 1% barrier lagoon shoreforms. Net shore drift - northward drift along the east shore of the island to just beyond Fudge Point, a short cell with southward drift, no appreciable drift on leeward shore of Buffingtons Lagoon.	Less degraded.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

1% developed, 14% beach, 78% forest, 5% wetland, 2% floodplain/riparian (GAP, 2009);

Riparian vegetation: 62% forest cover, 19% non-forest, 6% off-shore, 12% other natural vegetation, 1% water (PNPTC, 2011).

HABITATS AND SPECIES (MAP 8)

11,216 feet of sand lance spawning habitat. 8,413 feet of patchy kelp beds.

Wetlands –4.4 acres (2.8% of reach); wetland habitat types include estuarine intertidal aquatic bed, emergent, and unconsolidated shore.

WATER QUALITY (MAP 13)

Not listed as a 303(d) impaired waterbody.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use - Residential (46%); Forestry (31%); and Vacant (23%). Ownership –Private (99%) and Public (1%).

SHORELINE MODIFICATIONS (MAP 16)

There are 4 instances in the reach where mapped road(s) serve as tidal barriers. Overwater structures in the reach include: 9 small docks, 6 buildings, and 1 upland bridge. Shoreline armoring is mapped along 17% of the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential.
Comprehensive Plan Designations – 100% Rural.
Existing SED – 100% Rural.

PUBLIC ACCESS (MAP 14)

There are about 120 feet of WDNR trails that pass through a portion of the reach.

IMPERVIOUS SURFACES (MAP 16)

0% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show stretches of intact forest interspersed with single-family residential development.

AREAS OF SPECIAL INTEREST

No listed contaminated sites.

A portion of the reach (0.4 MI) has medium sediment supply and high nearshore connectivity. Medium sediment supply with moderate nearshore connectivity also present in the reach (0.4 MI) (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

There are no listed cultural resources or state or federally listed historic properties. Resource mapping suggests there is a moderate-high to very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Protect existing forested riparian areas, and revegetate shoreline.

Provide public access opportunities where little access exists.

Remove bulkheads or replace with natural logs (Anchor, 2004).

KEY MANAGEMENT ISSUES

Protection of existing forested riparian areas.

Portions of this reach are priority area providing a long, primarily intact stretch of shoreline that has an exceptional supply of sediment that is well connected to the nearshore (Anchor, 2004).

Conserve lagoons and emergent marsh habitat (Anchor, 2004).

Conserve feeder bluffs (Anchor, 2004).

HARSTENE ISLAND - REACH 47

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
3.3 MI	SPU 3215, SPU 3216, SPU 3217, SPU 3218, SPU 3219	78.7 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 2% (2 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

4% erosion, 85% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 82% bluff backed beaches, 13% barrier estuary, 5% barrier beaches.

Net shore drift - two cells converge on the shore landward on McMicken Island, northward drift converges with a southward drift cell at a barrier embayment.

NEARSHORE PROCESS DEGRADATION (MAP 17)

Least degraded with small section of less degraded shore.

LAND COVER (MAP 15)

1% developed, 5% beach, 87% forest, 5% wetland, 2% floodplain/riparian (GAP, 2009);

Riparian vegetation: 67% forest cover, 13% non-forest, 12% off-shore, 7% other natural vegetation (PNPTC, 2011)

HABITATS AND SPECIES (MAP 8)

22.4 acres of hardshell clam and 3.3 acres of oyster beds.

Wetlands – 2.1 acres (2.7% of reach); wetland habitat types include estuarine intertidal aquatic bed and unconsolidated shore.

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Case Inlet and Dana Passage, 303(d) listing (Category 5) for dissolved oxygen (offshore).

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Vacant (45%); Residential (32%); Forestry (20%); remaining 3% is a mix of Aquaculture and Parks, Open Space, and Recreation Areas. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include 1 small dock. No shoreline armoring or tidal barriers are mapped along the reach. Aquaculture facilities are located at the north end of the reach

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED –Rural (82%) and Conservancy (18%).

PUBLIC ACCESS (MAP 14)

Fudge Point, managed by Washington State Parks accounts for 16% of total linear miles. Public access is available at this site.

IMPERVIOUS SURFACES (MAP 16)

1% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show stretches of intact forest interspersed with single-family residential development.

AREAS OF SPECIAL INTEREST

No listed contaminated sites.

A portion of the reach (0.4 MI) has medium sediment supply with high nearshore connectivity (CGS, 2003)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

There are no listed cultural resources or state or federally listed historic properties. Resource mapping suggests there is a very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Protect existing forested riparian areas.

KEY MANAGEMENT ISSUES

Protection of existing forested riparian areas.

Conserve overhanging riparian vegetation and intact riparian corridor (Anchor, 2004).

Conserve stream mouth habitat (Anchor, 2004).

MCMICKEN ISLAND - REACH 48

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
0.6 MI	SPU 3218	9.7 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 77% (7 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

27% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 85% bluff backed beaches, 15% barrier beaches. Net shore drift - northeastward drift refracts around the north tip of the island, southward drift and northwestward drift converge at the southwest point of the island.

NEARSHORE PROCESS DEGRADATION (MAP 17)

Least degraded.

LAND COVER (MAP 15)

30% beach, 55% forest, 16% wetland (GAP, 2009);

Riparian vegetation: 71% forest cover, 4% non-forest, 8% off-shore, 18% other natural vegetation (PNPTC, 2011)

HABITATS AND SPECIES (MAP 8)

5.7 acres of herring holding habitat. 1,263 feet of patchy kelp beds.

No wetlands are mapped in this reach.

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Case Inlet and Dana Passage, 303(d) listing (Category 5) for dissolved oxygen (offshore).

BUILTBUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – 100% Parks, Open Space, and Recreation Areas. Ownership – Public (73%) and Private (27%).

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include 1 buoy. No shoreline armoring or tidal barriers are mapped along the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – 100% Conservancy.

PUBLIC ACCESS (MAP 14)

McMicken Island State Park, managed by Washington State Parks, is an undeveloped park that serves as a boater destination. Activities include hiking trails, wildlife viewing, and shellfish harvesting. It provides public access to 100% of the linear miles in the reach. The park is 11 acres in total size (Mason County Parks and Trails, 2006; WA State Parks, 2011).

IMPERVIOUS SURFACES (MAP 16)

0% of reach is mapped as impervious (NOAA CCAP, 2006). Aerial photos from 2009 show most of the island to be forested, with a few structures at the south end of the island.

AREAS OF SPECIAL INTEREST

No Ecology-listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

There are no listed cultural resources or state or federally listed historic properties. Resource mapping suggests there is a very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Protect existing forested riparian areas.

Opportunity to purchase private lands and add to park and public access.

KEY MANAGEMENT ISSUES

Protection of existing forested riparian areas.

REACH ISLAND - REACH 19

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
1.9 MI	SPU 3226, SPU 3227	42.0 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 55% (23 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

16% erosion, 14% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 48% bluff backed beaches, 35% barrier beaches, 17% open coastal inlets. Net shore drift - two northward transport cells diverge at the south tip of Reach Island, southward transport along the east shore and the northern half of the west shore, area of no appreciable drift between the two cells along the central leeward side of the island.

NEARSHORE PROCESS DEGRADATION (MAP 17)

More degraded.

LAND COVER (MAP 15)

27% developed, 43% beach, 29% forest, 2% wetland (GAP, 2009);

Riparian vegetation: 24% forest cover, 63% non-forest, 12% off-shore, 2% other natural vegetation (PNPTC, 2011)

HABITATS AND SPECIES (MAP 8)

302 feet of continuous and 74 feet of patchy eelgrass beds. 0.9 acre of unconsolidated shore wetland mapped (2.1% of reach).

PHYSICAL AND ECOLOGICAL FEATURES

WATER QUALITY (MAP 13)

Not listed as a 303(d) impaired waterbody.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (90%); remaining 10% is a mix of Vacant; Parks, Open Space, and Recreation Areas; and Aquaculture. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 18 buoys and floats, 13 small docks, 5 buildings, Reach Island Bridge, and 1 large dock. Shoreline armoring is mapped along 97% of the reach. No tidal barriers.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural.

Existing SED – 100% Urban Residential.

PUBLIC ACCESS (MAP 14)

Public access is available to property associated with Reach Island Bridge, managed by Washington State.

IMPERVIOUS SURFACES (MAP 16)

50% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show the reach to be almost entirely developed with single-family residences.

AREAS OF SPECIAL INTEREST

No listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists one inventoried early historic site, the Treasure Island Bridge, which is shared with MR-18 (Case Inlet). Resource probability mapping suggests there is a high to very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Protect eelgrass areas as critical saltwater habitats.

Remove or reduce the linear footage of shoreline armoring and replace with soft-shore stabilization.

Restore vegetation where lacking in the riparian zone.

KEY MANAGEMENT ISSUES

Armoring of the shoreline alters natural processes.

Impervious surface within 200 feet of the ordinary high water mark is high and could be reduced.

