

WRIA 1 SALMON RECOVERY BOARD

2010-2012 WRIA 1 SALMON RECOVERY 3-YEAR PROJECT PLAN

Format of Narrative

The format for the 2010-2012 WRIA 1 Salmon Recovery 3-Year Project Plan narrative includes three sections: WRIA 1 Watershed Recovery Strategy, 10-Year Action Plan, and WRIA 1 3-Year Project Plan. The WRIA 1 Watershed Recovery Strategy and 10-Year Action Plan are included in this 2010-2012 narrative because they effectively summarize the 10 year objectives and action plan of the WRIA 1 strategy and provide context for responses to the questions posed by the Puget Sound Partnership in the guidance for completing this narrative and that is included in the third section of this document; the WRIA 1 3-Year Project 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, river, estuarine, and nearshore marine processes, careful use of hatcheries, and responsible harvest, and with the active participation and support of local landowners, businesses, and the larger community. In the near-term, however, the objectives are to: (1) focus and prioritize salmon recovery efforts to maximize benefit to the two Nooksack early chinook populations; (2) address late-timed Chinook through adaptive management, focusing in the near-term on identifying hatchery- versus naturally-produced population components; (3) facilitate recovery of WRIA 1 bull trout by implementing actions with mutual benefit to both early chinook and bull trout and by removing fish passage barriers in presumed bull trout spawning and rearing habitats in the upper Nooksack River watershed; and (4) address other salmonid populations by (a) protecting and restoring WRIA 1 salmonid habitats and habitat-forming processes through regulatory and incentive-based programs; and (b) encouraging and supporting voluntary actions that benefit other WRIA 1 salmonid populations without diverting attention from early chinook recovery. Planning targets for the priority Nooksack early chinook populations are presented in Table 1. Focusing efforts on early chinook is consistent with regional salmon recovery – current abundance and productivity for the two populations is very low and recovery of both populations is critical to delisting and recovery of Puget Sound Chinook.

Table 1. Planning targets for Nooksack Early Chinook.

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

¹ Ocean Recruits at MSY

² Spawners at MSY

³ Productivity at MSY

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

10-Year Action Plan

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

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

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

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

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

WRIA 1 Salmon Recovery 3-Year Project Plan

Overview of 3-Year Project Plan

The projects, plans, and programs associated with the 2010-2012 WRIA 1 3-Year Plan are organized in the associated spreadsheet under 5 broad categories. The categories are:

- Habitat Projects by Geographic area
- Harvest/Hatchery
- Research/Monitoring/Evaluation
- Programs/Plans/Assessments
- Outreach/Education

The spreadsheet includes color blocks to identify actions updated from the 2009-2011 program, new actions, and actions that are fully or partially funded. A new tab has been added to the 2010-2012

WRIA 1 3-Project Plan labeled “project development”. This tab will be used to establish and develop project ideas for future action and/or for refinement of current projects.

The ability to implement many of the actions will depend on the community’s willingness to act and support these actions. The Outreach/Education section of the 2010-2012 WRIA 1 3-Year Project Plan includes developing an outreach plan, organizing a Salmon Summit, and redesigning the lead entity website to improve functionality and provide opportunities for the public to follow and provide feedback on WRIA 1 salmon recovery efforts.

A bulleted overview of the status of key actions in the 2010-2012 WRIA 1 3-Year Project Plan, organized by 10-year action plan elements (Appendix B, WRIA 1 Salmonid Recovery Plan), is presented below.

1. Continue the South Fork Chinook Captive Brood Hatchery Population Rebuilding Program
 - The goal of this program is to increase SF early chinook population abundances, and ultimately NORs, while habitat conditions improve, and is ongoing during 2010-2012 timeframe.
 - Elements of the program include:
 - Collection of South Fork Chinook broodstock by beach seining and DNA analysis to ascertain stock identity.
 - Early rearing at Skookum hatchery
 - Captive rearing at Kendall and Manchester facilities
 - Ripening adults transferred to Skookum Hatchery for spawning
 - Offspring reared at Skookum Hatchery and released to South Fork
2. Restore Anadromous Fish Passage
 - The goal of this WRIA 1 Salmonid Recovery Plan key action is to restore passage at Middle Fork Diversion Dam and Canyon Creek boulder and bedrock cascade
 - The status of actions for the Middle Fork Diversion Dam include:
 - Complete alternative analysis (2010)
 - Update cost estimates for preferred alternative (2010)
 - Identify strategy to fund and implement preferred alternative
 - The status of actions for the Lower Canyon Creek include:
 - Phase 1 (setback of lower sections of levee) was completed in 2009, which included removing major hydraulic constriction and mechanically altering the bedrock and boulder cascade forming worst impediment to passage.
 - Phase 2 planned for 2010-2011 include alternatives analysis, design concepts, Design project selection, and permitting.
 - Implementation of preferred for Phase 2 options (potential instream restoration, additional levee setback) in 2011-2012 timeframe.
3. Habitat Restoration in the Forks, Mainstem, and Major Early Chinook Tributaries.
 - South Fork.
 - Lower South Fork is the primary focus 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 more uniform land-use (i.e. commercial forestry) affords more passive

restoration through retention and recovery of riparian zones. Conditions are less degraded.

- Hydraulic modeling of lower South Fork reaches is in process to evaluate cumulative flood risk impacts of projects. The outcomes of the modeling will inform restoration project sequencing and location, and help advance reach scale plans.
- Projects in the *2010-2012 WRIA 1 3-Year Project Plan* are consistent with projects in the WRIA 1 Salmonid Recovery Plan, and are intended to help achieve near-term goals. The projects in process and planned are being designed to balance the needs to not increase flood risk to adjacent landowners, while also complementing, and not precluding, long term restoration plan options.
- All South Fork projects underway and planned in the South Fork address the following limiting factors: (1) habitat diversity by placing wood jams to provide instream complex 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 side channels; (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 and or treating forest roads, channel adjacent landslides, and other sediment sources; and (5) lateral and vertical channel stability (the impact of which was underestimated in EDT) by removal/setback of levees and/or bank hardening to improve egg to alevin survival.
- North Fork.
 - The North Fork between the Middle Fork confluence and Glacier Creek is the primary focus of restoration for the NF/MF population
 - An expansion of the current North Fork Assessment planned for 2009 is still in process. One element- North Fork Tributary Habitat Mapping- was completed in 2010. As part of the WRIA 1 Salmon Recovery Staff Team process the current “roadmap” for habitat actions will be refined.
 - The projects underway or currently planned in the North Fork address the following limiting factors: (1) channel stability, through log jam placement within throughout the active channel to restore , and by restoring quantity and quality of stable spawning habitats, such as side channels and stable forested islands; and (2) key habitat quantity, through log jam placement that form deep, complex pools and complex edge habitat.
- Middle Fork.
 - A reach assessment and restoration planning effort was initiated in 2008 for the Middle Fork from the mouth to approximately RM 18. The assessment is expected to be completed in 2011.
 - In 2010, Lummi Natural Resources in collaboration with Nooksack Natural Resources will work with Salmon Recovery Staff Team to develop sequence and priorities for implementing actions in the Middle Fork
 - The *2010-2012 WRIA 1 3-Year Project Plan* includes a place-holder for projects identified as an outcome of the Middle Fork assessment and other projects that may be identified for the reaches downstream from the below Mosquito Lake Road Bridge.

- Project to augment and stabilize log jams in the Porter Creek reach was approved for funding in 2009. Additional funding was recently secured to expand that work; restoration planning discussed above should inform location and design of projects.
- Mainstem Nooksack.
 - Reach assessment and restoration planning remains a proposed project for the mainstem Nooksack. Implementation is contingent on funding and availability of staff resources to either conduct the assessment or to scope and contract the work.
 - Additionally, limited small-scale restoration projects (piling jams) and larger projects that address both flood and salmon concerns are proposed; these address limiting factors of habitat diversity (complex cover, floodplain reconnection) and key habitat quantity (deep pools, backwaters, edge habitat).
- Estuarine and nearshore marine areas. Proposed actions for estuarine and nearshore areas include the following:
 - Assessment of juvenile Nooksack chinook distribution in and use of nearshore.
 - Restoration of floodplain connectivity upstream of the Nooksack delta including preliminary steps that will lead to future modification or removal of the left bank levee between Slater Road and Marine Drive. Possible repairs or replacement of the head structure on the Lummi River near Ferndale Road may also be evaluated when budget and staffing permit.
 - Restoration of connectivity (upstream and downstream) and estuarine habitat quantity and quality on the Lummi delta including the on-going Smuggler's Slough restoration project.
 - A riparian assessment of three coastal tributaries and the marine shoreline north of Point Whitehorn will be completed in mid-2010 and will form the basis to identify projects to restore salmon habitats and improve water quality. This assessment will be expanded to include the remainder of WRIA 1 pending funding and staff availability.
 - Multiple riparian restoration projects and fish passage projects are planned or underway in independent coastal streams.
- Multiple Geographic Areas

There are a number of actions included in the 2010-2012 WRIA 1 3-Year Project Plan applicable to multiple priority reaches within the Nooksack River Forks including:

- An update to the WRIA 1 Fish Passage Barrier Inventory database to capture barriers fixed since report publication in 2006 is planned for completion during 2010.
- A strategic plan for acquiring and/or conserving land for purposes of achieving habitat targets will be developed in 2010. Implementation of elements of the plan will occur in the 2010-2012 timeframe, and may include acquisition of priority areas for protection of function and/or to facilitate restoration. Implementation will be contingent on landowner willingness. The *2010-2012 WRIA 1 3-Year Project Plan* includes placeholders for acquisition of parcels or conservation easements as necessary for salmon recovery purposes.
- Forest Road Assessment and Abandonment/Decommissioning. Orphaned road segments in priority watersheds of the Forks will be identified and prioritized; condition will be assessed and prescriptions developed for abandonment/decommissioning beginning this summer, followed by implementation starting in 2011.

4. Integration of salmon recovery and floodplain management.

The following steps are proposed for the next 3 years:

- Implementation of pilot levee setback projects with mutual benefit for flood management and salmon recovery. The Bertrand Levee setback project has been completed with a similar project concept being developed for lower Fishtrap Creek.
- Implement measures to ensure flood and transportation projects maximize benefit to salmon to the extent possible (ongoing).
- Continue planning for a Mainstem Nooksack Reach Assessment. As part of this project, salmon recovery staff will work with County River and Flood staff to assess conditions, identifies projects, evaluate project feasibility, and conduct education and outreach of affected landowners and stakeholders.
- Consultation with salmon recovery staff for flood projects (ongoing). This has been occurring on a project specific basis. Next steps are to establish a means for earlier two-way consultation during project development phases for both recovery and flood projects.
- Refinement of the County procedures for complying with the FEMA Bi-Op on floodplain development will occur during the next couple years as the existing checklist is utilized and as FEMA/NOAA guidance becomes more clear and consistent.
- Complete the hydraulic modeling initiated in fall 2009 to evaluate interactions of habitat restoration projects and flood hazard management objectives. Specifically, the consultant is conducting hydraulic modeling and geomorphic analysis for the South Fork Nooksack River to estimate effects of restoration projects on flood hazard risk (flooding, bank erosion). The Flood Hazard Management Program Manager and staff is participating with the Staff Team to complete this project.

5. Establish New Instream Flows in WRIA 1.

- 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. The following actions are proposed or underway for the 3-year time frame:
 - Instream flow negotiations. The instream flow negotiation settlement process is still underway. The process is conducted under confidentiality agreements. The scope of the discussions has included the three Nooksack Forks, however, details associated with the scale or potential solutions for managing water are not available at this time. Discussion of an approach, process, or timeline for ISF negotiations below the Forks has not yet occurred but is anticipated to be initiated within the 3-year timeframe of the 2010-2012 3-year work plan.

6. 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:
 - Fish passage barrier removal program to address high priority fish passage barriers.
 - Riparian restoration program to support ongoing voluntary riparian restoration (e.g. Tenmile Creek partnership, Bertrand Watershed Improvement District, Birch Bay Watershed and Aquatic Resource Management) along lower mainstem and independent tributaries.

7. Other programmatic actions.

- Salmon recovery implementation oversight and coordination.
- Population monitoring for Chinook and other WRIA 1 salmonids that are ESA-listed (bull trout and steelhead) or species of concern (coho).
- Habitat and water quality monitoring in early Chinook habitats to evaluate project/program effectiveness and status and trends.
- Adaptive management for Nooksack early chinook. We expect to develop an adaptive management plan by the end of 2010; monitoring efforts will be expanded accordingly.

Summary of Changes to the 2010-2012 WRIA 1 3-Year Plan from the 2009-2011 WRIA 1 Salmon Recovery 3-Year Implementation Plan

- Projects that were not initiated in 2009 were shifted to a projected 2010 or later start date. Specific start date is depended on budget and staff capacity to implmenet.
- A column was added to the 2010-2012 WRIA 1 3-Year Project Plan to identify whether a project listed is in a 2010 priority reach for restoration projects.
- A Hatchery/Harvest category was added to the 2010-2012 3-year plan, and actions relevant to this category updated by the Co-Managers. Last year's 3-year project plan did not clearly categorize and update actions for this category, which made it challenging for the RITT review.
- An Education/Outreach program category was added to the 2010-2012 WRIA 1 3-Year Project Plan to identify specific tasks that are in process to improve opportunities for communicating information to the community and receiving input to salmon recovery program and processes.
- The local effort to move toward sequencing and phasing of restoration projects is reflected in the format of the 2010-2012 WRIA 1 3-Year Project Plan spreadsheet by including a section to show general phases and status for projects, and by organizing the project geographically and by reach.
- Projects were added that were considered feasible to implement or initiate within the projected timeframe, or that are associated with tasks in process. The additional projects include:
 - A Riparian and Stream Restoration in Nooksack Forks and Tributaries project was added to the 2010-2012 WRIA 1 3-Year Project Plan that will support the Washington Conservation Corp crew to implement priority riparian and instream restoration projects in the Nooksack River Forks. The prioritization of efforts will occur with the involvement of the WRIA 1 Salmon Recovery Staff Team.

