

WRIA 1 IMPLEMENTATION PROGRAM: 2007-2009

ACTION DESCRIPTIONS

The following descriptions are arranged by geographic area and align with the accompanying spreadsheet, which provides details on funding for 2007-2009 and the project priority. The “Overview Memo Category” below each project name and in the spreadsheet corresponds to the categories discussed in the Overview Memo.

South Fork Nooksack

South Fork Acme-Confluence Reach: Active Channel Logjams

Overview Memo Category: 3a

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

This project includes construction of stable log jams in the main channel in areas of known cool water influence (groundwater recharge or tributary inputs). The objective of the project is to increase habitat diversity, quantity of deep pools with cover, and availability of temperature refuges. Locations and proposed number of log jams include: (1) Caron Creek confluence and downstream, estimate 5 log jams; (2) Tawes Creek confluence and downstream, estimate 5 log jams; (3) Todd Creek confluence and downstream, estimate 5 log jams; (4) Sygitowicz Creek confluence and downstream, estimate 5 log jams; and (5) near Standard Creek confluence, estimate 6 log jams. Estimate cost of \$75,000 per structure, \$60,000 per location for design and permitting, and \$5000 per location for monitoring. Phase 1 (Todd, Sygitowicz Creeks) design and permitting is scheduled for 2007, construction for 2008, and monitoring for 2009. Total estimated Phase 1 cost: \$880,000. Phase 2 (Caron, Tawes, Standard Creeks) design and permitting is scheduled for 2008, and construction for 2009, with monitoring in subsequent years. Total estimated Phase 2 3-year cost: \$1,380,000. Projects are contingent on landowner willingness to proceed.

Benefit: 26 log jams engaged with low flow channel, 16 main channel pools, 16 temperature refuges during summer low flow (2°C difference from thalweg)

Cost: Estimated 3 year cost for Phase 1 is \$880,000 and Phase 2 is \$1,380,000

South Fork Acme-Confluence Reach: HMZ Reconnection

Overview Memo Category: 3a

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. Locations, HMZ area made accessible, and length of bank hardening removed/setback 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.

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

Cost: Estimated 3-year project cost is \$120,000.

Lower South Fork Tributary Riparian Restoration

Overview Memo Category: 3a

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. 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.

Cost: Estimated 3-year project cost is \$541,200 (\$180,400 per year).

Lower South Fork HMZ Riparian Restoration

Overview Memo Category: 3a

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. Projects 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.

Cost: Estimate for 3-year project is \$981,200 (\$327,067 per year)

Black Slough Wetland Water Storage Improvement

Overview Memo Category: 3a

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

This project envisions actions that promote water storage in a historically important wetland complex by plugging, backfilling, and/or re-meandering drainage ditches and re-creating micro-impoundments similar to beaver dams. Estimate 5500m of straight ditchline and 1900m of Black Slough stream length (approximately 1/3 of its length) within the wetland at \$70/m, for a total \$518,000. Project is contingent upon landowner willingness to proceed or sell conservation easement. Acquisition costs dependent on scale of project.

Benefit: restore 180 acres of Black Slough wetland, Flood reduction, increased summer baseflow, and decreased summer temperature in the lower 2 miles of the South Fork Nooksack.

Cost: Estimated cost for 3-year project is \$518,000 (Phase 1 implementation \$259,000; Phase 2 implementation \$259,000)

Acme-Saxon Reach Active Channel Logjams

Overview Memo Category: 3a

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:

- Stabilization of existing log jams near Nessel's Slough. The objective of the project would be to increase the stability of logjams, increase the number of pools and promote floodplain connectivity through local aggradation and scour. It is estimated that there would be 10 log jams in the reach that will be stabilized, using ballasted wood structures, pilings, or a similar approach. The project cost would vary depending on method (ballasted log structures, pilings, etc.) and engineering design but estimated costs are \$200,000.

Benefit: Benefit: 10 log jams (> 5 associated with channel at any one time), at least 5 pools

Cost: Estimated cost for 3-year project is \$200,000

- Stabilization/augmentation of existing log jams below Saxon Road bridge. 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 expected that the ~five instream structures would cost \$400,000 to design, permit and construct, although only \$70,000 is needed in the 3-year time frame for design and permitting.

Benefit: 5 log jams, 5 pools with complex cover, 5 cooler water areas local to the logjams during summer low flow (2°C difference from thalweg)

Cost: Estimated 3-year cost is \$70,000

Lower South Fork Slough Reconnection

Overview Memo Category: 3a

Objective: Increase habitat diversity by improving connectivity of two sloughs to the South Fork

- **Curtis Slough Reconnection.** This project will improve cover in slough using wood and rock structures adequately sized for the main channel, create a stable upstream connection to the river and work with instream structures constructed in the mainstem near Nessel's Slough. It is estimated that this project will cost \$100,000, although only \$80,000 is requested for the 3-year time frame. Projects are contingent on landowner willingness to proceed with project.

Benefit: improve connectivity, cover availability in 4000 foot of secondary channel.

Cost: Estimated 3 year cost \$80,000

- **Rothenbuhler Slough Reconnection.** This project will reconnect and improve Rothenbuhler Slough. The project includes channel excavation, grade control structures in the slough channel, creating a downstream connection and provides wood cover within the slough. A structure at the head of the channel to maintain the opening and prevent reoccupation by the main channel of the river would be necessary at the site. It is estimated that the project will cost \$200,000, although only \$180,000 is requested for the 3-year time frame. The planning of the project will require landowner participation in setting project objectives and allowable scope of work.

Benefit: improve connectivity, cover availability in 5800 foot of historic side channel

Cost: Estimated 3 year cost \$180,000

Floodplain Reconnection Upstream of City of Bellingham Water Pipeline

Overview Memo Category: 3a

This project includes working with the Acme Van Zandt Flood Subzone, adjacent property owners, members of the South Fork community, Whatcom County (Public Works and Parks and Recreation Departments), the Whatcom Land Trust, and the City of Bellingham to address the right bank levee upstream of the City of Bellingham water pipeline crossing, which constricts the South Fork through this reach to less than 270 feet wide. The primary habitat objectives are to improve floodplain connectivity and habitat diversity, which have been reduced due to levee construction. The planning and design process will also evaluate opportunities to simultaneously accomplish flood hazard management objectives in the reach. The intent is to produce projects that successfully integrate salmon recovery and flood hazard management objectives. Project options include levee removal, lowering, setback, or alteration and construction of instream habitat structures in the channel and floodplain area of the South Fork. The City of Bellingham will be consulted as potential effects on their water supply line are considered. Community involvement will be essential to successful project design and implementation. The 3-year project cost is estimated at ~\$440,000 to design, permit, construct and monitor.

Benefit: reconnect 30 acres of HMZ, 1500 feet of perennial secondary channel development, increased fine sediment and wood storage on the floodplain, increased floodwater retention.

Cost: 3 year project cost \$440,000

Upper South Fork 30 Mile Reach Restoration

Overview Memo Category: 3a

Objective: Slow channel incision, increase habitat diversity, and buffer South Fork from large landslides

The 30 Mile Reach Restoration Project includes the removal of a bridge, associated fill and riprap, removal of a blocking culvert on the southern access road, and the installation of several instream structures designed to slow channel incision in the reach and buffer the channel from several large stream-adjacent landslides. Bridge removal cost estimates vary depending on the salvage value of the beams, disposal of material and the methods for removal. This component is estimated to cost \$200,000. Wood and rock structures to roughen and control the grade of the channel and improve habitat conditions will cost an estimated \$550,000. Reusing the riprap on site will contribute to a cost savings to this component.

Benefit: removal of bridge and associated 400 feet of riprap, reconnect 5 acres of HMZ, buffer ~18,000 square yards of actively eroding landslides from the active channel.

Cost: Estimated 3 year cost \$738,000

Upper South Fork Orphan Road Assessment

Overview Memo Category: 3a

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

The orphan road assessment will use the coming LiDAR (Fall 2006) that will include 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 where drainage improvement and fill removal is necessary to reduce erosion and prevent slope failures. Projects are contingent on landowner willingness to proceed with project. 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 sidecast for several road miles. These projects will reduce sediment input into the South Fork and its tributaries.

