

8. Monitoring and Adaptive Management Strategy



Introduction and Purpose

This Plan lists many actions designed to improve the quality, quantity, diversity, and complexity of habitat for Chinook salmon in the Stillaguamish Watershed. The Plan also calls for investment in conservation programs, projects, and other actions designed to protect high-quality habitat and to prevent degraded habitat from becoming worse or lost altogether. Hatchery and harvest strategies developed by the co-managers are also part of the Plan. Monitoring and adaptive management provides a mechanism to evaluate our progress at the sub-basin, basin, and Chinook salmon population scales and adjust our direction if necessary as we implement the Plan.

Monitoring and adaptive management provides a mechanism to evaluate our progress at the sub-basin, basin, and Chinook salmon population scales and adjust our direction if necessary as we implement the Plan.

Monitoring is the systematic, measurable observation of watershed, habitat, and population characteristics; project and program implementation and effectiveness; and process studies designed to test the assumptions on which the Plan is based. Monitoring is a critical element of the recovery effort because it allows us to evaluate progress toward desired results. Adaptive management is the formal use of monitoring results, combined with preset criteria that serve as “triggers” to evaluate and revise, if necessary, project and program designs, implementation schedules, overall action strategies, and our assumptions and expectations about the desired results of our actions.

The following is a “bare bones” list of items to be monitored in order to know whether the Plan is being effectively implemented. It relies on existing monitoring efforts and other monitoring actions that have a high likelihood of being performed on a regular basis in the future. These monitoring actions include field inventory using explicit, quantitative protocols; basin-scale land cover analysis; data collected in hatchery and harvest operations; and, either directly or by reference, monitoring of Chinook salmon recovery actions and programs carried out by local, state and federal agencies. The monitoring elements are prioritized based on importance to our near-term and long-term understanding of Chinook salmon population performance and habitat quality.

Although this Monitoring and Adaptive Management Strategy is specifically designed to monitor and evaluate this Plan, the SIRC recognizes that many stakeholders have their own methods of monitoring the progress of their

respective salmon recovery activities. Some stakeholders have already established baseline conditions using indicators, such as the NOAA Fisheries Matrix of Pathways and Indicators, and they are implementing monitoring and adaptive management plans developed in consultation with regulatory authorities. The SIRC welcomes stakeholders to share the results of any relevant monitoring conducted outside of the framework of this Monitoring and Adaptive Management Strategy.

Monitoring Elements

This Monitoring and Adaptive Management Strategy is focused on unambiguous, quantifiable measures. As such it requires the use of standard measurement methods and techniques. Comparisons and triggers are carefully defined to provide clear indicators of whether and when adaptive actions are necessary. This strategy focuses on the following types of monitoring elements, or measures:

1. Specific Chinook salmon population and habitat conservation actions called for in this Plan (Implementation Monitoring);
2. Conservation actions that must be effective, rather than just accomplished (Direct Effectiveness Monitoring);
3. Conservation actions that are effective in a timeframe consistent with the Plan's stated goals, objectives, and targets (Cumulative Effectiveness Monitoring); and
4. Key assumptions that form the basis for undertaking actions and expecting specific responses (Validation Monitoring).

Implementation Monitoring

The purpose of implementation monitoring is to determine whether we did what we said we were going to do. If we did do what we said we were going to do, then adaptive action is not required. If we did not, then some kind of adaptive action may be necessary. This section defines the implementation monitoring framework for specific elements of the harvest, hatchery, and habitat strategies.