- A Nooksack River Forks Priority Reach Conservation Plan for Salmon Recovery Habitat Targets will be developed to help identify priority parcels for properties acquisition to support salmon recovery.
 - Several new restoration projects have been included in the 2010-2012 WRIA 1 3-Year Project Plan that will be staged from concept through construction within the 3-year horizon.
 - Reach scale restoration design for the Middle Fork has been added in the 2010-2012 3-year project plan.
 - Several new projects have been added under Estuary/Nearshore category including Slater Road Elevation, Marietta, and Coastal Stream and Marine Shoreline Riparian Assessment and Restoration Prioritization. The City of Bellingham has also identified several projects for inclusion under the Estuary/Nearshore project category.
 - An Education/Outreach category that includes specific actions and development of an overall education/outreach strategy are new to the 2010-2012 3-year plan, and are all expected to be completed in 2010. These efforts will inform additional activities for 2011 and beyond.
- Project costs were updated as appropriate to reflect new information such as revised project cost estimates, funding obtained, and engineering and/or design work completed.

Responses to Questions Posed in 2010 Three Year Work Plan/Program Guidance

Consistency Question

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

Actions are identified in the *2010-2012 WRIA 1 3-Year Project Plan* spreadsheet submitted with this narrative. The Overview of the 3-Year Project Plan section of this narrative organizes the key actions from the spreadsheet according to the WRIA 1 Salmon Recovery Plan 10-year action that they address. These actions can be grouped into the following categories;

- Actions necessary to stabilize the two natural origin Nooksack early Chinook populations through artificial supplementation.
- Habitat actions to address critical limiting factors in priority reaches for Nooksack early Chinook.
- Habitat actions to address multiple species needs of WRIA 1 salmonid populations
- Actions to address local implementation infrastructure including the integration of salmon recovery and watershed management administrative and policy functions are proceeding as per the integration plan...

Pace/Status Question

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

Progress is being made on all of the key actions identified in the WRIA 1 Salmon Recovery Plan either directly through the WRIA 1 Salmon Recovery Board and its committees or through the activities of the individual entities represented on the Board. Efforts within each of the key

actions have primarily focused on projects and actions to recover early Chinook. Significant progress has been made on the South Fork captive brood supplementation program, habitat restoration in the Nooksack Forks, and integration of salmon recovery needs into other WRIA 1 programs (e.g., CAO/SMP updates, flood hazard program, instream flow processes). Funding and capacity limitations experienced by many of the local recovery partners has limited the pace at which some key actions are being implemented. In addition, restoration of physical and biological processes is a complex undertaking with factors such as full geomorphic response to instream projects and subsequent population response taking years to occur. As a consequence a qualitative estimate is that we are on track, but behind where we anticipated we would be at 5 years post plan completion.

The WRIA 1 Salmon Recovery Staff Team is in the process of quantifying habitat needed to support recovery goals. That work in combination with the expansion of status and trends and effectiveness monitoring will enable the Staff Team to better evaluate the status and pace of recovery, and provide a quantitative assessment of the pace of recovery.

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

Sequence/Timing

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

The top implementation priorities have been actions that will maximize benefit to the two Nooksack early Chinook populations, namely habitat restoration in the Forks and conservation hatchery programs to sustain the populations while the habitat recovers. Assessment work and restoration planning has been completed for the entire South Fork. The 2010-12-2011 WRIA 1 3-Year Project Plan includes South Fork projects identified in the reach assessment/restoration planning documents. A restoration strategy is being developed that synthesizes the outcomes of the three South Fork reach assessments into a single restoration strategy that provides a priority sequence for the projects identified in the assessments. Starting with the 2009 grant funding round, sponsors of projects that have not been started and that are on the 3-Year Project Plan are being asked to identify the stages of their project and provide context for how their proposed project fits into the sequence of projects for the applicable reach. Although there is less assessment work completed for the North Fork, the approach described for the South Fork project sequencing and implementation is also planned for the North Fork as part of the

assessment work currently underway. The completed Middle Fork assessment that is in process will include information for projects and project sequencing once completed.

Successful implementation of these priorities will depend on the community's willingness to support the actions, whether it is a small restoration project or a salmon recovery project that is part of a larger project having multiple objectives such as flood hazard reduction or bridge replacement. Additionally, adequate levels and timing of funding is needed to successfully implement the salmon recovery priorities. Flexibility in accessing the allocated funds throughout the year such as PSAR improves the ability to successfully stage and implement project phases.

Next Big Challenge

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

The priorities in the 2010-2012 3-Year Project Plan have not changed from 2009-2011 Plan; only project specifics have changed as work has been accomplished, delayed, or new projects developed. Although the types of projects and the limiting factors addressed have not changed, the approach for implementing them has become more strategic.

The sequencing and staging of projects helps focus limited resources on priority actions, and helps WRIA 1 more effectively use available funding to make progress on the most immediate near-term goals. To further this strategic approach, rather than implement site-specific projects, sponsors are working at larger reach scales. In the design phase, for example, the project sponsors are developing the optimal restoration scenarios, effectively establishing habitat targets for the reach. As part of that process, constraints can then be explicitly identified along with efforts to address the constraints. The South Fork Hydraulic Modeling project is another example of strategically planning for restoration by reach, and considering multiple objectives. Strategic planning is not limited to the restoration projects. The WRIA 1 Salmon Recovery Staff Team is collaborating with the Whatcom Land Trust to develop a strategic plan for prioritizing acquisitions. This collaboration will advance the effectiveness of acquisition as a tool in salmon recovery.

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

Although population and limited habitat and water quality monitoring is underway, progress has not been made on comprehensively quantifying and summarizing status and trends. Population data indicates that the North Fork population has been stabilized through artificial propagation while the natural production remains below replacement levels. The South Fork population has reached critically low levels prompting the implementation of a captive brood stock program. This extreme measure was not anticipated in the original recovery plan. The current priority on habitat projects in the South Fork targets key limiting factors with the intent of providing for improved spawner to smolt survival conditions when the brood stock program begins to produce juveniles for out-planting.

SRST is in process of establishing habitat targets in the Nooksack Forks. With this work, along with expanded monitoring as specified in the adaptive management plan (expected late 2010, pending RITT's involvement), we shall better be able to quantitatively evaluate status or trends. Based on limited monitoring data and anecdotal evidence, however, we note the following:

- Early Chinook population status is stable, at low levels. The wild abundances increased moderately, and stabilized for North/Middle Fork spring Chinook through the Kendall Hatchery rebuilding program returns. A similar trend is anticipated for South Fork spring Chinook as the captive brood program continues. Good juvenile representation for brood year 2007, and especially 2008. Thus far BY 2009 collections are promising as well. Baseline abundance data is being collected for winter-run steelhead.
 - Pool quantity, residual pool depth, area in complex cover, large wood and log jam numbers and volume, and, to a lesser extent, temperature refuges have increased modestly in the South Fork.
 - More land is in conservation status, especially along the Forks.
 - Riparian function of lowland chinook tributaries is on a trajectory of recovery, due to extensive planting of riparian areas (within 30-50' of stream) in the last decade.
7. *Are there new challenges associated with implementing salmon recovery actions that need additional support? If so, what are they?*
- Community relationships in the current anti-government, anti-tax political environment.
 - Although there has been progress with integrating flood hazard management and salmon recovery, planning and implementing multiple objective projects involving multiple partners remains a challenge because of differing perspectives and priorities including those that may be associated with a funding source.
 - Implementation of FEMA Bi-Op on floodplain development lacks solid guidelines and clear policies as to how it may/may not relate to salmon recovery projects.
 - Challenge of decreasing resources of SRB entities affects staff involvement in all aspects of salmon recovery.
 - Steelhead is now listed, but they are not yet integrated into our recovery priorities. Even so, this has created additional needs for population monitoring, managing harvest etc. No additional funds are yet identified for steelhead.

Project Information											Project Planning							Project Cost and Sources				
Type	Project Name	Brief Project Description	2010 Priority Reach	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting		Current Project Status	2010		2011		2012		Beyond 2012	Total Project Cost	Est. 2010-2012 Budget	Existing funds (grants and local)	Source of funds
									Primary	Secondary		scope	cost	scope	est cost	scope	est cost					
Multiple Areas in the Nooksack River Forks and Tributaries																						
Multiple Geographic Areas Within the Nooksack Forks and Tributaries																						
Restoration	Riparian and Stream Restoration in Nooksack Forks and Tributaries	Funding for Washington Conservation Corp crew to complete riparian and instream restoration projects in priority reaches of the Nooksack River Forks.	yes	NSEA	multiple Recovery Plan factors	Nooksack MF Watershed Habitat Limiting Factors (LNR 2008), NF Nooksack Restoration Optimization Report (NNR 2006), SF Nooksack River Acme-Saxon Reach Restoration Plan (LNR and NNR, 2003)	Riparian / Instream	# trees planted; approximate # acres riparian forest restored	Chinook	steelhead, bull trout, coho, chum, other salmonids	Some funding available for materials and equipment. Need crew funding	scope	cost	scope	est cost	scope	est cost	yes	\$160,000		PSAR; NSEA; County; Other	
Restoration	Forest Road Assessment	Assess high-risk orphaned roads in priority watersheds and develop prescriptions	yes	Nooksack; SRST	excessive sediment; channel instability	WRIA 1 SRP	Upland	prescriptions for 15 miles of orphaned road; volume of fill removed; miles of road abandoned	Chinook		conceptual	scope	cost	scope	est cost	scope	est cost	yes	\$130,000	\$130,000	\$30,000	Nooksack; PSAR
Plan	Nooksack R. Forks Priority Reach Conservation Plan for Salmon Recovery Habitat Targets	Develop two element plan to achieve habitat targets: 1) conservation and/or acquisition for restoration and 2) conservation and/or acquisition for protection	yes	SRST; WLT	program			priorities for conservation and/or acquisition	chinook		In-process	Complete plan	\$9000 (PSAR capacity)	revisit plan	TBD	revisit plan	TBD	yes	\$9,000	\$9,000		PSAR capacity; SRST
Program; Combination	Implement Nooksack R. Forks Priority Reach Conservation Plan for Salmon Recovery	Implement sequence of tasks leading to conservation of priority properties to meet habitat targets in SF, MF, NF reaches. Tasks may include acquisition of identified priority parcels as the Nooksack Forks conservation and acquisition plan is being developed.	yes	TBD	multiple Recovery Plan factors		Land Protected, Acquired, or Leased		Chinook		in process	Landowner contacts; appraisals	\$36,000 (PSAR capacity-2 SF properties and 2 NF properties)	Landowner contacts; PSA; acquisition	\$550,000	Landowner contacts; PSA; acquisition	TBD	yes	TBD	\$586,000	\$36,000	PSAR capacity; SRFB; WLT; Others
South Fork Nooksack and Tributaries																						
Multiple Reach Projects and Programs																						
Acquisition	South Fork Reach Acquisition	Original SF In-Holding project amended by RCO to reach level acquisition (Acme Hwy 9 bridge to original parcel)	yes	WLT			Land Protected, Acquired, or Leased		Chinook		Acquisitions; continued negotiations; appraisals	final grant acquisitions	\$951,915 (RCO #07-1805)							\$951,915	\$142,788	PSAR; WLT
Plan	South Fork Strategic Plan	Develop sequence and priorities for implementing SRP actions in the SF watershed, including flood/salmon coordination	yes	SRST	multiple Recovery Plan factors		Instream, floodplain		Chinook	steelhead, bull trout, coho, pink, other salmonids	In process	complete hydraulic modeling of SF reaches; scope plan elements	\$95,000 (PSAR capacity-modeling)	activity depends on outcomes of modeling and scoping	TBD	TBD	TBD	yes	TBD	\$95,000		PSAR
Restoration	HMZ Reconnection	Coordinate implementation of South Fork Strategic Plan and Conservation Plan to reconnect disconnected floodplain required to achieve habitat targets	yes	TBD	multiple Recovery Plan factors	WRIA 1 SRP	Instream, Riparian/Floodplain	176 acres of HMZ reconnected	Chinook		conceptual pending completion of SF Strategic Plan and Priority Reach Conservation Plan	No activity planned	\$0	Review				yes				
Plan	Lower South Fork Joint Transportation/ Restoration Planning	Develop habitat restoration projects in conjunction with possible replacement or relocation of existing transportation infrastructure	yes	WCPW	Multiple; specific factors tied to infrastructure location	WRIA 1 SRP	Instream, Riparian/Floodplain	TBD -dependent on limiting factors addressed	Chinook	steelhead, bull trout, coho, pink, other salmonids	conceptual	Consult with County Roads regarding Potter Road Bridge replacement designs; identify opportunities, alternatives,	TBD/in-kind	work with landowners and transportation interests; scope specific project concepts	TBD	implement specific projects	TBD	yes	TBD; dependent	TBD	TBD	TBD
Restoration	Lower South Fork Wetland Water Storage Improvement	Plant, promote water storage in wetlands to restore temperature and baseflow maintenance functions	yes	TBD	water quality; stream flow		Wetlands	180 acres wetland restored	Chinook		Planning Concept	No activity planned	\$0	No activity planned		No activity planned		yes				
Acme to Confluence- River Miles 0-8.5 (Hydraulic Modeling Reaches 1-7)																						