Cost: Estimated 3-year cost \$120,000

USFS Road Network Monitoring and Maintenance

Overview Memo Category: 3a

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

Cost: Estimated 3-year project cost \$90,000

Years 3 and 4 of Skookum Chinook Supplementation

Overview Memo Category: 1

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

Cost: Estimated 3-year project cost \$510,054

Skookum Creek Hatchery Water Supply

Overview Memo Category: 1

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

Cost: Estimated 3-year project cost \$700,000

South Fork Spawning Channel Feasibility and Design

Overview Memo Category: 1

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.

Cost: Estimated 3 year project cost for Phases 1 and 2 is \$250,000

Lower South Fork Flood/Salmon Coordination

Objective: Increase habitat diversity, reducing poaching impact

These projects seek to develop coordinated salmon habitat and flood management projects for the South Fork in a location near Acme:

- Below Hutchinson Creek.

Overview Memo Category: 3a

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.

Cost: The project will cost an estimated \$300,000.

- Former Riverview RV Park.

Overview Memo Category: 5b, 3a

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 ~\$100,000. Construction costs are to be determined and are estimated at ~\$475,000.

Benefit:

Cost: Estimated 3 year project cost \$575,000.

Lower South Fork Joint Transportation/Restoration Planning

Overview Memo Category: 5b, 3a

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

Cost: Estimated 3-year project cost \$200,000

Bell Creek Road Crossing (Upper South Fork)

Overview Memo Category: 8a

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

Costs: Estimated 3 year project cost \$95,000

Middle Fork Nooksack

Peat Bog Side Channel

Overview Memo Category: 3c

Objectives: Improve early chinook spawning habitat in 4000 foot side channel.

Improve late summer flow through side channel to improve both attraction and spawning flows for early chinook, reduce juvenile and adult salmonid stranding which occurs in the frequently dewatered 2000 foot long reach at head of the channel, and reduce redd scour associated with high flood flows through the channel. The proposed action will create a constructed logjam at the head of the channel that will encourage a supply of 10 CFS of gravity fed Middle Fork flow middle fork water to head of the side channel and which will meter high flows to reduce winter flood flows through the channel. This action targets native early chinook spawning and egg incubation habitats.

Benefit: decrease frequency of dewatering in 2000 feet of side channel and associated redd dewatering while reducing redd scour during flood events.

Cost: Estimated 3 year project cost \$20,000.

Middle Fork Reach Assessment and Restoration Planning

Overview Memo Category: 3c

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.

Cost: Estimated 3-year cost is \$100,000

Middle Fork Diversion Dam

Overview Memo Category: 2

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 has been completed, but geotechnical issues have arisen that have doubled the estimated cost. Construction is scheduled for 2007, pending funding availability. 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

Cost: Estimated 3 year project cost \$15,000,000.

Middle Fork Diversion Dam: Lake Whatcom Kokanee Program

Overview Memo Category: (2)

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

Cost: Estimated 3 year project cost \$6,164,000.

Upper Middle Fork Spawner Surveys

Overview Memo Category: 9a

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. With passage scheduled in 2007, surveys should begin in 2007. 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

Costs: Estimated 3 year project cost is \$150,000

North Fork Nooksack

Lower Canyon Creek Design and Restoration

Overview Memo Category: 2,3b

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 will be defined in the on-going assessment. These will shape project design and sequencing. 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) in 0.9 miles of early chinook tributary habitat.

Cost: Estimated 3 year project cost \$1,250,000

North Fork Channel Stabilization

Overview Memo Category: 3b

Objective: Restore channel stability and encourage forested island formation and persistence through installation of complex wood jams

This project will begin to restore an anastomosing channel pattern to a ½ mile long unconfined reach of the North Fork Nooksack River upstream of Kendall Creek through placement of engineered log jams across the channel. It is expected that the reach would serve as a node that would improve stability in the North Fork downstream the ½ mile project reach; additional reaches would be similarly restored in subsequent years. Projects are likely to be contingent on landowner willingness to proceed.

Benefit: improved stability (reduced channel shifting, redd scour) and logjam distribution of a half-mile long reach; increased key habitat quantity (complex edge habitat, pools, backwater habitat) in a half-mile long reach

Cost: Estimated 3 year project cost \$1,500,000

North Fork Stable Side Channel Restoration

Overview Memo Category: 3b

Objective: Wood placement to improve stability, reduce low-flow dewatering of side channels for early chinook spawning

This project seeks to restore stable side channel spawning habitat through the targeted placement of ballasted wood structures at the upstream ends of floodplain channels with upland tributary sources of flow to reduce the likelihood that the North Fork mainstem would capture the channel

and increase the likelihood that the channel would remain wetted through incubation. Estimate 5 structures or sets of structures at \$150,000 each location, plus \$50,000 for design and permitting. Projects are likely to be contingent on landowner willingness to proceed.

Benefit: increased stability, low flow connectivity of 5 side channels; increased key habitat quantity (complex edge, backwater habitat) in 5 side channels

Costs: Estimated 3 year project cost estimate \$800,000

Mainstem Nooksack River

Invasive Weed Control

Overview Memo Category: 3a-d

Objective: to inventory and control 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 inventory and control 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 the Nooksack River and its forks. Specific targets include Japanese knotweed (*Polygonum cuspidatum*), Giant (*P. sachalinense*) and Himalayan (*P. polystachyum*). Existing inventories will be completed. 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

Cost: Estimated 3 year project cost \$315,000.

Mainstem Reach Assessment and Restoration Planning

Overview Memo Category: 3d, 5c

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

Cost: Estimated 3 year project cost \$300,000

Lower Bertrand Creek Levee Setback- LWD Placement

Overview Memo Category: 3d, 5a

Objective: Provide for habitat connectivity and in-stream habitat diversity and complexity in Lower Bertrand Creek.

The levees in lower Bertrand Creek are to be setback in the summer of 2006 to provide for restoration of riparian areas and to improve instream habitat functions and connectivity for rearing early chinook and other salmonids. Additional goals are to improve fall/winter flood storage and conveyance and to reduce spring flooding of agricultural lands. The goal of this project is placement of large woody debris to improve habitat complexity and diversity for juvenile early chinook rearing, bull trout foraging, and utilization by multiple other salmonid species and lifestages. Projects are contingent on landowner willingness to proceed.

Benefit: increased availability of off-channel refugia, tributary rearing habitat

Cost: Estimated 3 year project cost \$150,000

Sande Bar Levee and ‘Clay Bank’

Overview Memo Category: 3d, 5b

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

Cost: Estimated 3 year project cost \$3,300,000

Piling Jam, 4 Sites

Overview Memo Category: 3d

Objective: Demonstrate an economical and effective method to improve channel roughness, cover and quite 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

Cost: Estimated 3 year project cost \$100,000

Estuary and Adjacent Waters

Modeling of Currents in Bellingham Bay

Overview Memo Category: 4a

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

Costs: Estimated 3 year project cost \$56,000

Chinook Habitat Use Assessment in Bellingham Bay and Adjacent Areas

Overview Memo Category: 4a

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 are 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

Costs: Estimated 3 year project cost \$250,000

Smuggler's Slough Acquisition and Reconnection

Overview Memo Category: 4c

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. Riparian planting of the channels will follow design. It is estimated that the project will cost \$2,807,000. The planning of the project will require landowner participation in setting project objectives and allowable scope of work.

Benefit: 200 acres of wetland acquired and 125 acres of floodplain wetland restored, restored passage to 6-8 miles of tidal slough and Lummi Bay

Cost: 3-year project cost estimate is \$2,807,000

Lummi Delta Project

Overview Memo Category: 4c

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

The goal of this project is to remove portions of the Lummi Bay seawall to allow tidal inundation of the area between the northern and southern distributary channels of the Lummi River. This project includes wetland acquisition (120 acres), wetland restoration and seawall removal. It is estimated that project will cost \$408,000 over the next three years. This project is a companion to a larger wetland acquisition project in the area that will include an additional 280 acres of wetland acquisition and cost an estimated \$1,000,000.

Benefit: 301 acres of wetland acquired, 40 acres of wetland restored, including partial restoration of tidal inundation to sloughs and wetland areas.

