

2009- 2011 WRIA 1 SALMON RECOVERY 3-YEAR PROJECT PLAN

ACTION DESCRIPTIONS

The following descriptions are arranged by geographic area and align with the 2009-2011 WRIA 1 Salmon Recovery 3-Year Project Plan spreadsheet.

South Fork Nooksack

Saxon Reach Restoration [Acme-Confluence Reach: Active Channel Logjams (Phases 2b-5 in 2009-2011 WRIA 1 3-Year Project Plan Spreadsheet)]

Objective: restore deep pools with complex cover, promote development of temperature refuges

These projects include construction of stable log jams in the main channel in areas of known cool water influence (groundwater recharge or tributary inputs). The objectives of the projects are to increase habitat diversity, quantity of deep pools with cover, and availability of temperature refuges. Phase 1 (Kalsbeek Reach, RM 6.5) and 2 (Todd Creek Reach, RM 3.8) were constructed in 2007 and 2008, respectively; Phase 3 (Van Zandt Reach, RM 1.2) is funded and scheduled for construction in 2010. Additionally, the following projects are proposed: (1) an expansion of the Todd Creek project (Phase 2b, RM 3.9-4.0); (2) Phase 4 (River Farm Reach, RM 5.1-5.4); and (3) Phase 5 (Standard/McCarty Creek reach).

Benefit: Increase in number of log jams engaged with low flow channel, main channel pools, temperature refuges during summer low flow (2°C difference from thalweg)

Acme-Confluence Reach: HMZ Reconnection

Objective: Reconnect disconnected floodplain to reduce mainstem velocities and restore channel migration processes that create habitat diversity, reduce fine sediments by promoting overbank deposition of sediments

This project includes removal or setback of bank hardening that blocks HMZ to restore habitat-forming channel migration processes. The objectives of the project are to encourage greater interaction between the river and the HMZ in order to increase the availability of off-channel habitat, reduce mainstem velocities, and encourage floodplain deposition of fine sediment. Potential locations, HMZ area made accessible, and length of bank hardening removed/setback may include: (1) Caron Creek area, up to 57 acres of HMZ reconnected, up to 625 feet of bank hardening removed/setback; (2) Standard Creek area, up to 39 acres of HMZ reconnected, up to 560 feet of bank hardening removed/setback; (3) River Farm area, up to 40 acres of HMZ reconnected, up to 340 feet of bank hardening removed/setback; and (4) McCarty Creek area, up to 40 acres of HMZ reconnected some secondary channel development. Projects are contingent on landowner willingness to proceed with project or sell conservation easement (see Acquisition of Priority Habitats action). Estimate \$100/foot for removal and \$300/foot for setback. Projects may be informed by an effort underway to assess (through hydraulic modeling and geomorphic assessment) the interactions between restoration scenarios and flood hazard management in the lower South Fork.

Benefit: up to 176 acres HMZ reconnected; up to 1525 feet of bank hardening removed or set back

Acme-Confluence Reach HMZ Reconnection: Jones/McCarty (RM 7.5-8.0)

Objective: Reconnect disconnected floodplain to reduce mainstem velocities and restore channel migration processes that create habitat diversity and reduce fine sediment loading by promoting overbank sediment deposition.

This project is to acquire approximately 90 acres bordering the South Fork and on the Jones and McCarty Creek alluvial fans for future HMZ reconnection and off-channel habitat and riparian restoration. Acquisition will create opportunities to setback and existing levee, to open up a constriction caused by the BNSF bridge/trestle, to remeander the channel of Jones Creek to create improved floodplain tributary habitat and eliminate an anadromous barrier, and to engage the Acme Elementary School and the community in an active and community oriented restoration and education site.

Benefit: to 90 acres of historic floodplain and alluvial fan/tributary habitat reconnected; up to 0.3 miles of tributary habitat access improved, setback 1,500' of left bank levee

Lower South Fork Tributary Riparian Restoration

Objective: Restore riparian shading to provide temperature refuges in low-gradient floodplain tributaries for juvenile salmonids, including chinook, rearing in the South Fork mainstem

This project involves riparian planting in unforested or poorly stocked riparian areas of low-gradient tributaries (100 foot buffer widths) within ½ mile of the lower South Fork (downstream of Saxon Rd bridge). The planting will be 500 trees per acre and include layout, 3-year maintenance and beaver protection. Estimate 70 acres in the Acme-Confluence reach and 53 acres in the Acme-Saxon reach that have not already been restored, at \$4,400/acre, or \$541,200 total. Projects are contingent on landowner willingness to proceed with project.

Benefit: restore 123 acres of riparian buffer along lower South Fork tributaries to increase shading and wood recruitment to tributaries and the South Fork downstream of the tributary confluence.

Lower South Fork HMZ Riparian Restoration

Objective: Increase wood recruitment potential, ultimately to improve habitat diversity (i.e. cover, habitat unit diversity) and key habitat quantity (deep meander bend pools) in the lower South Fork

This project involves riparian planting in unforested areas in and within 260 feet of the accessible Historic Migration Zone (1880-present) of the South Fork in this reach. In this context, “accessible” refers to areas open to channel migration, i.e. not isolated from the active channel by bank hardening. The planting will be 500 trees per acre and include layout, 3-year maintenance and beaver protection. Estimate 161 acres in the Acme-Confluence reach and 62 acres in the Acme-Saxon reach that have not already been restored at \$4,400/acre, or \$981,200. Project is contingent on willingness of landowners of properties likely to be affected by the project.

Benefit: Restore approximately 223 acres of riparian forest within the South Fork HMZ to increase wood recruitment potential and shading of the South Fork. This action will have longer-term benefits to channel stability, habitat diversity and water temperature in the South Fork.

Lower South Fork Wetland Water Storage Improvement

Objective: Restore temperature and baseflow maintenance function of lower South Fork floodplain wetlands, to address low flow and high temperature in the lower South Fork

This project encompasses actions that promote water storage in historical and potential wetlands of the lower South Fork to restore temperature and baseflow maintenance functions to the mainstem South Fork. Activities to promote water storage include, plugging, backfilling, and/or re-meandering drainage ditches and re-creating micro-impoundments similar to beaver dams. An estimated 5500m of straight ditchline and 1900m of stream length in the historically important Black Slough wetland complex could be improved (approximately 1/3 of its length), plus additional ditchline and stream length in other wetlands in the lower South Fork valley. Estimated cost of water storage improvement is \$70/m, for a total \$518,000. Project is contingent upon landowner willingness to proceed.

Benefit: promote water storage along 7.4 km of ditchline and/or stream length to restore an estimated 180 acres of wetland, with associated improvements in wetland functions, such as flood storage, increased summer baseflow, and decreased summer temperature in the lower South Fork Nooksack River.

Saxon Reach Restoration (Acme-Saxon Reach Active Channel Logjams/Saxon Bridge)

Objective: Increase habitat diversity (number and persistence of pools, complex cover) in a cooler water section of the South Fork. This group of projects includes stabilization of log jams in the active channel of the South Fork between Acme and Saxon Road bridge. Projects are contingent on landowner willingness to proceed with project. Projects include:

- Saxon Reach Restoration Project will include the stabilization/augmentation of existing log jams. The goal of the project is to stabilize the split flow downstream of the bridge and create holding habitat in a cooler section of the reach. The project includes augmenting existing wood accumulations to encourage the stability of the mid-channel island. It is estimated that the project will require landowner participation in setting project objectives and allowable scope of the project. It is likely that the project will need to meet flood protection objectives in the reach, possibly including fish friendly bank protection
- Benefit: 2-5 log jams, 2-5 pools with complex cover, cooler water areas local to the logjams during summer low flow

South Fork Acme to Saxon Reach HMZ Reconnection: South Fork Regional Park (RM 8.4-8.7)

Objective: Restore access to larger portion of historic meander area and floodplain forest in a reach partially constrained by public and private infrastructure; install in-stream and LWD structures to increase habitat diversity and floodplain roughness.

Finalize designs, obtain permits, permit and remove ~ 200'-300' of right bank riprap, install large wood structures, and replant in native species to restore historic connectivity, instream, and floodplain structure and habitat in the reach between SR9 and the Williams Pipeline crossing that is located in Whatcom County's South Fork Regional Park.

Benefit: 200-300' of bank armor removed, lateral migration potential restored, floodplain connectivity improved for 8 acres.

Skookum Reach Project (Upper SF)

Objective: Remove channel constrictions, add LWD structure to the river channel, provide access to thermal refugia.

The Skookum Reach project will consist of installing active channel logjams near the mouth of Skookum Creek relocating Saxon Road from the river bank to upland areas owned by Whatcom Land Trust and Lummi Nation and restoring riparian buffer stands along the South Fork channel. An additional benefit of the project would be providing better road access control to Skookum Creek, Skookum Hatchery and the South Fork Weir.

Benefit: removal of feet of bank protection, installing 3 active channel logjams, re-locating 3000 feet of Saxon Road to upland areas and restoring 11.8 acres of riparian buffer stand.

Orphan Road Project Assessment including North Fork

Objective: Identify areas potentially in need of corrective action to reduce erosion and prevent slope failures

The orphan road assessment will use LiDAR that includes coverage of the state managed and private timberlands of Whatcom County to identify forest road grades that are not currently covered under forest practice road management rules. Once the extent of these existing roads is determined, the assessment will include field surveys to determine if and where drainage improvement and fill removal is necessary to reduce erosion and prevent slope failures. Orphan Road Abandonment projects resulting from the assessment will be contingent on landowner willingness to proceed with projects. Based on the costs of previous road assessment work, it is estimated that the assessment would cost \$120,000. Orphan road surveys conducted as a part of the upper SF assessment results will give us an indication of the extent that these roads are a problem.

Benefit: assessment of orphaned roads, with prescriptions for drainage improvement and pullback of landings and sidescast for several road miles. These projects will reduce sediment input into the Nooksack Forks and its tributaries.

Fobes Creek Reach Restoration

Objective: To stabilize existing wood debris in the active channel of the South Fork Nooksack to increase habitat functions and improve floodplain connectivity, provide high quality habitat in a known thermal refuge area, increase wood recruitment potential and shading through riparian enhancement.

The Fobes Reach project area and scope has been expanded to include the reach between Larson's Bridge (RM 20.5) and the top of Dye's Canyon (RM 18). The project will be constructed in several phases and likely use a variety of stabilization techniques to improve the function of wood in the channel. The design will build on the Larson's Bridge Project that lies in the reach.

The Fobes Creek Island project proposes to stabilize forested islands in the South Fork that are located between RM 18-20.5. The reach is one of the few areas where the South Fork Nooksack has historically migrated across its floodplain, resulting in many relict channels. Most of these channels maintain connection during periods of high flow, which is critical for reducing scour in the main channel during floods. The reach contains abundant small pieces of wood that can be stabilized to increase the function of woody debris in the channel. The reach is heavily used for holding, spawning, and rearing by Threatened spring chinook and other species. The Fobes Creek Island Project seeks to improve the persistence of instream wood and maintain high flow connectivity with existing side channels, while improving habitat in the cool water refuge at the confluence of Fobes Creek. The project includes riparian treatment to increase the conifer content on the forested islands in the reach and the placement of large woody debris to improve habitat quality in the Fobes thermal refuge area. Instream wood will be stabilized throughout the channel to provide flow impedance and slow flow in the channel. This is the highest ranked project area in the Upper South Fork Nooksack River Habitat Assessment.

Benefit: The project is expected to improve habitat diversity in a demonstrated thermal refuge area at the confluence of tributary creeks, increase instream cover, pool frequency and planform diversity by increasing the function of wood in the channel. The increase in wood is designed to approach historic conditions and is expected to lead to an increase in floodplain connectivity and an associated reduction in mainstem bed scour. Associated riparian treatments should increase shading and wood recruitment to the channel.

Cavanaugh Creek Island Project

Objective: To improve the low flow connectivity of a side-channel and increase habitat diversity in a demonstrated thermal refuge area through creating logjams, and increase shading and wood recruitment potential with riparian planting.

The Cavanaugh Island project is located in the South Fork between RM 16.6-17.0. The project reach includes the greatest length of side channel habitat in the South Fork watershed. The channel is separated from the main channel by an 11-acre island that is forested with deciduous trees and occasional young conifers. During the low flow period, the side channel is dry, but it receives enough water from the mainstem during high discharge events to maintain a 30-foot wide unvegetated, gravel-dominated bed. The project seeks to improve habitat diversity in the Cavanaugh Creek reach by maintaining year-round flow in the side channel. Flow will be encouraged into the channel by using pilings to create two wood accumulations to draw the

thalweg of the main channel toward the head of the island. Riparian restoration on the island will increase the stability of the island, and large wood will be placed in the side channel to impede flow and provide instream cover for rearing juveniles. The project also includes placing three wood structures in the thermal refuge areas associated with Cavanaugh Creek, located at the downstream end of the side channel. These structures will improve habitat quality in known cool water influence areas, including the plumes of two cooler water tributaries and a groundwater seep that enters the channel from terrace bordering the western side of the channel. This is the fourth highest ranked project in the Upper South Fork Nooksack River Habitat Assessment and the second highest ranked project not currently funded.

Benefit: The project is expected to improve habitat diversity in a demonstrated thermal refuge area at the confluence of Cavanaugh Creek, increase instream cover, pool frequency and planform diversity by increasing the function of wood in the channel and increase the connectivity of a side-channel. Associated riparian treatments should increase shading and wood recruitment to the channel.

Larson's Floodplain Refuge Project

Objective: Improve connectivity with cool water side-channel. Increase habitat diversity in an area with abundant groundwater seeps from an adjacent terrace.

This site is a series of groundwater-fed floodplain channels located just above the Larson's Bridge at RM 20.9. A relict South Fork channel, dating from the 1940s, runs through the forested floodplain and mixes with the main channel. Flow in the relict channel are low in the summer; however, temperatures (7-DAM) recorded in this channel averaged 12.5°C between July and October 2005. The best water quality conditions of all stations sampled were observed at this site. Temperatures recorded in the coldwater plume also maintained low values, providing an instream refuge for fish in the area during warm periods. This is the sixth highest ranked project in the Upper South Fork Nooksack River Habitat Assessment and the third highest ranked project not currently funded.

Benefit: Increase habitat diversity in cooler water section of the river and increase connectivity of a floodplain channel.

