PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION STUDY

APPENDIX A

RESTORATION SITE FACT SHEETS

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PUGET SOUND NEARSHORE
ECOSYSTEM RESTORATION PROJECT

Puget Sound Nearshore Ecosystem Restoration Project (PSNERP)

TENTATIVELY SELECTED PLAN

The Puget Sound region is generally characterized by areas of steep upland terrain (i.e., mountains, bluffs) that transitions quickly to the deep waters of Puget Sound. A narrow band of shoreline serves as a transition zone providing ecologically important connections between the terrestrial, freshwater and marine ecosystem types. These beaches, embayments and delta shorelines are heavily impacted by human changes. Therefore, the nearshore zone is a strategic focus for Puget Sound recovery.

Puget Sound is home to large concentrations of waterfowl, shorebirds and raptors; abundant shellfish; dozens of marine mammal species; and some of the largest salmon runs in the lower 48 states. More than 2,500 miles of beaches, estuaries and river deltas make up Puget Sound's nearshore zone. Nearshore habitats provide commercial, recreational and aesthetic benefits that enhance quality of life. For more than 150 years there has been profound physical modifications to the Puget Sound nearshore zone. Government and non-government agencies, organizations, tribes and businesses are actively seeking opportunities to reverse past damage. The Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) offers a unique opportunity to tackle large-scale habitat restoration based upon a comprehensive science-based assessment of this nationally-significant estuary.

NOOKSACK RIVER DELTA

SPENCER ISLAND

DUGUALLA BAY

IMAGES: Bing Maps (2014)

Tentatively Selected Plan

PSNERP evaluated more than 500 potential restoration sites, identifying the best places and opportunities to improve the nearshore zone's ability to provide locally- and nationally-valued resources. The currently proposed 11 sites included in the Tentatively Selected Plan will restore an estimated 5,300 acres of nearshore ecosystems, with an estimated total project cost of about $1.1 billion.

Benefits from this preferred alternative will derive from removing nearly 75,162 linear feet of shoreline stressors, including tidal barriers, nearshore fill and shoreline armoring; thereby restoring processes that will provide an additional 5,354 acres of tidally influenced wetlands in river deltas and shallow embayments, as well as sustain beach ecosystems. Sites included in the Tentatively Selected Plan are geomorphically representative of the entire study area. The proposal includes seven sites in major river deltas, one beach site, one open coastal inlet site and two barrier embayment sites. Completion of the Puget Sound Nearshore Study and the construction of the 11 proposed sites is a critical component of the Puget Sound Action Agenda, the state and Federal plan for Puget Sound Recovery. Construction of the proposed sites will also support efforts to preserve treaty protected fishing rights for Western Washington Treaty Tribes, and support recovery of the 13 fish and marine mammal species in Puget Sound listed as threatened or endangered under the Endangered Species Act.

Nearshore Study Contacts
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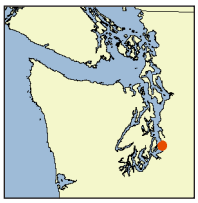
Selected Restoration Sites

Sites Recommended by the PSNERP Study Team for Inclusion in the Tentatively Selected Plan

SOURCE: ESA (2011)



PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION PROJECT (PSNERP)

TENTATIVELY SELECTED PLAN

Beaconsfield Feeder Bluff

The Beaconsfield Feeder Bluff is located north of Marine View Park in Normandy Park, Wash. The bluff restoration site is composed of several narrow residential parcels along 1,000 feet of shoreline. About 80 percent contains intermittent concrete vertical bulkheads and rock revetment armoring. This armoring blocks sand and gravel movement necessary to sustain beach structure and function. The proposed project should provide a sediment source to the degraded drift cell by restoring a connection between the feeder bluff and beach.

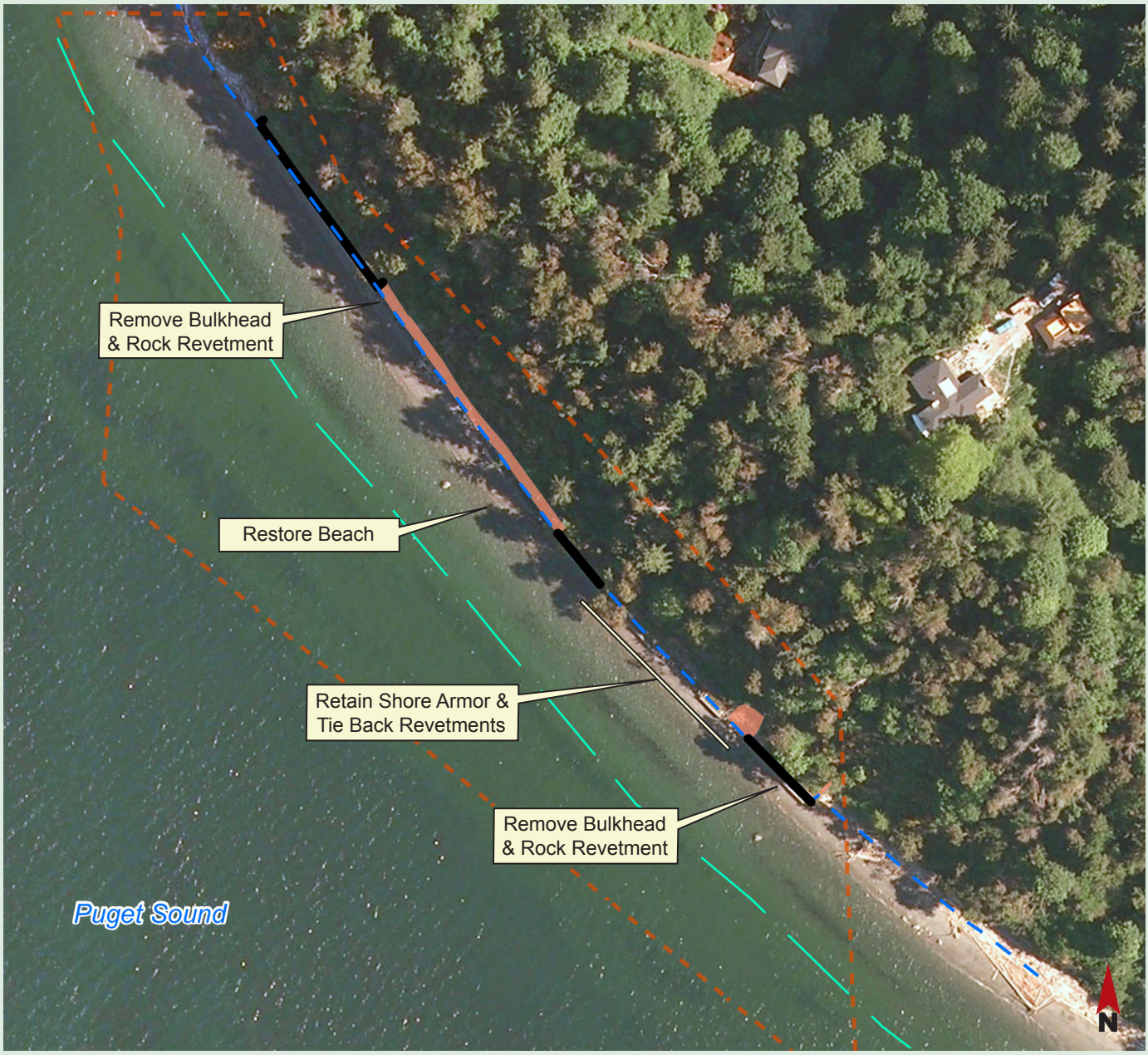
IMAGE: Washington State Department of Ecology (2006)

Ecosystem Restoration Benefits

- Restore sand and gravel beaches that can serve as spawning grounds for forage fish, such as surf smelt and Pacific sand lance, key elements of the marine food chain
- Re-establish intertidal and shallow subtidal areas to encourage kelp and eelgrass growth, increasing nearshore productivity for fish, birds and other marine species
- Improve resiliency of the shoreline to respond to changes in the environment such as sea level change and increasing storm events

Significance

- Limited beach restoration opportunities exist along the 27 percent of Puget Sound's armored shoreline, making this site unique and valuable. It is the only Tentatively Selected Plan beach site and is located in the most armored sub-basin
- Benefits of site restoration extend well beyond the immediate area of this project
- As the only south Puget Sound site, it improves the Tentatively Selected Plan's geographic scope
- Improves Endangered Species Act-listed Chinook salmon and bull trout critical habitat



SOURCE: ESA (2011); USDA-NAIP (2002)

Image above depicts major project features. See design report for additional details.

