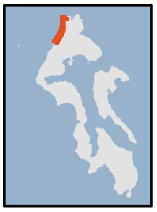


REACH SHEET DATA DESCRIPTIONS AND SOURCES

REACH SHEET GUIDE

SHORELINE LENGTH:
Length in Miles

REACH AREA:
Area in Acres

PSNERP PROCESS UNITS:
Identification number for shoreline segment used by PSNERP

REACH SUMMARY

Summary includes identification of reach location and extent, as well as synthesis of geomorphic, habitats and species, and land and shoreline use information.

GEOMORPHIC KEY INFORMATION

Geomorphic Shoretype (Map 9)

Shoretypes were determined by Coastal Geologic Services in 2005 using aerial photos and boat surveys. The shoretypes identify the feeder bluffs (sediment sources), transport zones, accretion shores and modified shores as defined in the report text. Shoretype classifications are also presented on the reach map.

Net Shore Drift (Map 8)

This dataset depicts littoral drift in Puget Sound. Each drift cell is described and mapped in terms of the direction of sediment transport, the location of divergent zones and areas where there is no appreciable drift. Data source: PSNERP, 2010.

Shoreform Current (Map 10)

The shoreform classifications were provided by the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP). Categories include barrier beach, bluff-backed beach, barrier estuary, barrier lagoon, delta, closed lagoon marsh, open coastal inlet, pocket beach, rocky platform, plunging rocky shore and artificial. The shoreform and shoretype information describes the geologic characteristics of the shoreline as they relate to nearshore process such as the erosion, transport and accretion / deposition of sediment.

Overall Rating of Degradation

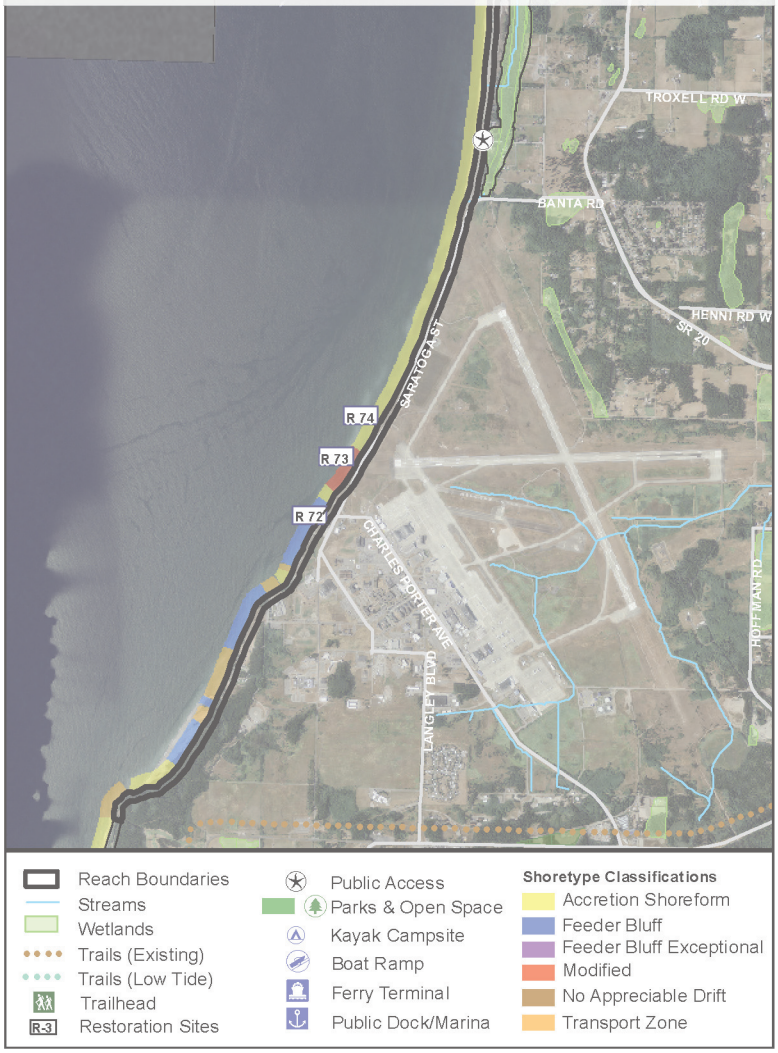
This score is an evaluation of the level of degradation (most degraded to least degraded) for each the following nearshore processes: sediment input, sediment transport, erosion/accretion, tidal flow, distributary channel formation, tidal channel formation, detritus import/export, freshwater input, physical disturbance, solar incidence. This is a relative analysis completed by PSNERP in 2010 which compares all the nearshore reaches of Puget Sound / Strait of Juan de Fuca. Degredation scores are depicted on Map 17 for all marine shorelines in Island County.

Coastal Landslides & Toe Erosion

These datasets contain information about geologic and coastal hazards, which include: areas of steep slope, coastal landslide areas, and toe erosion areas. In general, these show where geologic hazards are likely to occur or where they are known to have occurred. Data sources: Island County; Ecology; and Coastal Geologic Services, 2005.

REACH MAP

The reach maps show the physical features of each "reach" or inventory segment. Geologic shoretype components are depicted to help illustrate the location of feeder bluffs, sediment transport zones, accretion shores and modified shores. The reach maps also depict the locations of wetlands and streams based on Island County inventories. Restoration and protection sites identified by the County are labeled. Public access features, including trails, parks and open space areas, and access points, are mapped along with other public shoreline facilities. Shoreline oblique photos taken by Ecology in 2006 are provided to help orient the reader to key localities. The aerial photo base map is from 2009.



Shoreline oblique photos: Ecology, 2006, photo series; photo points identified on Reach Maps.

HABITATS & SPECIES

Significant & Unique Features (Maps 5-7)
Information on aquatic vegetation is from the Washington Department of Natural Resources Nearshore Habitat Program, which inventories and monitors seagrass and floating kelp beds as part of its program to track nearshore habitat health. Data collection and analysis are completed in collaboration with NOAA's Olympic Coast National Marine Sanctuary. Data source: WDNR.

Coastal Lagoons, Coastal Stream Mouths, and Wetlands (Map 4)
The reach maps depict the approximate location and extent of known wetlands, including coastal lagoons, and streams based on data from Island County wetland and stream inventories. This section also describes these habitat features.

Forage Fish
This WDFW dataset describes the extent of mapped forage fish presence within each reach, including Pacific herring, sandlance, and smelt. Forage fish are nearshore species that are significant food sources for anadromous salmonid and other marine species.

Shoreland and Marine Priority Habitats & Species (Map 5)
*This dataset describes the location of state-designated priority habitats and species in **Shoreland** (upland) and **Marine** (aquatic) areas as reported by the Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species Program and the Washington Department of Natural Resources (WDNR) Natural Heritage Program database. This dataset is called the PHS data and is available online at: http://wdfw.wa.gov/conservation/phs/maps_data/.*

Salmonid Fish Use (Map 5)
This dataset indicates federally (Endangered Species Habitat) designated critical habitat for listed salmonid species, including Chinook and bull trout occurring within marine areas. The dataset also indicates tributary streams with salmonid distribution – species and use information is included and depicted on Map 5. Data sources: WDFW, WDNR, and Federal Register.

LAND & SHORELINE USE

Shoreline Modifications (Map 13)
Shoreline modifications include a variety of structures / alterations to the shoreline such as bulkheads (commonly referred to as armoring and consisting of concrete, rock, wood, and/or piles), groins, levees, and breakwaters. Shoreline modifications are commonly designed and built to dissipate wave energy, maintain navigation channels, control shoreline erosion, provide protection from flooding, store or accumulate sediment, and promote commercial or recreational activity.

Armoring (Map 13)
Percentage of shoreline with mapped armoring. Data source: PSNERP, 2008.

Zoning (Map 11)
This data depicts Island County zoning categories coverage (by percentage) for each reach. Zoning information is useful in understanding development patterns and future development potential.

Current Land Use (Map 12)
This data describes the use and ownership (i.e., public, private, etc.) of lands immediately adjacent to the marine shoreline of each reach. The number of parcels within each reach and average reach parcel size are detailed to further inform the pattern of existing and potential future development. Existing land use information is based on County data and consultant analysis of aerial photography.

Public Access (Map 16)
This is a brief description of public and community access points. These data identify the location and type of shoreline access. Data sources: Ecology, 2010; WSU Island County Extension, 2010; and Island County, 2010, 2011.

Overwater Structures (Map 14)
This is a brief description of human-made structures that extend over the surface of a body of water, such as a pier or dock. Overwater structures frequently include in-water components.

Shellfish & Aquaculture (Map 15)
This dataset depicts the locations of shellfish beds and areas of recreational harvesting. Data source: WDFW, 2010.

KEY MANAGEMENT ISSUES

Key management issues are identified for each reach are based upon relevant geomorphic, biologic (habitat and species use), and land / shoreline use conditions. Preliminary management issues have been developed for the specific reaches with the intent of informing future management decisions at a scale consistent with variations in existing shoreline conditions. Identified management issues and resulting management recommendations should be used in development of shoreline environment designations, goals and policies, and shoreline regulations.

RESTORATION OPPORTUNITIES

Listed restoration opportunities document sites and / or action areas that have been previously identified for restoration potential along the marine shoreline. The primary source for identification of potential restoration sites is Appendix C of the Island County Feeder Bluff and Accretion Shoreform Mapping Report *(Coastal Geologic Services, 2005). Additional restoration opportunity sites were identified for specific reaches by Coastal Geologic Services in 2011; recent efforts were only completed for marine reaches where Appendix C of the 2005 report did not identify opportunity areas. Restoration opportunities documented by other sources may be listed, in which case specific source information is provided within the reach sheet text.*

CONSERVATION OPPORTUNITIES

Listed conservation opportunities document sites and / or action areas that have been previously identified for conservation potential along the marine shoreline. The primary source for identification of potential conservation sites is Appendix C of the Island County Feeder Bluff and Accretion Shoreform Mapping Report *(Coastal Geologic Services, 2005). Conservation opportunities documented by other sources may be listed, in which case specific source information is provided within the reach sheet text.*

REACH Smith and Minor Islands

Smith and Minor Islands

SHORELINE LENGTH:
1.56 Miles

REACH AREA:
24 Acres

PSNERP PROCESS UNITS:
NA

REACH SUMMARY

Smith Island is an island located in the eastern Strait of Juan de Fuca, about mid-way between Admiralty Inlet and Lopez Island. It is connected to the smaller Minor Island, to its east, by a low spit that is covered at high tide. The western shoreline of Smith Island is a significant feeder bluff, with all other areas of both islands' shorelines mapped as accretion beach areas.

The shorelines of both islands are generally undeveloped, although remnants of historical modification do occur (primarily on Smith). Both islands are generally low with open meadow and shrub habitat with few trees. The islands are important habitat for seabirds and the shorelines are a haulout site for sea lions and harbor seals. The islands are part of the San Juan Islands National Wildlife Refuge and are generally closed to the public. The islands and surrounding waters are additionally designated a WDNR aquatic reserve. Documented aquatic habitat includes red sea urchin and extensive pandalid shrimp areas extending to the south.

The islands' location at the east end of the Strait of Juan de Fuca makes them a significant feature for marine navigational aid. A lighthouse was first constructed on Smith Island in the late 1850s and was occupied and operated for approximately 100 years. The lighthouse / keeper residence structure was built at the west end of the island; over the years, bluff erosion crept closer to the structure, requiring the lighthouse to be abandoned in the 1950s with complete destruction occurring in 1998. Remnant out-structures of the light-house remain; the site is listed on the national and state registers of historic places. The lighthouse was replaced with an automated navigation light (97 feet high). Minor Island also has a light and a weather station operated by the National Oceanic and Atmospheric Administration is also located on the islands.

GEOMORPHIC KEY INFORMATION

Geomorphic Shoretype (Map 9)

Feeder Bluff (5%) and Feeder Bluff Exceptional (28%) on west shoreline of Smith Island feeding Accretion Shoreform (60%) along west Smith shoreline and all of Minor Island shoreline

Net Shore Drift (Map 8)

A divergence zone on the west side of Smith Island transitions to eastward drift on both the north and south shores of Smith Island. These drift cells converge on the east side of Minor Island.

