

WRIA 1 SALMON RECOVERY BOARD

2012-2014 WRIA 1 SALMON RECOVERY 3-YEAR PROJECT PLAN

Format of Narrative

The format for the 2012-2014 WRIA 1 Salmon Recovery 3-Year Project Plan narrative includes three sections: (1) overview of the WRIA 1 Watershed Recovery Strategy and WRIA 1 Near-Term Actions; (2) summary of the 2012-2014 WRIA 1 3-Year Project Plan; and (3) responses to questions posed in 2012 Three Year Work Plan/Program Guidelines. The overview of the WRIA 1 Watershed Recovery Strategy and WRIA 1 Near-Term Actions are included because they summarize the 10 year objectives for the *WRIA 1 Salmonid Recovery Plan* and provide context for responses to the questions posed by the Puget Sound Partnership in the 2012 guidelines.

Overview of WRIA 1 Watershed Restoration Strategy and Near-Term Actions

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 the Puget Sound Evolutionarily Significant Unit (ESU) for Chinook salmon.

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.

WRIA 1 Near-Term Actions

The WRIA 1 Near-Term Actions from the *WRIA 1 Salmonid Recovery Plan* that address the priorities presented above include:

1. Implement North Fork/Middle Fork and South Fork Chinook Recovery Hatchery programs
2. Implement harvest and hatchery management plans
3. Restore anadromous fish passage at early chinook barriers (Middle Fork diversion dam and Canyon Creek)
4. Habitat restoration and protection in the Forks, mainstem Nooksack River, and major early chinook tributaries
5. Habitat protection and restoration in estuarine and nearshore areas
6. Integrate salmon recovery needs into floodplain management planning
7. Habitat protection through local land use regulations
8. Setting and managing instream flows
9. Restore functioning riparian and water quality conditions and reconnect isolated habitats in lower mainstem tributaries and independent tributaries in WRIA 1

Expected results of implementing the near-term actions were modeled using through Ecosystem Diagnosis and Treatment (EDT) when the WRIA 1 Salmon Restoration Strategy was prepared, and are presented in Table 2. The results represent the long-term benefits of actions implemented in a 10-year time frame, rather than the expected population status after 10 years.

Table 2. Estimated benefits of near-term actions 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%

2011-2013 WRIA 1 Salmon Recovery 3-Year Project Plan

Overview of 3-Year Project Plan

The projects, plans, and programs associated with the *2012-2014 WRIA 1 3-Year Plan* are organized in the associated spreadsheet under six worksheet tabs. The worksheet tabs generally correlate to the WRIA 1 Salmon Recovery Plan near-term actions from the *WRIA 1 Salmonid Recovery Plan*. The primary focus of the WRIA 1 Salmon Recovery Board (Lead Entity) and staff is on the actions that provide the greatest benefit to listed species, which are shown on the “Habitat Action- Chinook Priority”, “Hatchery-Harvest”, and “Population Monitoring” tabs of the spreadsheet. The “Habitat Action- Other Species” and “Estuary and Nearshore” tabs are primarily implemented by WRIA 1 salmon partners and are not the focus of the Lead Entity. Although the actions on those worksheets are not currently priorities for recovering chinook and are not the focus of the lead entity, they are included in the 2012-2014 WRIA 1 3-year project plan because they play an important role in a

county-wide salmon program¹. As the Whatcom Local Integrating Organization (LIO) implementing the local and regional ecosystem restoration and protection actions evolves, actions on these tabs may transition to a Whatcom LIO project plans and lists. Over time, as conditions in the Forks improve, and/or as the scientific basis of local salmon recovery efforts is refined, the relative importance of these areas to chinook may shift.

(1) Habitat Actions-Chinook Priority

Addresses *WRIA 1 Salmonid Recovery Plan* near term actions: a) habitat restoration and protection in the Forks, upper Mainstem Nooksack, and major early chinook tributaries; and b) restore anadromous fish passage at early chinook barriers (Middle Fork diversion dam and Canyon Creek).

(2) Habitat Actions- Other Species

Addresses *WRIA 1 Salmonid Recovery Plan* near term actions: a) habitat restoration in lower Mainstem Nooksack and associated tributaries; and b) restore functioning riparian and water quality conditions and reconnect isolated habitats in lower mainstem tributaries and independent tributaries in WRIA 1

(3) Estuary and Nearshore

Addresses *WRIA 1 Salmonid Recovery Plan* near term action: habitat protection and restoration in estuarine and nearshore areas

(4) Hatchery-Harvest

Addresses *WRIA 1 Salmonid Recovery Plan* near term action: a) implement North Fork/Middle Fork and South Fork Chinook recovery/rebuilding hatchery programs; and b) implement harvest and hatchery management plans

(5) Population Monitoring-Research

Supports the hatchery and harvest program actions and overall plan effectiveness by monitoring salmonid populations

(6) Programs

Addresses *WRIA 1 Salmonid Recovery Plan* near term actions: a) integrate salmon recovery needs into floodplain management planning; b) habitat protection through local land use regulations; and c) setting and managing instream flows. This is also where the lead entity program activities are identified. One of the challenges of implementing the programmatic actions are the limited resources available to address these topics. The programmatic actions deal with policies, ordinances, and regulations- on multiple levels (federal, state, local) - that may not be entirely consistent with the processes required to restore ecosystem processes essential to production of properly functioning chinook habitat. The policy discussions that are necessary to further these actions require staff resources among and across the affected departments.

An overview of the 2012-2014 WRIA 1 3-Year Project Plan worksheet tab and status of key actions is presented below.

¹ The Puget Sound Partnership and Recovery Implementation Technical Team review of the 2011-2013 WRIA 1 3-Year Project Program expressed concern that efforts including restoration of lower river floodplains and tributaries; restoration of estuary and nearshore; and integration of salmon recovery planning with other planning or regulatory programs may be taking funding and local capacity away from the higher priority actions directed at the listed Chinook populations. The clarifying language in this narrative is added in an effort to more clearly explain that the WRIA 1 Lead Entity priority remains on addressing Chinook in the priority areas of the Nooksack by focusing both staff and salmon funding on projects that have the highest benefit to chinook.

Habitat Actions- Chinook Priority

This tab of the 2012-2014 WRIA 1 Project Plan focuses on habitat actions in the priority areas for recovery of North Fork/Middle Fork and South Fork early Chinook. All habitat actions on this worksheet have chinook as the primary species benefitting. Because recovery of chinook is the WRIA 1 salmon recovery priority, and restoration of the Forks to properly functioning conditions is expected to have the greatest impact on Nooksack early chinook, the vast majority of habitat actions in process or planned are in the Nooksack Forks.

The prioritization included in the worksheet column labeled *2012 Restoration Priority* reflects outcomes of the February 23, 2012 Project Development technical workshop. The goal of the workshop was to identify and prioritize appropriate restoration strategies by reach, and to identify whether opportunities exist to implement each strategy. The workshop outcomes are used in preparing the SRFB grant application letters of intent to direct project sponsors to priority projects that benefit Chinook recovery. Providing the workshop information in the form of the 2012 Project Matrix Strategy and associated reach map to potential grant applicants (Attachment A) ensures that salmon funds are directed to those projects that help further the WRIA 1 recovery goals.

Following is a summary of the 2012-2014 WRIA 1 actions benefitting chinook as the primary species:

Multiple Geographic Areas

There are a number of actions included in the 2012-2014 WRIA 1 3-Year Project Plan applicable to multiple priority reaches within the Nooksack River Forks including:

- Implementing a strategic plan for acquiring and/or conserving land for purposes of achieving habitat targets continues to be part of the 3-Year Project Plan. Implementation of these strategies will be contingent on landowner willingness and available funding. The *2012-2014 WRIA 1 3-Year Project Plan* includes placeholders for acquisition of parcels or conservation easements as necessary for salmon recovery purposes.
- Orphan Road Assessment and Implementation- The 2012-2014 WRIA 1 3-Year Project Plan includes a placeholder to implement prescriptions identified in an orphaned road assessment for a pilot area of the South Fork watershed, and also to expand assessment to other priority areas.

South Fork Nooksack

- The lower South Fork Nooksack 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 in the upper South Fork than in the lower South Fork, which is dominated by agricultural and rural land use.
- 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: (a) creating thermal refugia, i.e. deep, complex, pools in areas of cool groundwater influence expected to promote thermal stratification, and (b) reducing reach average temperature by restoring riparian areas and wetlands, and by promoting hyporheic exchange through increased wood loading; (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 is believed to be under-estimated in EDI) by removal/setback of levees and/or bank hardening to improve egg-to-alevin survival.

- Because of the conflict between current land use and the necessary processes to restore habitat, hydraulic modeling and geomorphic assessment are integrated into the project design to balance the need to not increase flood risk to adjacent landowners, while also complementing, and not precluding, long term restoration plan options.
- Project effectiveness monitoring completed in 2011 in the South Fork is being used by sponsors to inform project proposals for 2012 SRFB grant round.

North Fork Nooksack

- The North Fork between the Middle Fork confluence (RM 40.5) and Glacier Creek (RM 57.6) is the primary focus of restoration for the NF/MF population. Most projects have been concentrated between Kendall (RM 45.9) and Canyon Creeks (RM 55).
- The projects underway or currently planned in the North Fork address the following limiting factors: (1) channel stability, through log jam placement within and throughout the historically active channel to restore channel roughness and promote the development of the stable spawning habitats, such as side channels and stable forested islands; and (2) key habitat quantity, through reconnection of abandoned side channels and log jam placement to form deep, complex pools and complex edge habitat.
- Lower Canyon Creek Phase 2 is planned for construction to address a fish passage barrier and hydraulic constraints on habitat-forming processes and functions due to a flood management levee constructed in 1990.

Middle Fork Nooksack

- The Lummi Nation Natural Resources Department completed a *Middle Fork Habitat Report*, September 30, 2011. The report includes preliminary recommendations for projects and sequencing, and preliminary designs for a project in the Middle Fork was completed. The 2012 3-year project plan includes further development and vetting of the restoration strategy for the Middle Fork.
- The 2012 Project Strategy Matrix for the Middle Fork reflect information from the Lummi Natural Resources September 30th report, and outcomes of the February 23, 2012 project development workshop. Projects on the 2012-2014 WRIA 1 3-Year Work Plan reflect the February 23rd workshop outcomes.
- The status of the Middle Fork Diversion Dam project is outlined in the action description document that accompanies the *2012-2014 WRIA 1 3-Year Project Plan*. Generally, design and site analysis has been completed for three fish passage alternatives with the preferred option being a new intake design, utilizing a siphon and the existing tunnel, and removal of the dam. Funding is needed to further final design and construction. In December 2010, the WRIA 1 Management Team submitted the Middle Fork Diversion Dam to the Puget Sound Partnership to consider as a project of regional significance because the investment required to complete the domestic water distribution infrastructure and the removal of the dam exceed funding that may be available through salmon funding avenues. In February 2012 the City of Bellingham submitted the project to the Puget Sound Partnership as part of a job creation package of capital projects for funding consideration by the Washington State Legislature.

Upper Mainstem Nooksack

- The Upper Mainstem Reach Assessment and Restoration Planning remains on the 2012-2014 WRIA 1 3-Year Project Plan as a proposed project. Implementation is contingent on funding and availability of staff resources to either conduct the assessment or to scope and contract the work.

Habitat Actions- Other Species

This worksheet tab of the 2012-2014 WRIA 1 3-Year Project Plan represents habitat actions outside of the Nooksack Forks that are important to other WRIA 1 salmonids. Habitat actions for other species are primarily undertaken by the RFEG and other salmon partners and play an important role in the overall WRIA 1 salmon recovery program.² They are not prioritized because the focus of the WRIA 1 lead entity is on recovery of North Fork/Middle Fork and South Fork Chinook (worksheet “Habitat Actions- Chinook Priority”). Restoration projects on this worksheet include:

- Limited small-scale restoration projects (piling jams) and larger projects, such as setback of tributary levees where they cross the Nooksack floodplain, 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, flood refuge habitat).
- Fish passage barrier removal projects to address high priority fish passage barriers in the lower Nooksack watersheds. The 2006 *Whatcom County Fish Passage Barrier Inventory* is a source for identifying project priorities. Whatcom County compiled data from local partners to document barriers corrected since the original inventory; those data were submitted to WDFW for inclusion in the statewide barrier database. A maintenance update to the 2006 inventory was initiated in 2011 by Whatcom County Public Works and will be completed contingent on available staff resources.
- 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, Drayton Harbor Shellfish District, Fishtrap Watershed Improvement District) along lower mainstem tributaries and coastal independent tributaries.

Estuary and Nearshore

The Estuary and Nearshore worksheet of the *2012-2014 WRIA 1 3-Year Project Plan* primary includes projects planned by the City of Bellingham, Whatcom County, Marine Resources Committee, and Port of Bellingham, which are partners in the overall WRIA 1 salmon recovery effort. The Lead Entity policy for the past several years and remains for 2012 is that the estuary and nearshore are not priority areas for SRFB funding because they are not priority areas for Chinook recovery. Although projects in the Estuary and Nearshore are not priority areas for chinook recovery, they may play an important role in restoring estuary processes.³ :

- Estuarine and Marine Nearshore Needs Assessment and Prioritization action to synthesize existing data, identify and prioritize data gaps, and identify and prioritize protection, restoration,

² The RITT expressed concern that inclusion of restoration projects that are not a priority for the Lead Entity may be diverting capacity from projects that are a priority for Chinook recovery (refer to footnote 1). This explanation is intended to clarify that the Lead Entity staff and funding focus is on priority projects benefiting Chinook, and that the other projects are included because they are important in the overall salmon recovery program for WRIA 1.

³ Refer to footnotes 1 and 2.

and enhancement actions. A consultant was selected, and deliverables are expected by the end of June, although time and budget constraints may limit the ability to meet all project objectives.

- As a separate effort, Tribal staff has also made plans to work with RITT Liaison to revisit the hypotheses that formed the technical basis of the Recovery Plan and plan research to test those hypotheses.
- 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.
- Lower Nooksack River Restoration including acquisition of floodplain areas. This project was new on the 2011-2013 WRIA 1 3-Year Project Plan and included elements of the PSNERP project proposed for the Lower Nooksack. Through the PSNERP process the project was labeled a Tier 2, which means it is unlikely to proceed within the next couple years. It remains on the 2012-2014 WRIA 1 3-Year Project Plan because there may be elements that salmon partners move forward within the three year planning horizon.
- Multiple riparian restoration projects and fish passage projects are planned or underway in independent coastal streams.
- 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.

Harvest-Hatchery

Actions outlined on the 2012-2014 WRIA 1 3-Year Project Plan Harvest-Hatchery worksheet represent the ongoing Salmon Co-Manager efforts to implement the North Fork/Middle Fork and South Fork Chinook population recovery programs. The objective of the two programs is to increase population abundance through hatchery production while maintaining good genetic diversity. Ultimately, the objective is to increase natural-origin population abundance through having returns spawn naturally. Hypotheses related to these programs are incorporated in the Co-Managers work plans and management plans associated with the program. The co-manager representatives responsible for implementing these programs are participants on the WRIA 1 Salmon Recovery Board (lead entity for WRIA 1) and its various committees. This integrated participation improves integration and consistency in implementation of all recovery actions.⁴

Since the tasks outlined on the Harvest-Hatchery worksheet are part of an on-going program, they are not significantly different than those listed in the 2011-2014 3-Year Project Plan. The accompanying 2012-2014 WRIA 1 Salmon Recovery 3-Year Plan Action Description document provides a summary of these ongoing programs:

- South Fork Nooksack Chinook Captive Brood Recovery Program
- Skookum Creek Hatchery Water Supply
- North/Middle Fork Chinook Population Rebuilding Program
- Evaluate Stray Contributions of Samish Hatchery Origin Summer/Fall Chinook Releases
- Shift the Former Steelhead Hatchery Releases to Samish River to Whatcom Creek
- Hatchery Sport Program

⁴ RITT review of the 2011-2013 WRIA 1 3-Year Project Plan stated that the WRIA 1 work plan would benefit from better H integration. There were not examples provided by the RITT on how to improve integration in the local work plan. The Co-Managers, who are lead on the Hatchery and Harvest elements, are integral to the entire WRIA 1 Lead Entity structure and process and are very active in the LE program, which results in integration of the H's.

- Monitor Southern US Chinook Harvest to show Consistency in Meeting Harvest
- Agree on Pre-Season Chinook Forecasts for Nooksack Early Chinook and Summer/Fall Chinook, and Establish Seasons Consistent With These
- Monitor Nooksack Wild Steelhead Harvests in Sport, Commercial, and Subsistence Fisheries Adequate to Steelhead Harvest

Population Monitoring-Research

This worksheet tab in the 2012-2014 WRIA 1 3-Year Project Plan represents an on-going Salmon Co-Manager program, which is described in the accompanying 2012-2014 action description document. Generally, elements of the program include:

- Nooksack South Fork and North/Middle Fork Chinook Population Monitoring
- Mainstem smolt trap population monitoring
- Steelhead population monitoring
- Bull trout population monitoring
- Coho population monitoring

Programs

This tab of 2012-2014 WRIA 1 3-Year Project Plan outlines the programmatic activities associated with the WRIA 1 Salmon Recovery Plan near term actions. Additionally, this tab connects the 3-Year Project Plan to the Salmon Recovery Staff Team's Annual Work Plan by reference. The Salmon Recovery Staff Team's annual work plan outlines in greater detail programmatic activities and milestones associated with implementing near term actions in the WRIA 1 Salmonid Recovery Plan in addition to the Lead Entity operational activities. Following are the near term program actions included on the 2012-2014 WRIA 1 3-Year Project Plan.