Project Information											Project Planning						Project Cost and Sources					
Type	Project Name	Brief Project Description	2010 Priority Reach	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting	Current Project Status	2010	2011	2012	Beyond 2012	Total Project Cost	Est. 2010-2012 Budget	Existing funds (grants and local)	Source of funds				
Restoration	South Fork Instream Restoration-VanZandt	Complex logjams within a 0.5-mile segment of the lower South Fork Nooksack River near the mouths of Tawes and Caron Creeks.	yes	Nooksack	low habitat diversity, lack of deep pools with cover, high temperatures	SRP; Acme-Confluence Assessment	Instream	.5 miles treated; 12 structures placed	Chinook	hydraulic modeling	permits; construction	\$747,500 (RCO #07-1800 SRFB)	monitoring	\$10,000	\$757,000	\$757,500	\$757,500	SRFB; NIT				
Restoration	South Fork at Five Cedars	ELJ construction	yes	Nooksack	low habitat diversity, lack of deep pools with cover, high temperatures	SRP; Acme-Confluence Assessment	Instream	xx miles treated; xx log jams placed	Chinook	conceptual		design	\$40,000	Construction	\$350,000	yes						
Restoration	South Fork at Sygitowicz	ELJ construction	yes	Nooksack	low habitat diversity, lack of deep pools with cover, high temperatures	SRP; Acme-Confluence Assessment	Instream	.15 miles treated; 7 log jams placed	Chinook	conceptual design	Flood risk analysis; Final Design; Permits; Construction; Monitoring	\$286,765 (\$59,000 2009 SRFB)	Monitoring	\$15,000	Monitoring	\$15,000	yes	\$489,000	\$59,000	SRFB; NIT; PSAR; Others TBD		
Restoration	South Fork at Hardscrabble	ELJ construction	yes	Nooksack	low habitat diversity, lack of deep pools with cover	SRP; Acme-Confluence Assessment	Instream	xx miles treated; xx log jams placed	Chinook	conceptual design	Design; Monitoring	\$57,600 (#09-1683)	Construction	\$480,000	Monitoring	\$15,000	yes	\$580,950	\$57,600	SRFB; NIT; Others TBD		
Restoration	South Fork at Standard Creek	ELJ construction	yes	Nooksack	low habitat diversity, lack of deep pools with cover, high temperatures	SRP; Acme-Confluence Assessment	Instream	xx miles treated; xx log jams placed	Chinook	Conceptual							yes					
Restoration	Acme-Confluence Reach HMZ Reconnection: Jones/McCarty (RM 7.5-8.0)	Acquire approximately 90 acres bordering the South Fork and on the Jones and McCarty Creek alluvial fans for future HMZ reconnection and off-channel habitat and riparian restoration	yes	WCPW	floodplain connectivity, channel hydraulics; low habitat diversity; fish passage	SRP; Acme-Confluence Assessment	Floodplain; tributary	~90 acres for restoration; ~0.3 miles for passage	Chinook	steelhead, cutthroat, bull trout, coho	Property for sale, funding needed; dependent on Jones Creek flood planning	No activity planned	\$0	landowner contacts and negotiations; secure funding sources; complete acquisition	\$ 1,050,000	Designs and permits for levee removal/ setback; other restoration options	\$ 75,000	yes	\$525,000	\$1,125,000	TBD	
Acme to Saxon- River Miles 8.5-13 (Hydraulic Modeling Reaches 8-10)																						
Restoration	Acme Early Chinook Restoration	Increase habitat diversity, improve floodplain connectivity, reduce flood hazard to Acme	yes	WCPW	Temperature; complex pools	WRIA 1 SRP	Instream; riparian	4 large jams, 6 small jams, 630' cumulative length; 3/4 acre planted; 9.5 acres interplanted	Chinook	steelhead, bull trout, coho, pink, other salmonids	Phase 1 completed 2009; Phase 2 summer 2010 construction	Final design; Permitting; Construction	~\$255,000 (#07-1790)	monitoring, planting	\$5,000	Monitoring; planting	\$5,000	yes	\$422,000 (Phase 1 included)	\$255,000	\$255,000	PSAR; WCFZD; Acme Van Zandt Subzone
Restoration	South Fork Williams Pipeline-Hutchinson Restoration	ELJ construction	yes	TBD	low habitat diversity, lack of deep pools with cover, high temperatures	SRP; Acme-Saxon assessment	Instream; riparian function	xx log jams placed; xx pools formed; xx miles treated; XX acres planted	Chinook	steelhead, bull trout, coho, pink, other salmonids	Conceptual		Design	\$100,000	Construction	\$400,000	yes	\$500,000	\$500,000	PSAR; SRFB; Nooksack; Other		
Combination	Catalyst Floodplain and Wetland Riparian Restoration	Fish Passage Barrier removal, LWD placement, riparian planting on 129 acres bordering South Fork and containing South Fork tributaries	yes	NSEA; WLT	multiple Recovery Plan factors	SF Nooksack River Acme-Saxon Reach Restoration Plan (LNR and NNR, 2003)	Instream; Floodplain; Land Acquired/ Protected/ Easements	Daylight 1000 ft of tributary, install 15-20 LWD structures, Plant 120 acres of riparian / floodplain habitat	Chinook	steelhead, bull trout, coho, chum, other salmonids	In-Process	Construction; Acquisition	\$1,123,818 (2007 and 2008 SRFB & PSAR) + \$185,000 state funds	Riparian planting	\$180,000 (2011 CREP)	Riparian planting	(other potential sources)	\$1,463,818	\$1,463,818	\$1,463,818	PSAR; SRFB; NSEA; Other; State Supp	
Restoration	South Fork Riparian Enhancement Project	Improve riparian conditions	yes	NSEA			Instream	plant 34 acres; 3 yr maintenance	Chinook		In-Process	Planting	\$143,856 (#09-1671)	maintenance	covered in #09-1671	maintenance	covered in #09-1671	yes (2013)				
Restoration	Saxon Reach Restoration	~12 logjams will be built to encourage split flows and pool development; pools will provide cover; ~4 habitat structures will be built in Nessel's tributary for refugia	yes	Lummi	lack of habitat-forming processes (wood recruitment, pool development from logjams, multi-threaded channels); pool cover; refugia	SRP; SF Assessment	Instream	.75 miles treated; 12 ELJs; 4 habitat structures	Chinook	BullTrout; Steelhead	In-Process	Design; Permitting	\$150,405 (2008 SRFB)	Construction	\$1.1 million	monitoring		yes (monitoring)	\$1,650,405	\$1,650,405	\$150,405	SRFB; LIBC; Other
Upper South Fork- River Miles 13 and above (Hydraulic Modeling Reach 11)																						
Restoration	Skookum Reach Restoration Project	Logjams; relocate road from river bank; restore riparian buffer	yes	Lummi	complexity; tributary capacity; riparian shading; flow capacity	SRP; SF Assessment	Instream	.5 mi treated; 3 ELJ; 11.8 ac buffer; 2500ft road relocated	Chinook	BullTrout; Steelhead	Instream phase permitting; road paving	Construction; Monitoring	\$1,180,386 (#07-1803 SRFB & PSAR 2007, 2009)	Monitoring	\$12,500	Monitoring	\$12,500	yes	\$1,180,386	\$1,180,386	\$1,180,386	SRFB; PSAR; LIBC; FWS; PCSRF

Project Information											Project Planning						Project Cost and Sources			
Type	Project Name	Brief Project Description	2010 Priority Reach	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting	Current Project Status	2010	2011	2012	Beyond 2012	Total Project Cost	Est. 2010-2012 Budget	Existing funds (grants and local)	Source of funds		
Restoration	Cavanaugh Cr Island Project	Improve habitat diversity in the Cavanaugh Creek reach.	yes	Lummi	1, 2, 6, A3, A4, A8	Upper S. Fork Nooksack River Habitat Assessment	Instream	# LWD structures; riparian area restored	Chinook; BullTrout; Steelhead	conceptual		funding and design feasibility	\$5,000	Design and permitting	\$50,000	yes	\$350,000	\$55,000	SRFB; PSAR; LIBC; Other	
Restoration	Larson's Floodplain Refuge Project	Improve connectivity with cool water side-channel. Increase habitat diversity in an area with abundant groundwater seeps from an adjacent terrace.	yes	Lummi	1, 2, 6, A3, A4, A8	Upper S. Fork Nooksack River Habitat Assessment	Instream	#LWD Structures	Chinook; BullTrout; Steelhead	conceptual		funding and design feasibility	\$5,000	funding, design, and permitting	\$100,000	2016	\$600,000	\$105,000	USFWS; NMFS; SRFB; PSAR	
Restoration	Fobes Creek Reach Restoration	Stabilize forested islands; maintain high flow connectivity; foster cold water habitat potential	yes	Lummi	unstable wood accumulations; high water temperatures; loss of habitat; lack of habitat diversity	SRP; SF Assessment	Instream	1.4 mi treated; 14ELJs	Chinook; BullTrout; Steelhead	Permitting	Design; Monitoring	\$77,978	Construction	\$810,436	Monitoring	\$25,000	yes	\$913,414	\$913,414	SRFB; PSAR; LIBC; FWS; PCSRF
Middle Fork Nooksack and Tributaries																				
Multiple Reach Projects and Programs																				
Plan	Reach Scale Restoration Design	Develop sequence and priorities for implementing actions in the Middle Fork	yes	SRST; Nooksack			Instream, floodplain		Chinook; steelhead, bull trout, coho, pink, other salmonids	Conceptual	Preliminary Designs	\$20,000	develop scope; final designs	TBD		yes		\$20,000	Nooksack; SRST	
Assessment	Middle Fork Nooksack Habitat Assessment	Prepare assessment and restoration strategy for Middle Fork Nooksack	yes	Lummi	Habitat diversity inputs (low wood loading); no split flows	in process MF Assessment	Instream		chinook	In-Process	Identify and prioritize projects, write report	\$149,487 (2007 PSAR)					\$186,487	\$186,487 (\$149,487 PSAR; \$37,000 other grants)	PSAR; Other grants	
Restoration	Middle Fork Diversion Dam	Identify and implement preferred alternative for addressing barrier.	yes	Bellingham; Co Managers	reduced access to spawning habitat; obstructions	SRP	Fish Passage		Chinook	Feasibility Study	Determining feasibility of an alternative withdrawal based on a siphon intake placed below the dam.	\$5,000,000 to \$6,000,000	Determined by results of feasibility study.							
Reach Specific Projects and Programs																				
Reach: Porter																				
Restoration	Middle Fork LWD Placement 2009	Augment existing LWD accumulations	yes	NSEA	Channel Island and side channel development/ longevity / stability	NF Nooksack Restoration Optimization Report (NRR 2006)	Instream	Channel Island and side channel enhancement	Chinook; Bull Trout, steelhead, coho	permitted	Construction	\$189,880 (#09-1670 PSAR) +\$190,000 state funds					\$379,880	\$379,880	\$379,880	PSAR; NSEA; other grants; State Supp
Reach: Middle/Lower																				
Restoration	Nooksack Middle Fork Instream Phase 2	Implement design structures using results of the 2007 SRFB funded assessment and reach scale restoration designs	yes	TBD			instream		Chinook; Bull Trout, Steelhead, Coho	MF assessment in process	Concepts	-0-	Designs; Permits; Funding	TBD	Construction	TBD	yes			
North Fork Nooksack and Tributaries																				
Multiple Reach Projects and Programs																				
Assessment	Expand North Fork Assessment	Expand coverage of North Fork Assessment including fish section	yes	SRST; Nooksack; NSEA			Instream		chinook	draft assessment; trib habitat mapping in process	complete trib mapping; scope assessment elements and implement	\$11,325 (trib mapping PSAR); TBD	prepare report; review and update restoration strategies	TBD						PSAR; local funds; other
Reach Specific Projects and Programs																				
Reach: Farmhouse																				
Restoration	North Fork Farmhouse Reach Restoration	restore historic channel planform, habitat diversity, and habitat functions	yes	Nooksack	channel instability, low habitat diversity	SRP, North Fork Assessment	Instream	XX structures placed; xx miles treated; xx miles of stable spawning habitat	Chinook	Conceptual	Feasibility; Design	\$176,475	Construction	\$500,000	post-project monitoring	\$50,000	yes	\$726,475	\$176,475	SRFB; NIT; PSAR; Other
Restoration	North Fork Channel Island LWD Augmentation- Farm Reach	Protect and enhance channel islands, provide stable spawning and rearing habitat, and augment LWD	yes	NSEA; Nooksack	channel instability, low habitat diversity	NF Nooksack Restoration Optimization Report (NRR 2006)	Instream	XX structures stabilized	Chinook; steelhead, bull trout, coho, chum, other salmonids	conceptual design	Design; permits; construction	\$287,000 (#07-1828 PSAR) + \$191,000 State funds					\$478,000	\$478,000	\$478,000	SRFB; PSAR; local; other state and fed grants; State Supp