Table 15. Habitat Restoration Implementation Monitoring

Project	Indicator	Comparison	Trigger
Riparian restoration	Acres of riparian vegetation planted	Annualized progress toward target acres	Two consecutive years not meeting targets
Floodplain connectivity	Side-channel acres reconnected	Pro-rated five year total acres	Performance does not meet pro-rated five year total acres
Treat landslides	Landslides treated	1 landslide treatment constructed by 2009 and 1 more by 2014	No permits by end of 2008
Reduce sediment from roads	Miles unpaved forest roads on potentially unstable slopes restored or treated	Annualized progress toward target miles	Two consecutive years not meeting targets
Increase large woody debris (LWD)	Engineered log jams installed	Annualized progress toward target numbers, locations	Third year totals do not meet target; seven year totals do not meet target
Estuary restoration	1. Leque Island and The Nature Conservancy (TNC) properties restored to tidal influence 2. River delta log jams installed	1. 115 acres of Leque Island and 80 acres of TNC property restored to tidal influence 2. 10 log jams installed in river delta	1. No tidal influence restored to either Leque Island or TNC property by 2010 2. No log jams installed by 2010

Table 16. Habitat Protection Implementation Monitoring

Protection Element	Indicator	Comparison	Trigger
Critical Areas Regulations (CAR)	CAR updated	Current CAR	Update not complete on time
Comprehensive Growth Management Plan (Comp. Plan)	Comp. Plan updated	Current Comp. Plan	Update not complete on time
Shoreline Management Plan (SMP)	SMP updated	Current SMP	Update not complete on time
Hydraulic Code	1. # projects constructed without required Hydraulic Project Approval (HPA) permit 2. % hardened bank in EDT reach under HPAs	1. No unpermitted projects 2. NMFS (1996) hardened bank criteria	1. 2 in a calendar year 2. > 10% in EDT reach
Temperature Total Maximum Daily Load (TMDL)	TMDL water quality cleanup plan completed	No TMDL water quality cleanup plan	TMDL water quality cleanup plan not approved by DOE by 2007
Habitat designated for conservancy	Acres of habitat conserved	Annualized progress toward target	2 consecutive years of not meeting annualized target

Table 17. Harvest Strategy Implementation Monitoring

Harvest Element	Indicator	Comparison	Trigger
Non-incidentals harvest	% of fish harvested	Maximum annual target	Two consecutive years of exceeding target %
Incidental harvest	% of fish harvested	Maximum annual target	Two consecutive years of exceeding target %
Canada harvest	% of fish harvested	Maximum annual target	Two consecutive years of exceeding target %

Table 18. Hatchery Strategy Implementation Monitoring

Hatchery Element	Indicator	Comparison	Trigger
Selection of program fish	Portion/geographic distribution of population selected for program	Targeted distribution in time/space of program fish	Less than 80% of run time or geography selected for program
Smolt release	Number and size of smolts released	Minimum number of Chinook smolts released	Two consecutive years of not meeting minimum smolt release numbers

Effectiveness Monitoring

The purpose of effectiveness monitoring is to determine whether projects and other elements of the Plan are effective at what they were designed to accomplish. It also addresses cumulative effectiveness of the overall recovery plan and whether it is having the desired or planned affect on Chinook salmon productivity. This section defines the direct and cumulative effectiveness monitoring framework of specific elements of the harvest, hatchery, and habitat strategies as well as the Plan as a whole.

Table 19. Habitat Restoration Effectiveness Monitoring

Project	Indicator	Comparison	Trigger
Riparian restoration	Acres of conversion from bare ground, grass land cover to shrubs/small trees (use periodic land cover analysis every 3-5 years)	Pro-rated progress toward riparian restoration acre targets in Plan	Two consecutive periods of not meeting pro-rated progress toward riparian restoration acre targets in Plan
Floodplain connectivity	1. Do project side channels remain reconnected? (% connection maintained) 2. Are reconnected side channels used by juvenile Chinook salmon? (juvenile density in summer, winter)	1. % reconnected channel area that is wetted and contains > 8 ppm DO in August 2. Published juvenile density values (Stillaguamish Tribe, Washington Trout, NOAA Fisheries)	1. Less than 50% of new side-channel remains connected five years after construction 2. Less than 50% of published juvenile density in side-channel after 5 years
Treat landslides	Is sediment reduced from landslide treatments? (% fines in spawnable gravel downstream from landslide treatments)	Stillaguamish fine sediment criteria (STAG 2000)	Does not meet Stillaguamish fine sediment criteria within 2 years after construction
Reduce sediment from roads	Is sediment reduced from road treatments? (% fines in spawnable gravel downstream from road treatments)	Stillaguamish fine sediment criteria (STAG 2000)	Road-derived fine sediment does not meet standard by 2009
Increase large woody debris (LWD)	Are log jams increasing habitat diversity (% pool area [primary and backwater], pool frequency)?	Pool area and frequency criteria in Chinook salmon habitat	<5% increase in pool area in 5 years