USFS Road Network Monitoring and Maintenance

Objective: reduce sediment production from sites with known deficiencies

The SF/MF Watershed Analysis found that, regarding reduction of sediment production from roads, most roads have been improved, but several sites have known deficiencies and need correcting. Specific findings include the need to: (1) monitor the road network; (2) correct remaining drainage and stability problems on USFS Road 12 between Mileposts (MP) 7 and 9; and (3) Road 1260 will require periodic maintenance from MP 0.8 to 2.2, including brushing and ditch line cleaning due to raveling cut banks.

Benefit: reduced sediment delivery, stream pirating associated with USFS roads in upper South Fork

Years 4 and 5 of Skookum Chinook Supplementation Program

Objective: To increase the natural spawning population of the South Fork Nooksack River Early Chinook population, currently at risk of extinction, while minimizing the effects of hatchery intervention on the genetic integrity of the stock. (Target release of 200,000 sub-yearlings by year 4 of the program)

This activity will continue the program funded by the Pacific Salmon Commission Southern Endowment Fund that will expire in 2008 without additional funding. The requested support will cover the expenses of hatchery staff and operations essential to the supplementation program and hatchery improvements required to ensure safe and effective achievement of program goals. Brood Stock selected from adults diverted into the hatchery by a weir across the South Fork and identified to stock by microsatellite DNA analysis. Protocols have been developed to minimize risk from disease and the nature of operations in an isolated location. Hatchery production will be Coded Wire Tagged under the Pacific Salmon Commission Indicator Stock Program to evaluate survival and contribution to fisheries. The sub-yearlings will be released voluntarily in mid-May.

Benefit: established South Fork early chinook program and, ultimately, improved abundance of South Fork early chinook

Captive Brood Program at WDFW's Kendall Hatchery

Objective: To increase the abundance of the South Fork Nooksack River Early Chinook population, currently at risk of extinction, through raising a portion of the offspring from each mated pair without release to the wild, and transferring ripening adults back to Skookum Hatchery. (Target of approximately 250 juveniles per year with the program running for approximately 8 years.)

Offspring from Skookum Hatchery South Fork broodstock that meet the desired microsatellite DNA stock assignment will have a small portion of each family group transferred as eyed eggs or fry to WDFW's Kendall Hatchery, where they will be raised until maturing adults. Ripening adults will be transferred back to Skookum Hatchery to be spawned, with offspring reared and released as described in the Skookum Chinook Supplementation. Very recent microsatellite DNA analysis indicates approximately 20-30% of recently sampled wild adults were assigned to the South Fork spring chinook baseline.

Benefit: Increased short-term abundance of this population, which will transition to a traditional hatchery population rebuilding program upon completion and while degraded habitat conditions are addressed such that natural population productivity increases.

Captive Brood Program at Manchester Research Station

Objective: To increase the abundance of the South Fork Nooksack River Early Chinook population, currently at risk of extinction, through raising a portion of the offspring from each mated pair to adulthood without release to the wild, and transferring ripening adults back to Skookum Hatchery. (Target of approximately 250 juveniles per year with the program running for approximately 8 years.)

Offspring from Skookum Hatchery South Fork spawned broodstock that meet the desired microsatellite DNA stock assignment will have a small portion of each family group transferred as smolts (approximately 3 months old) to NOAA Fisheries Manchester Facility (Port Orchard, WA), where they will be raised until maturing adults. Ripening adults will be transferred back to Skookum Hatchery to be spawned with offspring released as described in the Skookum Chinook Supplementation. Very recent microsatellite DNA analysis indicates approximately 20-30% of recently sampled wild adults were assigned to the South Fork spring chinook baseline.

Benefit: Increased short-term abundance of this population, which will transition to a traditional hatchery population rebuilding program upon completion and while degraded habitat conditions are addressed such that natural population productivity increases.

Skookum Creek Hatchery Water Supply

Objective: To insure a steady supply of water and provide the redundancy appropriate to the rearing of native early chinook at the Skookum Creek Hatchery.

Skookum Creek Hatchery utilizes two sources of water for its operations, Skookum Creek and wells on the hatchery property. Well water is required for the incubation and early rearing because its temperature is well above that in the creek water and promotes accelerated growth during winter months. Water from the creek is required for the final grow out to release for purposes of improved growth as the season progresses and to ensure imprinting to the hatchery entrance upon their return. The current water supply requires an additional measure of redundancy to ensure the safety of the chinook supplementation program while meeting the other objectives of the hatchery. Additional water will be required when the chinook program reaches its full production. The intake in Skookum Creek must be modified to reduce the impact of sediment loads and changes in bed elevation on the intake, minimize the transport of sediment into the hatchery, to meet appropriate screening criteria and provide for improved passage in the creek for bull trout and native chinook. The production of the existing wells has deteriorated in recent years and rehabilitation of the existing wells and location of new wells is necessary to ensure the margin of safety required for safe and effective implementation of the chinook supplementation program as well as meeting other hatchery objectives. Project is contingent on landowner willingness to proceed.

Benefit: stable water supply sufficient to support Skookum hatchery operations

Skookum Cr Riparian Forest Conservation Easement

Objective: Protect riparian forests and the functions they provide to Skookum Creek.

This project will protect through acquisition of either easement or fee purchase of 300-600 acres of riparian forest along Skookum creek, from the mouth upstream 5 miles. This reach has been identified in the WRIA #1 Salmon Recovery Plan as “Protection Category A”. Protection of the riparian forests along this reach will address the limiting factors of low habitat diversity by protecting maturing riparian forests and allowing them to reach an older age and be recruited into Skookum Creek to serve as large woody debris and thereby increase diversity of habitat within the Skookum Creek channel. For larger landowners, some selective timber harvest is allowed even within the 200 shoreline buffer along Type 1 fish bearing streams, and further timber harvest is allowed within even smaller buffers along smaller streams. These buffer sizes and partial

harvest restrictions are not at all sufficient to provide the size and volume of native trees that have historically provided large woody debris to WRIA#1 streams and rivers. Furthermore, a recent study by DNR of the recently approved Forest and Fish rules found that only 60% of logging operations followed the forest practice rules. This result raises concern for the impact of forest practice regulations on endangered salmon habitat and points out once again the need to simply acquire critical habitat for species recovery rather than relying on the ability of individual landowners to understand and follow the complex set of forest practice rules and on an understaffed DNR Forest Practices Division to enforce the rules. Project scope has been prepared and is ready to proceed pending funding.

Spawning Channel Feasibility and Design

Objective: To determine conclusively the feasibility of constructing a chinook spawning channel in the South Fork Nooksack River with a capacity for 100 spawning pairs.

Preliminary studies of chinook redds in the South Fork have documented many problems with the ultimate survival of the spawn from those adults that return to the river. The supplementation program at the Skookum Creek hatchery is one approach to ensuring a higher productivity from returning adults, but still entails a level of risk that could be further reduced if it were possible to create an area protected from the erosional and sedimentation risks existing in the currently degraded channel conditions found in the South Fork. An additional benefit would be the ability to regulate the entry into the channel of non-native chinook later in the season. The objective would be to duplicate the success of the spawning channels for pink and sockeye salmon which allow for natural mate selection and controlled water quality and quantity as well as controlled sediment levels and yield high potential egg deposition to fry production. Similar success has not been encountered in the few spawning channels established to replace lost chinook spawning areas. This project would be staged in a series of phases that would progress as information supported continuation of the work. Phase 1: Analysis of critical chinook spawning habitat data, evaluation and critique of attempts to create controlled chinook spawning areas, and specification of requirements for a successful chinook spawning channel. Phase 2: Identification of locations within the South Fork meeting the specification of requirements for a successful chinook spawning channel, development of preliminary design options for the most likely locations, evaluate options with objective ranking criteria, prepare preliminary design and specifications for a channel at the highest ranking site and prepare initial cost estimates and construction schedule for a spawning channel. Landowner willingness will ultimately be required to evaluate sites and proceed with project.

Benefit: Protected spawning habitat for 100 pairs of native early chinook under natural conditions eventually resulting in 100,000 to 150,000 fry from naturally mated parents and reared under natural conditions.

Lower South Fork Flood/Salmon Coordination (Below Hutchinson Creek)

Objective: Increase habitat diversity, reducing poaching impact

This project seeks to develop coordinated salmon habitat and flood management projects for the South Fork in a location near Acme.

This project includes working with Whatcom County Public Works and Parks Departments to address the right bank erosion at the Acme Farm and the failing rock revetment at the Roos property (Dozer Hole). Accomplishing these objectives may include attempting to split flow on the left bank floodplain upstream adjacent to the Roos property to enhance floodplain connections and side channel formation and maintenance to enhance rearing opportunities.

Benefit: The project will improve habitat diversity in the reach through increasing side channel areas, increasing the number of pools in the reach, and providing improved cover to existing pools. It is expected that the project could lead to 3600 feet of secondary channel through relict floodplain channels. The project will also improve woody cover on a riprap pool that is currently subject to poaching of Threatened species.

Skookum to Confluence Integration of Salmon Habitat Reach Assessment & Projects with Flood Management (SF Hydraulic Modeling)

Objective: Develop refined tools to help guide integrated salmon and flood projects in the South Fork and to support community vision for restoration and future management

Benefit: Reaches that pose increased flood risk with increase restoration effort will be identified and tools and strategies developed to realize greatest restoration benefit while also addressing flood hazard management issues.

Acme Early Chinook Restoration

Objective: Increase habitat diversity, improve floodplain connectivity, reduce flood hazard to Acme.

This project seeks to develop coordinated salmon habitat and flood management projects for the South Fork in a location near Acme.

Habitat objectives of this project include improving South Fork floodplain connections and fine sediment storage at the former RV Park, improving habitat diversity and complexity, and maintaining connectivity for juvenile salmonids accessing the slough in Riverview Park and Landingstrip Creek. Reducing flood risk for the community of Acme is a primary flood management goal of this project. It should be noted that existing infrastructure currently limits floodplain functions in this area and that changes to infrastructure extend considerably beyond the 3-year planning horizon for this exercise. Planning and design costs are estimated at ~\$86,400. Construction costs are to be determined and are estimated at ~\$840,000.

Benefit: Improved complex pool habitat and thermal refugia; improved floodplain connectivity on one or both banks of the South Fork; community springboard for reach-scale discussions of salmon recovery and flood hazard management.

Confluence to Saxon Restoration Acquisitions

Objective: Acquire properties in the Saxon to Confluence reach of the South Fork that are necessary to implement planned priority restoration projects.

This project will acquire fee simple interest in 2-5 properties where habitat restoration projects are planned. This project address the limiting factors of habitat diversity, temperature and

sediment load by acquiring key restoration properties and keeping them in conservation status perpetually in order to fully control and restore key salmon habitat structures. Possible sites include the Todd Creek confluence, the junction of Caron Creek and Tawes Creek, property near Standard Creek confluence and the confluence of Hardscrabble Creek. These sites have been discussed in the South Fork Nooksack River Acme-Confluence Reach Restoration Planning: Analysis of Existing Information and Preliminary Restoration Strategies as possible locations of large, instream woody log jams. Other sites include wetland and potential properties that will support the **Lower South Fork Wetland Water Storage Improvement** project. Acquisition of these sites will provide willing landowner support for construction, monitoring and maintenance of the restoration projects.

Preliminary design of acquisition sites is underway with initial consultation with Nooksack Natural Resources and Lummi Natural Resources. Estimated date for completion is 6/2010.

Lower South Fork Joint Transportation/Restoration Planning

Objective: Develop habitat restoration projects in conjunction with possible replacement or relocation of existing transportation infrastructure.

Whatcom County is currently planning to replace Potter Road Bridge and improve drainage on Potter Road east and west of the bridge to increase public safety and access during flood events and to improve flood routing and salmon habitat functions. A second planning area lies between the State Route 9 (SR9) Acme Bridge (RM8.5) and the Burlington Northern Sante Fe Railroad (BNSF) Bridge (RM7.7). SR9 near the BNSF Bridge is considered a chronic maintenance problem by WSDOT (1999 Highway Concerns Review). Whatcom County is currently developing a hydraulic model for the South Fork Nooksack River which will help determine the extent to which the two bridges (BNSF and SR9) might be contributing to flooding concerns. This restoration planning project would complement the transportation planning process to optimize benefits for transportation and fish. Desired restoration elements include: (1) construction of instream logjams in an area of cool water influence to increase quantity of thermally-stratified deep pools with cover; and (2) construction of logjams along the margins of the HMZ to encourage greater connectivity with these surfaces, to increase the availability of off-channel habitat, reduce mainstem velocities and encourage floodplain deposition of fine sediment. The project will be implemented in two phases by area, with an estimated planning cost of \$100,000 for each area. Projects are likely to require landowner willingness to proceed with implementation.

Benefit: Two restoration plans coordinated with transportation plans

Bell Creek Road Crossing (Upper South Fork)

Objective: Allow bedload transport and migration

The Road 12 crossing of Bell Creek in the upper South Fork watershed is a partial bedload barrier and a complete fish barrier which fragments an isolated population of genetically identified, native Dolly Varden. This project involves replacing a culvert with a bridge. Because this road currently provides access to the SnowTel site and may not be maintained, the bridge will be designed to be easily removed if necessary. The project objective is to allow for bedload transport

and migration of resident Dolly Varden. Likely sponsors for the project are Whatcom County or the U.S.D.A. Forest Service. This project is estimated to cost \$95,000. All permitting and NEPA compliance has been completed.

Benefits: restored fish passage at 1 resident fish barrier

Middle Fork Nooksack

Middle Fork Reach Assessment and Restoration Planning

Objective: Develop comprehensive restoration plan for Lower Middle Fork to address Nooksack chinook limiting factors

This project will assess limiting habitat conditions and plan restoration projects in the lower Middle Fork Nooksack River from the confluence with the North Fork upstream to the gaging station upstream of the Mosquito Lake Road bridge (RM 0-5.5). Objectives include: (1) synthesis of existing information and collection of new data to characterize limiting habitat conditions and habitat-forming processes; (2) identify and prioritize project concepts that address limiting habitat conditions. Similar efforts have been completed and/or are underway for 3 reaches that comprise the anadromous extent of the South Fork Nooksack (RM 0-8, 8-14.3, 14.3-31) and for much of the anadromous extent of the North Fork Nooksack (RM 36.5 – 57). Restoration of the lower Middle Fork is expected to benefit early chinook spawning and rearing success.