Integration of salmon recovery and floodplain management

- 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, identify projects, evaluate project feasibility, and conduct education and outreach for affected landowners and stakeholders.
- Develop a strategic restoration and protection plan for the Mainstem Nooksack. This is contingent upon finishing the Mainstem Nooksack Reach Assessment, although the Flood/Fish subcommittee has begun work to frame plan elements.
- Consultation with salmon recovery staff for flood projects (ongoing). This has been occurring on a project specific basis, although greater integration is needed between SRST and FCZD efforts. For example, the County recently approved \$103,800 to fund Phase 2 of the sediment management pilot project, including conducting detailed technical analysis, designing a sediment management (gravel mining) project in the Mainstem Nooksack, and working with permitting agencies and other stakeholders.
- Continued discussion and refinement of County procedures and guidelines for complying with the FEMA Biological Opinion on the National Flood Insurance Program and the review of floodplain development will occur during the next couple years.

Setting and Managing Instream Flows in WRIA 1

- Instream flow evaluation and negotiation is occurring under the umbrella of the WRIA 1 Watershed Management Program and is not a focus for WRIA 1 Salmon Recovery. Nonetheless, it is an action in the WRIA 1 Salmonid Recovery Plan and is therefore identified on the 2012-2014 WRIA 1 3-Year Project Plan because there is collaboration and coordination that occurs within and among the WRIA 1 Board entities.

Other programmatic actions

- Salmon recovery implementation oversight and coordination (refer to 2012 Salmon Recovery Staff Team Annual Work Plan). The SRST has begun work to evaluate status of Salmon Recovery Plan implementation (specifically Appendix B- WRIA 1 Near-Term (10-Year) Actions) and identify what remains to be done and any barriers to implementation that exist.
- Habitat and water quality monitoring in early Chinook habitats to evaluate project/program effectiveness and status and trends
- Monitoring and Adaptive Management Program (MAMP) is in development. A draft outline and preliminary habitat targets have been completed. Subcommittees for each of the elements of the MAMP have been established. The Nooksack Tribe Natural Resources Department conducted monitoring of projects on the South Fork Nooksack in the summer of 2011. The approach used for the monitoring will be folded into the MAMP for WRIA 1. We anticipate completing the WRIA 1 MAMP in 2012 and expect to incorporate elements of the RITT Template in developing the plan.

Summary of Changes to the 2011-2013 WRIA 1 3-Year Plan from the 2011-2013 WRIA 1 Salmon Recovery 3-Year Implementation Plan

- The format of the 2012-2014 WRIA 1 3-Year Project Plan has not been modified for 2012-2014.
- Projects that were not initiated in 2011 but that remain on the planning horizon were shifted to a projected 2012 or later start date. Specific start date is depended on budget and staff capacity to implement.
- 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: new restoration projects in the Nooksack Forks that will be initiated within the 3-year horizon.
- 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 2012 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?*

The actions identified on the worksheets labeled “Habitat Actions- Chinook Priority”, “Harvest-Hatchery”, and “Population Monitoring” in the 2012-2014 WRIA 1 3-Year Project Plan spreadsheet reflects the suites of actions that are priorities for the WRIA 1 technical staff and co-managers for the next three years necessary to implement the WRIA 1 salmon recovery chapter of the regional plan. Other actions and programs are included on the 2012-2014 WRIA 1 3-Year Project Plan because they are important to the overall WRIA 1 salmon program, with many of those actions being implemented by WRIA 1 partners. Descriptions of all actions are in the accompanying 2012-2014 WRIA 1 3-Year Project Actions. 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;

- Hatchery actions necessary to stabilize the two natural origin Nooksack early Chinook populations.
- 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. Hatchery programs to rebuild both native chinook populations are under way. The North/Middle Fork Nooksack chinook population rebuilding program at Kendall hatchery continues to be implemented, and the South Fork Nooksack chinook population rescue program has been established and, implementation is on track. Approximately, 1900 progeny of captive-reared South Fork native chinook adults were released in 2011, and 32,000 will be released in late May or early June 2012. We anticipate a few hundred thousand will be released in 2012, since many BY2006, BY2007, and BY2008 chinook are rearing and growing well at both Manchester and Kendall hatchery facilities.

Implementation is also largely on track for South Fork instream restoration, where the 11 projects implemented through 2010 (5 years into Plan implementation) had cumulatively built 49% of the log jams planned for the 10-year time frame. On balance, implementation is not, however, on track to achieve the recovery goals identified in the Salmon Recovery Plan. Although the status of implementation in the Middle and North Forks has yet to be quantified, much less progress has been made in these Forks (7 instream projects total). No progress has been made on instream and floodplain restoration in the Mainstem Nooksack.

The project staging approach that was initiated in 2009 continues in the current 3-Year Project Plan (e.g., reach-scale design and feasibility funding staged first followed by construction funding when feasibility of design is known). The advantage of this approach is that we have greater certainty of cost and effectiveness before funding construction, allowing for more efficient use of limited funding, but the disadvantage is that it introduces delay into implementation. Now, with the SRFB funding cycle delays (~9 months from proposal to funding) and new RCO requirements to have design deliverables in place before submitting proposals to fund construction, the best case scenario (assuming sufficient funding to advance stages) is a three-year time lag from project concept to phase 1 construction. The sequencing of restoration projects and focusing on areas that benefit chinook continues to be a priority for implementation.

Barriers to implementation, including funding and capacity constraints experienced by many of the local recovery partners, continue to hinder the pace at which some key actions are being implemented. Some actions have barriers to implementation imposed at a federal or regional level that have implications to local actions (e.g., FEMA no rise, WDFW's recent move to deem river log jam projects ineligible for streamlined permitting). Nooksack and County staff recently met with FEMA to identify ways to reduce the constraints of the no-rise requirements. FEMA responded by informally clarifying the *Policy on Fish Enhancement Structures*, quantifying the amount of allowable rise (0.20 feet) for log jams and allowing for that rise to be averaged across a cross section of the 100-year floodplain (previous guidance had limited it to 0.20 feet anywhere within the floodplain). Lack of landowner willingness to allow access for instream restoration and, more broadly the flooding and channel migration necessary to restore habitat-forming processes, remains a major impediment, especially in the South Fork and, in the future, the Mainstem Nooksack. In addition, restoration of physical and biological processes is a complex undertaking, with factors such as full geomorphic and floodplain ecologic response to instream projects and subsequent population response taking years to occur.

The WRIA 1 Salmon Recovery Staff Team completed habitat targets in 2012 to support recovery goals as part of the task to develop a WRIA 1 MAMP. The completed MAMP will enable the Staff Team to better quantify the status and pace of recovery, and provide a quantitative assessment of the pace of recovery.

In 2012, the WRIA 1 Salmon Recovery Staff Team has on its annual work plan to review status of key actions in the WRIA 1 Salmonid Recovery Plan, and evaluate status, barriers to full implementation, and next steps. It is anticipated that this will inform the MAMP and will be considered in an addendum to the *WRIA 1 Recovery Plan*.

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

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.

Habitat assessment work and restoration planning has been completed for the entire South Fork. Assessment work has also been completed on the Middle and North Forks; the WRIA 1 Salmon Recovery Staff Team and other technical staff will build on this work to refine restoration plans for both forks. Projects identified in the 3-Year Project Plan are consistent with the habitat assessment work and restoration plans.

A project development workshop that reviewed project strategies by reach within the Nooksack River Forks further informs sequencing and staging of projects that will benefit chinook recovery. The outcomes of that workshop are also reflected in the proposed projects in the 2012-2014 WRIA 1 3-Year Project Plan.

Completing the WRIA 1 MAMP is a priority action for the Salmon Recovery Staff Team. The timeline for completing the MAMP is December 2012. In the meantime, adaptive management is proceeding. Effectiveness monitoring of log jam projects in the South Fork was conducted in summer 2011, and lessons learned are being incorporated into new projects and programs. Staff Team has also begun a process to more critically evaluate the status of implementation efforts and identify barriers to implementation, with the intent of engaging the Management Team in efforts to resolve barriers.

Successful implementation of restoration priorities will depend on sufficient funding to advance projects that are ready to implement, as well as community and landowner willingness to support development of new actions. Development of regional guidance to clarify, and to the extent possible reduce constraints of, no-rise requirements will increase project effectiveness. Additionally, efforts to streamline project permitting and reduce the length of the SRFB funding process will increase the pace of implementation.

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 project priorities in the 2012-2014 3-Year Project Plan have not changed from previous years. Project priorities are those projects that have a high benefit to Chinook and that are in high priority areas (North, Middle, and South Fork Nooksack). The approach for implementing restoration projects also has not changed and remains focused on sequencing and staging projects to more effectively use available funds. A project development workshop was conducted in February to evaluate and establish priorities for strategies and reaches in the Nooksack Forks.

One change from previous 3-year work plans has been the shift into adaptive management. Project effectiveness monitoring has begun, and lessons learned from 2011 monitoring have been reported to Management Team and incorporated into project planning. The WRIA 1 Salmon Staff Team are also reviewing and evaluating the status of key actions in the WRIA 1 Salmonid Recovery Plan, and identifying barriers to implementation. The information from the review will be presented for policy discussion and direction, and used to inform adaptive management. The review and evaluation of the key actions was not in previous 3-Year project plans. The Salmon Staff Team has identified it as a critical task needed to further advance implementation.

Completing a WRIA 1 MAMP remains a priority action in the 2012-2014 WRIA 1 3-Year Project Plan.

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. The development of a WRIA 1 MAMP will support that need. Based on available information, population data indicates that the North Fork population has been stabilized through artificial

propagation, although the natural origin (wild) population has declined in abundance for three consecutive years. Productivity remains well 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 as part of the MAMP. As part of that work, SRST and Co-Managers will be able to quantitatively evaluate status or trends. Based on limited monitoring data and anecdotal evidence, however, the following statements can be made:

- Early Chinook population status is low, and experiencing short term decline for the North/Middle Fork population. The South Fork population seems fairly stable, at very low levels. The North/Middle Fork population had the lowest spawning escapement, and lowest wild escapement, in over a decade. WDFW estimates only 865 total natural spawners in that population in 2011, including only 96 wild Chinook. This extends the decline of wild Chinook to a fourth year. The decline is especially acute in the North Fork sub-basin, and the trend continued of an increasing percentage of the wild Chinook being produced in the Middle Fork sub-basin. This is an encouraging response to the off-station Kendall Hatchery smolt releases into the Middle Fork which began in 2001, and for the first time, we had more wild Chinook spawners in the lower Middle Fork sub-basin (49), than we had in the North Fork sub-basin (47). There is far more habitat in the North Fork basin. We do not have a 2011 spawning estimate for the South Fork population yet, as some otoliths and DNA have not been run. The 2010 South Fork population escapement estimate was only 24 adults, although geneticists again think this is an underestimate. This is based on an analysis of families that produced BY 2010 juveniles collected for the captive brood population rebuilding program. In 2010, there were a total of 219 chinook redds in the South Fork by Oct. 1, while in 2011 there were a total of 187 redds to October 1. So overall abundances were lower in 2011 than 2010, although we do not yet know the breakdown of these into Kendall hatchery strays, fall Chinook hatchery strays, wild North Fork population Chinook in the South Fork, natural fall Chinook in the South Fork, and true South Fork population early (spring) Chinook. However, the overall percentage of wild Chinook appears higher in 2011. In 2010, 27 of the 76 sampled carcasses were natural origin (36%), while in 2011 77 of the 135 carcasses (57%) appear to be natural origin, based on presence of adipose fin clip and the lack of coded wire tags. In 2010 and 2011, there was sufficient survey data to enable wild winter run steelhead escapement estimates to be determined, and these estimates are 1,901, and 1,774 respectively, excluding additional spawners in British Columbia in Fishtrap, Peppin, and Bertrand creeks.
- 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.
- Availability of stable side channel habitat in the North Fork has improved modestly, due to implementation of the Lone Tree Reach and Wildcat Reach log jam projects.

- More land is in conservation status, especially along the Forks.
- Riparian function of lowland chinook tributaries is somewhat improved, 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?*

The challenges associated with implementing salmon recovery actions have not changed from the previous 3-Year Project Plan:

- Community relationships in the current anti-government, anti-tax, anti-environmental protection political environment
- Although there has been limited 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. For instance, Tribal staff envisioned that riprap removal and levee setback projects would be a cornerstone of integration efforts, yet many of the “integrated” projects advanced to date in the South Fork are fish-friendly bank protection projects. The issues identified in 2011-2013 work plan associated with ACOE levee vegetation removal and the FEMA no-rise policy also continues to be a challenge.
- Implementation of FEMA NFIP Bi-Op on floodplain development lacks solid guidelines and clear policies as to how it may/may not relate to salmon recovery projects. While County staff, with review and input from the Flood Control Zone District, recommended revisions to their Title 17 (Flood Damage Prevention Ordinance) to comply with the Bi-Op, the revisions have not been approved by County Council. Due to lack of staff capacity, WRIA 1 Salmon Staff Team was not directly involved in review and input on the Title 17 revisions. Whatcom County remains under “Door 3”, the permit-by-permit approach. Should the County choose to pursue Door 2 (programmatic approach) again in the future, technical assistance evaluating their submittal would be much appreciated.
- Challenge of decreasing staffing and budgetary resources of SRB entities affects staff involvement in all aspects of salmon recovery.
- Steelhead are now listed, but they are not yet explicitly integrated into our recovery priorities nor have critical habitats been federally designated providing some guidance on relative priority and multiple species restoration opportunity. Even so, this has created additional needs for population monitoring, managing harvest etc. Limited funds are available from the Puget Sound Partnership to advance steelhead recovery planning, but there is no plan locally to access those funds in the near-term.

38 **Forest Road Assessment and Implementation**

39 Type: Assessment/Restoration

40 Objective: Assess high risk orphan roads in priority watersheds and develop prescriptions.

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

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

51 **Nooksack River Forks Priority Reach Conservation Planning and Acquisition for Salmon**
52 **Recovery Habitat Targets**

53 Type: Plan/Program

54 Objective: Develop and implement a plan for prioritizing conservation easements and/or
55 acquisitions for purposes of achieving habitat targets.

56 Overview: WRIA 1 Salmon Recovery Staff Team and Whatcom Land Trust coordinate and
57 collaborate to identify high priority conservation easements and/or acquisitions for restoration
58 and protection in North Fork, Middle Fork, and South Fork watersheds. Project is contingent
59 upon landowner willingness to sell, allow conservation easements, or allow restoration to
60 proceed.

61 **Implement Nooksack River Forks Priority Reach Conservation Plan for Salmon Recovery:**
62 **South Fork, Middle Fork, North Fork Acquisitions**

63 Type: Program/Combination

64 Implement acquisition and/or conservation easement actions identified through the SRST
65 planning process (refer to *Nooksack River Forks Priority Reach Conservation Plan for*
66 *Salmon Recovery Habitat Targets*). The objective of is to acquire key properties to
67 implement planned priority restoration projects and/or provide protection for intact
68 habitat in the Nooksack River Forks. This action is listed as a single action in the
69 accompanying WRIA 1 2011-2013 project plan spreadsheet under “Multiple Geographic
70 Areas Within the Nooksack Forks and Tributaries”, and is included in this Action
71 Description document here and under each of the applicable section of this project action
72 description document (e.g., Geographic Area: South Fork Nooksack, etc).

73

74 **Geographic Area: South Fork Nooksack**

75 **Reaches- Multiple South Fork Reaches**

76 **South Fork Strategic Plan**

77 Type: Plan/Program

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

89 **HMZ Reconnection**

90 Type: Restoration

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

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

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

112

113 **Lower South Fork Joint Transportation/Restoration Planning**

114 Type: Plan/Restoration

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

117 Whatcom County is currently planning to replace Potter Road Bridge in 2013 and improve flood
118 conveyance under Potter Road east of the bridge to increase public safety and access during flood
119 events and to improve flood routing and salmon habitat functions. A second planning area lies
120 between the State Route 9 (SR9) Acme Bridge (RM8.5) and the Burlington Northern Sante Fe
121 Railroad (BNSF) Bridge (RM7.7). SR9 near the BNSF Bridge is considered a chronic
122 maintenance problem by WSDOT (1999 Highway Concerns Review). Whatcom County has
123 developed a hydraulic model for the South Fork Nooksack River, which can be used to evaluate
124 the extent to which the two bridges (BNSF and SR9) might be contributing to flooding concerns.
125 This restoration planning project would complement the transportation planning process to
126 optimize benefits for transportation and fish. Desired restoration elements include: (1)
127 construction of instream logjams in an area of cool water influence to increase quantity of
128 thermally-stratified deep pools with cover; (2) construction of logjams along the margins of the
129 HMZ to encourage greater connectivity with these surfaces, to increase the availability of off-
130 channel habitat, reduce mainstem velocities and encourage floodplain deposition of fine
131 sediment, and (3) improvements to the infrastructure to alleviate hydraulic constrictions and/or
132 reconnect historically connected side channel or floodplain habitats. The project will be
133 implemented in two phases by area, with an estimated planning cost of \$100,000 for each area.
134 Emphasis in the 2012-2014 period will be the Potter Road bridge area and the Black Slough reach
135 per the South Fork at Five Cedars Black Slough Reach project proposed in the Todd Creek
136 Reach. Projects are likely to require landowner willingness to proceed with implementation.

137 Benefit: Two restoration plans coordinated with transportation plans or projects.

138 **South Fork Groundwater Model Development**

139 Type: Research

140 Objective: The ultimate goal of the project is to develop a basin-scale groundwater-flow model
141 for the South Fork to evaluate the influence of groundwater on temperature and baseflow in the
142 South Fork Nooksack River to inform instream flow restoration and salmon recovery efforts,
143 including *Lower South Fork Wetland Water Storage Improvement*. The Nooksack Tribe
144 currently has funding for USGS to implement Phase 1, which will: (1) develop an exploratory
145 groundwater-flow model for the SF; (2) characterize the current contribution of wetlands to SF
146 baseflow and temperature through placement of a Distributed Temperature Sensor (DTS) cable
147 and monitoring of piezometers in adjacent wetlands; and (3) collect hydrologic data to support
148 future model calibration. Additional funding is needed to implement Phase 2, to calibrate the
149 model and to simulate restoration scenarios.