Cost: Estimated 3 year project cost \$408,000

Squalicum Creek Estuary Restoration

Overview Memo Category: 4d

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

Cost: Estimated 3 year project cost \$410,000

Lower Nooksack Tributaries

Instream Flow Enhancement Project(s)

Overview Memo Category: 7b

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 well and surface storage system (locally termed “pump and dump”) that will provide water to augment instream flows in critical reaches during low flow periods. This program is to be operated by the Bertrand Watershed Improvement District. Estimated total cost: \$725,000.
- 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

Cost: Estimated 3 year combined project cost \$780,000

Schneider Ditch Flood Gate

Overview Memo Category: 8a

Objective: Improve fish access to 20,000 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. 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

Cost: Estimated 3 year project cost \$150,000

Other Geographic Areas and Programs

Acquisition to Facilitate Restoration of Early Chinook Habitats

Overview Memo Category: 3a-d, 6b

Objective: Acquire or obtain easements on properties identified as priorities for protecting highly functional or for restoring early chinook habitats

This program seeks to acquire, in the most cost effective manner, through fee simple purchase or conservation easements, properties that are important to Nooksack early chinook populations. Priorities for acquisition are as follows: (1) Highest Priority: properties that are necessary to implement planned priority restoration projects in the Forks and Forks tributaries; (2) High Priority: properties that are necessary to implement planned priority restoration projects in the Mainstem and Estuary; and (3) Moderate Priority: properties that are necessary to implement planned priority projects along marine shorelines. This program will most likely fund acquisition of properties to facilitate setback or removal of hardening and/or levee, such as areas within historic migration zones and/or the County-delineated Channel Migration Zone that are artificially isolated (i.e. through hydromodification) from the main channel. Acquisition for protection of existing function may also be considered if the likelihood of degradation is high and regulatory programs are deemed insufficient. Estimate \$2 million a year. Projects are likely to be contingent on landowner willingness to proceed.

Benefits: ~400 acres of chinook habitat available for restoration and protected per year

Costs: Estimated 3 year cost \$6,000,000

Update Small Cities SMP/CAO

Note: The spreadsheet that accompanies this program description document includes a separate entry for the Sumas plan update due to the different priority tier assigned for efforts in this watershed. The project description below and estimated 3-year cost is inclusive of all planning updates.

Overview Memo Category: refer to individual bullets

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 scheduled for completion/adoption by the end of 2006. Salmon recovery staff are participating 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. The following updates (with associated funding needs) are planned for the 3-year time frame:

- Update Ferndale SMP (90% complete, 6-9 months of work remaining, need additional \$30,000) Category Memo Overview: 6a
- Update Lynden SMP (scheduled for 2007, need \$60,000) Category Memo Overview: 6a
- Update Blaine CAO (may occur in 2007, need \$18,000) Category Memo Overview: 6a, 4f
- Update Blaine SMP (in progress, need \$15,000) Category Memo Overview: 6a, 4f
- Update Everson SMP (planned, estimated need \$60,000) Category Memo Overview: 6a
- Update Nooksack SMP (planned, estimated need \$60,000) Category Memo Overview: 6a
- Update Sumas SMP (planned, estimated need \$60,000) Category Memo Overview: 6a

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

Costs: Estimated 3 year project cost for all planning efforts \$303,000

Restoration Plan and Watershed Management Plan Implementation

Overview Memo Category: 9b

Objective: Provide the resources required to provide broader community involvement and institutional support in the implementation of the Salmonid Recovery Plan to facilitate achievement of Plan 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.

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

Costs: Estimated 3 year project cost \$495,000

WRIA 1 Implementation of Instream Flow Negotiations

Note: The spreadsheet that accompanies this project description document includes two entries for the Instream Flow Negotiations due to the different priority tiers assigned to Bertrand and Middle Fork. The project description below and estimated 3-year cost is inclusive of both drainages.

Overview Memo Category: 7a

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 in two pilot areas 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 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

Cost: Estimated 3 year project cost \$625,000.

Habitat Monitoring to Support Adaptive Management

Overview Memo Category: 9a

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

Costs: Estimated 3 year cost \$300,000

Expand Monitoring and Stock Identification of Nooksack Chinook Population

Overview Memo Category: 9a

- Increased spawn survey frequency will 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

Costs: Estimated 3 year project cost \$160,000

Fish Passage Barrier Removal Program

Overview Memo Category: 8a

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.

Costs: Estimated 3 year program cost \$750,000

Riparian restoration program support: project match, conservations easements

Overview Memo Category: 8b

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

Cost: Estimated 3 year program cost \$750,000

Monitor and Establish DNA baselines for Nooksack Bull Trout Populations

Overview Memo Category: 9c

- 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

Cost: Estimated 3 year program cost \$120,000

Steelhead Spawn surveys and DNA Analysis

Overview Memo Category: 9c

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

Cost: Estimated 3 year program cost \$150,000

Coho Spawn Surveys

Overview Memo Category: 9c

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

Cost: Estimated 3 year program cost is \$120,000

WRIA 1 3-YEAR IMPLEMENTATION PLAN

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 and estuary/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 Return¹	Spawners (Natural Origin)²	Productivity³	Diversity Index⁴
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 (Appendix B) 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.

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%

3-Year Prioritized Implementation Plan

Process for Identification of Actions

Earlier this year, the Steering Committee of the WRIA 1 Salmon Recovery Board tasked the WRIA 1 Salmon Recovery Work Group with developing a near-term salmon recovery implementation plan. To develop the 3-year implementation plans requested by the Puget Sound Salmon Recovery Council, the Work Group hosted workshops for two geographic areas for which reach assessments/restoration planning efforts were complete or underway: the South Fork and the North Fork Nooksack River. Local, state, tribal, and federal agency and regional fisheries enhancement group staff with relevant knowledge and expertise were invited to the workshops, wherein salient findings of the reach assessments and preliminary project concepts were presented and discussed. Reach assessment leads and Work Group members incorporated feedback from the workshops into the action lists for each of the South and North Forks. Actions identified for the lower South Fork (RM 0 -14.3), where reach assessments have been completed, are more developed than for either the lower North Fork (RM 36.5 - 57) or upper South Fork (RM 14.3-31), where reach assessments are currently underway. Comprehensive assessment and restoration planning has also been completed for the Estuary and projects for the 3-year time frame were identified by the assessment lead (Lummi Natural Resources). Projects in other geographic areas (Middle Fork, mainstem, nearshore) were identified by Work Group staff and discussed through a series of Work

Group meetings. Reach assessment and associated restoration planning is proposed for each of these areas; until complete, actions proposed for these areas will tend to be more opportunistic than in areas where comprehensive restoration planning has been completed. Programmatic actions were also identified by Work Group staff.

Throughout all areas, actions were selected that were deemed important for Nooksack early chinook or, in some cases, other salmonid populations *and* are ready to proceed from a planning perspective. Important early chinook actions are those that either substantially address the most important limiting factors for early chinook (Appendix A) or support adaptive management.

It is important to recognize the proposed actions 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. This support can be realized provided the WRIA 1 Salmon Recovery Board devotes the resources needed to involve local communities in the development and implementation of salmon recovery projects. 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 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.

Prioritization of Actions

After actions were identified, the Work Group assigned a priority level to each action. Prioritization scheme follows:

- Priority 1A: Highest priority actions for Nooksack early chinook populations, i.e. those expected to yield relatively quick and significant improvement in population abundance and productivity by addressing important limiting factors through improvements in holding, spawning, incubation, and early rearing habitat. Habitat/watershed restoration projects that address important limiting factors in the Forks (including reach assessments that will lead to projects), instream flow negotiations for the Middle Fork, and the South Fork supplementation program comprise this category.
- Priority 1B: Actions that are a lower relative priority for Nooksack early chinook but seek to build community support and/or integrate salmon recovery with flood hazard management.
- Priority 1C: Studies to fill nearshore data gaps and habitat and chinook population monitoring to support adaptive management.
- Priority 2: Moderate priority actions for Nooksack early chinook populations, i.e. those expected to improve population abundance, productivity, spatial structure, and diversity through improvements in rearing habitats. Habitat restoration projects that address important habitat limiting factors in the mainstem Nooksack and Nooksack/Lummi estuary comprise this category.
- Priority 3: Actions that are lower priority in this time frame for Nooksack early chinook populations, i.e. those expected to improve population abundance, productivity, spatial structure, and diversity through improvements in nearshore rearing and transitional habitats. Habitat projects addressing limiting factors in Bellingham Bay are found in this category.

