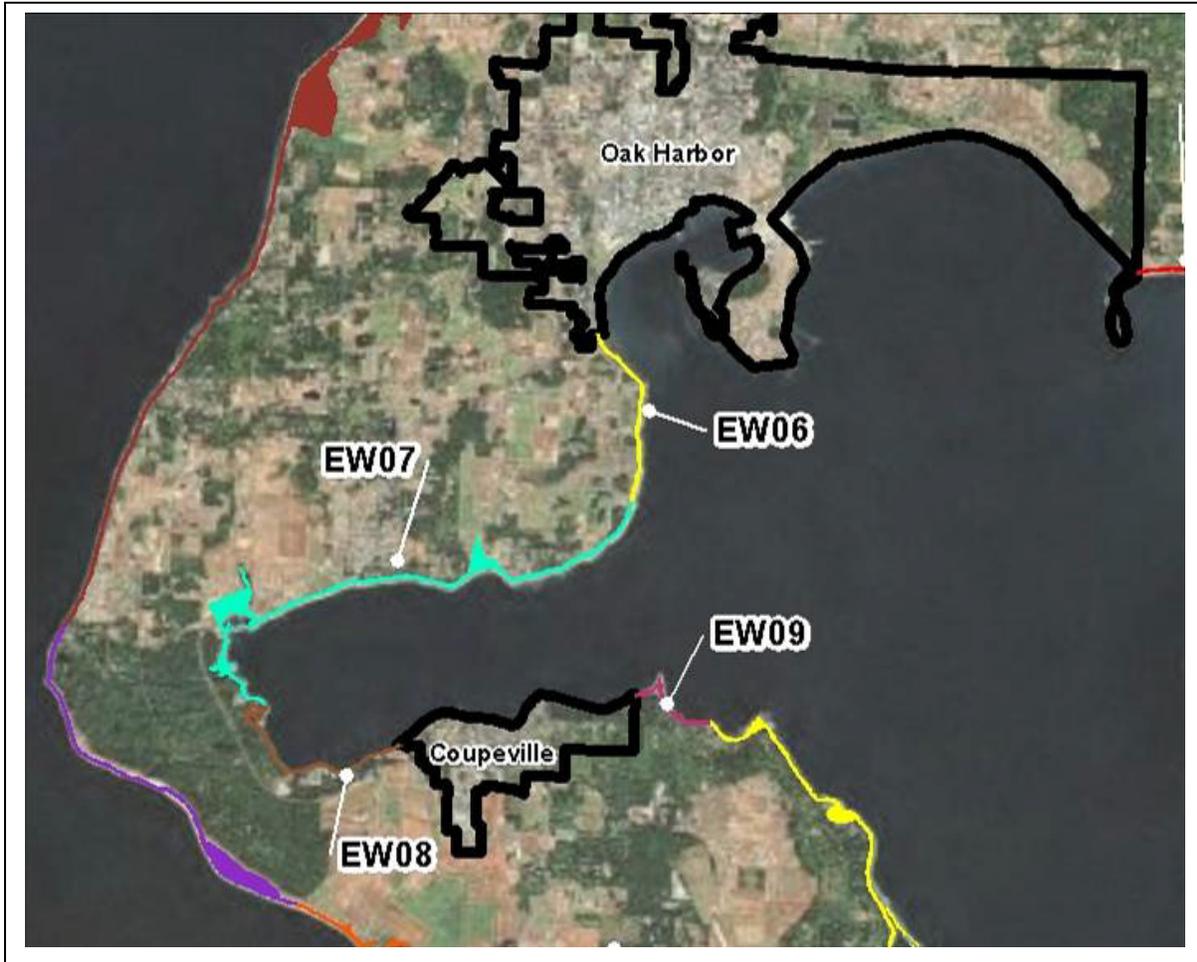


### 6.2.4 Reach Analysis

This section includes reach summaries (as reach information sheets) for East Whidbey Island's Oak Harbor and Penn Cove marine shorelines, as depicted in Figure 6-2.

Figure 6-2. Oak Harbor and Penn Cove marine reaches.





# REACH EW06

## Scenic Heights

### SHORELINE LENGTH:

1.70 Miles

### REACH AREA:

41 Acres

### PSNERP PROCESS UNITS:

6018, 6019

### REACH SUMMARY

Scenic Heights (Reach EW06) is located on the western shore of Oak Harbor. Geomorphic processes along the shoreline are dominated by divergence and transport of sediment — north into Oak Harbor and southwest into Penn Cove. The shore type in this reach is almost entirely feeder bluff.

No mapped streams or wetlands are located within the Scenic Heights reach area. Marine aquatic areas provide documented smelt and hardshell clam. Bald Eagle habitat and coastal cliffs are documented by WDFW along the shoreline.

Rural residential development is dominant, with most residences constructed atop feeder bluffs. Many parcels have been cleared to the bluff edge.