150 Benefit: Calibrated groundwater-flow model to inform salmon recovery and instream flow
151 restoration efforts; report on influence of wetlands on South Fork temperature and baseflow.

152

153 **Lower South Fork Wetland Water Storage Improvement**

154 Type: Restoration

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

157 This project encompasses actions that promote water storage in historical and potential wetlands
158 of the lower South Fork to restore temperature and baseflow maintenance functions to the
159 mainstem South Fork. Activities to promote water storage include, plugging, backfilling, and/or
160 re-meandering drainage ditches and re-creating micro-impoundments similar to beaver dams. An
161 estimated 5500m of straight ditchline and 1900m of stream length in the historically important
162 Black Slough wetland complex could be improved (approximately 1/3 of its length), plus
163 additional ditchline and stream length in other wetlands in the lower South Fork valley.
164 Estimated cost of water storage improvement is \$70/m, for a total \$518,000. Project is contingent
165 upon landowner willingness to proceed. *South Fork Groundwater Model Development* is
166 expected to inform prioritization of this action relative to other restoration projects in the
167 South Fork.

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

172 **South Fork Reach Projects and Programs**

173 ***Reach: Todd***

174 **South Fork at Five Cedars Black Slough Reach**

175 Type: Restoration

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

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

181 ***Reach: Hardscrabble***

182 **South Fork at Sygitowicz**

183 Type: Restoration

184 This project will restore habitat in a reach that scored 3rd highest among 18 reaches in the South
185 Fork in terms of restoration potential; projects in the other two reaches are already underway.
186 Specifically, this project will construct 7 engineered log jams, stabilize one existing log jam, and
187 remove about 250 feet of riprap in the South Fork Nooksack River near Sygitowicz Creek (RM
188 3.85-4.0) in order to: (1) Increase habitat diversity (i.e. increase quantity of complex wood cover
189 in low-flow and high-flow channels, increase habitat unit diversity); (2) increase key habitat
190 quantity (increase number and depth of pools for holding and rearing, number of pool tailouts for
191 spawning); and (3) increase availability of summer temperature refugia by encouraging formation

192 of deep, thermally-stratified pools in groundwater discharge and tributary confluence areas. The
193 project is also designed to not significantly increase flood risk to adjacent landowners.

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

196 **South Fork at Hardscrabble**

197 Type: Restoration

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

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

205 **Reach: Standard**

206 **South Fork at Standard Creek**

207 Type: Restoration

208 This project will construct log jams along the left bank of the South Fork Nooksack River (5.8-
209 6.2) to increase habitat diversity and form deep holding pools with cover. The project will
210 expand earlier work completed along the right bank and associated side channel in 2007.

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

212 **Reach: BNSF**

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

214 Type: Restoration

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

218 The original proposal for this project was to acquire approximately 90 acres bordering the South
219 Fork and on the Jones and McCarty Creek alluvial fans for future HMZ reconnection and off-
220 channel habitat and riparian restoration. However, the property was recently (2011) acquired by a
221 private party who is developing a variety of agricultural enterprises on the property. Whatcom
222 County Public Works River and Flood is currently consulting with the landowner and his
223 representatives regarding Jones Creek alluvial fan hazard mitigation plans. Acquisition or flood
224 or conservation easements would create opportunities to setback an existing levee, to open up a
225 constriction caused by the BNSF bridge/trestle, to remeander the channel of Jones Creek to create
226 improved floodplain tributary habitat and eliminate an anadromous barrier, to connect two
227 floodplain ponds to provide off-channel rearing and flood refugia, and to engage the Acme
228 Elementary School and the community in an active and community oriented restoration and
229 education site.

230 Benefit: up to 90 acres of historic floodplain and alluvial fan/tributary habitat reconnected; up to
231 0.3 miles of tributary habitat access improved, setback 1,500' of left bank levee

232 **South Fork Riparian Enhancement Project**

233 Type: Restoration

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

235 Plant 34 acres with appropriate native vegetation, and maintain for a period of 3-years.
236 Improvements in riparian vegetation will benefit multiple Salmonid species and lifestages by
237 providing shade and cover, reducing erosion, filtering inputs from adjacent agricultural lands, and
238 providing a future source of LWD. This project is related to SRFB Project #07-1828R, which
239 provided funding to acquire the largest of project sites for restoration and conservation.

240 **Reach: Hutchinson**

241 **South Fork Hutchinson Reach Restoration**

242 Type: Restoration

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

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

249 **South Fork Nessel's Reach Restoration**

250 Type: Restoration

251 Overview: This project will design and implement instream restoration (log jams) and floodplain
252 reconnection (riprap removal/setback) in the South Fork Nooksack River from ~RM 10.4 to RM
253 12. Eight natural log jams were stabilized and augmented in the upper part of the reach in 2008,
254 but effectiveness monitoring conducted in 2011 indicated that 3 of the structures have washed out
255 and the remaining structures have not been effective at meeting habitat objectives. The
256 recommendation was to develop engineering design for log jams and floodplain reconnection
257 (riprap removal) throughout the reach spanning from the Saxon Reach downstream to the
258 Hutchinson Reach.

259 Benefit: Increase in primary pools, active channel width.

260 **Reach: Saxon**

261 **Saxon Reach Restoration – Completed 2012**

262 Type: Restoration

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

- 267 • Saxon Reach Restoration Project will include the stabilization/augmentation of existing log
268 jams. The goal of the project is to stabilize the split flow downstream of the bridge and create
269 holding habitat in a cooler section of the reach. The project includes augmenting existing
270 wood accumulations to encourage the stability of the mid-channel island. It is estimated that
271 the project will require landowner participation in setting project objectives and allowable
272 scope of the project. It is likely that the project will need to meet flood protection objectives
273 in the reach, possibly including fish friendly bank protection
- 274 • Benefit: 7 engineered log jams, , one stabilized logjam, one log bank roughening complex, 5-
275 10 pools with complex cover, cooler water areas local to the logjams during summer low
276 flow

277 ***Reach: Cavanaugh***

278 **Cavanaugh Creek Island Project**

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

282 The Cavanaugh Island project is located in the South Fork between RM 16.6-17.0. The project
283 reach includes the greatest length of side channel habitat in the South Fork watershed. The
284 channel is separated from the main channel by an 11-acre island that is forested with deciduous
285 trees and occasional young conifers. During the low flow period, the side channel is dry, but it
286 receives enough water from the mainstem during high discharge events to maintain a 30-foot
287 wide unvegetated, gravel-dominated bed. The project seeks to improve habitat diversity in the
288 Cavanaugh Creek reach by maintaining year-round flow in the side channel. Flow will be
289 encouraged into the channel by installing two engineered logjams (ELJs) to draw the thalweg of
290 the main channel toward the head of the island. An ELJ downstream of the side channel inlet will
291 raise high flow water surface elevations for increased engagement into inlet. Habitat structures
292 comprised of key pieces of LWD will be installed in the side channel for habitat complexity.
293 Riparian restoration on the island will increase the stability of the island, and large wood will be
294 placed in the side channel to impede flow and provide instream cover for rearing juveniles. The
295 project also includes placing three wood structures in the thermal refuge areas associated with
296 Cavanaugh Creek, located at the downstream end of the side channel. These structures will
297 improve habitat quality in known cool water influence areas, including the plumes of two cooler
298 water tributaries and a groundwater seep that enters the channel from terrace bordering the
299 western side of the channel. Another project component will be three more ELJs along the lateral
300 bar of Cavanaugh Island. These ELJs will engage mainstem flows with a forested wetland cool
301 water outflow. This is the fourth highest ranked project in the Upper South Fork Nooksack River
302 Habitat Assessment and the second highest ranked project not currently funded.

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

308 **Reach: Larson's Bridge**

309 **Larson's Reach Phase 2 Instream Restoration Project**

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

312 This site is a series of groundwater-fed floodplain channels located just above the Larson's
313 Bridge at RM 20.9. A relict South Fork channel, dating from the 1940s, runs through the forested
314 floodplain and mixes with the main channel. Flow in the relict channel are low in the summer;
315 however, temperatures (7-DAM) recorded in this channel averaged 12.5°C between July and
316 October 2005. The best water quality conditions of all stations sampled were observed at this site.
317 Temperatures recorded in the coldwater plume also maintained low values, providing an instream
318 refuge for fish in the area during warm periods. This is the sixth highest ranked project in the
319 Upper South Fork Nooksack River Habitat Assessment

320 Benefit: 6 engineered logjams and 9 habitat structures that will increase habitat diversity in cooler
321 water section of the river and increase connectivity of a floodplain channel.

322 **Fobes Creek Reach Restoration**

323 Type: Restoration- Completed 2010

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

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

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

347 Benefit: 14 engineered logjams, 13 pools

348 **Reach: Elk Flats**

349 **Elk Flats Restoration Design**

350 Type: Restoration

351 Objective: To design a project that restores floodplain connectivity within the channel migration
352 zone (CMZ) and removes a major sediment source from upper South Fork.

353 Elk Flats is situated at RM 22.6 of the South Fork. Rural residential structures on the Elk Flats
354 CMZ are being removed to permit channel occupancy on a low-gradient floodplain. Engineered
355 logjams upstream of Elk Flats will be designed to encourage channel occupancy away from an
356 actively eroding bank and towards Elk Flats. A log revetment may also be designed to retain
357 sediment at the toe of the bank, similar to the downstream Larson's Reach project.

358 **Geographic Area: Middle Fork Nooksack**

359 **Reaches- Multiple Middle Fork Reaches**

360 **Reach Scale Restoration Design**

361 Type: Planning/Restoration

362 Develop sequence and priorities for implementing actions in the Middle Fork Nooksack. This
363 action will incorporate results of the Middle Fork Reach Assessment and Restoration Planning
364 that was completed by Lummi Natural Resources in September 2011.

365 **Middle Fork Diversion Dam**

366 Type: Restoration

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

368 Restoration of anadromous fish passage at the diversion dam on the Middle Fork Nooksack River
369 at RM 7.2 will restore access to at least 10.2 miles of Middle Fork and 6.9 miles of tributary
370 habitat. The project is expected to improve the abundance, productivity, spatial structure and
371 diversity of NF/MF Nooksack early chinook.

372 Design and site analysis work has been completed for three fish passage alternatives; a fish ladder
373 placed next to the dam and two designs that would remove the dam, a new intake upstream of the
374 present intake and a siphon intake located just below the face of the dam. A new intake design,
375 utilizing a siphon and the existing tunnel, and removal of the dam, is the preferred option.
376 Further work awaits funding for final design and construction.

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

378 **Middle Fork Reach Projects and Programs**

379 **Reach: Confluence to Mosquito Lake Bridge**

380 **Middle Fork LWD Assessment and Preliminary Design Project**

381 Type: Restoration

382 Overview: Assess/inventory existing stable LWD accumulations in lower 5 miles of the Middle
383 Fork Nooksack, and develop designs for large key piece LWD placement within the 5 mile reach.

384 **Geographic Area: North Fork Nooksack**

385 **North Fork Reach Projects and Programs**

386 ***Reach: Farmhouse***

387 **North Fork Farmhouse Reach Restoration**

388 Type: Restoration

389 This project will design and implement instream restoration throughout the North Fork Nooksack
390 River Farmhouse Reach (RM 46.8-49.4) that will restore historic channel planform (island-
391 braided morphology), habitat diversity, and habitat functions, including stable spawning and
392 rearing habitats for NF/MF Nooksack early chinook. Potential concepts include placement of
393 wood to protect side channels and existing and incipient forest islands. The Farmhouse reach of
394 the North Fork Nooksack River is one of two project reaches among 14 reaches that scored
395 highest in terms of restoration potential in the North Fork Nooksack River. Feasibility and design
396 was funded in 2009 SRFB/PSAR round; construction of phase 1 is expected in summer 2014.

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

399 ***Reach: Wildcat***

400 **North Fork Wildcat Reach Restoration**

401 Type: Restoration

402 This project will design and implement instream restoration throughout the North Fork
403 Nooksack River Wildcat Reach (RM 53.3-54.8) that will restore historic channel
404 planform (island-braided morphology), habitat diversity, and habitat functions, including
405 stable spawning and rearing habitats for NF/MF Nooksack early chinook. Potential
406 concepts include placement of wood to protect side channels and existing and incipient
407 forest islands. The Wildcat reach of the North Fork Nooksack River is one of two project
408 reaches among 14 reaches that scored highest in terms of restoration potential in the
409 North Fork Nooksack River. Feasibility and design was funded in 2009 SRFB/PSAR
410 round; phase 1 was constructed in summer 2011, with phases 2 and 3 planned for
411 construction in summers 2012 and 2013, respectively.

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

415 ***Reach: Canyon***

416 **Lower Canyon Creek Phase 2 Restoration**

417 Type: Restoration

418 Objectives: to maintain adult salmonid passage for the long-term and restore physical and
419 biological processes that form and maintain habitat diversity and complexity for early chinook
420 and pink salmon, steelhead, bull trout, and other salmonids in a major early Chinook tributary.

421 Restoration objectives that factor in geomorphic, habitat, alluvial fan flood risk, and public
422 outreach goals have been defined in the completed assessment. The Phase 1 project has been
423 completed with Phase 2 design and permitting, and property acquisition and easements are
424 happening in 2011-2012. Phase 2 construction is scheduled for 2013. Habitat priorities include
425 setting back the flood levee to remove a hydraulic constriction that limits floodplain and habitat
426 forming processes, providing improved in-stream habitat structure and diversity, and promoting
427 recovery of riparian areas. Passage at the river-mile 0.2 bedrock reach was evaluated and
428 determined to not be a barrier for the three ESA listed target species (spring Chinook, steelhead,
429 and bull trout) but may be problematic for weaker swimmers such as sockeye and pink salmon.
430 The reach scale habitat restoration plans will factor in maintaining or improving long-term
431 passage at the bedrock reach to provide access to upstream spawning and rearing areas.

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

435 **Habitat Assessments**

436 **Expand North Fork Assessment**

437 Type: Assessment

438 Build on existing assessment work for the North Fork watershed.

439 **Mainstem Nooksack Reach Assessment and Restoration Planning**

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

442 The purpose of this project is to assess limiting habitat conditions (habitat diversity, quantity of
443 key habitat like pools and off-channel habitat) and plan restoration projects in the Mainstem
444 Nooksack River from the upper extent of the estuary to the Forks confluence (RM 36.5).
445 Objectives include: (1) synthesis of existing information and collection of new data to
446 characterize limiting habitat conditions and habitat-forming processes; (2) identify and prioritize
447 project concepts that address limiting habitat conditions; (3) work with County River and Flood
448 to evaluate project feasibility; and (4) conduct education and outreach to affected landowners.
449 Similar efforts have been completed and/or are underway for 3 reaches that comprise the
450 anadromous extent of the South Fork Nooksack (RM 0-8, 8-14.3, 14.3-31) and for much of the
451 anadromous extent of the North Fork Nooksack (RM 36.5 – 57). Restoration of lower Nooksack
452 River habitats is expected to benefit early chinook oversummer and overwinter rearing.

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

456

457 **Habitat Action- Other Species**

458 **Geographic Area: Mainstem Nooksack River and Tributaries**

459 **Lower Mainstem**

460 **Double Ditch Acquisition and Relocation**

461 Relocate Double Ditch and Benson watercourses between Main and Badger to new corridor to
462 improve habitat and reduce flooding associated with these streams. Project involves purchasing a
463 5,000' by 200' foot easement between the Benson and Double Ditch Roads, constructing a new
464 channel and restoring the riparian corridor. Estimated three year cost \$1,000,000 which includes
465 the purchase of a 22 acre easement and construction of channel.

466 **Goodwin Road Culvert Replacement (Dale Creek)**

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

469 This project is on hold pending funding availability and completion of other higher priority
470 barrier corrections.

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

472 **Bay Road Culvert Replacement (California Creek)**

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

475 This project has been funded. Permits are in hand and easements have been obtained with 2012
476 construction planned.

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

478 **Riparian Restoration Program – Fishtrap Border to Badger Reach**

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

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

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

487 **Fish Trap Reach Levee Setback**

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

493 **Fish Passage Barrier Removal Program (Lake Terrell Passage)**

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

496 The WRIA 1 drainage structure inventory identified 478 drainage structures that block salmonid
497 access to 227 miles of historic habitat. An additional 423 miles are blocked by the state highway
498 system. Whatcom County currently replaces barrier drainage structures under county roads as the
499 design life is met, as sections of road are improved, and as funding becomes available for larger,
500 more complex projects (e.g. Bay Road). The purpose of this program is to supplement that
501 program to treat barriers, including those on private lands or in the cities of WRIA 1. Nooksack
502 Salmon Enhancement Association has taken the leadership role in working with private
503 landowners to systematically treat drainage structures that create barriers – removing them where
504 possible and replacing them with passable structures where landowners need to retain access.
505 Barriers providing the greatest fish benefit if removed are prioritized and will be systematically
506 repaired.

507 Whatcom Conservation District and WDFW secured a community salmon grant funding to
508 retrofit the Dam on Lake Terrell to provide fish passage which has blocked anadromous fish
509 access to the lake and Butler Creek since the 1940s.