Benefit: comprehensive plan for restoration of lower Middle Fork that addresses limiting factors for early chinook and other species.

Middle Fork Diversion Dam

Objective: To restore anadromous fish passage at Middle Fork diversion dam

Restoration of anadromous fish passage at the diversion dam on the Middle Fork Nooksack River at RM 7.2 will restore access to at least 10.2 miles of Middle Fork and 6.9 miles of tributary habitat. The 90% feasibility study for a new intake structure and partial dam removal has been completed, and a Charrette/Value Engineering Study completed. This revised the cost estimate for this option to \$22,300,000. The fish ladder design option to restoring passage is complete through 90% feasibility, and it is anticipated to also go through a Charrette/Value Engineering Study to review the design and associated costs. The project is expected to improve the abundance, productivity, spatial structure and diversity of NF/MF Nooksack early chinook.

Benefit: Restored passage at MF diversion dam to 17.1 miles of potential chinook habitat

Middle Fork Diversion Dam: Kokanee Program

Objective: To develop alternative kokanee production facilities to the Lake Whatcom program

The Lake Whatcom Hatchery is the primary source of kokanee (non-anadromous *Oncorhynchus nerka*) for Washington State, used to stock 36 lakes and reservoirs and supporting recreational fisheries valued at over \$20 million yearly. While the risk of virus transfer to Lake Whatcom through the pipeline from the Middle Fork is low, the Lake Whatcom Hatchery will lose its

pathogen-free water certification once anadromous fish use upstream of the diversion dam is restored. Loss of pathogen-free status will necessitate testing of all adults from which eggs or offspring are intended to be transferred out of the local fish or egg health management zone, a level of testing which is considered to be infeasible. The Legislature funded WDFW to initiate a feasibility study to identify sites that could be used to replace the Lake Whatcom kokanee egg supply, and the recommended option was for multiple brood lakes plus construction of additional hatchery capacity. WDFW supports the restored anadromous use to the Middle Fork above the diversion, with the understanding that kokanee brood facilities to replace Lake Whatcom production needs to be funded and constructed as close as possible to restoring passage to avoid or minimize the duration of kokanee hatchery production reductions. The WRIA 1 Salmon Recovery Board supports the WDFW efforts to obtain funding from the state legislature, although acquiring the funding is not a prerequisite to restoring passage.

Benefit: N/A

Nooksack Middle Fork Instream Phase 1 (Mosquito Lake Road Bridge to Porter Creek reach)

The objective of the Nooksack Middle Fork Instream Phase 1 project is to design and construct 15 to 20 LWD structures along a one mile reach of the lower Middle Fork channel from the Mosquito Lake Rd Bridge to Porter Creek.

Benefit: The project will improve and protect stable spawning habitat, a primary limiting factor of North /Middle Fork ESA listed native chinook in a reach which currently attracts up to 80% of the Middle Fork chinook spawning population and prior to 1995 supported the majority of MF tributary steelhead spawning. When complete the project is expected to 1) encourage the preservation of a 100 acre forested channel island and an associated spring fed side channel, 2) balance flows between two one mile long river channel reaches to maximize habitat area and provide considerable protection to developing stable spawning habitat and 3) initiate habitat recovery of the mile long Porter Creek channel reach

Middle Fork Project Phase 2 Bedrock Pool Reach

Design structures to stabilize existing wood debris, collect transient wood and provide key instream structure in active channel of the Middle Fork from Porter Creek to the confluence with the North Fork prioritized based on results of 2007 SRFB funded Middle Fork Assessment.

Benefit: The project will improve and protect stable spawning habitat, a primary limiting factor of North /Middle Fork ESA listed native chinook.

Upper Middle Fork Spawner Surveys

Restoring passage to the Middle Fork is anticipated to result in natural colonization by steelhead, coho, and anadromous bull trout, and by early chinook returns from the ongoing off-station Kendall Hatchery releases that have occurred above the existing dam. Effective spawn survey coverage of this habitat is needed to monitor habitat recolonization, North/Middle Fork chinook population size, including natural and hatchery origin abundances, and to collect coded wire tags essential for use in estimating harvest rates for this Pacific Salmon Treaty Indicator Stock. Due

to the stream sizes and remoteness, spawn surveys will primarily be conducted in two person crews.

Benefit: improved escapement estimate for Nooksack early chinook; improved understanding of species use to reconnected habitat

Middle Fork and Tributary Acquisitions (2-5 parcels key for salmon recovery)

Objective: Acquire properties on the Middle Fork Nooksack and tributaries that have been identified as necessary for salmon recovery.

This project will purchase fee simple interest in 2-5 properties where fishery biologists and unpublished analysis have identified key habitat restoration project sites. This project addresses the limiting factors of channel stability and habitat diversity by acquiring key sites and keeping them in conservation status perpetually in order to fully control and restore planned salmon habitat structures. Acquisition of these sites will provide perpetual and willing landowner support for construction, planting, monitoring and maintenance.

North Fork Nooksack

Lower Canyon Creek Design and Restoration

Objectives: to improve adult passage and restore processes that create habitat diversity and complexity for early chinook and pink salmon, bull trout, and other salmonids

Restoration objectives that factor in geomorphic, habitat, alluvial fan flood risk, and public outreach goals have been defined in the completed assessment. Phase 1 project design and sequencing has been defined with proposed options for Phase 2 design and implementation. Habitat priorities include providing long-term passage at a recognized barrier to upstream spawning areas for early chinook, pinks, bull trout, steelhead, and other salmonids and providing improved in-stream habitat structure and diversity while habitat forming processes recover in both the stream and adjacent riparian areas.

Benefit: restore passage to 4.1 miles of chinook habitat; increased pool quantity, spawning gravel availability, backwater habitat, cover availability, channel stability (i.e. less redd scour, channel shifting, improved riparian retention) in 0.9 miles of early chinook tributary habitat.

Lower North Fork Reach Stable Side Channel Restoration (Phase 1-4)

Objective: wood placement to improve channel stability, promote and protect forested island formation, and protect side channels for early Chinook spawning

This suite of projects seeks to protect and restore stable, off-channel spawning and rearing habitat to improve egg-to-emergence and juvenile rearing survival. The project concepts have been developed through an ecological assessment of the lower North Fork (Nooksack Tribe, in progress) that identifies lack of wood and loss of forested islands, in addition to higher and more frequent peak flows, as the most important factors in the channel instability that has been observed there. Preliminary strategies proposed include:

- (1) Install stable logs and log structures at the upstream extents and lateral margins of existing or incipient channel islands, to encourage island growth, maturity, and stability. Design structures to collect and trap additional wood;
- (2) Fortify entrances to back channels with stable wood structures that scour a narrow flow aperture, ensuring low-flow inundation but preventing major avulsion into the off-channel habitat;
- (3) Construct new or augment existing wood accumulations to promote formation of new forested channel islands by increasing roughness, encouraging fine sediment deposition and tree seedling establishment and growth to maturity;
- (4) Add wood structures to braids and younger back channels to provide instream cover and promote habitat diversity.

Preliminary project concepts, costs, and phasing have been proposed. Projects are contingent on landowner willingness to proceed. Phase 1 (Lone Tree) was constructed in 2008; an expansion of the project (Lone Tree Phase II) is funded and will be constructed in 2009. Future phases will be sequenced thus: (1) feasibility assessment (landowner contact, alternatives analysis, conceptual design); (2) design (permitting, construction-ready design, flood risk assessment); (3) construction; and (4) monitoring. Reaches have been prioritized and highest priority reaches will be restored first.

Benefit: increased stability, low flow connectivity of side channels; increased key habitat quantity (complex edge, backwater habitat) in side channels

Lower North Fork Reach Tributary Restoration

Objective: improve habitat conditions in lower tributary reaches and at mainstem-tributary junctions

This suite of projects seeks to restore tributary spawning and rearing habitats that can provide refugia from mainstem floods by: (1) placing logjams on mainstem floodplains to encourage side channel development in association with tributary junctions; (2) placing wood in tributary reaches to improve habitat complexity and diversity; and (3) restoring historic channel configuration in reaches that have been straightened and simplified. Preliminary concepts and costs have been developed for three sites: (1) Boulder Creek confluence, \$190,000; (2) Gallop Creek, \$200,000; (3) Bell Creek/Spruce Roost, \$95,000.

Lower North Fork Floodplain Riparian Restoration

Objective: Increase wood recruitment potential to improve channel stability and habitat diversity in the lower North Fork floodplain and increase shading to moderate temperatures in side channels

This project involves riparian planting in unforested or understocked areas in and within 260 feet of the North Fork floodplain in this reach. A rough preliminary cost estimate is \$100,000. Project is contingent on willingness of landowners of properties likely to be affected by the project.

Lower North Fork Tributary Riparian Restoration

Objective: Increase wood recruitment potential to improve channel stability and habitat diversity in the lower North Fork floodplain and increase shading to moderate temperatures in side channels

This project involves riparian planting in unforested or understocked areas along tributaries to the lower North Fork. A rough preliminary cost estimate is \$100,000. The projects are contingent on willingness of landowners of properties likely to be affected by the project.

North Fork Restoration Acquisitions (2-5 parcels key for restoration)

Objective: Acquire properties on the North Fork Nooksack that have been identified as necessary to implement planned priority restoration projects.

This project will purchase fee simple interest in 2-5 properties where fishery biologists and unpublished analysis have identified key habitat restoration project sites. This project address the limiting factors of channel stability, habitat diversity and sediment transport by acquiring key sites and keeping them in conservation status perpetually in order to fully control and restore planned salmon habitat structures. Possible sites include Boulder Creek confluence, Gallop Creek, and additional lands near Bell Creek and Big Spruce Roost/The Glen, Warnick Reach, Hatchery Reach Island Enhancement Kenny Slough and the Lone Tree Island reach. These sites are possible locations of large, instream woody log jams and riparian forest restoration. Acquisition of these sites will provide perpetual and willing landowner support for construction, planting, monitoring and maintenance.

Preliminary design of acquisition sites is underway with initial consultation with Nooksack Natural Resources and Lummi Natural Resources. Estimated date for completion is 10/2010.

Other

Invasive Weed Control

Objective: to use existing inventory data to implement controls on invasive weed infestations to foster recovery of natural riparian plant species and riparian functions in priority chinook recovery areas which are currently limiting.

This project will use existing inventory information to guide the control of invasive weed infestations that dramatically alter riparian species composition and jeopardize long-term riparian functions such as shading and large woody debris recruitment. The focus is on the Knotweed family in riparian areas of WRIA 1 with the primary emphasis being on seed/plant source areas within or draining into Chinook priority areas.. Specific targets include Japanese knotweed (*Polygonum cuspidatum*), Giant (*P. sachalinense*) and Himalayan (*P. polystachyum*). Existing inventories will be supplemented as new infestations are documented. Areas along the active channel and isolated populations where knotweed is established and is most likely transported to form new colonies downstream will be prioritized for treatment. Projects are likely to be contingent on landowner willingness.

Benefit: decreased occurrence, rate of spread of knotweed; less competition for native riparian species

Mainstem Nooksack River

Upper Mainstem Reach Assessment and Restoration Planning

Objective: Develop a comprehensive restoration plan for Mainstem Nooksack River to coordinate with flood management planning

The purpose of this project is to assess limiting habitat conditions (habitat diversity, quantity of key habitat like pools and off-channel habitat) and plan restoration projects in the Mainstem Nooksack River from the upper extent of the estuary to the Forks confluence (RM 36.5).

Objectives include: (1) synthesis of existing information and collection of new data to characterize limiting habitat conditions and habitat-forming processes; (2) identify and prioritize project concepts that address limiting habitat conditions; (3) work with County River and Flood to evaluate project feasibility; and (4) conduct education and outreach to affected landowners.

Similar efforts have been completed and/or are underway for 3 reaches that comprise the anadromous extent of the South Fork Nooksack (RM 0-8, 8-14.3, 14.3-31) and for much of the anadromous extent of the North Fork Nooksack (RM 36.5 – 57). Restoration of lower Nooksack River habitats is expected to benefit early chinook oversummer and overwinter rearing.

Benefit: comprehensive plan for restoration of Mainstem Nooksack that addresses limiting factors for early chinook, including identification of several projects that are feasible under current floodplain management context

Integration of Salmon Habitat Reach Assessment & Projects with Flood Management

Objective: to inventory current habitat conditions and identify habitat restoration and protection needs and priorities in order to reduce conflicts with flood management actions and optimize restoration opportunities.

This project will build on existing geomorphic, hydraulic, and habitat data for key reaches of WRIA 1 where flood management needs are most pressing and where conflicts with restoration objectives are most likely. Existing habitat restoration assessments will be used where available. Reconnaissance level assessments will be prepared in priority reaches, such as between Everson and Deming, pending availability of more detailed reach assessments. Products will be prepared in consultation with the salmon co-managers and Whatcom County River and Flood.

Benefit: better coordination of restoration and flood management objectives

Sande Bar Levee Setback and clay bank stabilization

Objective: to reduce a fine sediment input that degrades water quality (i.e. turbidity) in the Nooksack River mainstem and estuary to modify a channel confining structure that alters floodplain connectivity, and to improve in-stream habitat complexity.

The project scope is to analyze alternatives and risks, prepare feasibility designs and costs, prepare final design, implement, and monitor a project(s) to reduce or eliminate toe erosion at the ‘Clay Bank’ in the mainstem Nooksack River. Failure of the ~200’ tall slope introduces large volumes of fine-grained sediment to the river chronically impairing water and habitat quality. Historic catastrophic slope failures have also temporarily blocked and diverted the river onto the floodplain to the north. A ‘hook’ in the right bank levee directs flow toward the slide, exacerbating slope failure. A combination of instream structures, levee setback, acquisition or easements on key properties, and design of a controlled overflow path are among the options to be considered to reduce long-term habitat impacts and need for more extensive and confining flood infrastructure. Projects are likely to be contingent on landowner willingness to proceed.

Benefit: improved habitat diversity (wood cover), backwater and complex edge habitat, reduced velocities during flood flows; decreased turbidity, fine sediment downstream of slide.

Piling Jam, 4 Sites

Objective: Demonstrate an economical and effective method to improve channel roughness, cover and quiet water refuge particularly applicable to the single thread reaches of the main stem of the Nooksack and beneficial to salmonid stocks.