STRETCH ISLAND - REACH 21

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
3.4 MI	SPU 3122, SPU 3123, SPU 3222, SPU 3223, SPU 3224, SPU 3225	73.7 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 45% (33 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

7% erosion, 46% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 66% bluff backed beaches, 27% barrier beaches, 7% open coastal inlets.

Net shore drift - predominantly northward transport along Stretch Island shore and west shore, eastward transport along the north shore, short cell with southward drift along the northwest corner of the island.

NEARSHORE PROCESS DEGRADATION (MAP 17)

Moderately degraded, some less degraded shoreline.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

42% developed, 1% open water, 31% beach, 23% forest, 3% wetland, 1% floodplain/riparian (GAP, 2009);

Riparian vegetation: 33% forest cover, 39% non-forest, 17% off-shore, 12% other natural vegetation (PNPTC, 2011)

HABITATS AND SPECIES (MAP 8)

1,055 feet of sand lance spawning habitat. 160 feet of patchy eelgrass. 3,027 feet of patchy kelp beds.

Wetlands – 1.9 acres (2.6% of reach); wetland habitat types include estuarine intertidal aquatic bed, estuarine intertidal unconsolidated shore, palustrine aquatic bed, and palustrine emergent.

WATER QUALITY (MAP 13)

One 303(d) listing (Category 5) for PCBs; however, this listing is offshore.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (71%); Vacant (16%); remaining 13% is a mix of Agriculture; Aquaculture; and Parks, Open Space, and Recreation Areas. Ownership – Private (95%) and Public (5%).

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: buoys and floats, 13 small docks, 5 buildings, Stretch Point Bridge, and 1 large dock. Shoreline armoring is mapped along 39% of the reach. There are no tidal barriers mapped in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – Rural Residential (95%) and Agricultural Resource Lands (5%). Comprehensive Plan Designations – 100% Rural.

Existing SED – 100% Urban Residential.

PUBLIC ACCESS (MAP 14)

Public access is available to Stretch Point beach, located in the southeastern portion of the reach, and property associated with Stretch Point Bridge, both managed by Washington State. They account for 10% of total linear miles. Stretch Point State Park provides access to 7% of the reach's total linear miles. The park is a total of 4 acres and is mostly undeveloped. The park has 5 mooring buoys (Mason County Parks and Trails, 2006).

IMPERVIOUS SURFACES (MAP 16)

43% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show a mixture of forest and single-family residences throughout the reach.

AREAS OF SPECIAL INTEREST

No state-listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

There are no listed cultural resources or state or federally listed historic properties. Resource mapping suggests there is a moderate to very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Remove or reduce the linear footage of shoreline armoring and replace with soft-shore stabilization.

Restore vegetation where lacking in the riparian zone.

KEY MANAGEMENT ISSUES

Protect eelgrass areas as critical saltwater habitats.

HOPE ISLAND - REACH 35

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
1.6 MI	SPU 3194, SPU 3195	36.3 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)	HAZARD AREAS (MAP 12)
Floodplain - 50% (18 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	44% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7)	**NEARSHORE PROCESS DEGRADATION (MAP 17)**
Shoreform - 63% bluff backed beaches, 34% barrier beach, 3% barrier estuary. Net shore drift - northward drift along the eastern shore, southward drift along the north and southwest shore.	Not degraded.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

6% beach, 93% forest, 1% wetland (GAP, 2009);

Riparian vegetation: 93% forest cover, 3% non-forest, 4% other natural vegetation (PNPTC, 2011)

HABITATS AND SPECIES (MAP 8)

1,000 feet of sand lance spawning habitat. 38.8 acres of hardshell clam. 880 feet of continuous and 2,423 feet of patchy kelp beds.

1.2 acres of estuarine intertidal unconsolidated shore wetland mapped (3.3% of reach).

WATER QUALITY (MAP 13)

No 303(d) Category 5 listings. One Category 2 listing for fecal coliform bacteria, which indicates some evidence of water quality problems.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – 100% Vacant. Ownership – Public (98%) and Private (2%).

SHORELINE MODIFICATIONS (MAP 16)

No shoreline modifications are mapped in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – 100% Conservancy.

PUBLIC ACCESS (MAP 14)

Hope Island State Park, managed by Washington State Parks, provides public access to 52% of total linear miles. The park is 106 acres in total size and accessible only by boat. The park has old growth forests, saltwater marshes, and a sandy beach. Camping is available on the island (Mason County Department of Parks and Trails, 2006; Washington State Park, 2011).

IMPERVIOUS SURFACES (MAP 16)

No impervious surfaces are mapped in this reach (NOAA CCAP, 2006). Aerial photos from 2009 show the reach to be almost entirely undeveloped and in forest cover.

AREAS OF SPECIAL INTEREST

According to the Ecology facilities/sites database, there are no listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

There are no listed cultural resources or state or federally listed historic properties. Resource mapping suggests there is a very high probability of finding unknown artifacts within this reach.

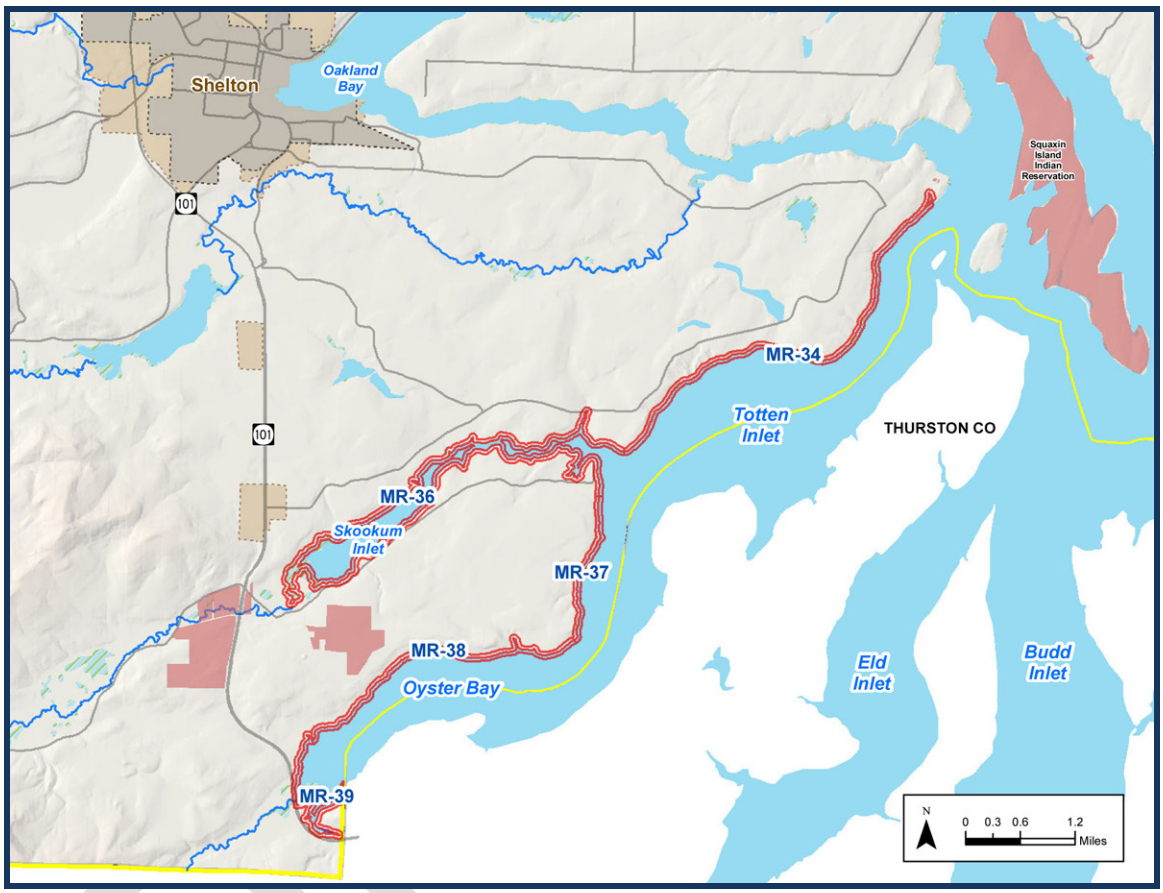
OPPORTUNITY AREAS (MAP 23)

- Protect existing forested riparian areas.

KEY MANAGEMENT ISSUES

- Protection of existing forested riparian areas.

5.2 Totten Inlet (including Skookum Inlet and Oyster Bay)



5.2.1 Physical Characterization and Modifications

Totten and Little Skookum Inlets are some of the most sheltered low-energy shores of the Puget Sound region. Little Skookum Inlet is highly complex, with frequent changes in shore orientation and includes several minor embayments. Erosion rates are very slow in this environment, as are sediment transport rates. Close to half of Little Skookum Inlet is mapped as having no appreciable drift due to the negligible quantity of sediment transport resulting from very low wave energy. The entire inlet was mapped by PSNERP as a large open coastal inlet. Totten Inlet is similar in character to Budd Inlet in Thurston County, as it is comprised largely of bluff backed beaches with many small embayments. Contiguous net shore-drift cells are mapped north of Oyster Bay, which is an area with no appreciable drift. Depositional shoreforms found within this area include: a single barrier estuary, intermittent barrier beaches and open coastal inlets and an artificial shoreform just north of Oyster Bay.