### GEOMORPHIC KEY INFORMATION

#### Geomorphic Shoretype (Map 9)

Primarily Feeder Bluff (85%) fronting residential development, with Transport Zone (8%), Accretion Shoreform (5%), and Modified shoreline (2%)

#### Net Shore Drift (Map 8)

Northward drift originates at a divergence zone just south of the southern boundary of this reach. Northward drift terminates near Smith Park in inner Oak Harbor.

#### Shoreform Current (Map 10)

Bluff-backed Beach (100%)

#### Overall Rating of Degradation

Moderate (100%)

#### Coastal Floodplain:

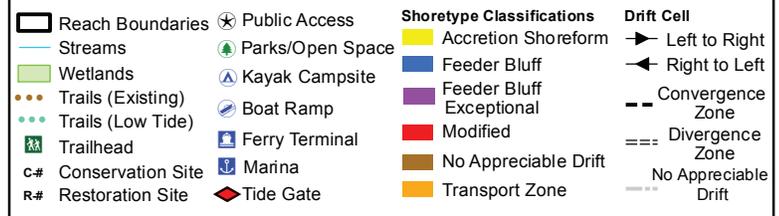
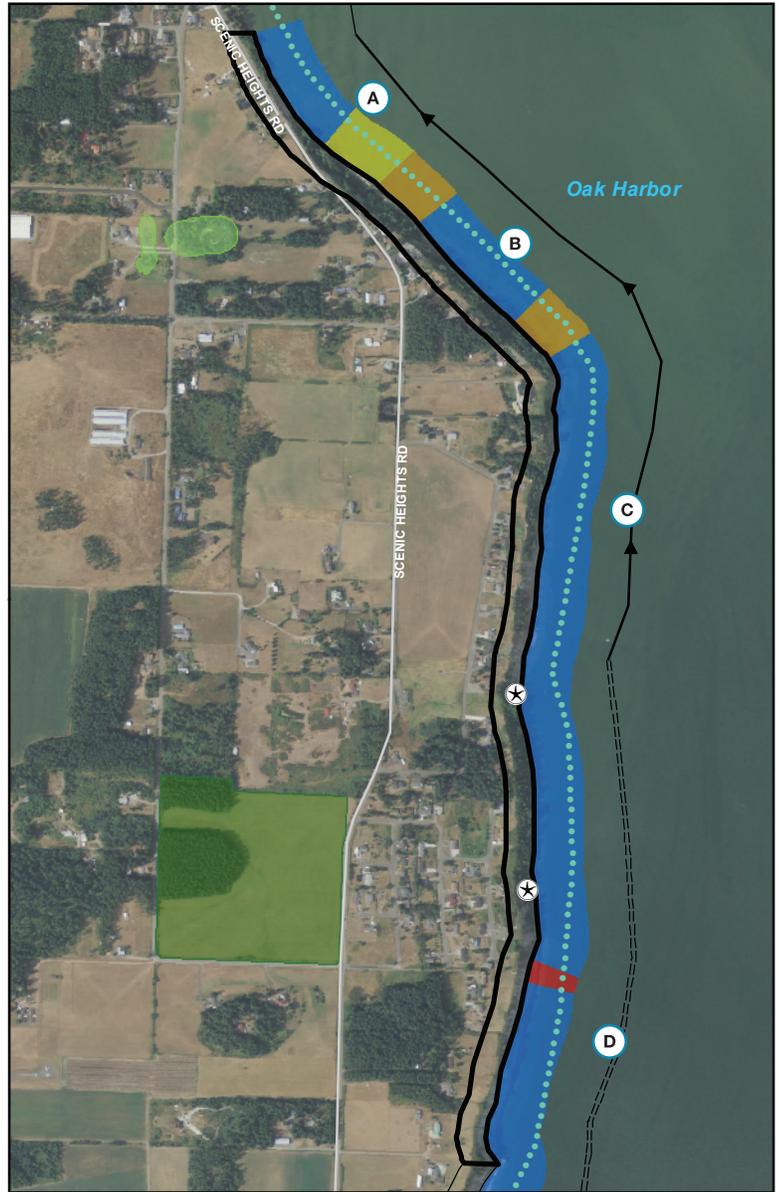
6%

#### Coastal Landslides & Toe Erosion:

Both mapped through majority of reach.

#### Steep Slopes

54%



Shoreline Oblique Photos (2006)

**HABITATS & SPECIES**

**Significant & Unique Features (Maps 5-7)**  
 Hardshell clam habitat; patchy eelgrass.

**Shoreland Priority Habitats & Species (Map 5)**  
 Bald Eagle buffer; Cliff

**Marine Priority Habitats & Species (Map 5)**  
 None mapped

**Coastal Lagoons** None mapped      **Coastal Stream Mouths** None mapped      **Wetlands (Map 4)** None mapped

**Forage Fish**  
**Sandlance** None mapped      **Smelt** 31%  
**Herring** None mapped

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

**LAND & SHORELINE USE**

**Shoreline Modifications (Map 13)**  
 No mapped modification.

**Public Access (Map 16)**  
 Public tidelands mapped through southern extent of reach; no apparent access from land side (improved or unimproved; any access would be challenging due to coastal bluffs).