Shoreform Current (Map 10)

None mapped

Overall Rating of Degradation

None mapped

Coastal Floodplain:

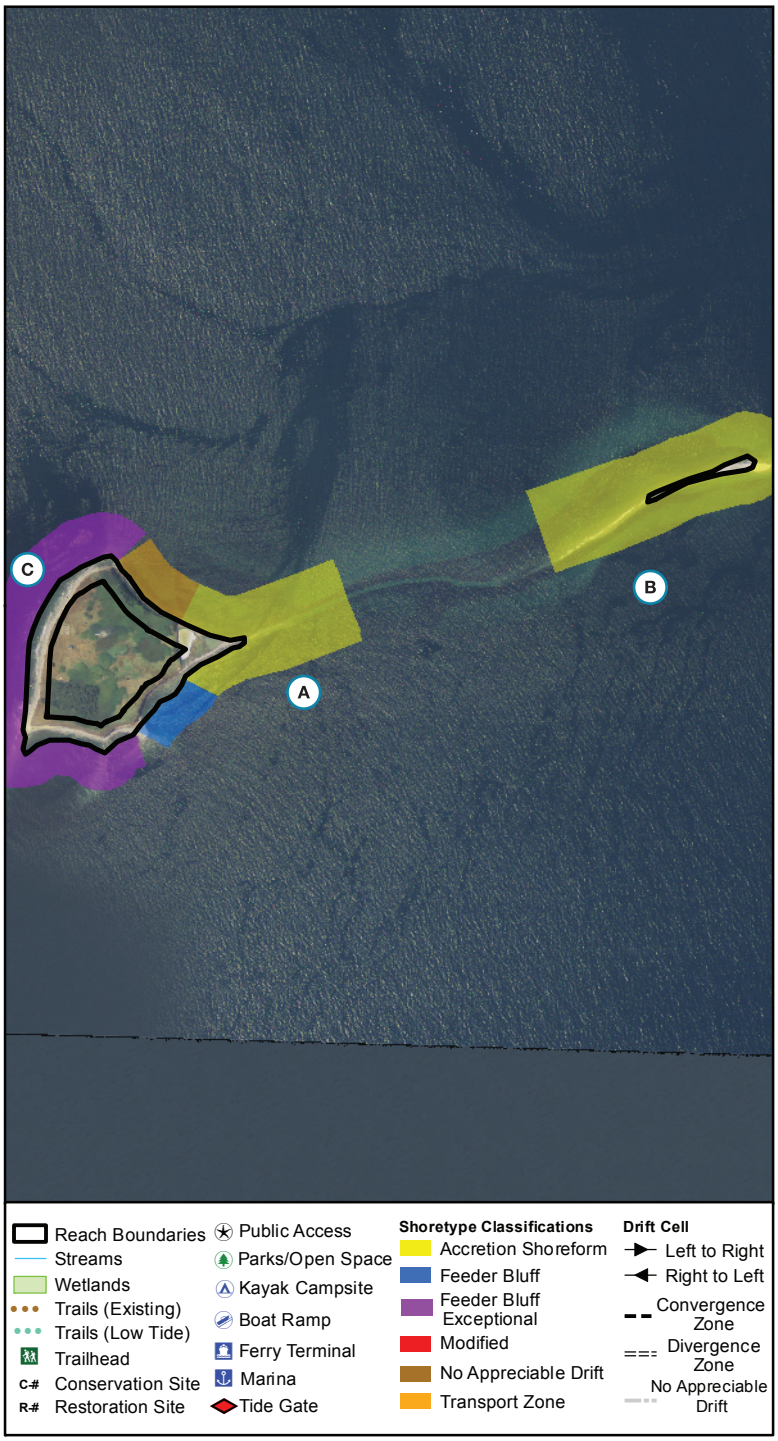
None mapped

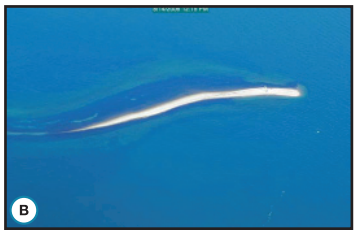
Coastal Landslides & Toe Erosion:

None mapped

Steep Slopes

None mapped





Shoreline Oblique Photos (© Microsoft Bing Maps, 2010)

Historic Photo: Smith Lighthouse

HABITATS & SPECIES

Significant & Unique Features (Maps 5-7)
Red Sea Urchin habitat (Smith Island only); pandalid shrimp habitat offshore to east and southeast.

Shoreland Priority Habitats & Species (Map 5)
All mapped under aquatic

Marine Priority Habitats & Species (Map 5)
Seabird colonies on both islands; seal haulout sites

Coastal Lagoons
None mapped

Coastal Stream Mouths
None mapped

Wetlands (Map 4)
None mapped

Forage Fish
Sandlance None mapped
Smelt None mapped
Herring None mapped

Salmonid Fish Use (Map 5)
No streams on islands.

LAND & SHORELINE USE

Shoreline Modifications (Map 13)
Unmodified shorelines.

Public Access (Map 16)
Public watercraft access to Smith and Minor Islands is not authorized.

Armoring (% of shoreline) (Map 13) None mapped

Zoning (Map 11)
No Zoning

Current Land Use (Map 12)
Number of Parcels 0 **Average Parcel Size** 0.00 Acres
Smith Island historically developed with a lighthouse and associated armoring. Lighthouse abandoned and largely destructed by island erosion. Unmanned navigation lights located on both islands.

Overwater Structures (Map 14)
No overwater structures

Shellfish & Aquaculture (Map 15)
Unclassified shellfish growing area; no mapped or classified shellfish beaches.

KEY MANAGEMENT ISSUES

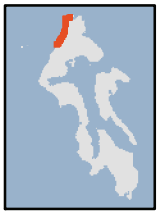
- Protection of aquatic and shoreline habitats through any future redevelopment, refurbishment or expansion of navigational and weather monitoring facilitates.
- Restoration and protection of island vegetation community from potential impacts of invasive species.
- Potential implications of sea level rise (SLR) on barrier beach and feeder bluff habitats (potential loss and / or modification of habitat).

RESTORATION OPPORTUNITIES

Restoration sites were identified in 2004 by Coastal Geologic Services (Appendix H).

Potential restoration sites were not identified; the shoreline is composed of bedrock and has not been developed or otherwise utilized.

Ongoing protection of Smith and Minor Islands, designated a WDNR aquatic reserve, should be prioritized.



REACH WW01

Deception Pass State Park (West Side), Moran Beach and Naval Air Station Whidbey Island

SHORELINE LENGTH:
6.55 Miles

REACH AREA:
155 Acres

PSNERP PROCESS UNITS:
8057

REACH SUMMARY

Deception Pass State Park (West Side), Moran Beach and Naval Air Station Whidbey Island (NASWI) (Reach WW01) extends from Deception Pass at the northern tip of Whidbey Island along the Strait of Juan de Fuca shoreline fronting Cranberry Lake and the Naval Air Station Whidbey Island. Geomorphic shoreline processes are significantly influenced by a single north-trending drift cell terminating at Deception Pass. Feeder bluff and transport zone shoretypes are located in the southern portion of the reach and supply sediment to a long accretion area (barrier beach) comprising more than two-thirds of the shoreline length.

There are no mapped wetlands associated with the shoreline in the reach area; however Cranberry Lake (a separate freshwater lake shoreline) adjoins the northern half of the reach. There are extensive wetlands associated with the lake, including areas designated as coastal lagoon extending to the south. Historic tidal influence on the Cranberry Lake system has been modified. Two stream mouths are mapped along the shoreline, both from the Cranberry Lake system; these streams are short and do not support salmonids. Habitat is mapped within marine aquatic areas, supporting Red Sea Urchin habitat at the northern end of the reach (extending to Deception Island) and kelp is mapped intermittently along the shoreline.

Land use within the shoreline area is associated with the Naval Air Station at the southern end of the reach, rural residential shoreline development through the central portion and Deception Pass State Park at the north end. The Naval Air Station and State Park include limited facilities within the shoreline area; significant undeveloped open space is associated with the Naval Air Station as well as park and residential uses. The marine shoreline is minimally modified. Significant public access is provided through the State Park.

GEOMORPHIC KEY INFORMATION

Geomorphic Shoretype (Map 9)

Primarily Accretion Shoreform (67%), only (4%) Modified

Net Shore Drift (Map 8)

A long drift cell extends northward from West Beach to just west of Deception Pass.

Shoreform Current (Map 10)

Barrier Beach (80%); Bluff Backed Beach (4%); Pocket Beach (10%); Rocky Platform Beach (7%)

Overall Rating of Degradation

Least (100%)

Coastal Floodplain:

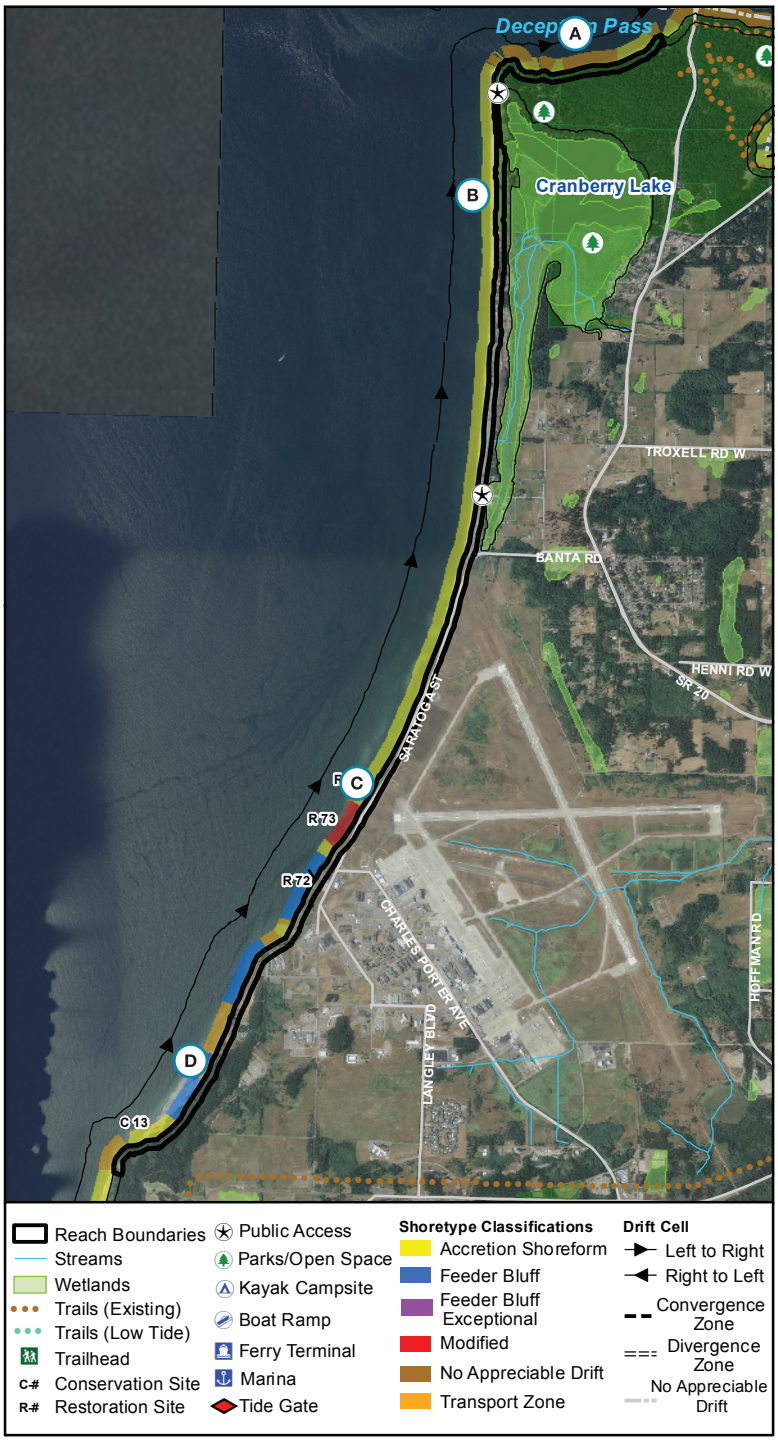
31%

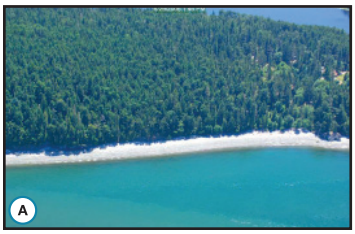
Coastal Landslides & Toe Erosion:

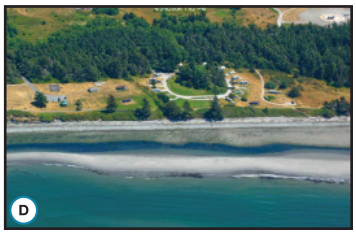
Limited mapping in southern end of reach, as well as some toe erosion just south of Cranberry Lake.