Project Information											Project Planning					Project Cost and Sources							
Type	Project Name	Brief Project Description	2010 Priority Reach	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting	Current Project Status	2010	2011	2012	Beyond 2012	Total Project Cost	Est. 2010-2012 Budget	Existing funds (grants and local)	Source of funds					
Reach: Lone Tree																							
Restoration	North Fork Reach Stable Side Channel Restoration- Lone Tree	Design and install log jams to restore stable side channel habitats and promote floodplain island formation to improve egg-fry survival	yes	Nooksack	channel instability, low habitat diversity	SRP, North Fork Assessment	Instream	structures placed; miles treated	Chinook	Design; permits	construction	\$250,000 (#08-1943)	post-project monitoring	\$10,000	post-project monitoring	\$10,000		\$270,000	\$270,000	PSAR; NIT; Other			
Reach: Wildcat																							
Restoration	North Fork Wildcat Reach Restoration	restore historic channel planform, habitat diversity, and habitat functions	yes	Nooksack	channel instability, low habitat diversity	SRP, North Fork Assessment	Instream	XX structures placed; xx miles treated; xx miles of stable spawning habitat	Chinook	Conceptual	Feasibility; Design	\$117,650	Construction	\$500,000	post-project monitoring	\$30,000	yes	\$647,650	\$117,650	SRFB; NIT; PSAR; Other			
Reach: Canyon																							
Restoration	Lower Canyon Creek Phase 2 Restoration	Complete next phase in a series of projects to restore habitat forming process and passage in the lower mile of Canyon Creek	yes	WCPW/ WCFZCD	passage, habitat diversity & complexity, riparian condition	WRIA 1 SRP (2005); HEC (2007); KWL (2003)	instream; fish passage; riparian	access to 3.9 miles; channel structures; acres of historic channel area reopened	Chinook	Conceptual alternatives identified as starting point	Alternative analysis/selection; Preliminary designs; draft permits (RCO 10-1340)	\$215,500	Final designs; permits; construction funding (RCO 10-1481)	\$1,025,000	final planting; post project monitoring	\$35,000	yes	\$1,371,195	\$1,275,500	\$1,209,750	PSAR; WCFZCD; SRFB; NOAA; Other		
Mainstem Nooksack River and Tributaries																							
Upper Mainstem																							
Assessment	Upper Mainstem Reach Assessment and Restoration Planning	habitat assessment and restoration planning for the Nooksack River from the SF confluence to Everson	no	Nooksack			Instream	restoration plan	Chinook	conceptual			Habitat assessment	\$75,000	Restoration Planning, conceptual designs for 2 projects	\$100,000	yes	\$175,000	\$175,000	SRFB; PSAR; other			
Lower Mainstem																							
Combination	Double Ditch Acquisition and Relocation	Relocate Double Ditch and Benson watercourses between Main and Badger to new corridor	no	Lynden; WDFW	Loss of tributary habitat diversity		Instream; Land protected, acquired, or leased		Steelhead	coho, fall chinook, chum	feasibility underway	purchase two parcels and a 5,000'x200' easement	\$1,250,000	initiate channel construction, riparian work	\$500,000	complete channel construction	\$250,000	yes	\$2,000,000	\$200,000	CCW; FCAP; County; State; City; CREP		
	Goodwin Road Culvert Replacement (Dale Creek)	Replace priority culvert; dependent on getting funding	no	WCPW	Reduced access to spawning habitat		Instream		coho	cutthroat; steelhead; chum	scoping in process	detailed design and specifications	TBD	Construction	TBD	Monitoring	TBD						
	Bay Road Culvert Replacement (California Cr)	Replace priority culvert; dependent on getting funding	no	WCPW	Reduced access to spawning habitat	WRIA 1 passage inventory (2006)	Instream	length of habitat opened up	coho	Steelhead and cutthroat trout	design completed; seeking funding	No activity planned	\$0	Permit and construct; if funding obtained	\$475,000	monitoring	TBD	yes	\$475,000		TBD		
Restoration	Riparian Restoration Program- Fishtrap border to badger reach	Continue riparian restoration efforts along 3 mile reach of Fishtrap US border to Badger Roads. Replace wet crossing	no	NSEA	Channel complexity, shade, water temperature reduced access to spawning habitat	WRIA 1 Limiting factors report,	Instream	restore 3 miles of riparian corridor	Steelhead	coho, fall chinook, chum	riparian work underway	Plant and maintain riparian US Pangborn	\$100,000	Continue riparian work DS Pangborn remove inwater crossing @ Sanga	\$150,000	complete Border to Badger riparian work	\$50,000		\$300,000	\$300,000	TBD		
Restoration	Fish Trap Reach Levee Setback	Set back levee along 10,000 ft of lower Fish Trap Reach	no	WCPW & Diking District	Channel Structure & Complexity; Floodplain Connectivity & Function; Habitat Diversity	WRIA 1 Limiting factors report, WRIA 1 SRP	Instream; riparian	10,000 ft setback, 40 acres reconnected	Steelhead	coho, cutthroat trout	conceptual	No activity planned pending staff availability and funding	\$0	Seek landowner interest and support (contingent on staff availability)	\$50,000	Purchase 40 acres of easements funding contingent	\$250,000	yes	\$750,000	\$1,050,000	\$300,000	TBD	
Restoration	Flood Gate Modification	Relace fish blocking flood gates on Whiskey and Cougar Creeks			Reduced access to 5 miles of spawning and rearing habitat		Instream		Steelhead	coho	Evaluate Schnieder Ditch SRT gate .	Discuss SRT options with Whiskey and Cougar Creek landowners, complete conceptual design	Covered under other resources	\$25,000	Secure funding, complete design finalize landowner agreements	\$150,000	Install Whiskey and cougar creek SRT gates daylight Whiskey Cr channel	\$150,000		WCD, NRCS, NSEA	\$175,000	\$0	NRCS, USFWS EQUIP
Restoration	Fish Passage Barrier Removal Program	Correct priority barriers identified in 2006 inventory; multiple leads including NSEA, WCPW, cities, WSDOT, forest landowners, private landowners, WDFW	no	NSEA; WCPW	Reduced access to spawning habitat, Obstructions	WRIA 1 passage inventory (2006)	Instream	Miles stream opened up	Steelhead	coho, fall chinook, chum, cutthroat trout, bull trout	On-going; funding dependent.	Correct priority sites with allocated funding. - sponsors operating independently based on mandates and budget.	TBD	Correct priority sites with allocated funding. - sponsors operating independently based on mandates and budget.	TBD		Yes	TBD	TBD	NSEA = ???WCPW \$0	TBD		
Estuary/Nearshore																							

Project Information											Project Planning						Project Cost and Sources			
Type	Project Name	Brief Project Description	2010 Priority Reach	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting	Current Project Status	2010	2011	2012	Beyond 2012	Total Project Cost	Est. 2010-2012 Budget	Existing funds (grants and local)	Source of funds		
Combination	Smuggler's Slough Acquisition and Restoration	Multi-phased project to restore tidal action, saltwater inundation, and freshwater flow through a network of tidal sloughs and freshwater channels	no	Lummi	passage, habitat diversity & complexity, riparian condition; hydrology	WRIA 1 Salmon Recovery Plan	estuary	# acres acquired and restored; passage barriers removed;	chinook; Chum, coho, sockeye, pink; Bald eagles; Bull trout; steelhead trout; surf and longfin smelt; sand lance starry flounder; Orca whale, marbled murrelet, Bald eagle; Pacific herring	wetland acquisition; final design; permitting; riparian planting	Final Design, Permits, Construct Phase 1 and 3	\$1,755,675 (Nearshore Partnership RCO #07-1069)	Construct Phase II	\$2,477,900 (ESRP RCO #09-1735)	Monitoring	\$20,000	yes	\$4,233,575	\$1,660,375	NRCS; USFWS; PSNRP; SRFB; ESRP
Restoration	Squalicum Cr Estuary Restoration	Project will remove several partial fish passage barriers and improve estuary habitat at the mouth of Squalicum Cr	no	Port of Bellingham, City of Bellingham, Bellingham Bay Action Team, WDFW	7, 11, A4	Bellingham Bay Pilot Habitat Study	Estuary		Chinook	conceptual design, conducting structural analysis on Roeder Ave Bridge,	prepare final design and secure permits	\$300,000	restore estuarine marsh, modify bridges,	\$600,000	monitoring	\$20,000	2012	\$920,000		
Restoration	Chuckanut Village Marsh Restoration	Replace culvert to improve fish passage and hydrodynamic connectivity between salt marsh and Chuckanut Bay nearshore.	no	City of Bellingham,	18, A11	Bellingham Bay Pilot Habitat Study, MANAGEMENT RECOMMENDATIONS FOR CITY OF BELLINGHAM POCKET ESTUARIES	Estuary		coho and chum from Chuckanut creek copepods	Design complete, have obtained all permits, will be constructed in 010 or 2011	construction	\$75,000					\$75,000			
Restoration	Padden Cr Estuary Restoration	Complete feasibility study to improve water quality, circulation, reduce sediment accumulation, improve habitat	no	City of Bellingham,		MANAGEMENT RECOMMENDATIONS FOR CITY OF BELLINGHAM POCKET ESTUARIES	Estuary													
Restoration	Little Squalicum Estuary creation	Create 1 acre salt marsh estuary at mouth of Little Squalicum Cr as part of EPA cleanup of ravine.	no	City of Bellingham, Bellingham Bay Action Team			Estuary		Chinook	Final Design complete, Need structural analysis of RR bridge supports	construction	\$2,000,000					\$2,000,000			
Restoration	Padden Cr @ Fairhaven Park	Increase habitat diversity, add LWD, improve floodplain connectivity	no	City of Bellingham			In stream		Coho, Chum, Chinook	Final design complete, awaiting permits			construction	\$75,000			\$75,000			
Restoration	Padden Cr 24th- 30th	Increase habitat diversity, add LWD, improve floodplain connectivity, reduce flood hazard	no	City of Bellingham			In stream			final design complete, awaiting permits and funding			construction	\$ 700,000			\$700,000			
Restoration	Squalicum Creek Re-Route	Increase habitat diversity, improve floodplain connectivity, reduce flood hazard, improve fish access	no	City of Bellingham			In stream		Coho, chum, steelhead, pink	feasibility	design	\$ 85,000	construction	\$ 800,000						
Restoration	Willow Spring	daylight piped stream	no	City of Bellingham			In stream		TBD	construction	construction	\$ 300,000								
Restoration	Fish Passage Barrier Removal Program	City prioritized list of culvert replacements or retrofits	no	City of Bellingham	Reduced access to spawning habitat, Obstructions		In stream	linear miles of habitat opened	all	finalizing priority list										
Restoration	Riparian Restoration Program	restore riparian habitat	no	City of Bellingham	Reduced access to spawning habitat,		upland, wetland	linear miles or acres of restored riparian area	all	implemented on an ongoing basis	implemented on an ongoing basis	\$ 325,000	implemented on an ongoing basis	\$ 325,000	implemented on an ongoing basis	\$ 325,000				
Construction	Slater Road Elevation	Construct new elevated road to cross the left bank flood plain east of the Nooksack river crossing. Elevating roadway is prerequisite to removal of levee south Slater Rd and reconnection of 600 acres of floodplain	no	WCPW; Lummi	flood plain connection		tidal influenced		chinook	project designed and permitted, waiting for funding, possible appropriation in 2012				\$10,000,000			\$10,000,000		TBD	
Acquisition	Marietta	Purchase fee simple title to homes and property prone to flooding as result of future levee removal/ modification	no	WCPW	Flood Plain Connection	Whatcom County CFHMP	Tidal Influenced		chinook	Flood model completed, approximately 12 properties have been purchased			purchase 8 properties	\$800,000			\$800,000			

Project Information											Project Planning							Project Cost and Sources			
Type	Project Name	Brief Project Description	2010 Priority Reach	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting	Current Project Status	2010	2011	2012	Beyond 2012	Total Project Cost	Est. 2010-2012 Budget	Existing funds (grants and local)	Source of funds			
Assessment	Coastal Stream and marine shoreline riparian assessment and restoration prioritization	Inventory riparian condition of coastal streams and marine shoreline.	no	WCPW	Riparian condition; shade; lwd recruitment; water quality/temperature	WRIA 1 SRP data gap; WRIA 1 Salmonid limiting factors report	coastal streams; estuary; nearshore	length of stream bank inventoried; numbers of projects identified	Dakota Chinook, coho, steelhead, coastal cutthroat trout, bull trout	Inventory for Dakota, California, Terrel, marine border to Pt. Whitehorn contracted	report due June 2010; identify priority restoration areas and projects	\$30,000	Inventory remainder of coastal streams and marine shoreline	\$75,000	Identify restoration priority areas and projects.	\$25,000	yes	\$135,000	\$135,000	\$30,000	WCPW
Plan	Nearshore habitat restoration salmon overly	Complete WRIA 1 nearshore habitat prioritization with salmon overlay	No	WCPW/ MRC	Estuary & nearshore juvenile rearing and foraging	WRIA 1 SRP	estuary; nearshore			MRC report developed	Salmon Recovery Staff Team and MRC Nearshore Subcommittee complete prioritization and address salmon overlay needs	\$75,000	Implement priorities; seek nearshore project funding	TBD	TBD	TBD					
Assessment	Chinook habitat use assessment of Bellingham Bay and adjacent areas		Estuary	City of Bellingham	data gap		Estuary and adjacent waters		Chinook		Compile relevant existing data and studies; implement 2 yrs sampling, analysis of 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	\$250,000			
Hatchery/Harvest																					
Hatchery	South Fork chinook Captive Brood Program	Seine juvenile chinook for a complete brood cycle, run DNA, retain 1000/brood yr South Fork chin. population, transfer to Kendall Hatchery where appx half rear to maturity in freshwater, and half later transfer to NMFS Manchester Research Facility for salt water rearing to maturity. Transfer ripening adults back to Skookum Hatchery for spawning and offspring rearing for traditional sub-yearling release		NMFS, WDFW, Lummi, Nooksack	low abundance	WRIA 1 SRP		increase population abundance and % of chinook in South Fork, while maintaining good genetic diversity. Ultimately, increase natural origin abundance	chinook	draft Hatchery Genetics Management Plan developed, program in place	mostly funded through PST mitigation funds										
Hatchery	South Fork chinook Captive Brood Program	run DNA on wild juveniles seined, retain those that assign to South Fork population DNA baseline. Run DNA on individually pit tagged chinook		WDFW	low abundance	WRIA 1 SRP		increase population abundance and % of chinook in South Fork, while maintaining good genetic diversity. Ultimately, increase natural origin abundance	chinook	ongoing	funded										
Hatchery	South Fork chinook Captive Brood Program	seine juveniles from well distributed sites in the South Fork to gain broodstock that have good representation of the parent spawners		Nooksack; Lummi	broodstock for program	WRIA 1 SRP		optimally 1000 S Fk population juvs per brood year for 5 years with good representation of the parent spawners	chinook	as of 4/1/10 BY 06: 22 juv's (all at Kendall); BY 07: 429 juv's (199 at Kendall, 230 at manchester), BY 08: 908 juvs (429 at Kendall, 219 at Manchester), and BY 09: 63 juvs. (all at Kendall)	partially funded by PST, with other program funds also supporting										
Skookum Hatchery	South Fork chinook population rebuilding program	Spawn ripe captive brood chinook, incubate, rear and release sub-yearlings into S Fk. Transition to traditional population rebuilding program similar to North Fork Nooksack Chin. Program at Kendall.		Lummi	low abundance	WRIA 1 SRP		initially increased abundances, then increased natural origin abundances	chinook	first adults likely to ripen fall 2010, with first release into S Fk spring 2011	funded										
Skookum Hatchery	Skookum Cr Hatchery Water Supply	increase available quantity of good water for hatchery		Lummi		WRIA 1 SRP	hatchery		chinook		construct new intake and additional wells	\$550,000									
Skookum Hatchery	improve adult chinook attraction to Skookum Hatchery	future chinook broodstock collection		Lummi		WRIA 1 SRP	hatchery	volitional recruit of S FK population adult chinook to hatchery	chinook	planning	seeking funding										