Key Design Elements

The proposed restoration involves acquiring parcels abutting the shoreline and removing 660 linear feet of bulkhead and rock revetment shoreline armoring. Some shore armor will be left in place to protect an existing house at the top of the bluff and return walls will be constructed at the remaining bulkhead ends. Portions of the beach will be re-graded to create a more natural beach profile.

Site Summary Statistics

- Area of Restored Process: 5.5 acres
- Total Project Cost: $4.4 million

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PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION PROJECT (PSNERP)

TENTATIVELY SELECTED PLAN

Deepwater Slough

The Deepwater Slough project is located on the South Fork Skagit River downstream from Conway, Wash. Deepwater Slough is a small channel between Freshwater and Steamboat Sloughs. The project area includes two islands on either side of Deepwater Slough. Diking, ditching and filling for agriculture greatly diminished the Skagit River delta freshwater and estuarine wetlands and tidal channels. Washington Department of Fish and Wildlife (WDFW) manages the site as a wildlife area, with some areas actively farmed for crop production and wildlife enhancement. Site restoration involves levee removal, restoring tidal hydrology to diked areas and reconnecting the historic tidal channel system on both sides of Deepwater Slough. These actions will restore 270 acres of scarce tidal freshwater wetlands in the Skagit River delta. Plantings on the low natural levee will expand the riparian corridor.

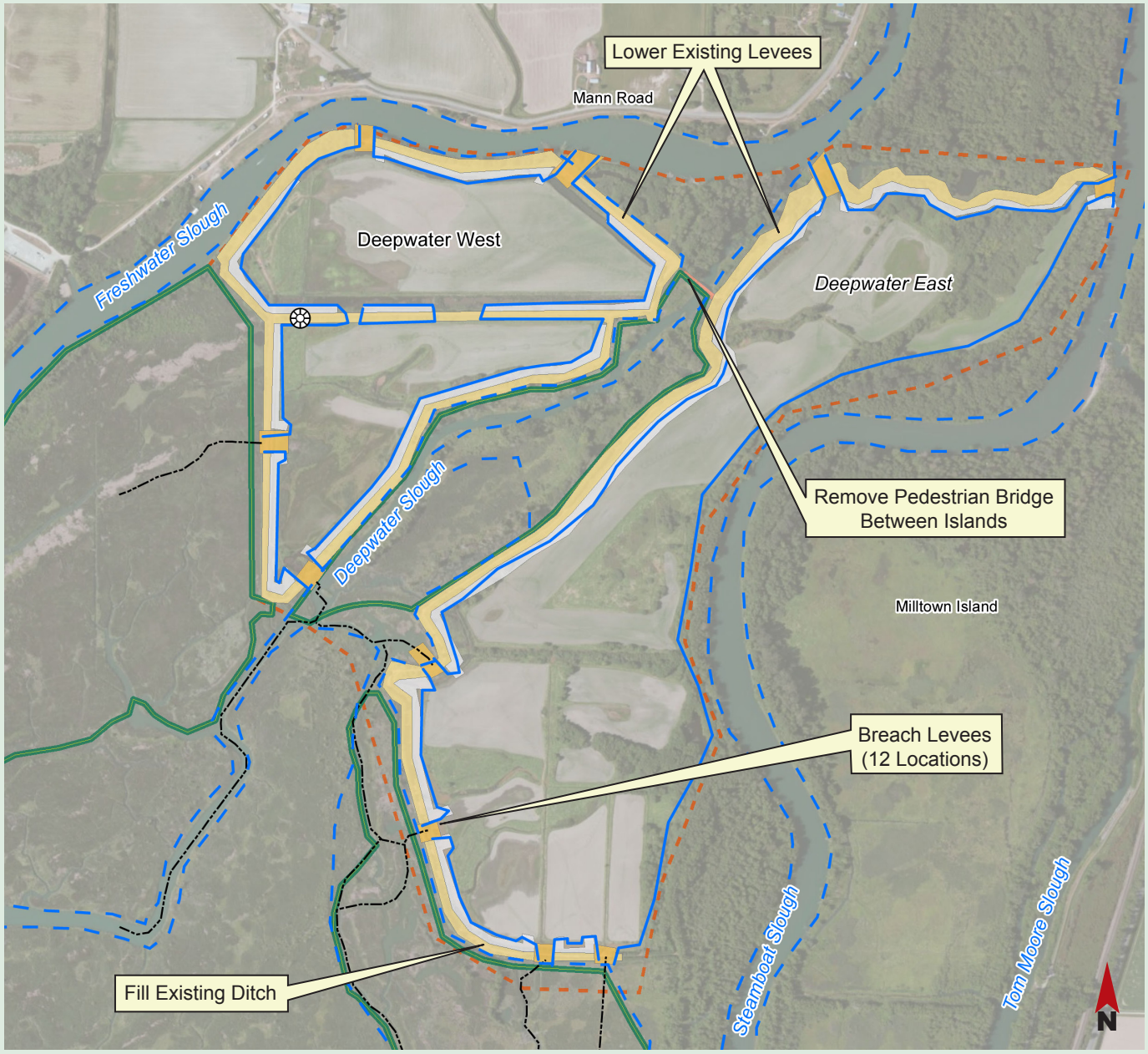
IMAGE: Google Earth (2011)

Ecosystem Restoration Benefits

- Restore highly productive tidal wetland habitats that support biodiversity and provide connectivity between the land and sea
- Restore a large river delta providing valuable nursery habitat for juvenile threatened salmon species increasing their survival and supporting Puget Sound population recovery
- Improve estuary water quality
- Improve resiliency of the shoreline to respond to changes in the environment such as sea level change and increasing storm events

Significance

- Included in Puget Sound Chinook Salmon Federal Recovery Plan
- Phase 2 of highly-successful Phase 1 site restoration
- Together, the Deepwater and Milltown projects complete the lower South Fork Skagit River restoration
- Site improves juvenile salmon rearing habitat and capacity, limiting factors in the lower Skagit River



SOURCE: ESA (2011); USDA-NAIP (2009)

Image above depicts major project features. See design report for additional details.

Key Design Elements

The restoration plan includes a combination of levee lowering and breaching around Deepwater West and East islands. Planting riparian vegetation on lowered levees and digging new channels will expand the riparian woodland corridor. The pedestrian bridge extending between the islands will be removed after levee lowering.

Site Summary Statistics

- Area of Restored Process: 270 acres
- Total Project Cost: $9.9 million

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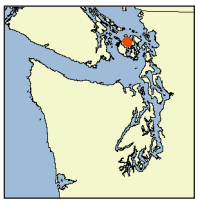

PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION PROJECT (PSNERP)

TENTATIVELY SELECTED PLAN

Deer Harbor Estuary

Deer Harbor includes the largest estuary on Orcas Island. The Cayou Valley Lagoon, also known as Deer Harbor Lagoon or Slough, is an open coastal inlet north of the Channel Road bridge. Tidal flushing from the larger bay into the northern inlet is limited by fill and Channel Road bridge armoring. These constrain the inlet mouth to less than half its historical width. This constriction altered the tidal prism and freshwater flows leading to sedimentation and loss of intertidal marsh, mudflats and tidal channels. The proposed Deer Harbor Estuary restoration entails widening the inlet mouth to allow full tidal flushing and freshwater flows, restoring 16 acres of tidally influenced marsh and mudflats. Fish passage will also improve in the estuary.