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

**Overwater Structures (Map 14)**  
 No overwater structures

**Zoning (Map 11)**  
 Rural Residential (51%); Rural (49%)

**Current Land Use (Map 12)**  
**Number of Parcels** 71      **Average Parcel Size** 1.55 Acres  
 Low density, large residences upland of high bluffs. Abuts city limit of Oak Harbor.

**Shellfish & Aquaculture (Map 15)**  
 Unclassified as a growing area; mapped as Conditional shellfish beach.

**KEY MANAGEMENT ISSUES**

- Drinking water supply (aquifer) issues associated with additional development (subdivision / intensified use) — saltwater intrusion and potential exacerbation from sea level rise (SLR); EW06 / EW07 reach break area mapped as ‘Very-High Risk’, east end of reach mapped as ‘High Risk’ (Island County Risk Rating Map).
- 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).
- Slope stability, habitat and aesthetic implications of additional private shoreline access points on high bank shorelines (accessory to residential development).
- 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.
- Potential implications of SLR on barrier beaches (loss of habitat) and increased rates of bluff erosion (implications for slope stability and sediment supplies).

**RESTORATION OPPORTUNITIES**

Restoration sites were identified in 2004 by Coastal Geologic Services (Appendix H).  
 No apparent restoration opportunities were identified along the EW06 shoreline. Opportunity for restoration may occur associated with private shoreline armoring and modification (including creosote pile bulkheads); however no specific sites were identified.



# REACH EW07

## North Side Penn Cove

### SHORELINE LENGTH:

5.97 Miles

### REACH AREA:

209 Acres

### PSNERP PROCESS UNITS:

6017-6019

### REACH SUMMARY

North Side Penn Cove (Reach EW07) includes the entire shoreline along the north side of the cove. Geomorphic processes are driven by two drift cells converging at the NE corner of a coastal lagoon (Kennedy's Lagoon) at the head of the bay. The reach is primarily mapped as feeder bluff shoretype, but also has accretion shoreforms. Large deposits of driftwood are present along portions of the beach.

Kennedy's Lagoon and associated wetland areas are at the northwest corner of Penn Cove. Associated wetlands are also located near Monroe Landing in the center of the reach and at the head of the bay. Construction of roadways disconnected these wetlands from estuarine habitat in the cove. Penn Cove has documented use by seabirds and Bald Eagles, with marine aquatic areas providing documented hardshell clam and forage fish habitat. The Penn Cove Shellfish company grows shellfish in the cove.

This area is rural residential, with single-family houses interspersed with pastures. Roadways (Penn Cove Road, SR 20, Madrona Way) parallel much of the shoreline in this reach. Residences are located on both low-lying areas near the shore and atop steep bluffs.

### GEOMORPHIC KEY INFORMATION

#### Geomorphic Shoretype (Map 9)

Primarily Feeder Bluff (39%) fronting residential development, with Accretion Shoreform (19%), Transport Zone (14%), No Appreciable Drift (13%), Modified shoreline (12%), and Feeder Bluff Exceptional (3%)

#### Net Shore Drift (Map 8)

Westward drift, originating from Blowers Bluff, extends along the north shore of Penn Cove and converges with northward drift from a short drift cell that originates at Mueller Park, located in the center of the west shore of Penn Cove.

#### Shoreform Current (Map 10)

Barrier Beach (25%); Barrier Estuary (13%); Bluff-backed Beach (62%)