- Priority 4: Actions that primarily benefit other WRIA 1 salmonids. Fish passage restoration including non-chinook habitats, population monitoring of other species, and habitat and instream flow restoration in tributaries to the lower mainstem comprise this category. Actions that opportunistically take advantage of funding opportunities that will not affect funding available for priority salmon recovery projects.

Overview of 3-Year Implementation Program

The WRIA 1 3-year implementation program establishes an ambitious pace for and constitutes substantial progress towards implementation of the 10-year action plan.

An overview of the key actions of the 3-year plan, organized by 10-year action, are presented below. The category number below is also listed in the accompanying spreadsheet for specific actions associated with each item.

1. South Fork chinook supplementation program, designed to conserve the South Fork early chinook population until habitat conditions improve. **Priority 1A.**
2. Restoration of passage at the two identified early chinook barriers, Middle Fork diversion dam and Canyon Creek. **Priority 1A.**
3. Habitat 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; reach assessment and restoration planning is currently underway. Projects 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 (5) channel stability (impact of which was underestimated in EDT) by removal/setback of levees and/or hardening and a study of the feasibility of construction of a chinook spawning channel. **Priority 1A or 1B.**
 - 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. Projects 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, including at heads of side channels with upland or groundwater sources of flow; and (2) key habitat quantity, through log jam placement

- that forms pools, side channels 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 or spreadsheet. **Priority 1A.**
- c. Middle Fork. Reach assessment and restoration planning is proposed for the lower Middle Fork (RM 0-5) to develop strategic projects in the reach. 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. **Priority 1A.**
 - 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) and key habitat quantity (deep pools, backwaters, edge habitat). **Priority 1B or 2.**
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, including study of circulation in Bellingham Bay that would affect juvenile chinook distribution and migratory pathways. **Priority 1C.**
 - b. Restoration of floodplain connectivity upstream of the Nooksack delta (not described further).
 - c. Restoration of connectivity (upstream and downstream) and estuarine habitat quantity and quality on the Lummi delta. **Priority 2.**
 - d. Restoration of non-natal estuary habitat (Squalicum Creek, Whatcom Creek) and other pocket estuary habitat (Post Point lagoon) in Bellingham Bay. **Note: Only Squalicum Creek restoration is described further. Priority 3.**
 - e. Improvement of connectivity along urbanized shoreline habitat benches constructed in association with redevelopment of inner Bellingham Bay (not described further).
 - f. Protection of existing function through Shoreline Master Program updates for Whatcom County and cities of Bellingham and Blaine. **Priority 1A.**
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. **Priority 1B.**
 - b. Implement measures to ensure flood and transportation projects maximize benefit to salmon to the extent possible. **Priority 1B.**
 - c. Mainstem Nooksack Reach Assessment. As part of this project, salmon recovery staff will work with County River and Flood staff to evaluate project feasibility and conduct education and outreach of affected landowners and stakeholders. **Priority 1A.**

- d. Consultation with salmon recovery staff for flood projects (ongoing, but not described further).
6. Critical Areas Ordinance (CAO)/Shoreline Management Program (SMP) Updates. The Whatcom County and City of Bellingham CAOs were adopted in 2005. Salmon recovery staff participated on the Technical Advisory Committee (TAC) for the Whatcom County Critical Areas Ordinance update and are participating on the TACs for both the Whatcom County and Bellingham SMP updates, which are scheduled for completion/adoption by the end of 2006. 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. SMPs will be updated for cities of Ferndale, Lynden, Everson, Nooksack and Blaine, as well as Blaine CAO. **Priority 1A.** SMP update for Sumas is lower priority, **Priority 4.**
 - b. In addition to regulatory protection, a program for fee simple or conservation easement acquisition is also proposed (**Priority 1A**), 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. Instream flows will be established for the pilot watersheds (Middle Fork Nooksack, Bertrand Creek), with other watersheds to be negotiated subsequently. Instream flow negotiations for Nooksack early chinook (Forks, lower Nooksack, some Forks tributaries) are high priority (**Priority 1A**), while the negotiations for non-early-chinook habitats are lower priority (**Priority 4**).
 - b. Projects are proposed to be implemented in the Bertrand Creek watershed to restore instream flows. **Priority 4.**
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. **Priority 4.**
 - 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. **Priority 4.**

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 2006. **Priority 1A.**
 - b. Salmon recovery implementation oversight, including integration of harvest, hatchery, and habitat actions. **Priority 1A.**
 - c. Population monitoring for other WRIA 1 salmonids that are ESA-listed (bull trout), proposed for listing (steelhead), or species of concern (coho). **Priority 1C.**

Project names that are highlighted with a color did not have quantifiable outcomes included in the project description. A separate color has been attributed to the individual that I believe is associated with the project.												
Basin	Priority Tier	Project Type	Project Name	3-Year Cost	Log Jams	Pools	Channel	Area Planted	Area Reconnected	Bank Improved	Assessment Need	Other
South Fork (Lower)	1A	Large Wood	Acme-Confluence Reach: Active Channel Logjams Phase 1/Acme-Confluence Reach: Active Channel Logjams Phase 2	\$880,000/ \$1,380,000	26	16						-16 cool water refuges
South Fork (Lower)	1A	Large Wood	Acme-Saxon Reach: Active Channel Logjams (Nesset's Slough)	\$200,000	10	5						
South Fork (Lower)	1A	Large Wood	Acme-Saxon Reach: Active Channel Logjams (Saxon Bridge)	\$70,000	5	5						-5 cooler water areas
South Fork (Lower)	1A	Floodplain	Acme-confluence Reach: HMZ Reconnection	\$120,000					-176 ac HMZ	-1525 ft bank hardening removed or setback		
South Fork (Lower)	1A	Floodplain	Lower South Fork Slough Reconnection (Curtis Slough)	\$80,000					-4000 ft secondary channel			
South Fork (Lower)	1A	Floodplain	Lower South Fork Slough Reconnection (Rothenbuhler Slough)	\$180,000					-5800 ft historic side channel			
South Fork (Lower)	1A	Floodplain	Floodplain Reconnection Upstream of COB Water Pipeline	\$440,000					-30 ac HMZ 1500 ft secondary channel			
South Fork (Lower)	1A	Riparian Restoration	Lower South Fork Tributary Riparian Restoration	\$541,200				-123 ac				
South Fork (Lower)	1A	Riparian Restoration	Lower South Fork HMZ Riparian Restoration	\$981,200				-223 ac				
South Fork (Lower)	1A	Hydrology	Black Slough Wetland Water Storage Improvement	\$518,000								-restore 180 ac wetland
South Fork (Lower)	1A	Hatchery Production	Years 3 and 4 Skookum Chinook Supplementation Project	\$510,054								-200,000 sub-yearling target release by year 4
South Fork (Lower)	1A	Hatchery Production	Skookum Cr Hatchery Water Supply	\$700,000								-stable water supply to support production
South Fork	1A	Planning/Assessment	South Fork Spawning Channel Feasibility and Design	\$250,000			-construction of channel with capacity for 100 chinook spawning pairs				-determine feasibility of constructing chinook spawning channel	-spawning of 100 pairs native early chinook under natural conditions with eventual outcome of 100,000 - 150,000 fry
South Fork (Lower)	1B	Floodplain	Lower South Fork Flood/Salmon Coordination (Hutchinson Creek)	\$300,000			-3600 ft secondary channel through relict floodplain channels					