Install log piling arrays (similar to structures installed in early 1900’s to protect river banks) to collect and hold wood debris, roughening the channel margins, creating fish cover and backwater habitat. Targeted species and life stage include both adult and juvenile stages of all salmonid species of the Nooksack River but in particular those species with extended freshwater adult holding and juvenile rearing stages. Projects are likely to be contingent on landowner willingness to proceed.

Benefit: increased cover and backwater habitat along 400-1200 feet of mainstem edge habitat

Estuary and Adjacent Waters

Modeling of Currents in Bellingham Bay Under Different Flow Regimes

Objective: Configure COHERENS hydrodynamic software to model physical processes in Bellingham Bay under different conditions of tide, creek and river discharge and wind, and collect data allowing calibration and validation of the computer model to provide a basis for identifying potential estuarine habitat limiting factors.

There has been much speculation on the nature of the currents in Bellingham Bay that may be a factor in the distribution of salmonids migrating from the Nooksack River through the passages to the open ocean. The COHERENS model will allow provide knowledge and information about water circulation, stratification, and distribution under typical, unusual and hypothetical conditions. This information will facilitate the sampling of chinook in the estuarine area of the Nooksack River to identify potential limiting factors associated with near shore and upland anthropogenic influences.

Benefit: increased understanding of current patterns that may affect juvenile chinook distribution in Bellingham Bay

Chinook Habitat Use Assessment of Bellingham Bay and Adjacent Areas

Objective: To identify habitat factors associated with the distribution and abundance of early Chinook in the areas adjacent to the mouths of the Nooksack River and identify anthropogenic impacts on ecosystem processes that may affect the productivity of the early Chinook runs to the Nooksack River.

Building on information generated from beach seine and open water salmonid surveys, implement a two year program to identify the habitats most frequented by Chinook leaving the Nooksack River. The project would regularly sample on shore and off shore habitats from Chuckanut Bay to Point Whitehorn, estimate the origin of hatchery and natural Chinook encountered and characterize the habitats sampled. The programs would provide a test of current hypotheses concerning the importance of near shore habitats on chinook use and abundance. The three year program will involve two years of sampling and sufficient time for analysis of results and communication of the results.

Benefits: increased understanding of distribution and abundance of chinook in Bellingham Bay and adjacent areas

Complete WRIA 1 Nearshore Habitat Prioritization with Salmon Overlay

Objective: To work with other groups, such as the Marine Resources Committee, to integrate the results of existing nearshore restoration plans and project lists into order to identify data gaps, to provide a way to prioritize projects across a range of nearshore habitat areas, and to design project priorities with respect to salmon recovery.

The goal of this project is to better integrate ecological restoration projects in both the freshwater and marine environments of WRIA 1 and across multiple programs with potentially differing objectives. The project will entail the review of existing nearshore restoration planning documents, proposed projects, and criteria for project prioritization. This information will be used to develop criteria (salmon overlay) to be used to identify and prioritize those projects which have a distinct salmon recovery benefit within the context of a larger nearshore ecosystem function.

Benefit: A strategy to better help plan and collaborate on projects within the nearshore will be generated and will allow for prioritization within nearshore projects and to help gauge the relative benefit with respect to freshwater salmon recovery projects.

Smuggler's Slough Acquisition and Reconnection

Objective: Restore access to historic estuarine habitat, improve water quality, restore tidal and saltwater influence to evaluate improved utilization and productivity of chinook.

The goal of this project is to reconnect Smuggler's Slough to the Nooksack River and Lummi Bay. The project includes acquisition and restoration of wetland areas adjacent to the channel that will likely be affected by reconnecting the slough. The reconnection will include removal or alteration of tide gates at multiple locations in the estuary, as well as improving channel connectivity under roads and in ditches. The project will also remove portions of the Lummi Bay seawall to allow tidal inundation and salt marsh habitat in the area between the southern

distributary channel of the Lummi River and setback levees formed by Kwina and Hillaire Roads. Riparian planting of the channels will follow design. Fresh water wetlands restoration will be accomplished in later project phases. It is estimated that the initial project will cost \$2,100,000 over four years with the first phase of property acquisition and design to take place in 2007 at a cost of \$300,000. The planning of the project will require landowner participation in setting project objectives and allowable scope of work.

Benefit: 250 acres of wetland acquired and 500 acres of flood plain wetland restored, restored passage to 6-8 miles of tidal slough and Lummi Bay

Cost: 3-year project cost estimate is \$3,000,000

Squalicum Creek Estuary Restoration

Objective: Restore estuarine marsh and intertidal mudflat in the Squalicum Creek delta.

Project elements include: (1) Removal of a derelict pier and associated creosote pilings, as well as over 200 additional creosote pilings; (2) restore 0.4 acres of estuarine fringe marsh; (3) restore 0.4 acres of riparian buffer; and (4) use clean dredge spoils to increase the area of shallow water intertidal habitat. Such habitat restoration is expected to benefit Nooksack early chinook fry and parr migrant life stages by restoring rearing habitat for physiological transition and feeding and refuge in a nonnatal estuary within 5 miles of the Nooksack River delta. Funding is needed for estuarine and riparian buffer restoration; removal of derelict structure and pilings will likely occur as mitigation for redevelopment in the area.

Benefit: restore 0.4 acres of estuarine fringe marsh, 0.4 acres riparian, increased shallow intertidal area associated with Squalicum Creek estuary

Chuckanut Village Marsh Restoration

Objective: Perform the preliminary design and permitting necessary to result in the restoration of the Chuckanut Village Marsh.

Tasks for this project include conducting a wetland assessment, developing a culvert removal memorandum, and completing submittal-ready permit applications. The wetland assessment will first be performed to characterize the wetland, determine the type and category, and evaluate functions. Information gathered from this task will inform the remaining two tasks of culvert removal memorandum and permit applications.

Benefit: The restoration opportunities at this site include enhancing the hydrologic connectivity and the tidal prism of the backshore wetland and recovering lost backshore habitat.

Lower Nooksack Tributaries

Bertrand Creek Wetlands Enhancement

Strategies for achieving an adequate water supply for varied uses are part of the instream flow negotiations described in the Overview document. The strategy for meeting all water demands includes defining and installing facilities intended to augment instream flows at critical low flow periods. Identified projects include:

- Bertrand Creek wetlands enhancement to increase water storage and infiltration to increase discharge to and augmentation of baseflow to Bertrand Creek. Additional projects will be identified that are intended to support the specific water demand needs, instream flow needs and hydrology of the subject watershed as the negotiations proceed. Estimated 3-year cost: \$55,000

Benefit: increased instream flow in Bertrand Creek

Main Stem Nooksack- Fish Trap Creek (Double Ditch Acquisition and Relocation; Fish Trap Reach Levee Setback; Improve Riparian Conditions along Fish Trap Border to Badger Reach)

- Relocate Double Ditch and Benson watercourses between Main and Badger to new corridor to improve habitat and reduce flooding associated with these streams. Project involves purchasing a 5,000' by 200' foot easement between the Benson and Double Ditch Roads, constructing a new channel and restoring the riparian corridor. Estimated three year cost \$1,000,000 which includes the purchase of a 22 acre easement and construction of channel.
- Improve stream crossing on Fish Trap and Double Ditch Creeks. Project involves replacing two undersized crossing, one on Fish Trap at main and a second on Double ditch at 17th Street to improve fish passage and flow conveyance. The Double Ditch project will be constructed in the summer of 2007 while design and engineering work of the Fish Trap project will begin in 2008 with construction planned for 2010. Total three year cost is estimated to be \$2,000,000.
- Improve habitat, storage, and drainage along the Border to Badger reach of Fish Trap Creek. Project involves completing hydrologic analysis of channel, design and engineering, in channel work and riparian restoration along a three mile reach of the creek to improve fish habitat and drainage. Total three year cost \$850,000 of which \$300,000 is in hand.
- Establish Instream flows for the Fish Trap basin. It is envisioned the Fish Trap basin will be the site of the next pilot in stream flow effort given the basin shares many of the same issues with the Bertrand. Work is underway to form a watershed improvement district to effectively deal with instream flow, flood and drainage issues. No estimate has been made for the three year cost.
- Levee set back along lower Fish Trap Creek. Project involves setting an existing levee back along 2 miles of lower Fish Trap Creek. Project actions include acquiring approximately a 40 acre easement to provide the footprint to accommodate a 200 foot levee setback along the two mile reach of Fish Trap Creek, design and engineering, relocation of the levee, and in channel habitat improvement. Costs during the three year period are estimated to be \$300,000 for acquisition and engineering.

Flood Gate Modification

Objective: Improve fish access to 20an estimated 10 miles,000 feet of flood plain tributary channel, associated wetlands, and ponds.

Modify existing flood gates to improve flow connectivity and fish passage between river and floodplain habitats on the Schneider, Whiskey, and Cougar Creek systems. . The proposed action is to complete an assessment of options, design and engineering, and construct preferred option. The targeted species and life stage are juvenile chinook expected to use the transition flood plain habitats between the Nooksack River and Schneider Ditch; adult and juvenile coho, steelhead, and cutthroat expected to use the entire Schneider ditch drainage. An added benefit to this project is the community outreach and good will that can be gained. Projects are likely to be contingent on landowner willingness to proceed.

Benefit: restored passage to floodplain habitats through range of flows

Other Geographic Areas and Programs

Regulatory Plan Updates

- The Whatcom County and City of Bellingham Critical Areas Ordinances were adopted in 2005, and the Whatcom County and Bellingham Shoreline Master Program updates are completed. Salmon recovery staff participated on the Technical Advisory Committee for both updates to ensure salmonid habitat is protected to the maximum extent possible. Small cities are in the progress of updating their CAO and SMPs. The updated Whatcom County CAO and SMP are expected to serve as models for those updates.

Benefit: no net loss of ecological function in city jurisdictional areas

Restoration Plan and Watershed Management Plan Implementation

Objective: Provide the resources required to provide broader community involvement and institutional support in the implementation of the Salmonid Recovery Plan and WRIA 1 Watershed Management Plan to facilitate achievement of the plans' objectives in the most effective manner.

WDFW currently provides minimum support for Lead Entity functions, primarily salmon recovery grant process with minimal salmon habitat project development through a grant of approximately \$65,000 per year. Additional resources are required to more fully support project list development and to achieve community vesting of the WRIA 1 Salmonid Recovery Plan and the specific actions proposed that affect agriculture, forestry and flood hazard management. This community vesting is essential for the successful implementation of the restoration of habitat forming and maintaining processes. Additional resources are also required to coordinate and support the progress on all 8 early action items set out in the WRIA 1 Salmonid Recovery Plan as well as providing the necessary institutional support for the reporting on plan implementation. The additional resources would allow the Lead Entity to ensure that the needs for salmonid recovery WRIA 1 are not overlooked in the state-wide and regional support for salmonid recovery.

Institutional support for the WRIA 1 Watershed Management Plan is also needed to ensure coordination and implementation of the salmon-recovery and protection actions. In particular, continued support for negotiation and legal mediation of the pilot projects is needed in 2007.

Benefit: local participation in regional, state salmon recovery forums; timely progress on implementation, all H-integration of WRIA 1 Salmon Recovery Plan

WRIA 1 Instream Flow Negotiations

Negotiations between affected parties, water rights holders, local governments, tribal governments, and the Washington Departments of Ecology and Fish and Wildlife are underway as part of the WRIA 1 Watershed Management Project. The objective of the negotiations is to determine a management system for water use that supports both instream ecological functions and out-of-stream uses such as agricultural production municipal water supply, and commercial and industrial uses. Bertrand Creek and the Middle Fork Nooksack River are two sub-watersheds of the twenty-two that were defined for WRIA 1. These areas were selected as pilot areas for the negotiations. Under the confidentiality agreement and negotiation settlement framework, the geographic area may be expanded to include adjacent watersheds. These two pilot negotiations are scheduled to produce draft agreements for each watershed by late 2006 and will establish a template for negotiation in subsequent watersheds including those with a priority due to utilization by ESA listed early chinook salmon. Successful participation by affected parties and negotiation of revisions to agreement in 2007 will lead to formal adoption of an agreed flow and management regime for each pilot area via appropriate state and federal procedures. A key element of the pilots and for future negotiations is the use of a skilled mediator that can facilitate reaching agreements acceptable to all the parties and that are in compliance with Indian water law, federal law and state water law.

Benefit: instream flows, flow management regime established for Middle Fork, Bertrand Creek; negotiations for other watersheds initiated

Habitat Monitoring to Support Adaptive Management

This program will collect the data in Nooksack early chinook habitats required to (1) evaluate the effectiveness of voluntary habitat projects and regulatory habitat protection programs (Forest and Fish, Northwest Forest Plan, Shoreline Master Programs, Critical Areas ordinances) to the reduction of chinook habitat limiting factors, and (2) quantify the linkages among watershed processes, land use, habitat, and salmonid population response, in conjunction with information from other watersheds. The adaptive management program will be developed by late 2006 and will specify what habitat and watershed attributes will be monitored. Limited habitat data has been collected in recent years through reach assessments and project-associated monitoring, but funding is needed to build a rigorous habitat monitoring program. Adaptive management is critical to ensuring recovery strategies will be effective over the long term at restoring abundance, productivity, spatial structure and diversity of Nooksack early chinook

Benefit: development and beginning implementation of habitat component of adaptive management plan

Nooksack Chinook Population Monitoring

- Increased spawn survey frequency will to improve estimates of population abundances for both early chinook populations by increasing survey frequency throughout the distribution area to record live and dead adults, redds, and to collect the essential biological data including

sex, fork length, coded wire tags, scales, otoliths, look for mass marks, and opercle punches (indicating hatchery turnbacks), and tissue samples. Present survey efforts are good, but inadequate to effectively cover all areas at the desired frequency, and to recovery carcasses and coded wire tags throughout the entire distribution area.

- Increase smolt trap sampling rates at the mainstem and South Fork smolt traps, to improve outmigration estimates, and by taking and analyzing DNA from non-hatchery chinook, estimate proportions attributable to the two populations and fall chinook at both traps. Smolt trap operation requires two person crews.
- Starting with the 2004 brood, the fall chinook at Samish Hatchery were otolith marked with unique marks for the groups destined for release on station in the Samish, in Lummi Bay, and in the lower Nooksack River. Beginning in 2007 we will have the first returns (3 year olds), and will need additional funding to consistently spawn survey the habitat, with emphasis on the South Fork, and to analyze the otoliths that are recovered.

