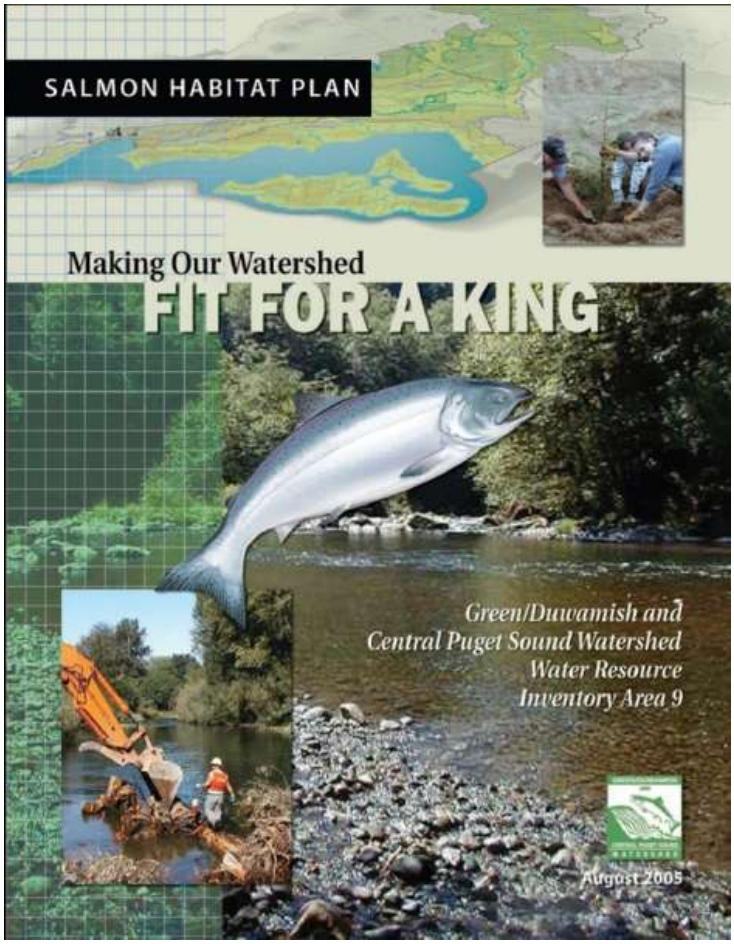
Green-Duwamish and Central Puget Sound Watershed (WRIA 9)



Chinook Monitoring and Adaptive Management Phase I Summary Report: Preliminary Monitoring and Adaptive Management Framework

Draft Effective Date: May 31, 2014

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GREEN / DUWAMISH AND CENTRAL PUGET SOUND WATERSHED

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The Puget Sound Recovery Implementation Technical Team (RITT) for their development of the Common Framework for Chinook Monitoring and Adaptive Management on which these products are based on as well as their technical guidance throughout this project.
The Puget Sound Salmon Recovery Council and Monitoring and Adaptive Management Subcommittee for their policy guidance on this project.
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The Puget Sound Partnership Ecosystem Recovery Team, Science Team and Executive Oversight Committee.

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The Core Team charged with translating the WRIA 9 Chinook documents to create this framework document was: Kollin Higgins, King County; Laura Blackmore, LLTK/Cascadia Consulting Group; Bruce Wulkan, Puget Sound Partnership; Kirk Lakey, Washington Department of Fish and Wildlife and Regional Implementation Technical Team; and Elissa Ostergaard, WRIA 9.

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Executive Summary

Puget Sound Chinook Monitoring and Adaptive Management: 2005 Recovery Plan Translation

In 1999, Puget Sound Chinook salmon were listed as threatened under the federal Endangered Species Act. Instead of NOAA-NMFS (the federal agency accountable for the listing) writing the recovery plan, NOAA supported having the plan written by locally led collaborative watershed groups that brought together local jurisdictions, tribes, non-profits, state and federal entities and other stakeholders to write unique chapters for their watersheds. The regional chapter (Volume I) along with the watershed chapters (Volume II), were submitted to NOAA for review and adoption as the Federal Recovery Plan. NOAA completed review in 2007 and adopted Volume I and II as the Puget Sound Chinook Recovery Plan. As Washington State's designated regional salmon recovery organization for Puget Sound, the Puget Sound Partnership uses the Puget Sound Chinook Recovery Plan as a guide for working with local stakeholders and communities, Native American tribes, businesses, and state and federal agencies to identify, sequence, prioritize and implement projects and programs to recover salmon.

Monitoring and adaptive management have occurred at the watershed and regional scales as implementation of the Recovery Plan has proceeded. However, the lack of a formal framework has meant that there is no standardized vocabulary or shared common approach to articulate the key assumptions of the chapters in Volume II, to test assumptions across chapters, or to connect the local, watershed-scale information in Volume II with the regional-scale information in Volume I. This gap limits the collective ability of resource managers to assess the effectiveness of salmon recovery efforts across the region, to identify uncertainties, and to update priorities and actions in the Recovery Plan.

To support monitoring and adaptive management plan development, the Puget Sound Recovery Implementation Technical Team (RITT) has been working with regional and local groups to provide technical review and guidance for recovery. The RITT completed the draft Chinook Common Framework in March 2013, which provides a formal Monitoring and Adaptive Management Common Framework (Common Framework) for assessing Puget Sound Chinook salmon recovery. Furthermore, the Common Framework is intended to help salmon recovery managers formalize their local-scale monitoring and adaptive management plans using a common approach. Ultimately, the Common Framework and the process and tools developed to implement the framework also may be applicable to recovery efforts for other similar species in the region.

The ultimate goal of the Chinook Monitoring and Adaptive Management (M and AM) Project is to provide Puget Sound with explicit, standardized tools to design, monitor, and adaptively manage Chinook salmon recovery efforts. The first major phase of the Chinook M and AM Project is to develop 16 Chinook M and AM Frameworks (local frameworks) by June 2014. These local frameworks are intended to capture information from the fourteen 2005 watershed chapters (plus the 2010 Skokomish watershed chapter and the forthcoming Elwha chapter) as well as any technical resources created between 2005-2013 that have been vetted in the watersheds. The local frameworks include all ecosystem conditions, relationships, and assumptions relevant to salmon recovery for each chapter and will help individual watersheds and the region answer the following key questions about Chinook recovery in a systematic manner:

- *What are our goals?*
- *What are the biggest challenges to reaching our goals?*
- *What are we doing or what should we do to reach our goals?*

After June 2014, the local frameworks will be used at the watershed scale to develop Chinook M and AM Plans, including priority monitoring metrics and protocols for status and trends, implementation, and effectiveness. Metrics and protocols will be developed in close collaboration with PSEMP and the RITT to ensure efficiency and quality control across watersheds. The Chinook M and AM Plans will help answer the following questions:

- *How do we measure progress?*
- *What tells us we need to adapt?*
- *How do we adapt if needed?*

Completed Chinook M and AM Frameworks and Plans will formalize an efficient reporting structure from the watersheds to the region. This will allow salmon recovery groups to track implementation of salmon recovery chapters more consistently, and watersheds will be able to provide standardized information on the conditions of

their habitats and Chinook populations for regional roll-up reports. These regional roll-ups will help watersheds and the Puget Sound Salmon Recovery Council report progress to the public, legislators, NOAA, and funders, and identify priority regional barriers to address

Specific watershed and regional outcomes from completing the Monitoring and Adaptive Management Project include:

• Documenting how recovery is expected to proceed
• Achieving Chinook population and habitat-related goals
• Emphasizing existing and/or identifying new strategies that maximize impact and advance Chinook recovery goals
• Understanding the barriers to success
• Compiling priority monitoring needs and gaps with measures to track progress
• Providing guidance for next steps, if the process does not reach expected goals
• Applying a common language (standardize nomenclature) and approach to define and support regional evaluation at the Evolutionarily Significant Unit (ESU) level

M and AM Phase I - Translation at the Watershed Scale

Phase I Project Status

In August 2013, the WRIA 9 Watershed Ecosystem Forum charged a Core Team with creating a monitoring and adaptive management framework in accordance with the regional Chinook Monitoring and Adaptive Management project described above. Using the WRIA 9 Salmon Habitat Plan: Making Our Watershed Fit for a King and supporting documents as its guide, the Core Team worked diligently to complete the following steps:

1. Identify components and key ecological attributes of importance in WRIA 9.
2. Identify the stresses that negatively affect habitats and Chinook salmon in our watershed.
3. Identify and prioritize indicators to measure the health of components and key ecological attributes. The WRIA 9 Core Team also developed condition bins to assess the status of the watershed's Chinook salmon population, components, and key ecological attributes.
4. Record baseline and current data for as many indicators as possible.
5. Record the goals of the WRIA 9 Salmon Habitat Plan, and desired future status of key ecological attributes.
6. Identify the pressures that cause stresses to Chinook and their habitats.
7. Identify the strategies contained in the WRIA 9 Salmon Habitat Plan, and develop results chains for the highest priority strategies. To the extent possible, the Core Team also identified implementation and effectiveness objectives and indicators to track progress toward achieving our goals through these strategies.
8. Summarize the gaps identified through this process, and describe the adaptive management process that WRIA 9 currently uses.

As a result of this process, WRIA 9 now has another tool to measure and communicate its progress, as well as barriers and needs, to its stakeholders and the region. We also have a list of prioritized indicators to help us track the most important characteristics of habitats and salmon populations, and a refined and more specific chain of logic explaining how we expect our most important strategies will lead to results. WRIA 9 also has gained a better understanding of the current plan, and its strengths and gaps, which will help guide our work in the future.

Next Steps

The WRIA 9 Core Team looks forward to completing the Chinook Monitoring and Adaptive Management project, particularly updating the draft WRIA 9 Monitoring and Adaptive Management Plan, which was shelved in 2013, to reflect this new framework and dovetail with the regional monitoring program. We also look forward to completing results chains and working to fill the gaps identified in Phase 1 so that we can enhance our collaborative work to recover Chinook salmon.

Lessons Learned

Overall, the WRIA 9 Salmon Habitat Plan and other supporting documents are comprehensive and strong. They do an excellent job of capturing stresses, pressures, and strategies to recover salmon. However, we did identify some gaps that should be filled to strengthen our collective work:

- The 2005 plan also lacks quantitative or time-bound objectives for our work on our strategies. Developing such objectives, particularly for the intermediate results we expect to achieve, would help us track and communicate our progress. Recovering salmon will take at least 50 years, but with quantifiable or time-bound objectives, we can report our progress on much shorter time scales.
- The Salmon Habitat Plan does not address the pressures of climate change, sea level rise, or recreation.
- The 2005 Salmon Habitat Plan focuses on habitat, and is weak in the areas of hatchery, harvest and dam mitigation. WRIA 9 would like to work more closely with the region and Co-Managers to agree on goals and timelines for reducing these pressures.

Our work on this project also illuminated areas where regional guidance and collaboration would be useful:

- Development of a set of indicators to monitor across all 16 watersheds in Puget Sound, using consistent protocols. Regional agreement on this set of indicators would help WRIA 9 update its monitoring plan, as well as allow us to contribute to telling the story of salmon recovery across the entire evolutionarily significant unit. This type of reporting is needed in order for NOAA to determine whether changes in the listing status of Chinook salmon may be warranted.
- Development of regional guidance on how to set condition bins. This guidance should cover as many indicators as possible, but at a minimum should be provided for the set of regional indicators described above.
- Development of guidance on how to set quantifiable goals and/or desired future status for habitats.

Filling these gaps at the watershed and regional levels would help us develop a robust monitoring program to track our progress efficiently and effectively. Funding the monitoring program would allow us to learn from our successes and challenges, and to adaptively manage our efforts.

1.0 Scope of Chinook Recovery Effort in Green-Duwamish Watershed

Scope of the Regional Recovery Effort

In 1999, Puget Sound Chinook salmon were listed as threatened under the federal Endangered Species Act. Instead of NOAA-NMFS (the federal agency accountable for the listing) writing the recovery plan, NOAA supported having the plan written by locally led collaborative watershed groups that brought together local jurisdictions, tribes, non-profits, state and federal entities and other stakeholders to write unique chapters for their watersheds. These watershed chapters, along with a regional chapter, were submitted to NOAA for review and adoption as the Federal Recovery Plan. NOAA completed review in 2007 and adopted the chapters, with the caveat that each watershed and the region needed to develop monitoring and adaptive management plans to guide and track the recovery effort. Phase I of the Monitoring and Adaptive Management (M and AM) Project takes the first step toward development of watershed and regional MAM plans by translating the 16 watershed chapters into a common framework for monitoring and adaptive management. As Washington state's designated regional salmon recovery organization for Puget Sound, the Puget Sound Partnership (PSP) uses the Puget Sound Chinook Recovery Plan as a guide for working with local stakeholders and communities, Native American tribes, businesses, and state and federal agencies to identify, sequence, prioritize and implement projects and programs to recover salmon. Use of a common framework will increase opportunities for shared learning across watersheds, will support the roll-up and assessment of information from the local (i.e. watershed) to the regional (i.e. Puget Sound) scale, and will improve PSP's capacity to support local and regional recovery efforts.

Phase I of the M and AM project has focused on translating information from the existing 2005 recovery plan chapters and subsequent Three Year Work Plans (3YWPs) into a common framework. Some watersheds also brought in relevant research conducted since 2005 that had gone through a local vetting process. For the most part, new information has not been developed or formally approved by the watersheds or the region through this process. However, the process completed over the past year has provided many opportunities for increased understanding of the context and assumptions underlying regional and watershed recovery plans, critical gaps, key next steps, and shared resource and learning opportunities.