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

512 **Flood Gate Modification**

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

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

523 Benefit: restored passage to floodplain habitats through range of flows

524 **Estuary and Nearshore**

525 **Smuggler's Slough Acquisition and Reconnection**

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

528 The goal of this project is to reconnect Smuggler's Slough to the Nooksack River and Lummi
529 Bay. The project includes acquisition and restoration of wetland areas adjacent to the channel
530 that will likely be affected by reconnecting the slough. The reconnection will include removal or
531 alteration of tide gates at multiple locations in the estuary, as well as improving channel
532 connectivity under roads and in ditches. The project will also remove portions of the Lummi Bay

533 seawall to allow tidal inundation and salt marsh habitat in the area between the southern
534 distributary channel of the Lummi River and setback levees formed by Kwina and Hillaire Roads.
535 Riparian planting of the channels will follow design. Fresh water wetlands restoration will be
536 accomplished in later project phases. It is estimated that acquisitions including surveys and
537 appraisals will cost \$2,575,758 over ten years with design for Phase 1-3 to taking place in 2007.
538 Construction for Phase 1 and 2 has been completed, which includes enhanced wetlands,
539 installation of a self regulation tidegate, and improved fish passage between Bellingham and
540 Lummi Bay. The planning of the project will require landowner participation in setting project
541 objectives and allowable scope of work.

542 Benefit: 638 acres of wetland acquired and 747 acres of flood plain wetland restored, restored
543 passage to 11 miles of tidal slough and Lummi Bay

544 **Bellingham Bay Nearshore and Pocket Estuaries Design, Restoration and Creation** (*General*
545 *action description for multiple projects listed on the 2012-2014 WRIA 1 3-Year Project Plan*
546 *spreadsheet*)

547 Type: Restoration

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

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

557 **Slater Road Elevation**

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

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

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

577 **Marietta Acquisition**

578 Objective: Purchase multiple flood prone properties located in the lower tidal reach of the
579 Nooksack River using a current ESRP grant. Acquisition of all developed parcels in Marietta is a
580 prerequisite to modifying Nooksack River levees to reconnect 600 acres of tidal influenced flood
581 plain and wetlands habitats.

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

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

595 2012-2013 cost is \$185,000 cost to complete all purchases is to be determined

596 **Coastal Stream and Marine Shoreline Riparian Assessment and Restoration Prioritization**

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

598 The inventory for Dakota, California, Terrell, marine border to Pt. Whitehorn was completed in
599 2010. The inventory for the remainder of coastal streams and marine shoreline south of Point
600 Whitehorn is under contract and will be completed in 2012.

601 Benefit: Inventories will be used to fill a key data gap and to identify restoration priority areas
602 and projects.

603 **Nearshore Habitat Restoration Salmon Overlay**

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

608 The goal of this project is to better integrate ecological restoration projects in both the freshwater
609 and marine environments of WRIA 1 and across multiple programs with potentially differing
610 objectives. The project will entail the review of existing nearshore restoration planning
611 documents, proposed projects, and criteria for project prioritization. This information will be
612 used to develop criteria (salmon overlay) to be used to identify and prioritize those projects which

613 have a distinct salmon recovery benefit within the context of a larger nearshore ecosystem
614 function.

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

618 **Lower Nooksack River Restoration**

619 Objective: Restore floodplain connectivity to restore habitat forming processes, moderate flood
620 velocities and improve flood refugia, and improve flood hazard management in the lower
621 Nooksack River, upper estuary, and floodplain tributaries.

622 This project supports restoration of riverine and floodplain function in the lower Nooksack River
623 from approximately the Lummi River south to the delta.

624 Phase 1. An ESRP grant has been obtained by Whatcom County Flood Control Zone District. A
625 portion of the grant will go to Marietta acquisitions while the remainder will be used for an
626 alternatives analysis and supporting hydraulic and habitat analysis. This work will begin in 2012
627 and be completed by the end of 2013. Projects identified may be funded and constructed in the
628 future under PNSERP or other funding.

629 Phase 2. WDFW has a coastal wetland grant and may pursue the acquisition of approximately
630 140 acres of right bank flood plain east of Ferndale Road in support of the larger Lower
631 Nooksack River objective. Cost is to be determined

632 Benefit: Purchase of flood prone properties reduces future flood loss claims and opens up
633 restoration opportunities for over 1,200 acres of floodplain and upper estuary.

634 **Estuarine and Marine Nearshore Needs Assessment and Prioritization**

635 Objective: Identify habitats, data gaps, and restoration and protection priorities for early Chinook
636 salmon and other species for the marine shoreline of Whatcom County

637 The City of Bellingham and Bellingham Bay Habitat Action Team are leading an effort to
638 compile relevant exiting data and studies such as beach seine and open water salmonid surveys
639 and habitat data. The project will produce a habitat function and prioritization tool to assist in
640 pursuing restoration and protection opportunities in a more coordinated manner. .

641 Benefits: increased understanding of habitat and fish distribution and abundance in Bellingham
642 Bay and adjacent areas and the relative priority of protection and restoration needs.

643 **Hatchery/Harvest**

644 **South Fork Nooksack Chinook Captive Brood Recovery Program**

645 Type: Captive Brood Hatchery Population Recovery Program

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

649 Continue seining juvenile Chinook for a complete brood cycle, run DNA for best fit assignment
650 to the three stock baselines. Retain the South Fork Chinook population juveniles (1000 per year),

651 and transfer the individuals that have been held temporarily at Skookum Hatchery to Kendall
652 Hatchery where approximately half rear to maturity in freshwater. The other half are transferred
653 from Kendall Hatchery to NMFS's Manchester Research Facility in Port Orchard for salt water
654 rearing to maturity. Pit tag individuals and associate the tags with the individual DNA. Transfer
655 ripening adults back to Skookum Hatchery for spawning, with pair mating input from geneticists.
656 Incubate eggs, and raise offspring for traditional sub-yearling release after coded wire tag
657 marking to the South Fork. Release adequate numbers from the hatchery to obtain broodstock
658 upon return, with the remainder off-station to increase the portion that spawn naturally, to
659 ultimately increase population natural origin abundances. After captive rearing a full brood
660 cycle to maturity, transition to a Skookum Hatchery traditional population rebuilding program
661 similar to North Fork Nooksack Chinook program at Kendall Hatchery. Coded wire tag the
662 juveniles released to the river.

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

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

672 **Skookum Creek Hatchery Water Supply**

673 Type: Skookum Hatchery water supply

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

676 Skookum Creek Hatchery utilizes two sources of water for its operations, Skookum Creek and
677 wells on the hatchery property. Well water is required for the incubation and early rearing
678 because its temperature is well above that in the creek water and promotes accelerated growth
679 during winter months. Water from the creek is required for the final grow out to release for
680 purposes of improved growth as the season progresses and to ensure imprinting to the hatchery
681 entrance upon their return. The current water supply requires backups to ensure the safety of the
682 chinook supplementation program while meeting other objectives of the hatchery.

683 Additional water will be required when the chinook program reaches its full production. The
684 intake in Skookum Creek must be modified to improve water intake, minimize the transport of
685 sediment into the hatchery, to meet appropriate screening criteria and to provide for improved
686 passage in the creek for bull trout and native chinook. This is anticipated to be constructed in
687 2012. The production of the existing wells has deteriorated in recent years and rehabilitation of
688 the existing wells and location of new wells is necessary to ensure the margin of safety required
689 for safe and effective implementation of the chinook rebuilding program as well as meeting other
690 hatchery objectives. Project requires landowner willingness to proceed. If adequate water cannot
691 be located, some coho rearing of Lummi Bay releases may shift to Kendall Hatchery.

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

694 **North/Middle Fork chinook population rebuilding program**

695 Type: Hatchery Population rebuilding program

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

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

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

707 Type: Hatchery evaluation program

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

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

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

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

731

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

733 Type: Hatchery steelhead program adjustment.

734 Objective: Have non-native steelhead returns recruit back to a hatchery rack, instead of spawning
735 naturally with wild steelhead. Until 2008, the Samish River received 35,000 Chambers Creek
736 origin steelhead as an off-station release transferred from Kendall Hatchery. Since these did not
737 have the ability to recruit back to a hatchery rack, uncaught returns spawned naturally. To reduce
738 competition and the potential for cross breeding with native steelhead, this release was shifted to
739 Whatcom Creek, and the hatchery on the lower creek will collect adults that return as a secondary
740 broodstock for Kendall Creek Hatchery.

741 Benefit: Reduce non-native hatchery steelhead spawning in the Samish River, creating a wild
742 steelhead zone for a relatively strong steelhead river (4th largest winter run escapement in Puget
743 Sound in 2011), with relatively early native spawning due to its low elevation setting. This
744 reduces the risk of interbreeding between Samish steelhead and Chambers Creek origin steelhead.

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

747 Type: Hatchery sport program

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

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

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

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

763 Type: Chinook harvest monitoring

764 Objective: Monitor and assess all sport, commercial, and ceremonial and subsistence fisheries to
765 collect data essential to determining the exploitation rates on the Nooksack early Chinook
766 management unit. Monitor and sample all fisheries, including mark-selective fisheries to estimate
767 total mortality (including non-retention mortality), and to detect and collect coded wire tags.
768 Meet as co-managers to discuss cwt inputs to WDFW, for expansion by the Chinook Technical
769 Committee. Sample the limited in-river ceremonial and subsistence fisheries for coded wire tags,
770 otoliths, scales, adipose fin clips, and DNA of probable wild Chinook to estimate hatchery and

771 wild compositions of the catch. Compile data for inclusion in Puget Sound post-season harvest
772 report to NOAA Fisheries.

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

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

778 Type: Chinook pre-season fisheries planning

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

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

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

786 Type: Steelhead harvest

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

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

793 **Population Monitoring-Research**

794 **Nooksack South Fork and North/Middle Fork Chinook Population Monitoring**

795 Type: Chinook population monitoring

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

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

812 **Mainstem smolt trap population monitoring**

813 Type: Population monitoring

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

817 Benefit: Population timing and long-term trend information.

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

820 Type: Steelhead population monitoring

821 Objective: As conditions are suitable, conduct aerial spring flights to count spring steelhead
822 redds in forks and mainstem (WDFW), and survey all accessible tributaries (all). Prior to 2010,
823 2004 is the only year when information was available for an informal abundance estimate of total
824 Nooksack wild winter-run steelhead, as viewing conditions for aerial flights were comparatively
825 good that spring. In 2009 aerial surveys were not suitable to estimate spawning abundances in
826 the forks and mainstem, but fairly complete tributary spawn survey data was collected. The more
827 recent tributary data can be used to evaluate the tributary indexes and expansions proposed in the
828 informal methodology. Optimally we will refine an escapement methodology for the tributary
829 portion of the population using the recent comprehensive surveys to establish representative
830 indexes. Nearly complete tributary surveys and extensive flights in 2010 and 2011 enabled co-
831 manager agreed to wild winter run escapement estimates to be reached (1,901 and 1,774 spawners
832 respectively, excluding additional spawners in British Columbia in Fishtrap, peppin, and Betrand
833 Creeks).

834 Since summer-run steelhead spawn areas of the South Fork that are inaccessible in late winter,
835 there is little chance that escapement surveys can occur. While there is not dedicated funding,
836 summer snorkeling of portions of the South Fork for adult counts could eventually lead to data
837 that can be used to establish population trends. Additional limited hook and line sampling to
838 collect tissues on summer-runs and other important species including bull trout can improve the
839 understanding of population genetics. Over 50 samples have now been collected from South
840 Fork Nooksack wild summer run steelhead.

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

843 **Establish bull trout Nooksack spawn survey index areas**

844 Type: Bull trout population monitoring

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

848 Benefit: Data collection to establish baseline for abundance trends

849 **Microsatellite DNA sampling of Nooksack bull trout core area local populations**

850 Type: Bull trout population monitoring

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

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

859 **Improve coho escapement estimates**

860 Type: Coho population monitoring

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

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

874 **Programs**

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

876 **Habitat Monitoring to Support Adaptive Management**

877 This program will collect the data in Nooksack early chinook habitats required to (1) evaluate the
878 effectiveness of voluntary habitat projects and regulatory habitat protection programs (Forest and
879 Fish, Northwest Forest Plan, Shoreline Master Programs, Critical Areas ordinances) to the
880 reduction of chinook habitat limiting factors, and (2) quantify the linkages among watershed
881 processes, land use, habitat, and salmonid population response, in conjunction with information
882 from other watersheds. The adaptive management program will be developed by late 2006 and
883 will specify what habitat and watershed attributes will be monitored. Limited habitat data has
884 been collected in recent years through reach assessments and project-associated monitoring, but
885 funding is needed to build a rigorous habitat monitoring program. Adaptive management is

886 critical to ensuring recovery strategies will be effective over the long term at restoring abundance,
887 productivity, spatial structure and diversity of Nooksack early chinook

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

890 **WRIA 1 Salmon Recovery Plan- Updates**

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

895 **WRIA 1 Lower Nooksack Strategy**

896 Objectives: 1) Negotiated settlement of water rights on the Mainstem Nooksack River; 2) Lower
897 Nooksack River Subbasin water budget; 3) Update Whatcom County Coordinated Water System
898 Plan; 4) Targeted Streamflow and water quality sampling; and 5) Advance implementation tools

899 WRIA 1 Joint Board approved a multi-objective work plan and funding strategy to implement
900 actions that advance a negotiated settlement of Tribal and state in-stream flow water rights on the
901 Mainstem of the Nooksack River, while maximizing the economic and environmental benefits of
902 out-of-stream water use in the Lower Nooksack sub-basin.

903 **Salmon Recovery Plan and Watershed Management Plan Implementation**

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

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

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

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

925 **WRIA 1 Instream Flow Negotiations (Nooksack Forks)**

926 The objective of the negotiations is to determine a management system for water use that
927 supports both instream ecological functions and out-of-stream uses such as agricultural
928 production municipal water supply, and commercial and industrial uses. Initially, the
929 negotiations were started in Bertrand and Middle Fork watersheds as pilot areas. Under the
930 confidentiality agreement and negotiation settlement framework, the geographic area changed to
931 the Nooksack Forks. The confidential negotiations are pending action by the negotiating parties.

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

934 **Lower Nooksack Tributaries Wetlands Enhancement**

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

939 Benefit: increased instream flow in lower Nooksack River tributaries

940 **WRIA 1 Salmon Recovery Staff Team Annual Work Plan**

941 The annual WRIA 1 Salmon Recovery Staff Team Work Plan outlines programmatic tasks and
942 actions associated with Lead Entity functions and Salmon Recovery Plan implementation.

2012-2014 WRIA 1 3-year Program Plan

- a) The 2012-2014 3-Year Program Plan is organized to relate to the 10-year actions, or near term actions, in the *WRIA 1 Salmon Recovery Plan* .
- b) The Nooksack River Forks and associated chinook tributaries are the priority for WRIA 1 salmon recovery efforts because of the ESA listing of North Fork/Middle Fork Chinook and South Fork Chinook. In the context of that priority near-term action, a technical workshop held on February 23, 2012 was convened for the purpose of identifying level of importance of project strategies by reach. In addition to level of importance, the opportunities available was identified. The outcome of the workshop is three tiers of project importance, which is identified under the column "2012 Restoration Priority" on the *NearTerm Habitat Action-Chinook* worksheet.
- c) Restoration actions that do not have chinook as their primary species benefitting are listed on the worksheet labeled *Habitat Action-Other Species* . The strategy for identifying restoration priorities is only identified for habitat actions that are a priority for chinook recovery; a strategy for prioritizing restoration actions for other species has not been developed.
- d) The *Hatchery-Harvest* worksheet represents actions and programs the Salmon Co-Managers are implementing in WRIA 1.
- e) The *Population Monitoring-Research* worksheet does not include preparing the WRIA 1 Salmon Recovery Monitoring and Adaptive Management Plan (MAMP) that will be used for habitat monitoring. The development of the WRIA 1 MAMP is under the worksheet labeled *Programs*
- f) The programs and actions that the WRIA 1 Salmon Recovery Staff Team implement that are associated with the Lead Entity operational grant, WRIA 1 Salmon Recovery Plan actions, and other salmon recovery actions are identified in the Salmon Staff Team's 2012 Annual Work Plan. The Program worksheet includes a line item that references implementing that annual work plan. The referenced 2012 DRAFT Annual Work Plan is attached to the WRIA 1 2012-2014 3-Year Work Plan.