#### Overall Rating of Degradation

Least (1%); Moderately (74%); More

#### Coastal Floodplain:

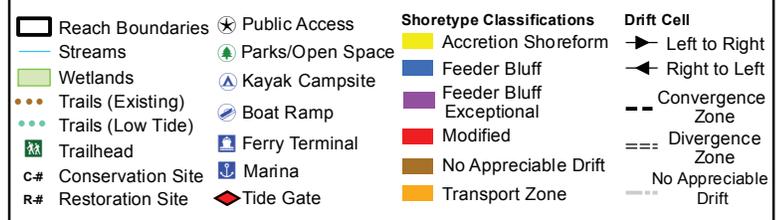
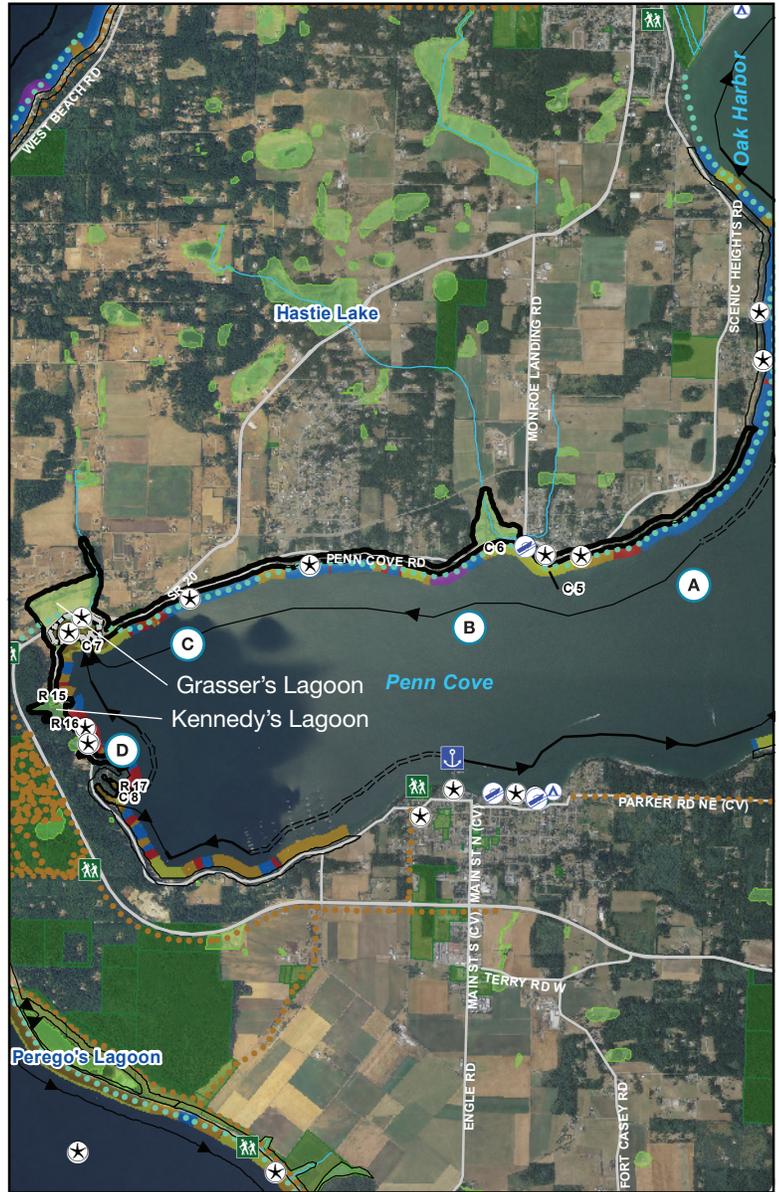
13%

#### Coastal Landslides & Toe Erosion:

Extensive to east of Monroe Landing; intermittently mapped further east of Landing.

#### Steep Slopes

12%



Shoreline Oblique Photos (2006)

## HABITATS & SPECIES

### Significant & Unique Features (Maps 5-7)

Hardshell clam habitat; patchy eelgrass mapped throughout reach; Kennedy's Lagoon at west edge of Cove and Grasser's Lagoon is located at northwest corner of Cove. Kennedy's Lagoon is a pond with limited tidal influence due to separation from the marine shoreline by Madrona Way. Grasser's Lagoon is tidally influenced with a partial barrier spit. Entire Penn Cove extent designated as Audubon Important Bird Area. Three Pigeon Guillemot nesting colonies documented: Rolling Hills, Monroe Landing, and Coupeville.

<b>Coastal Lagoons</b> 14 acres (7%)	<b>Coastal Stream Mouths</b> 2	<b>Wetlands (Map 4)</b> 41%
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### Forage Fish

<b>Sandlance</b> 14%	<b>Smelt</b> 37%
<b>Herring</b> None mapped	

## LAND & SHORELINE USE

### Shoreline Modifications (Map 13)

Fill and armoring associated with public and private boat launch facilities; limited bulkheads fronting low-bank residential development; fill and armoring associated with roadway infrastructure, primarily along northwest and west shorelines.

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

### Zoning (Map 11)

Rural and Rural Residential (93%); Agriculture (6%)

### Current Land Use (Map 12)

**Number of Parcels** 267      **Average Parcel Size** 2.51 Acres

Primarily rural residential, with areas of higher density residential use along the shoreline; agricultural use common throughout associated drainage basins and extends to shoreline in some areas; transportation infrastructure in shoreline includes (generally northeast to southwest) Scenic Heights Rd, Penn Cove Rd, State Route 20, and Madrona Way; public uses limited to shoreline access points.

### Shoreland Priority Habitats & Species (Map 5)

Bald Eagle (habitat buffers) / Cliffs-Bluffs / Wetlands - coastal lagoon areas and associated wetlands located primarily at the 2 stream mouths entering EW07 (Kennedy's Lagoon - 10 acres); 26 acres of mapped Native Oaks and Grassland

### Marine Priority Habitats & Species (Map 5)

Penn Cove mapped as Estuary; 2 mapped Seabird Colonies (Alcids)

### Salmonid Fish Use (Map 5)

Nearshore areas are designated ESA critical habitat for Chinook (Puget Sound ESU) and bull trout.