Project	Indicator	Comparison	Trigger
Estuary restoration	Acres of salt marsh habitat restored or created	Annualized progress for the following projects: 1. Leque Island 2. TNC property 3. River delta log jams	Salt marsh habitat restored or created by 2010: 1. Leque Island 60 acres 2. TNC property 40 acres 3. River delta log jams 60 acres
Cumulative effectiveness	Chinook salmon productivity	Annualized progress toward productivity target	Productivity by 2009 does not meet annualized progress toward productivity target

Table 20. Habitat Protection Effectiveness Monitoring

Protection Element	Indicator	Comparison	Trigger
Critical Area Regulations (CAR)	1. Nearstream Total Impervious Area (TIA) acres (see Purser et al. 2003) 2. Wetland acres	1. Spence et al.(1996) 2. No net loss of wetland acres	1. >3% increase in TIA in 5 years 2. >3% net loss of wetland acres in 5 years
Comprehensive Growth Management Plan (Comp. Plan)	1. Nearstream acres in forest land cover types (see Purser et al. 2003) 2. Wetland acres	1. Spence et al. (1996) 2. No net loss of wetland acres	1. >3% loss of forest land cover in 5 years 2. >3% net loss of wetland acres in 5 years
Shoreline Management Plan (SMP)	Bank hardening length in priority reaches	Spence et al., 1996; NMFS, 1996	>3% increase in 5 years
Forest Practices Regulations, DNR HCP, and Northwest Forest Plan	1. % hydrologically mature forest in subbasin (see Purser et al. 2003) 2. Road density 3. Miles of road on potentially unstable slopes	1. Nichols (1990) 2. NMFS (1996) 3. Baseline miles of road on potentially unstable slopes (see Table 5)	1. > or = 10% of historically forested portion of sub-basin < 20 years old 2. > 2.0 road miles / sq. mi. in any basin 3. any new roads built on potentially unstable slopes
Hydraulic Code	Feet of hardened bank allowed in Chinook salmon reaches	Current amount of hardened bank (see Haas et al. 2003)	Net increase in hardened bank
Temperature Total Maximum Daily Load (TMDL)	Stream temperature (7-day running average high)	TMDL numerical objective	5-year, 10-year milestones not met
Habitat designated for conservancy	% forest land cover; wetland	No net loss	>3% loss in 5 years

Table 21. Harvest Strategy Effectiveness Monitoring

Harvest Element	Indicator	Comparison	Trigger
Spawning escapement	Adult escapement	Annualized progress toward target	Two consecutive years of not meeting annualize progress toward target
Canada harvest	Canada harvest	Agreed upon limit to Canadian harvest	Two consecutive years of not meeting annualize progress toward target

Table 22. Hatchery Strategy Effectiveness Monitoring

Hatchery Element	Indicator	Comparison	Trigger
Manage hatchery for high return of program fish	Ratio of adults spawned to returning hatchery spawners	Ratio of hatchery spawners to natural spawners	< 2.0 returning adults per hatchery spawner
Manage hatchery for high smolt survival	Egg to release survival (%) of hatchery fish	Natural-origin egg to release survival	< 70% survival
Manage program smolts to emulate natural smolts	Size distribution and outmigration timing of hatchery and natural juveniles	No statistically significant difference between hatchery and natural juveniles	Statistically significant difference in size distribution or outmigration timing
Manage program adult fish to emulate natural adult fish	Age and sex composition, time and area of spawning of returning hatchery and natural adults	No statistically significant difference between hatchery and natural adults	Statistically significant difference in age or sex composition or time of spawning or area of spawning between hatchery-origin and natural-origin adults