B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
Project Information													Project Planning									Project Cost and Sources			
14	Type	Project Name	Brief Project Description	2012 Restoration Priority	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting	Current Project Status	Funding Sources	2012	2013	2014	Continues Beyond 2014	Total Project Cost	Est. 2012-2014 Budget	Existing funds (grants and local)						
15									Primary	Secondary		In-Hand	Needed	task	est cost	task	est cost	task	est cost						
16 Multiple Areas in the Nooksack River Forks and Tributaries																									
17 Multiple Geographic Areas Within the Nooksack Forks and Tributaries																									
18	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.		NSEA & Whatcom County	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	funding in hand through 2013, funding for 2014 TBD; projects underway	\$230,632 RCO (#10-1842); \$35,000 PSAR capacity	97,827	implement sites RCO 10-1842; assist with identifying restoration opportunities	\$97,826	complete RCO 10-1842; continue work with landowners to identify opportunities	\$97,827	continue work with landowners to identify and implement opportunities	\$97,827	yes	\$363,459	\$293,480	\$195,653	
19	Restoration	Knotweed Survey and Management	Funding covers additional survey and management of knotweed species in the riparian areas of the forks and key tributaries	2a - 2c depending on reach	Whatcom County	loss of riparian function, and floodplain forest encroachment	WRIA 1 SRP	Riparian / Instream	stream miles inventoried, acres treated, percent regrowth post-treatment	Chinook	steelhead, bull trout, coho, chum, other salmonids	funding in hand through 2013		Inventory and treat sites		grant ends 12/31/2013				yes	\$105,750	\$105,750	\$105,750		
20	Restoration	Forest Road Assessment and Implementation	Assess high-risk orphaned roads in priority watersheds and develop prescriptions		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		pursuing funding to implement prescriptions in 2011 pilot area; working with landowners to identify additional areas to assess	\$30,000 PSAR Capacity		prescriptions for 25 miles of orphaned road; assessment in priority reach	50,000; 30,000	\$50,000	prescriptions for 25 miles of orphaned road	\$50,000	yes	\$180,000	\$180,000	\$30,000		
21	Program: combination	Nooksack R. Forks Priority Reach Conservation Planning and Acquisition for Salmon Recovery Habitat Targets	Acquisition, conservation easements in priority areas for restoration and/or protection in SF, MF and NF reaches	1a-2c depending on reach	SRST: WLT	multiple Recovery Plan factors			priorities for conservation and/or acquisition	chinook		Ongoing process	\$35,000 PSAR capacity; \$299,198 PSAR capital (RCO #10-1777 and #11-1430)	TBD	SRST/WLT planning; Landowner contacts; acquisition	\$316,698	SRST planning; Landowner contacts; acquisition	\$297,500 (acq); \$17,500 landowner outreach	Landowner contacts; acquisition	1,000,000	yes	\$2,344,947	\$631,698	\$334,198	
22	South Fork Nooksack																								
23 Multiple Reach Projects and Programs																									
24	Plan	South Fork Strategic Plan	Develop sequence and priorities for implementing SRP actions in the SF watershed, including flood/salmon coordination	n/a	SRST	multiple Recovery Plan factors		Instream, floodplain		Chinook	steelhead, bull trout, coho, pink, other salmonids	matrices updated	Existing staff	TBD	identify next step, develop strategy	existing									
25	Restoration	HMZ Reconnection	Coordinate implementation of South Fork Strategic Plan and Conservation Plan to reconnect disconnected floodplain required to achieve habitat targets	TBD	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		TBD	no activity planned	Review				yes					
26	Plan	Lower South Fork Joint Transportation/Restoration Planning	Develop habitat restoration projects in conjunction with possible replacement or relocation of existing County transportation infrastructure	TBD	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	Potter Road Bridge @ 70% design, scheduled for 2013-2014 construction	Non-salmon recovery sources	Nooksack Tribe grant in process	Monitor Potter bridge, work with landowners and transportation interests to scope specific project concepts for other sites is on-hold pending staff availability	TBD	Potter Road bridge construction scheduled	Non-salmon sources		yes	TBD: dependent on project specifics	TBD	TBD		
27	Research	South Fork Groundwater Model Development	Develop a groundwater-flow model and evaluate the influence of various restoration scenarios on temperature and baseflow in the South Fork.		Nooksack Tribe/USGS	instream flow, temperature	Acme-Confluence Reach Assessment and Restoration Plan: WRIA 1 SRP	Wetlands	Exploratory MODFLOW model; USGS Data Series Report of hydrologic data for model calibration; USGS Scientific Investigations Report of surface groundwater interactions in the South Fork	Chinook	Bull trout, steelhead, coho, pink, sockeye.	Phase 1 funded and due to begin in May 2012. Need additional funding for Phase 2.	\$150,000	\$588,500	Develop exploratory MODFLOW groundwater-flow model for SF; Investigate surface water-groundwater interactions in the South Fork and adjacent wetlands (seepage runs, DTS cable,	\$85,000	Collect water-level data to calibrate model; develop hydrogeological framework.	\$65,000	Calibrate model; simulate and run restoration scenarios.	\$588,500		\$738,500	\$738,500	\$150,000	
28																									

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA		
14	Project Information													Project Planning							Project Cost and Sources							
15	Type	Project Name	Brief Project Description	2012 Restoration Priority	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting	Current Project Status	Funding Sources	2012	2013	2014	Continues Beyond 2014	Total Project Cost	Est. 2012-2014 Budget	Existing funds (grants and local)									
29	Restoration	Lower South Fork Wetland Water Storage Improvement	Plant, promote water storage in wetlands to restore temperature and baseflow maintenance functions	TBD	TBD	water quality; stream flow		Wetlands	180 acres wetland restored	Chinook							No activity planned		No activity planned				yes					
30	South Fork Reach Projects and Programs																											
32	Reach: Todd																											
32	Restoration	South Fork at Five Cedars Black Slough Reach	ELJ construction	Tier 1b	Nooksack	low habitat diversity, lack of deep pools with cover, high temperatures	SRP: Acme-Confluence Assessment	Instream	1.3 miles treated; 23 log jams placed (To be determined by design)	Chinook	Conceptual design complete; preliminary design in progress; funding proposal for construction anticipated for 2013 SRFB/PSAR round.	\$68,540 (RCO #10-1808)	600000	Conceptual, preliminary design.	\$30,000	Final design, permitting, hydraulic analysis.	\$38,540	Construction	\$600,000	monitoring	\$668,540	\$668,540	\$	68,540				
33	Reach: Hardscrabble																											
34	Restoration	South Fork at Sygitowicz	ELJ construction	Tier 1b	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	construction completed			Monitoring	\$5,000	Monitoring	\$5,000											
35	Restoration	South Fork at Hardscrabble	ELJ construction	Tier 1b	Nooksack	low habitat diversity, lack of deep pools with cover	SRP: Acme-Confluence Assessment	Instream	0.1 miles treated; 2 log jams placed	Chinook	design completed, Phase 1 construction planned	\$57,600 design grant (#09-1683); \$68,846 phase 1 construction (#11-1566)		Construction	\$108,456 phase 1	Monitoring	\$5,000	Monitoring	\$5,000				yes	\$166,056	\$108,456	\$126,056		
36	Reach: Standard																											
37	Restoration	South Fork at Standard Creek	ELJ construction	Tier 1b	Nooksack	low habitat diversity, lack of deep pools with cover, high temperatures	SRP: Acme-Confluence Assessment	Instream	xx miles treated; xx log jams placed (To be determined by design)	Chinook	Conceptual					Design	\$50,000					yes	\$365,000	\$50,000				
38	Reach: BNSF																											
39	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	Tier 1b, 1c, 2c	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	Jones Creek berm in design & funding - impact on habitat undetermined; new owner farming site and not interested in selling				Continue landowner contact to explore opportunities; track flood project to identify restoration opportunities and to target mitigation		Continue landowner dialog to explore interest & restoration options	TBD				Yes	TBD				
40	Restoration	South Fork Riparian Enhancement Project	Improve riparian conditions	Tier 3c	NSEA	multiple Recovery Plan factors	SF Nooksack River Acme-Saxon Reach Restoration Plan (LNR and NWR, 2003)	Instream	plant 34 acres; 3 yr maintenance	Chinook	steelhead, bull trout, coho, chum, other salmonids	In-Process				maintenance	covered in #09-1671	maintenance	covered in #09-1671				yes (2013)	\$143,856		\$143,856		
41	Reach: Hutchinson																											
43	Restoration	South Fork Hutchinson Reach Restoration	ELJ construction	Tier 1b	Nooksack	low habitat diversity, lack of deep pools with cover, high temperatures	SRP: Acme-Saxon assessment	Instream; riparian function	0.6 miles treated; 11 log jams placed (To be determined by design)	Chinook	steelhead, bull trout, coho, pink, other salmonids	Phase 1 constructed 2006; Design for Phases 2 through 4 in process.	\$68,540 (#10-1807) design; \$580,445 construction phase 2 (#11-1539)		Phase 2 construction	\$580,445	Phase 3 construction	300,830	Monitoring	\$5,000	yes	\$949,815	\$881,275	\$949,815				
44	Restoration	South Fork Nessel's Reach Restoration	ELJ construction and riprap removal to restore conditions through reach	Tier 1a	Nooksack	low habitat diversity, lack of key habitat, high temperatures	SRP: Acme-Saxon assessment; SF Log Jam Effectiveness Monitoring 2011	Instream	1.6 miles treated	chinook		Reach design (with final design for Phase 1) proposed for SRFB 2012 round	\$800,000		funding; preliminary designs		final design; permitting Phase 1 project	\$100,000	construction phase 1	\$700,000	yes	\$800,000	\$800,000					
45	Reach: Saxon																											
46																												

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA		
14	Project Information													Project Planning							Project Cost and Sources							
15	Type	Project Name	Brief Project Description	2012 Restoration Priority	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting	Current Project Status	Funding Sources	2012	2013	2014	Continues Beyond 2014	Total Project Cost	Est. 2012-2014 Budget	Existing funds (grants and local)									
	Restoration	Saxon Reach Restoration Phase 1	7 logjams will be built to encourage split flows and pool development; pools will provide cover; a bank roughening complex will be built on the left bank to provide woody cover and scour pools	Tier 1b, 2b	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; 7 ELJs; 1 bank roughening log complex	Chinook BullTrout: Steelhead	construction completed; monitoring	\$1,091,388 (#10-1300)	post project monitoring; close out grant	post project monitoring		yes (monitoring)	\$1,091,388		\$1,091,388									
47	Restoration	Saxon Reach Phase 2	Project feasibility, risk assessment, preliminary design, and construction budget for permitting of a project that increases habitat diversity and key habitat	Tier 1a	Lummi	low habitat diversity, elevated temperature	SRP: SF Assessment	Instream		Chinook	conceptual	\$45,000	seek funding; preliminary design	\$45,000	TBD		TBD	\$1,000,000										
48																												
51	Restoration	Cavanaugh Cr Island Project	Improve habitat diversity in the Cavanaugh Creek reach.	Tier 1a	Lummi	1, 2, 6, A3, A4, A8	Upper S. Fork Nooksack River Habitat Assessment	Instream	# LWD structures; riparian area restored	Chinook BullTrout: Steelhead	design completed	\$84,204 (#10-1806) design; \$547,880 (#11-1450) construction	construction	\$547,880	monitoring	TBD	yes	\$632,084	\$547,880	\$632,084								
52																												
53	Restoration	Larson's Reach Phase 2 Instream Restoration project	Project feasibility, risk assessment, 100% design, and construction budget for permitting of a project that increases channel shading, provide thermal refuge, and instream shading in the Larson's Bridge reach.	Tier 1a	Lummi	1, 2, 6, A3, A4, A8	Upper S. Fork Nooksack River Habitat Assessment	Instream	#LWD Structures	Chinook BullTrout: Steelhead	conceptual	\$5,000	\$1,880,000	funding and design feasibility	\$5,000	funding, design, and permitting	\$60,000	Construction	\$1,000,000	2016	\$1,880,000	\$1,065,000	\$5000					
54																												
56	Restoration	Elk Flats Restoration	Remove bank armoring and install log revetment to allow channel to migrate into southern terrace and move away from large sediment source	Tier 2a	Lummi	Sediment	Upper S. Fork Nooksack River Habitat Assessment	Instream		Chinook BullTrout: Steelhead	Conceptual	\$60,650		Design	\$60,650			TBD	\$60,650									
57																												
58																												
59	Middle Fork Nooksack and Tributaries																											
60	Multiple Reach Projects and Programs																											
61	Plan	Reach Scale Restoration Design	Finalize MF assessment report, develop sequence and priorities for implementing actions in the Middle Fork	n/a	SRST: Nooksack			Instream, floodplain		Chinook steelhead, bull trout, coho, pink, other salmonids	Conceptual																	
62	Restoration	Middle Fork Diversion Dam	Identify and implement preferred alternative for addressing barrier.	Tier 1a	Bellingham: Co-Managers	reduced access to spawning habitat; obstructions	SRP	Fish Passage		Chinook	pending policy and partner discussions			TBD	TBD	TBD	TBD											

B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
Project Information													Project Planning							Project Cost and Sources					
14	Type	Project Name	Brief Project Description	2012 Restoration Priority	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting	Current Project Status	Funding Sources	2012	2013	2014	Continues Beyond 2014	Total Project Cost	Est. 2012-2014 Budget	Existing funds (grants and local)						
63	Restoration	Middle Fork LWD Assessment and Preliminary Design Project	Assess existing stable LWD accumulations in lower 5 miles of the MF; develop designs for large key piece LWD placement with the 5 mile project reach	varies by reach and strategy	NSEA	Lack of channel stability; low habitat diversity; elevated water temperatures	LNR Middle Fork Assessment and recommendations (Lummi Natural Resources Rpt)	Instream	Improved channel stability; forested channels and associated side channels; pools with cover	chinook	concept revised from 2011 proposal	\$240,000	seek funding; inventory	construction	\$240,000		\$240,000	\$240,000							
64 Middle Fork Reach Projects and Programs																									
65	Reach: Kulshan																								
66	Reach: Welcome																								
67	Restoration	Ring Forest Off-Channel	ELI construction	Tier 1b	Lummi	low pool frequency	MF Habitat Assessment	Instream	n/a	chinook	Bull Trout, steelhead	conceptual design	\$632,500	design; feasibility	\$100,000	construction	\$532,500	monitoring	yes	\$632,500	\$632,500	\$65,000			
74 North Fork Nooksack and Tributaries																									
75 North Fork Reach Projects and Programs																									
76	Reach: Hatchery																								
77	Reach: Farmhouse																								
78	Restoration	North Fork Farmhouse Reach Restoration	restore historic channel planform, habitat diversity, and habitat functions	Tier 1a	Nooksack	channel instability, low habitat diversity	SRP, North Fork Assessment	Instream	XX structures placed; xx miles treated; xx miles of stable spawning habitat	Chinook	Design funded and in progress	\$176,475 (#09-1680)	\$2,400,000	Feasibility: Design	\$176,475	Construction	\$600,000	Phases 2-4: monitoring	\$2,576,475	\$776,475	\$176,475				
83	Reach: Wildcat																								
84	Restoration	North Fork Wildcat Reach Restoration	restore historic channel planform, habitat diversity, and habitat functions	Tier 1a	Nooksack	channel instability, low habitat diversity	SRP, North Fork Assessment	Instream	67 structures placed; 1.5 miles treated	Chinook	Design: permits: phase 1 constructed; phase 2 funded, phase 3 partially funded	\$674,379 (#11-1572); \$199,170 (WA DOE Watershed Protection and Restoration)	\$333,219 (phase 3)	Phase 2 construction	\$674,379	Phase 3 construction	\$532,389	monitoring	\$5,000	monitoring	\$2,154,850	\$1,211,768	\$873,549		
85	Reach: Canyon																								
86	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	Tier 1a	WCPW/WCF CZD	passage, habitat diversity & complexity, riparian condition	WRIA 1 SRP (2005); HEC (2007); KWL (2003); HEC 2012	Instream: fish passage; riparian	access to 3.9 miles; channel structures; acres of historic channel area reopened	Chinook	steelhead, pink, coho, salmon, bull trout, cutthroat trout	Design: permits: parcel acquisition	Design - funded: \$44,254; Construction - \$973,750	Acquisition - \$44,254; construction - \$1,491,668	final design and permitting (RCO 10-1340)	Covered under design grant (RCO 10-1340) and staff time	construction	\$2,465,418	final planting; post project monitoring	\$35,000	yes	\$ 2,464,418	\$2,464,418	\$973,750 -grant: local - TBD; other grant - TBD	
87 Habitat Assessments																									
88 Nooksack Forks																									
89	Assessment	North Fork Strategic Plan	Expand coverage of North Fork Assessment including fish section and watershed processes. Develop sequence and priorities for implementing SRP actions	n/a	SRST: Nooksack			Instream		chinook	draft assessment sections					scope assessment elements and implement	TBD					TBD			
90 Upper Mainstem																									
91	Assessment	Upper Mainstem Reach Assessment and Restoration Planning	habitat assessment and restoration planning for the Nooksack River from the SF confluence to Everson	n/a	Nooksack: SRST			Instream	restoration plan	Chinook	Coho, Pink, Chum, Sockeye, Bull Trout, Steelhead, Cutthroat	conceptual				Habitat assessment	\$75,000	Restoration Planning: conceptual designs for 2 projects	\$100,000	yes	\$175,000	\$175,000			

Project Information											Project Planning							Project Cost and Sources		
Type	Project Name	Brief Project Description	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting		Current Project Status	2012		2013		2014		Beyond 2014	Total Project Cost	Est. 2012-2014 Budget	Existing funds (grants and local)
								Primary	Secondary		task	est cost	task	est cost	task	est cost				
Mainstem Nooksack River and Tributaries																				
Lower Mainstem																				
Combination	Double Ditch Acquisition and Relocation	Relocate Double Ditch and Benson watercourses between Main and Badger to new corridor	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
Passage	Goodwin Road Culvert Replacement (Dale Creek)	Replace priority culvert: dependent on getting funding	WCPW	Reduced access to spawning habitat	WRIA 1 culvert inventory (WCPW et al. 2006)	Instream		coho	cutthroat; steelhead; chum	On hold pending funding	On hold pending funding	TBD		detailed design and specifications pending funding	TBD					
Passage	Bay Road Culvert Replacement (California Cr)	Replace priority culvert: dependent on getting funding	WCPW	Reduced access to spawning habitat	WRIA 1 passage inventory (2006)	Instream	length of habitat opened up	coho	Steelhead and cutthroat trout	design completed; funding obtained; seeking easements	Construction Summer 2012	\$475,000	monitoring	\$2,500			yes	\$475,000	\$477,500	
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	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	Continue riparian work DS Pangborn remove inwater crossing @ Sanga; complete Border to Badger riparian work	\$200,000						\$300,000	\$200,000	
Restoration	Fish Trap Reach Levee Setback	Set back levee along 10,000 ft of lower Fish Trap Reach	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; some channel assessment work	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	
Restoration	Lake Terrell Passage	Retrofit the dam on Lake Terrell to provide Fish Passage	WCD	Passage	Fish Passage Inventory		Passage to miles of stream	coho	cutthroat trout	designed and funded	construct 2012	\$150,000								
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.	Secure funding, complete design finalize landowner agreements	\$25,000		Install Whiskey and cougar creek SRT gates daylight Whiskey Cr channel	\$150,000			WCD, NRCS, NSEA	\$175,000	\$0
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	NSEA; WCPW; WDFW, NNR, LNR	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	TBD