### Public Access (Map 16)

Monroe Landing (boat ramp) at end of Monroe Landing Rd.; public shorelands near San de Fuca (northwest portion of reach; provides access to significant public tidelands extending east along northern shoreline); access additionally provided from WDNR site at west end of Cove.

### Overwater Structures (Map 14)

Private (gated) pier with small structure extends at San de Fuca; public pier and boat ramp facility at end of Riepma Ave (San de Fuca vicinity); private pier at west end of cove, associated with Captain Whidbey Inn property.

### Shellfish & Aquaculture (Map 15)

Conditional (west extent) and Closed (east extent) Shellfish Growing Areas and Beaches.

## KEY MANAGEMENT ISSUES

- Continued degradation of shoreline processes due to armoring (bulkheads).
- 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 sea level rise (SLR); EW06 / EW07 reach break area mapped as 'Very-High Risk', east end of reach mapped as 'High Risk' (Island County Risk Rating Map).
- Slope stability, habitat and aesthetic implications of additional private shoreline access points on high bank shorelines (accessory to residential development).
- Potential implications of SLR and coastal flooding on development within or near coastal floodplain areas (agricultural uses, shoreline residential development).
- Potential implications of SLR on coastal lagoons, estuarine areas, beaches and associated wetlands (loss of habitat) and increased rates of bluff erosion (implications for slope stability and sediment supplies).
- 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 / groundwater dynamics).
- 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.
- Municipal (treated) sewer discharge to marine waters, both at Monroe Landing and at Coupeville; potential water quality concerns.

## RESTORATION OPPORTUNITIES

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

**R15:** Remove fill and roadway to restore tidal flow to lagoon.

**R16:** Restore tidal flow to disconnected wetland area to re-establish saltmarsh / coastal lagoon habitat.

CGS restoration sites R15 and R16 are located at Kennedy Lagoon; lagoon restoration potential assessed in Island County Estuarine Restoration Program report (2001).

Grasser's Lagoon restoration potential assessed in Island County Estuarine Restoration Program report (2001).

## CONSERVATION OPPORTUNITIES

**C5:** Conserve backshore seasonal marsh (beach ridges and swales).

**C6:** Conserve coastal wetland and marsh.

**C7:** Lagoon — conserve lagoon and shores.



# REACH EW08

South Side Penn Cove (West Side of Coupeville)

**SHORELINE LENGTH:**

2.35 Miles

**REACH AREA:**

54 Acres

**PSNERP PROCESS UNITS:**

6014 - 6017

**REACH SUMMARY**

Reach EW08 encompasses the south side of Penn Cove to the western city limit of Coupeville. Geomorphic shoreline processes are primarily influenced by the convergence of two drift cells along the southwest shoreline of the Cove.

Twin Lagoons, two small lagoons located at the northern end of the reach, still appear to receive tidal influence from Penn Cove, although portions of the shoreline around the lagoons have been modified by clearing and development. The Penn Cove Shellfish company grows shellfish in the cove.

West Madrona Way parallels the shoreline throughout this reach. Development is rural residential, with residences located both at the toe and on top of steep bluffs. Relatively intact areas of forest are still present along much of the reach. Parcels upslope and just outside the reach boundary are used for commercial mining.