Benefit: improve accuracy of early chinook escapement (including natural-origin recruits) and juvenile production estimates

Fish Passage Barrier Removal Program

Objective: to remove artificial barriers to fish passage and restore connections to historic salmonid habitats to benefit multiple salmonid species

The WRIA 1 drainage structure inventory identified 478 drainage structures that block salmonid access to 227 miles of historic habitat. An additional 423 miles are blocked by the state highway system. Whatcom County currently budgets \$250,000/year to replace barriers under county roads. The purpose of this program is to supplement that program to treat barriers, including those on private lands or in the cities of WRIA 1. Barriers providing the greatest fish benefit if removed are prioritized and will be systematically repaired.

Benefits: Restored passage at 10-15 salmonid habitat barriers per year; ~60 miles of access to historic habitats restored.

Bay Road Culvert Replacement (California Creek)

Objective: To replace a culvert under Bay Road on a tributary to California Creek to improve passage for coho salmon and sea-run cutthroat trout.

Benefits: Full fish passage will be restored to historically accessible habitats.

Costs: To be determined. Deep fill requires additional design being completed in-house by the county while funding sources are being researched.

Goodwin Road Culvert Replacement (Dale Creek)

Objective: To restore access to historically utilized fish habitat in Dale Creek, a tributary to the Sumas River.

Benefits: Full fish passage will be restored to historically accessible habitats.

Riparian Restoration Program

Objective: to restore riparian functions such as shade, future large woody debris recruitment, nutrient inputs, and bank cohesion in mainstem and tributaries of WRIA 1.

Programmatic funding for riparian restoration will provide the mechanism to continue and enhance on-going riparian restoration efforts throughout WRIA 1. Funding would be used to provide match or direct project funding to restore riparian areas or obtain conservation easements for existing or proposed riparian restoration in areas with salmonid use. WRIA 1 recovery plan species priorities would be applied.

Benefits: restore 55 acres of riparian habitat along WRIA 1 salmonid streams annually

Nooksack Bull Trout Population Monitoring

- Establish Nooksack bull trout spawn survey index reaches that are consistently surveyed through the spawning period in each fork to establish trends to be established over time. The North Fork should have multiple indexes, while the Middle and South Forks may need fewer.
- Conduct snorkel surveys in bull trout streams, including Hutchinson Creek with established brook trout populations to determine current brook trout distribution limits, to later determine whether distributions are still expanding.
- Collect tissue samples from within bull trout local population areas and run micro-satellite DNA to establish baselines, and test assumptions with core local population areas. Collect and run tissues from bull trout passed upstream at the South Fork weir.

Benefit: established bull trout index reaches; improved knowledge of brook trout distribution; established DNA baseline for Nooksack bull trout

Steelhead Population Monitoring

Collect tissue samples and run DNA from native summer run steelhead collected and passed upstream at the South Fork weir. Increase spawning ground surveys to a minimum establish trends, and optimally to develop escapement estimates for winter steelhead.

Benefit: improved escapement estimate, baseline for summer steelhead

Coho Population Monitoring

Develop an improved coho escapement methodology and implement resulting increased spawn survey coverage to improve understanding of natural and hatchery origin returns, and to refine our understanding of the geographic extent of what appear to be native Nooksack coho.

Benefit: improved accuracy of coho escapement estimate, improved understanding of coho distribution

DRAFT - Pending WRIA 1 Salmon Staff Team Review and Steering Committee Approval		Project Information and How it Relates to the Recovery Plan													Project Planning					Project Cost and Sponsor				
Project Type	Plan Category	Project Name	Project Description (brief description)	Priority tier of project	Limiting Factors	Document Reference for limiting factor (Recovery Plan, Chapter 3 - Habitat Protection)	Habitat Type (HWS items - i.e. riparian, estuary river delta, nearshore, etc.)	Activity Type (HWS items - i.e. fish passage, instream flow, sediment reduction, etc.)	Project Performance (Restore 30 acres of floodplain)	Primary Species Benefiting	Secondary Species Benefiting	Current Project Status (Conceptual, Feasibility completed, design completed, permitting completed, construction completed)	2009 Activity to be funded	2009 Estimated Cost	2010 Activity to be funded	2010 Estimated Cost	2011 Activity to be funded	2011 Estimated Cost	Likely End Date	Likely Sponsor	Total Cost of Project	Local share or other funding	Source of funds (PSAR, SRFB, other)	
Restoration	Capital	South Fork Acme to Saxon Reach HAZ Reconnection: South Fork Regional Park (RM 8.4-8.7)	Finalize design, permit and remove ~200' of right bank riprap, install large wood structures, and replant to restore historic connectivity, instream, and floodplain structure and habitat in the reach between S49 and Williams Pipeline (South Fork Regional Park)		2, 7, A3, A4		Instream, riparian	channel connectivity; wood structure/log jam	0.06 miles treated; 8 ac reconstructed	Chinook	All other salmonids present	Feasibility completed	Final design	Construction, planting		\$225,000	Monitoring, plant maintenance	\$15,000	2010	Whatcom County	\$315,000	\$47,250	SRFB; PSAR; local funds; off-site mitigation	
Restoration	Capital	Acme-Confluence Reach: Active Channel Logjams (Phase 4: River Farm Reach (RM 5.1-5.4))	Design and install log jams in the main channel South Fork, River Farm Reach to increase habitat diversity, quantity of deep pools with cover, floodplain connectivity, and availability of temperature refuges.		2, 6, 11, A3, A4, AB		Instream	channel connectivity; wood structure/log jam	0.3 miles treated; up to 40 acres	Chinook	Bull trout, steelhead, coho, cutthroat, pink, sockeye	conceptual design	construction-ready designs, permitting, flood risk assessment	Construction		\$350,000	Monitoring	\$20,000	NIT		\$430,000		SRFB; PSAR; USFWS; BIA; PSC; PCSRF	
Restoration	Capital	Acme-Confluence Reach: Active Channel Logjams (Phase 5)	Design and install log jams in the main channel South Fork Standard/McCartney Creek Reach to increase habitat diversity, quantity of deep pools with cover.		2, 6, 11, A3, A4, AB		Instream	channel connectivity; wood structure/log jam	0.4 miles treated	Chinook	Bull trout, steelhead, coho, cutthroat, pink, sockeye	conceptual	construction-ready designs, permitting, flood risk assessment	Construction		\$350,000	Monitoring	\$20,000	NIT		\$430,000	TBD	TBD	
Restoration	Capital	Acme-Confluence Reach: Active Channel Logjams (Phase 2b: Todd Creek Reach (RM3.9-4))	Design, construct, and install log jams in the main channel South Fork Todd Creek Reach. Phase 2a (RM 3.7-3.9) was constructed in summer 2008		2, 6, 11, A3, A4, AB		Instream	channel connectivity; wood structure/log jam	0.1 miles treated	Chinook	Bull trout, steelhead, coho, cutthroat, pink, sockeye	Conceptual	construction-ready designs, permitting, flood risk assessment	Construction		\$300,000	Monitoring	\$15,000	NIT		\$365,000	TBD	SRFB; PSAR; USFWS; BIA; PSC; PCSRF	
Restoration	Capital	Saxon Reach Restoration (Acme-Saxon Reach Active Channel Logjams-Saxon Bridge)	Stabilize/adjust existing logjams to stabilize the split flow downstream of the bridge and create holding in a cooler section of the reach		2, 6, 11, A3, A4, AB		Instream	streambank stabilization; wood structure/log jam	.75 miles treated; 2-5 ELs	Chinook		concept design	Preliminary Design and Stakeholder Work	Final Design and Permitting		\$75,000	Construct and monitoring	\$680,000	2014	UNR	\$830,000		SRFB; PSAR; LIBC; FWS; PCSRF	
Restoration	Capital	South Fork Nooksack Instream Restoration- VanZandt (Acme-Confluence Reach: Active Channel Logjams [Phase 3: VanZandt EL])	Design and construction of four complex logjams within a 0.5-mile segment of the lower South Fork Nooksack River (RM 3-4M1.4) near the mouths of Taves and Caron Creeks.		2, 6, 11, A3, A4, AB		Instream	channel connectivity; wood structure/log jam	5 miles treated	Chinook		Design and permitting in process	Construction	monitoring		\$657,500			NIT		\$747,500	\$112,125	SRFB; PCSRF; USFWS;	
Restoration	Capital	Fobes Creek Reach Restoration	Stabilize forested islands in the South Fork between RM 18-20.5 to maintain high flow connectivity with existing side channels, while improving habitat in the cool water refuge at the confluence of Fobes Creek.		1, 2, 6, A3, A4, AB		Instream	channel connectivity; wood structure/log jam	1.4 miles treated; 7-15 ELs	Chinook		concept design	Feasibility and 50% Design	Permitting; Construction-Phase 1		\$78,000	Construction (Phase 2); Monitoring	\$300,000	2010	UNR	\$767,000	\$58,000	SRFB; PSAR; LIBC; FWS; PCSRF	
Restoration	Capital	Skookum Reach Project (Upper SF)	Install active channel logjams near the mouth of Skookum Cr re-locating Saxon Road from the river bank to floodplain areas owned by WLT and Lummi Nation, and restoring riparian buffer stands and improving effectiveness of adult capture for supplementation		2, 6, 11, A3, A4, AB		Instream	wood structure/log jam; channel connectivity	.5 miles treated; 3 EL; 11 acres	Chinook		design	design and permitting	Construction and monitoring		\$70,000	monitoring	\$1,170,000	2011	UNR	\$1,255,000		SRFB; PSAR; LIBC; FWS; PCSRF	
Restoration	Capital	Cavanaugh Cr Island Project	Improve habitat diversity in the Cavanaugh Cr reach.		1, 2, 6, A3, A4, AB		Instream			Chinook		conceptual		funding and design feasibility		\$5,000	Design and permitting	\$50,000	2014	UNR	\$350,000			
Restoration	Capital	Larson's Floodplain Refuge Project	Improve connectivity with cool water side-channel. Increase habitat diversity in an area with abundant groundwater seeps from an adjacent terrace.		1, 2, 6, A3, A4, AB		Instream	channel connectivity		Chinook		conceptual		funding and design feasibility		\$5,000	funding, design, and permitting	\$100,000	2016	UNR	\$600,000		USFWS; NMFS; SRFB; PSAR	
Restoration	Capital	Acme-Confluence Reach HAZ Reconnection	Reconnect historic migration zone areas through a combination of hardening removal and wood placement		2, 5, 7, 13, A3, A4, AB		Instream, Riparian/Floodplain	floodplain restoration	176 acres of HAZ reconstructed	Chinook		conceptual	Lower SF hydraulic modeling to evaluate restoration scenarios	Feasibility assessment		\$95,000	Acquisition	\$50,000	??	2050	Whatcom County, tribes, WLT	\$145,000		SRFB; PSAR; USFWS; FEMA
Restoration	Capital	Lower South Fork Tributary Riparian Restoration	Restore riparian areas along floodplain sections of tributaries to lower SF to provide floodplain refugia, shading, wood recruitment		6,8, 11, 13,A3, AB		Riparian	Riparian	123 acres riparian area restored	Chinook		Planned	landowner contacts and negotiations	Implement Phase 1		\$50,000	Implement Phase 2 and monitor/maintain	\$50,000	2015	tribes; NRCS-WCD; NSEA	\$100,000		CREP; USFWS; DOE	
Restoration	Capital	Lower South Fork HAZ Riparian Restoration	Restore riparian areas in lower SF historic migration zone to provide shading, wood recruitment		2, 6, 11, 13, A3, AB		Riparian	Riparian	223 acres floodplain forest restored	Chinook		Planned	landowner contacts and negotiations	Implement Phase 1		\$50,000	Implement Phase 2 and monitor/maintain	\$50,000	2015	tribes; NRCS-WCD; NSEA	\$100,000		CREP; USFWS; DOE	
Restoration	Capital	Lower South Fork Wetland Water Storage Improvement	Plant, prioritize water storage in wetlands to restore temperature and baseflow maintenance		6, 14, A7, AB		Wetlands	Instream/Upland Wetland	180 acres wetland restored	Chinook		Planned	landowner contacts and negotiations	Feasibility assessment		\$100,000	Implement Phase 1	\$250,000	2015	tribes; NRCS	\$350,000		DOE; BIA; USFWS; EPA	
Restoration	Capital	Lower South Fork Flood/Salmon Coordination (below Hutchinson Cr)	Objective is to allow for bedload transport and migration of resident Dolly Varden.		2, 5, A3, A4		Instream			Chinook		conceptual	Design and permitting, construction	replanting		\$285,000	monitoring	\$2,500		tribes; WCPW	\$300,000		Whatcom County Flood	
Restoration	Capital	Bell Creek Road Crossing					Instream	Fish Passage		Dolly Varden		permitting completed	construction		\$95,000				USFS	\$95,000				