Project Information											Project Planning					Project Cost and Sources			
Type	Project Name	Brief Project Description	2010 Priority Reach	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting	Current Project Status	2010	2011	2012	Beyond 2012	Total Project Cost	Est. 2010-2012 Budget	Existing funds (grants and local)	Source of funds	
Kendall Hatchery	South Fork chinook Captive Brood Program	Rear juveniles, PIT tag, transfer to Manchester, upgrade water and rearing capacity		WDFW	low abundance	WRIA 1 SRP	hatchery	increase population abundance and % of chinook in South Fork, while maintaining good genetic diversity. Ultimately, increase natural origin abundance	chinook	2006-2009 brood chinook rearing on station	funded								
Kendall Hatchery	South Fork chinook Captive Brood Program	rear Lummi Bay coho from eyed egg to smolt stage to free up water at Skookum for South Fork chinook. Fish will be transferred to Lummi Bay for release.		WDFW	low abundance	WRIA 1 SRP	hatchery		chinook	not needed yet	funded								
Kendall Hatchery	North/Middle Fork chinook population rebuilding program	spawn returning adults to achieve needs to release 150,000 at hatchery, 400,000 DIT upper North Fork release, and 200,000 M Fk release		WDFW		WRIA 1 SRP	hatchery	increase NOR abundance of population by creating more natural spawners, serve as a Puget Sound spring chinook indicator stock	chinook	currently operating as planned. Optimally, locate of create off-station release sites where fish can de-stress a few days prior to release	funded								
Manchester Hatchery	South Fork Captive Brood Program	rear approximately half of the South Fork captive brood juveniles to adulthood in salt water in Port Orchard		NMFS	low abundance	WRIA 1 SRP	hatchery	increase population abundance and % of chinook in South Fork, while maintaining good genetic diversity. Ultimately, increase natural origin abundance	chinook	currently operating. Infrastructure additions funded.	funded								
Hatchery	off-station release sites in each fork	investigate opportunities for de-stressing spring chinook releases off station by holding them a few days		WDFW, Lummi, Nooksack	maximize survival by reducing stress. Minimize straying to S Fk.	WRIA 1 SRP	hatchery	release survival and homing	chinook	evaluating Excelsior side channel, planning 2010 release into Lone Tree side channel, Bridge Camp and potentially a site near Glacier, Middle Fork release will hold in McKinnon Ponds	undetermined								
various Samish Hatchery summer/fall chinook releases	Minimize stray contributions from summer fall hatchery chinook releases	collect otoliths from fall chinook, read them, and evaluate origin and distribution of hatchery fall chinook on Nooksack spawning grounds, with emphasis in South Fork and Bertrand Creek		WDFW, Lummi, Nooksack	Increase homing to Bertrand Creek and minimize straying to early chinook spawning areas	WRIA 1 SRP	hatchery		chinook	ongoing	funded								
Hatchery	Middle Fork Diversion Dam- Kokanee Program	diversify and maintain the State's sport kokanee program to account for loss of pathogen free water source status once diversion dam passage is restored.		WDFW		WRIA 1 SRP	hatchery		sport Kokanee fishery	Captive brood rearing, with offspring released to 37 lakes	funded								
Hatchery	shift Samish River steelhead release to Whatcom Creek	Make premanent the change in 2008 which increased the Whatcom Creek steelhead release of Chambers Creek origin steelhead and deleted the Samish release.		WDFW	reduce potential for cross breeding	WDFW Steelhead White Paper, NMFS Status Review	hatchery	drop Samish hatchery steelhead release to reduce the risk of interbreeding, and create a second broodstock collection at Whatcom Creek Hatchery	steelhead	last release to Samish was 2007	funded								
chinook Harvest	monitor and evaluate Cereminal and Subsistence fisheries	determine total catch, and hatchery and wild contributions by population		Lummi, Nooksack		annual post-season harvest reporting of to NMFS, consistent with co-manager harvest plan	hatchery		chinook	ongoing									
chinook Harvest	estimate total sport, C&S, and commercial harvest	monitor all fisheries and report catches		Lummi, Nooksack, WDFW		annual post-season harvest reporting of to NMFS, consistent with co-manager harvest plan	harvest		chinook	ongoing									

Project Information											Project Planning							Project Cost and Sources			
Type	Project Name	Brief Project Description	2010 Priority Reach	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting	Current Project Status	2010	2011	2012	Beyond 2012	Total Project Cost	Est. 2010-2012 Budget	Existing funds (grants and local)	Source of funds			
chinook Harvest	preseason harvest planning	agree on run forecasts, shape annual fisheries to be consistent with summer/fall chinook hatchery escapement needs and the Southern U.S. Exploitation rate for Nooksack early chinook		Lummi, Nooksack, WDFW		consistency with co-manager chinook harvest plan submitted to NMFS	harvest		chinook	ongoing											
steelhead harvest	estimate total sport, C&S, and commercial harvest	estimate total sport, subsistence, and commercial harvest of Nooksack wild steelhead		Lummi, Nooksack, WDFW		consistency with co-manager steelhead harvest plan submitted to NMFS	harvest		steelhead	plan submitted to NMFS											
Research, Monitoring, and Evaluation																					
Program	Habitat Monitoring to Support Adaptive Management	Develop and implement habitat monitoring plan		SRST						Planned; developing habitat targets	complete habitat targets; coordinate with RITT	\$ PSAR Capacity Funds	Habitat monitoring	\$100,000	habitat monitoring	\$100,000	yes	\$300,000	PSAR; local funds; partners		
	Modeling of currents in Bellingham Bay under different flow regimes	Use hydrodynamic model to track currents, define potential sea level rise impacts, identify habitat restoration opportunities in the nearshore of Bellingham Bay.	N/A	Bellingham Bay Action Team		Bellingham Bay Pilot Habitat Study	Estuary and adjacent waters		marine ecosystem	Model beta version presented to BBAT.	run model under different condition of wind, tide, and discharge and basic ground truthing of results	\$78,000	run model under different condition of wind, tide, and discharge and basic ground truthing of results		Develop action plan for protecting elements of the critical habitat	\$60,000		\$138,000	BBDDPP; COB; MRC; DOE		
Population monitoring	Nooksack North/Middle Chinook Population Monitoring	Conduct spawn surveys of all suitable habitat at methodology's frequency to count redds and adults, and to collect CWT's, otoliths, DNA, adipose fin status, % spawn, sex, length etc.		Lummi, Nooksack, WDFW		WRIA 1 SRP		population monitoring per existing methodology to estimate escapement and wild and hatchery portions	chinook	record data for all species observed	ongoing		Mass mark funding, other funding that is insufficient								
Population Monitoring	Coded wire tag, Otolith and scale analysis	CWTs read with data submitted to Chinook Technical Committee, otoliths read to determine hatchery release strategy performances, to ID stray origins, and proportions hatchery and natural origin. Scales read for age composition.		WDFW laboratories		WRIA 1 SRP		population monitoring per existing methodology to estimate escapement and wild and hatchery portions	chinook		ongoing		tribes fund spring chin otolith work								
Population Monitoring	Nooksack South Fork chinook population monitoring	Conduct spawn surveys of all suitable habitat at methodology's frequency to count redds and adults, and to collect CWT's, otoliths, DNA, adipose fin status, % spawn, sex, length etc.		Lummi, Nooksack, WDFW		WRIA 1 SRP		population monitoring per existing methodology to estimate escapement and wild and hatchery portions	chinook	record data for all species observed	ongoing		Mass mark funding, other funding that is insufficient								
Population Monitoring	Nooksack South Fork chinook population monitoring	snorkel or seine in Upper S Fk and Upper Skookum Creek for presence of chinook in areas above known distribution		Lummi, Nooksack, WDFW		WRIA 1 SRP		seek explanation for why parent analysis of seined wild juveniles in BY 07 and BY 08 indicate abundances larger than esc. estimates	chinook	record data for all species observed	only discussion		unfunded								
Population Monitoring	mainstem smolt trap	enumerate outmigration of chinook and other species encountered, and estimate overall abundances; initiate juvenile coho mark and recapture effort to improve estimate of smolt productivity from basin;		Lummi, Nooksack, WDFW		WRIA 1 SRP		freshwater productivity	chinook	record data for all species observed	ongoing		operating to extent current funding allows								
Population Monitoring	spawn surveys for winter-run steelhead	As conditions are suitable, conduct aerial flights to count spring steelhead redds in forks and mainstem (WDFW), and survey all accessible tributaries (all)		Lummi, Nooksack, WDFW		WRIA 1 SRP		Attempt to determine population abundance and to develop an escapement methodology with indexes	winter-run steelhead	record data for other species observed like cutthroat	2004 is only year with good aerial surveys, 2009 is only year with nearly full trib. Surveys.		funding uncertain beyond 2010								

Project Information											Project Planning							Project Cost and Sources			
Type	Project Name	Brief Project Description	2010 Priority Reach	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting	Current Project Status	2010	2011	2012	Beyond 2012	Total Project Cost	Est. 2010-2012 Budget	Existing funds (grants and local)	Source of funds			
Population Monitoring	snorkel surveys and hook and line sampling for summer run steelhead in S Fk.	attempt occasional summer snorkel surveys of a sub-set of possible distribution area of summer steelhead in upper S Fk, and hook and line sampling for DNA sampling		Lummi, Nooksack, WDFW		WRIA 1 SRP		data collection to establish baseline for abundance trends	summer-run steelhead	record data for other species observed like chinook and bull trout	one good day of surveys in 2008, but WDFW funding cuts in 2009										
Population Monitoring	establish spawn survey indexes for Nooksack bull trout in each fork			Lummi, Nooksack, WDFW				data collection to establish baseline for abundance trends	bull trout	record data for other species	Thompson Cr. is a good candidate, but no funding										
Population Monitoring	confirm/refine Nooksack core area bull trout sub-populations and establish overall Nooksack bull trout population DNA baseline			Lummi, Nooksack, WDFW				data collection to improve understanding of population	bull trout	record data for other species	no action until funding										
Population Monitoring	Improve coho escapement estimate. Develop methods to use in-river coho catch mark/unmark and hatchery return data to estimate minimum coho escapement			Lummi, Nooksack, WDFW				low cost way to improve understanding of abundance as we have no escapement estimate methodology	coho		preliminary work underway										
Programs, Plans, and Assessments																					
WRIA 1 Watershed Plan and Salmon Recovery Plan Program Implementation and Coordination																					
Non-Capital Project	WRIA 1 Salmon Recovery Plan- updates	Update WRIA 1 SRP using outcomes of adaptive mgmt plan		SRST			program				Conceptual pending implementation of monitoring and adaptive mgmt plan	No activity planned	\$0	Review Status	\$0	TBD		yes			
Non-Capital Project	WRIA 1 Salmon Recovery Plan and WRIA 1 WMP Implementation	Implement WRIA 1 Salmon Recovery Plan and WRIA 1 Watershed Management Plans		SRST; Partners; WMP Staff Team; Boards			program				in-process	ongoing	ongoing	ongoing							
Non-Capital Project	WRIA 1 Instream Flow Negotiations (Nooksack Forks)	Complete instream flow negotiations in Forks of the Nooksack River	yes	WRIA 1 Watershed Team	stream flow	WRIA 1 SRP; WRIA 1 WMP; WRIA 1 Instream Flow Action Plan			Chinook		in-process	complete ISF agreements in early chinook watersheds; identify solutions; outreach	\$100,000	implement solutions in early chinook watersheds; monitoring	\$75,000	continue implementing solutions and monitoring	\$25,000	yes	\$200,000 (estimate subject to change; does not include expenditures prior to 2010)	DOE; WDFW; DOI; WRIA 1 Joint Board	
Non-Capital Project	WRIA 1 Instream Flow Negotiations (Lower Nooksack)	Initiate instream flow negotiations below Nooksack Forks	no	WRIA 1 Watershed Team	stream flow	WRIA 1 SRP; WRIA 1 WMP; WRIA 1 Instream Flow Action Plan	program				negotiations are currently occurring in the Nooksack Forks	initiate process for negotiations in lower Nooksack	\$250,000	continue negotiation process	\$250,000	continue negotiation process	\$250,000	yes	\$750,000 (estimate is subject to change)	TBD	DOE; WDFW; DOI; WRIA 1 Joint Board; Others
Capital	Lower Nooksack Tributaries Wetlands Enhancement	Implement strategies for water storage, ground water augmentation, and infiltration to increase discharge to and augment baseflows	no	TBD	water quality; stream flow		wetlands		fall chinook; steelhead; coho	bull trout; cutthroat; sockeye; chum	Conceptual	No activity planned	\$0	Review Status	TBD	TBD	TBD	yes			
Combination Acquisition/Restoration	Priority restoration and protection acquisitions	Acquire properties with high value habitat for protection and/or restoration		TBD	all	technical assessments; planning documents;	program	acres acquired by habitat type	all	all	On-going, as restoration and protection needs and priorities are identified and as opportunities arise	Work with partners to identify parcels	\$15,000	Negotiate, due diligence, complete three transactions.	\$750,000 for up to three properties	revisit scope/needs	\$15,000 for up to three appraisals for three properties	revisit scope/needs	\$780,000	TBD	
Non-Capital Project	WRIA 1 Long Term Monitoring Plan	Continue implementation of WRIA 1 LTMP (i.e., stream gage network and water quality stations)		WRIA 1 Staff Teams	water quality; stream flow	WRIA 1 WMP; WRIA 1 LTMP	program				prioritizing flow gages	continue monitoring		continue monitoring		continue monitoring		yes		WCPW; USGS; Ecology; EPA; WRIA 1 Joint Board	