**GEOMORPHIC KEY INFORMATION**

**Geomorphic Shoretype (Map 9)**

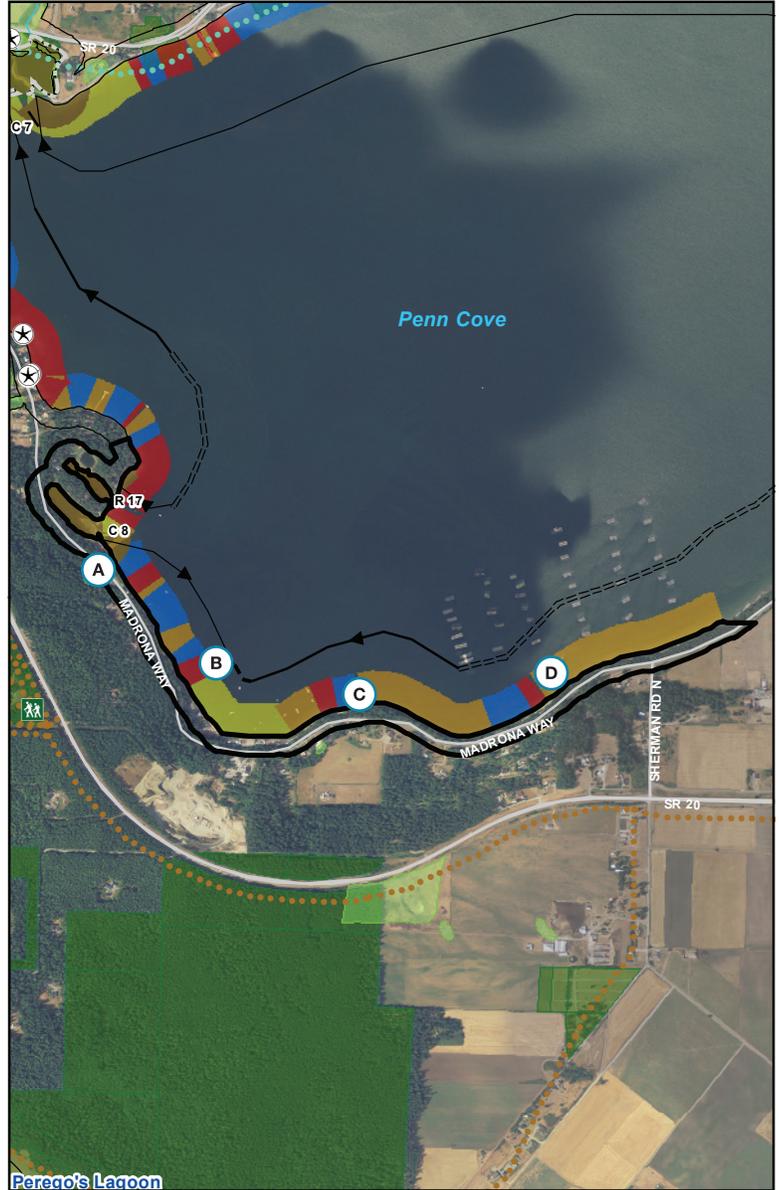
No Appreciable Drift along Twin Lagoons (25%), and Transport Zone (35%), Feeder Bluff (14%), Accretion Shoreform (13%), and Modified shoreline (13%) along Penn Cove

**Net Shore Drift (Map 8)**

From Mueller Park, located in the central west shore of Penn Cove southward drift converges with westward drift originating along the western shore of the City of Coupeville.

**Shoreform Current (Map 10)**

Primarily Bluff-backed Beach (64%); areas of Barrier Beach (11%) and Barrier Lagoon (25%)



**Overall Rating of Degradation**

Least (96%); More (4%)

**Coastal Floodplain:**

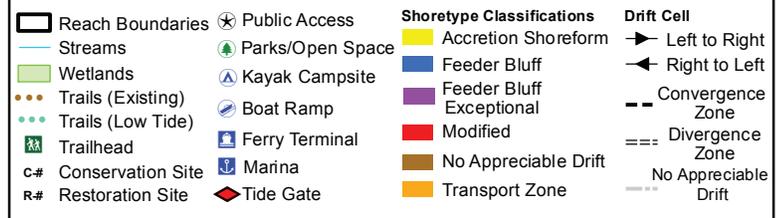
13%

**Coastal Landslides & Toe Erosion:**

Intermittent mapping of toe erosion, occasional landslide sites throughout reach.

**Steep Slopes**

18%



Shoreline Oblique Photos (2006)

## HABITATS & SPECIES

### Significant & Unique Features (Maps 5-7)

Hardshell clam habitat; patchy eelgrass; entire Penn Cove extent designated as Audubon Important Bird Area and as a County Habitat of Local Importance.

<b>Coastal Lagoons</b>	<b>Coastal Stream Mouths</b>	<b>Wetlands (Map 4)</b>
None mapped	None mapped	None mapped

### Forage Fish

**Sandlance** 1%                      **Smelt** 46%

**Herring** None mapped

## LAND & SHORELINE USE

### Shoreline Modifications (Map 13)

Armoring mapped along west and southwest shoreline of reach (associated with residential development).

**Armoring (% of shoreline) (Map 13)** 14%

### Zoning (Map 11)

Rural (100%)

### Current Land Use (Map 12)

**Number of Parcels** 112      **Average Parcel Size** 1.40 Acres

Rural residential development, with higher densities adjacent to Coupeville.

### Shoreland Priority Habitats & Species (Map 5)

Bald Eagle buffer

### Marine Priority Habitats & Species (Map 5)

Penn Cove mapped as Estuary; 2 mapped Seabird Colonies (Alcids)

### Salmonid Fish Use (Map 5)

Nearshore areas are designated ESA critical habitat for Chinook (Puget Sound ESU) and bull trout.

### Public Access (Map 16)

Public tidelands throughout reach; no apparent access from land side, except via Coupeville Wharf, to the east of this reach.

### Overwater Structures (Map 14)

Several structures inventoried, however are not apparent in aerial photography; Offshore floating aquaculture structures.

### Shellfish & Aquaculture (Map 15)

Commercial shellfish growing area; entire south shoreline is mapped as Closed shellfish beach.