Project Information										Project Planning								Project Cost and Sources		
Type	Project Name	Brief Project Description	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting		Current Project Status	2012		2013		2014		Beyond 2014	Total Project Cost	Est. 2012-2014 Budget	Existing funds (grants and local)
								Primary	Secondary		task	est cost	task	est cost	task	est cost				
Estuary/Nearshore																				
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	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; sandlance starry flounder;	Orca whale, marbled murrelet, Bald eagle; Pacific herring	wetland acquisition; final design; permitting; riparian planting	Construct Phase II		\$2,477,900 (ESRP RCO #091735)	Monitoring	\$20,000			yes	\$4,233,575	\$1,660,375
Restoration	Squalicum Cr Estuary Restoration	Project will remove several partial fish passage barriers and improve estuary habitat at the mouth of Squalicum Cr	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	Padden Cr Estuary Restoration	Complete feasibility study to improve water quality, circulation, reduce sediment accumulation, improve habitat	City of Bellingham, Bellingham Bay Action Team		Management Recommendations for City of Bellingham Pocket Estuaries	Estuary		Coho, Chum, Chinook		Feasibility and design	construction	TBD							\$65,000	
Restoration	Little Squalicum Estuary creation	Create 1 acre salt marsh estuary at mouth of Little Squalicum Cr as part of EPA cleanup of ravine.	City of Bellingham, Bellingham Bay Action Team			Estuary		Chinook		Need structural analysis of RR bridge supports. Also need soil characterization study to define type and extent of soil contamination	soil characterization	\$105,000	construction	\$2,000,000				\$2,000,000		
Restoration	Padden Cr @ Fairhaven Park	Increase habitat diversity, add LWD, improve floodplain connectivity	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	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	City of Bellingham			In stream		Coho, chum, steelhead, pink		feasibility	design	\$ 85,000	construction	\$ 800,000						
Restoration	Riparian Restoration Program	restore riparian habitat	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						
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	WCPW; Lummi	flood plain connection		tidal influenced	linear miles or acres of restored riparian area	chinook	coho, steelhead, coastal cutthroat trout, bull trout	project designed and permitted, waiting for funding, possible appropriation in 2012	Seek funding if opportunity presents		Seek funding if opportunity presents	\$10,000,000	Seek funding if opportunity presents			\$10,000,000		

Project Information										Project Planning							Project Cost and Sources			
Type	Project Name	Brief Project Description	Sponsor	Limiting Factors	Reference Document	Habitat Type	Project Performance	Species Benefitting		Current Project Status	2012		2013		2014		Beyond 2014	Total Project Cost	Est. 2012-2014 Budget	Existing funds (grants and local)
Acquisition	Marietta Acquisition	Purchase fee simple title to homes and property prone to flooding to provide opportunity for future levee removal/ modification	WCPW	Flood Plain Connection	Whatcom County CFHMP	Tidal Influenced	acres made available to support floodplain and estuary functions	chinook		Flood model completed, approximately 12 properties have been purchased	ESRP grant in-hand; purchase priority properties; seek FEMA funds for additional buy-out	\$180,000	ESRP grant in-hand; purchase priority properties; seek FEMA funds for additional buy-out	\$180,000 - 2012 expenditures	Seek funding			TBD	TBD	None
Assessment	Coastal Stream and marine shoreline riparian assessment and restoration prioritization	Inventory riparian condition of coastal streams and marine shoreline.	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 and marine shoreline inventoried; numbers of projects identified	Dakota Chinook,	coho, steelhead, coastal cutthroat trout, bull trout	Inventory for Dakota, California, Terrel, marine border to Pt. Whitehorn completed	Inventory Point Whitehorn south to Whatcom/Skagit County lines	\$30,000	Identify restoration priority areas and projects.	\$25,000			yes	\$85,000	\$55,000	Local funds (WCPW Natural Resource Budget)
Plan	Nearshore habitat restoration salmon overly	Complete WRIA 1 nearshore habitat prioritization with salmon overlay	WCPW/ MRC	Estuary & nearshore juvenile rearing and foraging	WRIA 1 SRP	estuary; nearshore	List with project identification and relative priority	Chinook	coho, steelhead, coastal cutthroat trout, bull trout	MRC report developed; action is dependent on staffing resources; and outcome of nearshore assessments in progress	Participate in COB lead nearshore assessment and prioritization	COB & BBHAT - \$?: WCPW staff time.	TBD	TBD						
Assessment & Acquisition	Lower Nooksack River Restoration (Phase 1)	Assess lower river hydraulics to define restoration alternatives; acquire key properties to facilitate existing and future restoration opportunities	WCPW, WDFW, Lummi Nation	Estuary juvenile rearing and foraging, flood refugia	WRIA 1 SRP and CFHMP	Estuary and adjacent waters	Project list; acquisition priorities	Chinook	coho, steelhead, coastal cutthroat trout, bull trout, chum	Grant proposals are in to ESRP and PSNERP	Scope and begin alternatives analysis, begin hydraulic and habitat assessments	\$135,000	Complete hydraulic & habitat assessments, alternatives analysis, and feasibility report	\$ 217,500	seek funding to implement preferred alternative	TBD	Yes	\$535,000 for alternatives, implementaton costs TBD	\$ 535,000	\$185,000 - WCFCDZ; \$350,000 - ESRP
Assessment, Restoration, and Construction	Birch Bay Shoreline Restoration	Removal of rip rap, groins, bulkheads, and seawalls along Birch Bay Drive; replace with soft shore beach berm; upgrade stormwater outfalls;	WCPW	reduced shoreline habitat		nearshore				Application to PWTF loan; conceptual design completed			Pre Eng Design, R-O-W requirements and permitting	\$ 750,000	Construction Design	750,000	Construction	10,000,000	\$ 1,500,000	PWTF loan (Road fund); EDI grant; REET;
Acquisition	Lower Nooksack River Project (Phase 2)	Acquire fee simple title to 140 acres of Right bank floodplain	WDFW	Estuary & nearshore juvenile rearing and foraging	WRIA 1 SRP	estuary; nearshore	Chinook	coho, steelhead, coastal cutthroat trout, bull trout		making application to National Coastal wetland Grant			1,350,000							

Project Information									Project Planning							Project Cost and Sources		
Type	Project Name	Brief Project Description	Sponsor	Reference Document	Project Performance	Species Benefitting		Current Project Status	2012		2013		2014		Beyond 2014	Total Project Cost	Est. 2012-2014 Budget	Existing funds (grants and local)
						Primary	Secondary		task	est cost	task	est cost	task	est cost				
Research, Monitoring, and Evaluation																		
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										
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										
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										
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 and BY10 (only years assessed) indicate abundances larger than escapement	chinook	record data for all species observed	only discussion										
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	WRIA 1 SRP	freshwater productivity	chinook	record data for all species observed	ongoing										
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 implement escapement methodology with indexes	winter-run steelhead	record data for other species observed like cutthroat	one first year with good aerial surveys, 2009 is first year with nearly full trib. Surveys. 2010 and 2011 had very good trib and flight surveys										
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										

Project Information								Project Planning							Project Cost and Sources			
Type	Project Name	Brief Project Description	Sponsor	Reference Document	Project Performance	Species Benefitting		Current Project Status	2012		2013		2014		Beyond 2014	Total Project Cost	Est. 2012-2014 Budget	Existing funds (grants and local)
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		no 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										

Project Information									Project Planning							Project Cost and Sources		
Type	Project Name	Brief Project Description	Sponsor	Reference Document	Project Performance	Species Benefitting		Current Project Status	2012		2013		2014		Beyond 2014	Total Project Cost	Est. 2012-2014 Budget	Existing funds (grants and local)
						Primary	Secondary		task	est cost	task	est cost	task	est cost				
Research, Monitoring, and Evaluation																		
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										
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										
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										
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 and BY10 (only years assessed) indicate abundances larger than escapement	chinook	record data for all species observed	only discussion										
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	WRIA 1 SRP	freshwater productivity	chinook	record data for all species observed	ongoing										
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 implement escapement methodology with indexes	winter-run steelhead	record data for other species observed like cutthroat	one good year with good aerial surveys, 2009 is first year with nearly full trib. Surveys. 2010 and 2011 had very good trib and flight surveys										
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										

Project Information								Project Planning							Project Cost and Sources			
Type	Project Name	Brief Project Description	Sponsor	Reference Document	Project Performance	Species Benefitting		Current Project Status	2012		2013		2014		Beyond 2014	Total Project Cost	Est. 2012-2014 Budget	Existing funds (grants and local)
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		no 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										

Project Information							Project Planning							Project Cost and Sources		
Type	Project Name	Brief Project Description	Sponsor	Reference Document	WRIA 1 Program	Current Project Status	2012		2013		2014		Beyond 2014	Total Project Cost	Est. 2012-2014 Budget	Existing funds (grants and local)
							task	est cost	task	est cost	task	est cost				
Programs, Plans, and Assessments																
WRIA 1 Watershed Plan and Salmon Recovery Plan Program Implementation and Coordination																
Program	Habitat Monitoring to Support Adaptive Management	Develop and implement habitat monitoring plan	SRST		Salmon Recovery	Prelim Habitat Targets; draft outline for MAMP	complete MAMP; coordinate with RITT	\$PSAR Capacity; existing funds	habitat monitoring	\$100,000	Habitat monitoring	\$100,000	yes		\$200,000	
Non-Capital Project	WRIA 1 Salmon Recovery Plan updates	Update WRIA 1 SRP using outcomes of adaptive mgmt plan	SRST		Salmon Recovery	Conceptual pending development and approval of monitoring and adaptive mgmt plan	Review Status	\$PSAR Capacity; existing	TBD				yes			
Non-Capital Project	WRIA 1 Lower Nooksack Strategy	Specific actions from the WRIA 1 WMP including ISF negotiations in lower nooksack, water budget, monitoring, water supply planning, and implementation tools	WRIA 1 Watershed Team; WRIA 1 Management Team	WRIA 1 WMP; Detailed Implementation Plan; Lower Nooksack Strategy	Watershed Management	in-process; water budget development underway	ongoing	\$470,000	ongoing	\$530,000			yes	TBD	\$1,610,000 (not all funds are in hand)	\$540,000 JB; \$20,000 PUD; 105,000 POB/Cities; \$620,000 Ecy; \$320,000 EDI
Non-Capital Project	WRIA 1 Instream Flow Negotiations (Nooksack Forks)	Complete instream flow negotiations in Forks of the Nooksack River	WRIA 1 Watershed Team	WRIA 1 SRP; WRIA 1 WMP; WRIA 1 Instream Flow Action Plan	Salmon Recovery; Watershed Management	on hold pending ISF negotiating parties' actions	TBD	TBD	TBD	TBD	TBD	TBD	yes		\$200,000 (estimate subject to change; does not include expenditures prior to 2010)	
Capital	Lower Nooksack Tributaries Wetlands Enhancement	Implement strategies for water storage, ground water augmentation, and infiltration to increase discharge to and augment baseflows	TBD	WRIA 1 SRP; WRIA 1 WMP; WRIA 1 Instream Flow Action Plan	Salmon Recovery; Watershed Management	Conceptual	no activity planned	TBD	TBD	TBD			yes			
Program	WRIA 1 Salmon Recovery Staff Team Annual Work Plan	Implement action and tasks associated with LE functions and Salmon Recovery Plan implementation (work plan attached)	SRST	WRIA 1 SRP	Salmon Recovery	in-process	ongoing	\$60,000 LE contract; existing local	ongoing	TBD			yes			
Partner Programs																
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	watershed plans; critical areas ordinance; shoreline management	Whatcom Conservation District								yes			

Category	10-year goal	50-year goal (?)	Hypothesis (reference)	Strategy	Sub-Strategy	Measurable Objectives
Habitat						
				1) Protect habitat through programmatic actions		
	Protect and restore freshwater, estuarine, and nearshore marine habitat, including water quantity and water quality conditions, in WRIA 1 sufficient to meet recovery goals for WRIA 1 salmonid populations, prioritizing as follows: 1. South Fork Nooksack early chinook and North Fork/Middle Fork Nooksack early chinook. 2. WRIA 1 bull trout 3. WRIA 1 wild late-timed chinook 4. WRIA 1 wild-spawning coho salmon 5. Other WRIA 1 salmonid populations (pg 176)				General strategies: 1) implement land use regulations, permits, policies, or programs to maintain/prevent further degradation, and restore to target levels the habitat parameters identified through reach-specific strategies; 2) emphasize voluntary and incentive-based actions in salmon recovery efforts, but use regulatory actions if non-regulatory actions are not being taken or are insufficient to achieve recovery; 3) Use the hierarchy identified on pg 199 in undertaking actions that impact salmonid habitat; 4) Implement, adapt and enforce compliance of existing regulations for the protection and restoration of salmonid habitat. Integrate incentives and other non-regulatory approaches within existing regulatory programs may improve compliance; 5) Develop non-regulatory strategies to motivate landowners and developers to engage in salmonid habitat protection and restoration; 6) coordinate salmon recovery planning efforts with other planning processes, including Growth Management, Shoreline Management, and flood control; 7) Identify, develop, review, revise, and implement bmps that limit impacts to salmonid habitats of forestry, ag., construction, road maintenance, etc.; (pg 202)	Nooksack early chinook freshwater habitat - Access: No migration obstruction for fish access, or existing obstructions allow full upstream and downstream passage of juveniles and adults (pg 218)
	Identify and prioritize the sequencing and location of habitat protection and restoration efforts using the WRIA 1 Salmonid Habitat Restoration Strategy. (pg 176)				General Strategies, continued: 8) manage growth wisely; 9) use education/outreach to increase awareness of human impacts to salmonids, foster land stewardship, and encourage behavior changes to reduce impacts; 10) develop and propose rule changes or legislative changes as needed to improve likelihood of success of salmon recovery; 11) evaluate new regulations, permits, or programs for the potential to lead to conservation of salmon habitat by avoiding, minimizing, or mitigating human impacts on salmon habitat; 12) identify/minimize inconsistencies b/n and w/in current and new policies that relate to salmonid habitat protection and restoration; 13) develop an organizational structure that can facilitate the technical review of policies, programs, projects, permits that affect salmonid habitat by local experts; 14) create tax breaks and/or market incentives to encourage the development and implementation of economically and ecologically sustainable land use practices that maximize positive and/or minimize adverse impacts to WRIA 1 salmonids and habitats; 15) amend zoning regulations to minimize development in and near salmonid habitats, esp. priority habitats; and 16) ensure that permitting departments have sufficient levels of staff, expertise, and training to effectively implement regulations (pg 202)	Nooksack early chinook freshwater habitat - Channel Conditions: 1) fine sediment: riffles = < 11% ; 2) embeddedness: riffle and tailout habitat units (where cobble, gravel, substrates occur = < 25% covered by fine sediment ; 3) wood debris: complex array of large wood pieces (> 50 cm diameter) but fewer cross channel bars and fewer pieces of sound large wood due to less recruitment than historic conditions, large wood, jams are as prevalent influence on channel morphology + lwd of cw < 25 = 2-3 / lwd cw 25-50 ft = 2-4 / lwd cw 50-150 ft = 3-7 / lwd cw 150 -400 ft = 10 to 20 plus log jams where accumulation occur / lwd cw >400 ft = 8 to 15 plus large jams where accumulations occur + bed scour = spawning areas = frequent scour depth of < 10 cm ; pool frequency + quantity/quality of pools = width 5' = 184 / width 10' = 95 / width 15' = 20 / width 20' = 56 / width 50' = 26 / width 75' = 23 / width 100' = 18 (pg 219)

	Protect and restore the natural watershed processes that form and maintain the habitat to which WRIA 1 salmonid stocks are adapted (pg 176).				Protect and restore freshwater, estuarine, and nearshore marine habitat, including water quantity and water quality conditions in WRIA 1 sufficient to meet recovery goals for WRIA 1 salmonid populations, prioritizing in terms of: 1) South Fork Nooksack early Chinook and North Fork/Middle Fork Nooksack early chinook; 2) WRia 1 bull trout; 3) WRIA 1 wild late-timed chinook; 4) WRIA 1 late spawning coho salmon; 5) Other WRIA 1 salmonid populations (pg 167)	Nooksack early chinook freshwater habitat - Floodplain condition - 1) hydromodification = stream channel is fully connected to floodplain although very minor structures may exist that do not result in flow restrictions or constriction (pg 219)	
	Maintain or increase the quality and quantity of habitat necessary to sustain healthy, self-sustaining runs of other WRIA 1 salmonids to provide for harvest, as well as cultural and social values. (pg 176)						
	Retain or provide adequate quantity and quality of water in streams for salmonids. (pg 176)						
	Restore access to isolated habitat. (pg 176)						
	Forest practice goals: 1) support harvestable levels of salmonids; 2) support the long-term viability of covered species; or 3) meet or exceed water quality standards (protection of designated uses, narrative and numeric criteria, and anti-degradation) (pg 171)				Implement forest practices, including addressing: riparian buffers, road maintenance, and unstable slopes (pg 171)		
	Additional "Objectives": Ensure programs and actions are consistent with Endangered Species Act and Clean Water Act requirements. <ul style="list-style-type: none"> • Maintain viable forestry, agricultural, and other industries and provide long-term regulatory certainty. • Ensure that citizens and stakeholders are actively engaged in salmon conservation efforts. • Uphold existing federal, state, tribal, and local laws and implementation authorities (pg 176) 				DNR HCP protection measures: riparian protection, unstable slopes protection, road network management, hydrologic maturity in rain on snow zones, and wetlands (pg 173)		

