Shoreline Management Plan

Restoration Opportunities Identified in the 2007 Restoration Plan

120 restoration opportunities were identified.

NOOKSACK BASIN WATERSHED MANAGEMENT UNITS (58 opportunities)

North Fork Nooksack WMU

1. Stabilize and/or abandon roads crossing unstable slopes to reduce sediment delivery to the North Fork.
2. Restore fish passage to Canyon Creek to allow unimpeded access to important Chinook salmon tributary habitat.
3. Enhance riparian cover on the Canyon Creek alluvial fan to increase habitat diversity and provide hydraulic roughness.
4. Enhance riparian vegetation in areas of residential and agricultural development to increase shade and detrital inputs, and otherwise buffer adverse effects of adjacent development.
5. Reforest managed timberlands, including areas subject to rain-on-snow events to restore natural runoff patterns.
6. Create stable islands in appropriate locations by installing log jams to restore lateral and vertical channel stability, increase hydraulic roughness, and promote off-channel habitat development.
7. Increase conifer density and cover in hardwood-dominated riparian areas to improve long-term LWD recruitment potential.
8. Restore degraded or lost wetlands within the floodplain to mitigate the effects of increased sediment loads and increase water storage capacity.
9. Relocate infrastructure away from the channel migration areas and alluvial fans (see specific recommendations in WSDOT reports, GeoEngineers 2001; Gowan 1989).

Middle Fork Nooksack WMU

1. Restore fish passage upstream of the diversion dam – this is one of the most important restoration opportunities in this WMU.
2. Stabilize and/or abandon roads crossing unstable slopes to reduce sediment delivery to the Middle Fork.
3. Reforest managed timberlands, including areas subject to rain-on-snow events to restore natural runoff patterns.
4. Enhance riparian cover on Porter Creek to mitigate temperature increases.

South Fork Nooksack WMU

1. Install instream LWD at key areas to improve channel stability, habitat diversity (e.g., pool formation, etc.), temperature, and habitat quantity for adult holding and spawning in the lower South Fork. See the Acme-Saxon In-stream Assessment (Maudlin et al. 2002) and the Acme to

Confluence Assessment (Nooksack Natural Resources, in prep.), which identifies specific areas for in-stream wood placement.

2. Remove or set back infrastructure that is constraining channel migration in the lower South Fork. Examples include pipeline crossings (natural gas pipeline and City of Bellingham water pipeline), a railroad, State Route 9, Mosquito Lake Road, and Saxon Road.
3. Enhance riparian areas along stream corridors (mainstem and tributaries) dominated by deciduous trees through planting conifers to improve LWD wood delivery to the channel and mitigate temperature impacts.
4. Restore former and/or degraded wetlands on the floodplain (e.g., Rothenbuhler Slough, Foxglove wetland complex near Acme, and the Landingstrip Creek area) and in the vicinity of Black Slough. Also, restore drainage ditches on the floodplain to enhance wetland functioning.
5. Manage forest roads to mitigate sediment generated from road failures.
6. Acquire lands in the upper South Fork floodplain from timber interests.
7. Restore side channels and other off-channel habitat and enhance riparian areas on Hutchinson Creek to aid in long-term sediment storage (through LWD recruitment and pool creation).

Upper Mainstem Nooksack River WMU

1. Protect deltaic character of the Anderson Creek mouth to maintain complex instream and riparian habitats.
2. Restore wetlands upstream of the Anderson Creek mouth in Reaches 3, 4, and 5, to provide areas for sediment storage and nutrient cycling.
3. Repair armored banks and depauperate riparian zones along the mainstem, especially in the low gradient, unconfined reaches.
4. Introduce key pieces of LWD to stabilize what are generally loose aggregates of LWD deposits within the mainstem to jumpstart stabilization/restoration of stream morphology by creating permanent islands, increasing instream sediment storage capacity, and providing habitat complexity.
5. Enhance riparian cover in areas of bank instability such as SMP inventory Reach 19 upstream of the Mount Baker Highway crossing and Reach 20 upstream of Deming.
6. Reconnect Smith Creek to the Nooksack floodplain and protect existing riparian forest of the Nooksack floodplain near the confluence of Smith Creek.
7. Protect groundwater discharge areas on the right bank upstream of Everson to ensure cool water supply to the mainstem.

Lower Mainstem Nooksack River WMU

1. Enhance riparian cover in areas of high bank instability such as SMP inventory Reach 15 downstream of Everson.
2. Integrate floodplain management with habitat recovery, especially in the Schneider Creek area.
3. Implement Best Management Practices on urban and agricultural lands to prevent water quality and habitat degradation.
4. Restore tributary slough habitat by reconnecting channels to provide flood refuge for fry and overwintering juveniles in the lower mainstem.