IMAGE: Google Earth (2011)

Ecosystem Restoration Benefits

- Restore coastal embayment that provides valuable nursery habitat for juvenile threatened salmon species, increasing survival and supporting Puget Sound population recovery
- Restore intertidal and shallow subtidal habitat areas for recreationally- and culturally-important shellfish
- Re-establish intertidal and shallow subtidal areas to encourage kelp and eelgrass growth, increasing nearshore productivity for fish, birds and other marine species
- Improve estuary water quality

Significance

- Restoring the largest estuary on Orcas Island will support young fish from many nearby river systems
- Restoration will support native oyster beds
- As the only San Juan County site, it improves the Tentatively Selected Plan's geographic scope

SOURCE: ESA (2011); USDA-NAIP (2009)

Image above depicts major project features. See design report for additional details.

Key Design Elements

The restoration will return the estuary width opening to pre-development conditions. It entails removing the existing 50-foot timber Channel Road bridge including fill and riprap under it. A new 110-foot long bridge across the estuary opening allows for complete tidal exchange, sediment supply and transport, and natural tidal channel formation.

Site Summary Statistics

- Area of Restored Process: 16 acres
- Total Project Cost: $8.2 million

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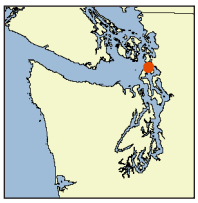


PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION PROJECT (PSNERP)

TENTATIVELY SELECTED PLAN

Dugualla Bay

Dugualla Bay is located on northeast Whidbey Island in western Skagit Bay. The action area includes part of Naval Air Station Whidbey Island, Dugualla Lake and the lower Dugualla Creek. A former estuary and salt marsh, the area is now separated from Dugualla Bay's marine waters by Dike Road, a causeway that functions as a levee. To create agricultural land, the causeway, a tide gate and pump station system were built at the historic barrier embayment inlet. This eliminated tidal inundation, converting the estuary into freshwater Dugualla Lake and restricting fish access from Puget Sound. The proposed restoration will remove tidal hydrology barriers in Dugualla Bay, allowing tidal exchange between Dugualla Lake and bay, restoring 572 acres of salt marsh and mudflats. It also improves connection with the surrounding floodplain and allows fish to access the system.

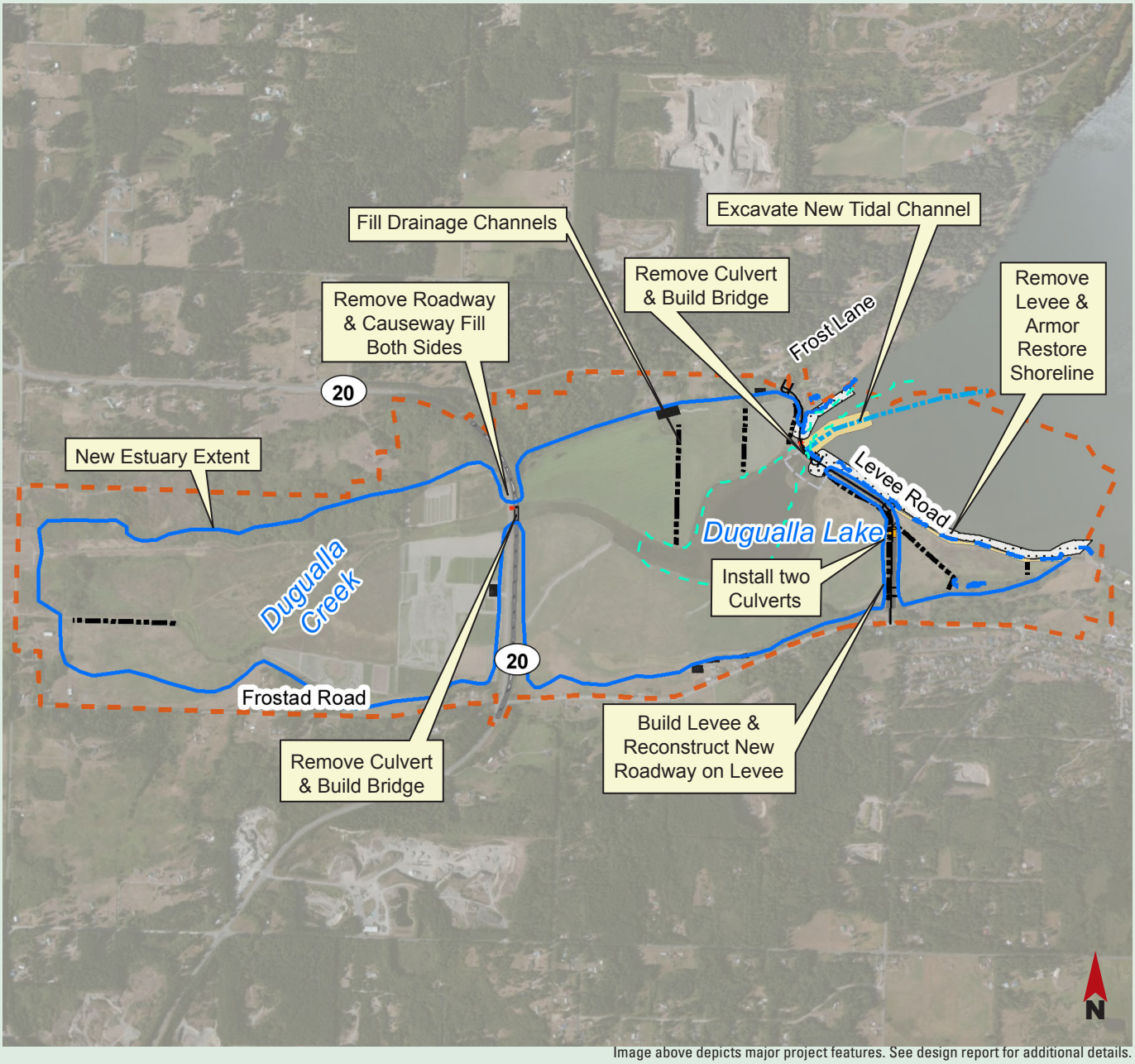
IMAGE: Washington State Department of Ecology (2006)

Ecosystem Restoration Benefits

- Restore coastal embayment that provides valuable nursery habitat for juvenile threatened salmon species increasing their survival and supporting Puget Sound population recovery
- Restore intertidal and shallow subtidal areas for recreationally- and culturally-important shellfish
- Increase shoreline area, length and complexity

Significance

- Provides critical estuary habitat in the Whidbey basin, where about 80 percent of estuary habitat is no longer accessible
- Included in Puget Sound Chinook Salmon Federal Recovery Plan
- Site will be used by roughly half of the out-migrating North Fork Skagit juvenile salmon
- Adds more than five times the shoreline length to existing, available nearshore habitat



SOURCE: ESA (2011); USDA-NAIP (2009)

Image above depicts major project features. See design report for additional details.

Key Design Elements

The restoration returns historical tidal inundation to Dugualla Bay by removing the tide gate and pumping system, excavating a starter channel, and allowing tidal flow into the existing lake. Two barrier beaches, historically defining the tidal channel entrance, will be created and a new 750-foot-long bridge will allow vehicle passage along Dike Road. Portions of the road will also be raised out of the newly inundated floodplain. A 200-foot-long bridge will replace a culvert under State Route 20.