					CAO?? (pg 176)		
					SMP?? (pg 178)		
					10-year actions -- Lower North Fork actions: riparian planting of the channel migration area for wood recruitment, riparian planting for shading benefits, construction of stable in-stream wood structures, protection of existing in-stream wood, monitoring of forest practice activities, and relocation of stream adjacent roads and infrastructure (pg 178)		
					10-year actions -- Upper North Fork actions: large-scale lwd placement, riparian restoration to improve wood delivery to the channel, riparian restoration to improve channel shading, and set back infrastructure from the channel (pg 181)		
					10-year actions -- North Fork Tributaries: riparian restoration to improve wood delivery to the channel, riparian restoration to improve channel, canyon creek fish passage improvement, and canyon creek habitat restoration (pg 181)		
					10-year actions -- Lower Middle Fork actions: upland forest management, riparian timber managed lands, riparian planting of the channel migration area for wood recruitment, and riparian planting for shading benefits (pg 183)		
					Upper Middle Fork: restore passage at middle fork diversion dam, establish and manage for sufficient instream flow at the middle fork diversion, upland forest management, and riparian timber managed lands (pg 185)		
					Middle Fork Tributaries: riparian timber managed lands, and monitoring of forest practice activities (pg 186)		
					Lower South Fork actions: upland forest management through forest and fish, northwest forest plan, including forest road maintenance and monitoring, riparian management, and avoidance of unstable slopes, protect existing function through CAO/SMP, acquisition of priority habitats, large-scale lwd placement, restoration of channel migration area, riparian restoration to improve wood delivery, riparian restoration to improve riparian shading, set back infrastructure from the channel, and wetland restoration to improve baseflow, temperature maintenance (pg 186)		
					Upper South Fork: upland forest management through forest and fish, northwest forest plan, including forest road maintenance and monitoring, riparian management, and avoidance of unstable slopes, priority habitat acquisition, large-scale wood placement, decrease river-adjacent sediment inputs to south fork mainstem, and riparian restoration to improve channel shading and wood delivery to the channel (pg 189)		
					South Fork Tributaries: riparian restoration to improve wood delivery to the channel, riparian restoration to improve channel shading, and monitoring of forest practice activities (pg 191)		

					Upper Mainstem: riparian and floodplain habitat acquisition, riparian restoration for shading in the Upper Mainstem Area, riparian restoration for wood recruitment in the Upper Mainstem Area, levee setback and removal of bank protection along the Upper Mainstem Nooksack, large wood placement, and monitor shorelines and critical areas ordinance (pg 192)		
					Lower Mainstem: early action projects that integrate floodplain management with habitat recovery: Betrand Creek area + Whiskey-Schneider Creek area, implementation of BMP on urban and agricultural lands, restore mainstem channel complexity, systematically integrate flood planning with habitat recovery, and monitor shorelines and critical areas ordinance (pg 194)		
					Mainstem Tributaries: restoration of tributaries slough habitat to provide flood refuge for fry and overwintering juveniles in the lower mainstem, small-scale riparian restoration through CREP, voluntary stewardship or community-based programs that do not compete with early chinook projects, establish and manage for instream flows through watershed management project, implement bmp to maintain water quality for downstream habitats, restore fish passage using funding sources specifically targeted for fish passage improvements, and implement forest and fish rules (applies to Smith and Anderson Creek watersheds) (pg 195)		
					Estuary actions: restore riverine-tidal blind channel network - Marietta Slough, restore riverine-tidal blind channel network - Tennant Wetland, setback/remove levees on LB of river between Slater road and Ferndale, restore channel complexity, reconnect slough and floodplain habitat, and reconnect distributary habitat (pg 197)		
					Bellingham Bay actions: prioritize and implement relevant recommendations from the Bellingham Bay Pilot Project and monitor shorelines and CAO (pg 198)		
					Other WRIA 1 Nearshore Areas action: restore beach habitat-forming processes and monitor shorelines and CAO (pg 199)		
					Access: 1) Enforce and monitor compliance of existing laws that mandate the maintenance or restoration of fish access and passage for man-made structures (pg 202); 2) Develop education and outreach programs to educate small forest and other private landowners regarding salmonid migration habits and passage issues (pg 202)	None, or existing obstructions allow full upstream and downstream passage of juveniles and adults (pg218)	
					Channel Conditions (Sediment Supply): 1) Evaluate and adapt land management policies, practices, and plans to prevent disturbances to natural rates of sediment supply, deposition, and routing (pg 203); 1I) Maintain and, where possible restore, road densities within watersheds to target levels (i.e. develop incentives, retain roadless areas, avoid construction of new roads) (pg 203);	1) Riffles = < 11% (pg 218)	
					Channel Conditions (LWD): 1) Prevent removal of wood from rivers and streams (educate public/road/bridge maintenance crews, develop/enforce regulations to restrict removal, and where wood removal is unavoidable due to safety or risk to public or private infrastructure, relocate wood to other areas w/in the channel (pg 204)	CW <25 ft = 2 to 3 / CW 25-50 ft = 2 to 4 / CW 50 - 150 ft = 3 to 7 / CW 150 - 400 ft = 10 to 20 (excluding large jams), plus large jams where accumulations occur / CW > 400 ft = 8 to 15 (excluding large jams), plus large jams where accumulations occur (pg 218)	

					<p><i>Floodplain Conditions:</i> I) Develop a strategic Flood Hazard Management Plan for Nooksack River and Forks that integrates salmonid habitat and human needs and prioritizes projects that maximize mutual benefit (pg 206); II) Protect Nooksack River and other floodplain habitats in WRIA 1 by preventing further encroachment into floodplain (i.e. enact land use regulations to prevent new development/determental activities, acquire undeveloped land, maintain/develop incentives, etc.) (pg 206-207)</p>	<p>1) Hydromodifications - Stream channel is fully connected to the floodplain although very minor structures may exist that do not result in flow restrictions or constrictions; 2) Flood connectivity - Off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation and succession; 3) Habitat Type - Off Channel - Use historic conditions as reference (pg 219)</p>	
					<p>functions along WRIA 1 streams, rivers, and floodplain habitats, as well as recovering riparian areas (i.e. maintain array of existing riparian functions, develop/enforce land use regulations, establish buffers outside regulated 'no-touch' riparian areas, and develop/implement non-regulatory measures) (pg 208); II) If adequate vegetated riparian buffers are infeasible, emphasize activities/land uses that are compatible with or that minimize impacts to salmonids and their habitat (pg 209); Restrict livestock access to avoid/minimize adverse impacts to streams and riparian areas - 1) install fencing and stream crossings; 2) develop watering areas away from streams/riparian areas (pg 209); III) Encourage Army Corps to reverse its policy of requiring levee maintenance activities remove vegetation (pg 209); IV) Develop programs/zoning ordinances to prevent or discourage land conversions that degrade habitat conditions (pg 209); V) Avoid construction of roads/utility lines/stream crossings that encroach upon riparian areas (pg 209); VI) Limit recreation or design use areas to minimize degradation of riparian habitat (pg 210); VII)</p>	<p>1) Riparian Function = > 70% of functional attributes present; 2) Riparian buffer width and composition = >150 ft or site potential tree height (whichever is greater) and dominated (>70%) by mature conifers unless hardwoods were dominated historically (pg 219)</p>	

					<p><i>Water Quality (General):</i> I) Employ regulatory and voluntary measures to maintain and restore properly functioning water quality conditions (pg 210); II) Seek rigorous enforcement of Clean Water Act (pg 210); III) Monitor/implement measures to ensure that irrigation return flows, water conveyance systems, and stormwater inputs meet applicable water quality standards (pg 210); IV) Deny, defer, or condition all permits that will adversely impact water quality in WRIA 1 salmonid streams (pg 210); V) Ensure BMP are employed to reduce nonpoint source pollution and other adverse impacts of land uses on water quality (pg 210);</p>	<p>1) General water quality = low levels of contamination from agricultural, industrial, and other sources; no excess nutrients; no 202d-listed reaches; 2) temperature-daily maximum = see pg 220 for chart; 3) temperature - spatial variation = intermittent sites of groundwater discharge into surface waters and total quantity groundwater discharge not a major source of flow in reach; 4) dissolved oxygen = > 8 mg/L; 5) turbidity = SEV Index 6; Occasional episodes with low to moderate concentrations (<250 mg/L) of suspended sediment. Concentrations are sublethal, although slight behavioral modifications may occur; Pollutants = no toxicity expected due to dissolved heavy metals to salmonids under prolonged exposure (1 month exposure assumed) (pg 220)</p>	
					<p><i>Turbidity:</i> I) Control fine sediment sources (pg 211); II) Regulate in-channel activities that can suspend sediments (pg 211)</p>		
					<p><i>Toxic Contaminants:</i> I) Develop/enforce applicable laws and land use regulations to restrict application and runoff of chemicals that have known or likely deleterious effects to salmonids and stream habitat and productivity (pg 211); II) Use best available technology to maximize efficient use of chemicals and reduce overapplication; III) Minimize use and potential for delivery to streams of materials used during road and bridge construction and repair (pg 212); IV) Support/facilitate state/federal efforts to fund/implement cleanup of toxic areas (pg 212)</p>		
					<p><i>Dissolved Oxygen:</i> Manage land use practices to avoid nutrient concentrations in salmonid streams that increase biological oxygen demand and can lead to critically low dissolved levels (pg 212)</p>		

					<p><i>Water Quantity:</i> I) Work through Watershed Management Project and Comprehensive Irrigation District and Management Plan process to manage water use to provide adequate instream flows to meet salmonid needs, as well as channel-formation and maintenance flows (pg 213); II) Reduce hydrologic effects of forest roads (pg 213); III) Minimize effective impervious surface area (pg 214); IV) Develop/implement BMP to minimize soil compaction and vegetation disturbance in forestry, agriculture, and grazing practices, especially proximal streams; V) Increase flood water storage capacity and groundwater recharge, esp. Nooksack River and Forks (pg 214); V) Prevent channelization and ditching; restore historical channel, floodplain, and wetland morphologies where possible; VI) Develop stormwater management plans that minimize, to the maximum extent feasible, the effects of stormwater on the hydrologic regime (pg 214)</p>	<p>1) Annual variation in peak flow = peak annual flows typical of an undisturbed watershed of similar size, geology, orientation, topography, and geography; OR <20% change in Q2yr based on historical record; 2) storm runoff response (rates of change in flow) typical of undisturbed watershed of similar size, geology, orientation, topography, and geography; OR <5% reduction in average TQmean compared to the undeveloped watershed state; 3) Annual variation in low flow = average daily low flows expected to be comparable to an undisturbed watershed of similar size, geology, and flow regime (or the pristine state for the watershed of interest); OR <20% change in the 45 or 60-day consecutive lowest average daily flow (pg 219); 4) Diel variation in flow = slight to low variation in flow stage during an average 24 hr period during season/month. This pattern typical of routine slight to low ramping condition associated with flow regulations, averaging <2 inches change in stage per hour (pg 220)</p>	
					<p>and cooperation w/ and among various organizations and committees working within the estuarine and nearshore marine environments of WRIA 1 (pg 217); II) Work with Burlington Northern railroad to seek solutions to reduce impacts to WRIA 1 shorelines (pg 217); III) Reduce occurrence of treated wood structures in nearshore (pg 217); IV) Evaluate, address, and avoid or minimize impacts of industrial/municipal discharges in cherry point to water and sediment quality (pg 217); V) Evaluate and remove creosote logs in WRIA 1 estuaries and nearshore marine habitats (pg 217); VI) Promote oil and hazardous substance spill prevention, contingency, and response planning to reduce risk, minimize exposure, remediate contaminated areas, and restore lost resource functions and services (pg 217); VII) Regularly monitor for presence of Spartina and other invasive species (esp. in Lummi Bay and Bellingham Bay) (pg 217); and VIII) Continue to address cleanup/disposal or appropriate capping of contaminated sediments in inner Bellingham Bay according to the prioritization by Bellingham Bay Demonstration Pilot (pg 217)</p>		
					<p>2) Protect habitat through capital improvements</p>		

					Access: 1) Ensure that new stream crossings, fishways, and surface water diversions comply with WDFW design guidance and standards (pg 202); p 2) Ensure that new flood structures maintain passage into floodplain habitat (pg 202);	None, or existing obstructions allow full upstream and downstream passage of juveniles and adults (pg218)	
					Channel Conditions (Sediment Supply): 1) Employ BMP and implement activity limitations to limit surface erosion and fine sediment delivery to streams (pg 203); II) Reduce frequency and magnitude of anthropogenically-induced mass wasting events, including landslides and debris flows (i.e. minimize/avoid land-use activities on unstable slopes, inventory/upgrade or decommission roads that have potential to increase mass wasting...) (pg 203);	1) Riffles = < 11% ; 2) Riffle and tailout habitat units (where cobble, gravel substrates occur) = < 25% covered by fine sediment (pg 218)	

				3) Restore habitat through programmatic actions			
	Protect and restore freshwater, estuarine, and nearshore marine habitat, including water quantity and water quality conditions, in WRIA 1 sufficient to meet recovery goals for WRIA 1 salmonid populations, prioritizing as follows: 1. South Fork Nooksack early chinook and North Fork/Middle Fork Nooksack early chinook. 2. WRIA 1 bull trout 3. WRIA 1 wild late-timed chinook 4. WRIA 1 wild-spawning coho salmon 5. Other WRIA 1 salmonid populations (pg 176)				Access: I) Systematically inventory, assess, prioritize, and correct: 1) fish passage barriers, which block access including tributary, floodplain, and estuarine habitat; and 2) surface water diversions, which have potential to entrain salmonids (pg 202); II) Manage impoundments to minimize the ponded area necessary for surface water diversion; III) Develop and implement regular and effective monitoring and maintenance programs to ensure that fish passage is maintained at stream crossings and fishways (pg 202); IV) When stream crossings are in place or unavoidable, provide technical assistance in design and construction of structures to facilitate passage (pg 203); V) Secure long-term funding and develop incentive and cost-sharing programs to help defray and equitably distribute the costs of fish passage restoration (pg 203); VI) Integrate fish passage and screening needs into land and water use planning to reduce the opportunity for additional problems to develop (pg 203)	None, or existing obstructions allow full upstream and downstream passage of juveniles and adults (pg218)	
	Identify and prioritize the sequencing and location of habitat protection and restoration efforts using the WRIA 1 Salmonid Habitat Restoration Strategy. (pg 176)				Channel Conditions (Channel): I) Evaluate alternatives to channel dredging (i.e. need for continuous intensive channel dredging could be avoided or minimized by identifying/managing upstream and upslope sediment sources, etc.) (pg 205); II) Avoid gravel mining and dredging in Chinook and Bull Trout habitats; where unavoidable, minimize negative effects to salmonids and their habitat by limiting the intensity, location, and/or timing of dredging activities (pg 205); III) Remove/set back existing bank hardening that impedes channel migration. Avoid/minimize new channelization projects or encroachments (pg 205)	1) Emeddedness - Riffle and tailout habitat units (where cobble, gravel substrates occur) = < 25% covered by fine sediment ; 2) Bed Scour - Spawning areas (i.e. in pool tailouts and small cobble-gravel riffles = Frequent scour of depth < 10 cm ; 3) Quantity/Quality of Pools - Pool Frequency = Width 5' = 184 / Width 10' = 95 / Width 15' = 20 / Width 20' = 56 / Width 50' = 26 / Width 75' = 23 / Width 100' = 18 (pg 218/219)	
	Protect and restore the natural watershed processes that form and maintain the habitat to which WRIA 1 salmonid stocks are adapted (pg 176).				Floodplain Conditions: I) Conduct comprehensive inventory of man-made structures that constrain the channel or restrict flood flow access to floodplain and carry out feasibility analysis for their removal or relocation (pg 205)	1) Hydromodifications - Stream channel is fully connected to the floodplain although very minor structures may exist that do not result in flow restrictions or constrictions; 2) Flood connectivity - Off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation and succession; 3) Habitat Type - Off Channel - Use historic conditions as reference (pg 219)	

	Maintain or increase the quality and quantity of habitat necessary to sustain healthy, self-sustaining runs of other WRIA 1 salmonids to provide for harvest, as well as cultural and social values. (pg 176)				<i>Water Quality:</i> Evaluate influence of insufficient instream flows on degraded water quality and incorporate into instream flow planning efforts (pg 211)	<p>1) General water quality = low levels of contamination from agricultural, industrial, and other sources; no excess nutrients; no 202d-listed reaches; 2) temperature-daily maximum = see pg 220 for chart; 3) temperature - spatial variation = intermittent sites of groundwater discharge into surface waters and total quantity groundwater discharge not a major source of flow in reach; 4) dissolved oxygen = > 8 mg/L; 5) turbidity = SEV Index 6; Occasional episodes with low to moderate concentrations (<250 mg/L) of suspended sediment. Concentrations are sublethal, although slight behavioral modifications may occur; Pollutants = no toxicity expected due to dissolved heavy metals to salmonids under prolonged exposure (1 month exposure assumed) (pg 220)</p>	
	Retain or provide adequate quantity and quality of water in streams for salmonids. (pg 176)						
	Restore access to isolated habitat. (pg 176)			4) <i>Restoration habitat through capital improvements</i>			
	Forest practice goals: 1) support harvestable levels of salmonids; 2) support the long-term viability of covered species; or 3) meet or exceed water quality standards (protection of designated uses, narrative and numeric criteria, and anti-degradation) (pg 171)				<i>Channel Conditions (LWD):</i> I) Add lwd to streams to increase channel complexity, cover, spawning gravel retention, channel stability, pool frequency and depth, and habitat diversity (pg 204); II) Maintain/restore natural lwd recruitment/routing processes by maintaining and restoring riparian buffers, avoiding and reducing artificial channel confinement, and ensuring that instream structures convey wood (pg 204)	CW <25 ft = 2 to 3 / CW 25-50 ft = 2 to 4 / CW 50 - 150 ft = 3 to 7 / CW 150 - 400 ft = 10 to 20 (excluding large jams), plus large jams where accumulations occur / CW > 400 ft = 8 to 15 (excluding large jams), plus large jams where accumulations occur (pg 218)	