Restoration	Capital	Acme Early Chinook Restoration		2, A3		Instream		Chinook	Bull Trout, Steelhead, Coho	Construction summer 2009	Construction	Funded	Monitoring	\$2,500	monitoring	\$500		WCPW	\$3,000	all local funds	SRFB, Whatcom County FCFD			
Restoration	Capital	Middle Fork Diversion Dam		10, A5		Instream	Fish Passage	Chinook	Bull Trout, Steelhead, Coho	feasibility study, assessments, permit applications, and design initiated	alternative design analysis; funding strategy		construction					COB	\$22,300,000		PSAR; PWTF; WA; SRFB; COB; TRDA			
Restoration	Capital	Nooksack Middle Fork Instream Phase 1: Mosquito Lk Rd Bridge to Porter Creek Reach	Design, engineer, permit, and construct a suite of LWD structures to collect wood and stabilize existing wood debris	2, A1, A3, A4		Instream	large woody debris	Chinook	Bull Trout, Steelhead, coho	concept design			design and construct 15-20 LWD structures from ML Rd to DS Porter Creek	\$60,000	200,000			NSEA	\$260,000	\$60,000	SRFB; PSAR; local; other state and fed grants			
Restoration	Capital	Nooksack Middle Fork Instream Phase 2: Bedrock Pool Reach	Design structures to stabilize existing wood debris, provide key structure, and collect transient wood in reaches from Porter Creek to NF confluence using results of the 2007 SRFB funded assessment.			Instream		Chinook	Bull Trout, Steelhead, Coho	conceptual			Preliminary Design	\$0	Design and Permitting \$ 85,000			2014	UNR	\$750,000	\$85,000			
Restoration	Capital	Lower North Fork Reach Stable Side Channel Restoration, Phase 1b (Low Tree Phase II)	Design and install log jams to restore stable side channel habitats and promote floodplain island formation to improve egg fry survival	1, 2, 5, 11, A1, A3, A4		Instream	wood structure/log jam; channel connectivity	0.5 mi	Chinook		Design and permitting in process					monitoring	\$10,000	monitoring	\$10,000		NIT	77	77	77
Restoration	Capital	Lower North Fork Reach Stable Side Channel Restoration, Phase 2	Design and install log jams to restore stable side channel habitats and promote floodplain island formation to improve egg fry survival	1, 2, 5, 11, A1, A3, A4		Instream	wood structure/log jam; channel connectivity	1 mile treated	Chinook		conceptual		Design (Permitting, construction-ready design, flood risk assessment)	\$75,000	\$100,000	Construction, Phase 1	\$500,000	2013	NIT	\$675,000		SRFB; PSAR; USFWS; BIA; PSC; PCSRF		
Restoration	Capital	Lower North Fork Reach Stable Side Channel Restoration, Phase 3	Design and install log jams to restore stable side channel habitats and promote floodplain island formation to improve egg fry survival	1, 2, 5, 11, A1, A3, A4		Instream	wood structure/log jam; channel connectivity	1 mile treated	Chinook		conceptual		Design (Permitting, construction-ready design, flood risk assessment)	\$75,000	\$100,000	2014	NIT	\$175,000		SRFB; PSAR; USFWS; BIA; PSC; PCSRF				
Restoration	Capital	Lower North Fork Reach Stable Side Channel Restoration, Phase 4	Design and install log jams to restore stable side channel habitats and promote floodplain island formation to improve egg fry survival	1, 2, 5, 11, A1, A3, A4		Instream	wood structure/log jam; channel connectivity	1 mile treated	Chinook		conceptual		Design (Permitting, construction-ready design, flood risk assessment)	\$75,000	\$100,000	2015	NIT	\$75,000		SRFB; PSAR; USFWS; BIA; PSC; PCSRF				
Restoration	Capital	North Fork Channel Island LWD Augmentation- Farm Reach	Protect and enhance the channel islands, and the back channels associated with them, provide stable spawning and rearing habitat for Chinook salmon, and augment LWD	1, 2, 11, A1, A3, A4		Instream	wood structure/log jam; channel connectivity		Chinook		conceptual design								NSEA	\$243,000	\$44,000	SRFB; PSAR; local; other state and fed grants		
Restoration	Capital	Lower Canyon Creek Design and Restoration (Phase 2)	Design and install large wood structures to provide instream habitat in anticipation of potential near term levee breach; design and construct follow-up actions to ensure long-term passage at RM 0.2 following 2009 partial levee removal	5, 8, 10, A5, A3, A4		Instream; fish passage	wood structure/log jam; channel connectivity; barrier	0.24 miles treated; 3.9 miles passage improvement	Chinook	steelhead, pinks, bull trout, cutthroat trout	Conceptual		Complete designs, obtain permits, seek construction funding	\$135,000	Included in 2009 request	Construction and begin monitoring	\$ 950,000	2012	WCPW	\$1,085,000	\$162,750	SRFB; PSAR; local; other state and fed grants; community assn/diking district; off-site mitigation		
Restoration	Capital	Lower North Fork Reach Tributary Restoration	Improve habitat conditions in lower tributary reaches and at mainstem-tributary junctions	8, 2 A1, A3, A4		Instream	wood structure/log jam; channel connectivity		Chinook		Conceptual		Design and permitting	\$50,000	Phase 1 Construction	\$435,000		Tribes, WLT, WSDOT, USFS	\$485,000		SRFB; PSAR; Other			
Restoration	Capital	Lower North Fork Floodplain Riparian Restoration	Restore riparian areas to provide shading and wood recruitment in NF Floodplain	13, A3		Riparian	Riparian		Chinook		Conceptual		Phase 1- Implement	\$50,000	Phase 2- Implement	\$50,000		NSEA; Tribes	\$100,000		CSF			
Restoration	Capital	Lower North Fork Tributary Riparian Restoration	Restore riparian areas to provide shading and wood recruitment in NF tributaries	6, 13, A3, A8		Riparian	Riparian		Chinook		Conceptual		Phase 1- Implement	\$50,000	Phase 2- Implement	\$50,000		NSEA; Tribes	\$100,000		CSF			
Restoration	Capital	Sande Bar Levee Setback & Clay Bank Stabilization		2, 5, A3		Instream	Sediment source control, instream restoration	0.3 miles treated; multiple structures installed	Chinook	steelhead, other salmonids	Conceptual pending upper mainstem reach analysis and restoration plan		Alternatives analysis, designs, permits	\$0	Construction	\$1,500,000	2113	WCPW	\$1,650,000		WCPW; DOE; EPA; Tribes			
Restoration	Capital	Piling jam, 4 sites		2, A3		Instream	Instream habitat diversity in migration reach	2-3 jams at 4 sites	Chinook	steelhead, other salmonids	Conceptual pending upper mainstem reach analysis and restoration plan		Alternatives analysis, designs, permits	\$0	Construction	\$65,000		WCPW; NSEA	\$190,000	\$ 21,000	WCPW			
Restoration	Capital	Squalicum C' Estuary Restoration		7, 11, A4		Estuary			Chinook		conceptual design		remove derelict structure and pilings; prepare final design and secure permits	\$535,000	restore estuarine marsh	\$300,000	monitoring	\$20,000	2012	Port of Bellingham	\$875,000	MRC; DNR; BRDP; COB		
Restoration	Capital	Smuggler's Slough Acquisition and Reconnection		5, 7, A3, A4, A5		Estuary			Chinook		wetland acquisition; final design; permitting; riparian planting		Final Design, Permits, Construct Phase I	\$1,180,000	Construct Phase II	\$2,000,000	Monitoring	\$20,000	2012	UNR	\$3,200,000	\$2,345,000	NRCS; USFWS; PSNRP; SRFB	
Restoration	Capital	Chuckanut Village Marsh Restoration		18, A11		Estuary			unknown	copepods	feasibility underway		TBD based on alternatives identified in assessment	\$20,000	TBD	TBD	TBD		COB; MRC	\$20,000 (2009)	\$20,000	MRC; COB grant		
Restoration	Capital	Bertrand Creek Wetlands Enhancement		14, A7		Wetlands	instream flow		fall chinook; steelhead; coho	bull trout; cutthroat; sockeye; chum	Conceptual		design and permitting; site preparation	\$55,000					Bertrand WID	\$55,000		DOE; Other		
Restoration	Capital	Double Ditch Acquisition and Relocation	relocate Double Ditch and Benison watercourses between Main and Badger to new corridor	8		Instream; Land Protected, acquired, or leased	channel connectivity; streambank or riparian protection		Steelhead	coho, fall chinook, chum	feasibility underway		purchase two parcels and a 5,000'200' easement	\$1,250,000	initiate channel construction, riparian work	\$500,000	complete channel construction	\$250,000		City of Lynden	\$2,000,000	\$200,000	CCW; FCAP; County; State; City; CREP	
Restoration	Capital	Improve riparian conditions along Fish trap border to Badger reach		10		Instream	channel connectivity; streambank or riparian protection	restore 3 miles of riparian corridor	Steelhead	coho, fall chinook, chum	riparian work underway		Continue riparian work DS Pangborn remove inwater crossing @ Sanga	\$100,000		complete Border to Badger riparian work	\$50,000		2012	NSEA	\$300,000		CCW NRCS	

Restoration	Capital	Fish Trap Reach Levee Setback	Set back levee along 10,000 ft of lower Fish Trap Reach	5, A3, A4	Instream	floodplain connectivity, riparian restoration	10,000 ft setback, 40 acres reconnected	Steelhead	coho, cutthroat trout	conceptual	Seek landowner interest and support	\$50,000	Purchase 40 acres of easements	\$250,000	complete levee relocation, channel, and riparian improvement	\$750,000	WCPW Flood Div NRCS Flood plan program	\$1,050,000			
Restoration	Capital	Flood Gate Modification		10	Instream			Steelhead	coho, fall chinook, chum	assessment; design	design Cougar and Whiskey Land secure owner agreements	\$12,000	complete Cougar flood gate	\$50,000	Install Whiskey Creek gate , daylight channel	\$100,000	WCD, NRCS, NSEA	\$162,000	\$30,000	NRCS, USFWS	
Restoration	Capital	Fish Passage Barrier Removal Program		10, A5	Instream	Fish Passage		Steelhead	coho, fall chinook, chum	on-going	obtain landowner agreement and implement top 10 priority barriers	\$250,000	obtain landowner agreement and implement top 10 priority barriers	\$250,000	Continue down list to completion; monitor effectiveness	TBD	NSEA WCD	\$500,000		FFFF, CSF; Whatcom Co.; Other	
Restoration	Capital	Bay Road Culvert Replacement (California Cr)		10	Instream	Fish Passage		coho	cutthroat	design completed; seeking funding	Obtain funding; construct	\$475,000	monitoring	TBD	monitoring	TBD	WCPW	\$475,000			
Restoration	Capital	Goodwin Road Culvert Replacement (Dale Creek)		10	Instream	Fish Passage		coho	cutthroat; steelhead; chum	scoping in process	detailed design and specifications	TBD	Construction	TBD	Monitoring	TBD	WCPW	TBD		WCPW; grant TBD	
Acquisition	Capital	Confluence to Saxon Restoration Acquisitions	Acquire and/or easements to facilitate priority habitat restoration in the South Fork, confluence to Saxon Reach	5, A3, A4	Land Protected, Acquired, or Leased	streambank or riparian protection	80 acres	Chinook		Conceptual							WLT; Tribes; WCPW	\$942,000	\$142,000	SRFB; PSAR; local; other state and fed grants	
Acquisition	Capital	Acme-Confluence Reach HAZ Reconnection: Jones/McCarthy (RM 7.5-8.0)	Acquire approximately 90 acres bordering the South Fork and on the Jones and McCarthy Creek alluvial fans for future HAZ reconnection and off channel habitat and riparian restoration	5, A3, A4	Land Protected, Acquired, or Leased	streambank or riparian protection, floodplain connectivity	~90 acres for restoration; ~0.3 miles for passage	Chinook	steelhead, cutthroat, bull trout, coho	Priority for sale, seeking funding	landowner contacts and negotiations; secure funding sources; complete acquisition	\$ 1,050,000	Designs and permits for levee removal/setback; other restoration options	\$ 75,000	Levee Setback	\$ 325,000	2011 WCPW	\$1,650,000	\$247,500	SRFB; PSAR; local; other state and fed grants	
Acquisition	Capital	South Fork and tributary acquisition (2-5 parcels key for salmon recovery)		5, A3, A4	Land Protected, Acquired, or Leased	streambank or riparian protection		Chinook		Conceptual	planning, landowner contacts and negotiations	\$15,000	landowner contacts, negotiations, and acquisition	\$817,500	landowner contacts, negotiations, and acquisition	\$817,500	WLT	\$1,650,000	\$300,000	PSAR; SRFB; WLT; Other	
Acquisition	Capital	Middle Fork and tributary acquisition (2-5 parcels key for salmon recovery)		5, A3, A4	Land Protected, Acquired, or Leased	streambank or riparian protection		Chinook		Conceptual	planning, landowner contacts and negotiations	\$15,000	landowner contacts, negotiations, and acquisition	\$817,500	landowner contacts, negotiations, and acquisition	\$817,500	WLT	\$1,650,000	\$300,000	PSAR; SRFB; WLT; Other	
Acquisition	Capital	North Fork Acquisitions (2-5 parcels key for salmon recovery)		5, A1, A3, A4	Land Protected, Acquired, or Leased	streambank or riparian protection		Chinook		Conceptual	planning, landowner contacts and negotiations	\$15,000	landowner contacts, negotiations, and acquisition	\$1,985,000			WLT	\$2,000,000		SRFB; PSAR; WLT; Other	
Acquisition	Capital	Skookum Cr riparian forest conservation easement	Acquire 580 acres riparian forest along both sides of lower Skookum Cr from Edfro Cr Salmon Preserve along SF Nooksack to RM 2.3	13, A3	Land Protected, Acquired, or Leased	streambank or riparian protection		Chinook		Negotiations	acquisition	\$600,000					WLT	\$600,000	\$124,500	PSAR; WLT	
Hatchery																					
project	capital	Skookum Cr Hatchery Water Supply			hatchery			Chinook	none	design completed	construct new intake and additional wells	\$550,000									
project	capital	Middle Fork Diversion Dam-Kokanee Program			hatchery			Kokanee		conceptual										legislature	
Harvest																					
Hydropower																					
Other																					
	capital	Invasive Weed Control	Control knotweed and other riparian invasives in WRIA 1, with emphasis plant/seed sources in Chinook priority areas	13, A3	Riparian	riparian protection and restoration		Chinook	coho, steelhead, pink, other salmonids	Treatment is on-going at small scale using effective controls	Control	\$125,000	control	\$125,000	control	\$ 125,000	On-going	Whatcom County Weed Control Board, Tribes, Parks	\$375,000	\$ 56,250	SRFB, PSAR, local funds, partner match
Total Capital Need												\$8,167,500	\$11,175,000	\$9,390,000	\$53,132,500						
Non-Capital Programs																					
Harvest Management Support	Non-Capital	South Fork Chinook Rescue Program	Collection, identification and maintenance of brood stock and juvenile production of high extinction risk SF Chinook for brood years 2010-2011 to preserve stock genetics while habitat restoration proceeds		Low abundance	stock preservation		Chinook	none	Operational										PSAR; LBC; PSCSEF; WDFW; NIT; NDA	
Harvest Management Support	Non-Capital	Years 4 and 5 of Skookum Chinook supplementation program			Low abundance	hatchery		Chinook	none	Operational	rear and release 2007 brood, and rear 2008 brood	\$170,018	rear and release 2008 brood, and rear 2009 brood	\$170,018	continue program operation		Co-Managers	\$10,054			Lummi; WDFW; PSC SEF
Harvest Management Support	Non-Capital	Captive Brood Program at WDFW's Kendall Hatchery			Low abundance	hatchery		Chinook	none	Operational	rear 250 fry from 2008 brood and 250 juveniles from 2007 brood	\$19,000	rear 250 fry from 2009 brood and 250 juveniles from 2007 and 2008 broods	\$38,000			Co-Managers				
Harvest Management Support	Non-Capital	Captive Brood program at Manchester Research Station			Low abundance	hatchery		Chinook	none	Operational	rear 250 fry from 2008 brood and 250 juveniles from 2007 brood	\$250,000	rear 250 fry from 2009 brood and 500 juveniles from 2007 and 2008 broods	\$250,000			Co-Managers				
Future Habitat Project Development	Non-Capital	Spawning Channel Feasibility and Design		1, 2, 4, 11, 15, A2, A3, A4	Instream			Chinook		conceptual	Identify necessary parameters, field investigation/GIS representation of results, ranking criteria	\$60,000	identification of suitable locations, measure parameters, availability of land, cost estimates	\$60,000	Engineering design of facility and preparation of permits	\$130,000	WCD	\$250,000			
Future Habitat Project Development	Non-Capital	Orphan Road Project Assessment including North Fork	Assess high-risk orphaned roads in priority watersheds and develop prescriptions	4, A1, A2				Chinook		conceptual	GIS Analysis	\$20,000	Field Assessment and prescriptions	\$100,000			Tribes	\$120,000		City of Seattle; USFWS	
Future Habitat Project Development	Non-Capital	Lower South Fork Joint Transportation/ Restoration Planning		2, 5, A3, A4				Chinook		conceptual	scope projects, seek funding	\$5,000	scope projects, seek funding	\$25,000	project design and permitting	170,000	WCPW; Nooksack	\$200,000 (2009-2011)	TBD	Whatcom County; BIA; WSDOT; ACCE	
Future Habitat Project Development	Non-Capital	Middle Fork Reach Assessment and Restoration Planning		1, 2, 5, 11, 13, A1, A3, A4	Instream			Chinook		In-Process	Data collection, analysis, and synthesis	\$105,000	identify and prioritize projects, write report	\$45,000			WCD	\$160,842		PSAR	
Future Habitat Project Development	Non-Capital	Expansion of North Fork Assessment	Expand coverage of existing Draft North Fork Assessment, and finalize report					Chinook		Draft completed; Tributary Habitat Mapping scope approved and contracted		\$20,000	TBD	TBD			Salmon Recovery Program w/Partners	TBD		PSAR	
Future Habitat Project Development	Non-Capital	Upper Mainstem Reach Assessment and Restoration Planning	habitat assessment and restoration planning for the Nooksack River from the SF confluence to Everson (RM 24-36.5)	1, 3, A3, A4	Instream	wood structure/log jam; channel connectivity	comprehensive restoration plan; preliminary project designs for two priority projects	Chinook	Coho, Pink, Chum, Sockeye, Bull Trout, Steelhead, Cutthroat	conceptual			Habitat assessment	\$75,000	Restoration Planning, conceptual designs for 2 projects	\$100,000	2011	WLT	\$175,000	\$22,368	SRFB; PSAR; PSCSEF