Site Summary Statistics

- Area of Restored Process: 572 acres
- Total Project Cost: $92.2 million

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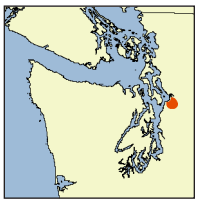


PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION PROJECT (PSNERP)

TENTATIVELY SELECTED PLAN

Everett Marshland

The Everett Marshland site is located along Snohomish River's west bank near the Ebey Slough fork. Most of the site is within Everett city limits. Although in the river's 100-year floodplain, the action area is completely cut off from tidal hydrology by levees and drainage structures installed to support agricultural land use. The area is also bisected by the Burlington Northern Santa Fe (BNSF) railroad running generally northwest and southeast, with utility corridors running east and west. This project restores tidal hydrology and channel-forming processes to 829 acres of tidal freshwater wetlands, reconnecting the site to the Snohomish River. This is accomplished by relocating levees and roadways, altering and filling drainage canals, restoring tidal channels and reconnecting streams to the tidal area.

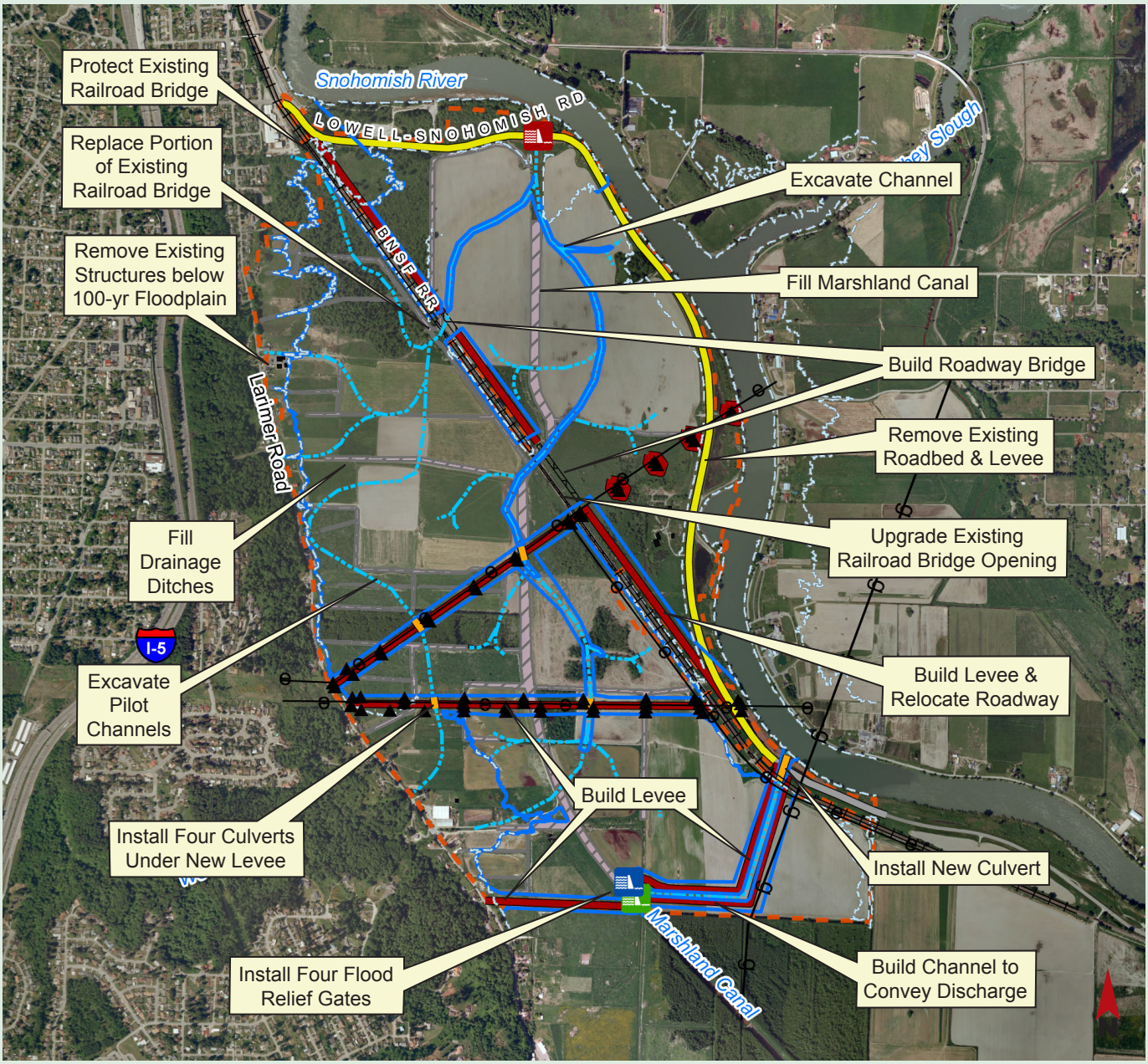
IMAGE: Google Earth (2010)

Ecosystem Restoration Benefits

- Restore highly productive tidal freshwater wetland habitats that support biodiversity and provide connectivity between land and sea
- Restore large river delta that provides valuable nursery habitat for juvenile threatened salmon, increasing their survival and supporting Puget Sound population recovery
- Improve estuary water quality
- Increase shoreline area, length and complexity
- Improve resiliency of the shoreline to respond to changes in the environment such as sea level change and increasing storm events

Significance

- More than 80 percent of the Snohomish estuary is leveed, with only 18 percent of historical wetlands remaining
- Provides floodplain forest and swamp wetlands, the most absent from the Snohomish system, and critical for out-migrating fish
- Located on the Snohomish River's mainstem, the site will benefit all out-migrating fish
- Builds on previous Federal, state, tribal, local and non-government restoration investments, including Corps projects at Qwuloolt and Union Slough
- Included in Puget Sound Chinook Salmon Federal Recovery Plan
- Adds more than three times the shoreline length to existing, available nearshore habitat



SOURCE: ESA (2011); Bing Maps (2011)

Image above depicts major project features. See design report for additional details.

Key Design Elements

The restoration removes 1.5 miles of levee along the Snohomish River and Lowell-Snohomish River Road, which re-introduces tidal influence to diked farmlands. The road will align with the BNSF railroad and multiple new bridges will allow tidal flow beneath the road and railroad embankment. The Marshland Pump Station and flood gates will relocate to the site's south end. Excavation of multiple starter channels in the area will initiate tidal slough channel development. New levees will protect regional transmission lines and gas pipelines west of BNSF's railroad.

Site Summary Statistics

- Area of Restored Process: 829 acres
- Total Project Cost: $328 million

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PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION PROJECT (PSNERP)

TENTATIVELY SELECTED PLAN

Livingston Bay

Livingston Bay is a closed barrier embayment next to Port Susan Bay near the Stillaguamish River delta on Camano Island's southeast side. Extensive diking and drainage of Livingston Bay occurred for agricultural proposes. This blocked exchange of tidal waters, sediment and organic debris between Livingston and Port Susan Bays. Site restoration involves removing diking to open Livingston Bay to tidal flow, restoring 239 acres of tidal marsh. The action will allow exchange of sediment and organic debris, the evolution of tidal channels and fish access.

IMAGE: Google Earth (2007)

Ecosystem Restoration Benefits

- Restore coastal embayment that provides valuable nursery habitat for juvenile threatened salmon species, increasing survival and supporting Puget Sound population recovery
- Improve estuary water quality
- Increase shoreline area, length and complexity
- Improve resiliency of the shoreline to respond to changes in the environment such as sea level change and increasing storm events

Significance

- Provides critical estuary habitat in the Whidbey basin, where about 80 percent of estuary habitat is no longer accessible
- Included in the Puget Sound Chinook Salmon Federal Recovery Plan
- Requires minimal infrastructure to complete significant habitat improvements
- Adds more than three times the shoreline length to existing, available nearshore habitat

SOURCE: ESA (2011); USDA-NAIP (2009)

Image above depicts major project features. See design report for additional details.