Partner Programs

Project Information											Project Planning							Project Cost and Sources			
Type	Project Name	Brief Project Description	2010 Priority Reach	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting	Current Project Status	2010	2011	2012	Beyond 2012	Total Project Cost	Est. 2010-2012 Budget	Existing funds (grants and local)	Source of funds			
Program	Farm Planning, Nutrient Management Planning and Implementation	Ongoing technical assistance for preparing, updating and implementing nutrient management plans, farm plans for berry growers, CPAL, Drainage Improvement		WCD	water quality	watershed plans; critical areas ordinance; shoreline management	program							yes							
Program	Knotweed Survey and Management	Knotweed control in Nooksack River Forks	yes	Weed Board			riparian		coho, steelhead, pinks, other salmonids	priority reach funding for 3 years	control	\$35,250 (2009 SRFB)	control	\$35,250 (2009 SRFB)	control	\$35,250 (2009 SRFB)	yes	\$105,750 (2009 SRFB grant)	\$ 16,750	SRFB, local funds, partner match	
Outreach and Education																					
Non-Capital Project	Salmon Summit	Organize and convene 13th annual summit		SRST; NSEA						scope development	implement and evaluate	\$20,000	revisit	TBD		\$20,000 (2010)		NEP funds; local funds; partners			
Non-Capital Project	Whatcom Salmon website	Enhance and update Whatcom Salmon website		SRST						scope development	implement scope; content updates	\$15,000 (design); \$3,000 (content)	content management/maintenance	\$5,000	content management/maintenance	\$5,000	yes	\$25,000 (capacity funds and match)	TBD	WCPW; EPA; Other	
Non-Capital Project	Salmon Recovery Education and Outreach	Prepare and implement a multi-level outreach strategy		SRST						develop preliminary scoping questions	develop scope; implement priority tasks										

2010- 2012 WRIA 1 SALMON RECOVERY 3-YEAR PLAN

ACTION DESCRIPTIONS

The 2010-2012 WRIA 1 Salmon Recovery 3-Year Plan Action Description document is formatted to align with the projects and programs listed in the 2010-2012 WRIA 1 Salmon Recovery Plan 3-Year Plan spreadsheet.

Geographic Area: Multiple Areas in the Nooksack River Forks and Tributaries

Riparian and Stream Restoration in Nooksack Forks and Tributaries

Type: Restoration

Objective: Improve instream and riparian conditions on the Nooksack River Forks and Tributaries

Partnering with private landowners, NSEA's Washington Conservation Corps (WCC) Crew will implement multiple riparian revegetation and instream habitat enhancement projects. NSEA presently has funding from other sources that provide project administration, oversight, materials and contractor expenses. PSAR funding for the WCC crew will be used for match for existing and future grant funding for this project. 2010 projects include Stavik / Tinling Creek, Hollinsworth / Tinling Creek, Anderson / Black slough, Walker / Coal Creek, Farwell / Middle Fork, Shull / Rothenbuhler Slough, Thompson / Landingstrip Creek Tributary, Ohern / Landingstrip Creek Tributary

Orphan Road Assessment

Type: Assessment/Restoration

Objective: Assess orphan roads in Nooksack River Forks watersheds

This project consists of the following stages: (1) compile information from RMAPs on known orphan roads and identify additional orphan roads from LiDAR and other data sources; (2) work with forest landowners to identify (and remove from further study) those road segments planned for future use; (3) prioritize road segments based on potential for mass wasting and sediment delivery to streams; (4) contract with qualified forest engineer to field survey priority orphaned road segments and develop prescriptions for road abandonment or road drainage improvement/fill removal.

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 Nooksack Forks and its tributaries.

Nooksack River Forks Priority Reach Conservation Plan for Salmon Recovery Habitat Targets

Type: Plan/Program

Develop and implement a plan for prioritizing conservation easements and/or acquisitions for purposes of achieving habitat targets. The initial emphasis is on conservation and/or acquisition

for restoration. Project is contingent upon landowner willingness to sell, allow conservation easements, or allow restoration to proceed.

Geographic Area: South Fork Nooksack

Reaches- Multiple South Fork Reaches

South Fork Strategic Plan

Type: Plan/Program

Develop sequence and priorities for implementing WRIA 1 Salmon Recovery Plan actions in the South Fork watershed. This planning involves hydraulic modeling of South Fork reaches that is currently underway. The tools developed will help guide integrated salmon and flood projects in the South Fork and to support community vision for restoration and future management. A strategic plan will also build on existing geomorphic, hydraulic, and habitat data for key reaches of WRIA 1 where flood management needs are most pressing and where conflicts with restoration objectives are most likely. Existing habitat restoration assessments will be used where available. Reconnaissance level assessments will be prepared in priority reaches, such as between Everson and Deming, pending availability of more detailed reach assessments. Products will be prepared in consultation with the salmon co-managers and Whatcom County River and Flood.

HMZ Reconnection

Type: Restoration

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

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

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

Lower South Fork Joint Transportation/Restoration Planning

Type: Plan/Restoration

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

Lower South Fork Wetland Water Storage Improvement

Type: Restoration

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

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

Benefit: promote water storage along 7.4 km of ditchline and/or stream length to restore an estimated 180 acres of wetland, with associated improvements in wetland functions, such as flood

storage, increased summer baseflow, and decreased summer temperature in the lower South Fork Nooksack River.

Acme to Confluence- River Miles 0-8.5 (Hydraulic Modeling Reaches 1-7)

South Fork Instream Restoration- VanZandt

Type: Restoration

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

This project involves design and construction of stable log jams within a 0.5-mile segment of the lower the South Fork Nooksack River (RM 0.9-1.4) in an area of known cool water influence (mouth of Tawes and Caron Creeks). The objectives of the project are to increase habitat diversity, quantity of deep pools with cover, and availability of temperature refuges, while not increasing flood risk to adjacent landowners.

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

South Fork at Five Cedars

Type: Restoration

This project will restore habitat in the South Fork Nooksack River (RM 2.8-3.2), continuing our strategy of locating log jams at regular intervals along the lower South Fork to improve holding and rearing habitat for South Fork Nooksack early chinook and other salmonids. Log jams will be designed to form pools and provide complex cover.

Benefit: Increase in number of log jams engaged with low flow channel, main channel pools,

South Fork at Sygitowicz

Type: Restoration

This project will restore habitat in a reach that scored 3rd highest among 18 reaches in the South Fork in terms of restoration potential; projects in the other two reaches are already underway. Specifically, this project will construct 7 engineered log jams, stabilize one existing log jam, and remove about 250 feet of riprap in the South Fork Nooksack River near Sygitowicz Creek (RM 3.85-4.0) in order to: (1) Increase habitat diversity (i.e. increase quantity of complex wood cover in low-flow and high-flow channels, increase habitat unit diversity); (2) increase key habitat quantity (increase number and depth of pools for holding and rearing, number of pool tailouts for spawning); and (3) increase availability of summer temperature refugia by encouraging formation of deep, thermally-stratified pools in groundwater discharge and tributary confluence areas. The project is also designed to not significantly increase flood risk to adjacent landowners.

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

South Fork at Hardscrabble

Type: Restoration

This project will design and construct engineered log jams in the South Fork Nooksack Hardscrabble Creek Reach (~RM 5.1-5.4). Log jams will be designed to address factors most limiting SFN early Chinook in the reach, including low habitat diversity and lack of deep holding pools with cover. Structures presented in the conceptual designs are similar to those constructed in the Todd Creek reach downstream in summer 2008; those structures have been successful at promoting scour and formation of deep, thermally stratified pools.

Benefit: Increase in number of log jams engaged with low flow channel, main channel pools

South Fork at Standard Creek

Type: Restoration

This project will construct log jams along the left bank of the South Fork Nooksack River (5.8-6.2) to increase habitat diversity and form deep holding pools with cover. The project will expand earlier work completed along the right bank and associated side channel in 2007.

Benefit: Increase in number of log jams engaged with low flow channel, main channel pools

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

Type: Restoration

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

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

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

Acme to Saxon- River Miles 8.5-13 (Hydraulic Modeling Reaches 8-10)

Acme Early Chinook Restoration

Type: Restoration

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

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

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

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

South Fork Williams Pipeline-Hutchinson Restoration

Type: Restoration

This project will design and implement instream restoration projects along the South Fork Nooksack River from ~RM 9.3-10 to increase habitat diversity and form deep holding pools with cover. There are several flood hazard concerns in the proximity, so this reach presents potential opportunities for flood-salmon integration and education/outreach to the community of the South Fork valley.

Benefit: Increase in number of log jams engaged with low flow channel, main channel pools

Catalyst Floodplain and Wetland Riparian Restoration

Objective: improve fish passage, water storage, and instream, riparian and wetland habitat conditions

- Daylight 1000 feet of Landingstrip Creek tributary
- Make minor channel modifications and install LWD structures along Landingstrip Creek and tributary
- Work with Acme Flood Control District to stabilize South Fork left bank (upstream of Dozer hole) using LWD
- Revegetate 127 acres of riparian and flood plain habitat with appropriate native vegetation on

South Fork Riparian Enhancement Project

Type: Restoration

Objective: Improve riparian conditions on the South Fork Nooksack River and several tributaries.

Plant 34 acres with appropriate native vegetation, and maintain for a period of 3-years.

Improvements in riparian vegetation will benefit multiple Salmonid species and lifestages by providing shade and cover, reducing erosion, filtering inputs from adjacent agricultural lands, and

providing a future source of LWD. This project is related to SRFB Project #07-1828R, which provided funding to acquire the largest of project sites for restoration and conservation.

Saxon Reach Restoration

Type: Restoration

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

- Saxon Reach Restoration Project will include the stabilization/augmentation of existing log jams. The goal of the project is to stabilize the split flow downstream of the bridge and create holding habitat in a cooler section of the reach. The project includes augmenting existing wood accumulations to encourage the stability of the mid-channel island. It is estimated that the project will require landowner participation in setting project objectives and allowable scope of the project. It is likely that the project will need to meet flood protection objectives in the reach, possibly including fish friendly bank protection
- Benefit: 10-13 log jams, 5-10 pools with complex cover, cooler water areas local to the logjams during summer low flow
- Habitat structures along right bank of Nessel's Creek, flowing into the downstream section of the right bank of the project reach

Upper South Fork- River Miles 13 and above (Hydraulic Modeling Reach 11)

Skookum Reach Restoration

Type: Restoration

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

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

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

Cavanaugh Creek Island Project

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

The Cavanaugh Island project is located in the South Fork between RM 16.6-17.0. The project reach includes the greatest length of side channel habitat in the South Fork watershed. The

channel is separated from the main channel by an 11-acre island that is forested with deciduous trees and occasional young conifers. During the low flow period, the side channel is dry, but it receives enough water from the mainstem during high discharge events to maintain a 30-foot wide unvegetated, gravel-dominated bed. The project seeks to improve habitat diversity in the Cavanaugh Creek reach by maintaining year-round flow in the side channel. Flow will be encouraged into the channel by using pilings to create two wood accumulations to draw the thalweg of the main channel toward the head of the island. Riparian restoration on the island will increase the stability of the island, and large wood will be placed in the side channel to impede flow and provide instream cover for rearing juveniles. The project also includes placing three wood structures in the thermal refuge areas associated with Cavanaugh Creek, located at the downstream end of the side channel. These structures will improve habitat quality in known cool water influence areas, including the plumes of two cooler water tributaries and a groundwater seep that enters the channel from terrace bordering the western side of the channel. This is the fourth highest ranked project in the Upper South Fork Nooksack River Habitat Assessment and the second highest ranked project not currently funded.

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

Larson's Floodplain Refuge Project

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

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

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

Fobes Creek Reach Restoration

Type: Restoration

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

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

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

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

Geographic Area: Middle Fork Nooksack

Reaches- Multiple Middle Fork Reaches

Reach Scale Restoration Design

Type: Planning/Restoration

Develop sequence and priorities for implementing actions in the Middle Fork Nooksack. This action will incorporate results of the Middle Fork Reach Assessment and Restoration Planning that is in process.