## KEY MANAGEMENT ISSUES

- Continued degradation of shoreline processes due to armoring (bulkheads).
- 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 sea level rise (SLR); majority of reach area mapped as 'Very-High Risk' for saltwater intrusion (Island County Risk Rating Map).
- Slope stability, habitat and aesthetic implications of additional private shoreline access points on high bank shorelines (accessory to residential development).
- 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 / groundwater dynamics).
- 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.
- Potential implications of SLR on coastal lagoons, estuarine areas, beaches and associated wetlands (loss of habitat).
- Potential implications of SLR and coastal flooding on development within or near coastal floodplain areas (agricultural uses, shoreline residential development).
- Potential increases in rates of bluff erosion due to SLR or other factors.
- 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).

**R17:** Restore tidal flow to coastal lagoon by widening partially filled inlet.

## CONSERVATION OPPORTUNITIES

**C8:** Lagoon and Saltmarsh — Preserve tidalflow and shore.



# REACH EW09

South Side Penn Cove (East Side of Coupeville)

**SHORELINE LENGTH:**

1.02 Miles

**REACH AREA:**

23 Acres

**PSNERP PROCESS UNITS:**

6012 - 6014

**REACH SUMMARY**

Reach EW09 encompasses the southern shore of Penn Cove, east of Coupeville. Geomorphic shoreline processes are primarily influenced by the convergence of two short cells feeding the shoreline at Long Point and two short cells feeding the Harrington Lagoon shoreline (the latter primarily within EW10) — convergence in these areas formed and maintains each of these respective features.

No streams or wetlands are within the reach area. The Penn Cove estuary provides forage fish and hardshell clam habitat. Bald Eagle habitat is documented by WDFW along the shoreline.

This reach is dominated by residences constructed near the beach on small parcels. North Marine Drive and Indian Hill Road dead-end at the shoreline in the western part of the reach. The central portion of the reach, southeast of Long Point, has been modified for residential development.

**GEOMORPHIC KEY INFORMATION**

**Geomorphic Shoretype (Map 9)**

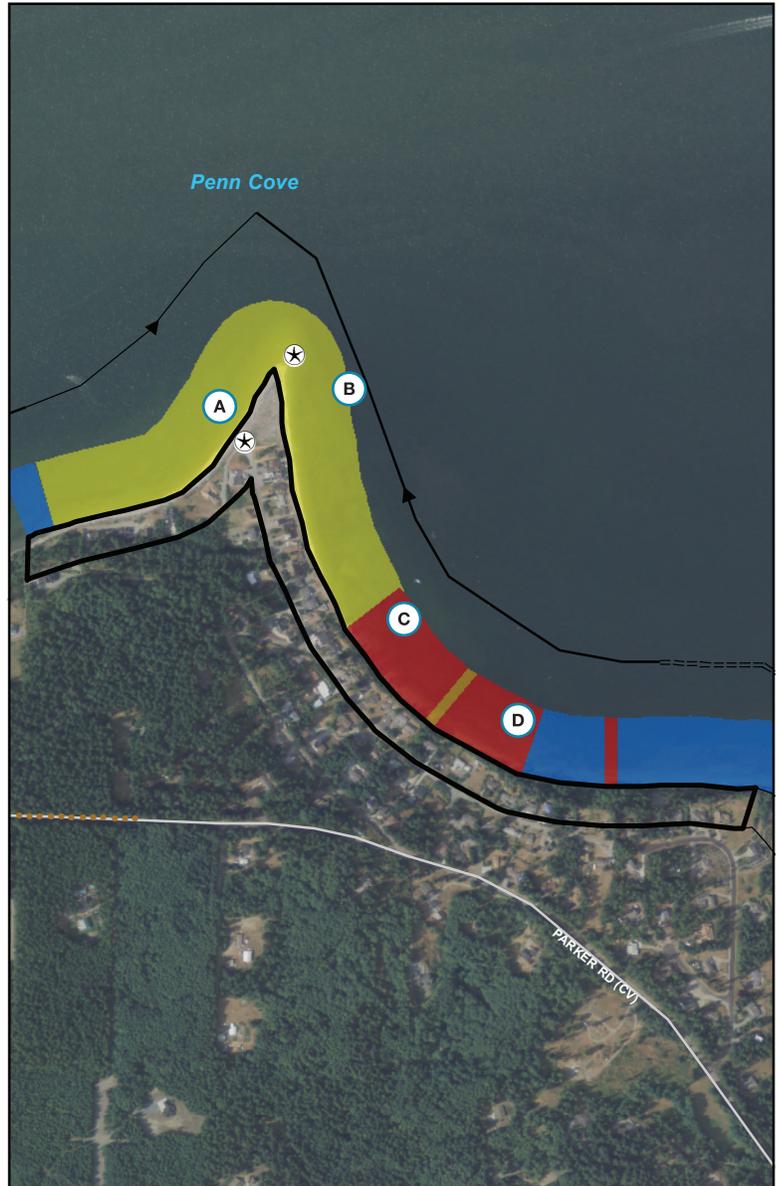
Accretion Shoreform (53%) along Long Point. Feeder Bluff (24%) and Modified shoreline (22%) fronting residential development; minimal amount of Transport Zone

**Net Shore Drift (Map 8)**

A drift cell with westward drift that originates in Penn Cove converges at Long Point with another cell with eastward drift from Kineth Point. The west side of this reach is truncated by City of Coupeville jurisdiction.