Steep Slopes

9%







Shoreline Oblique Photos (2006)

HABITATS & SPECIES

Significant & Unique Features (Maps 5-7)
Red Sea Urchin habitat at northern end of reach (extending to Deception Island) / patchy kelp mapped intermittently. Marine areas designated ESA critical habitat for Green Sturgeon (excluding naval restricted areas). Deception Pass area is designated as an Audubon Important Bird Area. Pigeon Guillemot nesting colony at cliffside. Dune vegetation south of Cranberry Lake along Surfcrest Drive.

Shoreland Priority Habitats & Species (Map 5)
Bald Eagle (habitat buffer areas identified)

Marine Priority Habitats & Species (Map 5)
None mapped

Coastal Lagoons
None mapped

Coastal Stream Mouths
2

Wetlands (Map 4)
None mapped

Forage Fish
Sandlance 3%
Smelt None mapped
Herring None mapped

Salmonid Fish Use (Map 5)
None mapped within coastal streams. Nearshore areas are designated ESA critical habitat for Chinook (Puget Sound ESU) and bull trout excluding naval restricted areas.

LAND & SHORELINE USE

Shoreline Modifications (Map 13)
Limited modification, outside of areas associated with overwater structures; armoring mapped fronting N Moran Beach Ln.

Public Access (Map 16)
Significant access through Deception Pass State Park (public lands); parking lot in State Park located within shoreline area, provides direct access to extensive public beach as well as Cranberry Lake.

Armoring (% of shoreline) (Map 13) 1%

Zoning (Map 11)
Federal (Naval Air Station - 54%); Rural (25%); Parks (State Park - 21%)

Overwater Structures (Map 14)
No overwater structures

Current Land Use (Map 12)
Number of Parcels 87 **Average Parcel Size** 18.64 Acres
Significant vacant land, limited uses associated with Naval Air Station (southern extent) / Rural residential development along shoreline (central portion) / State Park with limited facilities in shoreline area (northern extent); significant undeveloped open space for all existing uses in shoreline area.

Shellfish & Aquaculture (Map 15)
Unclassified shellfish growing area; no mapped or classified shellfish beaches.

KEY MANAGEMENT ISSUES

- Water quality issues associated with additional development in residential areas (subdivision / intensified use)—including implications of septic systems and road runoff.
- Management of open space areas to maximize shoreline habitat and protect unique dune area - coordination with State Park and Naval Air Station administrators.
- Potential implications of sea level rise (SLR) on barrier beaches (northern two-thirds of reach) (loss of habitat) and increased rates of bluff erosion (south end of reach only) (implications for slope stability and sediment supplies).
- Potential implications of SLR and coastal flooding on development within or near coastal floodplain areas (shoreline residential development).
- Maintenance of groin and drainage outfall for Cranberry Lake.
- Control erosion along the shoreline north of Naval Air Station.

RESTORATION OPPORTUNITIES

Restoration sites were identified in 2004 by Coastal Geologic Services (Appendix H).

R72: Remove concrete rubble from intertidal and bank toe.

R73: Remove concrete rubble revetment.

R74: Remove very long outfall structure; redevelop outfall to have less impact on intertidal areas.

CONSERVATION OPPORTUNITIES

C13: Undeveloped berm and lagoon complex. Extends 2000+ ft and into Feeder Bluff with intertidal bars.

REACH WW02

Joseph Whidbey State Park, Swan Lake and South to Libbey Road

SHORELINE LENGTH:
7.49 Miles

REACH AREA:
381 Acres

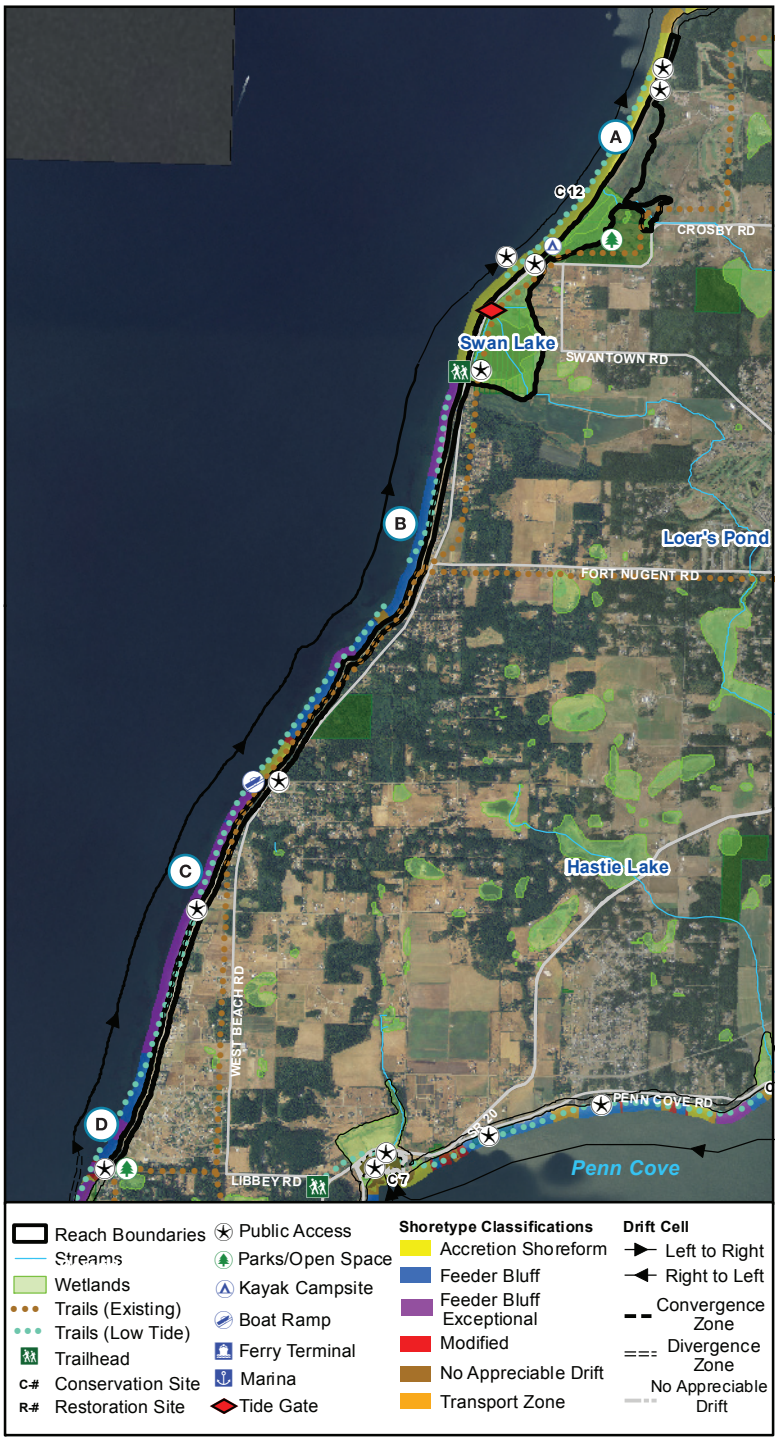
PSNERP PROCESS UNITS:
8057

REACH SUMMARY

Joseph Whidbey State Park, Swan Lake and South to Libbey Road (Reach WW02) extends along the shoreline fronting the Swan Lake area south to the Point Partridge vicinity. The reach includes the Swan Lake feature, which is a coastal lagoon associated with the marine shoreline. Geomorphic shoreline processes are significantly influenced by a single north-trending drift cell starting at Point Partridge and continuing north through Reach WW01. Feeder Bluff and Feeder Bluff Exceptional shoretypes are located south of Swan Lake — these shorelines supply sediment to a long accretion area (barrier beach) fronting and extending north of Swan Lake. Feeder bluffs within the reach are substantial and have very little slope vegetation (Oblique Photos B, C and D).

Swan Lake is a large coastal lagoon comprising almost 20 percent of the reach area. The lagoon drains directly to the shoreline and is mapped as supporting salmonids in addition to providing significant habitat for numerous other species. One additional stream (without mapped salmon use) drains to the shoreline to the north of Swan Lake. Other shoreland habitats include WDFW mapped Bald Eagle territory, coastal cliffs, associated wetland areas and native oak and grass lands. Mapped aquatic habitats include geoduck habitat with patchy kelp intermittent throughout the reach.

Primary land uses within the shoreline area include shoreline residential development, park lands and open space. Most of the undeveloped open space area is mapped as wetland / coastal lagoon associated with the marine shoreline. Shoreline residential development occurs at rural densities along NW Beach Road, with houses setback between 100 and 150 feet behind the top of coastal bluffs. Residential yards and lawns typically extend to the edge of the bluff, with very little riparian vegetation. Joseph Whidbey State Park is minimally modified in the shoreline vicinity.



GEOMORPHIC KEY INFORMATION

Geomorphic Shoretype (Map 9)

Feeder Bluff (29%) and Feeder Bluff Exceptional (33%) through south extent into Accretion Shoreform (35%) fronting Swan Lake vicinity

Net Shore Drift (Map 8)

This drift cell originates at a divergence zone at Point Partridge and extends northward to just west of Deception Pass.

Shoreform Current (Map 10)

Barrier Beach (32%); Bluff-backed Beach (68%)

Overall Rating of Degradation

Least (100%)

Coastal Floodplain:

33%

Coastal Landslides & Toe Erosion:

Toe erosion along significant feeder bluff through south end of reach; intermittent areas of landslide.

Steep Slopes

20%

Shoreline Oblique Photos (2006)

HABITATS & SPECIES

Significant & Unique Features (Maps 5-7)
Geoduck habitat fronting Swan Lake marine shoreline vicinity; patchy kelp mapped intermittently; coastal lagoon areas extending north from Swan Lake. Marine areas designated ESA critical habitat for Green Sturgeon. Swan Lake and surrounding areas are listed as County Habitat of Local Importance.

Shoreland Priority Habitats & Species (Map 5)
Bald Eagle buffer; Cliff; Wetland; 8 acres of mapped Native Oaks and Grassland

Marine Priority Habitats & Species (Map 5)
Two documented Pigeon Guillemot nesting colonies at Swan Lake and Hastie Lake

Coastal Lagoons	Coastal Stream Mouths	Wetlands (Map 4)
73 acres (19%)	2	43%

Forage Fish
Sandlance None mapped **Smelt** 25%
Herring None mapped

Salmonid Fish Use (Map 5)
None mapped within coastal streams. Nearshore areas are designated ESA critical habitat for Chinook (Puget Sound ESU).

LAND & SHORELINE USE

Shoreline Modifications (Map 13)
Generally limited modification; armoring associated with areas of dense residential development fronting Swan Lake and in the vicinity of the Hastie Lake Road Boat Launch; a tide gate is located at the northwest corner of Swan Lake.

Public Access (Map 16)
Hastie Lake Road Boat Launch, West Beach Vista (adjacent to Swan Lake); significant access through Joseph Whidbey State Park; additional County owned public beach access at the end of Lebbey Rd (Point Partridge).

Armoring (% of shoreline) (Map 13) 11%

Zoning (Map 11)
Rural (62%); Federal (16%) / Parks (13%) / Rural Residential (8%) / Commercial Agriculture (1%)

Current Land Use (Map 12)
Number of Parcels 346 **Average Parcel Size** 3.98 Acres
Primarily public park lands; significant open space associated with uses throughout reach.

Overwater Structures (Map 14)
No overwater structures

Shellfish & Aquaculture (Map 15)
Approved shellfish growing area; no mapped or classified shellfish beaches.

KEY MANAGEMENT ISSUES

- Slope / bluff stability for existing and future land uses at the top of slopes (focused on land uses and modifications such as clearing, impervious surfaces, modified surface / groundwater dynamics).
- Subdivision — additional modification of feeder bluff / steep slope areas due to greater intensity of use.
- Water quality issues associated with additional development (subdivision / intensified use) — including implications of septic systems and road runoff.
- Drinking water supply (aquifer) issues associated with additional development (subdivision / intensified use) — saltwater intrusion and potential exacerbation from SLR. Reach area mapped as 'Very-High Risk' for saltwater intrusion (Island County Risk Rating Map).
- Potential use conflicts associated with public access to beaches and private residential property rights.
- Potential implications of sea level rise (SLR) on Swan Lake lagoon, adjoining coastal wetland areas, barrier beaches; associated wetlands (loss of habitat); and further bluff erosion.
- Potential implications of SLR and coastal flooding on development within or near coastal floodplain areas (residential development in Swan Lake vicinity).
- Coastal flooding, storm damage, and tsunami hazard at Swan Lake and Hastie Lake (Whitecap Lane).
- Hazards of bluff erosion and potentially rapid erosion rates along West Beach Road.