Middle Fork Reach Assessment and Restoration Planning

Type: Assessment

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

This project will assess limiting habitat conditions and plan restoration projects in the lower Middle Fork Nooksack River from the confluence with the North Fork upstream to the gaging

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

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

Middle Fork Diversion Dam

Type: Restoration

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

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

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

Reaches- Porter

Middle Fork LWD Placement

Type: Restoration

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

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

Reaches- Middle/Lower

Nooksack Middle Fork Instream Phase 2

Type: Restoration

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

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

Geographic Area: North Fork Nooksack

Reaches- Multiple North Fork Reaches

Expand North Fork Assessment

Type: Assessment

Build on existing assessment work for the North Fork watershed. Tributary habitat mapping and scoping of the expanded assessment will occur in 2010.

Reach- Farmhouse

North Fork Farmhouse Reach Restoration

Type: Restoration

This project will design and implement instream restoration throughout the North Fork Nooksack River Farmhouse Reach (RM 46.8-49.4) that will restore historic channel planform (island-braided morphology), habitat diversity, and habitat functions, including stable spawning and rearing habitats for NF/MF Nooksack early chinook. Potential concepts include placement of wood to protect side channels and existing and incipient forest islands. The Farmhouse reach of the North Fork Nooksack River is one of two project reaches among 14 reaches that scored highest in terms of restoration potential in the North Fork Nooksack River. Feasibility and design was funded in 2009 SRFB/PSAR round; construction of phase 1 is expected in summer 2011.

Benefit: increased stability, low flow connectivity of side channels; increased key habitat quantity (primary pools; complex edge, backwater habitat); increased area and age of floodplain forest.

North Fork Channel Island LWD Augmentation- Farm Reach

Type: Restoration

This project will implement a component of the design developed through the *North Fork Farmhouse Reach Restoration* project, namely stabilization and augmentation of existing log jams.

Benefit: increased stability of log jams, increased roughness

Reach- Lone Tree

North Fork Reach Stable Side Channel Restoration- Lone Tree

Type: Restoration

This project will design and implement instream restoration throughout the North Fork Nooksack River Lone Tree Reach. Up to two large and four small logjams on the left bank floodplain of the North Fork Nooksack River at RM 53 will be constructed in order to roughen the floodplain, encourage channel island and side channel development, and encourage flow into a 1.1 km side channel that was the focus of Phase I (07-1802R).

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

Reach- Wildcat

North Fork Wildcat Reach Restoration

Type: Restoration

This project will design and implement instream restoration throughout the North Fork Nooksack River Wildcat Reach (RM 53.3-54.8) that will restore historic channel planform (island-braided morphology), habitat diversity, and habitat functions, including stable spawning and rearing habitats for NF/MF Nooksack early chinook. Potential concepts include placement of wood to protect side channels and existing and incipient forest islands. The Wildcat reach of the North Fork Nooksack River is one of two project reaches among 14 reaches that scored highest in terms of restoration potential in the North Fork Nooksack River. Feasibility and design was funded in 2009 SRFB/PSAR round; construction of phase 1 is expected in summer 2011.

Benefit: increased stability, low flow connectivity of side channels; increased key habitat quantity (primary pools; complex edge, backwater habitat); increased area and age of floodplain forest.

Reach- Canyon

Lower Canyon Creek Phase 2 Design and Restoration

Type: Restoration

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

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

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

Geographic Area: Mainstem Nooksack River and Tributaries

Upper Mainstem

Upper Mainstem Reach Assessment and Restoration Planning

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

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

Objectives include: (1) synthesis of existing information and collection of new data to characterize limiting habitat conditions and habitat-forming processes; (2) identify and prioritize project concepts that address limiting habitat conditions; (3) work with County River and Flood to evaluate project feasibility; and (4) conduct education and outreach to affected landowners. Similar efforts have been completed and/or are underway for 3 reaches that comprise the anadromous extent of the South Fork Nooksack (RM 0-8, 8-14.3, 14.3-31) and for much of the anadromous extent of the North Fork Nooksack (RM 36.5 – 57). Restoration of lower Nooksack River habitats is expected to benefit early chinook oversummer and overwinter rearing.

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

Lower Mainstem

Double Ditch Acquisition and Relocation

Relocate Double Ditch and Benson watercourses between Main and Badger to new corridor to improve habitat and reduce flooding associated with these streams. Project involves purchasing a 5,000' by 200' foot easement between the Benson and Double Ditch Roads, constructing a new channel and restoring the riparian corridor. Estimated three year cost \$1,000,000 which includes the purchase of a 22 acre easement and construction of channel.

Goodwin Road Culvert Replacement (Dale Creek)

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

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

Bay Road Culvert Replacement (California Creek)

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

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

Riparian Restoration Program – Fishtrap Border to Badger Reach

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

Fish Trap Reach Levee Setback

Project involves setting an existing levee back along 2 miles of lower Fish Trap Creek. Project actions include acquiring approximately a 40 acre easement to provide the footprint to accommodate a 200 foot levee setback along the two mile reach of Fish Trap Creek, design and engineering, relocation of the levee, and in channel habitat improvement. Costs during the three year period are estimated to be \$300,000 for acquisition and engineering.

Fish Passage Barrier Removal Program

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

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

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

Flood Gate Modification

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

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

Benefit: restored passage to floodplain habitats through range of flows

Geographic Area: Estuary/Nearshore

Smuggler's Slough Acquisition and Reconnection

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

The goal of this project is to reconnect Smuggler's Slough to the Nooksack River and Lummi Bay. The project includes acquisition and restoration of wetland areas adjacent to the channel that will likely be affected by reconnecting the slough. The reconnection will include removal or alteration of tide gates at multiple locations in the estuary, as well as improving channel connectivity under roads and in ditches. The project will also remove portions of the Lummi Bay seawall to allow tidal inundation and salt marsh habitat in the area between the southern distributary channel of the Lummi River and setback levees formed by Kwina and Hillaire Roads. Riparian planting of the channels will follow design. Fresh water wetlands restoration will be accomplished in later project phases. It is estimated that the initial project will cost \$2,100,000 over four years with the first phase of property acquisition and design to take place in 2007 at a cost of \$300,000. The planning of the project will require landowner participation in setting project objectives and allowable scope of work.

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

Slater Road Elevation

Objective : Construct new elevated road to cross the left bank flood plain east of the Nooksack river crossing. Elevating roadway is prerequisite to removal of levee south Slater Road and the reconnection of 600 acres of floodplain.

The project supports continuing efforts of the WDFW and Whatcom County to reduce flood hazards and restore critical off channel and transitional riverine habitats. The project represents a component of the third phase of the earlier Marietta Slough restoration effort which purchased the fee simple title to 600 acres of flood plain wetland habitat, removed four homes, and began the process of restoring wetland and riparian habitats on the acreage. The long term objective of the Marietta slough project is to modify sections of existing levees to reconnect the floodplain with the tidal influenced river. Slater road, which provides primary access to the Lummi Reservation, two refineries and Alco aluminum is prone to flooding and frequently is closed. Hydraulic modeling indicated flooding of Slater road could be exacerbated with levee modification. Given the past history of road closures and the desire to re-connect the floodplain immediately downstream of Slater road, the elevation of the road way is a critical component to achieving the long term objective of modifying the levee to reconnect the 600 acres of floodplain with the Nooksack River.

Benefit: The project is designed and permitted. Completing the elevation of the roadway will remove a critical obstacle to the modification/removal of levees disconnecting 600 acres of wetland and floodplain from the Nooksack River.

Cost \$9,000,000

Marietta Acquisition

Objective: Purchase 8-10 flood prone properties located in the lower tidal reach of the Nooksack River as a prerequisite to modifying Nooksack River levees to reconnect 600 acres of tidal influenced flood plain and wetlands habitats.

The project supports continuing efforts of the WDFW and Whatcom County to reduce flood hazards and restore critical off channel and transitional riverine habitats. The project represents a component of the third phase of the earlier Marietta Slough restoration effort which purchased the fee simple title to 600 acres of flood plain wetland habitat, removed four homes, and began the process of restoring wetland and riparian habitats on the acreage. The long term objective of the Marietta slough project is to modify sections of existing levees to reconnect the floodplain with the tidal influenced river. The town site of Marietta routinely floods generating repetitive flood damage losses. Hydraulic modeling indicated flooding in the Marietta town site could be exacerbated with levee modification. Given the past history of flood loss and the desire to re-connect the floodplain immediately upstream of Marietta, the removal of residences from the site is a prudent use of public funds

Benefit: Purchase of flood prone properties reducing future flood loss claims and the removal of a major obstacle to the restoration of 600 acres of tidally influence flood plain.

Cost \$800,000

Coastal Stream and Marine Shoreline Riparian Assessment and Restoration Prioritization

Objective: Inventory riparian condition of coastal streams and marine shoreline.

Complete inventory for Dakota, California, Terrell, marine border to Pt. Whitehorn in 2010, and inventory remainder of coastal streams and marine shoreline in 2011. Inventories will be used to identify restoration priority areas and projects.

Complete WRIA 1 Nearshore Habitat Prioritization with Salmon Overlay

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

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

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

Bellingham Bay Pocket Estuaries Design, Restoration and Creation

Type: Restoration

Objective: Restore historic estuarine habitat, create new estuarine habitat, improve water quality, restore tidal and saltwater influence for improved utilization and productivity of early Chinook and steelhead.

The City of Bellingham will partner with multiple landowners to implement pocket estuary restoration projects within Bellingham Bay. Projects will likely include riparian restoration, LWD placement, removal of fish barriers, increased shoreline length, increased hydrologic connectivity, and increased salt marsh area. These actions will increase habitat availability, habitat function, habitat diversity and habitat connectivity for Nooksack early chinook and steelhead.

Chinook Use Assessment of Bellingham Bay and Adjacent Areas

Type: Assessment

Objective: Identify distribution and abundance of early Chinook in Bellingham Bay.

Compile relevant existing data and studies such as beach seine and open water salmonid surveys, implement a two year program to identify areas and habitat types most frequented by juvenile Chinook. The project would regularly sample on shore and off shore habitats from Chuckanut Bay to Portage Island, 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

Hatchery/Harvest

South Fork Nooksack Chinook Captive Brood Recovery Program

Type: Captive Brood Hatchery Population Recovery Program

Objective: Increase population abundance in South Fork, through captive brood rearing, while maintaining good genetic diversity. Ultimately, increase natural origin population abundances through having returns spawn naturally.

Continue seining juvenile Chinook for a complete brood cycle, run DNA for best fit assignment to the three stock baselines. Retain the South Fork Chinook population juveniles (1000 per year), and transfer the individuals that have been held temporarily at Skookum Hatchery to Kendall Hatchery where approximately half rear to maturity in freshwater. The other half are transferred from Kendall Hatchery to NMFS's Manchester Research Facility in Port Orchard for salt water rearing to maturity. Pit tag individuals and associate the tags with the individual DNA. Transfer ripening adults back to Skookum Hatchery for spawning, with pair mating input from geneticists. Incubate eggs, and raise offspring for traditional sub-yearling release after coded wire tag marking to the South Fork. Release adequate numbers from the hatchery to obtain broodstock

upon return, with the remainder off-station to increase the portion that spawn naturally, to ultimately increase population natural origin abundances. After captive rearing a full brood cycle to maturity, transition to a Skookum Hatchery traditional population rebuilding program similar to North Fork Nooksack Chinook program at Kendall Hatchery. Coded wire tag the juveniles released to the river.

Program requires facility upgrades at Skookum, Kendall and Manchester hatcheries, more water at Skookum Hatchery, and will likely require some coho that are reared at Skookum Hatchery to be reared at Kendall Hatchery to have adequate water. An off-station de-stressing release site in upper river will eventually be needed too, as will improving conditions for adult Chinook attraction back to the hatchery when released juveniles return as adults.

Benefits: Increase population abundances with good genetic and life history representation from the population, while improving habitat improves population productivity through better land management and restoration actions. The cwt data will eventually lead to improved understanding of South Fork Chinook migration and river entry timing.

Skookum Creek Hatchery Water Supply

Type: Skookum Hatchery water supply

Objective: To insure a steady supply of water 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 backups to ensure the safety of the chinook supplementation program while meeting 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 improve water intake, minimize the transport of sediment into the hatchery, to meet appropriate screening criteria and to 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 rebuilding program as well as meeting other hatchery objectives. Project requires landowner willingness to proceed. If adequate water cannot be located, some coho rearing of Lummi Bay releases may shift to Kendall Hatchery.

Benefit: Stable cool, clean water supply sufficient to support Skookum Chinook population rebuilding program needs, as well as other hatchery needs.

North/Middle Fork chinook population rebuilding program

Type: Hatchery Population rebuilding program

Objective: Increase population natural origin abundances by having hatchery returns spawn naturally in a manner that generally distributes them well, within the spawning habitat for this population. Release 150,000 into the North Fork at the hatchery, 200,000 into the Middle Fork, and 400,000 double index coded wire tag Chinook into the upper North Fork consistent with the Pacific Salmon Treaty spring chinook harvest management indicator stock criteria. Upper North Fork and Middle Fork releases need de-stressing acclimation sites where fish can be held a few days to maximize survival.

Benefits: Increase population natural origin abundances while improving population productivity through better land management and restoration actions. Provide data for PSC Chinook Technical Committee use on exploitation rates.

Evaluate stray contributions of Samish Hatchery origin summer/fall Chinook releases

Type: Hatchery evaluation program

Objective: Collect otoliths from hatchery summer/fall chinook, read them, and evaluate the origin and distribution of hatchery summer/fall Chinook on Nooksack spawning grounds, with emphasis in South Fork and Bertrand Creek.