Validation Monitoring

- Validation monitoring tests our assumptions about what our actions will achieve, the time-frame for achievement, and whether a particular method or strategy is adequate for achieving target conditions. Specifically for this Plan, validation monitoring is a tool we can use to test our hypotheses about watershed processes and Chinook salmon population performance. Significant differences between what we think happens and what actually happens trigger adaptive management.

Table 23. Habitat Restoration Validation Monitoring

Project/Hypothesis	Indicator	Comparison	Trigger
Riparian restoration (voluntary approach can achieve targets)	Acres replanted by subbasin	Plan targets for riparian restoration acres by subbasin	Two consecutive years of not meeting annualized targets
Floodplain connectivity (reconnected side channels increase Chinook salmon rearing habitat and smolt escapement)	1. % backwater pool 2. Juvenile Chinook salmon use of upstream side-channels 3. Smolt escapement	1. % pool target 2. Juvenile density target 3. Smolt escapement target	1. No increase in pool area 2. Low level of use by juvenile Chinook salmon 3. Low # of natural smolts 3 years in a row
Treat landslides (landslides are the major sources of redd-intruding sediment)	Sediment from roads; fines in redds	Stillaguamish fine sediment criteria (STAG 2000)	Fine sediment criteria not met in downstream redds within 5 years after treatment
Reduce sediment from roads (landslides and/or road-derived sediment are the largest sources of redd-intruding sediment)	Sediment from landslides; fines in redds	Stillaguamish fine sediment criteria (STAG 2000)	Fine sediment criteria not met in downstream redds within 5 years after treatment
Increase large woody debris (log jams improve habitat diversity and complexity for juvenile Chinook salmon)	1. % pool area in EDT reach 2. Juvenile density in and around log jams	1. % pool area in EDT reach before restoration 2. Juvenile density before restoration	1. No net increase in pool area % in reach; 2. No use for Chinook salmon juvenile rearing
Estuary restoration (restoration or creation of salt marsh habitat improves habitat diversity and complexity for juvenile Chinook salmon)	Juvenile density in restored or created salt marsh	Juvenile density in existing salt marsh	Less than 50% of published juvenile density within 3 years of restoration

Table 24. Habitat Protection Validation Monitoring

Protection Element/Hypothesis	Indicator	Comparison	Trigger
Critical Area Regulations (CAR) protect riparian buffers	% forest cover	2001 land cover	Loss of mature evergreen and medium evergreen forest cover in nearstream
Shoreline Management Plan (SMP) protects against modifications to banks in Chinook salmon habitat	% hydromodification	2002 data from SC	Increase in % modification
Forest Practices Regulations, DNR HCP, and Northwest Forest Plan protect riparian buffers	% forest cover	2001 land cover	Loss of mature evergreen and medium evergreen forest cover in nearstream

Table 25. Harvest Strategy Validation Monitoring

Harvest Element/Hypothesis	Indicator	Comparison	Trigger
Harvest of ESA-listed fish (e.g., blackmouth fishery; assumption is that there are fish surplus to recovery)	1. Harvest % 2. Adult escapement	1. Harvest ceiling % 2. Adult escapement for South Fork and North Fork populations	1. Two consecutive years of exceeding harvest ceiling 2. Two consecutive years of not meeting adult escapement targets