RESTORATION OPPORTUNITIES

Three potential restoration opportunities were identified from review of Ecology 2006 shoreline oblique photography during development of this Inventory:

1. Remove derelict structures (piles and remnants of pier / boat ramp) along marine shoreline just north of Swan Lake.
2. Remove tide gate and associated armoring that restricts tidal exchange between Swan Lake and the marine shoreline.
3. Remove concrete debris (degrading shoreline armoring) to the south of the row of shoreline residences fronting the shoreline adjacent to Swan Lake.

Swan Lake restoration is additionally identified by the Island County Estuarine Restoration Program report (2001).

CONSERVATION OPPORTUNITIES

C12: Undeveloped beach and backshore.

REACH WW03

Fort Ebey State Park and Perego's Lagoon

SHORELINE LENGTH:
3.78 Miles

REACH AREA:
143 Acres

PSNERP PROCESS UNITS:
8057, 8058

REACH SUMMARY

Fort Ebey State Park and Perego's Lagoon (Reach CAM03) extends along the Strait of Juan de Fuca / Admiralty Inlet shoreline fronting Ebey's Landing and Perego's Lagoon (Oblique Photo D). The unique lagoon feature is an enclosed barrier (coastal) lagoon sitting between coastal bluffs to the east and a barrier beach to the west. Geomorphic shoreline processes are significantly influenced by a south-trending drift cell starting from a divergence zone at Point Partridge and continuing south into Reach WW03. Feeder bluff and feeder bluff exceptional shoretypes are located north of Perego's Lagoon — these shorelines supply sediment to the barrier beach (accretion area) fronting the lagoon, as well as areas further south. Feeder bluffs within the reach are substantial and have no slope vegetation (Oblique Photos A, B, C).

Perego's Lagoon comprises 25 percent of the reach area. The lagoon has no tidal opening through the barrier beach hydrologic connection with the marine shoreline is subsurface except potentially during coastal flooding / storm events. No coastal streams drain to the reach shoreline. Other shoreland habitats include WDFW-mapped Bald Eagle territory, coastal cliffs and 52 acres of native oak and grass lands. Mapped aquatic habitats include pandalid shrimp and hardshell clam areas, a seabird colony and continuous kelp off-shore of coastal bluff areas.

Land use within the reach is limited to public park areas, as the entire shoreline is part of Fort Ebey State Park and the adjoining Ebey's Landing National Historical Reserve. Outside of hiking trails, the shoreline is unaltered. Public access is extensive, provided through developed access points to the north and south.

GEOMORPHIC KEY INFORMATION

Geomorphic Shoretype (Map 9)

Feeder Bluff (15%) and Feeder Bluff Exceptional (31%), Accretion Shoreform (20%) fronting Perego's Lagoon

Net Shore Drift (Map 8)

Southward drift from a divergence zone at Partridge Point extends around Admiralty Head and converges with northward drift inside Admiralty Bay.

Shoreform Current (Map 10)

Barrier Beach (20%); Bluff-backed Beach (48%); Coastal Lagoon and Marsh (32%)

Overall Rating of Degradation

Least (17%); Less (83%)

Coastal Floodplain:

32%

Coastal Landslides & Toe Erosion:

Almost continuous landslide mapped to the northwest of Perego's lagoon (along Feeder Bluff; Feeder Bluff Exceptional).

Steep Slopes

44%

Shoreline Oblique Photos (2006)

HABITATS & SPECIES

Significant & Unique Features (Maps 5-7)
Mapped Seabird Colony (Alcids); Perego's Lagoon (34 acres).

Shoreland Priority Habitats & Species (Map 5)
Bald Eagle buffer; Cliffs; 52 acres of mapped Native Oaks and Grassland

Marine Priority Habitats & Species (Map 5)
None mapped

Coastal Lagoons	Coastal Stream Mouths	Wetlands (Map 4)
36 acres (25%)	1	19%

Forage Fish
Sandlance None mapped **Smelt** None mapped
Herring None mapped

Salmonid Fish Use (Map 5)
None mapped within coastal streams. Nearshore areas are designated ESA critical habitat for Chinook (Puget Sound ESU) excluding naval restricted areas.

LAND & SHORELINE USE

Shoreline Modifications (Map 13)
Limited modification within Libbey Beach Park (bulkhead and riprap); no other shoreline modifications.

Public Access (Map 16)
Significant access provided by Fort Ebey State Park and adjoining Ebey's Landing National Historical Reserve.

Armoring (% of shoreline) (Map 13) 2%

Zoning (Map 11)
Rural (61%); Parks (39%)

Current Land Use (Map 12)
Number of Parcels 23 **Average Parcel Size** 30.58 Acres
Primarily public park lands; significant open space associated with uses throughout reach.

Overwater Structures (Map 14)
No overwater structures

Shellfish & Aquaculture (Map 15)
Unclassified shellfish growing area; no mapped or classified shellfish beaches.

KEY MANAGEMENT ISSUES

- Preservation of publicly owned open space areas to maximize shoreline habitat — coordination with State Park and Reserve administrators.
- Control of invasive species.
- Potential implications of sea level rise (SLR) on Perego's Lagoon and barrier beaches (loss of habitat), as well as implications for bluff toe erosion and stability.

RESTORATION OPPORTUNITIES

Restoration sites were identified in 2004 by Coastal Geologic Services (Appendix H).

No apparent restoration opportunities were identified along the WW03 shoreline. Shorelines within the reach are primarily characterized by high bluffs and coastal wetlands that are largely unaltered; no derelict structures identified.

REACH WW04

Crockett Lake, Coupeville Ferry, Fort Casey State Park, and Driftwood Park

SHORELINE LENGTH:
8.77 Miles

REACH AREA:
1,288 Acres

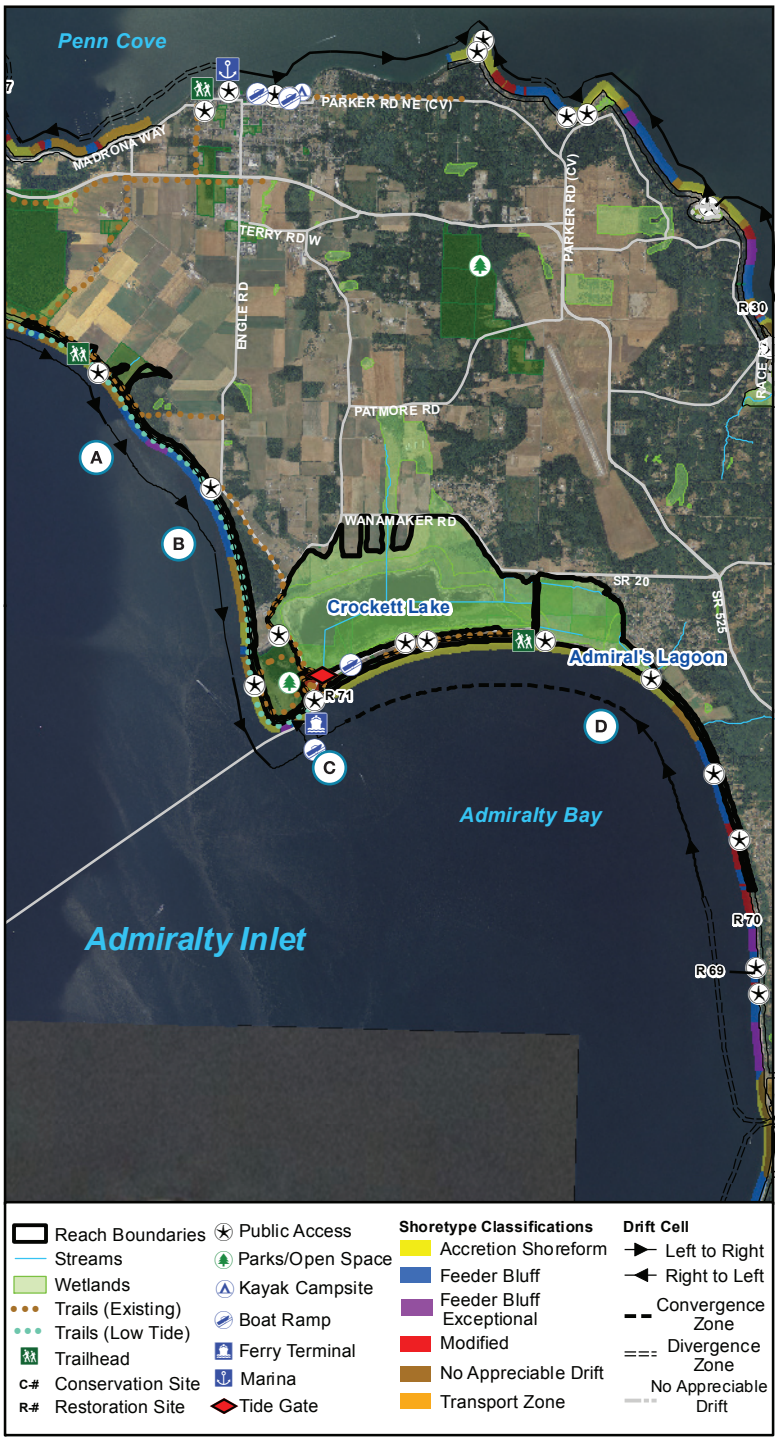
PSNERP PROCESS UNITS:
8058, 8059, 5029

REACH SUMMARY

Crockett Lake, Coupeville Ferry Facility (at Keystone), Fort Casey State Park and Driftwood Park (Reach WW04) extends south along the Ebey's Landing shoreline and east along the Crockett Bay shoreline. The reach includes Keystone Harbor and Crockett Lake, a lagoon area associated with the marine shoreline. This reach includes the Washington State Ferries Coupeville-to-Port Townsend Ferry Facility (at Keystone) (picture C), which provides ferry service to Port Townsend and the Olympic Peninsula (across Admiralty Inlet). Geomorphic shoreline processes are characterized by a convergence of two drift cells along the Admiralty Bay shoreline, supporting the accretion area (barrier beach) separating the bay from Crockett Lake lagoon immediately north. The northwest and southeast portions of the shoreline are mapped with feeder bluffs and transport zones.

Crockett Lake lagoon and adjoining associated wetlands provide significant habitat and is designated a waterfowl concentration area. The lagoon is modified by the access road to the Coupeville Ferry Facility and Keystone Harbor. Admirals Lagoon (14 acres) is also within the reach, located immediately east of the Crockett Lake. Four streams (no salmon use) drain to the shoreline. Mapped habitat within aquatic areas includes pandalid shrimp and hardshell clam areas, a seabird colony, forage fish use and continuous Kelp throughout coastal bluff areas.

Reach land use is characterized by public facilities — both within largely undeveloped park areas within Fort Casey State Park and Ebey's Landing and high intensity facilities along and adjacent to Keystone Harbor. The ferry terminal facility and a public boat launch at the southeast mouth of the harbor include overwater structures. Development within the State Park to the west of Keystone Harbor also includes significant camping and access facilities within the shoreline. Shoreline armoring is common through these areas. The shoreland area between Admiral Bay and Crockett Lake is developed with shoreline residential properties. An offshore tidal energy facility is being investigated to the SW of Admiralty Head.



GEOMORPHIC KEY INFORMATION

Geomorphic Shoretype (Map 9)

Feeder Bluff (26%), Feeder Bluff Exceptional (3%), and Transport Zones (19%) along west facing shoreline, long Accretion Shoreform (45%) fronting Crockett Lake and Coupeville Ferry Facility

Net Shore Drift (Map 8)

Southward drift at a divergence zone at Partridge Point extends around Admiralty Head and converges with northward drift inside Admiralty Bay.