5. Restore riparian forest cover on the mainstem and tributaries through CREP, voluntary stewardship, or other community-based programs.
6. Establish and manage for instream flows through the WRIA 1 Watershed Management Project.

Lynden North WMU

1. Improving fish passage at specific locations identified by Whatcom County, including the West Branch of Bertrand Creek and McClellan Creek, the tide gate on Duffner Ditch, on Fishtrap Creek in the City of Lynden, and other fish passage limiting culverts throughout the watershed. Modify existing conditions on the West Branch and McClellan Creek to enable passage over the full range of streamflows.
2. Reconnecting floodplain wetlands in lower Bertrand Creek (SMP inventory reaches 1-4) to the creek and planting with native trees and shrubs to enhance habitat value for terrestrial and aquatic wildlife.
3. Restoring drained/ditched wetlands on peat deposits to provide additional water storage capacity.
4. Implementing Best Management Practices on urban and agricultural lands to prevent nutrients, pathogens, and sediments from reaching streams and degrading water quality and habitat.
5. Programmatically evaluating the costs and benefits of upgrading culverts (to improve fish passage) on agricultural lands on a watershed-wide basis.
6. Re-establishing riparian buffers along the natural and artificial watercourses to provide habitat for salmon and other fish and wildlife, improve water quality, control erosion, provide shade, and filter/retain sediment, and nutrients.
7. Directing development away from important infiltration areas (permeable deposits) and implement Best Management Practices (including stormwater retrofitting) to prevent future impacts to infiltration/recharge and groundwater discharge processes.
8. Restoring riparian cover along Fishtrap Creek in conjunction with floodplain restoration in Reach 1. Restore riparian areas upstream to improve water quality function in areas correlated with increased loading, such as Reaches 7 and 8 and at tributary junctions. Restore channelized sections to a more natural morphology in Reaches 1 and 6.
9. Improving canopy cover by planting conifers and fast-growing deciduous species along stream banks, especially in the lower reaches (Reach 1 through 4) of Bertrand Creek.

Tenmile Creek WMU

1. Implement measures to control reed canary grass infestations in Tenmile Creek including Barrett Lake.
2. Implement measures to eradicate spotted knapweed (Reach 2) and tansy ragwort (Reaches 2 and 6) along Tenmile Creek.
3. Restore former riparian wetlands along Fourmile Creek, including wetlands on organic deposits.
4. Protect existing forest cover along the lakeshore of Fazon Lake. The existing buffer width ranges from approximately 150 feet on the south end to more than 1,000 feet on the northwest shoreline.

5. Plant conifers and fast-growing hardwoods throughout the riparian zones on lower Tenmile, Deer, and Fourmile creeks, as well as headwater tributaries where cover is lacking, to improve LWD recruitment potential.
6. Increase stream sinuosity and floodplain connectivity along Fourmile and Deer Creeks.
7. Implement Best Management Practices on urban and agricultural lands to prevent nutrients, pathogens, and sediments from reaching streams and degrading water quality and habitat.
8. Protect the alluvial fan near the mouth of Tenmile Creek from encroachment or other disturbance.

Nooksack Delta/Silver Creek WMU

1. Restore riverine-tidal blind channel network at Marietta Slough.
2. Set back levees on left bank of the river between Slater Road and Ferndale to improve the rearing habitat and passage characteristics of the estuary.
3. Restore instream habitat complexity of the mainstem channel.
4. Prioritize and implement relevant recommendations from the Bellingham Bay Pilot Project.
5. Restore degraded wetlands directly downslope of Ferndale.
6. Redesign or remove tide gates to enhance and/or increase the extent of tidal influence and estuarine area. The potential for restoring estuarine and/or tidally influenced areas extends beyond the existing distributary channels into Reach 3 and Reach 4.
7. Install LWD to improve channel roughness and habitat heterogeneity.
8. Expand public land holdings to include Tennant Lake, the Nooksack River, and the associated floodplain and wetlands in between.

COASTAL BASIN WATERSHED MANAGEMENT UNITS (62 opportunities)

Squalicum WMU

1. Restoring former wetlands south and east of Squalicum Lake.
2. Improving instream habitat in Squalicum Creek (SMP inventory Reach 3).
3. Restore the historic Squalicum Creek floodplain and replanting riparian vegetation along the stream channel.
4. Remove creosote pilings, plant native vegetation, and increase salt marsh habitat within the pocket estuary.
5. Protect and/or restore estuary habitat, wildlife corridors, and habitat forming processes.
6. Minimize bank erosion and downcutting in Squalicum Creek from Meridian Street to the mouth. Increase LWD placement and recruitment opportunities, restore native riparian vegetation, decrease peak flow events, improve stormwater detention, increase use of Low Impact Development techniques in the Squalicum watershed, and implement the 2005 stormwater manual and the Lower Squalicum log jam project.