Table 26. Hatchery Strategy Validation Monitoring

Hatchery Element/Hypothesis	Indicator	Comparison	Trigger
Conservation hatchery program will increase composite North Fork Chinook salmon population above critical threshold	Relative productivity of natural spawners versus hatchery spawners	Productivity of natural spawners compared to hatchery spawners	Conservation hatchery does not increase composite North Fork population for 3 consecutive years and hatchery fish do not return with >2.0 natural spawner to hatchery spawner survival rate
Conservation hatchery program can produce Chinook salmon that are not significantly different genetically from the naturally spawning population	Periodic DNA monitoring of the hatchery component and naturally spawning component of the North Fork population	Genetic composition of hatchery component compared to naturally spawning component	Genetic composition of hatchery component changes significantly from naturally spawning component within 4 years

Administration

Implementation of this Monitoring and Adaptive Management Strategy, will require the following conditions:

1. Commitment to fund and implement monitoring and evaluation actions;
2. Timely reporting of monitoring results;
3. Regular and timely evaluation of whether criteria are met; and
4. Commitment to change what we said we will do if it is found to be infeasible, ineffective, or if the underlying assumptions of the action cannot be validated.

Monitoring responsibilities, priorities, and adaptive management responses for the habitat, harvest, and hatchery strategies are summarized in the following tables. The Stillaguamish Technical Advisory Group (TAG) will review all monitoring results annually in March. The TAG will determine the particular barriers to success related to inadequate progress on implementation of the Plan, ineffectiveness of actions, or invalid assumptions. The TAG will present its findings and recommendations to the SIRC in April. The SIRC will determine appropriate management response and take action accordingly.

The lead agencies indicated in the monitoring responsibility and priority tables below are coded as follows:

CLC	Cascade Land Conservancy
SC	Snohomish County
ST	Stillaguamish Tribe
DOE	Washington State Department of Ecology
WDFW	Washington State Department of Fish and Wildlife
DNR	Washington State Department of Natural Resources
FS	United States Forest Service

Table 27. Habitat Restoration Monitoring Responsibilities and Priorities

Monitoring Element	Lead Agency	Reporting Frequency	Evaluation Frequency	Priority (1 – 3)
Riparian Restoration				
Acres of riparian vegetation planted	ST	Annually	Annually	3
Acres of conversion from bare ground, grass land cover to shrubs/small trees	SC	Every 3-5 years	Every 3-5 years	3
Acres replanted by subbasin	SC	Every 3-5 years	Every 3-5 years	3
Floodplain Connectivity				
Side-channel acres/miles reconnected	SC	Annually	Five years	3
1. % side-channel connection maintained 2. Juvenile density in summer and winter	SC/ST	Annually	Annually	3
1. % backwater pool 2. Juvenile Chinook salmon use of upstream side-channels; smolt escapement	SC/ST	Annually	Annually	3
Treat Landslides				
Landslides treated	ST	Annually	Five years	2
% fines in spawnable gravel downstream from landslide treatments	ST/SC	Annually	Annually	2
Sediment from landslides, other sources; fines in redds	ST/SC	Annually	Annually	2
Reduce Sediment from Roads				
Miles unpaved forest roads on potentially unstable slopes restored or treated	DNR/FS	Annually	Annually	2
% fines in spawnable gravel downstream from road treatments	ST/SC	Annually	Annually	2
Sediment from landslides, other sources; fines in redds	ST/SC	Annually	Annually	2
Increase Large Woody Debris				
Engineered log jams installed	SC	Annually	3-4 years	2
% pool area (primary and backwater), pool frequency	SC	Annually	Annually	2
juvenile Chinook density in and around log jams	ST	Annually	Annually	2
Estuary Restoration				
1. Leque Island and The Nature Conservancy (TNC) properties restored to tidal influence 2. River delta log jams installed	ST	Annually	Five years	1
Acres of salt marsh habitat restored or created	ST	Annually	Five years	1
Juvenile density in restored or created salt marsh	ST	Annually	Five years	1