Key Design Elements

The restoration creates an opening at the western end of Livingston bay. A network of excavated starter channels will initiate tidal marsh development. Internal drainage ditches will be filled and levees lowered. A 2-foot high berm constructed along East Livingston Bay Shore Drive's north side prevents inundation of the Livingston Bay Community. Riparian vegetation will be planted on levee slopes.

Site Summary Statistics

- Area of Restored Process: 239 acres
- Total Project Cost: $13.1 million

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PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION PROJECT (PSNERP)

TENTATIVELY SELECTED PLAN

Milltown Island

Milltown Island, on the South Fork Skagit River delta, is part of Washington Department of Fish and Wildlife's 17,000-acre Skagit Wildlife Area. This island was historically used for agriculture after construction of perimeter dikes, a central cross dike and drainage channels. This diking hydrologically disconnected the site from the Skagit River, resulting in a loss of tidal marsh and channels. The island's southern portion, which isn't diked, consists of about 100 acres of tidal marsh. The proposed restoration action will remove sections of the perimeter levees, restoring tidal and freshwater hydrology to the island's 214-acre interior marsh. Restoring tidal and riverine processes will form, scour and expand the levee breaches and marsh channels within the island's former agricultural areas.

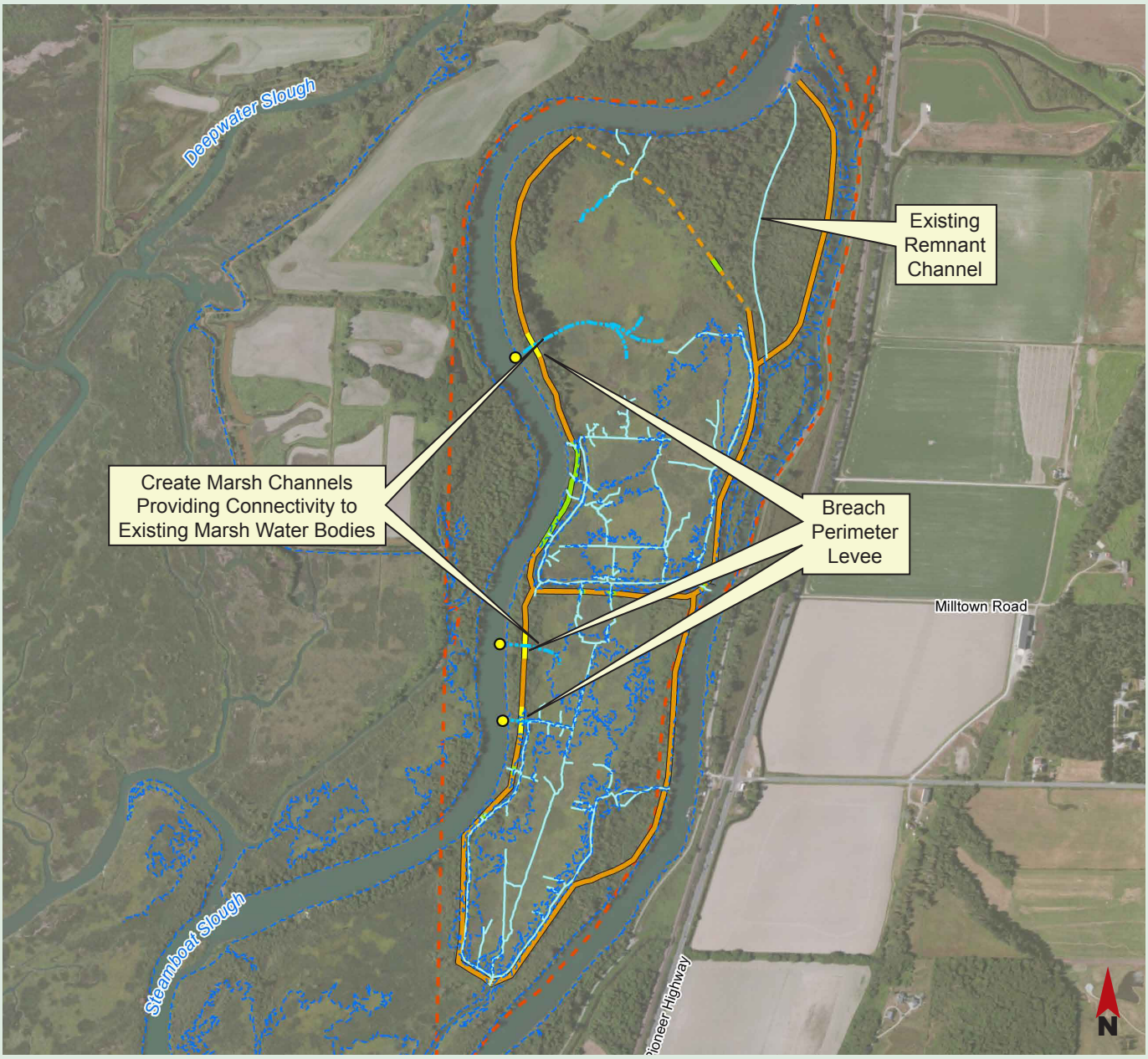
IMAGE: Washington State Department of Ecology (2006)

Ecosystem Restoration Benefits

- Restore highly-productive tidal freshwater wetland habitats, supporting biodiversity and providing land and sea connectivity
- Restore large river delta that provides valuable nursery habitat for juvenile threatened salmon species, increasing survival and supporting Puget Sound population recovery
- Improve estuary water quality

Significance

- Included in the Puget Sound Chinook Salmon Federal Recovery Plan
- Phase 2 of highly-successful Phase 1 site restoration
- Together, the Deepwater and Milltown projects complete the lower South Fork Skagit River restoration



SOURCE: ESA (2011); USDA-NAIP (2009)

Image above depicts major project features. See design report for additional details.

Key Design Elements

The restoration creates three breaches in the levee on Milltown Island's west side along Steamboat Slough. Controlled blasting is proposed to create the levee openings instead of excavation. This process was used during previous Milltown Island restoration efforts. Excavate interior island channels focusing on the west side near the new levee breaches.

Site Summary Statistics

- Area of Restored Process: 214 acres
- Total Project Cost: $4 million

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PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION PROJECT (PSNERP)

TENTATIVELY SELECTED PLAN

Nooksack River Delta

The Nooksack River Delta is located on the Lummi Nation lands north of Bellingham, Wash. It includes nearly all of the Nooksack and Lummi River estuaries below Ferndale, Wash. The Nooksack and Lummi River flow paths have been modified since the mid-19th century, beginning with active removal of large wood, draining, diking and levee construction. Today, substantial surface water diversions, groundwater withdrawals and drainage activities within the Nooksack River watershed impact the magnitude, timing and duration of delta surface water flows. The proposed restoration modifies levees, roads and other hydrological barriers, restoring delta riverine and tidal flow, as well as sediment transport and delivery processes. All told, it restores 1,807 acres of scarce tidal freshwater wetlands. The restoration complements, but doesn't depend on, the proposed Lummi Nation Wetland and Habitat Bank project (Lummi Nation 2008). Mitigation bank features are not included in the proposed Federal project footprint.