Shoreform Current (Map 10)

Barrier Beach (36%); Bluff-backed Beach (58%); Artificial (6%)

Overall Rating of Degradation

Least (37%); Less (63%)

Coastal Floodplain:

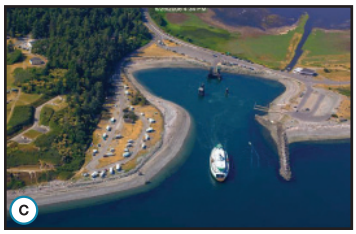
46%

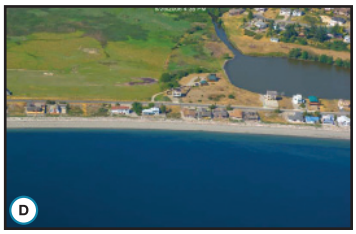
Coastal Landslides & Toe Erosion:

Landslide areas mapped at north and south ends of reach.

Steep Slopes

5%





Shoreline Oblique Photos (2006)

HABITATS & SPECIES

Significant & Unique Features (Maps 5-7)
Mapped Seabird Colony (Alcids); Admiral's Lagoon (14 acres); Crockett Lake is a brackish coastal lagoon with salt-marshes and associated freshwater wetlands; designated as Audubon Important Bird Area. Crockett Lake is also designated as a County Habitat of Local Importance and is the site of an annual international shorebird survey. Three documented Pigeon Guillemot nesting colonies located at Fort Casey, Keystone, and Ledgewood.

Coastal Lagoons	Coastal Stream Mouths	Wetlands (Map 4)
18 acres (1%)	4	82%

Forage Fish
Sandlance None mapped **Smelt** 2%
Herring None mapped

Shoreland Priority Habitats & Species (Map 5)
Bald Eagle buffer; Cliffs; Wetlands; 3 acres of mapped Native Oaks and Grassland

Marine Priority Habitats & Species (Map 5)
Waterfowl Concentration through Crockett Lake lagoon

Salmonid Fish Use (Map 5)
Nearshore areas are designated ESA critical habitat for Chinook (Puget Sound ESU).

LAND & SHORELINE USE

Shoreline Modifications (Map 13)
Areas of significant modification; significant modification associated with Coupeville Ferry Facility (modification of connection between marine shoreline and Crockett Lake; riprap armoring fronting terminal facility); major boat launch facility immediately east of the ferry terminal; groins/breakwaters at entrance to Keystone Harbor; riparian areas impacted by historic clearing within Fort Casey State Park; area of armoring along Ebey's Landing Rd (and trail head facility) to the southeast of Perego's Lagoon; bulkheads and armoring fronting residential development along Admiralty Bay; tide gate located at southwest corner of Crockett Lake.

Armoring (% of shoreline) (Map 13) 7%

Zoning (Map 11)
Rural (73%); Rural Agriculture (12%); Rural Residential (7%); Commercial Agriculture (5%); Parks (3%)

Current Land Use (Map 12)
Number of Parcels 345 **Average Parcel Size** 6.54 Acres
Primarily public park lands; significant open space associated with uses throughout reach; major public shoreline facilities at Keystone Harbor; shoreline residential development to the east of harbor.

Public Access (Map 16)
Public lands and tidelands (some accessible only via watercraft) throughout majority of reach; Washington State Parks owned open space throughout a portion of Crockett Lake (limited small craft accessibility); public facilities and access associated with Coupeville Ferry Facility; significant access provided by Fort Casey Historical State Park and adjoining Ebey's Landing National Historical Reserve; public beach access from County property at Driftwood Park, at end of Keystone Spit.

Overwater Structures (Map 14)
Coupeville Ferry Facility located in Keystone Harbor (130 ft. long, 30 ft. wide pier; dolphin structures associated with pier); 2 piers at public boat launch; remnant pier immediately east of boat launch facility (piles and overwater structures remain). An offshore tidal energy facility is being considered to the southwest of Admiralty Head. The facility would primarily be underwater; however, it may have overwater structures along the shoreline.

Shellfish & Aquaculture (Map 15)
Unclassified shellfish growing area; no mapped or classified shellfish beaches.

KEY MANAGEMENT ISSUES

- Continued degradation of shoreline processes due to armoring (bulkheads).
- Drinking water supply (aquifer) issues associated with additional development (subdivision / intensified use) — saltwater intrusion and potential exacerbation from sea level rise (SLR); limited areas of 'High Risk' for saltwater intrusion in Keystone vicinity (Island County Risk Rating Map).
- Redevelopment and / or intensified use of Coupeville-to-Port Townsend Ferry Facility and adjacent intensive active use areas.
- Restoration of connection between Lake Crockett and the marine shoreline.
- Implications of additional private shoreline access points on high bank shorelines (accessory to residential development).
- Potential implications of SLR on coastal lagoons and barrier beaches (loss of habitat).
- Potential increases in coastal flooding and rates of bluff erosion due to SLR or other factors.
- Potential use conflicts associated with public access to beaches and private residential property rights.
- Subdivision and intensified use — additional modification of feeder bluff / steep slope areas and water quality implications (septic systems and road runoff) due to greater intensity of use.

RESTORATION OPPORTUNITIES

Restoration sites were identified in 2004 by Coastal Geologic Services (Appendix H).

R71: Remove 115 creosote piles and old structures in subtidal area.

Comprehensive restoration of Crockett Lake is identified in the Island County Estuarine Restoration Program plan (2001); restoration goals include establishing open exchange of saltwater, restoration of salmon access and enhanced wildlife habitat.

REACH WW05

Lake Hancock

SHORELINE LENGTH:
5.31 Miles

REACH AREA:
136 Acres

PSNERP PROCESS UNITS:
5029, 5030

REACH SUMMARY

Lake Hancock (Reach WW05) extends along the Admiralty Inlet shoreline as it fronts Lake Hancock, a tidally active coastal lagoon (Oblique Photos B and C). The entire reach is mapped as a divergence zone between drift cells trending north and south. The shoreline fronting Lake Hancock is an accretion area and all other shorelines are comprised of feeder bluffs (including areas mapped as exceptional).

Lake Hancock is a large coastal lagoon comprising more than 45 percent of the reach area; the lagoon drains directly to the shoreline, providing significant habitat for numerous species (WDFW habitats include Lagoon, Slough, Wetland and Shorebird and Waterfowl Concentrations). Two streams (both without mapped salmonid use) drain to the shoreline, one within the lagoon area. Other shoreland habitats include Bald Eagle territory and coastal cliffs. Mapped aquatic habitats include geoduck habitat, hardshell clam habitat and patchy kelp and eelgrass intermittently throughout the reach.

Land use is comprised of federally owned (military) open space throughout Lake Hancock lagoon area and rural residential development behind bluffs along the Admiralty Inlet shoreline. The shoreline is modified in areas north of Lake Hancock, where shoreline residential development occurs in front of shoreline slopes and bulkheads are prevalent.

GEOMORPHIC KEY INFORMATION

Geomorphic Shoretype (Map 9)

Feeder Bluff (22%) and Feeder Bluff Exceptional (13%), Accretion Shoreform (14%) fronting Lake Hancock (lagoon area is mapped with No Appreciable Drift (46%))

Net Shore Drift (Map 8)

A broad divergence zone with northward and southward drift occurs along this reach.

Shoreform Current (Map 10)

Barrier Beach (16%); Barrier Lagoon (46%); Bluff-backed Beach (38%)

Overall Rating of Degradation

Least (50%); Less (50%)

Coastal Floodplain:

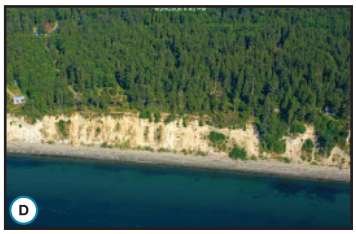
1%

Coastal Landslides & Toe Erosion:

Extensive mapping of both along feeder bluffs to north and south of Lake Hancock lagoon.

Steep Slopes

20%



Shoreline Oblique Photos (2006)

HABITATS & SPECIES

Significant & Unique Features (Maps 5-7)
Geoduck habitat along Admiralty Inlet shoreline (north and south portions of reach); limited hardshell clam habitat; continuous eelgrass extending along shoreline and into Lake Hancock lagoon; patchy kelp mapped intermittently; two documented Pigeon Guillemot nesting colonies at Lagoon North.

Shoreland Priority Habitats & Species (Map 5)
Cliffs; Wetland

Marine Priority Habitats & Species (Map 5)
Lagoon; Slough; Waterfowl Concentration; Shorebird Concentration (all focused at Lake Hancock lagoon)

Coastal Lagoons	Coastal Stream Mouths	Wetlands (Map 4)
None mapped	2	9%

Forage Fish
Sandlance None mapped **Smelt** None mapped
Herring None mapped

Salmonid Fish Use (Map 5)
Nearshore areas are designated ESA critical habitat for Chinook (Puget Sound ESU).

LAND & SHORELINE USE

Shoreline Modifications (Map 13)
Limited modification at north end of reach with shoreline residential development; reach (including Lake Hancock coastal lagoon) otherwise unmodified.

Public Access (Map 16)
The entire Lake Hancock lagoon is federally owned, with public access provided via a walkway and viewing platform; public tidelands accessible via watercraft at north end of reach.

Armoring (% of shoreline) (Map 13) 5%

Zoning (Map 11)
Federal (59%); Rural (21%); Rural Residential (10%); Rural Forest (10%)

Current Land Use (Map 12)
Number of Parcels 85 **Average Parcel Size** 7.63 Acres
Federally owned open space throughout Lake Hancock lagoon area, rural residential development behind bluffs along Admiralty Inlet shoreline.

Overwater Structures (Map 14)
No overwater structures

Shellfish & Aquaculture (Map 15)
Unclassified shellfish growing area; no mapped or classified shellfish beaches.

KEY MANAGEMENT ISSUES

- Continued degradation of shoreline processes due to armoring (bulkheads) in northern areas of reach.
- Disconnection of feeder bluff areas from shoreline due to toe armoring and / or development fronting bluff areas leading to greater down-drift erosion rates (issue is related to short portions of reach where development fronts coastal bluffs).
- Slope stability, habitat and aesthetic implications of additional private shoreline access points on high bank shorelines (accessory to residential development).
- Potential implications of sea level rise (SLR) on Lake Hancock lagoon and fronting barrier beach (loss of habitat).
- Potential use conflicts associated with public access to beaches and private residential property rights.
- Slope / bluff stability for existing and future land uses at the top or toes of slopes, (considering land uses and modifications such as clearing, creation of impervious surfaces, modified surface / ground-water dynamics).
- Subdivision and intensified use — additional modification of feeder bluff / steep slope areas and water quality implications (septic systems and road runoff) due to greater intensity of use.
- Shoreline areas of several subdivisions (i.e., Ledgewood, Bonair, Teronda West) are subject to deep-seated landslides.

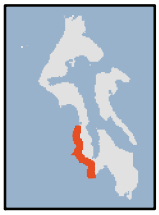
RESTORATION OPPORTUNITIES

Restoration sites were identified in 2004 by Coastal Geologic Services (Appendix H).

R69: Remove 35 creosote piles from failing wall.

R70: Remove 4 creosote piles in subtidal area.

Lake Hancock restoration is identified in the Island County Restoration Program plan (2001); restoration goals include removal of creosote pilings and unexploded military ordinances. Continued protection of the valuable, intact lagoon is also highlighted.