Project Category	Project Name	Priority	Project Description	Species	Location	Phase	Start	End	Staff	Contractors	Other	Funding Source	Amount	Notes		
Future Habitat Project Development	Integration of salmon Habitat Reach Assessment & Projects with Flood Management (SF Hydraulic Modeling)	Non-Capital	Develop refined tools to help guide integrated salmon and flood projects in the South Fork and to support community vision for restoration and future management	1, 2, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 17, A1, A2, A3, A4, A5, A7, A8, A9	Instream, floodplain	Planning and project identification, prioritization, and sequencing	TBD	Chinook	Conceptual; Scope under development for restoration project scenario hydraulic modeling	develop and implement scope report prepared	\$95,000	TBD	TBD	Salmon Recovery Program/ WCPW Flood Div \$95,000 (2009) PSAR; Local		
Future Habitat Project Development	Complete WRIA 1 nearshore habitat prioritization with salmon overlay	Non-Capital			estuary; nearshore				MRC report developed	Staff Team and MRC Nearshore Subcommittee complete	\$75,000	Implement priorities; seek nearshore project funding	TBD	TBD	MRC/SRST \$75,000 SRST/MRC in-kind; grant	
Habitat Protection	Regulatory Plan Updates (CAQ/ISMP)	Non-Capital												small cities \$240,000		
Habitat Protection	Riparian Restoration Program	Non-Capital	Support for a riparian restoration program: project match, conservation assessments	13	riparian				ongoing program	leverage grant sources; implement priority riparian restoration	\$250,000	leverage grant sources; implement priority riparian restoration	\$250,000	evaluate program/ progress and monitor effectiveness	WCD; Tribes \$500,000	
Watershed Plan Implementation & Coordination	Restoration Plan and Watershed Management Plan Implementation	Non-Capital	Assist in implementing ISF pilot projects and coordination of participating partners						in-process	implement and coordinate programs	\$165,000	implement and coordinate programs	\$165,000	Evaluate progress and facilitate adaptive mgmt actions	202 WRIA 1 Policy Boards \$495,000 DOE; WDFW; DOI; Other	
Outreach & Education																
Instream Flow Protection	WRIA 1 Instream Flow Negotiations	Non-Capital	Negotiate instream flow settlement agreements in WRIA 1 watersheds; develop management solutions; outreach						in-process	negotiate settlement agreements in early chinook watersheds; identify solutions; outreach	\$400,000	implement solutions in early chinook watersheds; initiate negotiation in remaining watersheds; identify solutions; outreach	\$800,000	Continue implementing solutions; completed adoption process for negotiated flows	WRIA 1 Policy Boards; ISF Negotiation Parties \$2,000,000 \$300,000 DOE; WDFW; DOI; Other	
Habitat Project Monitoring	Habitat monitoring to support Adaptive Management	Non-Capital							Planned	Develop overarching monitoring plan		Habitat monitoring	\$100,000	habitat monitoring	\$100,000	Tribes \$300,000
Stock Monitoring Support	Upper Middle Fork Spawner Surveys	Non-capital							Planned	Spawner surveys, DNA and otolith analysis	\$50,000	spawner surveys, DNA and otolith analysis	\$50,000	spawner surveys, DNA and otolith analysis	\$50,000	Co-Managers \$150,000
Stock Monitoring Support	Nooksack Chinook Population Monitoring	Non-capital	Expand monitoring and stock identification of Nooksack Chinook populations						operational needs expansion	Spawner surveys, smolt trapping, DNA, and otolith analysis	\$200,000	Spawner surveys, smolt trapping, DNA, and otolith analysis	\$200,000	Spawner surveys, smolt trapping, DNA, and otolith analysis	\$200,000	Co-Managers \$600,000
Stock Monitoring Support	Nooksack Bull Trout Population Monitoring	Non-capital	monitor and establish DNA baseline for Nooksack Bull Trout						Planned	spawner surveys, DNA baseline establishment and analysis	\$100,000	spawner surveys, brook trout surveys	\$100,000	spawner surveys, DNA analysis	\$100,000	Co-Managers; USFWS \$300,000
Monitoring Support	Steelhead Population Monitoring	Non-capital	steelhead spawner surveys and DNA analysis						Planned	DNA Analysis	\$150,000	DNA Analysis	\$150,000	DNA Analysis	\$150,000	WDFW \$450,000
Stock Monitoring Support	Coho Population Monitoring	Non-capital	Coho spawner surveys						Planned	spawner surveys, DNA baseline establishment and analysis	\$40,000	spawner surveys, DNA analysis	\$40,000	Spawner surveys, DNA analysis	\$40,000	Co-Managers; NSEA \$120,000
Research	Modeling of currents in Bellingham Bay under different flow regimes	Non-Capital			Estuary and adjacent waters				Planned	run model under different condition of wind, tide, and discharge and basic ground truthing of results	\$78,000	run model under different condition of wind, tide, and discharge and basic ground truthing of results	\$78,000	Develop action plan for protecting elements of the critical habitat	\$60,000	Co-Managers \$216,000 BDDPP; COB; MRC; DOE
Research	Chinook habitat use assessment of Bellingham Bay and adjacent areas	Non-Capital			Estuary and adjacent waters	Chinook			Pilot	Analysis of Pilot Project results, implement Year 1 Sampling, Analysis of Year 1 data (hatchery release strategy/natural)	\$125,000	Sampling program year 2, analysis of results and course of action for habitat actions	\$125,000	develop action plan for protecting elements of the critical habitat	TBD	2010 INR \$250,000 MRC; BDDPP; NWSC
Other	USFS Road Network Monitoring and Maintenance	Non-capital		4, A2					monitoring and maintenance	monitoring and maintenance	\$30,000	monitoring and maintenance	\$30,000		USFS \$60,000	
Total Non-Capital Needs:											\$2,407,018		\$2,851,018	\$2,065,000	\$8,446,896	
Priority Projects and Programs Benefiting Non-Listed Species																
Total Non-Listed Species Needs:																

WRIA 1 SALMON RECOVERY BOARD

2009-2011 WRIA 1 SALMON RECOVERY 3-YEAR PROJECT PLAN

Format of Narrative

The format for the 2009-2011 WRIA 1 Salmon Recovery 3-Year Project Plan narrative includes two sections from the 2008-2010 WRIA 1 Salmon Recovery 3-Year Plan: WRIA 1 Watershed Recovery Strategy and 10-Year Action Plan. The two sections are included in this 2009-2011 narrative because they effectively summarize the 10 year objectives and action plan of the WRIA 1 strategy and provide context for responses to the questions posed by the Puget Sound Partnership in the guidance for completing this narrative.

WRIA 1 Watershed Recovery Strategy

The ultimate goal for salmon recovery in WRIA 1 is to recover self-sustaining salmonid runs to harvestable levels through the restoration of healthy rivers and natural stream, river, estuarine, and nearshore marine processes, careful use of hatcheries, and responsible harvest, and with the active participation and support of local landowners, businesses, and the larger community. In the near-term (10-year time frame), however, the objectives are to: (1) focus and prioritize salmon recovery efforts to maximize benefit to the two Nooksack early chinook populations; (2) address late-timed Chinook through adaptive management, focusing in the near-term on identifying hatchery- versus naturally-produced population components; (3) facilitate recovery of WRIA 1 bull trout by implementing actions with mutual benefit to both early chinook and bull trout and by removing fish passage barriers in presumed bull trout spawning and rearing habitats in the upper Nooksack River watershed; and (4) address other salmonid populations by (a) protecting and restoring WRIA 1 salmonid habitats and habitat-forming processes through regulatory and incentive-based programs; and (b) encouraging and supporting voluntary actions that benefit other WRIA 1 salmonid populations without diverting attention from early chinook recovery. Planning targets for the priority Nooksack early chinook populations are presented in Table 1. Focusing efforts on early chinook is consistent with regional salmon recovery – current abundance and productivity for the two populations is very low and recovery of both populations is critical to delisting and recovery of Puget Sound Chinook.

Table 1. Planning targets for Nooksack Early Chinook.

Population	Adult Return ¹	Spawners (Natural Origin) ²	Productivity ³	Diversity Index ⁴
North Fork early chinook	10,600	3,400	3.1	97%
South Fork early chinook	7,600	2,300	3.3	98%

¹ Ocean Recruits at MSY

² Spawners at MSY

³ Productivity at MSY

⁴ Diversity Index refers to the percentage of estimated potential life history trajectories that are sustainable.

10-Year Action Plan

The *WRIA 1 Salmonid Recovery Plan* identified 8 actions to be implemented over the next 10 years that would address the near-term priorities presented above:

1. Establish a South Fork gene bank/supplementation program
2. Restore anadromous fish passage at early chinook barriers (Middle Fork diversion dam and Canyon Creek)
3. Habitat restoration in the Forks, mainstem Nooksack River, and major early chinook tributaries
4. Habitat protection and restoration in estuarine and nearshore areas
5. Integrate salmon recovery needs into floodplain management planning
6. Integrate salmon recovery needs into local Critical Areas Ordinance and Shoreline Management Program updates
7. Establish new instream flows and begin implementation of instream flow management programs
8. Restore functioning riparian and water quality conditions and reconnect isolated habitats in lower mainstem tributaries and independent tributaries in WRIA 1

Expected results of the 10-Year Action Plan were modeled through EDT and are presented in Table 2. The results represent the long-term benefits of actions implemented in the 10-year time frame, rather than the expected population status after 10 years.

Table 2. Estimated benefits of 10-year plan on Nooksack early chinook populations.
 Note: Benefits are projected over the long term and assume no net degradation from land use.
 Table 1 footnotes apply.

Population	Adult Return	Spawners (Natural Origin)	Productivity	Diversity Index
North Fork early chinook	3,400	1,600	2.2	89%
South Fork early chinook	1,900	860	3.3	87%

WRIA 1 Salmon Recovery 3-Year Project Plan

Overview of 3-Year Project Plan

The WRIA 1 3-year project plan establishes an ambitious pace for and constitutes substantial progress towards implementation of the 10-year action plan. To help ensure the pace progresses, annual salmon recovery work plans are prepared to further identify tasks necessary to implementing the actions.

It is important to recognize the actions identified in the *2009-2011 WRIA 1 Salmon Recovery 3-Year Project Plan* are based on our current scientific knowledge as it pertains to salmon recovery. Our ability to implement these actions will depend on the community's willingness to act and support these actions. Public outreach associated with implementation of the *WRIA 1 Salmonid Recovery Plan* is included in the *2009 WRIA 1 Salmon Recovery Work Plan*. In addition, and in many cases, a salmon recovery project may be part of a larger project having multiple objectives, such as a flood hazard

reduction or bridge replacement project. Ultimately our success will depend on our ability to engage the community in a way that supports salmon recovery while addressing other community needs. Our approach this year recognizes the challenges of implementing important projects by focusing much more on breaking projects into component actions that can be systematically addressed.

An overview of the key actions of the 3-year plan, organized by 10-year action, is presented below.