	<p>Additional "Objectives": Ensure programs and actions are consistent with Endangered Species Act and Clean Water Act requirements.</p> <ul style="list-style-type: none"> • Maintain viable forestry, agricultural, and other industries and provide long-term regulatory certainty. • Ensure that citizens and stakeholders are actively engaged in salmon conservation efforts. • Uphold existing federal, state, tribal, and local laws and implementation authorities (pg 176) 				<p><i>Channel Conditions (Channel):</i> I) Maintain/restore habitats and habitat elements needed by species and life history stages that use a reach (pg 204); II) Emphasize restoration of processes that form and maintain historic channel patterns. In highly managed systems, instream habitat enhancements may also be the only viable alternative (pg 204); III) Reduce fine sediment levels by improving channel complexity, natural bank stability, and channel/floodplain connectivity (pg 204)</p>	<p>1) Emeddedness - Riffle and tailout habitat units (where cobble, gravel substrates occur) = < 25% covered by fine sediment ; 2) Bed Scour - Spawning areas (i.e. in pool tailouts and small cobble-gravel riffles = Frequent scour of depth < 10 cm ; 3) Quantity/Quality of Pools - Pool Frequency = Width 5' = 184 / Width 10' = 95 / Width 15' = 20 / Width 20' = 56 / Width 50' = 26 / Width 75' = 23 / Width 100' = 18 (pg 218/219)</p>	
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					<p><i>Floodplain Conditions:</i> I) Restore floodplain habitats/habitat-forming processes in WRIA 1 floodplains, esp. along the Nooksack River and Forks, using historic conditions as reference (pg 205); II) Remove or setback bank hardening, dikes and levees, stream-adjacent roads, bridges, buildings and other infrastructure that constrain channel/restrict flood flow access to floodplain (pg 205); III) Restore connectivity to floodplain habitats that are isolated by hydromodifications and bank stabilization (pg 205); IV) Add wood at upstream ends of overflow channels to meter flow and increase floodplain habitat stability; V) Restore riparian forests w/in channel migration zones (pg 205);</p>	<p>1) Hydromodifications - Stream channel is fully connected to the floodplain although very minor structures may exist that do not result in flow restrictions or constrictions; 2) Flood connectivity - Off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation and succession; 3) Habitat Type - Off Channel - Use historic conditions as reference (pg 219)</p>	
					<p><i>Riparian Areas:</i> I) Restore degraded riparian areas where possible along streams, rivers, floodplain habitats, and wetlands throughout WRIA 1 (i.e. prioritize riparian restoration in floodplain areas available for channel migration, focus on restoring structural and functional integrity of riparian areas, allow for passive restoration of riparian areas, etc.) (pg 208-209); II) Develop program for early detection and monitoring of the distribution of non-native invading plant species and act aggressively to eliminate or prevent the spread of such species (pg 209)</p>	<p>1) Riparian Function = > 70% of functional attributes present; 2) Riparian buffer width and composition = >150 ft or site potential tree height (whichever is greater) and dominated (>70%) by mature conifers unless hardwoods were dominated historically (pg 219)</p>	
					<p><i>Water Quality:</i> I) Restore wetlands and riparian areas to enhance their capacity to moderate sediment, chemical, and nutrient delivery to streams (pg 210)</p>	<p>1) General water quality = low levels of contamination from agricultural, industrial, and other sources; no excess nutrients; no 202d-listed reaches; 2) temperature-daily maximum = see pg 220 for chart; 3) temperature - spatial variation = intermittent sites of groundwater discharge into surface waters and total quantity groundwater discharge not a major source of flow in reach; 4) dissolved oxygen = > 8 mg/L; 5) turbidity = SEV Index 6; Occasional episodes with low to moderate concentrations (<250 mg/L) of suspended sediment. Concentrations are sublethal, although slight behavioral modifications may occur; Pollutants = no toxicity expected due to dissolved heavy metals to salmonids under prolonged exposure (1 month exposure assumed) (pg 220)</p>	
					<p><i>Temperature:</i> I) Protect/restore vegetation along riparian areas of WRIA 1 to provide adequate shading (pg 211); II) Restore natural hydrologic regime, esp. conditions that support increased summer base flow (pg 211); III) Identify/protect/restore both unique cold water features and processes that support them (pg 211)</p>		
					<p><i>Toxic Contaminants:</i> Clean up and remove dumped material from streams and riparian areas (pg 212)</p>		

					<p><i>Water Quantity:</i> I) Maintain/restore natural hydrologic regimes to properly functioning conditions for WRIA 1 salmonids (pg 213); II) Restore processes and conditions that support summer base flows for WRIA 1 salmonid streams (pg 213); III) Restore hydrologic maturity (pg 213)</p>	<p>1) General water quality = low levels of contamination from agricultural, industrial, and other sources; no excess nutrients; no 202d-listed reaches; 2) temperature-daily maximum = see pg 220 for chart; 3) temperature - spatial variation = intermittent sites of groundwater discharge into surface waters and total quantity groundwater discharge not a major source of flow in reach; 4) dissolved oxygen = > 8 mg/L; 5) turbidity = SEV Index 6; Occasional episodes with low to moderate concentrations (<250 mg/L) of suspended sediment. Concentrations are sublethal, although slight behavioral modifications may occur; Pollutants = no toxicity expected due to dissolved heavy metals to salmonids under prolonged exposure (1 month exposure assumed) (pg 220)</p>	
					<p><i>Water Quantity:</i> Restore channel conditions and habitat elements that will buffer the negative effects of peak flows on salmonid habitat, esp. in Nooksack River and Forks (pg 214)</p>	<p>1) Annual variation in peak flow = peak annual flows typical of an undisturbed watershed of similar size, geology, orientation, topography, and geography; OR <20% change in Q2yr based on historical record; 2) storm runoff response (rates of change in flow) typical of undisturbed watershed of similar size, geology, orientation, topography, and geography; OR <5% reduction in average TQmean compared to the undeveloped watershed state; 3) Annual variation in low flow = average daily low flows expected to be comparable to an undisturbed watershed of similar size, geology, and flow regime (or the pristine state for the watershed of interest); OR <20% change in the 45 or 60-day consecutive lowest average daily flow (pg 219); 4) Diel variation in flow = slight to low variation in flow stage during an average 24 hr period during season/month. This pattern typical of routine slight to low ramping condition associated with flow regulations, averaging <2 inches change in stage per hour (pg 220)</p>	
					<p><i>Estuarine and Nearshore Marine Habitat:</i> I) Address water quality degradation in streams/rivers flowing into estuarine/nearshore marine waters (pg 215); II) Protect/restore estuaries associated with coastal independent tributaries (esp. Bellingham Bay) (pg 215); III) Protect/restore processes regulating the supply, transport, and deposition of sediment, water, large wood, and nutrients in the estuarine/nearshore marine environment (pg 215); IV) Protect/restore nearshore marine habitat structure/function (pg 215); V) Protect/restore shoreline conditions (pg 215); Protect/restore forage fish spawning areas (pg 216); VI) Improve migratory corridors in estuarine and nearshore marine environment (pg 216)</p>		

Watershed: Nooksack

Hatchery							
				1) <i>Manage hatcheries for recovery through programmatic actions</i>			
			Hatchery practices have moderate impact of limiting genetic diversity of South Fork early Chinook (pg 155)		Operate hatchery programs as either genetically integrated or segregated relative to naturally spawning populations (pg 254)		
			Hatchery practices have a moderate impact of limiting the genetic diversity of North/Middle Fork early Chinook (pg 157)		Operate hatcheries within the context of their ecosystems (pg 255)		
			Hatchery practices have a high impact of increasing the abundance of North Fork/Middle Fork early Chinook (pg 157)		Incorporate flexibility into hatchery design and operation (pg 256)		
			Genetic diversity of Nooksack late-timed chinook has been highly limited by past non-native releases and continues to be limited by hatchery practices (pg 159)		Evaluate and adaptively manage hatchery programs regularly to ensure success (pg 256)		
			Past releases of non-native brook trout have a low negative impact on bull trout and Dolly Varden genetic diversity (pg 160)		Locate and time releases of hatchery fish to minimize potential for interactions with naturally produced fish (pg 257)		
			Artificially propagated chinook compete with wild Chinook, resulting in negative impacts to both North Fork/Middle Fork and South Fork early Chinook productivity (pg 160)		Take eggs throughout the natural period of adult return (pg 257)		

			Yearling coho and steelhead may prey on native salmonids including chinook, resulting in a low negative impact to early chinook abundance (pg 162)		Develop spawning protocols to maximize effective population size (pg 257)		
			Larger brook trout, established from past releases may prey on native salmonids, resulting in a low negative impact to bull trout from competition and predation (pg 163)		Establish goals for education program releases and minimize numbers released (pg 258)		
					Operate hatcheries in compliance with the Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State (NWIFC and WDFW 1998) (pg 258)		
					Use hatchery fish as indicators of wild salmon populations for fisheries management purposes for listed and at risk species (pg 258)		
				2) Manage hatcheries for recovery through capital improvements			

Harvest							
				1) Manage runs for recovery through programmatic actions			
	Manage harvest to provide for exercises of treaty-reserved fishing rights while not impeding recovery of early chinook populations (pg 14)	25-100 year goal: expand fisheries further to sustainably harvest recovered, self-sustaining salmonid populations (pg 15)				Populations recover to the level where they would produce three recruits for each spawner, allowing a spawning population of 3,000 to produce a harvestable surplus 6,000 in each of the populations in the Nooksack Early Chinook management unit (pg 226)	
	Protect current harvest levels for late-timed chinook, sockeye, pink, coho, steelhead, and chum salmon (pg 14)						
	11-25 year goal: Expand harvest to early chinook to include more meaningful ceremonial and subsistence use and of other stocks (pg 15)						
				2) Manage runs for recovery through capital investments			Ensure that hydropower projects have no net adverse impacts on salmonids and salmonid habitat. Projects should ensure fish passage, maintain water quality, provide sufficient instream flows, provide tailrace protection, screen intake structures to prevent entrainment, and manage water releases using ramping, as well as mitigate fully for any habitat loss and degradation (pg 263)
Hydropower							
				1) Manage hydropower facilities for recovery through programmatic actions			
					New Hydropower Projects: 1) Contest the siting of any new hydropower projects within known, presumed or potential/historic distribution of anadromous or resident salmonids, as depicted in the most current version of the WRIA 1 Salmonid Distribution maps; 2) If a new project is sited within known salmonid-bearing waters, work with FERC, EPA, NOAA Fisheries, USFWS, WDOE, and WDFW to ensure adequate fish passage and intake screening, evaluate and set sufficient instream flows, and minimize and fully mitigate for any habitat loss (pg 263-64)		

					Existing Hydropower Projects: 1) Ensure that ramping rates are established consistent with criteria set forth in (Hunter, M.A. 1992. Hydropower Flow Fluctuations and Salmonids: A Review of the Biological Effects, Mechanical Causes, and Options for Mitigation. September 1992. State of Washington, Department of Fisheries, Habitat Management Division. Olympia, WA); 2) Ensure that instream flow needs are met for all species and life stages likely to be affected.; 3) Ensure that structures do not interrupt routing of sediment, wood and other organic matter.; 3) Monitor impacts of water release fluctuations (e.g. redd dewatering, juvenile stranding), establish communication pathways between facility operators and local biologists, and develop mechanism for timely adaptive management of water releases. (pg 264)		
			Hydropower projects may impact anadromous salmon in a variety of ways, including alteration of flow regime and barrier to access (pg 163)		Address flow issues associated with Excelsior/Nooksack Falls hydropower Facility (pg 164)		
					Address flow issues associated with small hydroelectric facilities, including Sygitowicz Creek facility (pg 164)		
			The Middle Fork Diversion Dam, although not hydropower, may have many of the same impacts as hydropower development (pg 163)		Address fish access issues and flow issues associated with the Middle Fork Diversion Dam (pg 165)		
				2) Manage hydropower facilities for recovery through capital investments			

VSP							
				1) Increase abundance of current runs			
	<p>South Fork Nooksack Early Chinook: 1) spawner abundance planning range: 9,900 - 13,000 (1.0) ; 2) Outmigrant smolt abundance: low productivity = 410,000 and high productivity = 280,000 (pg 16)</p>					<p>Interium Benchmarks: South Fork Nooksack early chinook: Abundance: 1,562 (pg 19)</p>	
	<p>North Fork/Middle Fork Early Nooksack Chinook: 1) spawner abundance planning range: 14,000 - 22,000 (1.0) ; 2) Outmigrant smolt abundance: low productivity = 610,000 and high productivity = 410,000 (pg 16)</p>					<p>Interium Benchmarks: North/Middle Fork Nooksack early chinook: Abundance: 3,283 (pg 18)</p>	
				2) Increase productivity			
	<p>South Fork Nooksack Early Chinook: 1) spawner abundance: a) productivity for planning range of abundance = 1.0 ; b) low productivity = 1.0 ; and c) high productivity = 3.3 ; 2) Outmigrant smolt abundance: a) low productivity = not given ; b) high productivity = not given (pg 16)</p>					<p>Interium Benchmarks: South Fork Nooksack early chinook: Productivity: 2.9 (pg 19)</p>	
	<p>North Fork/Middle Fork Early Nooksack Chinook: 1) spawner abundance: a) productivity for planning range of abundance = 1.0; b) low productivity = 1.0 ; and c) high productivity = 3.1 ; 2) Outmigrant smolt abundance: a) low productivity = not given ; b) high productivity - not given (pg 16)</p>					<p>Interium Benchmarks: North/Middle Fork Nooksack early chinook: Productivity: 3.4 (pg 18)</p>	
				3) Increase spatial structure			
	to be determined						

				4) Increase diversity			
	to be determined					Interium Benchmarks: South Fork Nooksack early chinook: Diversity Index: 79% (pg 19)	
						Interium Benchmarks: North/Middle Fork Nooksack early chinook: Diversity Index: 77% (pg 18)	
	Bull Trout Recovery Goal: Nooksack Population - Abundance = 2000 ; Distribution = Maintain or expand the current distribution ; Trend = Stable or increasing trends in abundance at or above the recovered abundance target level in each core area based on 10 - to 15-year time frame ; Connectivity = Restore connectivity by identifying and addressing specific existing and potential barriers to bull trout movement in each core area (pg 20)						
	Bull Trout Recovery Goal: Chilliwack Population - Abundance = 600 ; Distribution = Maintain or expand the current distribution ; Trend = Stable or increasing trends in abundance at or above the recovered abundance target level in each core area based on 10						
Education and Outreach							
				1) Conduct education and outreach through programmatic actions			
					1) Increase understanding of recommendations in Recovery Plan; 2) Engage broader community on actions that are needed; and 3) Make individuals aware of voluntary actions they can take that will aid in recovery (pg 275)		

					General educational programs and topics should expand to include: 1) The opportunities for mutual benefit and balance between flood hazard management and salmon habitat restoration; 2) Stormwater management and incorporation of best management practices into everyday behavior; 3) Estuarine/nearshore environment and their importance to the salmon lifecycle.; 4) The role of large woody debris in forming and maintaining salmon habitats. (pg 275)		
				2) Conduct education and outreach through capital actions			
Adaptive Management and Monitoring							
				1) Conduct research			
					1) identification and quantification of impairments to natural processes (i.e. sediment supply, transport, and deposition; hydrology; wood inputs; nutrient/chemical inputs; light/heat inputs); (2) inventory and characterization of habitat conditions (i.e. access, substrate, habitat structure/stability, flow regime, and water quality); (3) identification and characterization of biotic interactions (i.e. food webs, competition, predation, disease/parasitism); and (4) characterization of salmonid populations (i.e. abundance, productivity, diversity, and spatial structure). (pg 267)		
				2) Conduct monitoring			
					Development of a monitoring and evaluation plan. General questions to be addressed: How well does a specific project work? <ul style="list-style-type: none"> • Are the collective projects achieving the anticipated results? In the short-term, long-term? • Are the hypotheses for what is limiting recovery valid and is our strategy appropriate? • Are we achieving recovery of salmon in our watershed and across Puget Sound? (pg 271) Conduct compliance monitoring, effectiveness monitoring, validation monitoring (pg 271-273)		
				3) Make decisions via adaptive management			

				<p>Components of decision-making structure: 1) Tracking and guiding plan implementation; 2) Making technical assessments about effectiveness of hatchery, harvest and habitat actions; 3) Evaluating progress and making decisions about priorities within and across H's; 4) Communicating progress – County, City, nonprofits; 5) Managing data, describing plan effectiveness – co-managers; 6) Securing funds to support plan implementation – WRIA 1 SRB</p> <p>In developing the adaptive management framework, thresholds will be established to measure progress towards recovery and to determine possible courses of action (No action—if target thresholds are met or exceeded; Continue or expand monitoring—if significant progress is made towards a threshold but it is not met.; Modify strategy or action—if results fall far short of the target threshold or conditions worsen.) (pg 274)</p>	<p>Timeline identified: 1) 1st 2 years: develop detailed monitoring plan, initiate monitoring, reporting on implementation ;</p> <p>2) year 3+ : effectiveness assessments and continue implementation reporting; 3) year 5+ : use info to evaluate progress and priorities for continued funding of projects, engage discussion with broader policy committee for these decisions (pg 274)</p>	
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