Lake Whatcom WMU

1. Removing channel-constraining features on the Smith Creek alluvial fan (such actions may require concurrent acquisition of at-risk properties).
2. Restoring instream habitat in Anderson Creek if the management of the Middle Fork Diversion changes.
3. Restoring wetlands below Mirror Lake and just upstream of the mouth.
4. The completely channelized section of Austin Creek flowing through Sudden Valley golf course is also a good candidate for restoration. The intact riparian corridor just upstream should be protected.

Bellingham Bay WMU

1. Removing concrete rubble and riprap along the base of bluffs and the derelict (creosoted wood) cement plant pier.
2. Restoring the Little Squalicum Creek mouth/estuary and the armored shore around portions of the Mount Baker Plywood area would provide habitat improvements.
3. Removing abundant wood debris smothering nearshore sediments along the Cliffside community beach in the northwest portion of the reach.
4. Removing wood waste/LWD from backshore marshes where it is likely causing disturbance and reducing primary productivity of coastal wetlands.
5. Removing abundant invasive species in the marine riparian area. Feeder bluffs, intact coastal wetlands, and marine riparian vegetation in the Fort Bellingham reach should be protected.
6. In the Chuckanut Bay reach, intact coastal wetlands and remaining limited sediment sources for bay beaches should be preserved.

Lummi Bay WMU

1. Remove the sediment accreted north of the Conoco-Phillips pier base and bypass it to the south. This would entail removing sediment from the backshore and leaving the berm intact, thereby creating a new coastal wetland as well. A second bypass option would be at the entrance channel of the Sandy Point basin. Filling this entrance channel will allow net shore-drift to continue south and restore accretion processes at Sandy Point. Bluff sediment sources could be reconnected in other bulkheaded areas in the reach.
2. Enhance or create marine riparian vegetation/dune habitat along Neptune Beach and the no-bank portions of the reach.
3. Remove unnecessary bulkheads to restore upper beach and backshore habitat in the Sandy Point Basin reach.
4. Protect the function of the up-drift feeder bluff segments and the remaining coastal wetland near Neptune Beach.
5. Create riparian buffer/dune habitat to provide habitat and flood control benefits.
6. Restore marsh habitat by removing fill in undeveloped uplands.
7. Remove some of the numerous creosote soldier pile bulkheads and pilings along Lummi Flats and Sandy Point Basin reaches.
8. Protect fair-condition nearshore habitat on the north side of the South Cape area.

9. Pull back the dike and recreate a more natural upper foreshore on the West Lummi Bay reach.
10. In the Lummi Flats reach, remove extensive dikes and tide gates across the river delta to restore tidal inundation and improve fish habitat.
11. Prevent further infilling of coastal wetlands and marsh, including preventing the construction of additional impervious surfaces.
12. Within the Gooseberry Point reach, restoration opportunities include removing sediment impoundments (bulkheads) and alongshore drift impediments such as the failed concrete and rock bulkhead located approximately 0.7 mile north of Gooseberry Point. Additionally, broken concrete bulkhead sections could be removed from the foreshore, primarily north of Gooseberry Point and near the tip and south shore of the point.
13. Protect the feeder bluffs of the Lummi Peninsula.

Birch Bay WMU

1. Restoring historic wetlands, particularly in Semiahmoo and Birch Bay, to provide areas for nutrient retention and removal.
2. Enhancing existing wetlands through planting to improve habitat conditions for wetland-associated wildlife.
3. Protect the off-channel habitat at the upper end Reach 1 of Terrell Creek from future encroachment and channelization.
4. Restoring and enhancing riparian wetlands within the Birch Bay and Fingalson Creek drainages.
5. Enhance the monotypic plant communities in the wetlands associated with Terrell Creek at Birch Bay State Park.
6. Removing bulkheads and other nearshore structures in the Birch Bay and Cherry Point reaches that are known to impede alongshore movement of sediment and negatively affect adjacent beaches.
7. Protect sediment sources that supply large accretionary beaches and marshes, such as Semiahmoo Spit, Birch Bay, and the Gulf Road pocket estuary.
8. Remove old and failing structures, possibly in conjunction with large-scale beach nourishment in the Birch Bay reach. This would include removing groins and bulkheads along Birch Bay Drive to restore upper beach and backshore habitats.
9. Restore historic marsh areas where possible and create a riparian buffer along the Birch Bay shore.
10. Remove bulkheads, including unauthorized bulkheads, between Birch Bay State Park and Point Whitehorn.
11. Restore littoral processes in the Cherry Point reach by re-introducing impounded sediment on the north side of the pier base fills, and excavating and bypassing the accreted sediment south of the two southern industrial piers at Cherry Point (which could also create coastal wetlands in the backshore). When and if the marina entrance channel at Sandy Point is dredged, sediment could be bypassed to the south.