The PSNERP Strategic Needs Assessment composite measure of degradation to multiple nearshore processes highlights areas to target for restoration and conservation within Mason County. Within the shores of Totten and Skookum Inlets and Oyster Bay nearshore process degradation was most commonly mapped as "least" and "less" degraded. Only one area was mapped as "moderately" degraded, which was located along the shore south of the mouth of Little Skookum Inlet.

5.2.2 Water Quality

Totten Inlet, Little Skookum Inlet and Oyster Bay are part of the Sound Puget Sound Dissolved Oxygen Study (Ecology 2008); similar to the rest of South Sound which is being evaluated for nutrient loading leading to low levels of dissolved oxygen. In addition, Totten Inlet and Little Skookum Inlet have been part of a TMDL undertaken by the EPA and Ecology for fecal coliform. In addition, as part of the fecal coliform pollution reduction program, Mason County Public Health Department has conducted a septic system survey and analysis to evaluate septic sources of nutrients (Mason County PH, 2009). Nutrient loading contributing to the low levels of dissolved oxygen are likely related to non-point sources such as septic sewer systems, agricultural runoff, use of fertilizers and other man-made sources.

5.2.3 Critical or Priority Habitat and Species

Critical or priority habitats and species mapped within the Mason County shoreline jurisdiction of Totten Inlet are covered in this section; including Marine Reaches (MR): MR 34 and MR 36-39.

According to the PHS data, Totten Inlet supports several priority salmonid species (WDFW, 2010; Table 5-2).

Table 5-2. Fish species documented for Totten Inlet

Common Name	Scientific Name	Habitat Use	Federal Listing	State Listing
Coastal cutthroat trout	*Oncorhynchus clarki clarki*	Presence/Migration	~	~
fall Chinook salmon	*Oncorhynchus tshawytscha*	Presence/Migration	Threatened	Candidate
fall Chum salmon	*Oncorhynchus keta*	Known spawning and Presence/Migration	~	~
Coho salmon	*Oncorhynchus kisutch*	Presence/Migration	Concern	~
winter Steelhead trout	*Oncorhynchus mykiss*	Presence/Migration	Threatened	~

Critical habitat has been designated for the Puget Sound ESU Chinook salmon for all reaches covered in this section, extending upstream to the point of tidal influence. Critical habitat has also been designated for the Southern Resident killer whale DPS for all reaches covered in this section, extending to waters deeper than 20 feet (USFWS, 2010).

Approximately 4.9 acres of herring spawning habitat is mapped in Totten Inlet (WDFW, 2010). Sand lance spawning habitat is recorded for over 11,000 linear feet of Totten Inlet in Marine Reach 34 (WDFW, 2010). Smelt is mapped as spawning along the nearshore for all reaches covered in this section, with the exception of MR 39 (WDFW, 2010). Essential fish habitat for rock sole is mapped for MR 34: 4,579 feet and for MR 37: 994 feet (WDFW, 2010).

Shellfish beds for hardshell clam and oyster are recorded for selected reaches and described on the reach sheets (WDFW, 2010). Patchy occurrences of kelp beds are recorded for two reaches in Totten Inlet as described on the reach sheets that follow (WDNR, 2008).

Priority species known to occur include mountain quail, purple martin, and bald eagle. Nesting bald eagle habitat is also documented in Totten Inlet and Little Skookum Inlet (WDFW, 2010). Wetlands are mapped in all reaches located in this section (NWI, 1989).

5.2.4 Land Use

Land use is a mix of residential, forestry and vacant lands along Totten Inlet, Little Skookum Inlet and Oyster Bay. There are several docks and piers and limited armoring located throughout these shorelines. Public access is only available by accessing tidelands managed by WDNR in parts of Little Skookum Inlet and Oyster Bay.

5.2.5 Land Cover

According to the GAP 2009 data, the dominant land cover type for Little Skookum and Totten Inlets is conifer dominated forest at 42 percent. The next highest percent cover is provided by harvested forest at 19 percent. The third highest land cover type is salt, brackish, and estuary wetland at 7 percent. Developed land comprises 6 percent of the overall land cover of Totten Inlet shorelines.

According to the PNPTC 2011 data set, the dominant land cover type of Little Skookum and Totten Inlets is forest cover at 63 percent. The next highest percent cover is provided by non-forest at 23 percent. The third highest land cover type is other natural vegetation, at 9 percent, and off-shore comprises 5 percent of the overall land cover.

5.2.6 Summary of Key Management Issues

[PLACEHOLDER]

5.2.7 Reach Analysis

An analysis by shoreline reach is given in the following section. Reach sheets are provided corresponding to specific shorelines as listed below:

- Totten Inlet (Reaches 34, 37 and 38);
- Little Skookum Inlet (Reach 36); and
- Oyster Bay (Reach 39).

TOTTEN INLET - REACH 34

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
5.4 MI	SPU 3086	125.7 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)	HAZARD AREAS (MAP 12)
Floodplain - 14% (18 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	16% erosion, 84% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7)	**NEARSHORE PROCESS DEGRADATION (MAP 17)**
Shoreform - 87% bluff backed beaches, 7% barrier estuary, 6% intermittent barrier beaches. Net shore drift - predominantly northward drift.	Less degraded.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

11% developed, 11% beach, 1% mud flat, 76% forest, 1% wetland (GAP, 2009);

Riparian vegetation: 54% forest cover, 26% non-forest, 8% off-shore, 12% other natural vegetation (PNPTC, 2011).

HABITATS AND SPECIES (MAP 8)

11,092 feet of sand lance spawning habitat. 24.2 acres of hardshell clam and 6.8 acres of oyster beds. 4,808 feet of patchy kelp beds.

Wetlands – 5.9 acres of mapped wetland (4.7% of reach); wetland habitat types include estuarine intertidal aquatic bed and unconsolidated shore.

WATER QUALITY (MAP 13)

No 303(d) Category 5 listings. Three Category 2 listings for temperature, dissolved oxygen, and pH.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (65%), Vacant (26%), remaining 9% is a mix of Forestry, Agriculture, and Aquaculture. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 5 small docks, 2 buildings, 1 large dock and buoy. Shoreline armoring is mapped along 15% of the reach. No tidal barriers are mapped in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – 100% Urban Residential.

PUBLIC ACCESS (MAP 14)

There are no mapped public access facilities in the reach.

IMPERVIOUS SURFACES (MAP 16)

5% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show forested areas with limited residential development along the reach.

AREAS OF SPECIAL INTEREST

According to the Ecology facilities/sites database, there are no listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

There are no listed cultural resources or state or federally listed historic properties. Resource mapping suggests there is a very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

KEY MANAGEMENT ISSUES

Approximately 18% of the reach is identified for conservation of habitat beneficial to juvenile salmonids (Squaxin Island Tribe, 2009).

TOTTEN INLET - REACH 37

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
1.7 MI	SPU 3078, SPU3079, SPU 3080, SPU 3081, SPU 3082	41.6 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)	HAZARD AREAS (MAP 12)
Floodplain - 1% (1 acre) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	79% erosion, 87% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7)	**NEARSHORE PROCESS DEGRADATION (MAP 17)**
Shoreform - 93% bluff backed beaches, 7% barrier beaches. Net shore drift - two cells converge at Quarters Point, southward drift from Big Cove to the south.	Mostly least degraded some moderately degraded and narrow reach of less degraded shoreline.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

4% mud flat, 87% forest, 8% wetland (GAP, 2009);

Riparian vegetation: 71% forest cover, 15% non-forest, 6% off-shore, 8% other natural vegetation (PNPTC, 2011).

HABITATS AND SPECIES (MAP 8)

30.9 acres of hardshell clam and 13.5 acres of oyster.

2.5 acres of mapped estuarine intertidal aquatic bed wetland (5.9% of reach).

WATER QUALITY (MAP 13)

Not listed as a 303(d) Category 5 impaired waterbody.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (46%), Forestry (32%), remaining 22% is a mix of Vacant; Aquaculture; and Parks, Open Space, and Recreation Areas.
Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 2 buoys and floats, 2 large docks, 1 building and a small dock. Shoreline armoring is mapped along 7% of the reach. No tidal barriers are mapped in the reach. According to aerial imagery (2009), aquaculture is present south of Big Cove.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential.
Comprehensive Plan Designations – 100% Rural.
Existing SED – Rural (84%) and Urban Residential (16%).

PUBLIC ACCESS (MAP 14)

There are no mapped public access facilities in the reach.

IMPERVIOUS SURFACES (MAP 16)

1% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show forested areas with limited residential development along the reach.