IMAGE: Google Earth (2011)

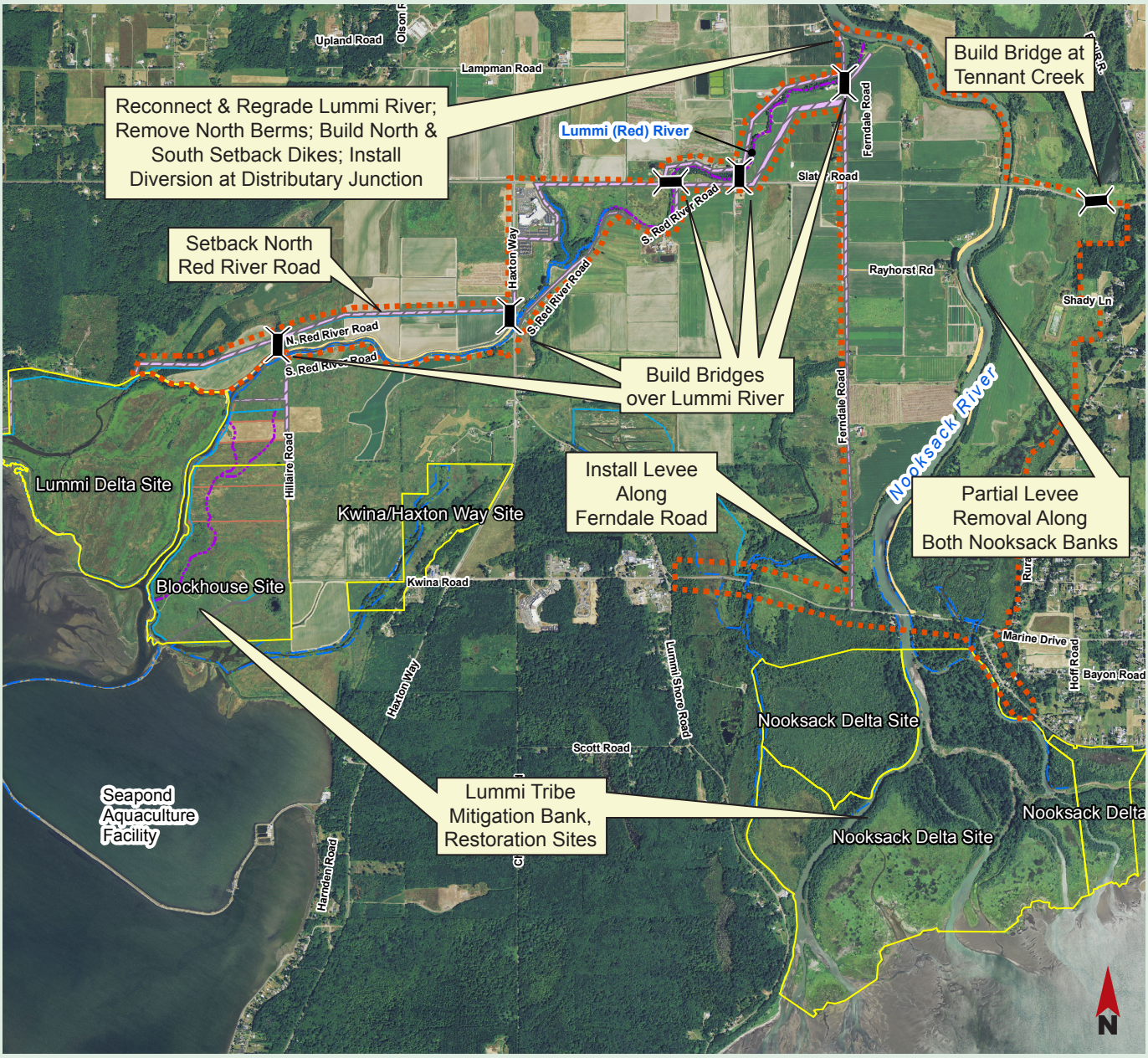
Ecosystem Restoration Benefits

- Restore large river delta that provides valuable nursery habitat for juvenile threatened salmon species, increasing survival and supporting Puget Sound population recovery
- Re-establish intertidal and shallow subtidal areas to encourage kelp and eelgrass growth, increasing nearshore productivity for fish, birds and other marine species
- Improve connectivity to nearshore and adjacent uplands
- Increase shoreline area, length and complexity
- Improve resiliency of the shoreline to respond to changes in the environment such as sea level change and increasing storm events

Significance

- Builds on Lummi Nation's existing, planned mitigation bank projects to restore the delta
- Strong Tribal support for Nooksack Delta restoration
- Central to Whatcom County's comprehensive approach to managing flooding and restoring estuary habitat in the lower Nooksack River
- Supports Puget Sound Chinook Salmon Recovery Plan
- Provides 25 percent of Puget Sound Action Agenda's 2020 estuarine habitat recovery goal in a single project

Nooksack River Delta



SOURCE: ESA (2011); USDA-NAIP (2009)

Image above depicts major project features. See design report for additional details.

Key Design Elements

The restoration includes partial levee removal along both Nooksack River banks and levee construction on North Red River Road. The Lummi River channel will be dredged and graded to reconnect it to Nooksack River flows. Old agricultural ditches will be filled and tidal channels recreated. Several roads will be raised on bridges to allow more tidal flows across the delta.

Site Summary Statistics

- Area of Restored Process: 1,807 acres
- Total Project Cost: $260 million

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PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION PROJECT (PSNERP)

TENTATIVELY SELECTED PLAN

North Fork Skagit River Delta

The North Fork Skagit River empties into Skagit Bay south (downstream) from La Conner, Wash. The proposed action is located between the former Dry Slough inlet and the western levee system's end near Rawlins Road. Extensive North Fork diking caused substantial loss of tidal wetlands and associated tidal channels. River levees reduced the floodplain area and constrained the river channel. The proposed restoration builds a levee on the river's south side, restores natural levees and restores 256 acres of scarce tidal freshwater marsh.

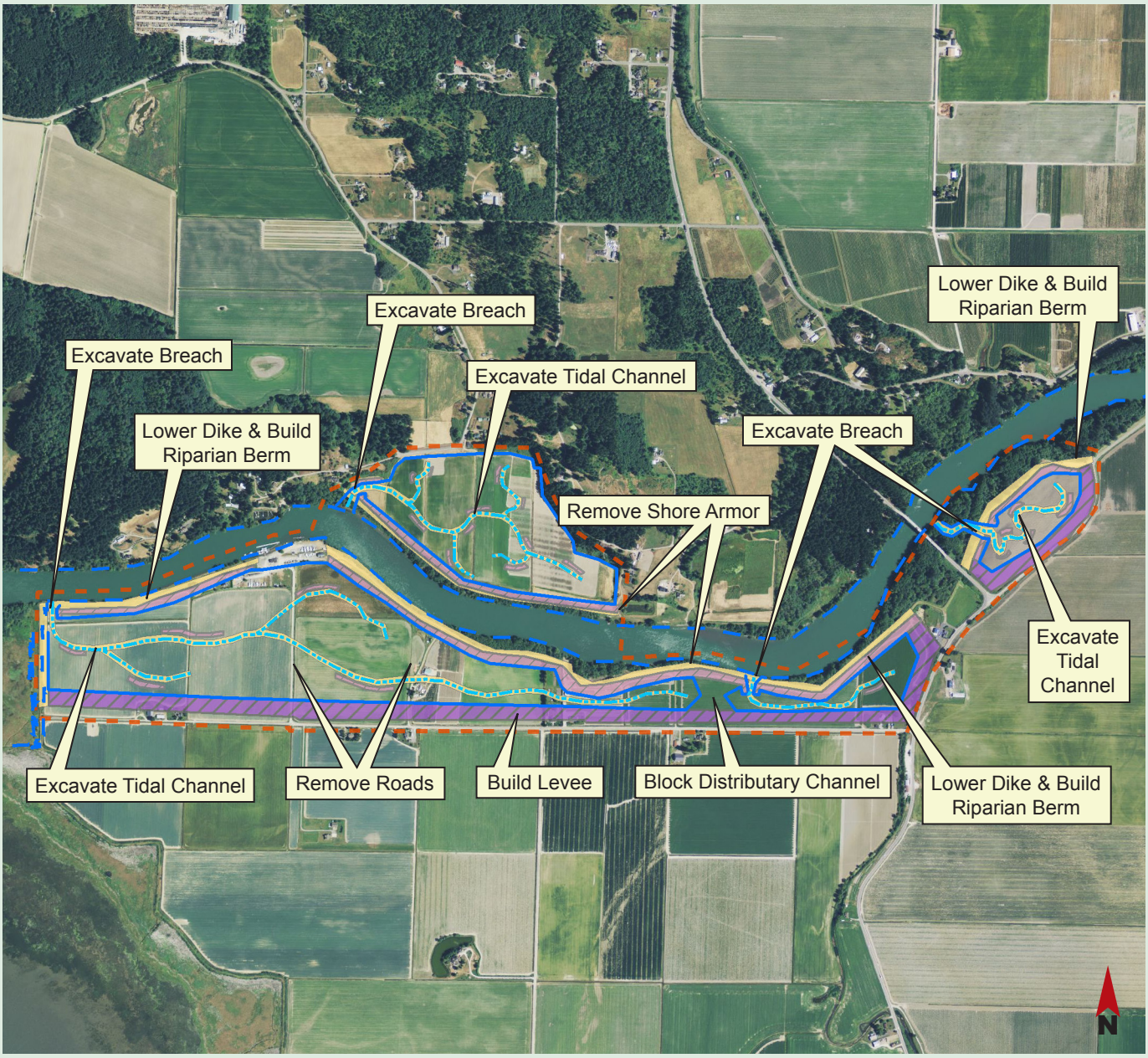
IMAGE: Washington State Department of Ecology (2006)