REACH WW06

Lagoon Point, South Whidbey State Park, Bush Point Lagoon, Mutiny Bay

SHORELINE LENGTH:
14.51 Miles

REACH AREA:
369 Acres

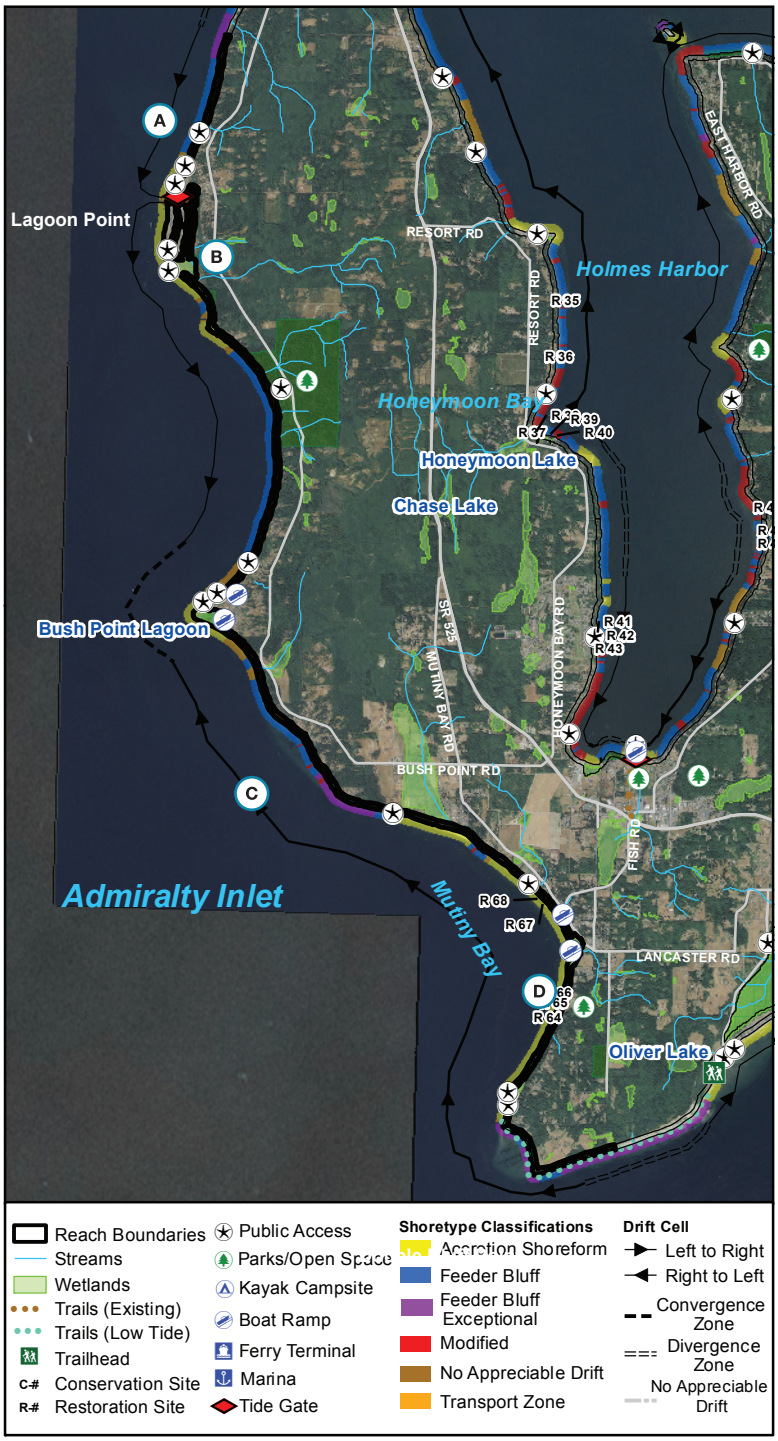
PSNERP PROCESS UNITS:
5030 - 5032

REACH SUMMARY

Lagoon Point, South Whidbey State Park, Bush Point Lagoon, Mutiny Bay (Reach WW06) extends for almost 15 miles along the Admiralty Inlet shoreline and is generally characterized by intermittent coastal bluff shorelines backed by rural residential development and barrier beach (accretion) areas with pockets of denser, low-bank shoreline residential development. Geomorphic shoreline processes are significantly influenced by the convergence of two long drift cells at Bush Point Lagoon. Sediments transported by these cells support several significant accretion areas — at Lagoon Point (Oblique Photo B), at Bush Point Lagoon and within Mutiny Bay (Oblique Photo D).

Coastal lagoon (Bush Point Lagoon) and associated wetland areas are mapped within the reach; however, most historic coastal lagoons have been significantly modified by shoreline residential development. Twelve stream mouths (none with mapped salmonid use) drain to the shoreline within the reach — all from relatively short drainages. Other shoreland habitats include WDFW mapped Bald Eagle territory, coastal cliffs and old growth / mature forest areas. Mapped aquatic habitats include hardshell clam habitat around Lagoon Point and geoduck habitat within Mutiny Bay. Patchy kelp and eelgrass is inventoried intermittently throughout the reach. Two haulout sites are located off Double Bluff Point and one haulout site is offshore from Bush Point.

Primary land uses within the shoreline area include high density shoreline development at Lagoon Point and Bush Point and rural residential development and park land in other areas of reach. Numerous overwater structures providing private residential moorage and access are located within the Lagoon Point community. Significant public access is provided by Double Bluff Park.



GEOMORPHIC KEY INFORMATION

Geomorphic Shoretype (Map 9)

Long reach is characterized by alternating areas of Feeder Bluff (30%), Transport Zone (6%), and Accretion Shoreform (36%); some modified shoreline mapped

Net Shore Drift (Map 8)

Two drift cells converge at Bush Point: one with southward drift originates near Lake Hancock; one with northward drift originates near Double Blulff.

Shoreform Current (Map 10)

Barrier Beach (33%); Bluff-backed Beach (51%); Artificial (16%)

Overall Rating of Degradation

Less (100%)

Coastal Floodplain:

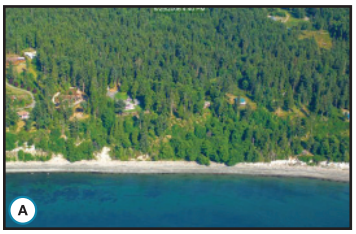
46%

Coastal Landslides & Toe Erosion:

Landslides mapped along Double Bluff Beach, feeder bluff areas flanking Bush Point and Lagoon Point; toe erosion extensive north of Lagoon Point.

Steep Slopes

25%



Shoreline Oblique Photos (2006)

HABITATS & SPECIES

Significant & Unique Features (Maps 5-7)
Geoduck habitat; extensive hardshell clam habitat; continuous eelgrass; patchy Kelp mapped intermittently; Bush Point Lagoon (3 acres); six documented Pigeon Guillemot nesting colonies: Lagoon South, Malmo Bluff, Shore Meadows, Mutiny Sands, Limpet Lane, and Double Bluff.

Coastal Lagoons 3 acres (1%)
Coastal Stream Mouths 12
Wetlands (Map 4) 10%

Forage Fish
Sandlance 3%
Smelt 1%
Herring None mapped

Shoreland Priority Habitats & Species (Map 5)
Bald Eagle buffer; Cliffs; Old Growth/Mature Forest

Marine Priority Habitats & Species (Map 5)
Band-tailed Pigeon, Old-growth / Mature Forest (both located between Lagoon and Bush Points); Waterfowl Concentration; Haulout sites at Double Bluff Point and Bush Point

Salmonid Fish Use (Map 5)
Nearshore areas are designated ESA critical habitat for Chinook (Puget Sound ESU).

LAND & SHORELINE USE

Shoreline Modifications (Map 13)
Armoring focused in several short reaches, primarily fronting and within Lagoon Point community (significant modification of shoreline in dense residential area, both within internal waterways and along Admiralty Inlet shoreline; riprap breakwaters at mouth of cove; dredging required for maintenance of community waterways); similarly intense modification of Admiralty Inlet shoreline at Bush Point; limited modification associated with residential development along Mutiny Bay; tide gate located on E Seashore Ave.

Armoring (% of shoreline) (Map 13) 6%

Zoning (Map 11)
Rural (82%); Rural Residential (10%); Parks (6%); Rural Forest (2%)

Current Land Use (Map 12)
Number of Parcels 924 **Average Parcel Size** 0.99 Acres
High density shoreline development at Lagoon Point and Bush Point; rural residential development and park land in other areas of reach.

Public Access (Map 16)
Double Bluff Park in WW07 provides significant access to Double Bluff Beach extending along southern reach shoreline; Mutiny Bay Boat Launch provided at Robinson Rd end (adjacent to unimproved County park property); public tidelands accessible via watercraft southeast of Bush Point; Sandpiper Lane Beach Access at Bush Point; Significant access via South Whidbey Island State Park (4,500 ft of shoreline; overnight camping); Beach access via tide access points at Lagoon Point (North via S Shell St and South via E Salmon St); boat launch located at Bush Point.

Overwater Structures (Map 14)
Approximately 100 private residential piers/docks (T-shaped with docks parallel to the shoreline) and 1 community pier/dock and boat launch within 'cove' community at Lagoon Point (structures closely spaced in protected cove adjoining Admiralty Inlet); several other individual piers along Mutiny Bay shoreline (no clustering - all appear to be private).

Shellfish & Aquaculture (Map 15)
Unclassified shellfish growing area except in aquatic area fronting Mutiny Bay (Approved); no mapped or classified shellfish beaches.

KEY MANAGEMENT ISSUES

- Continued degradation of shoreline processes due to armoring (bulkheads), particularly at Lagoon Point, Bush Point and along portions of the Mutiny Bay shoreline.
- Disconnection of feeder bluff areas from shoreline due to toe armoring and / or development fronting bluff areas leading to greater down-drift erosion rates (issue is related to short portions of reach where development fronts coastal bluffs).
- Drinking water supply (aquifer) issues associated with additional development (subdivision / intensified use) — saltwater intrusion and potential exacerbation from SLR. Bush Point area mapped as 'Very-High Risk' for saltwater intrusion; other areas mapped with 'Low Risk' (Island County Risk Rating Map).
- Potential use conflicts associated with public access to beaches and private residential property rights.
- Slope / bluff stability for existing and future land uses at the top or toes of slopes, (considering land uses and modifications such as clearing, creation of impervious surfaces, modified surface / ground-water dynamics).
- Management of shoreline steep slope areas extending outside of shoreline jurisdiction.
- Subdivision and intensified use — additional modification of feeder bluff / steep slope areas and water quality implications (septic systems, road runoff and agriculture) due to greater intensity of use.

RESTORATION OPPORTUNITIES

Restoration sites were identified in 2004 by Coastal Geologic Services (Appendix H).

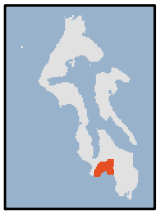
R64: Remove 7 creosote piles.

R65: Remove 4 creosote piles.

R66: Remove 7 creosote piles.

R67: Remove 11 creosote piles.

R68: Remove 4 creosote piles.



REACH WW07

Useless Bay, Deer Lagoon

SHORELINE LENGTH:
6.97 Miles

REACH AREA:
729 Acres

PSNERP PROCESS UNITS:
5031 - 5033

REACH SUMMARY

Useless Bay, Deer Lagoon (Reach WW07) includes the Useless Bay shoreline as well as associated coastal lagoon and wetland areas to the north of the bay shoreline (Oblique Photos B and C). The reach includes Deer Lagoon, which is substantially modified by historic diking and development and associated wetlands stretching north toward Lone Lake (which drains to Deer Lagoon). Geomorphic shoreline processes are characterized by a convergence of two drift cells along the bay shoreline, supporting the accretion area (barrier beach) separating the bay from the lagoon immediately north. The northwest and southeast portions of the shoreline are mapped with feeder bluffs.

Deer Lagoon and adjoining associated wetlands provide significant habitat (WDFW-mapped habitats include Lagoon, Wetland and Shorebird and Waterfowl Concentrations). Six streams drain to the shoreline, with the majority draining to the lagoon area. The stream draining from Lone Lake is mapped for salmonid use. Other shoreland habitats include Bald Eagle territory and coastal cliffs. Mapped aquatic habitats include geoduck habitat and hardshell clam throughout Useless Bay; patchy eelgrass is mapped intermittently throughout the reach.

Reach land use is characterized by public open space (the majority of the Deer Lagoon area) as well as small-lot residential development along the shoreline. There is minimal modification of the shoreline, outside of dikes and tide gates separating east and west portions of lagoon from tidal connection. Restoration planning to restore tidal connectivity is underway. Public access is provided at Double Bluff Park (west end) and to Sunlight Beach.

GEOMORPHIC KEY INFORMATION

Geomorphic Shoretype (Map 9)

Feeder Bluff Excpetional (12%) shorelines flanking Accretion Shoreform (61%) fronting Deer Lagoon along Useless Bay (tidal areas of lagoon area are mapped with No Appreciable Drift (25%))

Net Shore Drift (Map 8)

Northeastward drift originating east of Double Bluff converges in Useless Bay with the terminus of another cell with northward drift originating at Scatchet Head.