AREAS OF SPECIAL INTEREST

According to the Ecology facilities/sites database, there are no listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists two inventoried pre-contact sites within this reach. Resource probability mapping suggests there is a very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Protect intact riparian forested cover.

KEY MANAGEMENT ISSUES

Protection of existing riparian forested habitat.

Approximately 24% of the reach is identified for conservation of habitat beneficial to juvenile salmonids (Squaxin Island Tribe, 2009).

TOTTEN INLET - REACH 38

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
3.7 MI	SPU 3077, SPU 3078	89.5 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 33% (29 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

45% erosion, 83% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 79% bluff backed beaches, 10% intermittent barrier beaches, 8% open coastal inlet, 3% artificial shoreforms. Net shore drift - predominantly eastward, a short cell with southwestward drift south of the divergent zone near Totten Inlet.

NEARSHORE PROCESS DEGRADATION (MAP 17)

Mostly less degraded, with some least degraded shoreline.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

1% developed, 1% beach, 11% mud flat, 79% forest

8% wetland (GAP, 2009);

Riparian vegetation: 67% forest cover, 16% non-forest, 7% off-shore, 10% other natural vegetation (PNPTC, 2011)

HABITATS AND SPECIES (MAP 8)

27.1 acres of hardshell clam and 28.6 acres of oyster.

Wetlands – 1.9 acres of mapped wetland (2.1% of reach); wetland habitat types include estuarine intertidal aquatic bed and beach/bar.

WATER QUALITY (MAP 13)

Not listed as a 303(d) Category 5 impaired waterbody.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Forestry (50%), Residential (25%) remaining 25% is a mix of Vacant and Aquaculture.
Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

There are 5 locations mapped in the reach where tidal barriers exist: 4 sites with fill and 1 road. Overwater structures in the reach include: 4 small docks, 2 large docks, and 2 buildings. Shoreline armoring is mapped along 7% of the reach. According to aerial imagery (2009), aquaculture is present in the middle of the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential.
Comprehensive Plan Designations – 100% Rural.
Existing SED – Rural (59%) and Conservancy (41%).

PUBLIC ACCESS (MAP 14)

There are no mapped public access facilities in the reach.

IMPERVIOUS SURFACES (MAP 16)

3% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show forested areas with limited residential development, and a shellfish processing facility in the central part of the reach.

AREAS OF SPECIAL INTEREST

According to the Ecology facilities/sites database, there are no listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists three inventoried pre-contact sites within this reach. Resource probability mapping suggests there is a moderate to high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Protect intact riparian forested cover.

KEY MANAGEMENT ISSUES

Approximately 27% of the reach is identified for conservation of habitat beneficial to juvenile salmonids (Squaxin Island Tribe, 2009).

LITTLE SKOOKUM INLET - REACH 36

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
12.4 MI	SPU 3082, SPU 3083, SPU 3084, SPU 3085, SPU 3086, SPU 3194, SPU 3195	294.2 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 44% (130 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

3% erosion, 43% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 91% open coastal inlet, 7% bluff backed beach, 2% barrier beaches.

Net shore drift - predominantly no appreciable drift, westward drift in a few cells at the mouth of the Little Skookum Inlet, eastward drift in a few cells on the north and south shores of the inlet.

NEARSHORE PROCESS DEGRADATION (MAP 17)

Least degraded.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

5% developed, 8% mud flat, 51% forest, 22% wetland,

13% floodplain/riparian (GAP, 2009);

Riparian vegetation: 59% forest cover, 29% non-forest, 4% off-shore, 8% other natural vegetation, 0.5% water (PNPTC, 2011)

HABITATS AND SPECIES (MAP 8)

4.9 acres of herring spawning habitat. 108.1 acres of hardshell clam and 79.0 acres of oyster. 17,407 feet of patchy kelp beds.

Wetlands – 38.6 acres of mapped wetland (13.1% of reach); wetland habitat types include estuarine intertidal aquatic bed, estuarine emergent, palustrine emergent, palustrine scrub-shrub, and palustrine forested.

WATER QUALITY (MAP 13)

Skookum Creek was listed on 2004 303(d) list as Category 5 water for fecal coliform bacteria and temperature. Skookum Creek and Little Skookum Inlet are part of a TMDL for fecal coliform bacteria and temperature.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (33%), Forestry (33%), Vacant (18%), remaining 16% is a mix of Agriculture, Aquaculture; and Transportation. Ownership – Private (92%) and Public (8%).

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 11 small docks, 8 buoys and floats, 4 buildings, 2 large docks and 1 upland bridge. Shoreline armoring is mapped along 5% of the reach. No tidal barriers are mapped in the reach. According to aerial imagery (2009) there is aquaculture located in Little Skookum Inlet.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations –Rural (89%) and Agricultural Resource Lands (11%). Existing SED – Rural (84%) and Urban Residential (16%).

PUBLIC ACCESS (MAP 14)

Little Skookum, managed by WDNR accounts for 7% of total linear miles.

IMPERVIOUS SURFACES (MAP 16)

3% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show a mixture of forested areas, residential development, and agricultural uses along the reach.

AREAS OF SPECIAL INTEREST

According to the Ecology facilities/sites database, there are no listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists 11 inventoried pre-contact sites within this reach. Resource probability mapping suggests that there is a moderate-high to very high probability of finding unknown artifacts within this reach, with a smaller portion of the reach in a very low probability zone.

OPPORTUNITY AREAS (MAP 23)

Protect intact riparian forested cover.

KEY MANAGEMENT ISSUES

Approximately 13% of the reach is identified for conservation of habitat beneficial to juvenile salmonids (Squaxin Island Tribe, 2009).

OYSTER BAY - REACH 39

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
2.7 MI	SPU 3077	62.4 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY	HAZARD AREAS (MAP 12)
Floodplain - 44% (28 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	79% erosion, 87% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7)	**NEARSHORE PROCESS DEGRADATION (MAP 17)**
Shoreform - 100% open coastal inlet. Net shore drift - no appreciable drift.	Least degraded.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

16% developed, 8% mud flat, 56% forest, 16% wetland 3% floodplain/riparian (GAP, 2009);

Riparian vegetation: 71% forest cover, 17% non-forest, 0.5% off-shore, 12% other natural vegetation, 0.5% water (PNPTC, 2011)

HABITATS AND SPECIES (MAP 8)

16.4 acres of oyster.

Wetlands – 3.0 acres of mapped wetland (4.8% of reach); wetland habitat types include estuarine intertidal aquatic bed and estuarine emergent.

WATER QUALITY (MAP 13)

Not listed as a 303(d) Category 5 impaired waterbody. However, Kennedy Creek has a 303(d) listing (Category 5) for dissolved oxygen. Oyster Bay is part of the Totten Inlet/Skookum Inlet TMDL.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (57%), Vacant (22%), remaining 21% is a mix of Agriculture and Forestry. Ownership – Public (58%) and Private (42%).

SHORELINE MODIFICATIONS (MAP 16)

There are 3 instances in the reach where mapped road(s) serve as tidal barriers. Shoreline armoring is mapped along 2% of the reach. According to aerial imagery (2009), Highway 101 is located within the southern part of the reach and crosses over the Kennedy Creek stream mouth.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – Rural Residential (69%) and Agricultural Resource Lands (21%). Comprehensive Plan Designations - Rural (69%) and Agricultural Resource Lands (21%). Existing SED – 100% Conservancy.

PUBLIC ACCESS (MAP 14)

Kennedy Creek Tidelands, managed by WDNR accounts for 83% of total linear miles.

IMPERVIOUS SURFACES (MAP 16)

13% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show the reach to be mostly forested; SR 101 intersects the central part of the reach.

AREAS OF SPECIAL INTEREST

According to the Ecology facilities/sites database, there are no listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists two inventoried pre-contact sites within this reach. Resource probability mapping suggests there is a very high probability of finding unknown artifacts within this reach.