Ecosystem Restoration Benefits

- Restore highly productive tidal freshwater wetland habitats that support biodiversity and provide connectivity between land and sea
- Restore large river delta that provides valuable nursery habitat for juvenile threatened salmon species, increasing survival and supporting Puget Sound population recovery
- Re-establish shorebird foraging and resting tidal flat habitats for large flocks of Dunlin, Great Blue Herons and other marine birds
- Improve nearshore and adjacent uplands connectivity
- Improve estuary water quality

Significance

- Included in the Puget Sound Chinook Salmon Federal Recovery Plan
- Provides habitat on the lower North Fork Skagit River, where limited restoration opportunities and estuary habitats exist
- Complements Skagit General Investigation Tentatively Selected Plan in overlapping study areas



SOURCE: ESA (2011); (20)

Image above depicts major project features. See design report for additional details.

Key Design Elements

The restoration proposal lowers 13,000 feet of levee along the North Fork Skagit River south bank. Remove several structures and construct a levee along Rawlins Road. Lower 3,140 feet of levee along the north bank. Existing topography provides flood risk management without a levee on the river's north side. Breaches in the lowered levees and excavated channels allow for water to access the newly restored floodplain. Replanting lowered levees will restore a natural riparian corridor along the river.

Site Summary Statistics

- Area of Restored Process: 256 acres
- Total Project Cost: $102.3 million

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PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION PROJECT (PSNERP)

TENTATIVELY SELECTED PLAN

Spencer Island

Spencer Island is located in the Snohomish River estuary between Union and Steamboat Sloughs near Everett, Wash. Diking and drainage for grazing has lead to the loss of tidally influenced wetlands and distributary channels. Existing levees, with current small levee breaches, and an existing field drainage system prevented full tidal hydrology restoration and tidal channel network development. Snohomish County and Washington Department of Fish and Wildlife manage the site as a popular undeveloped recreation park and wildlife management area. The proposed action lowers and breaches levees, restoring full estuarine processes and seasonal riverine flooding. Restoration actions will reestablish conditions necessary to recreate 313 acres of rare tidal freshwater marsh.

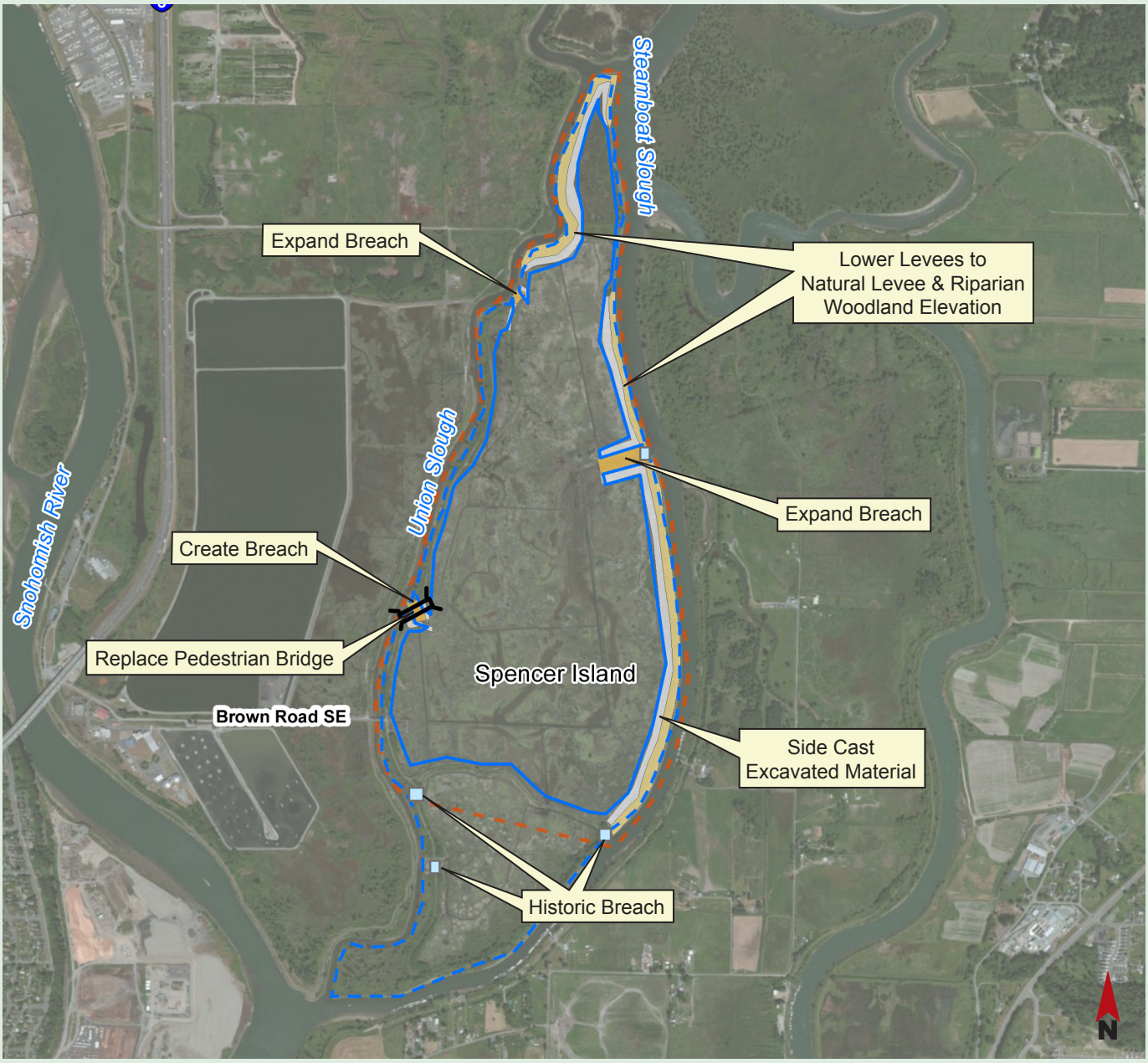
IMAGE: Washington State Department of Ecology (2006)

Ecosystem Restoration Benefits

- Restore large river delta that provides valuable nursery habitat for juvenile threatened salmon species, increasing survival and supporting Puget Sound population recovery
- Restore highly productive tidal freshwater wetland habitats that support biodiversity and provide connectivity between land and sea
- Improve estuary water quality
- Improve public access to shore and recreational opportunities

Significance

- Completes previous restoration work and complements other slough system restoration work
- Included in the Puget Sound Chinook Salmon Federal Recovery Plan
- Restored wetland area provides Trumpeter Swan habitat and filtration of agricultural pollutants



SOURCE: ESA (2011); USDA-NAIP (2009)

Image above depicts major project features. See design report for additional details.