Chinook Recovery at the Watershed Scale

As a first step in Phase I of the M and AM project, each watershed identified the vision, scope, biophysical and cultural context of Chinook recovery in their watershed. Information from the 2005 recovery plan chapter and subsequent 3YWPs was used to develop the content included in this section. Identification of the vision, scope and underlying context of the recovery effort was an important early step in the process, as this information helped to place sidebars on project conversations and decisions taking place in the subsequent steps of the MAM project.

If a vision for the overall recovery effort was articulated in the 2005 chapter or subsequent 3YWPs, this information formed the basis for the vision included below. If a vision does not yet exist, this gap was identified. The scope of the recovery effort includes a description of the Chinook populations in the watershed, the ecosystem components (i.e. habitats and other species) identified as priorities for Chinook recovery and specific goals for both Chinook and Chinook habitat that have been identified in the 2005 chapter or 3YWPs.

Chinook recovery takes place within a larger biophysical and socio-political context. In order to identify recovery priorities and determine the most effective sequencing of actions, it is important to understand this context and its relationship to the Chinook recovery effort. This information was compiled from existing plans and documents and included below in the section titled Chinook Recovery Context in the Watershed.

Vision for the Chinook Recovery Effort within the Watershed

Working proactively to achieve a healthy watershed where people, fish and wildlife will thrive today and tomorrow.

Description of Chinook Populations within the Watershed

The scope of this project is to develop a Habitat Plan to restore habitat used by Chinook salmon, bull trout, and other salmonids in the Green/Duwamish/and Central Puget Sound Watershed. The plan focuses on Green River Chinook, using the mainstem river, WRIA 9 nearshore areas as well as the marine shoreline of Vashon and Maury Island. The marine shoreline is used by many other Chinook populations. A goal of the plan is to

reintroduce a spring Chinook stock to the upper watershed. Given the historic connection of the White River to the Green River system, the White River spring Chinook population is likely the most compatible population, but analysis has not been done yet to determine which population to use.

The plan addresses habitat, but not harvest and hatchery actions.

Geographic Scope (Sub-watersheds):
Upper Green
Middle Green
Lower Green
Duwamish
Nearshore

Watershed-specific pressures are not specifically listed, but strategies and actions are specific by sub-watershed. Sub-watershed conservation hypotheses are related to specific pressures for each sub-watershed.

Documents relied on:
Habitat Plan
WRIA 9 Salmon Habitat Plan-2007 Amendments
WRIA 9 Status and Trends Monitoring Report: 2005-2010
WRIA 9 Monitoring and Adaptive Management Plan-DRAFT
Implementation Guidance for the WRIA 9 Salmon Habitat Plan 2006
WRIA 9 Strategic Assessment Report-Scientific Foundation for Salmon Habitat Conservation.

Priority Ecosystem Components and Goals for Chinook Recovery

We identified the following ecosystem components from the Common Framework (RITT 2013) as priorities for Chinook recovery in our watershed. The names and descriptions of goals identified in the 2005 plan or in subsequent 3 Year Work Plans that are relevant to species and habitat ecosystem components are included. There is one set of goals that applies to each of the habitat components, so they are only listed once. However, these goals apply to each component. The Chinook component has an additional set of goals, which are listed only under the Chinook component. For a complete list of components with descriptions, see Appendix A.1.

Natal Chinook estuaries
Coastal landforms
Bluff backed beaches
Pocket estuaries
Channels >50m Bankfull Width
Channels <50m Bankfull Width
Side channels
Non-Channel Lakes & Wetlands
Species & food webs
Uplands

The following goals apply to all WRIA 9 components:

> **Goal: Overall (Overall)** - Protect, rehabilitate, and enhance habitat to support viable salmonid populations in response to the Endangered Species Act listing of Chinook salmon and bull trout using an ecosystem approach. This approach will also benefit other non-listed aquatic species.
>
> **Goal: Processes & Habitats (Goal 1)** - Protect and restore physical, chemical, and biological processes and the freshwater, estuarine, and marine nearshore habitats on which salmonids depend.-- Protect and restore natural ecosystem processes; where restoration is not possible, consider sustainable engineered solutions;-- Protect currently functioning habitat;-- Protect and restore headwater areas, streams, and wetlands where feasible;-- Encourage management of flows to support habitat-forming processes; and-- Encourage management of land use changes and development standards to minimize impacts.
>
> **Goal: Habitat Connectivity (Goal 2)** - Protect and restore habitat connectivity where feasible.-- Encourage maintenance and protection of corridors that link habitats and (re) connect freshwater, estuarine, and saltwater habitats and their associated zones, as required by salmonids during all life

stages;-- Connect side channels and floodplain areas to the mainstem where feasible; and-- Restore fish access where limited by dams, culverts, revetments and other barriers, where feasible.

Goal: Water Quality & Quantity (Goal 3) - Protect and improve water quality and quantity conditions to support healthy salmonid populations.-- Reduce processes and inputs that degrade water quality where possible;-- Enhance riparian vegetation to improve water quality conditions where possible; and-- Encourage management of water withdrawals and groundwater recharge to maintain cool water inputs in key areas.

Goal: Implement Plan (Goal 4) - Provide an implementable plan that supports salmon recovery.-- Promote informed, sustained commitment of key watershed interests;-- Implement an adaptive management approach to respond to changes and to ensure continued effectiveness;-- Develop a strategy to secure adequate funding for implementation;-- Obtain support of WRIA 9 interlocal agreement member jurisdictions, federal and state agencies, Tribes, the agricultural community, and the business community in their recovery efforts;-- Provide public outreach and education, and engage the public in stewardship, restoration, and enhancement activities;-- Coordinate with other WRIA 9 planning activities; and-- Provide management actions that are doable, practical, and effective.

Green River Fall Chinook Salmon (This is the only component to which all 8 goals apply.)

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Goal: Abundance (Goal 5) - Short-term (10-15 years): Increase abundance of natural origin salmon to between 1,000 and 4,200 annually.Long-term (50-100 years): Increase abundance of natural origin salmon to 27,000 annually.

Goal: Productivity (Goal 6) - Short-Term Productivity: Increase population growth rate of natural origin salmonLong-Term Productivity: Stabilize population growth rate at the equilibrium.

Goal: Spatial Structure (Goal 7) - Short-Term Spatial Structure: Increase distinct spawning aggregations in the Middle Green.Long-Term Spatial Structure: Achieve distinct spawning aggregations above Howard Hanson Dam.

Goal: Diversity (Goal 8) - Short-Term Diversity: Protect existing life history types and increase variability in age structure.Long-Term Diversity: Re-establish spring population upstream of Howard Hanson Dam. Re-establish historical run and spawn timing of existing fall population.

Chinook Recovery Context in the Watershed

Bioregional and Landscape Context

WRIA 9 consists of the Green/Duwamish and Central Puget Sound watersheds. It is one of 19 Water Resource Inventory Areas (WRIAs) draining into Puget Sound. This watershed has seen some of the most intensive human development of any watershed in Puget Sound. The Green/Duwamish River begins in the Cascade Mountains about 30 miles northeast of Mount Rainier and flows over 93 miles to Seattle's Elliott Bay. The Central Puget Sound watershed consists of the short independent streams that drain to Puget Sound from Elliott Bay south to Federal Way, and the associated shorelines of Puget Sound. Vashon/Maury Island and its marine shorelines also are included in WRIA 9 for salmon habitat planning purposes. WRIA 9 is bordered on the north by the Lake Washington/Cedar/Sammamish watershed (WRIA 8) and to the south by the Puyallup/White River watershed (WRIA 10).

Watershed Geography

The Green/Duwamish River is the largest freshwater component of WRIA 9. The Green/Duwamish mainstem is responsible for producing the eight major species of anadromous and resident salmonids present in the watershed. Historically, the White, Green, and Cedar (via the Black) Rivers flowed into the Duwamish River, and the system drained an area of over 1,600 square miles. Because of the diversion of the White River in 1911 and the Cedar River in 1916, the Green/Duwamish drainage area has been reduced to 556 square miles. The marine shoreline of WRIA 9 includes two geographic areas. The mainland portion extends from West Point in Seattle down to the King County boundary in Federal Way. Note that the northern boundary at West Point is different than how DOE classifies the boundary between WRIAs 8 and 9. The second portion of the marine shoreline is composed of Vashon and Maury Islands.

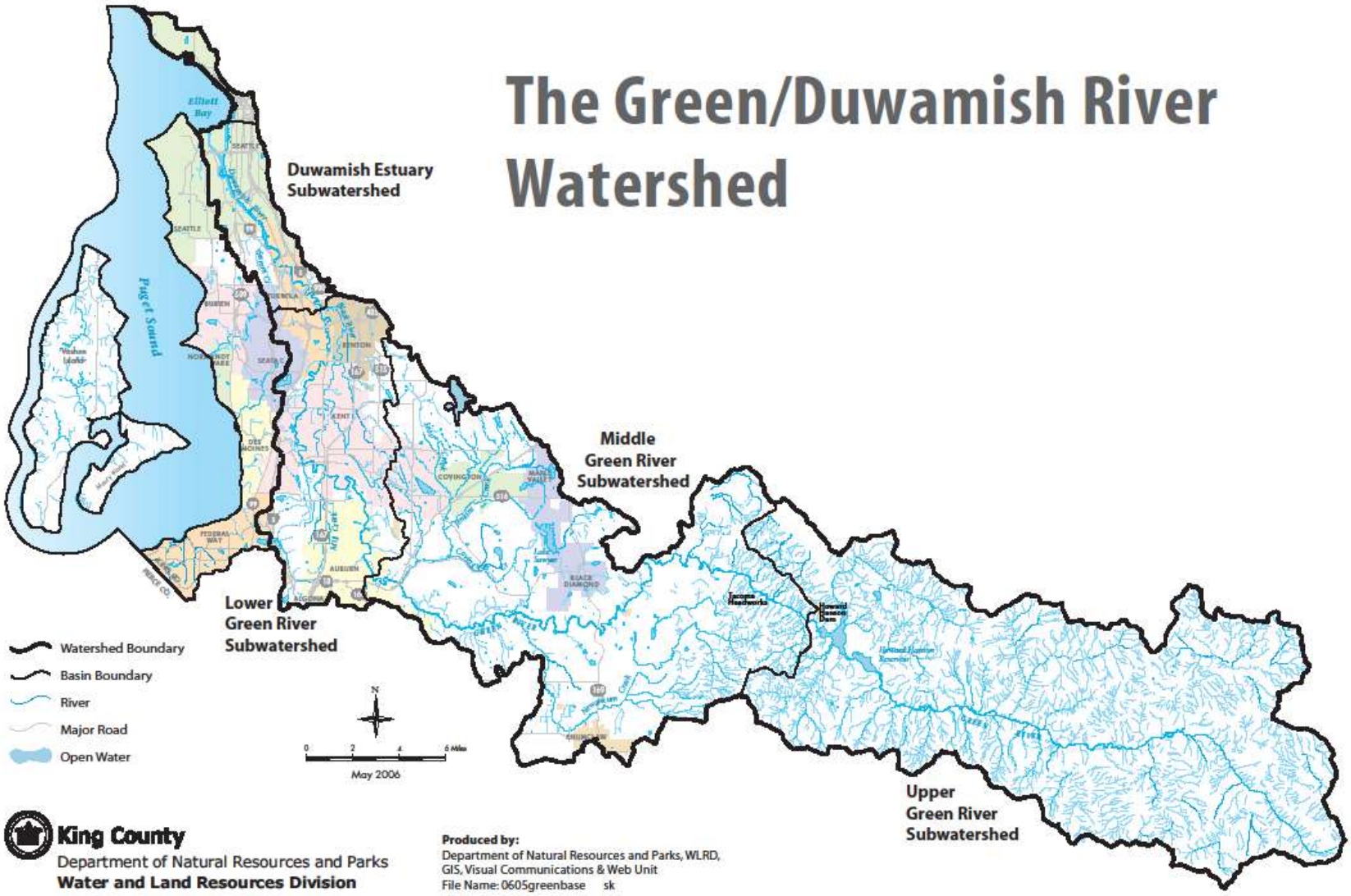


Figure 1. Map of Green-Duwamish and Central Puget Sound Watershed

Physical Description

Water Resource Inventory Area 9 (WRIA 9) consists of the Green/Duwamish Watershed and Central Puget Sound Watershed. The Green/Duwamish River flows over 93 miles from the Cascade Mountains to Elliott Bay, and the Green/Duwamish River watershed covers 482 square miles. The Central Puget Sound Watershed, the smaller portion of WRIA 9, consists of the short independent stream basins that drain to Puget Sound from West Point south to the Pierce County line and the associated shorelines of Puget Sound. Also included in WRIA 9 for salmon habitat planning purposes is Vashon/Maury Island. The land area of the Central Puget Sound watershed totals 93 square miles and the marine waters make up an additional 89 square miles. Overall, the planning area of WRIA 9 encompasses 664 square miles of land and water.

For ease of reference in this Habitat Plan, this entire area is referred to as the Green/Duwamish and Central Puget Sound Watershed or simply WRIA 9.

WRIA 9 is divided into five sub-watersheds for planning purposes:

- Upper Green River (Green/Duwamish river miles 93+ to 64.5);
- Middle Green River (Green/Duwamish river miles 64.5 to 32);
- Lower Green River (Green/Duwamish river miles 32 to 11);
- Duwamish Estuary (Green/Duwamish river miles 11 to 0); and
- Marine Nearshore.

WRIA 9 is bordered on the north by the Lake Washington/Cedar/Sammamish Watershed (WRIA 8) and to the south by the Puyallup/White River Watershed (WRIA 10). Historically, the Green River joined the White River in Auburn. Farther downstream, in Tukwila, the Cedar/Black Rivers joined the Green/White Rivers to form the Duwamish River, which meandered 15 miles farther to empty into Elliott Bay. The three major rivers drained a watershed of about 1,600 square miles. The area draining into Elliott Bay today is about 30% of the size it was a century ago.