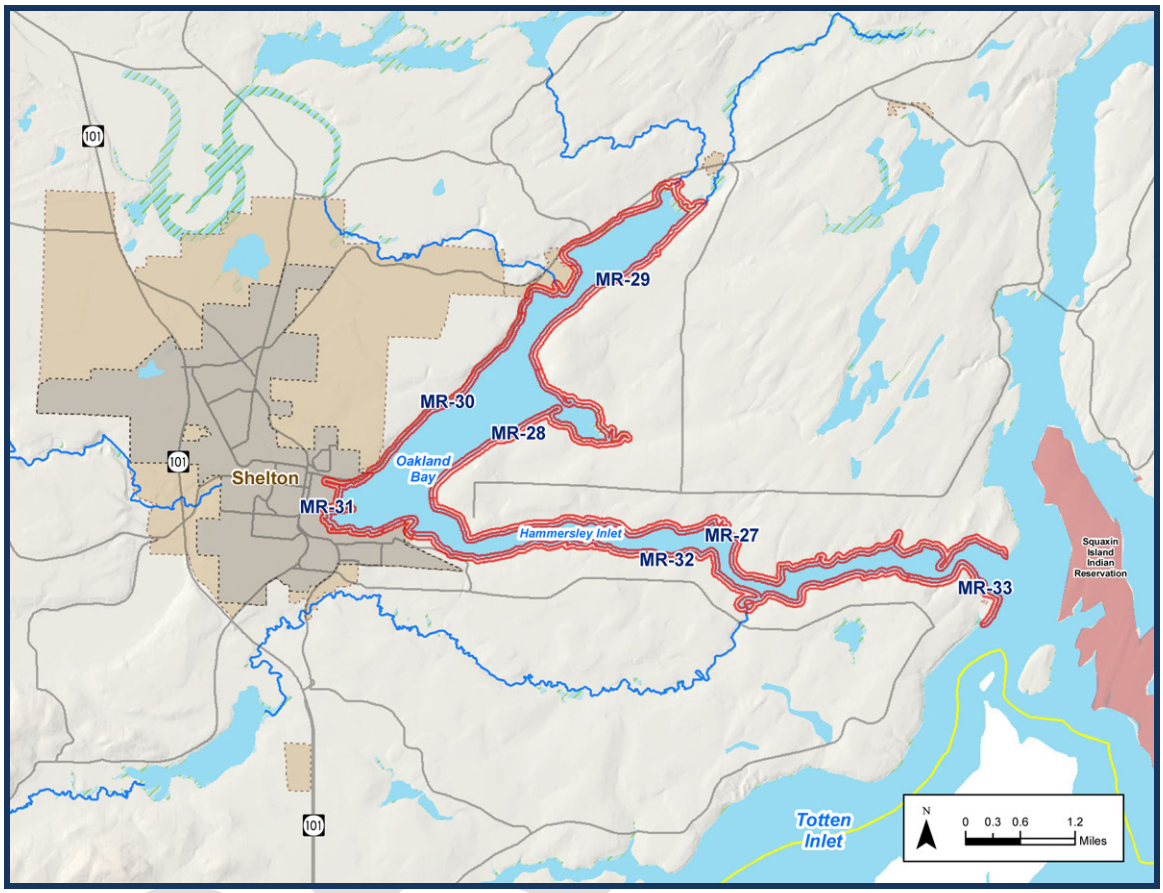
OPPORTUNITY AREAS (MAP 23)

Protect intact riparian forested cover.

KEY MANAGEMENT ISSUES

Approximately 64% of the reach is identified for conservation of habitat beneficial to juvenile salmonids (Squaxin Island Tribe, 2009).

5.3 Hammersley Inlet and Oakland Bay



5.3.1 Physical Characterization and Modifications

Hammersley Inlet and Oakland Bay are some of the more sheltered low-energy shores of the Puget Sound region. These highly complex shores, frequently change shore orientation and have many small scale embayments. Tidal currents are significant particularly in the narrowest parts of Hammersley Inlet. Net shore-drift occurs in several drift cells of variable length throughout these waterbodies. Erosion rates are very slow in this environment, as are sediment transport rates. Intermittent areas of no appreciable drift have been mapped due to bedrock exposures, stream mouths, and extremely sheltered conditions at bayheads, such at along the shores of the City of Shelton and the head of Oakland Bay. Bluff backed beaches are the most abundant shoreform, but many open coastal inlets and barrier beaches also are found in this area of Mason County. The largest artificial shoreform mapped in the South Puget Sound occurs at along the shores of the City of Shelton.

The PSNERP Strategic Needs Assessment composite measure of degradation to multiple nearshore processes highlights areas to target for restoration and conservation within Mason County. Within the Hammersley Inlet and Oakland Bay shorelines nearshore process degradation is predominantly "less". The "least" degradation has occurred to the east shore of Oakland Bay and "moderate" degradation has occurred to the northwest shore of Hammersley Inlet. However, the most degradation has occurred along the City of Shelton's shores, which were mapped as "more" degraded.

5.3.2 Water Quality

Oakland Bay water quality has been adversely impacted by development and its historical and current industrial uses (Herrera, 2010). Four of the five delineated marine reaches are included on the 303 (d) list of impaired waters due to elevated fecal coliform concentrations. All but one of the marine reaches are included in the 303 (d) list of impaired waters due to elevated fecal coliform concentrations (Map 13) Ecology identified Oakland Bay for focused investigation related to source control, sediment cleanup, and restoration (Herrera, 2008). Ecology initiated this investigation because previous environmental investigations have documented contamination from historical and current industrial and commercial activities. Previous sediment quality investigations had indicated that contaminant concentrations exceeded Chapter 173-204 Washington Administrative Code (WAC) Sediment Management Standards (SMS) (Herrera, 2008). However, during an extensive sediment sampling and characterization study conducted between 2008 and 2010, none of the samples collected exceeded State sediment quality standards (Herrera, 2010). However, results from this study did indicate that there are elevated levels of wood, and wood related chemicals (e.g sulfides, and ammonia) in

most samples; and that all samples contained detectable levels of dioxin, a chemical that can cause cancer and other deleterious health effects (Washington State Department of Health, 2010a). Dioxin source assessments conducted in Washington indicate that incinerators, hog fuel (wood waste) boilers, bleached pulp and paper mills, cement kilns, kraft black liquor boilers, tire combustion, and sewage sludge incineration are potential sources of dioxin production (Washington State Department of Ecology, 1998).

Dissolved oxygen levels in Oakland Bay are typically above State water quality limits and are therefore not discussed further in this section. Other water quality generally meets water quality standards (Washington State Department of Ecology, 2004).

Fecal Coliform

Fecal coliform contamination of Oakland Bay is a persistent problem. Oakland Bay was first placed on the 303 (d) list of impaired waters for fecal coliform contamination in 1996 (Coots and Whitman, 2005), and shellfish harvest was restricted in the southern end of the bay as early as 1987 (Kenny, 2007). Fecal coliform contamination is of particular concern for Oakland Bay because of its importance as a shellfish growing area. Shellfish growing and harvesting areas are subject to stringent fecal coliform standards (less than 14 colonies per 100mL); and exceedance of this standard results in restrictions (e.g., conditional closures during rain events) or complete prohibition of harvest from that area (Washington State Department of Health, 2008).

Washington State Department of Health evaluated trends in fecal coliform concentrations at 15 stations in Oakland Bay for the period from 1998-2008. This study documented that fecal coliform concentrations decreased between 1998 and 2005, but increased again in 2006, and remained relatively high throughout 2008 (Washington State Department of Health, 2008). In 2007, approximately 1,434 acres of Oakland Bay's shellfish growing areas were classified as Conditionally Approved; fifty- five acres at the north end of the bay were classified as Restricted; and 774 acres in the south end were classified as Prohibited due to Shelton's Wastewater Treatment Plant discharge (Kenny, 2007). (The acreage closed due to the treatment plant discharge is a mandated closure related to all treatment plants and not related to poor performance at the Shelton plant.) Sampling conducted in 2010 as part of the WDOH Early Warning System reaffirmed these designations (Washington State Department of Health, 2010b). In 2010, Mason County conducted extensive sampling of shoreline freshwater inputs for fecal coliform as part of the County's Pollutant Identification and Correction (PIC) program (Kenny, 2010). It is suspected that the source of fecal coliform in the tested shoreline seeps may be failing septic systems (Kenny, 2010). Where results indicate fecal coliform levels that exceed the study's threshold of 100 colonies/100mL, additional sampling

and investigation of potential septic system pollutant sources are conducted (Kenny, 2010).

A variety of sources are likely responsible for the high fecal coliform concentrations in Oakland Bay. Several tributaries that contribute surface water to Oakland Bay have elevated fecal coliform levels. Campbell, Uncle John, and Malaney Creeks are on the 303 (d) list of impaired waters due to elevated fecal coliform concentrations (Washington State Department of Ecology, 2008a). Shelton and Goldsborough Creeks, while not on the 303 (d) list also have fecal coliform concentrations that sometimes exceed State water quality standards (Kenney and Estrada, 2009). Many other small water courses (122 pipes and culverts, 43 seepages, 27 unnamed tributaries and 87 drainages) may also transport fecal coliform from the land surface or subsurface (i.e. septic systems) to Oakland bay (Ahmed and Konovsky, 2010). Surface runoff during storm events may also contribute substantial amounts of fecal coliform to Oakland bay, especially for fecal coliforms originating from livestock, pets, and wildlife. Point sources such as sanitary sewer overflows, or discharges from Shelton's municipal wastewater treatment plant may also contribute fecal coliforms to the Bay. In addition to the traditional suspected sources of fecal coliform contamination, resuspension of sediments contaminated with fecal coliform has been suggested as a source (Konovsky et. al., 2010) and is currently being investigated.