All summer/fall Chinook originating from Samish Hatchery have one or more unique marks. The largest release is to the Samish River, and it has a unique otolith mark. The releases to Lummi Bay and into Bertrand Creek (a lower Nooksack tributary) each also have unique otolith marks. All of these are also adipose fin clipped, except for 50% of the coded wire tag (cwt) release into the Samish River. The Bertrand Creek release was shifted from the lower Nooksack River beginning in 2008, in hopes of having them home to Bertrand Creek as adults. Bertrand Creek is not within either Nooksack spring Chinook population's spawning area. In 2008 the release was un-acclimated (meaning directly into lower Bertrand Creek), and in 2009 the release was held for two weeks in the creek, prior to release, to try to increasing their imprinting on that release location so they home back as adults.

In addition to the spring Chinook surveys, later timed Chinook surveys (after Oct. 7th) can collect otoliths from all adipose fin clipped and/or cwt spawned out Chinook, and have these read by the WDFW otolith laboratory. The laboratory will determine the origins of the carcasses, which can help evaluate the contribution rates into the Nooksack spring Chinook spawning areas from these releases, and also whether the releases into Bertrand Creek are mostly homing to that non-spring Chinook tributary.

Benefits: Potentially reduce stray contributions to early Chinook spawning areas. Determine the respective stray contributions from various releases to the South Fork and Bertrand Creek. Test the hypothesis that shifting the release to Bertrand Creek results in homing back to that creek. Results may take a few years to be informative.

Shift the former steelhead hatchery releases to Samish River to Whatcom Creek

Type: Hatchery steelhead program adjustment.

Objective: Have non-native steelhead returns recruit back to a hatchery rack, instead of spawning naturally with wild steelhead. Until 2008, the Samish River received 35,000 Chambers Creek origin steelhead as an off-station release transferred from Kendall Hatchery. Since these did not

have the ability to recruit back to a hatchery rack, uncaught returns spawned naturally. To reduce competition and the potential for cross breeding with native steelhead, this release was shifted to Whatcom Creek, and the hatchery on the lower creek will collect adults that return as a secondary broodstock for Kendall Creek Hatchery.

Benefit: Reduce non-native hatchery steelhead spawning in the Samish River, creating a wild steelhead zone for a relatively strong steelhead river with relatively early native spawning due to its low elevation setting. This reduces the risk of interbreeding between Samish steelhead and Chambers Creek origin steelhead.

Diversify and maintain Washington's sport kokanee program after loss of certified pathogen free water status when the Middle Fork diversion dam passage is restored

Type: Hatchery sport program

Objective: Diversify and maintain hatchery sport kokanee releases to Washington lakes. The fisheries co-manager disease policy requires disease testing of eggs and fish that are transferred out of the respective fish health zones and not raised on certified pathogen free water. This is very expensive, as this has been the traditional source for most kokanee released in Washington lakes. While the risk of virus transfer to Lake Whatcom through the 9 mile long pipeline from the Middle Fork is low, restored anadromous access to the Middle Fork will change the pathogen free water status of Lake Whatcom.

WDFW has begun a captive brood kokanee program near Spokane, where 14,000 kokanee are being raised to adulthood on certified pathogen free water, in anticipation of the changed water status in Lake Whatcom. The current plan is to spawn these fish when ripe, raise offspring and release them into 37 lakes, in anticipation of Lake Whatcom kokanee not being available.

Benefit: Maintain an important recreational fishery while restoring anadromous use to the Middle Fork.

Monitor Southern US Chinook harvest to show consistency in meeting harvest commitments to not impede recovery

Type: Chinook harvest monitoring

Objective: Monitor and assess all sport, commercial, and ceremonial and subsistence fisheries to collect data essential to determining the exploitation rates on the Nooksack early Chinook management unit. Monitor and sample all fisheries, including mark-selective fisheries to estimate total mortality (including non-retention mortality), and to detect and collect coded wire tags. Meet as co-managers to discuss cwt inputs to WDFW, for expansion by the Chinook Technical Committee. Sample the limited in-river ceremonial and subsistence fisheries for coded wire tags, otoliths, scales, adipose fin clips, and DNA of probable wild Chinook to estimate hatchery and wild compositions of the catch. Compile data for inclusion in Puget Sound post-season harvest report to NOAA Fisheries.

Benefit: Show consistency with Southern US exploitation rate ceiling for Nooksack early Chinook (North/Middle Fork and South Fork Chinook) using Kendall double index coded wire tag program and other data.

Agree on pre-season Chinook forecasts for Nooksack early Chinook and summer/fall Chinook, and establish seasons consistent with these

Type: Chinook pre-season fisheries planning

Objective: Agree on Chinook preseason forecasts per Puget Sound Salmon Management Plan criteria, shape fisheries consistent with summer/fall chinook hatchery escapement needs, and the Southern US exploitation rate ceilings for Nooksack early Chinook.

Benefit: Be consistent with harvest commitments to Chinook recovery, and with gaining needed escapements to hatcheries.

Monitor Nooksack wild steelhead harvests in sport, commercial and subsistence fisheries adequately to Steelhead harvest

Type: Steelhead harvest

Objective: Monitor sport, commercial, and subsistence fisheries adequately to estimate and report wild Nooksack steelhead harvest to show consistency with co-manager steelhead harvest plan commitments.

Benefit: While recent steelhead harvest was not considered a significant factor in the threatened species listing, show consistency with the harvest commitment to recovery, while habitat protection and improvements result in reversing the decline in population productivity.

Research, Monitoring, and Evaluation

Habitat Monitoring to Support Adaptive Management

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

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

Population Monitoring

Nooksack South Fork and North/Middle Fork Chinook Population Monitoring

Type: Chinook population monitoring

Objective: Conduct spawn surveys of all suitable habitat for the two populations at the two methodology frequencies to count redds and adults, and to collect CWT's, otoliths, DNA, adipose fin status, scales, % spawned, sex, and fork length. After analysis use this data to estimate escapements. Funding constraints and weather limit the ability to completely count all redds, live and dead Chinook in all accessible habitats. Regardless, these surveys, and the coded wire tags and other data collected enable us to estimate total early Chinook abundances for the two populations and hatchery and natural origin contributions to the escapements. WDFW laboratories read the scales for age and life history information, otoliths, and microsatellite DNA from natural origin South Fork Chinook. These data inform the escapements and natural origin abundances. For the South Fork population, explore unsurveyed areas above partial barriers in the Upper South Fork and Skookum Creek above known Chinook use. This is to seek an explanation for the microsatellite DNA parent analysis results of 2007 and 2008 brood year seined juveniles, where the number of parents was larger than the total escapement estimates.

Benefit: Monitor population status of these two high risk populations that are critical for recovery, and collect essential coded wire tags for use by the PSC Chinook Technical Committee. Ultimately see whether population productivity is changing in response to habitat shifts.

Mainstem smolt trap population monitoring

Type: Population monitoring

Objective: Enumerate outmigration of chinook and other species encountered, and estimate overall abundances; initiate juvenile coho mark and recapture effort to improve estimate of smolt productivity from basin.

Benefit: Population timing and long-term trend information.

Spawn surveys for Nooksack wild winter-run steelhead, and occasional summer snorkel surveys for summer-run steelhead

Type: Steelhead population monitoring

Objective: As conditions are suitable, conduct aerial spring flights to count spring steelhead redds in forks and mainstem (WDFW), and survey all accessible tributaries (all). 2004 is the only year when information was available for an informal abundance estimate of total Nooksack wild winter-run steelhead, as viewing conditions for aerial flights were comparatively good that spring. In 2009 aerial surveys were not suitable to estimate spawning abundances in the forks and mainstem, but fairly complete tributary spawn survey data was collected. The more recent tributary data can be used to evaluate the tributary indexes and expansions proposed in the informal methodology. Optimally we will refine an escapement methodology for the tributary portion of the population using the recent comprehensive surveys to establish representative indexes.

Since summer-run steelhead spawn areas of the South Fork that are inaccessible in late winter, there is little chance that escapement surveys can occur. While there is not dedicated funding, summer snorkeling of portions of the South Fork for adult counts could eventually lead to data that can be used to establish population trends. Additional limited hook and line sampling to collect tissues on summer-runs and other important species including bull trout can improve the

understanding of population genetics. Collecting steelhead tissues as opportunities arise will increase temporal and spatial representation of Nooksack steelhead, adding to initial co-manager 2009 collections that have had DNA analysis.

Benefits: Abundance and trend information for Nooksack wild steelhead, and better understanding of Nooksack population genetics.

Establish bull trout Nooksack spawn survey index areas

Type: Bull trout population monitoring

Objective: Establish spawn survey indexes for Nooksack bull trout in each fork, as there are no indexes in the Nooksack core area. All accessible areas of Thompson Creek is a good first index for the North Fork, as adult counts have been highest in this creek. No funding to date.

Benefit: Data collection to establish baseline for abundance trends

Microsatellite DNA sampling of Nooksack bull trout core area local populations

Type: Bull trout population monitoring

Objective: In the draft Bull Trout Recovery Plan for the Puget Sound Management Unit (USFWS 2004) and the WRIA 1 SRP (2005), the Nooksack core population is comprised of 10 proposed local populations, representing the smallest interactive reproductive groups. We neither have a general genetics baseline representing the whole core area, nor individual baselines testing the underlying hypotheses for the local populations. Representative tissue sampling within these local areas, DNA analysis and evaluation is needed to better our understanding.

Benefit: Refine our understanding of Nooksack core area bull trout, and the local population groupings within it.

Improve coho escapement estimates

Type: Coho population monitoring

Objective: Improve the existing crude proposed Nooksack coho escapement estimate methodology by developing an independent estimate of minimum natural abundance. Sample the in-river coho fishery for percentages that are natural and hatchery origin, and use the hatchery return data from the same years to estimate minimum natural coho escapements. An assumption is that all hatchery coho not caught in commercial or sport fisheries return to the hatcheries and are enumerated. The total hatchery returns are then expanded by the proportion natural fish in the sampled fishery to estimate total natural abundance, assuming the same migration timing. While the marked Kendall Hatchery coho releases ended in 2008, returning adults to Kendall Creek will still be enumerated at the Kendall ponds before being passed up Kendall Creek. All Skookum and Lummi Bay coho smolts are adipose fin clipped.

Benefit: A low cost way to improve our understanding of minimum natural coho abundance, as our proposed methodology is based on only a handful of indexes that were never based on a study determining their respective contributions toward total abundance.

Programs, Plans, and Assessments

WRIA 1 Watershed Plan/ Salmon Recovery Plan Program Implementation and Coordination

WRIA 1 Salmon Recovery Plan- Updates

This task is to prepare a schedule and initiate updates to the WRIA 1 Salmon Recovery Plan. The task is pending completion of the WRIA 1 Adaptive Management Plan. Updates anticipated include projects completed and adjustments to the restoration strategy to reflect information gained through completed assessments and strategic plans.

Salmon Recovery Plan and Watershed Management Plan Implementation

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

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

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

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

WRIA 1 Instream Flow Negotiations

Negotiations between affected parties, water rights holders, local governments, tribal governments, and the Washington Departments of Ecology and Fish and Wildlife are underway as part of the WRIA 1 Watershed Management Project. The objective of the negotiations is to determine a management system for water use that supports both instream ecological functions and out-of-stream uses such as agricultural production municipal water supply, and commercial and industrial uses. Initially, the negotiations were started in Bertrand and Middle Fork watersheds as pilot areas. Under the confidentiality agreement and negotiation settlement

framework, the geographic area changed to the Nooksack Forks. Once completed, the negotiation effort will be initiated for the Nooksack River below the Forks.

Benefit: instream flows, flow management regime established for the Nooksack Forks; negotiations for Nooksack below the Forks initiated

Lower Nooksack Tributaries Wetlands Enhancement

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

Benefit: increased instream flow in lower Nooksack River tributaries

WRIA 1 Long Term Monitoring Plan

The purpose of the WRIA 1 program is to establish and maintain an ambient monitoring program sufficient to assess current water quality, water quantity, and fish habitat conditions and trends and to protect beneficial uses in WRIA 1. The status of the WRIA 1 LTMP is that the water quality and water quantity elements that focus on an over-arching program to achieve the goals of the WRIA 1 Watershed Management Project are completed. The habitat monitoring element is pending completion of the Adaptive Management and Monitoring Program for Salmon Recovery. Once completed, the habitat monitoring will be incorporated into the WRIA 1 LTMP.

Partner Programs

Knotweed Survey and Management

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

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

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

Education and Outreach

Salmon Summit

This task is to plan and convene a WRIA 1 Salmon Summit to coordinate and share information relevant to salmon recovery with sponsors, technical staff, community and regional scientists, decision-makers, legislators, and other interested parties and community members. A planning committee that includes the WRIA 1 Salmon Recovery Staff Team members will work with NSEA event coordinator on the Summit program including theme, presenters, and topics, and organizational logistics (e.g., venue, registration, sponsors)

Whatcom Salmon Website

The Whatcom Salmon website (<http://whatcomsalmon.whatcomcounty.org>) was designed in 2003 to support dissemination of information about local, regional, and federal salmon recovery plans, programs, and actions. The platform the site was built on is not conducive to providing ongoing updates and does not provide flexibility for staff to modify the site's pages to accommodate changing information needs. The redesigned website will be updated and maintained on a regular schedule to serve as a community outreach tool to inform and receive feedback on salmon recovery projects and actions as they are being planned and implemented.

Salmon Recovery Education and Outreach

This action is to develop and implement a multi-level outreach strategy for public outreach and information. The strategy will identify different target audiences and approaches for reaching those audiences with information on salmon recovery efforts. The strategy will incorporate and support partners currently involved in community education and outreach programs. An initial step in developing the strategy will be a brief survey to gauge community knowledge of the Salmon Recovery Plan and associated actions.