The physical characteristics of WRIA 9 have been affected by a legacy of development and human activities in the watershed. These alterations have affected important habitat forming processes and shaped existing salmonid habitat throughout the watershed.

"As habitats shrink, they are no longer capable of supporting populations large enough to maintain themselves; many are locally extirpated even though some attributes of the habitat remains." (King County Department of Natural Resources and Parks 2004a)

The habitat changes in WRIA 9 are well documented. The area and continuity of native vegetation has been transformed from the original composition and arrangement to alternative structures and functions. This transformation and its effects are described in the Best Available Science Report (King County Department of Natural Resources and Parks 2004a). Some of the transformation processes that have occurred over the past century are continuing today as the human population growth of WRIA 9 increases.

Biological Description

The Green River is believed to have historically supported two independent populations of Chinook salmon, a stream-type and ocean-type (Nehlsen et al. 1991; WDF et al. 1993; Puget Sound TRT 2003). Stream-type Chinook salmon, commonly referred to as spring stocks, return to their natal river principally in spring and early summer, several months prior to spawning. Ocean-type, commonly referred to as summer/fall stocks, principally enter freshwater during the late summer and fall, just a few days or weeks before spawning. These two races usually exhibit different juvenile life history types. The majority of stream-type juveniles typically spend a year or more in freshwater before outmigration to marine areas, while ocean-type juveniles normally outmigrate within several months of emerging from gravel. Ocean-type Chinook are larger than stream-type Chinook at every age class because stream-type Chinook grow at a slower rate during their first year (Healey 1991).

In addition to the two Green River populations, there were probably a minimum of three other independent Chinook populations within the greater Duwamish basin, including those in the Cedar River, White River, and North Lake Washington (Figure 2.4) (Puget Sound TRT 2004). However, the extensive use of Green River hatchery stock within the greater Duwamish basin to replenish depleted stocks has made it difficult to reconstruct the historical patterns of genetic similarity and divergence (Puget Sound TRT 2004).

For adults, variations in return and spawn timing are behavioral patterns that help to differentiate ocean-type from stream-type Chinook salmon, as well as create greater diversity within a population that can reduce its risk

of extinction due to natural disaster. It is difficult to know for certain the historical return and spawn timing, but estimates were made using anecdotal information and hatchery records. Green River spring Chinook are believed to have entered the system from May to mid-June and migrated to the upper parts of the watershed to spawn from mid-June through September (Williams et al. 1975). The historical natural run timing of Green River summer/fall Chinook most likely ranged from late June through early November (Williams et al., 1975). Between 1905 and 1924, WDF operated a weir on the Green River mainstem near Big Soos Creek. This weir was installed in mid-August after the high spring flows to catch fall Chinook. It has been suggested that the hatchery practice of harvesting eggs from the first part of the run rather than throughout has shifted the return and peak times for the Green River fall Chinook. According to Miller and Stauffer (1967), hatchery fish returned two weeks earlier in the mid-1960s than they did in the mid-1940s. If this were the case, the natural return peak would have been near the third week of October (Grette and Salo 1986).

For juvenile salmon, variation in estuarine and freshwater residence time, and size at outmigration are aspects of juvenile life history diversity. Increased habitat diversity will increase the opportunity for juvenile Chinook to utilize these habitats, thus potentially increasing their residence time within the system. The combinations of these behavioral traits are expressed in multiple life histories shown by a population (Healey 1991). Lacking specific data on the historical life history diversity of Green River juvenile Chinook, it is our assumption that all the current five juvenile life histories would have been present historically in the Green River, with some trajectories being more common than they are today. It is possible that more variations existed historically given the complexity of habitat that was available. Salmon species present in WRIA 9 include Chinook, chum, coho, pink, and winter steelhead.

Jurisdictional Status

The State of Washington passed several laws in 1998-99 directing planning efforts to address issues of habitat degradation in fresh and salt water through watershed planning. House Bills 2514 and 2496, and Senate Bill 5595 identified geographic areas, organizational structures, and funding mechanisms to develop and implement watershed plans throughout the state. House Bill 2514 was primarily focused on in-stream flow issues, whereas House Bill 2496 and Senate Bill 5595 were focused primarily on addressing habitat limiting factors.

The geographic areas identified for these planning efforts are called Water Resource Inventory Areas (WRIAs). The WRIAs were originally designed as stream inventory areas by the state. Washington State is divided into 62 WRIAs. The Green/Duwamish and Central Puget Sound Watershed is WRIA 9.
Under House Bill 2496 (and reasserted by Senate Bill 5595), the State Conservation Commission was tasked with developing a Limiting Factors Report for each of the WRIAs in Washington. This legislation also called for lead entities in each of the WRIAs to establish a Steering Committee and Technical Committee to identify funding priorities for salmon conservation and to develop a strategy or plan for addressing salmon habitat limiting factors.

The WRIA 9 salmon habitat planning effort was advanced by the Tri-County Model Conservation Planning Program. Beginning in 1998, the Tri-County initiative brought together local governments, environmental groups, and businesses in Snohomish, King, and Pierce Counties to address the habitat-related factors of salmonid decline. Watershed (WRIA)-based habitat plans were among the six “planks” identified as part of habitat-focused recovery efforts. It is noteworthy that while not all local governments in King County embraced the other five “planks,” the watershed-planning plank did receive nearly universal support. In WRIA 9, all 16 local governments – 15 cities and King County – in the watershed (plus Tacoma Public Utilities) provided financial support for the planning process and the majority participated in the developing the Habitat Plan.

Beginning in 2001, 16 local governments in WRIA 9 entered into an interlocal agreement regarding salmon habitat planning (later, the City of Tacoma–Tacoma Public Utilities also signed the agreement) and establishing the WRIA 9 Forum of local governments, the body responsible for executing the agreement. (The WRIA 9 Forum was not a wholly new body but rather the result of merging the predecessor Green/Duwamish Forum and a portion of the predecessor Central Puget Sound Forum.) This agreement provided a mechanism and governance structure for the joint funding, development, review, and approval of WRIA-based watershed plans. The agreement also established the responsibilities of the parties, the planning products, decision making regarding the Habitat Plan, and how staff services would be provided. Each jurisdiction made an annual financial contribution to support a small Watershed Coordination Services staff provided to the WRIA by King County. The maximum financial or resource obligation of any participating eligible jurisdiction under the agreement is limited to its share of the cost of developing plans and does not include the costs of implementation. The Watershed Coordination Services staff was responsible for working with the partner jurisdictions, the Steering Committee and its subcommittees, and the general public to develop both the Near-Term Action Agenda (Kulzer (Ed.) 2002) and this Habitat Plan.

History of Our Watershed

Between the retreat of the ice 12,000 years ago to 1850, human history and land use in the watershed was the story of the Indian tribes. Duwamish, Suquamish, and other Salish peoples developed a lifestyle centered on the annual runs of the salmon and steelhead. The fish occupied a central role in their economic, cultural, and spiritual lives.

European settlement began in 1851 in the Duwamish estuary area (Kerwin and Nelson [Eds.] 2000). WRIA 9 was one of the first areas of Puget Sound extensively settled by immigrants in the late 18th century. Beginning in the 1880s, extensive logging occurred across much of the watershed and agricultural land use expanded south to fill much of the Kent Valley from Tukwila to Auburn. Small towns such as Kent and Auburn were established to serve the farmers.

The 19th century and the early 20th century brought river channelization for navigational purposes, diversion of major Green/Duwamish tributaries for flood abatement and water supply, construction of diversion dams for municipal water needs, and filling of tidelands for development. The Duwamish estuary was intensively dredged and filled between 1900 and 1940, continuing to a lesser degree until the 1970s.

Between 1906 and 1916, the White and Cedar/Black Rivers were diverted from the Green/Duwamish River. The White River was diverted in 1906 for flood control, and the Cedar River was diverted between 1912 and 1916 when the Hiram M. Chittenden Locks were constructed and the level of Lake Washington was lowered (Figure 3-1). The re-routed Cedar River provides water to operate the locks. Tacoma Public Utilities completed its headworks (diversion dam) in 1913 to draw 65 cubic feet per second worth of water from the Green River for its water supply, and the total diversion capacity was subsequently increased to 113 cubic feet per second (Culhane et al. 1995). The White and Cedar/Black River basins combined previously comprised approximately 70% of the watershed in total acreage and contributed a commensurate amount of flow to the lower Green/Duwamish River. Because of these two diversions, the area presently draining into Elliott Bay is approximately 482 square miles, which is about 30% of the size it was a century ago. The reduction in drainage area has increased salinity levels in and decreased the size of the Duwamish estuary.

During the middle of the 20th century, economic development fostered further construction of levees and dams to reduce flooding, construction of roads and other transportation infrastructure, and industrial, commercial, and residential development. Howard Hanson Dam and its storage facility were constructed in 1962. Tacoma Public Utilities acquired a well field along the North Fork tributary of the Green River in 1975 to provide an alternate source of drinking water during times of high turbidity in the Green River. Bulkheads, seawalls, and piers were added to the nearshore environment. An estimated 64% of the nearshore has some form of armoring to accommodate residential and commercial development. Although armoring has occurred on Vashon/Maury Island, it has occurred to a lesser extent than on the mainland.

In the early 20th century, the region experienced a dramatic increase in human population, predominantly in urban areas in the western one-third of the watershed. As the Puget Sound population centers continued to expand through the 1970s, 1980s, and 1990s, WRIA 9 experienced increasing urbanization throughout what would become the Urban Growth Area under the King County Comprehensive Plan (King County 2004). Smaller cities in the Middle Green River Subwatershed such as Black Diamond and Enumclaw were joined by Covington and Maple Valley in the 1990s as rapid population growth and development shifted eastward. In 2004, the population in WRIA 9 was estimated at 630,000 (adapted from Puget Sound Regional Council data). About 89% of the population lives within the Urban Growth Area and 11% live in the Rural Area. Land development estimates indicate the biggest areas of future development will be in the Middle Green River Subwatershed and along the nearshore. Black Diamond is the city projected to have the greatest increase in housing development in the Middle Green River Subwatershed over the next 20 years (Kerwin and Nelson [Eds.] 2000).

During the last 30 years of the 20th century, government agencies and the public began to support environmental protection measures and growth management. The federal government passed environmental legislation to protect undeveloped land, wetlands, shorelines, and endangered species habitat. State and local government began to embrace policies to manage development growth and protect shorelines, undeveloped land, wetlands, and farmlands. For a more extensive history of human development, land uses, and environmental protection measures in WRIA 9, see Part II of the Habitat Limiting Factors and Reconnaissance Assessment Report (Kerwin and Nelson [Eds.] 2000).

Cultural Context

No information identified.

Social Context

At the grassroots level, there are thousands of motivated, informed citizens making a positive difference every day. The watershed is home to countless private property landowners whose concern for their land, its resources, and impacts on people living downstream propel them to be good stewards of land and water. These people variously practice natural yard care, maintain their septic systems, dispose of hazardous wastes appropriately, control noxious and non-native invasive weeds, practice sustainable forestry, and leave a portion of their land "wild" where it can provide an on-going stream of ecosystem goods and services for themselves and the broader community.

The people of the watershed have spawned a diverse array of community, environmental, and educational groups/programs that create on-the-ground improvements for salmon, water quality, and environmental protection in general. Some of these groups work on projects or programs across the watershed while others focus on stewarding streams in their own backyard. Some groups consist of a few dedicated souls while others involve hundreds and have paid staff. In addition to on-the-ground efforts to protect and restore habitat, these groups and programs help make salmon conservation relevant to the broader public.

The tremendous accomplishments by the individuals, groups, and governments in WRIA 9 have been improving the health of the watershed for several decades. Implicit in the ambitious recommendations of this Habitat Plan is the assumption that the good work of the past and present can be matched or exceeded in the decades ahead. (Excerpted from Section 2.6 of Plan)

Socio-Economic Description

The total value of taxed property within WRIA 9 is $71.5 billion. Of this, $43.9 billion consists of improvements on property (built capital) and $27.6 billion of land value (social and natural capital). It has taken about 150 years to accumulate the $43.9 billion of taxed built capital stock in WRIA 9.

The costs of restoration and benefits of habitat improvements are not necessarily born equally by everyone within the watershed. Equity issues are increasingly important considerations in salmon protection and restoration.

The greatest socio-economic implication of salmon habitat recovery is securing healthy ecosystems, which provide vast public and private benefits. Understanding the value that flows to the people of the watershed from healthy ecosystems provides important context for making decisions about where and when to make investments in salmon habitat and how to share those costs. This analysis shows that making expenditures on habitat in areas where costs are high are justified in terms of the high value of ecosystem goods and services produced in areas where those services are scarce (e.g., the Duwamish Estuary transition habitat). Implementation of the WRIA 9 Habitat Plan will enhance the economy and quality of life for citizens in WRIA 9 by enhancing natural capital and the stream of ecosystem goods and services generated by that capital. All three forms of capital -- natural capital, human-built capital, and social capital -- must be healthy to maintain a healthy economy and high quality of life.

Human Population

In 2011, the human population of WRIA 9 was 694,137, according to the *Implementation Progress Report 2005-2011.*

2.0 M and AM Phase I Project Description

This section provides an overview of the M and AM Phase I project, including a brief description of the work undertaken by each watershed and the people involved in content development and review.

Regional Chinook Recovery - M and AM Phase I Overview

Over the past year, June 2013 – May 2014, PSP staff and contractors guided watersheds through completion of Phase I of the M and AM project. This work focused on translation of existing information into a common framework for Chinook recovery through a series of steps: 1) definition of scope and vision; 2) identification of priority ecosystem components and assessment of their health and current status; 3) identification of key pressures in the watershed and their relationship to the ecosystem components, and 4) documentation of theories of change and underlying assumptions associated with existing strategies and actions. Products associated with each of these steps are described in the following sections of this report.