Sediment Quality and Dioxin

Sediment quality is a serious issue for Oakland Bay because of the Bay's historic and current use by the wood products industry (Herrera, 2008; Herrera, 2010). The Shelton waterfront and harbor are currently (and were historically) used by several timber and wood product manufacturing industries, including saw mills and plywood manufacturing, pulp and paper production, and insulation board and fiberboard manufacturing. Over time, process chemicals and wastewater from wood-product manufacturing processes have either been discharged (through onsite industrial stormwater systems) or released (due to accidental spills and leaks to the harbor) to Shelton and Goldsborough Creeks, or across upland portions of the waterfront. Discharges and spills of process chemicals and wastewater have included; release of process wastewater discharges and sulfite waste liquor generated from the former Rayonier pulp mill; release of air emission particulates from wood-fired power plants and associated emission stacks; power plant baghouse solids; laboratory chemicals; wood preservatives containing chlorinated phenols; releases of petroleum products, polychlorinated biphenyl (PCB)-contaminated oil, and resin and veneer wastewater; wood waste directly released directly into the bay through chip loading, log rafts, and log transfer operations (Herrera, 2010).

Recently, concerns have arisen throughout Puget Sound about the potential adverse effects of wood waste in sediments. Several studies have indicated that wood waste can have a variety of physical and chemical related adverse impacts on aquatic life. Common impacts include; organic enrichment of sediments; oxygen depletion in the water column; alteration of benthic communities to more pollution tolerant species; leaching of toxic chemicals such as phenols, methylated phenols, benzoic acid, benzyl alcohol, terpenes, and tropolones; and physical alteration of the benthic substrate (Norton and et. al., 2000).

Wood waste enters and is distributed across the Oakland Bay system in two primary ways: low concentrations spread across deeper portions of Oakland Bay by tidal flows near the sediment bed, and significant accumulations (greater than 20 percent by volume) near both historical and current log rafting and wood processing (milling) locations. Milling primarily generates wood chips and sawdust, and log rafting primarily generates bark. Most wood mass exists in sediment as a widespread, low-concentration deposit and is mixed within the recently deposited marine bed surface. The patchy distribution of wood waste; significant localized accumulations combined with low wood concentrations in much of the area; indicates that wood waste is relatively immobile (Herrera, 2010).

Sediment sampling results from the Oakland Bay Sediment Investigation (Herrera, 2010) indicated that no industrial contaminants of concern were found above Ecology's Sediment Management Standards screening levels in the study area. However, dioxins/furans, (which are not included in the Sediment Management Standards), were found at relatively high concentrations in 65% of samples collected in the study area. Additionally, many of the sediment samples from Shelton Harbor and Oakland Bay failed toxicity tests. It is likely that these failures resulted from conditions associated with the presence of wood waste, fine-grain sediment, synergistic effects of these and other correlated constituents of concern, or some unmeasured condition (Herrera, 2010).

No discernable source-specific spatial pattern of chemical contamination of sediments was observed; however, dioxin/furan concentrations were much higher in Shelton Harbor, and were also higher in subsurface samples. This indicates that inputs to the system, at least in part, originated in Shelton Harbor and that inputs to the system appear to be diminishing; and recent, cleaner sediments are likely covering older, more contaminated deposits. However, some surface samples also exhibited high dioxin concentrations. This suggests there is a continuing source of dioxin, or sediments from areas with higher concentrations are being redistributed to areas with lower concentrations by tidal currents, or that mixing of deeper and shallower sediments has occurred as a result of human or natural processes (Herrera, 2010).

Sediment sulfide concentrations were elevated throughout Shelton Harbor and Oakland Bay in comparison to reference sediments collected from Carr Inlet. Mean concentrations of total sulfides in surface sediment in Shelton Harbor (661 mg/kg) and Oakland Bay (666 mg/kg) were greater than the mean reference sediment result (168 mg/kg) (Herrera, 2010). Ammonia, another common by product of microbial degradation of organic materials (i.e. wood products) was not found to be at higher concentrations than in the reference sediments collected from Carr Inlet. Ammonia and sulfides can toxic to benthic invertebrates. A negative correlation was documented in Herrera 2010 between ammonia and sulfide concentrations and mussel larval (larval) development bioassays. However results were inconclusive as to whether the observed toxicity resulted from elevated sulfide and ammonia concentrations, or from the presence of other toxic constituents.

Although Oakland Bay sediment quality is a concern, especially with regard to high dioxin concentrations, it does not appear to pose a serious threat for consumers and growers of shellfish. A recent review by the WDOH and the Agency for Toxic Substances and Disease Registry, documented that no toxic exposure risk is likely to occur for employees of the shellfish industry who contact Oakland Bay sediments on a regular basis (Washington State Department of Health, 2010a). It was also concluded that those that consume shellfish grown in Oakland Bay are not at risk because shellfish, due to their low fat content, do not accumulate dioxin (Washington State Department of Health, 2010a). However, dioxin is highly persistent in the environment, and is a toxic chemical that can enter and be distributed through the food web, accumulating in the tissues of animals, including humans (Washington Department of Ecology, 1998).

5.3.3 Critical or Priority Habitat and Species

Critical or priority habitats and species mapped within the Mason County shoreline jurisdiction of Hammersley Inlet and Oakland Bay are covered in this section; including Marine Reaches (MR): MR 27-33.

Hammersley Inlet and Oakland Bay are mapped as supporting many priority salmonid species (WDFW, 2010; Table 5-3).

Table 5-3. Fish species documented for Hammersley Inlet and Oakland Bay

Common Name	Scientific Name	Habitat Use	Federal Listing	State Listing
Coastal cutthroat trout	*Oncorhynchus clarki clarki*	Presence/Migration	~	~
fall Chinook salmon	*Oncorhynchus tshawytscha*	Presence/Migration	Threatened	Candidate
fall Chum salmon	*Oncorhynchus keta*	Known spawning and Presence/Migration	~	~
summer Chum salmon	*Oncorhynchus keta*	Known spawning and Presence/Migration	Threatened	Candidate
Coho salmon	*Oncorhynchus kisutch*	Known spawning and Presence/Migration	Concern	~
Rainbow trout	*Oncorhynchus mykiss*	Presence/Migration	~	~
winter Steelhead trout	*Oncorhynchus mykiss*	Presence/Migration	Threatened	~

Critical habitat has been designated for the Puget Sound ESU Chinook salmon for all reaches covered in this section, extending upstream to the point of tidal influence. Critical habitat has also been designated for the Southern Resident killer whale DPS for all reaches covered in this section, extending to waters deeper than 20 feet (USFWS, 2010).

Hammersley Inlet and Oakland Bay have recorded occurrences of forage fish, such as herring spawning habitat, sand lance spawning, and smelt spawning (WDFW, 2010). Essential fish habitat for rock sole is recorded for these marine shorelines (WDFW, 2010)

Shellfish beds for hardshell clam and oyster are mapped for several reaches (WDFW, 2010; see reach sheets). Kelp beds are also recorded for several reaches (WDNR, 2008).

Other priority species present include, purple martin and bald eagle (WDFW, 2010).

5.3.4 Land Use

Land use in Hammersley Inlet and Oakland Bay is a mix of residential and vacant lands. Oakland Bay Reach 28 also has agriculture and forestry land uses. Public access is available to tidelands mostly managed by WDFW. Mason County manages several community parks along both Hammersley Inlet and Oakland Bay: Jacoby

Shorecrest County Park, Walker County Park and Oakland Bay Historical Park (Mason County Department of Parks and Trails, 2006). In addition, there are two public boat launches: one is managed by Taylor Shellfish and WDFW and provides access to Oakland Bay; and a second, Arcadia Boat Launch, is owned by Squaxin Island Tribe and provides access to Hammersley Inlet (Explore Hood Canal, 2011).

5.3.5 Land Cover

According to the GAP 2009 data, the dominant land cover type of Hammersley Inlet and Oakland Bay is conifer dominated forest at 38 percent. The next highest percent cover is provided by harvested forest at 21 percent. The third highest land cover type is developed land at 12 percent.

According to the PNPTC 2011 data set, the dominant land cover type of Hammersley Inlet and Oakland Bay is forest cover at 50 percent. The next highest percent cover is provided by non-forest at 38 percent. The third highest land cover type is other natural vegetation at 10 percent. Off-shore comprises 2 percent.

5.3.6 Summary of Key Management Issues

[PLACEHOLDER]

5.3.7 Reach Analysis

An analysis by shoreline reach is given in the following section. Reach sheets are provided corresponding to specific shorelines as listed below:

- Hammersley Inlet (Reaches 27, 32 and 33); and
- Oakland Bay (Reaches 28-31).

HAMMERSLEY INLET - REACH 27

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
8.7 MI (NORTH SHORE)	SPU 3096, SPU 3097, SPU 3098, SPU 3099, SPU 3100, SPU 3101, SPU 3102	203.8 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)	HAZARD AREAS (MAP 12)
Floodplain - 38% (77 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	7% erosion, 60% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7)	**NEARSHORE PROCESS DEGRADATION (MAP 17)**
Shoreform - 80% bluff backed beaches, 11% barrier beaches, 12% barrier estuaries, 6% open coastal inlets. Net shore drift - predominantly eastward drift.	Mostly moderately degraded, with some least degraded shore at central-eastern end of reach.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

5% developed, 4% open water, 18% beach, 66% forest, 7% wetland (GAP, 2009)

Riparian vegetation: 48% forest cover, 42% non-forest, 1% off-shore, 8% other natural vegetation (PNPTC, 2011).