Drayton Harbor WMU

1. Restore wetlands and riparian areas associated with the California Creek through planting.

2. Restore riparian vegetation along California Creek, focusing on Reaches 2, 5 and 8.
3. Restore riparian vegetation along Reaches 5 and 7 of Dakota Creek.
4. Protect existing forest cover, particularly conifer stands such as those found in Reach 8 of Dakota Creek, to ensure long-term LWD recruitment potential.
5. Improve instream habitat conditions in Dakota and California Creeks by creating additional off-channel estuarine and tidal habitat in the lower reaches.
6. Investigate and address the potential barrier at Loomis Trail Road between the stream (California Creek) and an associated wetland. Reconnect the wetland to improve hydrology, storage potential, and habitat access.
7. Install LWD in both streams to rectify problems of low quality pool and riffle habitat. Reach 5 of California Creek appears to provide the best opportunity for combined channel realignment, off-channel habitat creation, riparian planting, and in-stream structure placement.
8. Remove creosote pilings including soldier pile bulkheads at a degraded soldier pile bulkhead (scoured away on landward side) located northwest of Dakota Creek, and at creosote piles located near the Semiahmoo Spit marina (in the City of Blaine).
9. Modify the California Creek causeway.
10. Restore marine riparian vegetation in areas devoid of overhanging vegetation.
11. Removing unnecessary bulkheads, and debris in intertidal areas.

Portage Island and Lummi Peninsula WMU

1. Relocating Lummi Shore Road to reduce sediment impoundment.

Lummi/Eliza Island WMU

1. Conserving remaining feeder bluff sources would contribute to protection of beach habitats.
2. Areas with over-water structures adjacent to the ferry terminal should be investigated for potential mitigation of shading and disturbance due to ferry operations adjacent to forage fish spawning areas.
3. The area immediately east of Village Point would benefit from removal of relict structures in backshore/marsh environments with marsh restoration. The road setback in this area is non-existent, as the beach has eroded and a seawall was constructed in a portion of the area by Whatcom County in recent years.
4. Removal of a failed solid fill pier, large rock groin, concrete debris and derelict piles in the western portion of Legoe Bay would benefit the nearshore.
5. Derelict piles (likely creosoted) could also be removed from eastern Legoe Bay.
6. There is significant room for habitat enhancement at Lummi Point on the northeast part of the island. Any bulkheads that are not necessary for protection of houses could be scaled back or moved landward where possible and picnic structures over what would be active beach could be removed, particularly on the east end of the spit. Also riparian planting could be enhanced.

Point Roberts

1. One opportunity exists in the County seawall area where an outfall crosses the beach near the end of Elm Street. It is not known if the water receives any treatment, and this should be

determined to see if the water needs treatment. The outfall structure, short groin, and the old pilings could be at least partially removed to create beach area and remove the foreign material.

2. Reach-scale restoration opportunities in the Lily Point reach include site-specific removal of derelict structures and possible acquisition of properties along the toe of the bluff if they become damaged during coastal flooding events. Removal opportunities are present at the large accretion shoreform located just northeast of Lily Point, where an old cannery was located (Bauer 1974). Pilings, slag piles, and various debris such as concrete pieces could be removed from the intertidal and backshore. A row of houses/cabins with revetments is present west of Lily Point that both cover a portion of the beach and cause sediment impoundment. Acquisition of these properties and restoration should be a long-term goal. This area would also benefit from restoration of marine riparian vegetation. Conservation is key in the Lily Point reach, particularly as it pertains to maintaining and protecting high value feeder bluffs (exceptional feeder bluffs, un-bulkheaded) that supply all of the sediment for the Maple Beach reach. The same applies to the accretion shoreforms in the reach, particularly in the southern half of the reach.
3. The Lighthouse reach receives all net shore-drift sediment from sources further east and conservation of the net shore-drift process is essential to maintaining nearshore habitats and property throughout the reach. Efforts should focus on ensuring that sediment bypassing at the Point Roberts Marina is performed according to permit conditions, some of which require that sediment be pushed into the active foreshore. Site-specific restoration opportunities include removal of the old telephone building and associated shore defense structures from the southwest point of the County Park. This includes a soldier pile bulkhead and a boulder and debris revetment. Other derelict structure removal opportunities in the reach include two large sets of abandoned piles north of Lighthouse Park that are in the intertidal (including by the west end of Gulf Road). Efforts could be made to restore filled backshore marshes and restore hydrologic connectivity with the marine environment.
4. Similar to the Lighthouse reach, the Boundary Bluff reach is dependent on net shore-drift sediment from the Lily Point reach, and preservation and restoration of sediment input is also a priority here. Restoration in the reach should be focused on site-specific removal of rock bulkheads in the southern and central portion of the reach, where erosion does not appear to be substantial. Conservation of healthy marine riparian vegetation, which offers morning shade to the upper intertidal, should be carried out.