To complete this work, PSP convened a team of staff and contractors, led by Long Live the Kings (LLTK), to support the watersheds with coaching, technical and facilitation resources. For each watershed, the Phase I project was led by a Core Team including a PSP Ecosystem Recovery Coordinator, a LLTK coach, one or more representatives from the watershed, and in some cases additional contract support. Engagement of a broader suite of technical and policy advisors and additional partners and stakeholders to assist with development, review and approval of content varied by watershed, as described below.

Watershed Chinook Recovery - M and AM Phase I Overview

The scope of this project is to translate the existing WRIA 9 Habitat Plan into the Common Framework for Puget Sound Chinook Recovery.
The intent of the plan is to restore habitat used by Chinook salmon, bull trout, and other salmonids in the Green/Duwamish/and Central Puget Sound Watershed. The plan focuses on Green River Chinook, using the mainstem river, WRIA 9 nearshore areas as well as the marine shoreline of Vashon and Maury Island. The marine shoreline is used by many other Chinook populations. A goal of the plan is to reintroduce a spring chinook stock to the upper watershed, we will need to be able to show this stock which is not determined (likely the white). The plan addresses habitat, but not harvest and hatchery actions.

Geographic Scope-subwatersheds

- Upper Green
- Middle Green
- Lower Green
- Duwamish
- Nearshore

Watershed specific pressures not specifically listed, but strategies and actions are specific by subwatershed. Subwatershed conservation hypotheses are related to specific pressures for each subwatershed.

Documents being relied on:

- Habitat Plan
- WRIA 9 Salmon Habitat Plan-2007 Amendments
- WRIA 9 Status and Trends Monitoring Report: 2005-2010
- WRIA 9 Monitoring and Adaptive Management Plan-DRAFT
- Implementation Guidance for the WRIA 9 Salmon Habitat Plan 2006
- WRIA 9 Strategic Assessment Report-Scientific Foundation for Salmon Habitat Conservation.

M and AM Phase I Project Management, Team and Partners in the Watershed

Membership of the Watershed Ecosystem Forum is comprised of the municipalities of WRIA 9 that are parties to the interlocal agreement (ILA) and business, environmental, and community interests as appointed by the parties to the ILA. Each member municipality, agency, or entity of the Watershed Ecosystem Forum determines its representative delegate and alternate to represent them on the Watershed Ecosystem Forum.

To be members of the Watershed Ecosystem Forum, non-governmental organizations and businesses on the Watershed Ecosystem Forum should meet the following criteria:

- Have activities or interests across the entire watershed or at least across one subwatershed
- Be in existence at least three years;
- Attend, be prepared for, and actively participate in Watershed Ecosystem Forum meetings (if a delegate does not attend, an alternate should)
- Seek to understand the interests and concerns of other members; and
- Work cooperatively and in good faith with other members to implement the WRIA 9 Salmon Habitat Plan: Making Our Watershed Fit for a King.

By a two-thirds vote, a quorum of the existing membership of the Watershed Ecosystem Forum may waive any of these requirements to authorize membership.

If a non-governmental or business member does not participate in three (3) sequential meetings of the Watershed Ecosystem Forum, its membership may be revoked by a two-thirds vote of a quorum of the Watershed Ecosystem Forum.

The Watershed Ecosystem Forum functions as both (1) an advisory body to the parties to the ILA to make recommendations concerning protecting and restoring the ecosystem of the Green-Duwamish River and Central Puget Sound Watershed, including monitoring implementation of the “WRIA 9 Salmon Habitat Plan: Making Our Watershed Fit for a King”; and (2) the local citizens committee, also known as the Lead Entity Citizens Advisory Group under state law, to develop prioritized habitat project lists for funding consideration by the Salmon

Recovery Funding Board

The scope of work and staffing of the Watershed Ecosystem Forum are determined annually by the parties pursuant to the ILA under which participating municipalities in WRIA 9 have agreed to work together from 2007 through 2015. The Watershed Ecosystem Forum may make recommendations to the parties to the ILA on annual scope of work and staffing levels.

Staff members are responsible for generating products and action items for the Watershed Ecosystem Forum. Staff members comprise a group housed at King County called the Salmon Habitat Recovery Team.

Decisions and recommendations of the Watershed Ecosystem Forum are to be made with efficiency and fairness. Member representatives recognize there is a direct relationship between successfully implementing the WRIA 9 Salmon Habitat Plan and the number of member entities who agree to implementation measures, priority actions, and changes to the Salmon Habitat Plan. Consensus (as defined by lack of dissent), therefore, will be the goal of the Watershed Ecosystem Forum.* The Chair is to seek consensus among representatives on key decisions. In the absence of consensus, a majority of all members present and the majority of the local governments present at any meeting of the Watershed Ecosystem Forum prevail. Minority opinions are recorded in the summary of the meeting, along with the reason for the dissent. Meeting summaries can be supplemented by written statements from member representatives. The Chair is responsible for gauging the degree of consensus, and for calling the question to vote.

Some decisions will only be in the purview of the parties pursuant to the ILA. The parties to the ILA choose the Chair of the Watershed Ecosystem Forum, and select and assign duties to a Management Committee that serves as its executive committee. The parties to the ILA solely oversee and administer the expenditures of budgeted funds and allocated resources contributed by each party or obtained from other sources. The parties to the ILA, in tandem with the U.S. Army Corps of Engineers, periodically during a year convene separately as the Ecosystem Restoration Project Executive Committee to make funding decisions regarding the Green/Duwamish River Ecosystem Restoration Project.

The WRIA 9 Implementation Technical Committee (ITC) includes representatives from the following organizations: Tacoma Public Utilities, Washington Department of Ecology, City of Seattle, City of Auburn, City of Tukwila, EarthCorps, City of Kent, and the Washington Department of Fish and Wildlife. Other entities that engage in the process include the Puget Sound Partnership, Urban Waters Partnership, and King County. The ITC holds monthly meetings to discuss projects monitoring efforts,
The purpose of the WRIA 9 ITC is to review and evaluate salmon habitat projects. The ITC will oversee the collection and interpretation of physical and biological data for salmon habitat restoration projects completed in WRIA 9 and to provide recommendations to project and program sponsors and the WRIA 9 Watershed Ecosystem Forum regarding improvements to the existing projects and/or modifications to incorporate into future projects. The oversight role is envisioned to be distanced from the actual data collection and will not entail shepherding the completion of monitoring efforts. The decision-making goal of the ITC will be to reach consensus on recommendations. When this is not possible, provisions for the expression of minority opinions will be made so that decision makers and the public are informed of the diversity of views.

* The Parties to the ILA make decisions as described in the WRIA 9 Interlocal Agreement for 2007-2015 or as amended.

Project Team

The table below shows the members of the project team who took the lead on developing the products in this report. In addition, members of the advisory, technical and decision-making bodies who are collectively responsible for the content and implementation of the watershed Chinook recovery plan may also be listed.

Given Name	Surname	Organization	Position	Role(s)
Elissa	Ostergaard	WRIA 9	Project Manager	Team Member
Laura	Blackmore	LLTK/Cascadia Consulting Group	Coach	Team Member
Bruce	Wulkan	PSP	ERC	Team Member
Kollin	Higgins	King County-WRIA9	Miradi lead	Team Member
Kirk	Lakey	RITT-WDFW	RITT lead	Team Member

Partners and Stakeholders

The table below shows the people and organizations external to the project team who are involved in this project. We acknowledge their critical role in ensuring that the plan reflects the broad interests of the local Chinook recovery community and we are grateful for the contributions they make to the project's plan, implementation and outcomes.

Organizational Partner	**Role(s)**
Recovery Implementation Technical Team	RITT chair
Puget Sound Partnership	PSP salmon recovery watershed plan translation lead
Recovery Implementation Technical Team	Common Framework technical advisor
Muckleshoot Indian Tribe	Review
WRIA 9 Implementation Technical Committee	Technical Advisory Group to WRIA
WRIA 9 Forum	Watershed Coordinator

3.0 Current Context in the Watershed

Situation Analysis and Conceptual Models in M and AM Phase I

Understanding the current context within which Chinook recovery operates will contribute to development of a more successful recovery plan. A situation analysis is used to identify the contributing factors or root causes underlying the existence and persistence of pressures to Chinook and their habitats. Conceptual models are then used to illustrate the cause and effect relationships between contributing factors, pressures and ecosystem components. Factors can be natural or human-derived and they can include financial, social, cultural, regulatory, or infrastructural issues. Situation analyses are also used to identify positive factors and opportunities that would be desirable to maintain or strengthen.

In Phase I of the M and AM project, most watersheds did not complete a situational analysis or develop conceptual models describing the current context in their watershed. Since most recovery chapters include strategies and actions that are already being implemented and monitored, most watersheds chose to focus first on results chains describing their current strategies (see Section 5.0). In future years, watersheds may include a situational analysis and development of conceptual models to increase common understanding of the context within each watershed and improve understanding of key opportunities for, or barriers to, action.

If the watershed completed some work on conceptual models, the diagrams and a brief description of each conceptual model is available in Appendix A.2.

4.0 Priority Ecosystem Components for Chinook Recovery

Each watershed identified the priority ecosystem components, or “components”, in their watershed. Components are the focus of the recovery effort; the strategies and actions comprising the recovery plan are designed to improve or protect the health of components either directly, usually through restoration strategies, or indirectly by reducing pressures on the ecosystem. Progress toward improvement of ecosystem condition is tracked using status measures.

Watersheds selected their priority ecosystem components from a Puget Sound-wide taxonomy of ecosystem components developed by the Recovery Implementation Technical Team (RITT 2013). Key ecological attributes (KEAs) for each component were selected from a companion taxonomy of KEAs (RITT 2013) and indicators to track the status of KEAs were identified on a watershed by watershed basis. Where available, watersheds included information about the current status (2005 and 2013) and desired future status (e.g. 2025, 2050, etc) of each indicator. Defining and tracking status and condition information is a critical step in developing a monitoring and adaptive management framework and will allow the Puget Sound Salmon Recovery Council to assess progress toward recovery status and goals across the Puget Sound Chinook ESU.

In this section, we use the following terminology to characterize and describe the condition of the ecosystem in our watershed:

Ecosystem components (components) are the things we care about conserving. They can be individual species, habitat types, ecological processes, or ecosystems chosen to encompass the full breadth of conservation objectives for a specific project and were selected from a taxonomy of ecosystem components for Puget Sound Chinook recovery (RITT 2013).

A goal is a desired future condition of a habitat, Chinook, or species/food webs component.

Key ecological attributes (KEAs) are the characteristics of an ecosystem component that, when present, support a viable component but, if missing or altered, lead to loss or degradation of the component over time. KEAs can be used to assess the status of a component, develop protection and restoration objectives for conservation, and focus monitoring and adaptive management programs. In the Chinook Common Framework, intact KEAs are characteristics necessary for salmon recovery, such as the abundance and productivity of Chinook salmon, or the tidal hydrology of estuary habitats.

Status indicators are specific units of information measured over time that document changes in the status of a KEA. Indicators can be measured directly or computed from one or more directly measured variables. In the Chinook M and AM project, indicators are metrics to assess salmon recovery, such as the annual number of Chinook salmon spawners for a population, or the length of tidal channel habitat in an estuary.

This section first provides a summary of available information about the current health and desired future health of all components identified by the watersheds as priorities for ecosystem recovery. It then provides additional detail about each of the components including a description of the component, it's current and future desired health, and the measures used to assess its status and condition. Gaps in status and trends were identified where possible. A summary list of the ecosystem components and their description is included in Appendix A.1. A list of all ecosystem status and trends monitoring priorities and gaps is included in Appendix A.4.

In a few watersheds, condition bins were defined for a subset of status indicators. Best available biological and ecological information was used to define categories of Poor, Fair, Good and Very Good for each indicator (see Table 1), and used to rate the health of the indicator. These ratings were then rolled up to produce an overall health rating for the associated KEA and ecosystem component. Any status ratings for components in the viability table on the next page reflect the results of this viability analysis. However, most watersheds did not complete this level of analysis in Phase I and will develop condition bins and complete a viability assessment in Phase 2 of the M and AM project. A complete viability analysis supports prioritization of recovery efforts to focus on those ecosystem components in greatest need of recovery actions.

Table 1. General definitions for viability condition categories

KEA	Indicator	Poor	Fair	Good	Very Good
X	Y	Near-term chance of extirpation without significant intervention	Within natural range of variation as a function of significant ongoing intervention	Within natural range of variation with limited intervention needed	Stable – no intervention needed (likely historical conditions)

Viability Assessment Summary for Chinook and Chinook Habitats

A viability assessment looks at each of the ecosystem components to determine how to measure its "health" over time, and then to identify how the component is doing today and what a "healthy state" might look like in the future. This helps to identify which parts of the ecosystem are most in need of attention, and defines indicators for measuring success over time. The status ratings are derived by rolling up measurements for underlying indicators for each Key Ecological Attribute (KEA), as described on the previous page.

In Phase I of the M and AM project, most watersheds did not complete a viability assessment for all of the components. This table is included to capture any viability work that was completed as part of Phase I and to show our intent to do this type of assessment in Phase 2.