Basin	Priority Tier	Project Type	Project Name	3-Year Cost	Log Jams	Pools	Channel	Area Planted	Area Reconnected	Bank Improved	Assessment Need	Other
South Fork (Lower)	1B	Floodplain	Lower South Fork Flood/Salmon Coordination (Riverview Park)	\$575,000	8	8	-habitat connectivity, complexity, enhanced in 1200' of floodplain tributary/side channel & SFK	~7 ac	no change	-500 ft SFK bank roughened with LWD	-hydraulics, alternatives analysis and feasibility design	
South Fork (Lower)	1B	Infrastructure	Lower South Fork Joint Transportation/Restoration Planning	\$200,000				TBD	TBD		-hydraulics, geomorphic, habitat benefit, owner willingness, emergency access	
South Fork (Upper)	1A	Restoration	30 Mile Reach Restoration	\$738,000					-5 ac HMZ			-remove bridge -remove 400 ft riprap -instream structures to buffer channel from large stream-adjacent landslides
South Fork (Upper)	1A	Assessment	Orphan Road Project Assessment	\$120,000							-orphan roads	-prescriptions for improvements
South Fork (Upper)	1A	Infrastructure	USFS Road Network Monitoring and Maintenance	\$90,000								-monitor road network -correct problems on 2 mi stretch of USFS Road 12 -maintenance of 1.4 mi on Road 1260
South Fork (Upper)	4	Infrastructure	Bell Creek Road Crossing	\$95,000								-restore fish passage at 1 resident fish barrier
Middle Fork	1A	Hydrology	Peat Bog Side Channel	\$20,000	1							-decrease dewatering in 2000 ft of side channel
Middle Fork	1A	Planning/Assessment	Middle Fork Reach Assessment and Restoration Planning	\$100,000							-comprehensive restoration plan	-project concepts addressing limiting conditions
Middle Fork	1A	Habitat Restoration	Middle Fork Diversion Dam	\$15,000,000								-10.2 mi Middle Fork and 6.9 mi tributary habitat access restored
Middle Fork	1C	Planning/Assessment	Upper Middle Fork Spawner Surveys	\$150,000							-monitor habitat recolonization after restoring Middle Fork passage	-improve escapement estimate for early chinook -improve understanding of species use to reconnected habitat
North Fork	1A	Habitat Restoration	Lower Canyon Creek Design & Restoration	\$1,250,000			-stabilize .9 mi					-restore passage to 4.1 mi chinook habitat
North Fork	1A	Habitat Restoration	North Fork Channel Stabilization	\$1,500,000			-stabilize .5 mi					
North Fork	1A	Habitat Restoration	North Fork Stable Side Channel Restoration	\$800,000	5				-low flow connectivity of 5 side channels			

Basin	Priority Tier	Project Type	Project Name	3-Year Cost	Log Jams	Pools	Channel	Area Planted	Area Reconnected	Bank Improved	Assessment Need	Other
Mainstem & Forks	1A (Forks); 2 (MS)	Planning/Assessment	Invasive Weed Control	\$315,000								-decreased occurrence & rate of spread of knotweed
Mainstem	1B	Planning/Assessment	Mainstem Reach Assessment & Restoration Planning	\$300,000							-comprehensive restoration plan	-project concepts addressing limiting conditions
Mainstem	1B	Floodplain	Lower Bertrand Cr Levee Setback LWD	\$150,000	~10	~10	-effect change from plane-bed to forced pool	~21 ac (part of on-going project)	~21 ac (part of on-going project)			-placement of ~100 logs to form jams and individual logs to improve channel complexity and diversity
Mainstem	1B	Habitat Restoration	Sande Bar Levee & Clay Bank	\$3,300,000	TBD	TBD	-stabilize and roughen 0.3 miles of eroding bank/landslide toe	TBD	TBD	TBD	-hydraulic, fish habitat potential, structural alternatives, designs	
Mainstem	2	Habitat Restoration	Piling Jam (4 sites)	\$100,000			-400-1200 ft mainstem edge habitat improved					
Estuary/ Adjacent Waters	1C	Planning/Assessment	Modeling of Currents in Bellingham Bay	\$56,000								-increased understanding of current patterns affecting juvenile chinook distribution -information that facilitates identifying potential limiting factors
Estuary/ Adjacent Waters	1C	Planning/Assessment	Chinook Habitat Use Assessment of Bellingham Bay & Adjacent Areas	\$250,000								-2 yrs sampling of early chinook and result analysis
Estuary/ Adjacent Waters	2	Habitat Restoration & Acquisition	Smuggler's Slough Acquisition & Reconnection	\$2,807,000					-6-8 mi tidal slough and Lummi Bay passage restored			-200 ac wetland acquired -125 ac floodplain wetland restored
Estuary/ Adjacent Waters	2	Habitat Restoration & Acquisition	Lummi Delta Project	\$408,000								-120 ac wetland acquired -40 ac wetland restored
Estuary/ Adjacent Waters	3	Habitat Restoration	Squalicum Cr Estuary Restoration	\$410,000								-0.4 ac estuarine fringe marsh restored -0.4 ac riparian buffer restored
Lower Nooksack Tributaries	4	Hydrology	Bertrand Cr - Well and Surface Storage System	\$725,000								-augment baseflow to Bertrand Cr during critical low flow periods
Lower Nooksack Tributaries	4	Hydrology	Bertrand Cr - Wetlands Enhancement	\$55,000								-increase water storage & infiltration to increase baseflow in Bertrand Cr during critical low flow periods
Lower Nooksack Tributaries	4	Habitat Restoration	Schneider Cr - Flood Gate Modification	\$150,000			-improve access to 20,000 ft flood plan tributary channel					

Basin	Priority Tier	Project Type	Project Name	3-Year Cost	Log Jams	Pools	Channel	Area Planted	Area Reconnected	Bank Improved	Assessment Need	Other
WRIA 1	1A	Acquisition	Acquisition of Priority Habitats	\$6,000,000								-approx 1200 ac chinook habitat available for restoration and/or protection over 3 years
WRIA 1	1A	Planning/Assessment	Update Lynden, Ferndale, Nooksack, Everson, and Blaine SMP and/or CAO	\$243,000								-no net loss of ecological function in city jurisdictional areas
WRIA 1	1A	Planning/Assessment	Restoration Plan/Watershed Mgmt Plan Implementation	\$495,000								-local participation in regional, state salmon recovery forums -timely progress on implementation
WRIA 1	1A	Hydrology	WRIA 1 Instream Flow Negotiations (early chinook habitats)	\$375,000								-establish flow management regime for early chinook tributaries
WRIA 1/ early chinook habitats	1C	Monitoring	Habitat Monitoring to Support Adaptive Management	\$300,000								-data collection in chinook habitats to evaluate project and program effectiveness and to quantify linkages amount processes, land use, habitat and population response
WRIA 1/ chinook habitats	1C	Monitoring	Expand Monitoring and Stock Identification of chinook populations	\$480,000								-improve estimates of population abundances for early chinook populations -increase smolt trap sampling rates -spawn surveys and analysis of recovered otoliths
WRIA 1	4	Hydrology	WRIA 1 Instream Flow Negotiations (other salmonid habitats)	\$250,000								-establish flow management regime for other salmonid tributaries
WRIA 1	4	Habitat Restoration	Fish Passage Barrier Removal Program	\$750,000								-10-15 salmonid habitat barriers removed per year -restore approx. 60 mi access to historic habitats restored
WRIA 1	4	Riparian Restoration	Riparian Restoration Program Support: Project Match, Conservation Easements	\$750,000				-165 ac riparian habitat over 3 years				
WRIA 1/ bull trout habitats	4	Monitoring	Monitor and Establish DNA Baselines for bull trout	\$120,000								-established bull trout index reaches -improve knowledge of brook trout distribution -establish DNA baseline

Basin	Priority Tier	Project Type	Project Name	3-Year Cost	Log Jams	Pools	Channel	Area Planted	Area Reconnected	Bank Improved	Assessment Need	Other
WRIA 1/ steelhead habitats	4	Monitoring	Steelhead Spawn Surveys and DNA Analysis	\$150,000								-collect tissue samples -run DNA analysis -increase spawning ground surveys to establish trends
WRIA 1/ coho habitats	4	Monitoring	Coho Spawn Surveys	\$120,000								-develop improved escapement methodology and implement resulting increased spawn survey coverage
Sumas Basin	4	Planning/Assessment	Update Sumas SMP	\$60,000								-no net loss of ecological function in city jurisdictional areas