Table 28. Habitat Protection Monitoring Responsibilities and Priorities

Monitoring Element	Lead Agency	Reporting Frequency	Evaluation Frequency	Priority (1 – 3)
Critical Areas Regulations (CAR)				
CAR updated	SC	Annually	Legal due date	1
1. Nearstream Total Impervious Area (TIA) acres 2. Wetland acres	SC	Every 3-5 years	Every 3-5 years	1
% forest cover	SC	Every 3-5 years	Every 3-5 years	1
Comprehensive Growth Management Plan (Comp. Plan)				
Comp. Plan updated	SC	Annually	Legal due date	1
1. Nearstream acres in forest land cover types 2. Wetland acres	SC	Every 3-5 years	Every 3-5 years	1
<i>No validation monitoring</i>				
Shoreline Management Plan (SMP)				
SMP updated	SC	Annually	Legal due date	1
Bank hardening length in priority reaches	SC	Annually	Annually	1
% hydromodification	SC	Annually	Annually	1
Forest Practices Regulations, DNR HCP, and Northwest Forest Plan				
<i>No implementation monitoring</i>				
1. % hydrologically mature forest in subbasin 2. Road density 3. Miles of road on potentially unstable slopes	SC	Every 3-5 years	Every 3-5 years	1
% forest cover	SC	Every 3-5 years	Every 3-5 years	1
Hydraulic Code				
1. # projects constructed without required Hydraulic Project Approval (HPA) permit 2. % hardened bank in EDT reach, under HPAs	WDFW	Annually	Annually	1
Feet of hardened bank allowed in Chinook salmon reaches	SC	Annually	Annually	1
<i>No validation monitoring</i>				
Temperature Total Maximum Daily Load (TMDL)				
TMDL water quality cleanup plan completed	DOE	Annually	Legal due date	1
Stream temperature (7-day running average high)	DOE	Annually	Five years	1
<i>No validation monitoring</i>				
Habitat designated for conservancy				
Acres of habitat conserved	CLC	Annually	Annually	2
% forest land cover; wetland	SC	Every 3- 5 years	Every 3-5 years	2
<i>No validation monitoring</i>				

Table 29. Harvest Monitoring Responsibilities and Priorities

Monitoring Element	Lead Agency	Reporting Frequency	Evaluation Frequency	Priority (1 – 3)
Non-incidentals % or number of fish harvested	ST	Annually	Annually	1
Incidental % or number of fish harvested	ST	Annually	Annually	1
Canada % or number of fish harvested	ST	Annually	Annually	1
Harvest %; adult escapement	ST	Annually	Annually	1

Table 30. Hatchery Monitoring Responsibilities and Priorities

Monitoring Element	Lead Agency	Reporting Frequency	Evaluation Frequency	Priority (1 – 3)
Portion/geographic distribution of population selected for conservation hatchery program	ST	Annually	Annually	1
Number and size of smolts released	ST	Annually	Annually	1
Egg to release survival (%) of hatchery fish	ST	Annually	Annually	1
Size distribution, outmigration timing of hatchery and natural juveniles	ST	Annually	Annually	1
Age and sex composition, time and area of spawning of returning hatchery and natural adults	ST	Annually	Annually	1
Relative productivity of natural spawners versus hatchery fish	ST	Annually	Annually	1
Periodic DNA monitoring of the hatchery component and naturally spawning component of the North Fork population	ST	Annually	Annually	1

Table 31. Implementation Adaptive Management Responses

Monitoring Element	Trigger	Barriers to Success	Determine Cause	Potential Responses
Habitat Restoration Implementation	Projects not implemented	Inadequate SRFB funding; lack of staff commitment, project sponsors; inability to obtain permits; no willing landowners	Review funding, agency resources; review permit requirements; outreach to landowners	Seek other sources of funding; encourage prioritization of project development and implementation; seek ways to improve permitting; improve outreach to recruit sponsors and willing landowners
Habitat Protection Implementation	Protective measures not implemented or updated	Lack of agency cooperation; internal obstacles for implementing agencies; work programming does not prioritize protection	Review current protection policies to determine adequacy; review work priorities	Propose policy revisions and prioritization of habitat protection; work directly with elected officials, agency directors
Harvest Strategy Implementation	Recovery Exploitation Rate (RER) exceeded or minimum escapement not reached	Poor pre-season estimate of run size; Inaccurate pre-season fishery impact assessments; Failure to adhere to RER or minimum escapement guideline	Review preseason forecast methodology and impact assessment models (postseason reports); harvest north of US/Canada border too high to be compensated in US fisheries	Modify preseason forecast input data or methodology; recalibrate impact assessment model Reduce fishery impacts to adhere to RER or minimum escapement guideline; renegotiate US Canada treaty
Hatchery Strategy Implementation	Program goals not met	Work programming; poor escapement	Review program fish selection methods; review escapement parameters	Revise program operations to align with program objectives