WRIA 9 did complete an initial viability assessment for most components. We conducted this assessment at the sub-watershed and sub-basin level, as shown in the table below. The key to the sub-watershed and sub-basin coding is as follows:

- NRM is the mainland nearshore
- NRV is the nearshore of Vashon and Maury Islands
- DU is Duwamish
- LG is Lower Green
- MG is Middle Green
- UG is Upper Green
- NE is Newaukum Creek
- SO is Soos Creek

ID	ECOSYSTEM COMPONENTS	CURRENT STATUS*	DESCRIPTION	DESIRED FUTURE STATUS*	DESCRIPTION
CHEM-C06	**Natal Chinook estuaries**	Poor		TBD	TBD
CHEM-C07	**Coastal landforms - All**	Fair		TBD	TBD
CHEM-C07	**Coastal landforms NRM**	Poor		TBD	TBD
CHEM-C07	**Coastal landforms NRV**	Good		TBD	TBD
CHEM-C08	**Bluff backed beaches - All**	Fair		TBD	TBD
CHEM-C08	**Bluff backed beaches NRM**	Poor		TBD	TBD
CHEM-C08	**Bluff backed beaches NRV**	Good		TBD	TBD
CHEM-C09	**Pocket estuaries - All**	Fair		TBD	TBD
CHEM-C09	**Pocket estuaries NRM**	Poor		TBD	TBD
CHEM-C09	**Pocket estuaries NRV**	Good		TBD	TBD
CHFW-C02	**Channels >50m Bankfull Width - All**	Fair		TBD	TBD
CHFW-C02	**Channels >50m LG**	Poor		TBD	TBD
CHFW-C02	**Channels >50m DU**	Poor		TBD	TBD
CHFW-C02	**Channels >50m UG**	Fair		TBD	TBD
CHFW-	**Channels >50m MG**	Fair		TBD	TBD

ID	ECOSYSTEM COMPONENTS	CURRENT STATUS*	DESCRIPTION	DESIRED FUTURE STATUS*	DESCRIPTION
C02					
CHFW-C03	**Channels <50m Bankfull Width - All**	Fair		TBD	TBD
CHFW-C03	**Channels <50m NE**	Poor		TBD	TBD
CHFW-C03	**Channels <50m SO**	Fair		TBD	TBD
CHFW-C04	**Side channels - All**	Fair		TBD	TBD
CHFW-C04	**Side channels MG**	Fair		TBD	TBD
CHFW-C04	**Side channels LG**	Poor		TBD	TBD
CHFW-C04	**Side channels DU**	Poor		TBD	TBD
CHFW-C04	**Side channels UG**	Very Good		TBD	TBD
CHFW-C05	**Non-Channel Lakes & Wetlands - All**			TBD	TBD
CHUP-C01	**Uplands - All**	Fair		TBD	TBD
CHUP-C01	**Uplands MG**	Fair		TBD	TBD
CHUP-C01	**Uplands LG**	Fair		TBD	TBD
CHUP-C01	**Uplands DU**	Fair		TBD	TBD
CHUP-C01	**Uplands NRV**	Very Good		TBD	TBD
CHUP-C01	**Uplands NRM**	Fair		TBD	TBD
CHUP-C01	**Uplands UG**	Very Good		TBD	TBD
CHSP-C13	**Chinook salmon - All**	Fair		TBD	TBD
CHSP-C14b	**Species & food webs - All**			TBD	TBD

***Legend for ratings of health status:**
Very Good - Ecologically desirable status; requires little intervention to maintain health of ecosystem component.
Good - Health within acceptable range of variation; some intervention required for maintenance
Fair - Health outside acceptable range of variation; requires human intervention to maintain component
Poor - Restoration or recovery increasingly difficult; may result in extirpation of ecosystem component.

Natal Chinook estuaries

The mouth of the Duwamish River, an urbanized, tidally influenced estuary.

Description of Natal Chinook estuaries

Includes the following shoreline types:
• Drowned channels
• River-dominated (fan) deltas
• Tidal deltas
• Delta lagoons
and the following habitat zones:
• Alluvial floodplains
• Tidal channels (e.g., distributary and blind tidal channels, lagoon inlets/outlets)
• Impoundments (e.g., lagoons, ponds, lakes)
• Tidally influenced wetlands (e.g. saltmarsh, scrub-shrub, forested)
• Tide flats, low tide terraces, subtidal flats
• All other zones possible along delta margins

Current Status of Natal Chinook estuaries

Poor -

Goals for Natal Chinook estuaries

This table shows recovery goals that were included in the 2005 plan as well as those that have been adopted since 2005 through the 3-year Work Plan and other processes.

ID	GOAL	DETAILS
Overall	Overall	Protect, rehabilitate, and enhance habitat to support viable salmonid populations in response to the Endangered Species Act listing of Chinook salmon and bull trout using an ecosystem approach. This approach will also benefit other non-listed aquatic species.
Goal 1	Processes & Habitats	Protect and restore physical, chemical, and biological processes and the freshwater, estuarine, and marine nearshore habitats on which salmonids depend.-- Protect and restore natural ecosystem processes; where restoration is not possible, consider sustainable engineered solutions;-- Protect currently functioning habitat;-- Protect and restore headwater areas, streams, and wetlands where feasible;-- Encourage management of flows to support habitat-forming processes; and-- Encourage management of land use changes and development standards to minimize impacts.
Goal 2	Habitat Connectivity	Protect and restore habitat connectivity where feasible.-- Encourage maintenance and protection of corridors that link habitats and (re) connect freshwater, estuarine, and saltwater habitats and their associated zones, as required by salmonids during all life stages;-- Connect side channels and floodplain areas to the mainstem where feasible; and-- Restore fish access where limited by dams, culverts, revetments and other barriers, where feasible.
Goal 3	Water Quality & Quantity	Protect and improve water quality and quantity conditions to support healthy salmonid populations.-- Reduce processes and inputs that degrade water quality where possible;-- Enhance riparian vegetation to improve water quality conditions where possible; and-- Encourage management of water withdrawals and groundwater recharge to maintain cool water inputs in key areas.
Goal 4	Implement Plan	Provide an implementable plan that supports salmon recovery.-- Promote informed, sustained commitment of key watershed interests;-- Implement an adaptive management approach to respond to changes and to ensure continued effectiveness;-- Develop a strategy to secure adequate funding for implementation;-- Obtain support of WRIA 9 interlocal agreement member jurisdictions, federal and state agencies, Tribes, the agricultural community, and the business community in their recovery efforts;-- Provide public outreach and education, and engage the public

ID	GOAL	DETAILS
		in stewardship, restoration, and enhancement activities;-- Coordinate with other WRIA 9 planning activities; and-- Provide management actions that are doable, practical, and effective.

Monitoring the health of Natal Chinook estuaries

This table shows the attributes used to assess the health of this component, along with the indicators that will be measured periodically to assess progress toward recovery goals.

KEY ECOLOGICAL ATTRIBUTE (KEA)	INDICATOR	INDICATOR DETAILS
Fluvial sediment dynamics - condition	(GRNE-DU-1) GRNE-DU-1 amount of unarmored bank	(GRNE-DU-1) WRIA sponsored data collection
Freshwater hydrology - condition	(GAP) Freshwater hydrology - condition	(GAP)
Detritus recruitment and retention - extent	(GRNE DU - 2) Amount of unarmored bank (GRNE-DU-3) Pieces of LW per mile (GRNE-DU-4) Number of jams per mile	(GRNE DU - 2) (GRNE-DU-3) (GRNE-DU-4)
Tidal channel formation and maintenance - extent of channels	(GAP) Tidal channel formation and maintenance - extent of channels	(GAP)
Water quality	(GAP) Water Quality	(GAP)
Detritus recruitment and retention - extent of supply	(GRNE - DU - 5) Amount of unarmored bank (GRNE - DU - 6) Riparian condition along banks (GRNE-DU-3) Pieces of LW per mile	(GRNE - DU - 5) WRIA sponsored data collection (GRNE - DU - 6) WRIA sponsored data collection (GRNE-DU-3)
Habitat connectivity condition	(GAP) Habitat connectivity Condition	(GAP)
Estuarine habitats - condition	(GRNE-DU-12) Amount of unarmored bank (GRNE-DU-10) Area of shallow water habitat (GRNE-DU-12) Area of shallow water habitat	(GRNE-DU-12) WRIA sponsored data collection (GRNE-DU-10) (GRNE-DU-12)
Estuarine habitats - extent	(GRNE-DU-9) Amount of unarmored bank (GRNE-DU-10) Area of shallow water habitat (GRNE-DU-11) Linear feet of bank restored	(GRNE-DU-9) WRIA sponsored data collection (GRNE-DU-10) (GRNE-DU-11)
Tidal channel formation and maintenance - connectivity of channels	(GAP) Tidal channel formation and maintenance - connectivity of channels	(GAP)
Freshwater hydrology - dependent water condition	(GAP) Freshwater hydrology - dependent water condition	(GAP)
Tidal circulation - dependent water condition	(GAP) Tidal circulation - dependent water condition	(GAP)

Coastal landforms

Description of Coastal landforms

Coastal landforms are within the Drift Cell system type and include the following shoreline types:
• Barrier beaches (spits, cusps, tombolos)

and the following habitat zones:
• Backshores, beach faces, tide flats, low tide terraces, subtidal flats
Includes the Marine Nearshore Subwatershed. Plan uses accretion areas as the primary landform descriptor. Accessory data includes types of beach.

Current Status of Coastal landforms

Fair -

Goals for Coastal landforms

This table shows recovery goals that were included in the 2005 plan as well as those that have been adopted since 2005 through the 3-year Work Plan and other processes.

ID	GOAL	DETAILS
Overall	Overall	Protect, rehabilitate, and enhance habitat to support viable salmonid populations in response to the Endangered Species Act listing of Chinook salmon and bull trout using an ecosystem approach. This approach will also benefit other non-listed aquatic species.
Goal 1	Processes & Habitats	Protect and restore physical, chemical, and biological processes and the freshwater, estuarine, and marine nearshore habitats on which salmonids depend.-- Protect and restore natural ecosystem processes; where restoration is not possible, consider sustainable engineered solutions;-- Protect currently functioning habitat;-- Protect and restore headwater areas, streams, and wetlands where feasible;-- Encourage management of flows to support habitat-forming processes; and-- Encourage management of land use changes and development standards to minimize impacts.
Goal 2	Habitat Connectivity	Protect and restore habitat connectivity where feasible.-- Encourage maintenance and protection of corridors that link habitats and (re) connect freshwater, estuarine, and saltwater habitats and their associated zones, as required by salmonids during all life stages;-- Connect side channels and floodplain areas to the mainstem where feasible; and-- Restore fish access where limited by dams, culverts, revetments and other barriers, where feasible.
Goal 3	Water Quality & Quantity	Protect and improve water quality and quantity conditions to support healthy salmonid populations.-- Reduce processes and inputs that degrade water quality where possible;-- Enhance riparian vegetation to improve water quality conditions where possible; and-- Encourage management of water withdrawals and groundwater recharge to maintain cool water inputs in key areas.
Goal 4	Implement Plan	Provide an implementable plan that supports salmon recovery.-- Promote informed, sustained commitment of key watershed interests;-- Implement an adaptive management approach to respond to changes and to ensure continued effectiveness;-- Develop a strategy to secure adequate funding for implementation;-- Obtain support of WRIA 9 interlocal agreement member jurisdictions, federal and state agencies, Tribes, the agricultural community, and the business community in

ID	GOAL	DETAILS
		their recovery efforts;-- Provide public outreach and education, and engage the public in stewardship, restoration, and enhancement activities;-- Coordinate with other WRIA 9 planning activities; and-- Provide management actions that are doable, practical, and effective.

Monitoring the health of Coastal landforms

This table shows the attributes used to assess the health of this component, along with the indicators that will be measured periodically to assess progress toward recovery goals.

KEY ECOLOGICAL ATTRIBUTE (KEA)	INDICATOR	INDICATOR DETAILS
Coastal sediment dynamics in drift cells - condition	(GRCL-NE-1) Amount of unarmored bank (GRCL-VS-1) Amount of unarmored bank	(GRCL-NE-1) Mainland Nearshore - WRIA sponsored data (GRCL-VS-1) Vashon/Maury Nearshore
Coastal sediment dynamics in drift cells - landscape context	(GRCL-NE-2) % sediment source intact by drift cell-broken into 5 categories	(GRCL-NE-2) WRIA sponsored data
Coastal sediment dynamics - extent (size or volume) of wind and wave dependent features	(GAP_GRCL-NE-6) Amount of intertidal area	(GAP_GRCL-NE-6) (Amount of intertidal fill)-There are no federal, state, county or other data sets that tackle the issue of extent of intertidal area that has been filled. WRIA 9 has targets related to shallow intertidal habitat improvements, but no existing baseline to measrue how we are doing. This is a data set WRIA 9 had suggested being created prior to the PSPMAMP process. A brand new data set will be created in near future-that will cover condition in 05 and current. This will help describe shoreline conditions waterward of OWHM as well as track implementation of projects.
Interidal habitat zone - extent	(GRCL-NE-11) Amount of intertidal area	(GRCL-NE-11) (Amount of intertidal fill)-There are no federal, state, county or other data sets that tackle the issue of extent of intertidal area that has been filled. WRIA 9 has targets related to shallow intertidal habitat improvements, but no existing baseline to measrue how we are doing. This is a data set WRIA 9 had suggested being created prior to the PSPMAMP process. A brand new data set will be created in near future-that will cover condition in 05 and current. This will help describe shoreline conditions waterward of OWHM as well as track implementation of projects.
Tidal circulation - extent of dependent biological activity	(GAP) Tidal Circulation- extent of dependent biological activity	(GAP)
Detritus recruitment and retention - extent of supply	(GAP) Detritus recruitment and retention - extent of supply	(GAP) Not currently being tracked, but data is available for analysis (armor above/below OHWM, 2004 drift log accumulations).
Coastal sediment deposition and accretion - extent	(GAP_GRCL-NE-5) Amount of unarmored accretion areas	(GAP_GRCL-NE-5) Data needs to be compiled

Bluff backed beaches

Description of Bluff backed beaches

Bluff backed beaches are within the Drift Cell system type and include the following shoreline types:
• Sediment source beaches
• Depositional beaches
• Beach seeps
• Plunging sediment bluffs

and the following habitat zones:
• Marine riparian zones
• Bluff faces
• Backshores, berms, beach faces, tide flats, low tide terraces
Marine Nearshore subwatershed. Note that the plan does not use Bluff Back Beach descriptor since it is not very useful to differentiate shoretype units. Plan uses Feeder bluffs, accretion, transport, modified, no available drift areas as its shoreline types. Seeps are not mapped within WRIA 9

Current Status of Bluff backed beaches

Fair -

Goals for Bluff backed beaches

This table shows recovery goals that were included in the 2005 plan as well as those that have been adopted since 2005 through the 3-year Work Plan and other processes.