Priority	Overview	Memo Category	Action	Likely sponsor	Project or program?	Project/ program status	Total cost of first three years	Funding in Hand		Funding Needed ¹		2007		2008		2009		2010+	
								Funding in hand	Source of funding in hand	Total Need	Proposed source of other funds	Year 1 Scope	Year 1 Cost	Year 2 Scope	Year 2 Cost	Year 3 Scope	Year 3 Cost	Future Scope	Future Cost
South Fork Nooksack (lower) 1A	3a	Acme-Confluence Reach: Active Channel Logjams (Phase 1)	Tribes	Project	Planned	\$880,000	0		880,000		Project Design & permitting	120,000	Construction	750,000	Monitoring	10,000	Monitoring		
South Fork Nooksack (lower) 1A	3a	Acme-Confluence Reach: Active Channel Logjams (Phase 2)	Tribes	Project	Planned	\$1,380,000	0		DOE, BIA, 1,380,000 USFWS, EPA		Project Design & permitting		180,000	Construction	1,200,000	Monitoring			
South Fork Nooksack (lower) 1A	3a	Acme-Confluence Reach HMZ Reconnection	Tribes	Project	Planned	\$120,000	0		DOE, BIA, 120,000 USFWS, EPA		Work with landowners on project scope.		Work with landowners on project scope.		Project Design & permitting (Caron, River Farm sites); work with landowners on scope for McCarty, Standard sites	120,000	Construction (Caron, River Farm sites); Design, permitting, construction (McCarty, Standard sites)	297,000	
South Fork Nooksack (lower) 1A	3a	Lower South Fork Tributary Riparian Restoration	Tribes; NRCS WCD; NSEA	Program	Ongoing	\$541,200	0		CREP/USFW S/DOE	541,200	Implement Phase 1	180,400	Implement Phase 2	180,400	Implement Phase 3	180,400	Monitor and maintain.		
South Fork Nooksack (lower) 1A	3a	Lower South Fork HMZ Riparian Restoration	Tribes; NRCS WCD; NSEA	Program	Ongoing	\$981,200	0		CREP; 981,200 USFWS; DOE		Implement Phase 1	327,067	Implement Phase 2	327,067	Implement Phase 3	327,067	Monitor and maintain.		
South Fork Nooksack (lower) 1A	3a	Black Slough Wetland Water Storage Improvement	Tribes; NRCS	Project	Planned	\$518,000	0		DOE; BIA; 518,000 USFWS; EPA		Work with landowners on project scope		Implement Phase 1	259,000	Implement Phase 2	259,000	Monitor and maintain.		
South Fork Nooksack (lower) 1A	3a	Acme-Saxon Reach Active Channel Logjams (Nesset's Slough)	Tribes	Project	Planned	\$200,000	0		200,000		Work with landowners to develop preliminary plan,		Project Design and permitting	50,000	Construction	150,000	Monitoring	15,000	2012
South Fork Nooksack (lower) 1A	3a	Acme-Saxon Reach Active Channel Logjams (Saxon Bridge)	Tribes	Project	Planned	\$70,000	0		70,000				Design and Permitting	70,000	Construction and monitoring	330,000	2014		
South Fork Nooksack (lower) 1A	3a	Lower South Fork Slough Reconnection (Curtis Slough)	WLT; LNR; NSEA	Project	Planned	\$80,000	0		80,000		Work with landowners on project scope		Project Design & permitting	15,000	Construction	65,000	Monitoring	10,000	2012
South Fork Nooksack (lower) 1A	3a	Lower South Fork Slough Reconnection (Rothenbuhler Slough)	WLT; LNR; NSEA	Project	Planned	\$180,000	0		180,000		Work with landowners on project scope		Project Design & permitting	30,000	Construction	150,000	Monitoring	20,000	2012
South Fork Nooksack (lower) 1A	3a	Floodplain Reconnection Upstream of COB Water Pipeline	WCPW	Project	Planning	\$440,000	300,000	Whatcom County Flood Fund	140,000	Whatcom County Flood/Salmon Funds	Final design, final permit, construct	435,000	Construction	2,500	Monitoring	2,500	Monitoring	30,000	2011
South Fork Nooksack (upper) 1A	3a	30 Mile Reach Restoration	Lummi	Project	Developing conceptual design	\$738,000	350,000	City of Seattle USFWS	388,000	Seattle CCW USFWS	Hydraulic analysis, design, permitting	122,000	Construction	612,000	Monitoring	4,000	Monitoring		2011
South Fork Nooksack (upper) 1A	3a	Orphan Rd. Project Assessment	Tribes	Project	Pilot Study	\$120,000	10,000	City of Seattle	110,000	City of Seattle USFWS	GIS analysis	20,000	Field assessment & prescriptions	100,000					2008
South Fork Nooksack (upper) 1A	3a	USFS Road Network Monitoring and Maintenance	USFS	Program	Ongoing	\$90,000	50,000	USFS	40,000		Monitoring and maintenance	30,000	Monitoring and maintenance	30,000	Monitoring and maintenance	30,000			

Geographic Area	Priority Tier	Overview					Total cost of first three years	Funding in Hand		Funding Needed ¹		2007		2008		2009		2010+		
		Memo Category	Action	Likely sponsor	Project or program?	Project/program status		Funding in hand	Source of funding in hand	Total Need	Proposed source of other funds	Year 1 Scope	Year 1 Cost	Year 2 Scope	Year 2 Cost	Year 3 Scope	Year 3 Cost	Future Scope	Future Cost	Likely end date
South Fork Nooksack	1A	1	Years 3 and 4 of Skookum Chinook supplementation project	Lummi; Co-Mgrs	Project	Implementation	\$510,054	170,018	Lummi, WDFW, PSC-SEF	340,036	US DOI, ?	Rear and Release 2006 brood, collect and rear 2007 Brood Complete Design, Permits and land access, locate new well field, rehab old wells	170,018	Rear and Release 2007 brood, collect and rear 2008 Brood	170,018	Rear and Release 200 brood, collect and rear 2009 Brood	170,018	Continue Supplementatio n until NORs sustainable	170,018 per year	2018
South Fork Nooksack	1A	1	Skookum Cr Hatchery Water Supply	Lummi	Project	Preliminary Design for intake, Initial funding	\$700,000	200,000	DOI BUREC	500,000		Identify necessary parameters, field investigation/GIS representation of results, ranking criteria	150,000	Construction of new intake and additional wells	550,000					
South Fork Nooksack	1A	1	Spawning Channel Feasibility and Design Lower South Fork Flood/Salmon	Lummi	Project	Planning	\$250,000	0		250,000			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	Facility Construction	2,300,000	
South Fork Nooksack (lower)	1B	5b, 3a	Coordination (below Hutchinson Creek)	Tribes; WCPW	Project	Planning	\$300,000	0		300,000	Whatcom County Flood	Design and permitting, construction	285,000	Replanting	12,500	Monitoring	2,500	Monitoring	5,000	2010
South Fork Nooksack (lower)	1B	5b, 3a	Coordination (Riverview Park)	WCPW	Project	Planning/Design	\$575,000	0		575,000	Whatcom County Flood	Preliminary designs		Final designs and permitting Work with landowners and transportation interests on project scope.	100,000	Construction	475,000	Monitoring		
South Fork Nooksack (lower)	1B	5b, 3a	Lower South Fork Joint Transportation/Restoration Planning	WCPW; Nooksack	Project	Planned	\$200,000	0		200,000	Whatcom County/BLA/WSDOT/AC OE			30,000	Project Design & permitting	170,000	Construction, monitoring			
South Fork Nooksack (upper)	4	8a	Bell Creek Road crossing	WCPW; USFS	Project	Permitting and design complete	\$95,000	0		95,000	USFS			Construction	95,000					2008
Subtotals- South Fork																				
	All						\$8,968,454			\$7,888,436										
	1A,B				Projects		\$7,261,054			\$6,231,036										
	1A,B				Programs		\$1,612,400			\$1,562,400										
	4				Projects		\$95,000			\$95,000										
Middle Fork Nooksack	1A	3c	Peat Bog side channel	NSEA	Project	Continuation of ongoing project	\$20,000	5,000	TU	15,000	ALEA	construction	20,000					Monitoring		
Middle Fork Nooksack	1A	3c	Assessment and Restoration Planning	Tribes	Project	Not started	\$100,000	0		100,000		Scope assessment and analysis needs	5,000	Data analysis and synthesis	65,000	Identify and prioritize projects	30,000	Design and construction		
Middle Fork Nooksack	1A	2	Middle Fork Diversion Dam	COB	Project	Feasibility study, assessments, permit applications, and design initiated	\$15,000,000	6,125,000	PWTF; WA; SRFB w/Match; FRIMA	8,875,000		construction	15,000,000							
Middle Fork Nooksack	1B	(2)	Middle Fork Diversion Dam (Kokanee Program)	WDFW	Project	Not started	\$6,164,000	0		6,164,000	State legislature									