Table 32. Effectiveness Adaptive Management Responses

Monitoring Element	Trigger	Barriers to Success	Determine Cause	Potential Responses
Habitat Restoration Effectiveness	Restoration targets not met	Poor implementation (pace, methods, etc.); inadequate juvenile production; assumptions invalid	Review project designs, locations; review construction methods; review, revise validation monitoring, test new hypotheses	Focus on projects that are known to be successful; try new designs, locations, methods; revise monitoring strategy
Habitat Protection Effectiveness	Degradation of riparian forest, wetlands, banks, forest cover, stream temperature	Poor administration and/or lack of enforcement of protective measures	Review protection and enforcement policies	Propose revisions to protection policies, new enforcement policies, new standards and/or codes; connect administration and enforcement to current conditions, desired future conditions
Harvest Strategy Effectiveness	Escapement trend not reflective of population productivity trend	Recovery Exploitation Rate (RER) not appropriate for population productivity	Review input data and methodology for derivation of RER and minimum escapement	Revise computation of RER and minimum escapement
Hatchery Strategy Effectiveness	Low survival of hatchery fish and/or natural fish	Poor selection of program fish; problems with hatchery operations; natural fish production limiting program production	Review program fish selection methods, hatchery methods, escapement parameters, habitat availability	Revise program operations to align with program objectives

Table 33. Validation Adaptive Management Responses

Monitoring Element	Trigger	Barriers to Success	Determine Cause	Potential Responses
Habitat Restoration Validation	Assumptions/hypotheses not valid	Continued use of ineffective ideas, data, technology, methods	Review hypotheses, assumptions and develop new hypotheses	Revise Plan to incorporate new hypotheses and revise Monitoring Strategy to test new hypotheses
Habitat Protection Validation	Assumptions/hypotheses not valid	Continued use of ineffective ideas, data, technology, methods	Review hypotheses, assumptions and develop new hypotheses	Revise Plan to incorporate new hypotheses and revise Monitoring Strategy to test new hypotheses
Harvest Strategy Validation	Assumptions/hypotheses not valid	Continued use of ineffective ideas, data, technology, methods	Review hypotheses, assumptions and develop new hypotheses	Revise Plan to incorporate new hypotheses and revise Monitoring Strategy to test new hypotheses
Hatchery Strategy Validation	Assumptions/hypotheses not valid	Continued use of ineffective ideas, data, technology, methods	Review hypotheses, assumptions and develop new hypotheses	Revise Plan to incorporate new hypotheses and revise Monitoring Strategy to test new hypotheses

Funding for Monitoring

The proposed Monitoring and Adaptive management Strategy includes measurable actions, indicators, comparison criteria, evaluation trigger points, and management responses. It also provides a supporting framework for re-focusing our efforts, if necessary, based on the results of our evaluation process. This Monitoring and Adaptive Management Strategy should also serve as an explicit platform for obtaining political and financial support for actions that are proven to be successful for Chinook salmon recovery in the Stillaguamish Watershed. Much of the work called for in this Monitoring and Adaptive Management Strategy is currently funded and underway. However, much of the current funding is short-term and its continuation is uncertain. Therefore continuation of the currently funded monitoring and evaluation work is also uncertain. Long-term funding is an essential condition for implementing this Monitoring and Adaptive Management Strategy.