ID	GOAL	DETAILS
Overall	Overall	Protect, rehabilitate, and enhance habitat to support viable salmonid populations in response to the Endangered Species Act listing of Chinook salmon and bull trout using an ecosystem approach. This approach will also benefit other non-listed aquatic species.
Goal 1	Processes & Habitats	Protect and restore physical, chemical, and biological processes and the freshwater, estuarine, and marine nearshore habitats on which salmonids depend.-- Protect and restore natural ecosystem processes; where restoration is not possible, consider sustainable engineered solutions;-- Protect currently functioning habitat;-- Protect and restore headwater areas, streams, and wetlands where feasible;-- Encourage management of flows to support habitat-forming processes; and-- Encourage management of land use changes and development standards to minimize impacts.
Goal 2	Habitat Connectivity	Protect and restore habitat connectivity where feasible.-- Encourage maintenance and protection of corridors that link habitats and (re) connect freshwater, estuarine, and saltwater habitats and their associated zones, as required by salmonids during all life stages;-- Connect side channels and floodplain areas to the mainstem where feasible; and-- Restore fish access where limited by dams, culverts, revetments and other barriers, where feasible.
Goal 3	Water Quality & Quantity	Protect and improve water quality and quantity conditions to support healthy salmonid populations.-- Reduce processes and inputs that degrade water quality where possible;-- Enhance riparian vegetation to improve water quality conditions where possible; and-- Encourage management of water withdrawals and groundwater recharge to maintain cool water inputs in key areas.
Goal 4	Implement Plan	Provide an implementable plan that supports salmon recovery.-- Promote informed, sustained commitment of key watershed interests;-- Implement an adaptive

ID	GOAL	DETAILS
		management approach to respond to changes and to ensure continued effectiveness;-- Develop a strategy to secure adequate funding for implementation;-- Obtain support of WRIA 9 interlocal agreement member jurisdictions, federal and state agencies, Tribes, the agricultural community, and the business community in their recovery efforts;-- Provide public outreach and education, and engage the public in stewardship, restoration, and enhancement activities;-- Coordinate with other WRIA 9 planning activities; and-- Provide management actions that are doable, practical, and effective.

Monitoring the health of Bluff backed beaches

This table shows the attributes used to assess the health of this component, along with the indicators that will be measured periodically to assess progress toward recovery goals.

KEY ECOLOGICAL ATTRIBUTE (KEA)	INDICATOR	INDICATOR DETAILS
Coastal sediment dynamics in drift cells - condition	(GRBB-NE-1) Amount of unarmored bank (GRBB-VS-1) Amount of unarmored bank (GRBB- NE) 2 % sediment source intact by drift cell-broken into 5 categories (GRBB-NE-3) Amount of unarmored bank (GRBB-VS-3) Amount of unarmored bank	(GRBB-NE-1) WRIA sponsored data (GRBB-VS-1) WRIA sponsored data (GRBB- NE) Nearshore - WRIA sponsored data (GRBB-NE-3) WRIA sponsored data - Mainland Nearshore (GRBB-VS-3)
Detritus recruitment and retention - extent	(GRBB-NE-10) Amount of unarmored bank (GRBB-VS-10) Amount of unarmored bank (GRBB-NE-11) Amount of intertidal area	(GRBB-NE-10) WRIA sponsored data (GRBB-VS-10) (GRBB-NE-11) (Amount of intertidal fill)-There are no federal, state, county or other data sets that tackle the issue of extent of intertidal area that has been filled. WRIA 9 has targets related to shallow intertidal habitat improvements, but no existing baseline to measure how we are doing. This is a data set WRIA 9 had suggested being created prior to the PSPMAMP process. A brand new data set will be created in near future-that will cover condition in 05 and current. This will help describe shoreline conditions waterward of OWHM as well as track implementation of projects.
Coastal Sediment Dynamics -extent (sizes of volume) of wind and wave dependent features	(GRBB-NE-8) Amount of intertidal area	(GRBB-NE-8) (Amount of intertidal fill)-There are no federal, state, county or other data sets that tackle the issue of extent of intertidal area that has been filled. WRIA 9 has targets related to shallow intertidal habitat improvements, but no existing baseline to measurehow we are doing. This is a data set WRIA 9 had suggested being created prior to the PSPMAMP process. A brand new data set will be created in near future-that will cover condition in 05 and current. This will help describe shoreline conditions waterward of OWHM as well as track implementation of projects.

KEY ECOLOGICAL ATTRIBUTE (KEA)	INDICATOR	INDICATOR DETAILS
Tidal Hydrological dynamics-Tidal Circulation-extent of biological activity	(GAP) Tidal Hydrological dynamics - Tidal Circulation - extent of biological activity	(GAP)

Pocket estuaries

Description of Pocket estuaries

Also known as embayments, Pocket estuaries are within the Drift Cell system type and include the following shoreline types:
• Drowned channel lagoons
• Tidal delta lagoons
• Longshore lagoons
• Tidal channel lagoons (or marshes)
• Closed lagoons and marshes
• Open coastal inlets

and the following habitat zones:
• Marine riparian zones
• Tidal channels (e.g., distributary and blind tidal channels, lagoon inlets/outlets)
• Impoundments (e.g., lagoons, ponds, lakes)
• Tidally influenced wetlands (e.g., saltmarsh, scrub-shrub, forested)
• Backshores, berms, beach faces, tide flats, low tide terraces

Applies to the Marine Nearshore Subwatershed. Technical documents did not identify/map pocket estuaries by themselves, but has many strategies/actions to restore them. The WRIA does not have a good working definition that defines what subestuaries count as a pocket estuary and which ones do not.

Current Status of Pocket estuaries

Fair -

Goals for Pocket estuaries

This table shows recovery goals that were included in the 2005 plan as well as those that have been adopted since 2005 through the 3-year Work Plan and other processes.

ID	GOAL	DETAILS
Overall	Overall	Protect, rehabilitate, and enhance habitat to support viable salmonid populations in response to the Endangered Species Act listing of Chinook salmon and bull trout using an ecosystem approach. This approach will also benefit other non-listed aquatic species.
Goal 1	Processes & Habitats	Protect and restore physical, chemical, and biological processes and the freshwater, estuarine, and marine nearshore habitats on which salmonids depend.-- Protect and restore natural ecosystem processes; where restoration is not possible, consider sustainable engineered solutions;-- Protect currently functioning habitat;-- Protect and restore headwater areas, streams, and wetlands where feasible;-- Encourage management of flows to support habitat-forming processes; and-- Encourage management of land use changes and development standards to minimize impacts.
Goal 2	Habitat Connectivity	Protect and restore habitat connectivity where feasible.-- Encourage maintenance and protection of corridors that link habitats and (re) connect freshwater, estuarine, and saltwater habitats and their associated zones, as required by salmonids during all life stages;-- Connect side channels and floodplain areas to the mainstem where feasible; and-- Restore fish access where limited by dams, culverts, revetments and other barriers, where feasible.
Goal 3	Water Quality & Quantity	Protect and improve water quality and quantity conditions to support healthy salmonid populations.-- Reduce processes and inputs that degrade water quality where

ID	GOAL	DETAILS
		possible;-- Enhance riparian vegetation to improve water quality conditions where possible; and-- Encourage management of water withdrawals and groundwater recharge to maintain cool water inputs in key areas.
Goal 4	Implement Plan	Provide an implementable plan that supports salmon recovery.-- Promote informed, sustained commitment of key watershed interests;-- Implement an adaptive management approach to respond to changes and to ensure continued effectiveness;-- Develop a strategy to secure adequate funding for implementation;-- Obtain support of WRIA 9 interlocal agreement member jurisdictions, federal and state agencies, Tribes, the agricultural community, and the business community in their recovery efforts;-- Provide public outreach and education, and engage the public in stewardship, restoration, and enhancement activities;-- Coordinate with other WRIA 9 planning activities; and-- Provide management actions that are doable, practical, and effective.

Monitoring the health of Pocket estuaries

This table shows the attributes used to assess the health of this component, along with the indicators that will be measured periodically to assess progress toward recovery goals.

KEY ECOLOGICAL ATTRIBUTE (KEA)	INDICATOR	INDICATOR DETAILS
Tidal channel formation and maintenance - extent of channels	(GAP)	(GAP)
Detritus recruitment and retention - extent	(GRPE-NE-5) Amount of unarmored bank (GRPE-VS-5) Amount of unarmored bank	(GRPE-NE-5) WRIA sponsored data (GRPE-VS-5) Vashon/Maury Nearshore
Tidal circulation - extent of dependent biological activity	(GAP) Tidal circulation - extent of dependent biological activity	(GAP)
Tidal channel formation and maintenance - connectivity of channels	(GAP) Tidal channel formation and maintenance - extent of channels	(GAP)

Channels >50m Bankfull Width

Description of Channels >50m Bankfull Width

Includes main channels >50 m bankfull width (BFW)Includes the following habitat types at the reach scale:Confined: Straight Unconfined: Meandering, Island-braided, BraidedIncludes the following habitat types at the habitat unit scale:Mid-channel: Pools, Glides, Riffles (boulder/cobble or cobble/gravel)Edge: Bars ,Banks (natural or hardened), Backwaters (alcoves)
Applies in the Upper, Middle, Lower Green subwatersheds Strategies are mostly watershed wide, versus subwatershed specific.

Current Status of Channels >50m Bankfull Width

Fair -

Goals for Channels >50m Bankfull Width

This table shows recovery goals that were included in the 2005 plan as well as those that have been adopted since 2005 through the 3-year Work Plan and other processes.

ID	GOAL	DETAILS
Overall	Overall	Protect, rehabilitate, and enhance habitat to support viable salmonid populations in response to the Endangered Species Act listing of Chinook salmon and bull trout using an ecosystem approach. This approach will also benefit other non-listed aquatic species.
Goal 1	Processes & Habitats	Protect and restore physical, chemical, and biological processes and the freshwater, estuarine, and marine nearshore habitats on which salmonids depend.-- Protect and restore natural ecosystem processes; where restoration is not possible, consider sustainable engineered solutions;-- Protect currently functioning habitat;-- Protect and restore headwater areas, streams, and wetlands where feasible;-- Encourage management of flows to support habitat-forming processes; and-- Encourage management of land use changes and development standards to minimize impacts.
Goal 2	Habitat Connectivity	Protect and restore habitat connectivity where feasible.-- Encourage maintenance and protection of corridors that link habitats and (re) connect freshwater, estuarine, and saltwater habitats and their associated zones, as required by salmonids during all life stages;-- Connect side channels and floodplain areas to the mainstem where feasible; and-- Restore fish access where limited by dams, culverts, revetments and other barriers, where feasible.
Goal 3	Water Quality & Quantity	Protect and improve water quality and quantity conditions to support healthy salmonid populations.-- Reduce processes and inputs that degrade water quality where possible;-- Enhance riparian vegetation to improve water quality conditions where possible; and-- Encourage management of water withdrawals and groundwater recharge to maintain cool water inputs in key areas.
Goal 4	Implement Plan	Provide an implementable plan that supports salmon recovery.-- Promote informed, sustained commitment of key watershed interests;-- Implement an adaptive management approach to respond to changes and to ensure continued effectiveness;-- Develop a strategy to secure adequate funding for implementation;--

ID	GOAL	DETAILS
		Obtain support of WRIA 9 interlocal agreement member jurisdictions, federal and state agencies, Tribes, the agricultural community, and the business community in their recovery efforts;-- Provide public outreach and education, and engage the public in stewardship, restoration, and enhancement activities;-- Coordinate with other WRIA 9 planning activities; and-- Provide management actions that are doable, practical, and effective.

Monitoring the health of Channels >50m Bankfull Width

This table shows the attributes used to assess the health of this component, along with the indicators that will be measured periodically to assess progress toward recovery goals.

KEY ECOLOGICAL ATTRIBUTE (KEA)	INDICATOR	INDICATOR DETAILS
Hydrology - high flow hydrological regime	(GRLC MG,LG,UG 4) Days With Habitat Forming Flows	(GRLC MG,LG,UG 4) Habitat Forming Flows are > 8829cfs. Middle Green, Lower Green, Duwamish, USGS data.
Organic matter - retention/processing	(GRSD-UG-8) Pieces of LW per mile (GRSD - DU - 8) Pieces of LW per mile (GRSD - LG - 8) Pieces of LW per mile (GRSD-MG-8) Pieces of LW per mile	(GRSD-UG-8) Upper Green, ACOE and WRIA sponsored data collection. (GRSD - DU - 8) Duwamish (GRSD - LG - 8) Lower Green (GRSD-MG-8) Middle Green, ACOE and WRIA sponsored data collection.
Sediment dynamics - sediment delivery	(GRLC - UG- 1) Unarmored Bank (GRLC MG 1) Unarmored Bank (GRLC LG 1) Unarmored bank (GRLC DU 1) Unarmored bank (GAP_ GRLC MG 2) Bank Sediment Available to River (GAP_GRLC-LG-2) Bank Sediment Available to River	(GRLC - UG- 1) Upper Green, WRIA sponsored data collection (GRLC MG 1) Middle Green, WRIA sponsored data collection (GRLC LG 1) Lower Green, WRIA sponsored data colelction (GRLC DU 1) Duwamish, WRIA sponsored data colelction (GAP_ GRLC MG 2) Middle Green, WRIA sponsored data collection (GAP_GRLC-LG-2)
Sediment dynamics-sediment trsansport and storage	(GRLC-UG-3) Unarmored Bank (GRLC MG 3) Unarmored Bank	(GRLC-UG-3) Upper Green, WRIA sponsored data collection (GRLC MG 3) Middle Green, WRIA sponsored data collection
Water Quality	(GAP_ MG,LG) Temperature - number of days violating state standards	(GAP_ MG,LG)

Channels <50m Bankfull Width

Description of Channels <50m Bankfull Width

Includes main channels <50 m bankfull width (BFW)

Includes the following habitat types at the reach scale:
Confined - Bedrock, Colluvial
Unconfined - Alluvial - Cascades, Step pools, Plane bed, Pool riffles, Dune ripples

Includes the following additional habitat types at the habitat unit scale:
Pools, Glides, Riffles, Rapids, Runs, Cascades
Applies in the Upper, Middle and Lower Green River Subwatersheds. Also includes independent tributaries to Puget Sound (e.g. Miller-Walker, Judd, Shinglemill)

Current Status of Channels <50m Bankfull Width

Fair -

Goals for Channels <50m Bankfull Width

This table shows recovery goals that were included in the 2005 plan as well as those that have been adopted since 2005 through the 3-year Work Plan and other processes.