HABITATS AND SPECIES (MAP 8)

37.6 acres of herring spawning habitat. 241 linear feet of sand lance spawning habitat. 3.4 acres of hardshell clam and 6.7 acres of oyster bed. 21,950 linear feet of patchy kelp beds.

Wetlands – 13.7 acres of mapped wetland (6.7% of reach); wetland habitat types include estuarine intertidal aquatic bed, estuarine emergent, and unconsolidated shore.

WATER QUALITY (MAP 13)

Hammersley Inlet, 303(d) listing (Category 5) for fecal coliform.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Cover – Residential (58%), Vacant (34%) remaining 8% is a mix of Forestry; Agriculture, Transportation, and Parks, Open Space, and Recreation Areas. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 9 small docks, 5 buoys and floats, and 2 buildings. Shoreline armoring is mapped along 37% of the reach. No tidal barriers are mapped in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – Urban Residential (57%) and Rural (43%).

PUBLIC ACCESS (MAP 14)

Jacoby Shorecrest County Park is a Mason County community park. It is about 3 acres in total size and provides beach access, boat launch and picnic tables. (Mason County Department of Parks and Trails, 2006). About 40 feet of WDNR trails are mapped in a portion of the reach.

IMPERVIOUS SURFACES (MAP 16)

10% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show the reach to be dominated by forested and single-family residential areas, with limited agricultural uses.

AREAS OF SPECIAL INTEREST

No Ecology-listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists three inventoried pre-contact sites within this reach. Resource probability mapping suggests there is a very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Protect intact riparian forested cover.

KEY MANAGEMENT ISSUES

Approximately 6% of the reach is identified for conservation of habitat beneficial to juvenile salmonids(Squaxin Island Tribe, 2009).

Approximately 10% of the reach is identified as containing habitat beneficial to juvenile salmonids (Squaxin Island Tribe, 2009).

HAMMERSLEY INLET - REACH 32

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
7.1 MI	SPU 3087, SPU 3088, SPU 3096	166.4 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 24% (40 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

67% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 83% bluff backed beaches, 12% open coastal inlet, 4% intermittent barrier beaches, 1% barrier estuary, 1% barrier lagoon. Net shore drift - eastward drift along most of the southern inlet shore, one cell with westward drift occurs in western end of reach, an area of no appreciable drift at the mouth of Mill Creek.

NEARSHORE PROCESS DEGRADATION (MAP 17)

Less degraded.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

17% developed, 1% beach, 68% forest, 8% wetland, 7% floodplain/riparian (GAP, 2009)

Riparian vegetation: 46% forest cover, 49% non-forest, 2% off-shore, 2% other natural vegetation (PNPTC, 2011).

HABITATS AND SPECIES (MAP 8)

17.1 acres of herring spawning habitat. 9,268 linear feet of patchy kelp beds.

Wetlands – 6.6 acres of mapped wetland (3.9% of reach); wetland habitat types include estuarine intertidal aquatic bed, estuarine emergent, and unconsolidated shore.

WATER QUALITY (MAP 13)

Hammersley Inlet, 303(d) listing (Category 5) for fecal coliform.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use - Residential (66%); Vacant (24%); remaining 8% is a mix of Forestry; Parks, Open Space, and Recreation Areas; and Transportation. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 19 small docks, 4 buoys and floats, 3 large docks, and 2 buildings. Shoreline armoring is mapped along 45% of the reach. There are no mapped tidal barriers. According to aerial imagery (2009), aquaculture is present in the middle of the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – Urban Residential (69%) and Rural (31%).

PUBLIC ACCESS (MAP 14)

The Port of Shelton owns a small portion of a sandy beach in this reach. Public access is also available at Walker County Park, a Mason County community park. The park has beach access, a picnic shelter, a play area and can be used by kayakers for overnight camping. The park is mostly forested and is 5 acres in total size (Mason County Parks and Trails, 2006).

IMPERVIOUS SURFACES (MAP 16)

14% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show a mixture of forested and single-family residential areas throughout the reach.

AREAS OF SPECIAL INTEREST

No Ecology-listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

There are no listed cultural resources or state or federally listed historic properties. Resource mapping suggests there is a high to very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Protect intact riparian forested cover.

KEY MANAGEMENT ISSUES

Approximately 12% of the reach is identified as containing habitat beneficial to juvenile salmonids (Squaxin Island Tribe, 2009).

HAMMERSLEY INLET - REACH 33

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
1.7 MI (ARCADIA POINT)	SPU 3086, SPU 3087	38.6 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 21% (8 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

95% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 94% bluff backed beaches, 6% barrier beach.

Net shore drift - northwestward drift into Hamsersley Inlet and extends to Cape Cod, eastward transport east of Cape Cod, a few areas of no appreciable drify by eastern headlands.

NEARSHORE PROCESS DEGRADATION (MAP 17)

Less degraded.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

13% developed, 11% beach, 67% forest, 9% wetland (GAP, 2009)

Riparian vegetation: 57% forest cover, 37% non-forest, 4% off-shore, 2% other natural vegetation (PNPTC, 2011).

HABITATS AND SPECIES (MAP 8)

22.4 acres of herring spawning habitat. 1,747 LF of sand lance spawning habitat. 5,189 LF of patchy kelp beds.

4.5 acres of mapped estuarine intertidal unconsolidated shore wetland habitat (11.5% of reach).

WATER QUALITY (MAP 13)

Hammersley Inlet, 303(d) listing (Category 5) for fecal coliform.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use - Residential (70%); Vacant (25%); remaining 5% is a mix of Aquaculture and Forestry. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 9 small docks and 1 buoy. Shoreline armoring is mapped along 43% of the reach. There are no mapped tidal barriers in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – Conservancy (61%) and Urban Residential (41%).

PUBLIC ACCESS (MAP 14)

Arcadia Point boat launch, managed by the Squaxin Island Tribe, provides public access. The launch site has associated parking.

IMPERVIOUS SURFACES (MAP 16)

5% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show the western part of the reach to be mostly forested, while the eastern part is developed with single-family residences.

AREAS OF SPECIAL INTEREST

No listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

There are no listed cultural resources or state or federally listed historic properties. Resource mapping suggests there is a very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Protect intact riparian forested cover.

KEY MANAGEMENT ISSUES

OAKLAND BAY - REACH 28

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
4.9 MI (CHAPMAN COVE)	SPU 3094, SPU 3095, SPU 3096	105.3 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)

Floodplain - 76% (80 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain

HAZARD AREAS (MAP 12)

34% landslide

SHOREFORM AND NET SHORE DRIFT (MAP 7)

Shoreform - 53% open coastal inlet, 42% bluff backed beaches, 6% barrier beaches.

Net shore drift - two cells converge into Chapman Cove, northward drift from a divergence zone north of Munson Point to the barrier beach that embays Chapman Cove, southward drift adjacent to the northern spit, no appreciable drift along inner shore of embayment.

NEARSHORE PROCESS DEGRADATION (MAP 17)

Less degraded.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

1% developed, 2% agriculture, 7% beach, 55% forest, 25% wetland, 10% floodplain/riparian (GAP, 2009)

Riparian vegetation: 62% forest cover, 22% non-forest, 0.5% off-shore, 15% other natural vegetation (PNPTC, 2011)

HABITATS AND SPECIES (MAP 8)

52.1 acres of hardshell clam beds and 22.3 acres of oyster.

Wetlands – 21.9 acres of mapped wetland (20.8% of reach); wetland habitat types include estuarine intertidal aquatic bed, estuarine emergent, estuarine intertidal flat, palustrine emergent, and palustrine forested.

WATER QUALITY (MAP 13)

Oakland Bay (Chapman Cove), 303(d) listing (Category 5) for fecal coliform.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Vacant (37%), Agriculture (21%) Forestry (18%), Residential (18%), remaining 6% is a mix of Transportation and Aquaculture. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

There are 10 instances in the reach where mapped road(s) serve as tidal barriers. Overwater structures in the reach include: 4 upland bridges, 2 small docks, and 1 buoy. Shoreline armoring is mapped along 9% of the reach. According to aerial imagery (2009), aquaculture is present in Chapman Cove.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – Rural Residential (80%) and Agricultural Resource Lands (20%). Comprehensive Plan Designations – Rural (80%) and Agricultural Resource Lands (20%). Existing SED - Urban Residential (64%) and Rural (36%).

PUBLIC ACCESS (MAP 14)

Oakland Bay and Chapman Cove Exclusive, managed by WDFW accounts for 9% of total linear miles. Public access is available at the site.

IMPERVIOUS SURFACES (MAP 16)

14% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show the reach to be predominantly forest and agriculture with limited single-family residential uses.

AREAS OF SPECIAL INTEREST

No listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists three inventoried pre-contact sites within this reach. Resource probability mapping suggests there is a very high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Protect intact riparian forested cover.