Key Design Elements

The restoration expands two existing levee breaches and adds a third, allowing more tidal flow to enter the island interior. The interior island tidal channel network should form over time with the increased tidal prism. Existing Steamboat and Union Slough levees will be lowered and planted to create a riparian woodland corridor. A pedestrian bridge will be replaced across the Union Slough southern breach to maintain the existing public access trail.

Site Summary Statistics

- Area of Restored Process: 313 acres
- Total Project Cost: $6.5 million

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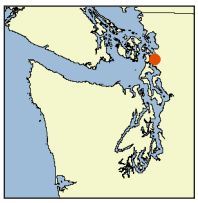


PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION PROJECT (PSNERP)

TENTATIVELY SELECTED PLAN

Telegraph Slough

Telegraph Slough is located in a diked area between Swinomish Channel and Padilla Bay. Major regional road and railway transportation and utility infrastructure bisects the site in an east and west direction. Tidal influence, blocked by State Route 20 and adjacent BNSF railroad, is limited to a small historical slough remnant north of the highway. South of this highway, Telegraph Slough and three other distributary channels are cutoff from Swinomish Channel and Padilla Bay. A series of tide gates drain the Slough's south portion to the Swinomish Channel. Most of the land outside public road rights-of-way is privately owned and in agricultural use or largely abandoned. Levees turned the area into a freshwater marsh dominated by invasive species in the south and limited salt marsh and mudflat area north of State Route 20. This project aims to restore tidal hydrology and channel-forming processes to historic distributary slough channels connecting Swinomish Channel to Padilla Bay, restore tidal hydrology to diked farmland that was historically estuarine marsh, and increase freshwater inputs to Padilla Bay by constructing bridges at causeway crossings, removing levees and creating and reconnecting channels.

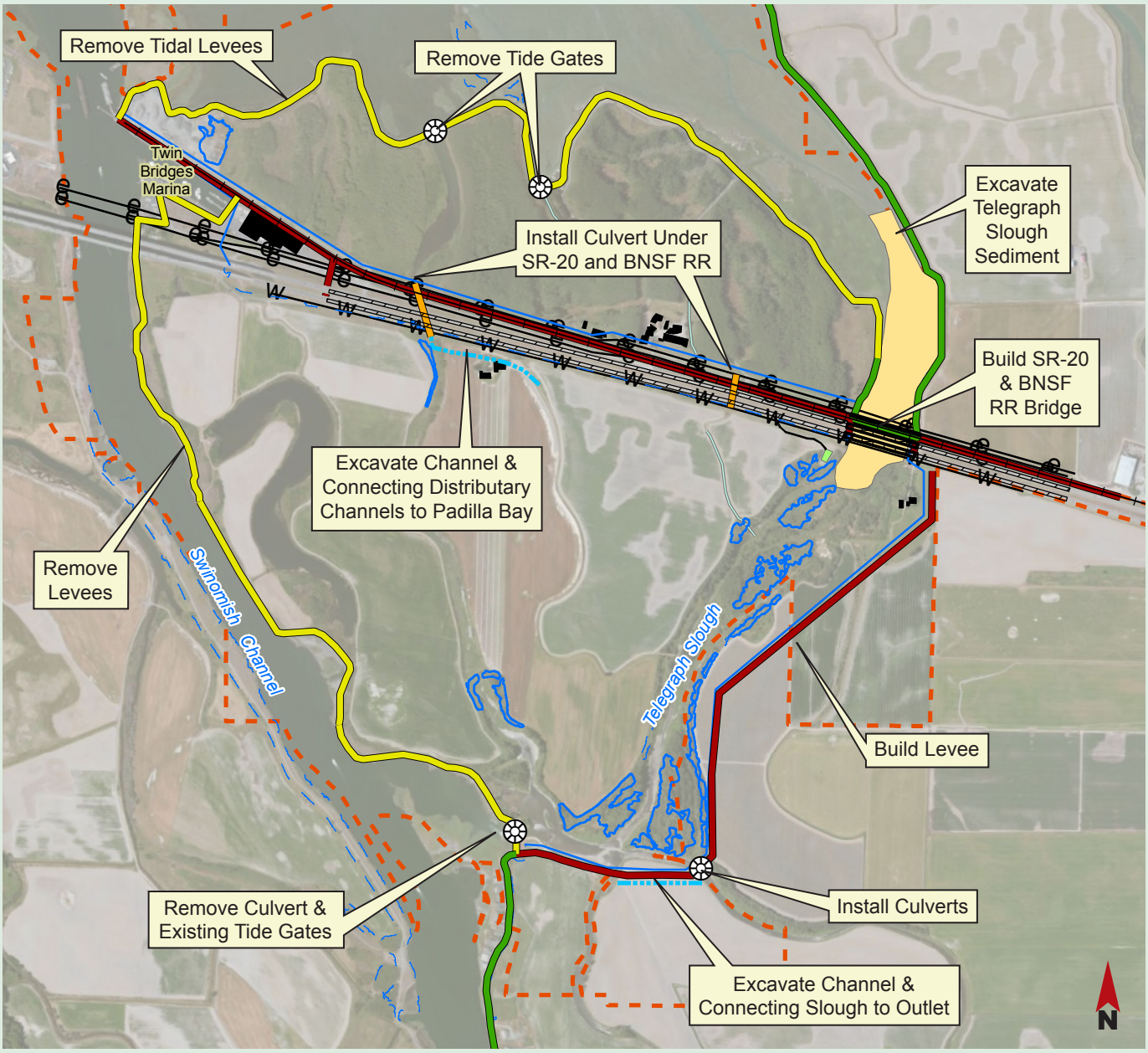
IMAGE: Washington State Department of Ecology (2006)

Ecosystem Restoration Benefits

- Restore large river delta that provides valuable nursery habitat for juvenile threatened salmon species, increasing survival and supporting Puget Sound population recovery
- Restore sand and gravel beaches that serve as spawning grounds for forage fish, such as surf smelt and Pacific sand lance, key elements of the marine food chain
- Re-establish intertidal and shallow subtidal areas to encourage kelp and eelgrass growth, increasing nearshore productivity for fish, birds and other marine species

Significance

- Opens another fish pathway into Padilla Bay, a National Estuarine Research Reserve with the largest existing Puget Sound eelgrass meadow
- Provides restoration beneficial to fish and wildlife using the North Fork Skagit River, where opportunities are limited
- Included in the Puget Sound Chinook Salmon Federal Recovery Plan
- Increases juvenile salmon rearing habitat
- More than doubles existing nearshore shoreline habitat available



SOURCE: ESA (2011); Bing Maps (2011)

Image above depicts major project features. See design report for additional details.

Key Design Elements

The restoration removes most of the levees along Telegraph Slough, Padilla Bay and eastern Swinomish Channel. Levee removal requires raising the railroad and State Route 20 between Swinomish Channel to Telegraph Slough to keep them above the inundation and wave action limits. The railroad and State Route 20 will cross the Slough on elevated long-span bridges. A new levee along east and south Telegraph Slough will contain flood flows and extreme tides. Levee removal restores about 832 acres of former salt marsh to tidal influence.

Site Summary Statistics

- Area of Restored Process: 832 acres
- Total Project Cost: $279.7 million

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