ID	GOAL	DETAILS
Overall	Overall	Protect, rehabilitate, and enhance habitat to support viable salmonid populations in response to the Endangered Species Act listing of Chinook salmon and bull trout using an ecosystem approach. This approach will also benefit other non-listed aquatic species.
Goal 1	Processes & Habitats	Protect and restore physical, chemical, and biological processes and the freshwater, estuarine, and marine nearshore habitats on which salmonids depend.-- Protect and restore natural ecosystem processes; where restoration is not possible, consider sustainable engineered solutions;-- Protect currently functioning habitat;-- Protect and restore headwater areas, streams, and wetlands where feasible;-- Encourage management of flows to support habitat-forming processes; and-- Encourage management of land use changes and development standards to minimize impacts.
Goal 2	Habitat Connectivity	Protect and restore habitat connectivity where feasible.-- Encourage maintenance and protection of corridors that link habitats and (re) connect freshwater, estuarine, and saltwater habitats and their associated zones, as required by salmonids during all life stages;-- Connect side channels and floodplain areas to the mainstem where feasible; and-- Restore fish access where limited by dams, culverts, revetments and other barriers, where feasible.
Goal 3	Water Quality & Quantity	Protect and improve water quality and quantity conditions to support healthy salmonid populations.-- Reduce processes and inputs that degrade water quality where possible;-- Enhance riparian vegetation to improve water quality conditions where possible; and-- Encourage management of water withdrawals and groundwater recharge to maintain cool water inputs in key areas.
Goal 4	Implement Plan	Provide an implementable plan that supports salmon recovery.-- Promote informed, sustained commitment of key watershed interests;-- Implement an adaptive management approach to respond to changes and to ensure continued

ID	GOAL	DETAILS
		effectiveness;-- Develop a strategy to secure adequate funding for implementation;-- Obtain support of WRIA 9 interlocal agreement member jurisdictions, federal and state agencies, Tribes, the agricultural community, and the business community in their recovery efforts;-- Provide public outreach and education, and engage the public in stewardship, restoration, and enhancement activities;-- Coordinate with other WRIA 9 planning activities; and-- Provide management actions that are doable, practical, and effective.

Monitoring the health of Channels <50m Bankfull Width

This table shows the attributes used to assess the health of this component, along with the indicators that will be measured periodically to assess progress toward recovery goals.

KEY ECOLOGICAL ATTRIBUTE (KEA)	INDICATOR	INDICATOR DETAILS
Hydrology - high flow hydrological regime	(GAP) Hydrology - high flow hydrological regime	(GAP)
Nutrient supply - water quality	() Temperature for Soos () Temperature for Newaukum	() Number of days above WADOE 7-DADMax Summer Standard () # of days above WADOE 7-DADMax Summer Standard. King County Data.
Habitat connectivity	(GAP) Habitat Connectivity	(GAP)
Riparian - spatial extent and continuity of riparian areas	(GRSC-SO-4) Riparian Condition - Soos (GRSC-NE-4) Riparian condition - Newaukum	(GRSC-SO-4) WRIA sponsored data collection (GRSC-NE-4) WRIA sponsored data collection
Hydrology - low flow hydrological regime	(GAP) Hydrology - low flow hydrological regime	(GAP)
Riparian - riparian community structure	(GAP) Riparian - riparian community structure	(GAP)
Organic inputs-Organic matter-inputs	(GRSC-SO-3) riparian condition-Soos (GRSC-NE-3) Riparian Condition Newaukum	(GRSC-SO-3) WRIA sponsored data collection (GRSC-NE-3)
Organic inputs-Organic matter-retention processing	(GAP) Organic inputs-Organic matter-retention processing	(GAP)
Nurtient supply-nutrient cycling/flux	(GAP) Nutrient supply - nutrient cycling/flux	(GAP)

Side channels

Description of Side channels

Includes the following habitat types at the reach scale:
Unconfined: Alluvial - Step pools, Plane beds, Pool riffles, Dune ripples

Includes the following habitat types at the habitat unit scale:
Pools, Glides, Riffles, Rapids, Runs
Applies in the Middle Green, Upper Green and Lower Green subwatersheds-reporting is the same, strategies are different.

Current Status of Side channels

Fair -

Goals for Side channels

This table shows recovery goals that were included in the 2005 plan as well as those that have been adopted since 2005 through the 3-year Work Plan and other processes.

ID	GOAL	DETAILS
Overall	Overall	Protect, rehabilitate, and enhance habitat to support viable salmonid populations in response to the Endangered Species Act listing of Chinook salmon and bull trout using an ecosystem approach. This approach will also benefit other non-listed aquatic species.
Goal 1	Processes & Habitats	Protect and restore physical, chemical, and biological processes and the freshwater, estuarine, and marine nearshore habitats on which salmonids depend.-- Protect and restore natural ecosystem processes; where restoration is not possible, consider sustainable engineered solutions;-- Protect currently functioning habitat;-- Protect and restore headwater areas, streams, and wetlands where feasible;-- Encourage management of flows to support habitat-forming processes; and-- Encourage management of land use changes and development standards to minimize impacts.
Goal 2	Habitat Connectivity	Protect and restore habitat connectivity where feasible.-- Encourage maintenance and protection of corridors that link habitats and (re) connect freshwater, estuarine, and saltwater habitats and their associated zones, as required by salmonids during all life stages;-- Connect side channels and floodplain areas to the mainstem where feasible; and-- Restore fish access where limited by dams, culverts, revetments and other barriers, where feasible.
Goal 3	Water Quality & Quantity	Protect and improve water quality and quantity conditions to support healthy salmonid populations.-- Reduce processes and inputs that degrade water quality where possible;-- Enhance riparian vegetation to improve water quality conditions where possible; and-- Encourage management of water withdrawals and groundwater recharge to maintain cool water inputs in key areas.
Goal 4	Implement Plan	Provide an implementable plan that supports salmon recovery.-- Promote informed, sustained commitment of key watershed interests;-- Implement an adaptive management approach to respond to changes and to ensure continued effectiveness;-- Develop a strategy to secure adequate funding for implementation;--

ID	GOAL	DETAILS
		Obtain support of WRIA 9 interlocal agreement member jurisdictions, federal and state agencies, Tribes, the agricultural community, and the business community in their recovery efforts;-- Provide public outreach and education, and engage the public in stewardship, restoration, and enhancement activities;-- Coordinate with other WRIA 9 planning activities; and-- Provide management actions that are doable, practical, and effective.

Monitoring the health of Side channels

This table shows the attributes used to assess the health of this component, along with the indicators that will be measured periodically to assess progress toward recovery goals.

KEY ECOLOGICAL ATTRIBUTE (KEA)	INDICATOR	INDICATOR DETAILS
Sediment dynamics - sediment delivery	(GRSD-UG-1) Amount of unarmored bank (GRSD-MG01) Amount of unarmored bank (GRSD-LG-1) Amount of unarmored bank (GRSD-DU-1) Amount of unarmored bank (GAP_GRSD-MG-2) Amount of bank sediment available to river (GAP_GRSD-LG-2) Amount of bank sediment available to river (GRSD-MG-4) number of days of habitat forming flows (> 8829cfs) per water year (GRSD-LG-4) number of days of habitat forming flows (> 8829cfs) per water year (GRSD-UG-4) Number of days of habitat forming flows (> 8829cfs) per water year (GAP_GRSD-MG-5) number of day of daily average flow <300cfs (GAP_GRSD-LG-5) number of day of daily average flow <300cfs (GAP_GRSD-DU-5) number of day of daily average flow <300cfs	(GRSD-UG-1) WRIA sponsored data collection - Upper Green (GRSD-MG01) WRIA sponsored data collection - Middle Green (GRSD-LG-1) Lower Green - WRIA Sponsored data collection (GRSD-DU-1) WRIA sponsored data collection (GAP_GRSD-MG-2) WRIA Sponsored data - Middle Green (GAP_GRSD-LG-2) WRIA sponsored data collection - Lower Green (GRSD-MG-4) USGS Data - Middle Green (GRSD-LG-4) USGS data- Lower Green (GRSD-UG-4) USGS Data - Upper Green (GAP_GRSD-MG-5) USGS data - Middle Green (GAP_GRSD-LG-5) (GAP_GRSD-DU-5) USGS Data - Duwamish
Organic matter - inputs	(GRSD-UG-6) Amount of unarmored bank (GRSD-DU-6) Amount of unarmored bank (GRSD-LG-6) Amount of unarmored bank (GRSD-MG-6) Amount of unarmored bank	(GRSD-UG-6) WRIA Sponsored data collection - Upper Green (GRSD-DU-6) WRIA Sponsored data collection - Duwamish (GRSD-LG-6) (GRSD-MG-6) WRIA sponsored data collection - Middle Green
Riparian - function of riparian and wetland vegetation	(GRSD-LG-11) Amount of unarmored bank (GRSD-MG-11) Amount of unarmored bank (GRSD-UG-11) Amount of unarmored bank (GRSD-DU-11) Amount of unarmored	(GRSD-LG-11) (GRSD-MG-11) WRIA sponsored data collection (GRSD-UG-11) WRIA sponsored data collection (GRSD-DU-11) WRIA Sponsored data collection

KEY ECOLOGICAL ATTRIBUTE (KEA)	INDICATOR	INDICATOR DETAILS
	bank	
Floodplain-channel interactions - floodplain connectivity	(GRSD-LG-13) Amount of historic floodplain currently accessible	(GRSD-LG-13) Lower Green
Habitat connectivity	(GAP) Habitat Connectivity	(GAP)
Nutrient supply - nutrient cycling/flux	(GAP) Nutrient supply - nutrient cycling/flux	(GAP)
Organic matter - retention/processing	(GRSD-UG-7) Amount of unarmored bank (GRSD-MG-7) Amount of unarmored bank (GRSD-LG-7) Amount of unarmored bank (GRSD-DU-7) Amount of unarmored bank (GRSD-UG-8) Pieces of LW per mile (GRSD-MG-8) Pieces of LW per mile (GRSD-LG-8) Pieces of LW per mile (GRSD-DU-8) Pieces of LW per mile (GRSD-DU-9) Number of jams per mile (GRSD-LG-9) Number of jams per mile (GRSD-MG-9) Number of jams per mile (GRSD-UG-9) Number of jams per mile	(GRSD-UG-7) WRIA sponsored data collection - Upper Green (GRSD-MG-7) WRIA Sponsored data collection - Middle Green (GRSD-LG-7) WRIA sponsored data collection - Lower Green (GRSD-DU-7) WRIA sponsored data collection - Duwamish (GRSD-UG-8) ACOE and WRIA sponsored data collection (GRSD-MG-8) ACOE and WRIA sponsored data collection (GRSD-LG-8) ACOE and WRIA sponsored data collection (GRSD-DU-8) ACOE and WRIA sponsored data collection (GRSD-DU-9) ACOE and WRIA sponsored data collection (GRSD-LG-9) ACOE and WRIA sponsored data collection (GRSD-MG-9) ACOE and WRIA sponsored data collection (GRSD-UG-9) ACOE and WRIA sponsored data collection
Riparian - spatial extent and continuity of riparian areas	(GRLC-DU-10) Riparian condition along banks (GRLC-LG-10) Riparian condition along banks (GRLC-MG-10) Riparian condition-% of CMZ	(GRLC-DU-10) WRIA sponsored data collection (GRLC-LG-10) WRIA sponsored data collection (GRLC-MG-10) WRIA sponsored data collection

Non-Channel Lakes & Wetlands

Description of Non-Channel Lakes & Wetlands

Includes the following habitat types at the reach scale:
Lacustrine habitats (i.e., lakes, ponds, reservoirs) and palustrine habitats (i.e., wetlands). Includes waterbodies in which Chinook could live directly due to their connectivity with channels, and waterbodes isolated from channels and inaccessible to Chinook.
NOTE-no strategies are really associated with addressing floodplain habitats, but is described in the Necessary Future Conditions of at least the lower green section

Includes the following habitat types at the habitat unit scale:
Littoral, Limnetic

Emergent wetland, Scrub-shrub wetland, Forested wetland

Current Status of Non-Channel Lakes & Wetlands

(not available)

Goals for Non-Channel Lakes & Wetlands

This table shows recovery goals that were included in the 2005 plan as well as those that have been adopted since 2005 through the 3-year Work Plan and other processes.