Shoreform Current (Map 10)

Barrier Beach (46%); Bluff-backed Beach (14%); Artificial (25%); Barrier Estuary (15%)

Overall Rating of Degradation

Least (46%); Less (54%)

Coastal Floodplain:

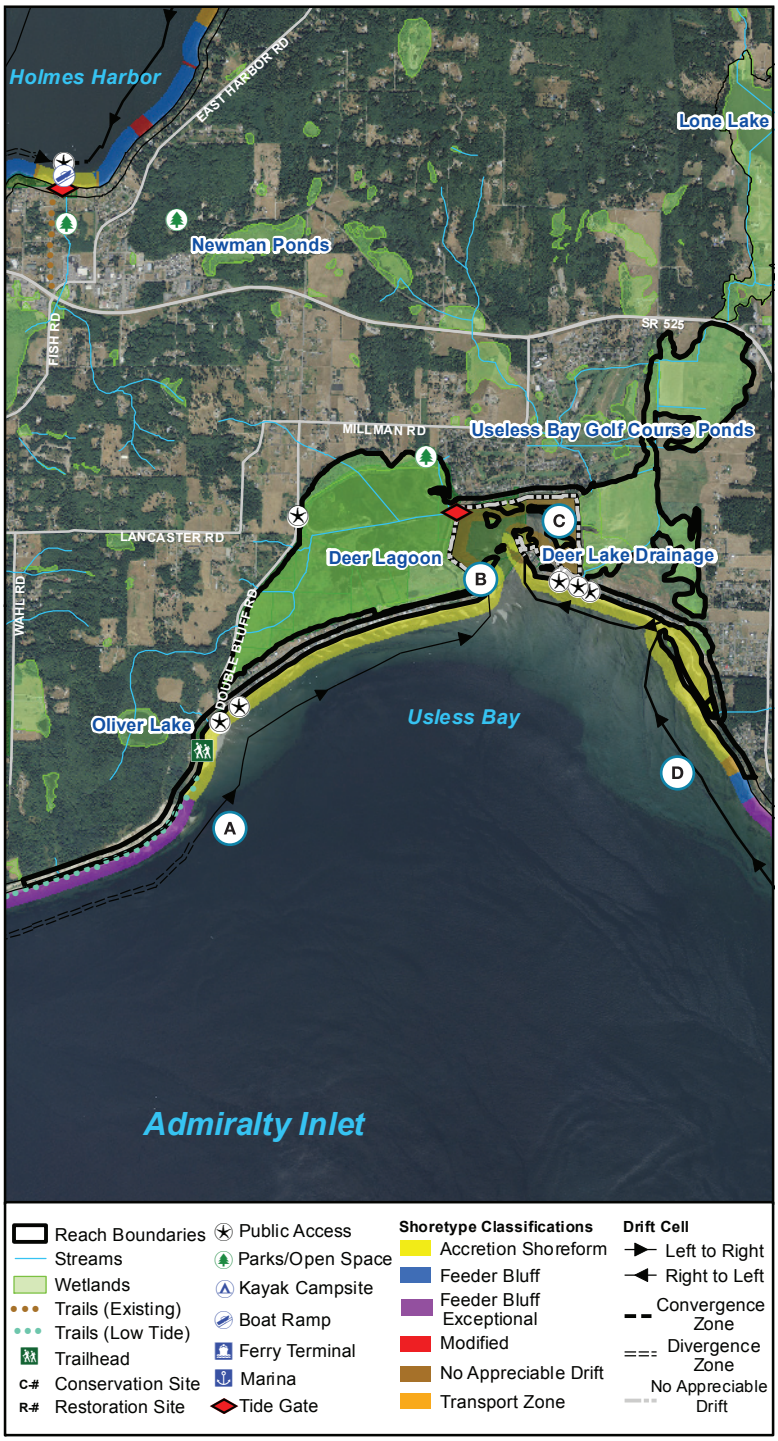
52%

Coastal Landslides & Toe Erosion:

Landslides and toe erosion mapped along both ends of reach shoreline.

Steep Slopes

4%



Shoreline Oblique Photos (2006)

HABITATS & SPECIES

Significant & Unique Features (Maps 5-7)
Geoduck habitat; Dungeness crab throughout Useless Bay; extensive hardshell clam habitat; patchy eelgrass; limited areas of patchy kelp mapped intermittently; Deer Lagoon (136 acres); designated as Audubon Important Bird Area and as a County Habitat of Local Importance; Useless Bay is additionally designated as a Habitat of Local Importance.

Shoreland Priority Habitats & Species (Map 5)
Bald Eagle buffer; Cliffs; Wetlands

Marine Priority Habitats & Species (Map 5)
Lagoon; Slough; Waterfowl Concentration; Shorebird Concentration (all focused at Lake Hancock lagoon)

Coastal Lagoons	Coastal Stream Mouths	Wetlands (Map 4)
332 acres (45%)	6	82%

Forage Fish
Sandlance 3% **Smelt** 3%
Herring None mapped

Salmonid Fish Use (Map 5)
Coastal cutthroat, coho, fall chum in stream draining from Lone Lake to Deer Lagoon; presence/migration for all. Nearshore areas are designated ESA critical habitat for Chinook (Puget Sound ESU).

LAND & SHORELINE USE

Shoreline Modifications (Map 13)
Limited modification outside of Deer Lagoon system (substantial alteration of lagoon, including dikes/tide gates separating western and eastern portions from tidal influence); bulkheads and hardening front residential development along east end of Useless Bay (most lots to the west along barrier beach have no bulkhead); tide gate at northern edge of Deer Lagoon.

Public Access (Map 16)
County owned Sunlight Beach access near end of Sunlight Beach Rd.; 20 acres of Deer Lagoon is County open space; Double Bluff Park to the southwest of Deer Lagoon (>1 acre; significant access to Double Bluff Beach extending east).

Armoring (% of shoreline) (Map 13) 6%

Zoning (Map 11)
Rural (59%); Rural Agriculture (29%); Rural Residential (10%); Commercial Agriculture (2%)

Current Land Use (Map 12)
Number of Parcels 427 **Average Parcel Size** 2.48 Acres
County owned open space area (Deer Lagoon); small lot shoreline residential development.

Overwater Structures (Map 14)
No overwater structures

Shellfish & Aquaculture (Map 15)
Area fronting Useless Bay is a prohibited shellfish growing area, other aquatic areas within reach are Approved; Double Bluff Beach is an Approved shellfish beach.

KEY MANAGEMENT ISSUES

- Water quality issues associated with additional development (subdivision / intensified use) — including implications of septic systems and road runoff.
- Potential use conflicts associated with public access to beaches and private residential property rights.
- Potential implications of sea level rise (SLR) on Deer Lagoon, barrier beaches and associated wetlands (loss of habitat).
- Potential implications of SLR and coastal flooding on development within or near coastal floodplain areas (shoreline residential development).

RESTORATION OPPORTUNITIES

Restoration of Deer Lagoon is identified in the Island County Estuarine Restoration Program report (2001); goals include restoration and reconnection of areas behind the dike and restored salmon access to all lagoon areas as well as Lone Creek. A restoration feasibility assessment is being completed for the lagoon, lead by the Wild Fish Conservancy (Luerkens, 2011).

REACH WW08

Dave Mackie Park, Maxwelton

SHORELINE LENGTH:
5.74 Miles

REACH AREA:
371 Acres

PSNERP PROCESS UNITS:
5033, 5034

REACH SUMMARY

Dave Mackie Park, Maxwelton (Reach WW08) includes the unincorporated shoreline community of Maxwelton along the shoreline between Useless Bay and Scatchet Head (Oblique Photo D) Geomorphic shoreline processes are primarily influenced by a long north-trending drift cell extending from the Scatchet Head into Useless Bay. Feeder bluffs feed two primary areas of accretion — the first at Scatchet Head and the second along the shoreline fronting Maxwetlon.

A large wetland complex is associated with the shoreline at the center of the reach, extending inland along several stream corridors. Drainages combine within the wetland before discharging to the marine shoreline; this stream is mapped with salmonid use (the marine area fronting the stream is the only documented area of juvenile rearing within Island County). A second stream without inventoried salmon use drains to the shoreline at the south end of the reach. Marine aquatic areas provide documented Dungeness crab and hardshell clam habitats.

Land use is rural to moderate density residential development, along with areas of commercial agriculture and limited areas of rural agriculture. Public access is provided by Dave Mackie Park in core of Maxwelton community. Shoreline modifications are focused on reach fronting the park, including a boat launch facility within the park.

GEOMORPHIC KEY INFORMATION

Geomorphic Shoretype (Map 9)

Relatively long reach is characterized by alternating areas of Feeder Bluff (41%), Feeder Bluff Exceptional (26%), Transport Zone (4%), and Accretion Shoreform (28%) (two primary areas of accretion depicted in oblique photos B and D)

Net Shore Drift (Map 8)

This reach encompasses most of the length of a drift cell with northward drift from Scatchet Head to Useless Bay.

Shoreform Current (Map 10)

Barrier Beach (11%); Bluff-backed Beach (78%); Artificial (11%)

Overall Rating of Degradation

Least (97%); Less (3%)

Coastal Floodplain:

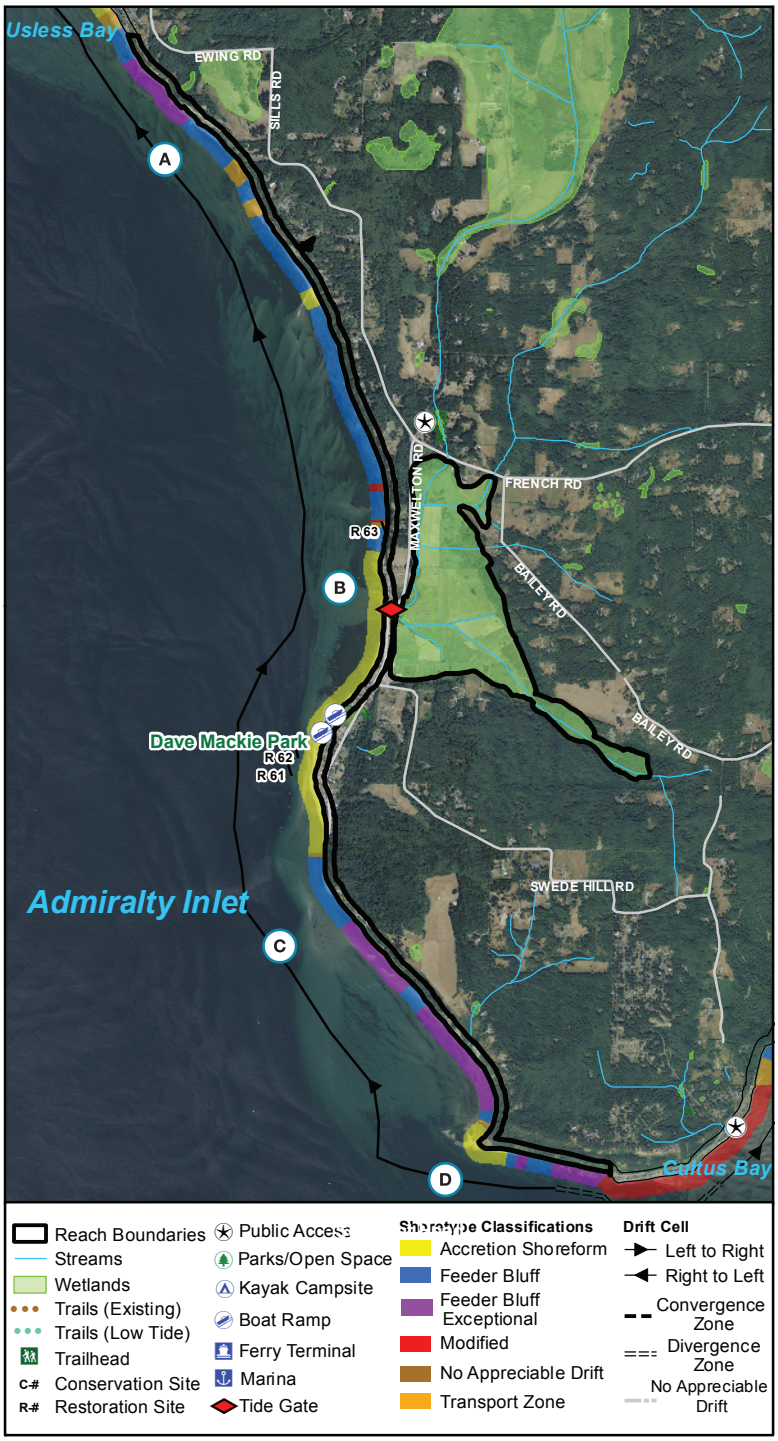
63%

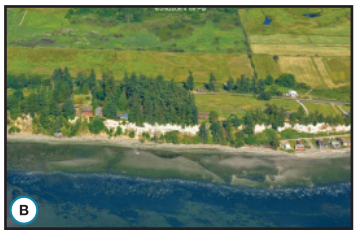
Coastal Landslides & Toe Erosion:

Toe erosion at reach's southern feeder bluff.