Geographic Area	Priority Tier	Overview		Likely sponsor	Project or program?	Project/program status	Total cost of first three years	Funding in Hand		Funding Needed ¹		2007		2008		2009		2010+			
		Memo Category	Action					Funding in hand	Source of funding in hand	Total Need	Proposed source of other funds	Year 1 Scope	Year 1 Cost	Year 2 Scope	Year 2 Cost	Year 3 Scope	Year 3 Cost	Future Scope	Future Cost	Likely end date	
Middle Fork Nooksack	1C	9a	Upper Middle Fork Spawner Surveys	Co-mgrs	Program	Not started	\$150,000	0		150,000		Spawn surveys, DNA and otolith analyses	50,000	Spawn surveys, DNA and otolith analyses	50,000	Spawn surveys, DNA and otolith analyses	50,000	Spawn surveys, DNA and otolith analyses			
Subtotal- Middle Fork		All						\$21,434,000			\$15,304,000										
		1A,B,C	Projects					\$21,284,000			\$15,154,000										
		1A,B,C	Program					\$150,000			\$150,000										
North Fork Nooksack	1A	2, 3b	Lower Canyon Creek Design and Restoration	Design - WCPW; Implementation - TBD	Project	Assessment & design in-progress	\$1,250,000	95,000	SRFB/Whatcom County	1,155,000	USFS, DOE, BIA, USFWS, EPA, Whatcom Co.	Final design & permitting; phase 1 construction (acquisition, easements, structural)	450,000	Phase 2 construction (structural) & phase 1 monitoring	650,000	Phase 3 (revegetation) & phases 1&2 monitoring	150,000	Monitoring	2500/yr	2018	
North Fork Nooksack	1A	3b	North Fork Channel Stabilization	Tribes	Project	Not started	\$1,500,000			1,500,000				Design and permitting	375,000	Construction	1,125,000				
North Fork Nooksack	1A	3b	North Fork Stable Side Channel Restoration	Tribes	Project	Not started	\$800,000			800,000		Design and permitting	50,000	Construction	450,000	Construction	300,000				
Subtotal- North Fork		All						\$3,550,000			\$3,455,000										
		1A						\$3,550,000			\$3,455,000										
Forks & Mainstem	1A (Forks); 2 (MS)	3a-d	Invasive Weed Control	Whatcom County Weed Control Board	Program	In-progress	\$315,000	0	NA	315,000	DOE; EPA; USFWS; WC	Inventory & spot control	65,000	Control	125,000	Control	125,000	Reinventory; continue management	325,000	2013	
Mainstem Nooksack	1B	3d, 5c	Mainstem Reach Assessment and Restoration Planning	Tribes	Project	Not started	\$300,000	0		300,000		Scope assessment and analysis needs	15,000	Data analysis and synthesis	215,000	Identify and prioritize projects; public outreach and education	70,000	Design and construction			
Mainstem Nooksack	1B	3d, 5a	Lower Bertrand Creek Levee Setback - passage & LWD	Tribes; WCD; WCPW	Project	Major construction in 2006	\$150,000	0	NA	150,000	WCPW; DOE; EPA; USFWS	Passable flood gate installation; obtain landowner agreements for LWD placement	50,000	Place LWD	95,000	Monitoring	5,000	Monitoring	\$500/year	2018	
Mainstem Nooksack	1B	3d, 5b	Sande Bar Levee & Clay Bank	WCPW	Project	Not started	\$3,300,000	0	NA	3,300,000	WCPW; DOE; EPA	Alternatives analysis, design, landowner agreements, construction grants	300,000	Construction	2,950,000	Monitoring	50,000	Monitoring	\$3,000/yr	2018	
Mainstem Nooksack	2	3d	Piling jam, 4 sites	WCPW; NSEA	Pilot Project	Early discussion only	\$100,000	0		100,000	WCPW	design,	15,000	construction	85,000		Monitoring				
Subtotal- Mainstem		All						\$4,165,000			\$4,165,000										

Geographic Area	Priority Tier	Overview		Likely sponsor	Project or program?	Project/ program status	Total cost of first three years	Funding in Hand		Funding Needed ¹		2007		2008		2009		2010+		Likely end date	
		Memo Category	Action					Funding in hand	Source of funding in hand	Total Need	Proposed source of other funds	Year 1 Scope	Year 1 Cost	Year 2 Scope	Year 2 Cost	Year 3 Scope	Year 3 Cost	Future Scope	Future Cost		
	1A,B				Program		\$315,000			\$315,000											
	1A,B				Projects		\$3,750,000			\$3,750,000											
	2				Projects		\$100,000			\$100,000											
Estuary and Adjacent Waters	1C	4a	Modeling of Currents in Bellingham Bay under different flow regimes	Co-managers	Project	Ready to Go	\$56,000	0	NA	56,000	BBDPP	Run Currens Model under different condition of wind, tide and discharge and basic ground truthing of results	56,000						Develop Action Plan for protecting elements of the critical habitat	TBD	
Estuary and Adjacent Waters	1C	4a	Chinook Habirat Use Assessment of Bellingham Bay & Adjacent Areas	Lummi	Project	Pilot only	\$250,000	0	NA	250,000	MRC; BBDPP; NWSC	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	2014
Estuary	2	4c	Smuggler's Slough Acquisition & Reconnection	Lummi	Project	On-going	\$2,807,000	343,680	SRFB	2,463,320	Coastal Wetlands Grant; Wetland Reserve (NRCS); Tribal Wildlife Grant; Tribal Landowner Grant	Wetland Acquisition (100 ac), Preliminary Design, Wetland Restoration (125 ac)	325,000	Wetland Acquisition (425 ac), Final Design, Permitting and Construction of slough reconnection, Riparian Planting (30 ac)	2,205,000	Riparian maintenance & monitor, Wetland Restoration Phase 2 (125 ac)	277,000	Monitoring	25,000	2014	
Estuary	2	4c	Lummi Delta Project	Lummi	Project	Planning	\$408,000	0		408,000	Coastal Wetlands Grant; Wetland Reserve (NRCS); Tribal Wildlife Grant; Tribal Landowner Grant	Wetland Acquisition (100 ac), Preliminary Design, Wetland Restoration (125 ac)		Conceptual Design and Funding Acquisition	8,000	Wetland Acquisition (120 ac.), Preliminary Design for Lummi Delta Restoration	400,000	Final Design, Acquisition, Construction and Monitoring	1,500,000	2016	
Squalicum Creek/Bellingham Bay	3	4d	Squalicum Creek Estuary Restoration	Port of Bellingham	Project	Conceptual restoration design complete	\$410,000	0		410,000	Port of Bellingham	Remove derelict structure and pilings			270,000	Restore estuarine marsh	140,000	Monitoring			
Subtotal- Estuary/ Adjacent Waters	All						\$3,931,000			\$3,587,320											
	1C				Projects		\$306,000			\$306,000											
	2				Projects		\$3,215,000			\$2,871,320											