**Shoreform Current (Map 10)**

Barrier Beach (57%); Bluff-backed Beach (43%)



**Overall Rating of Degradation**

Least (100%)

**Coastal Floodplain:**

34%

**Coastal Landslides & Toe Erosion:**

Intermittent mapping of toe erosion, occasional landslide sites throughout reach.

**Steep Slopes**

17%

<ul style="list-style-type: none"> <li>□ Reach Boundaries</li> <li>— Streams</li> <li>■ Wetlands</li> <li>••• Trails (Existing)</li> <li>••• Trails (Low Tide)</li> <li>■ Trailhead</li> <li>C# Conservation Site</li> <li>R# Restoration Site</li> </ul>	<ul style="list-style-type: none"> <li>⊗ Public Access</li> <li>⊗ Parks/Open Space</li> <li>⊗ Kayak Campsite</li> <li>⊗ Boat Ramp</li> <li>⊗ Ferry Terminal</li> <li>⊗ Marina</li> <li>⊗ Tide Gate</li> </ul>	<p><b>Shoretype Classifications</b></p> <ul style="list-style-type: none"> <li>■ Accretion Shoreform</li> <li>■ Feeder Bluff</li> <li>■ Feeder Bluff Exceptional</li> <li>■ Modified</li> <li>■ No Appreciable Drift</li> <li>■ Transport Zone</li> </ul>	<p><b>Drift Cell</b></p> <ul style="list-style-type: none"> <li>➔ Left to Right</li> <li>➜ Right to Left</li> <li>--- Convergence Zone</li> <li>=== Divergence Zone</li> <li>--- No Appreciable Drift</li> </ul>
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Shoreline Oblique Photos (2006)

**HABITATS & SPECIES**

**Significant & Unique Features (Maps 5-7)**

Hardshell clam habitat; patchy eelgrass; entire Penn Cove extent designated as Audubon Important Bird Area.

**Shoreland Priority Habitats & Species (Map 5)**

Bald Eagle buffer

**Marine Priority Habitats & Species (Map 5)**

Penn Cove mapped as Estuary

**Salmonid Fish Use (Map 5)**

Nearshore areas are designated ESA critical habitat for Chinook (Puget Sound ESU) and bull trout.

**Coastal Lagoons** None mapped    **Coastal Stream Mouths** None mapped    **Wetlands (Map 4)** None mapped

**Forage Fish**  
**Sandlance** 45%                      **Smelt** 77%  
**Herring** None mapped

**LAND & SHORELINE USE**

**Shoreline Modifications (Map 13)**

Limited armoring inventoried on either side of Long Point.

**Public Access (Map 16)**

Public tidelands throughout reach; public access at Long Point; additional access via Coupeville Wharf, to the west of this reach.

**Armoring (% of shoreline) (Map 13)** 17%

**Zoning (Map 11)**

Rural (100%)

**Overwater Structures (Map 14)**

One private structure mapped (single pier).

**Current Land Use (Map 12)**

**Number of Parcels** 59      **Average Parcel Size** 0.46 Acres  
Rural residential development, with higher densities adjacent to Coupeville.

**Shellfish & Aquaculture (Map 15)**

Unclassified shellfish growing area; entire south shoreline is mapped as Closed shellfish beach.

**KEY MANAGEMENT ISSUES**

- Disconnection of feeder bluff areas from shoreline due to toe armoring and / or development fronting bluff areas leading to greater down-drift erosion rates.
- Drinking water supply (aquifer) issues associated with additional development (subdivision / intensified use) — saltwater intrusion and potential exacerbation from sea level rise (SLR); Long Point vicinity 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.
- 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).
- Slope stability, habitat and aesthetic implications of additional private shoreline access points on high bank shorelines (accessory to residential development).
- 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.
- Potential implications of SLR barrier beaches (loss of habitat).
- Potential increases in coastal flooding and rates of bluff erosion due to SLR.

**RESTORATION OPPORTUNITIES**

Restoration sites were identified in 2004 by Coastal Geologic Services (Appendix H).  
  
No apparent restoration opportunities were identified along the EW09 shoreline. Opportunity for restoration may occur associated with private shoreline armoring and modification (including potential for use of soft shore protection as an alternative to existing low bank bulkheads with the reach); however no specific sites were identified.