Steep Slopes

23%





Shoreline Oblique Photos (2006)

HABITATS & SPECIES

Significant & Unique Features (Maps 5-7)
Area fronting salmon stream is only known area with documented juvenile rearing (see Map 5); geoduck habitat; Dungeness crab throughout Useless Bay; patchy eelgrass.

Shoreland Priority Habitats & Species (Map 5)
Bald Eagle buffer; Cliffs; Wetlands

Marine Priority Habitats & Species (Map 5)
None mapped

Coastal Lagoons	Coastal Stream Mouths	Wetlands (Map 4)
1 acre (< 1%)	2	63%

Forage Fish
Sandlance 3% **Smelt** 3%
Herring None mapped

Salmonid Fish Use (Map 5)
Coastal cutthroat, coho, fall chum in stream draining to large wetland associated with marine shoreline; known spawning as well as migration/presence. Nearshore areas are designated ESA critical habitat for Chinook (Puget Sound ESU).

LAND & SHORELINE USE

Shoreline Modifications (Map 13)
Limited modification within reach associated with shoreline development in Maxwelton community (including armoring and boat launch at Dave Mackie County Park); tide gate located along Maxwelton Rd.

Public Access (Map 16)
Dave Mackie Park (County facility; 4 acres located in the Maxwelton vicinity); public tidelands mapped in area fronting Sills Rd.

Armoring (% of shoreline) (Map 13) 1%

Zoning (Map 11)
Rural (57%); Rural Agriculture (11%); Rural Forest (5%); Commercial Agriculture (27%)

Current Land Use (Map 12)
Number of Parcels 250 **Average Parcel Size** 3.93 Acres
Primarily residential (moderate to rural densities) development and areas of agriculture; limited areas of forest (timber) use.

Overwater Structures (Map 14)
One pier inventoried in Maxwelton vicinity.

Shellfish & Aquaculture (Map 15)
Approved shellfish growing area except Prohibited area fronting large associated wetland in central portion of reach; Prohibited shellfish beach in the Prohibited growing area, no other mapped or classified shellfish beaches.

KEY MANAGEMENT ISSUES

- Potential increases in coastal flooding and rates of bluff erosion due to sea level rise (SLR) may affect shoreline residential development.
- Drinking water supply (aquifer) issues associated with additional development (subdivision / intensified use) — saltwater intrusion and potential exacerbation from SLR. Majority of reach area mapped as 'Medium Risk' for saltwater intrusion; other areas mapped with 'Low Risk' (Island County Risk Rating Map).
- Potential implications of SLR barrier beaches (loss of habitat).
- Management of coastal salmon-bearing streams with significant document salmon use flowing through unincorporated area of more intense residential and agricultural development.
- Slope stability, habitat and aesthetic implications of additional private shoreline access points on high bank shorelines (accessory to residential development).
- Water quality issues associated with additional development (subdivision / intensified use) — including implications of septic systems and road runoff.
- Potential use conflicts associated with public access to beaches and private residential property rights.

RESTORATION OPPORTUNITIES

Restoration sites were identified in 2004 by Coastal Geologic Services (Appendix H).

R61: Remove 4 creosote piles.

R62: Remove 12 creosote piles.

R63: Remove old wood bulkhead wall and landward alterations (during redevelopment activities).

Comprehensive restoration of the Maxwelton estuary included in the Island County Estuarine Restoration Program report (2001); restoration is identified as including estuarine wetland enhancement and improved salmonid access.

REACH WW09

Cultus Bay

SHORELINE LENGTH:
6.17 Miles

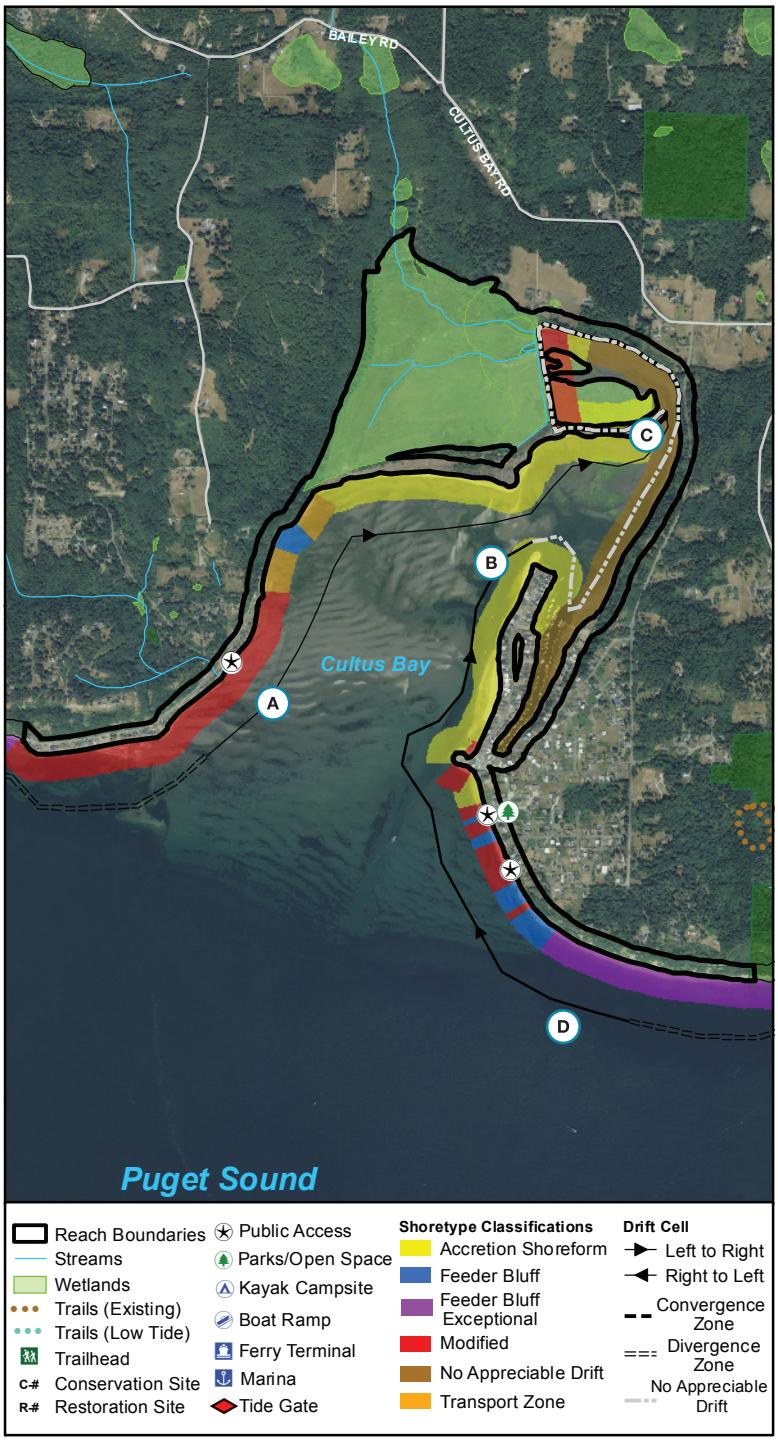
REACH AREA:
273 Acres

PSNERP PROCESS UNITS:
5033 - 5035, 8001

REACH SUMMARY

Cultus Bay (Reach WW09) focuses on the Cultus Bay shoreline as well as associated coastal lagoon and wetland areas to the north of the bay shoreline (Oblique Photos B and C). Geomorphic shoreline processes are characterized by a convergence of two drift cells along the bay shoreline, supporting the accretion areas (barrier beaches) along the north and east shorelines. Significant shoreline modification is mapped along the reach's west shoreline (Oblique Photo A) as well as along inner-bay shorelines separating tidal areas from historically connected wetland habitats (Oblique Photo B). The barrier beach spit along the east shoreline of the bay is also modified with intensive shoreline residential development.

Cultus Bay and adjoining associated wetlands provide significant habitat (WDFW-mapped Waterfowl Concentration, mapped salmonid use within stream draining to bay). Two streams drain to the shoreline. Other shoreland habitats include WDFW-mapped Bald Eagle territory and coastal cliffs. Mapped marine aquatic habitats include Dungeness crab, geoduck habitat and hardshell clam; patchy eelgrass is mapped intermittently throughout the reach.



GEOMORPHIC KEY INFORMATION

Geomorphic Shoretype (Map 9)

Modified shoreline (primarily southwest of bay) and Feeder Bluff (4%), Feeder Bluff Exceptional (8%), (primarily SE of bay) with Accretion Shoreform (43%) fronting inner bay shoreline

Net Shore Drift (Map 8)

A drift cell with northward drift from Scatchet Head converges at the head of Cultus Bay with another cell with northward drift along the east shore of the bay, originating at Possession Point.

Shoreform Current (Map 10)

Barrier Beach (21%); Bluff-backed Beach (14%); Artificial (45%); Barrier Estuary (13%)

Overall Rating of Degradation

Least (4%); Less (3%); Moderate (49%);

Coastal Floodplain:

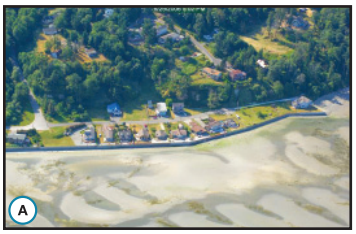
65%

Coastal Landslides & Toe Erosion:

Extensive mapping at south end of reach (feeder bluff area).

Steep Slopes

10%



Shoreline Oblique Photos (2006)

HABITATS & SPECIES

Significant & Unique Features (Maps 5-7)
Geoduck habitat; Dungeness crab throughout Useless Bay; extensive hardshell clam habitat; patchy eelgrass; limited areas of patchy kelp mapped intermittently; Cultus Bay is designated as a County Habitat of Local Importance.

Shoreland Priority Habitats & Species (Map 5)
Bald Eagle buffer; Cliffs; Wetlands

Marine Priority Habitats & Species (Map 5)
Waterfowl Concentration

Coastal Lagoons	Coastal Stream Mouths	Wetlands (Map 4)
20 acres (7%)	2	55%

Forage Fish
Sandlance 10% **Smelt** 27%
Herring None mapped

Salmonid Fish Use (Map 5)
Nearshore areas are designated ESA critical habitat for Chinook (Puget Sound ESU) and bull trout along Cultus Bay shoreline.

LAND & SHORELINE USE

Shoreline Modifications (Map 13)
Armoring focused in several short reaches fronting the southeast and southwest shorelines of Cultus Bay; southeast shoreline modification is primarily riprap fronting a single row of shoreline residential properties (backed by Driftwood Dr); more substantial southwest modification surrounds Sandy Hook Dr community (significant modification of shoreline in dense residential area, both within internal waterway and along Cultus Bay shoreline; riprap breakwaters/groins at either end of Sandy Hook.

Public Access (Map 16)
Extensive public tidelands through Cultus Bay.

Armoring (% of shoreline) (Map 13) 16%

Zoning (Map 11)
Rural (54%); Rural Agriculture (19%); Rural Forest (12%); Commercial Agriculture (15%)

Current Land Use (Map 12)
Number of Parcels 319 **Average Parcel Size** 1.49 Acres
Primarily residential development (limited areas of higher density within Cultus Bay) as well as areas of agriculture and forest (timber) use.

Overwater Structures (Map 14)
Approximately 70 private residential piers/docks (T-shaped with docks parallel to the shoreline) and 2 community piers/docks and boat launch (adjacent to east community pier) within internal waterway on southeast shoreline of Cultus Bay.

Shellfish & Aquaculture (Map 15)
Primarily an unclassified shellfish growing area, surrounded by approved growing areas to the west and east; Closed as a shellfish beach.

KEY MANAGEMENT ISSUES

- Water quality issues associated with additional development (subdivision / intensified use) — including implications of septic systems and road runoff.
- Habitat degradation and alteration associated with maintenance of existing shoreline armoring.
- Potential use conflicts associated with public access to beaches and private residential property rights.
- Potential implications of sea level rise (SLR) on barrier beaches and associated wetlands (loss of habitat).
- Potential implications of SLR and coastal flooding on development within or near coastal floodplain areas (shoreline residential development).

RESTORATION OPPORTUNITIES

Restoration sites were identified in 2004 by Coastal Geologic Services (Appendix H), however did not include sites in Reach WW09.

The Island County Estuarine Restoration Program report (2001) assesses restoration potential within Cultus Bay and identifies goals, including reconnection of diked area to saltmarsh with tidal flushing and improved access to Cultus Creek.