1. South Fork chinook supplementation program, designed to conserve the South Fork early chinook population until habitat conditions improve, is ongoing during the 2009-2011 timeframe.
2. Restoration of passage at the two identified early chinook barriers, Middle Fork diversion dam and Canyon Creek continues in the 2009-2011 timeframe.
3. Habitat protection and restoration of early chinook freshwater habitats.
 - a. South Fork. The lower South Fork (RM 0 – 13) is one of the primary focus areas for restoration efforts since it is the most important reach to restore for the SF population and because reach assessments and restoration planning have been completed. The upper South Fork is also important although conditions are less degraded. A synthesis of the three South Fork assessments was initiated in fall of 2008. A proposal for a South Fork restoration strategy based on the synthesis of the assessments consolidates and prioritizes areas for project actions, and a sequence for completing the projects is in draft form and under discussion by the WRIA 1 Salmon Recovery Staff Team. The draft proposal for project sequencing is based on the WRIA 1 Restoration Strategy that is included in the WRIA 1 Salmon Recovery Plan. Projects in the 2009-2011 3-Year Project Plan are consistent with the projects proposed for sequencing in the draft South Fork Restoration Strategy. All projects underway and planned in the South Fork address the following limiting factors: (1) habitat diversity by placing wood jams to provide wood cover and increase habitat unit diversity and complex edge habitat, and by restoring floodplain forest; (2) key habitat quantity by increasing quantity of deep pools and reconnecting sloughs; (3) temperature by creating thermal refugia, i.e. deep, complex, pools in areas of cool groundwater influence expected to promote thermal stratification, and restoring tributary riparian areas and wetlands; (4) sediment load by reconnecting forested floodplain areas that can promote fine sediment deposition, or assessing or treating forest roads and other sediment sources; and (5) channel stability (impact of which was underestimated in EDT) by removal/setback of levees and/or hardening.
 - b. North Fork. The lower North Fork (RM 36.5 to 57) is another primary focus of restoration, since it is the most important reach to restore for the NF/MF population and because reach assessment and restoration planning is underway. An expansion of the current Draft North Fork Assessment is planned for 2009, which may result in identification of additional projects and/or project sequencing. A May 5, 2009 technical workshop validated priority reaches for project actions and sequencing that are identified in the Draft North Fork Assessment. The projects underway or currently planned in the North Fork (including Canyon Creek, see category 2 above) address the following limiting factors: (1) channel stability, through log jam placement throughout the active channel, and by restoring quantity and quality of stable spawning habitats, such as side channels; and (2) key habitat

- quantity, through log jam placement that forms pools and complex edge habitat. Sediment load will be addressed through ongoing forest road management through Forest and Fish and USFS; this action is not described in the detailed descriptions. An Orphan Road Project Assessment that will include the North Fork is identified as a non-capital project in the 2009-2011 WRIA 1 3-Year Project Plan.
- c. Middle Fork. A reach assessment and restoration planning effort was initiated in 2008 for the Middle Fork from the mouth to approximately RM 18. The outcomes of the assessment will be used to develop a strategic project plan for the assessed reach. As an interim measure, a May 5, 2009, restoration planning workshop for WRIA 1 identified reaches below Mosquito Lake Road Bridge where projects may be appropriate. The 2009-2011 project plan includes a place-holder for projects identified as an outcome of the Middle Fork assessment and other projects that may be identified for the reaches below Mosquito Lake Road Bridge. A project is also proposed to mediate flow (ensure low flows, moderate high flows) into a spring-fed side channel that supports increasing numbers of early chinook spawners. Conceptual design work has been completed for that project, which is located in one of the reaches identified at the May 5, 2009, workshop.
 - d. Mainstem Nooksack. Reach assessment and restoration planning is proposed for the mainstem Nooksack. Additionally, limited small-scale restoration projects (piling jams) and larger projects that address both flood and salmon concerns (see also action #5) are proposed; these address limiting factors of habitat diversity (complex cover, floodplain reconnection) and key habitat quantity (deep pools, backwaters, edge habitat).
 - e. Acquire priority areas for protection of function and/or to facilitate restoration. A strategy for effective use of acquisition tools in salmon recovery is in development. It is expected that the completed strategy will further advance acquisition of key properties for protection and/or restoration purposes. The *2009-2011 WRIA 1 3-Year Project Plan* includes placeholders for acquisition of parcels or conservation easements as necessary for salmon recovery purposes.
4. Estuarine and nearshore marine areas. Proposed actions for estuarine and nearshore areas include the following:
- a. Assessment of Nooksack chinook distribution in and use of nearshore.
 - b. Restoration of floodplain connectivity upstream of the Nooksack delta (See 3d; not described further).
 - c. Restoration of connectivity (upstream and downstream) and estuarine habitat quantity and quality on the Lummi delta.
 - d. Improvement of connectivity along urbanized shoreline habitat benches constructed in association with redevelopment of inner Bellingham Bay (not described further).
 - e. Protection of existing function through regulatory updates to Shoreline Master Program and Critical Areas Ordinances (see #6).
5. Integration of salmon recovery and floodplain management. Salmon Recovery Board members have agreed that integration should be pursued deliberately but carefully to build community vesting and to avoid polarizing stakeholders and landowners. The following steps are proposed for the next 3 years:

- a. Implementation of pilot levee setback projects with mutual benefit for flood management and salmon recovery; lessons learned will be applied to future projects.
 - b. Implement measures to ensure flood and transportation projects maximize benefit to salmon to the extent possible (ongoing).
 - c. Mainstem Nooksack Reach Assessment. As part of this project, salmon recovery staff will work with County River and Flood staff to assess conditions, identify projects, evaluate project feasibility, and conduct education and outreach of affected landowners and stakeholders. This reach assessment did not receive funding in 2008 and remains on the 2009-2011 project to initiate.
 - d. Consultation with salmon recovery staff for flood projects (ongoing, but not described further).
 - e. Implement a scope of work to evaluate interactions of habitat restoration projects and flood hazard management objectives. Specifically, the WRIA 1 Salmon Recovery Staff Team has hired a consultant to conduct hydraulic modeling and geomorphic analysis for the South Fork Nooksack River to estimate effects of restoration projects on flood hazard risk (flooding, bank erosion). The Flood Hazard Management Program Manager is participating with the Staff Team to initiate and complete this project.
6. Salmon habitat protection through Critical Areas Ordinance (CAO)/Shoreline Management Program (SMP) Updates. The updated Whatcom County CAO and SMP are expected to serve as models for other local government CAO/SMP updates in the 3-year time frame:
- a. The regulatory updates for the CAO and SMP by the small municipalities in WRIA 1 remain on the WRIA 1 3-Year Project List.
 - b. In addition to regulatory protection, a program for fee simple or conservation easement acquisition is also proposed, although the primary objective is to acquire lands to facilitate important restoration projects.
7. Instream flows. The goal of the WRIA 1 Watershed Management Project as it relates to salmon recovery is to ensure adequate instream flow levels for spawning, rearing, and migration of all WRIA 1 salmonids. Priority species and life stages were selected in each geographic area that generally represent the most flow-limited in that area. The technical teams have identified flows that are optimal for priority WRIA 1 fish species and life stages subject to current hydrologic model constraints and fish habitat model limitations. These technical recommendations, along with other technical, policy, and legal considerations, including beneficial out-of-stream water needs and existing and future hydrologic constraints, will be used to negotiate a flow regime that is acceptable to the parties and is then adopted. The following actions are proposed for the 3-year time frame:
- a. Instream flow negotiations. The instream flow negotiation settlement process is still underway. The process is conducted under confidentiality agreements and therefore, the scope of the area under discussion and potential solutions for managing water are not available at this time.
 - b. Projects are proposed to be implemented in the Bertrand Creek watershed to restore instream flows and improve habitat conditions.
8. Other WRIA 1 salmonid habitats. The primary emphasis for other WRIA 1 salmonid habitats is protection of existing function through implementation of Shoreline Master Programs, Critical Areas Ordinances, and stormwater management programs. Limited

activities are also proposed to restore processes and reconnect isolated habitats in Nooksack River tributaries and the independent tributaries to the Fraser River and Strait of Georgia:

- a. Fish passage barrier removal program to address high priority fish passage barriers.
 - b. Riparian restoration program to support ongoing voluntary riparian restoration (e.g. Tenmile Creek partnership, Bertrand Watershed Improvement District) along lower mainstem and independent tributaries.
9. Other programmatic actions.
- a. Adaptive management for Nooksack early chinook. Generic population and habitat monitoring programs are described herein. Monitoring will follow the adaptive management plan, expected to be developed by the end of 2009.
 - b. Salmon recovery implementation oversight and coordination.
 - c. Population monitoring for other WRIA 1 salmonids that are ESA-listed (bull trout), proposed for listing (steelhead), or species of concern (coho).

Summary of Changes to the 2009-2011 WRIA 1 Salmon Recovery 3-Year Implementation Plan from the 2008-2010 WRIA 1 Salmon Recovery 3-Year Implementation Plan

- Projects that were not initiated in 2008 were shifted to a projected 2009 or later start date.
- Projects were added that were considered feasible to implement or initiate within the projected timeframe, or that are associated with tasks in process. The additional projects include:
 - Middle Fork and tributary restoration acquisition is added for the *2009-2011 WRIA 1 3-Year Project Plan* as a placeholder for key properties that may be identified in the Middle Fork Assessment as being necessary to facilitate salmon recovery restoration projects and/or for protection of functioning habitat.
 - Expansion of the North Fork Assessment to broaden the depth of information in the current assessment as well as to expand the geographic coverage of the assessment. Tributary habitat mapping that is part of an expanded assessment is planned for summer 2009.
 - The *2008-2010 WRIA 1 3-Year Project Plan* included an action to Integrate Salmon Habitat Reach Assessment and Projects with Flood Hazard Management. This action is being implemented in 2009 with the addition of the hydraulic modeling of restoration project scenarios that was mentioned under #5 of the previous section.
- Project costs were updated as appropriate to reflect new information such as revised project cost estimates, funding obtained, and engineering and/or design work completed.

Responses to Questions Posed in 2009 Three Year Work Plan/Program Guidance

1. *What are the actions and/or suites of actions needed for the next three years to implement your salmon recovery chapter as part of the regional recovery effort?*

Actions are identified in the *2009-2011 WRIA 1 3-Year Project Plan* spreadsheet submitted with this narrative. The Overview of the 3-Year Project Plan section of this narrative organizes the key actions from the 2009-2011 project spreadsheet according to the WRIA 1 Salmon Recovery Plan 10-year action that they address. Synthesizing the South Fork Reach Assessments into a single strategy that sequences priority reaches for project actions, prioritizing reaches in the North Fork based on the Draft North Fork Assessment, and completing the Middle Fork Assessment with a restoration strategy that prioritizes reaches for sequencing project actions will

further the progress already made on implementing WRIA 1 recovery plan priorities to achieve WRIA 1 recovery objectives. The prioritization of the Nooksack River Forks and reaches within the Forks is also reflected in the WRIA 1 process for evaluating and scoring project applications for SRFB and PSAR funding. Focusing WRIA 1 project actions and efforts on South Fork and Middle Fork/North Fork early chinook is consistent with regional salmon recovery. The current abundance and productivity for the two populations is very low and recovery of both populations is critical to delisting and recovery of Puget Sound Chinook.

2. *What is the status of actions underway per your recovery plan chapter? Is this on pace with the goals of your recovery plan?*

Progress is being made on all of the key actions identified in the WRIA 1 Salmon Recovery Plan either directly through the WRIA 1 Salmon Recovery Board and its committees or through the activities of the individual entities represented on the Board. Efforts within each of the key actions have primarily focused on projects and actions to recover early chinook. The WRIA 1 Watershed Recovery Strategy section of this narrative provides additional information on the goals and objectives of the WRIA 1 recovery plan. A concerted effort is being made by participants of the Salmon Staff Team to involve Flood Hazard Management Program staff and participants of the WRIA 1 Watershed Management Project to collaborate and coordinate on actions that achieve multiple goals. This collaboration and coordination is needed to advance progress on the key actions in the WRIA 1 Salmon Recovery Plan involving but not limited to instream flows, flood hazard management, and regulatory compliance. The WRIA 1 Salmon Recovery Monitoring and Adaptive Management Plan will be completed in 2009, which will be used to help further measure the rate of progress in achieving the goals of the recovery plan.

3. *An excel document is attached which includes a spreadsheet called 'PSP Staff Work – Watershed Goals.' This spreadsheet will be filled out by PSP staff based on your watershed chapter plan to identify the 10-year recovery goals & objectives. PSP staff will send each watershed this information in preparation for the three-year work plan update process. This spreadsheet is to help track progress (and changes) toward recovery goals. What is the general status of implementation towards your habitat restoration, habitat protection, harvest management, and hatchery management goals? Progress can be tracked in terms of 'not started, little progress, some progress, or complete' or in more detail if you choose.*

Refer to column in 2009-2011 WRIA 1 3-Year Project List on PSP Staff Work worksheet labeled "status".

4. *What are the top implementation priorities in your recovery plan in terms of specific actions or theme/suites of actions? How are these top priorities being sequenced in the next three years? What do you need to be successful in implementing these priorities?*

The top implementation priorities have been actions that will maximize benefit to the two Nooksack early chinook populations. Assessment work and restoration planning has been completed for the entire South Fork. The 2009-2011 WRIA 1 3-Year Project Plan includes South Fork projects identified in the reach assessment/restoration planning documents. A restoration strategy is being developed that synthesizes the outcomes of the three South Fork reach assessments into a single restoration strategy that provides a priority sequence for the projects identified in the assessments. Starting with the 2009 grant funding round, sponsors of projects

that have not been started and that are on the 3-Year Project Plan are being asked to identify the stages of their project and provide context for how their proposed project fits into the sequence of projects for the applicable reach. Although there is less assessment work completed for the North Fork, the approach described for the South Fork project sequencing and implementation is also planned for the North Fork. The completed Middle Fork assessment that is in process will include information for project sequencing.

5. *Do these top priorities reflect a change in any way from the previous three-year work program? Have there been any significant changes in the strategy or approach for salmon recovery in your watershed? If so, how and why?*

The priorities in the 2009-2011 3-Year Project Plan have not changed from 2008-2010 Plan. The efforts in 2009 have been to move to a more strategic approach of phasing projects and actions.

6. *What is the status or trends of habitat and salmon populations in your watershed?*

The WRIA 1 Salmon Recovery Plan Monitoring and Adaptive Management Plan will be designed to address those questions. The overarching monitoring plan is slated to be completed in 2009 with monitoring to begin in 2010.

7. *Are there new challenges associated with implementing salmon recovery actions that need additional support? If so, what are they?*

[This question will be answered in the final 2009-2011 WRIA 1 3-Year Project Plan submittal]