Protect floodplain area from alteration and fill.

KEY MANAGEMENT ISSUES

Water quality impairments and sediments contaminated by dioxin and wood waste chemicals.

Approximately 53% of the reach is identified for conservation of habitat beneficial to juvenile salmonids (Squaxin Island Tribe, 2009).

OAKLAND BAY - REACH 29

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
6.4 MI	SPU 3092, SPU 3093, SPU 3094	155.8 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10)	HAZARD AREAS (MAP 12)
Floodplain - 56% (88 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	27% erosion, 41% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7)	**NEARSHORE PROCESS DEGRADATION (MAP 17)**
Shoreform - 47% bluff backed beaches, 38% open coastal inlet, 14% barrier beaches, 1% barrier lagoon. Net shore drift - predominantly northward drift, a few areas with no appreciable drift.	Southeast shore least degraded, northwest shore less degraded.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

7% developed, 7% beach, 63% forest, 18% wetland, 4% floodplain/riparian (GAP, 2009)

Riparian vegetation: 49% forest cover, 31% non-forest, 3% off-shore, 17% other natural vegetation, 0.5% water (PNPTC, 2011)

HABITATS AND SPECIES (MAP 8)

34.4 acres of hardshell clam and 39.0 acres of oyster.

Wetlands – 9.9 acres of mapped wetland (6.3% of reach); wetland habitat types include estuarine intertidal aquatic bed and estuarine emergent.

WATER QUALITY (MAP 13)

Oakland Bay, 303(d) listing (Category 5) for fecal coliform.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use –Residential (50%), Vacant (28%), remaining 22% is a mix of Forestry, Transportation and Aquaculture. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

There are 8 instances in the reach where mapped road(s) serve as tidal barriers. Overwater structures in the reach include: 4 small docks, 3 upland bridges, 2 buoys and floats. Shoreline armoring is mapped along 6% of the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – County: Rural Residential (73%), mix of Agricultural Resource Lands and Rural Tourist-Campground (10%). Bay Shore Hamlet: a mix of Rural Tourist and Rural Residential (17%). Comprehensive Plan Designations – Rural (75%), Hamlet (17%), and Agricultural Resource Lands (8%).

Existing SED –Urban Residential (68%), Conservancy (20%), and Rural (11%).

PUBLIC ACCESS (MAP 14)

Oakland Bay and Chapman Cove Exclusive mud flats, managed by WDFW, and North Oakland Bay and Oakland Bay mud flats, managed by Washington State Department of Transportation, provide public access to 38% of total linear miles. The reach also has a public boat launch, managed both by Taylor Shellfish and WDFW.

Oakland Bay Historical Park, a regional park managed by Mason County, is 82 acres in total size. The park provides waterfront access to Oakland Bay and is the site of an old homestead. The homestead includes a turn of the century home and an orchard. (Mason County Parks and Trails, 2006).

IMPERVIOUS SURFACES (MAP 16)

13% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show the south shore of Oakland Bay within the reach to be a mix of forest, residential, and agricultural areas; the north shore is more developed with roads, agriculture, residential, and a golf course.

AREAS OF SPECIAL INTEREST

According to the Ecology facilities/sites database, there are no listed contaminated sites.

The privately-owned Shelton Bayshore Golf Course is located at the stream mouth of John's Creek.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists two inventoried pre-contact sites and one early historic inventory site within this reach.

OPPORTUNITY AREAS (MAP 23)

KEY MANAGEMENT ISSUES

Water quality impairments and sediments contaminated by dioxin and wood waste chemicals.

Approximately 67% of the reach is identified for conservation of habitat beneficial to juvenile salmonids (Squaxin Island Tribe, 2009).

OAKLAND BAY - REACH 30

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
2.5 MI (WESTERN SHORE)	SPU 3092	60.0 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10) Floodplain - There is no mapped FEMA 1% annual chance floodplain for the reach	**HAZARD AREAS (MAP 12)** 100% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7) Shoreform - 97% bluff backed beaches, 3% barrier beach. Net shore drift - predominantly northward drift.	**NEARSHORE PROCESS DEGRADATION (MAP 17)** Less degraded.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

31% developed, 3% open water, 15% beach, 48% forest, 3% wetland (GAP, 2009)

Riparian vegetation: 46% forest cover, 44% non-forest, 10% other natural vegetation, (PNPTC, 2011)

HABITATS AND SPECIES (MAP 8)

28.1 acres of hardshell clam and 9.55 acres of oyster.

2.3 acres of mapped estuarine intertidal aquatic bed wetland (3.9% of reach).

WATER QUALITY (MAP 13)

Oakland Bay, 303(d) listing (Category 5) for fecal coliform.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – Residential (46%), Vacant (23%), Forestry (16%), remaining 16% is a mix of Transportation and Commercial. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: 3 small docks, 1 building, buoy, and large dock. Shoreline armoring is mapped along 38% of the reach. No tidal barriers are mapped in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – 100% Rural Residential. Comprehensive Plan Designations – 100% Rural. Existing SED – 100% Urban Residential.

PUBLIC ACCESS (MAP 14)

Oakland Bay and Chapman Cove Exclusive mud flats, managed by WDFW, provide public access to 3% of total linear miles.

IMPERVIOUS SURFACES (MAP 16)

17% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show SR 3 running parallel to the shoreline through most of the reach; single-family residences and a barge loading facility are located in the central part of the reach.

AREAS OF SPECIAL INTEREST

According to the Ecology facilities/sites database, there are no listed contaminated sites.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists one registered historic site: the Oakland townsite, 3 miles NE of Shelton on WA-3. Resource probability mapping suggests there is a moderate-high to high probability of finding unknown artifacts within this reach, with a small portion of the reach in a very high probability zone.

OPPORTUNITY AREAS (MAP 23)

KEY MANAGEMENT ISSUES

Water quality impairments and sediments contaminated by dioxin and wood waste chemicals.

OAKLAND BAY - REACH 31

SHORELINE LENGTH	PSNERP PROCESS UNITS	REACH AREA
3.5 MI (SHELTON HARBOR)	SPU 3092	68.7 AC

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY (MAPS 4 AND 10) Floodplain - 67% (46 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain	**HAZARD AREAS (MAP 12)** 84% landslide
SHOREFORM AND NET SHORE DRIFT (MAP 7) Shoreform - 76% artificial shoreforms, 24% bluff backed beach. Net shore drift - two cells with westward drift converge into a large area of no appreciable drift at the bayhead in downtown Shelton, another convergence occurs south of Shelton.	**NEARSHORE PROCESS DEGRADATION (MAP 17)** More degraded.

PHYSICAL AND ECOLOGICAL FEATURES

LAND COVER (MAP 15)

26% developed, 3% open water, 6% beach, 50% forest, 13% wetland, 3% floodplain/riparian (GAP, 2009);

Riparian vegetation: 30% forest cover, 47% non-forest, 19% off-shore, 4% other natural vegetation, 0.5% water (PNPTC, 2011).

HABITATS AND SPECIES (MAP 8)

Wetlands - 3.8 acres of mapped wetland (5.6% of reach); wetland habitat types include estuarine emergent aquatic bed and estuarine emergent flat.

WATER QUALITY (MAP 13)

Oakland Bay (Shelton Harbor), 303(d) listing (Category 5) for fecal coliform.

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP (MAP 18)

Land Use – 100% Parks, Open Space, and Recreation Areas. Ownership – 100% Private.

SHORELINE MODIFICATIONS (MAP 16)

Overwater structures in the reach include: buoys and floats, 3 small docks, 1 building, 1 buoy, and 1 large dock. There are no mapped tidal barriers or shoreline armoring in the reach.

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21)

Zoning districts – Shelton UGA: 100% General Commercial. Comprehensive Plan Designations – 100% Urban Growth Area.

Existing SED – 100% Urban Residential.

PUBLIC ACCESS (MAP 14)

There are no mapped public access facilities in this reach.

IMPERVIOUS SURFACES (MAP 16)

15% of reach is mapped as containing impervious surfaces (NOAA CCAP, 2006). Aerial photos from 2009 show the reach to be largely developed with industrial facilities.

AREAS OF SPECIAL INTEREST

No Ecology- listed contaminated sites.

Port of Shelton owns property in Shelton's UGA that is set aside as open space tracts for Alder Creek.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The DAHP database lists one inventoried pre-contact site within this reach. Resource probability mapping suggests there is a low to high probability of finding unknown artifacts within this reach.

OPPORTUNITY AREAS (MAP 23)

Provide public access through purchase of easements or road right-of-way, if feasible.

Approximately 48% of the reach is identified for restoration of habitat beneficial to juvenile salmonids (Squaxin Island Tribe, 2009).

KEY MANAGEMENT ISSUES

Water quality impairments and sediments contaminated by dioxin and wood waste chemicals.

5.4 Data Gaps

The following data gaps have been identified for the marine shorelines of South Puget Sound within Mason County:

- County-specific wetland inventory is lacking; and
- A comprehensive inventory and assessment of coastal feeder bluffs.