Geographic Area	Priority Tier	Overview		Likely sponsor	Project or program?	Project/ program status	Total cost of first three years	Funding in Hand		Funding Needed ¹		2007		2008		2009		2010+			
		Memo Category	Action					Funding in hand	Source of funding in hand	Total Need	Proposed source of other funds	Year 1 Scope	Year 1 Cost	Year 2 Scope	Year 2 Cost	Year 3 Scope	Year 3 Cost	Future Scope	Future Cost	Likely end date	
3		Projects					\$410,000		\$410,000												
Bertrand Creek	4	7b	Bertrand Creek Well and Surface Storage System	Bertrand WID	Project	Planned	\$725,000		725,000	Feasibility study for water treatment and water storage and transfer options	90,000	Implement water treatment, acquisition of property and final design for storage facility	485,000	Construct water storage facility	150,000						
Bertrand Creek	4	7b	Bertrand Creek Wetlands Enhancement	Bertrand WID	Project	Planned	\$55,000		55,000			Design and permitting, site preparation	55,000								
Schneider	4	8a	Flood gate Modification	WCPW; NSEA	Project	Preliminary assessment underway	\$150,000		150,000	Final assessment, design	25,000	construction	125,000	Monitoring							
Subtotal- Lower Nooksack Tributaries		All						\$930,000		\$930,000											
4		Projects					\$930,000		\$930,000												
Nooksack Watershed	1A	3a-d, 6b	Acquisition of Priority Habitats	WLT	Program	Ongoing	\$6,000,000	0	6,000,000	Acquisition	2,000,000	Acquisition	2,000,000	Acquisition	2,000,000						
Lower Nooksack watershed	1A	6a	Update Lynden SMP	City of Lynden	Program	scheduled for 2007	\$60,000		60,000	SMP update	60,000										
Lower Nooksack watershed	1A	6a	Update Ferndale SMP	City of Ferndale	Program	~90% complete, 6-9 months more work	\$30,000		30,000	SMP update	30,000										
Lower Nooksack watershed	1A	6a	Update Nooksack SMP	City of Nooksack	Program	planned	\$60,000	0	60,000			SMP update	60,000								
Lower Nooksack watershed	1A	6a	Update Everson SMP	City of Everson	Program	planned	\$60,000	0	60,000			SMP update	60,000								
Drayton Harbor watershed/Strait of Georgia	1A	6a, 4f	Update Blaine CAO/SMP	City of Blaine	Program	SMP update in progress, CAO planned	\$33,000		33,000	SMP update	15,000	CAO update	18,000								
Watershed	1A	9b	Restoration Plan and Watershed management plan implementation	WRIA 1; boards	Program	expansion	\$495,000	0	495,000	WDFW; DOE; DOI	165,000	Assist in Implementation of pilots, and coordination of participating partners and sponsors	165,000	Assist in Implementation of pilots, and coordination of participating partners and sponsors	165,000	Assist in Implementation of pilots, and coordination of participating partners and sponsors	165,000	Evaluation of progress and facilitate any adaptive management actions	annual requirement	2025	

Geographic Area	Priority Tier	Overview		Likely sponsor	Project or program?	Project/program status	Total cost of first three years	Funding in Hand		Funding Needed ¹		2007		2008		2009		2010+		Likely end date
		Memo Category	Action					Funding in hand	Source of funding in hand	Total Need	Proposed source of other funds	Year 1 Scope	Year 1 Cost	Year 2 Scope	Year 2 Cost	Year 3 Scope	Year 3 Cost	Future Scope	Future Cost	
WRIA 1	1A	7a	WRIA 1 Instream Flow Negotiations (Early chinook habitats)	WRIA 1 Board; ISF Negotiation Parties	Program	Ongoing	\$375,000	90,000	City of Bellingham/ Participating governments	285,000		Middle Fork negotiation: public notifications, communications and meetings	75,000	Middle Fork: flow adoption. Begin next priority area	150,000	Other subwatersheds: facilitate renegotiation, evaluate agreement compliance with Indian water law, federal law and state water law	150,000	Continue flow selection and adoption process in priority areas.	150,000/yr	
WRIA 1	4	7a	WRIA 1 Instream Flow Negotiations (Other salmonid habitats)	WRIA 1 Board; ISF Negotiation Parties	Program	Ongoing	\$250,000	147,000	Whatcom County/ Participating governments	103,000		Finalize Bertrand flow agreements; seek state and federal adoption	50,000	Finalize adoption of Bertrand; begin instream flow adoption process in next priority area	100,000	Continue flow selection and adoption process in priority areas.	100,000	Continue flow selection and adoption process in priority areas.	150,000/yr	
Nooksack early chinook habitats	1C	9a	Habitat monitoring to support adaptive management	Tribes	Program	Some monitoring underway; adaptive management program needs to be developed.	\$300,000	0		300,000		Habitat monitoring to support adaptive management	100,000	Habitat monitoring to support adaptive management	100,000	Habitat monitoring to support adaptive management	100,000	Habitat monitoring to support adaptive management	\$100,000/year	2106
Nooksack chinook habitats	1C	9a	Expand Monitoring and Stock Identification of Nooksack Chinook Populations	Co-mgrs	Program	Existing population monitoring ongoing but needs expansion	\$480,000	0		480,000		Spawn surveys, smolt trapping, DNA and otolith analyses	160,000	Spawn surveys, smolt trapping, DNA and otolith analyses	160,000	Spawn surveys, smolt trapping, DNA and otolith analyses	160,000	Spawn surveys, smolt trapping, DNA and otolith analyses		
WRIA 1	4	8a	Fish passage barrier removal program	NSEA; Co-mgrs; WCD	On-going Program	Inventory complete; need imple. Funding	\$750,000	0	NA	750,000 TBD		Obtain landowner agreements and implement top 10 priority barriers	250,000	Obtain landowner agreement & do next 10 barriers	250,000	Obtain landowner agreement & do next 10 barriers	250,000	Continue down priority list until done; monitor effectiveness	TBD	2017
Sumas watershed	4	6a	Update Sumas SMP	City of Sumas	Program	planned	\$60,000	0		60000				SMP update	60000					
WRIA 1	4	8b	Riparian restoration program support: project match, conservations easements	WCD; Tribes	On-going Program		\$750,000	0	NA	750,000 TBD		Leverage grant sources; do priority riparian restoration	250,000	Leverage grant sources; do priority riparian restoration	250,000	Leverage grant sources; do priority riparian restoration	250,000	Continue down priority list until done; monitor effectiveness	TBD	2025
Nooksack bull trout habitats	4	9c	Monitor and establish DNA baselines for Nooksack bull trout Populations	Co-mgrs; USFWS	Program	Not started	\$120,000	0		120,000		Spawn surveys, DNA baseline establishment and analysis	40,000	Spawn surveys, brook trout surveys	40,000	Spawn surveys, DNA analysis	40,000	Spawn surveys, DNA analysis		

Geographic Area	Priority Tier	Overview					Total cost of first three years	Funding in Hand		Funding Needed ¹		2007		2008		2009		2010+	
		Memo Category	Action	Likely sponsor	Project or program?	Project/ program status		Funding in hand	Source of funding in hand	Total Need	Proposed source of other funds	Year 1 Scope	Year 1 Cost	Year 2 Scope	Year 2 Cost	Year 3 Scope	Year 3 Cost	Future Scope	Future Cost
Nooksack steelhead habitats	4	9c	Steelhead Spawn Surveys and DNA Analysis	WDFW	Program	Not started	\$150,000	0	150,000		DNA analysis	50,000	DNA analysis	50,000	DNA analysis	50,000	DNA analysis		
Nooksack coho habitats	4	9c	Coho Spawn Surveys	Co-mgrs; NSEA	Program	Not started	\$120,000	0	120,000		Spawn surveys, DNA baseline establishment and analysis	40,000	Spawn surveys, DNA analysis	40,000	Spawn surveys, DNA analysis	40,000	Spawn surveys, DNA analysis		
Subtotal - Other Geographic Areas		All					\$10,093,000		\$9,856,000										
		1A,C			Programs		\$8,143,000		\$7,906,000										
		4			Programs		\$3,355,000		\$3,118,000										
Total Resource Need							\$53,071,454	7,885,698	45,185,756		Total year 1 need	21,825,485	Total year 2 need	15,334,485	Total year 3 need	9,747,485			

¹Intended to convey total funding need. WRIA 1 Salmon Recovery Board anticipates the need for, and is committed to, leveraging other potential funding sources to optimize available salmon recovery funding to accomplish priority projects.