ID	GOAL	DETAILS
Overall	Overall	Protect, rehabilitate, and enhance habitat to support viable salmonid populations in response to the Endangered Species Act listing of Chinook salmon and bull trout using an ecosystem approach. This approach will also benefit other non-listed aquatic species.
Goal 1	Processes & Habitats	Protect and restore physical, chemical, and biological processes and the freshwater, estuarine, and marine nearshore habitats on which salmonids depend.-- Protect and restore natural ecosystem processes; where restoration is not possible, consider sustainable engineered solutions;-- Protect currently functioning habitat;-- Protect and restore headwater areas, streams, and wetlands where feasible;-- Encourage management of flows to support habitat-forming processes; and-- Encourage management of land use changes and development standards to minimize impacts.
Goal 2	Habitat Connectivity	Protect and restore habitat connectivity where feasible.-- Encourage maintenance and protection of corridors that link habitats and (re) connect freshwater, estuarine, and saltwater habitats and their associated zones, as required by salmonids during all life stages;-- Connect side channels and floodplain areas to the mainstem where feasible; and-- Restore fish access where limited by dams, culverts, revetments and other barriers, where feasible.
Goal 3	Water Quality & Quantity	Protect and improve water quality and quantity conditions to support healthy salmonid populations.-- Reduce processes and inputs that degrade water quality where possible;-- Enhance riparian vegetation to improve water quality conditions where possible; and-- Encourage management of water withdrawals and groundwater recharge to maintain cool water inputs in key areas.

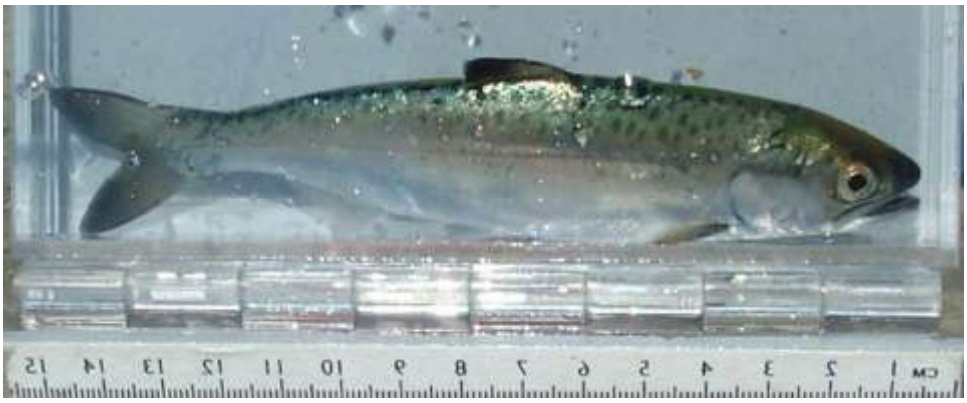
ID	GOAL	DETAILS
Goal 4	Implement Plan	Provide an implementable plan that supports salmon recovery.-- Promote informed, sustained commitment of key watershed interests;-- Implement an adaptive management approach to respond to changes and to ensure continued effectiveness;-- Develop a strategy to secure adequate funding for implementation;-- Obtain support of WRIA 9 interlocal agreement member jurisdictions, federal and state agencies, Tribes, the agricultural community, and the business community in their recovery efforts;-- Provide public outreach and education, and engage the public in stewardship, restoration, and enhancement activities;-- Coordinate with other WRIA 9 planning activities; and-- Provide management actions that are doable, practical, and effective.

Monitoring the health of Non-Channel Lakes & Wetlands

This table shows the attributes used to assess the health of this component, along with the indicators that will be measured periodically to assess progress toward recovery goals.

KEY ECOLOGICAL ATTRIBUTE (KEA)	INDICATOR	INDICATOR DETAILS
Hydrology - low flow hydrological regime	(GAP_GRFL-MG-2) Number of day of daily average flow <300cfs (GAP_GRFL-LG-2) Number of day of daily average flow <300cfs (GAP_GRFL-DU-2) Number of days of daily average flow <300cfs	(GAP_GRFL-MG-2) USGS data (GAP_GRFL-LG-2) USGS data (GAP_GRFL-DU-2) USGS data
Organic matter - inputs	(GAP) Organic Matter - inputs	(GAP)
Organic matter - retention and processing	(GAP) Organic matter- retention/processing	(GAP)
Nutrient supply - nutrient cycling/flux	(GAP) Nutrient supply - nutrient cycling/flux	(GAP)
Habitat connectivity	(GAP) Habitat Connectivity	(GAP)
Nutrient supply - water quality	(GAP) Nutrient Supply - water quality	(GAP)
Hydrology - high flow hydrological regime	(GRFL-DU-1) number of days of RIVER habitat forming flows (> 8829cfs) per water year (GRFL-LG-1) number of days of RIVER habitat forming flows (> 8829cfs) per water year (GRFL-MG-1) Number of days of RIVER habitat forming flows (> 8829cfs) per water year	(GRFL-DU-1) (GRFL-LG-1) (GRFL-MG-1)

Green River Fall Chinook Salmon



Description of Green River Fall Chinook Salmon

Green River Fall Chinook. And future spring stock likely from White River system--to reestablish extinct spring stock in Upper Green. Many of the 22 populations use the nearshore of WRIA 9.

Current Status of Green River Fall Chinook Salmon

Fair -

Goals for Green River Fall Chinook Salmon

This table shows recovery goals that were included in the 2005 plan as well as those that have been adopted since 2005 through the 3-year Work Plan and other processes.

ID	GOAL	DETAILS
Overall	Overall	Protect, rehabilitate, and enhance habitat to support viable salmonid populations in response to the Endangered Species Act listing of Chinook salmon and bull trout using an ecosystem approach. This approach will also benefit other non-listed aquatic species.
Goal 1	Processes & Habitats	Protect and restore physical, chemical, and biological processes and the freshwater, estuarine, and marine nearshore habitats on which salmonids depend.-- Protect and restore natural ecosystem processes; where restoration is not possible, consider sustainable engineered solutions;-- Protect currently functioning habitat;-- Protect and restore headwater areas, streams, and wetlands where feasible;-- Encourage management of flows to support habitat-forming processes; and-- Encourage management of land use changes and development standards to minimize impacts.
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Goal 3	Water Quality & Quantity	Protect and improve water quality and quantity conditions to support healthy salmonid populations.-- Reduce processes and inputs that degrade water quality where possible;-- Enhance riparian vegetation to improve water quality conditions where possible; and-- Encourage management of water withdrawals and groundwater recharge to maintain cool water inputs in key areas.
Goal 4	Implement Plan	Provide an implementable plan that supports salmon recovery.-- Promote informed, sustained commitment of key watershed interests;-- Implement an adaptive management approach to respond to changes and to ensure continued effectiveness;-- Develop a strategy to secure adequate funding for implementation;-- Obtain support of WRIA 9 interlocal agreement member jurisdictions, federal and state agencies, Tribes, the agricultural community, and the business community in their recovery efforts;-- Provide public outreach and education, and engage the public in stewardship, restoration, and enhancement activities;-- Coordinate with other WRIA 9 planning activities; and-- Provide management actions that are doable, practical,

ID	GOAL	DETAILS
		and effective.
Goal 5	Abundance	Short-term (10-15 years): Increase abundance of natural origin salmon to between 1,000 and 4,200 annually.Long-term (50-100 years): Increase abundance of natural origin salmon to 27,000 annually.
Goal 6	Productivity	Short-Term Productivity: Increase population growth rate of natural origin salmonLong-Term Productivity: Stabilize population growth rate at the equilibrium.
Goal 7	Spatial Structure	Short-Term Spatial Structure: Increase distinct spawning aggregations in the Middle Green.Long-Term Spatial Structure: Achieve distinct spawning aggregations above Howard Hanson Dam.
Goal 8	Diversity	Short-Term Diversity: Protect existing life history types and increase variability in age structure.Long-Term Diversity: Re-establish spring population upstream of Howard Hanson Dam. Re-establish historical run and spawn timing of existing fall population.

Monitoring the health of Green River Fall Chinook Salmon

This table shows the attributes used to assess the health of this component, along with the indicators that will be measured periodically to assess progress toward recovery goals.

KEY ECOLOGICAL ATTRIBUTE (KEA)	INDICATOR	INDICATOR DETAILS
Abundance	(GRF 1) Fall-NOS-Low productivity (GRF 2) Fall NOS - High productivity (GAP_ GRF3) Number of emergent fry (GAP_GRF 4) Number of parr migrants	(GRF 1) Geographic specificity: Lower Green. WDFW spawner surveys as translated by NOAA, NOAA salmon opulation summary database. This is abundance when productivity numbers are low. Source - 2005 Plan. (GRF 2) Geographic specificity: Lower Green. WDFW spawner surveys as translated by NOAA, NOAA salmon population summary database. This is abundance when productivity numbers are high. Source - 2005 Plan. (GAP_ GRF3) Geographic specificity: Middle Green. WDFW smolt trap data. 2005 Plan. No desired future status, gap for future adaptive management. (GAP_GRF 4) Geographic specificity: Middle Green. WDFW smolt trap data. 2005 Plan. No desired future status, gap for future adaptive management.
Productivity - fish growth	(GAP) Fish Growth	(GAP) Geographic specificity: watershed wide. Currently a GAP-considering Avg Size by date at Smolt Trap.
Productivity - population growth	() Median short-term population growth rate of NOS	() Watershed wide. WDFW spawner data
Diversity - genetic diversity	() Percent hatchery fish spawning naturally	() Geographic Specificity: Lower and Middle Green together. WDFW spawner data
Productivity - survival rate	() Recruit per NOS () Egg to outmigrant survival	() Geographic specificity: watershed wide. WDFW smolt Trap () Geographic specificity: watershed wide. WDFW smolt trap.
Spatial distribution	(GAP) Number of occupied spawning patches (GAP) Number of occupied spawning patches	(GAP) Geographic specificity: Lower Green (GAP) Geographic specificity: Middle Green. WDFW spawner data.

KEY ECOLOGICAL ATTRIBUTE (KEA)	INDICATOR	INDICATOR DETAILS
Diversity - life history diversity	(GAP) Relative abundance of Parr outmigrants (GAP) TIming of Peak outmigration of fry (GAP) Timing of Peak outmigration of parr (GAP) Proportion of 5 and 6 year old NOS	(GAP) Geographic Specificity: Middle Green. WDFW smolt Trap. No desired future status, gap for future adaptive management. (GAP) Geographic Specificity: Middle Green. WDFW smolt Trap. No desired future status, gap for future adaptive management. Data need from WDFW in a different format. (GAP) Geographic Specificity: Middle Green. WDFW smolt Trap. No desired future status, gap for future adaptive management. Data need from WDFW in a different format. (GAP) Geographic Specificity: watershed wide. WDFW smolt Trap. No desired future status, gap for future adaptive management. Data need from WDFW in a different format.

Species & food webs

Description of Species & food webs

This component includes freshwater and nearshore/marine predators, competitors and prey of Chinook, as well as other dimensions of food webs and species that might be disease vectors or have other impacts on Chinook salmon. Indicators should address attributes across all habitat types where appropriate.
This is described in both contexts- freshwater and marine subwatersheds.

Current Status of Species & food webs

(not available)

Goals for Species & food webs

This table shows recovery goals that were included in the 2005 plan as well as those that have been adopted since 2005 through the 3-year Work Plan and other processes.

ID	GOAL	DETAILS
Overall	Overall	Protect, rehabilitate, and enhance habitat to support viable salmonid populations in response to the Endangered Species Act listing of Chinook salmon and bull trout using an ecosystem approach. This approach will also benefit other non-listed aquatic species.
Goal 1	Processes & Habitats	Protect and restore physical, chemical, and biological processes and the freshwater, estuarine, and marine nearshore habitats on which salmonids depend.-- Protect and restore natural ecosystem processes; where restoration is not possible, consider sustainable engineered solutions;-- Protect currently functioning habitat;-- Protect and restore headwater areas, streams, and wetlands where feasible;-- Encourage management of flows to support habitat-forming processes; and-- Encourage management of land use changes and development standards to minimize impacts.
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Goal 3	Water Quality & Quantity	Protect and improve water quality and quantity conditions to support healthy salmonid populations.-- Reduce processes and inputs that degrade water quality where possible;-- Enhance riparian vegetation to improve water quality conditions where possible; and-- Encourage management of water withdrawals and groundwater recharge to maintain cool water inputs in key areas.
Goal 4	Implement Plan	Provide an implementable plan that supports salmon recovery.-- Promote informed, sustained commitment of key watershed interests;-- Implement an adaptive management approach to respond to changes and to ensure continued effectiveness;-- Develop a strategy to secure adequate funding for implementation;-- Obtain support of WRIA 9 interlocal agreement member jurisdictions, federal and state agencies, Tribes, the agricultural community, and the business community in their recovery efforts;-- Provide public outreach and education, and engage the public in stewardship, restoration, and enhancement activities;-- Coordinate with other WRIA

ID	GOAL	DETAILS
		9 planning activities; and-- Provide management actions that are doable, practical, and effective.

Monitoring the health of Species & food webs

This table shows the attributes used to assess the health of this component, along with the indicators that will be measured periodically to assess progress toward recovery goals.

KEY ECOLOGICAL ATTRIBUTE (KEA)	INDICATOR	INDICATOR DETAILS
Prey population size	(GAP) Prey population size	(GAP)
Prey population condition	(GAP) Prey population condition	(GAP)
Competitor population size	(GAP) Competitor population size	(GAP)
Competitor population condition	(GAP) Competitor population condition	(GAP)
Predator population size	(GAP) Predator population size	(GAP)
Predator population condition	(GAP) Predator Population condition	(GAP)
Other species population size	(GAP) Other species population size	(GAP)
Other species population condition	(GAP) Other species population condition	(GAP)
Food web community composition	(GAP) Food web community composition	(GAP)
Food web energy & material flow	(GAP) Food web energy & material flow	(GAP)

Uplands

Description of Uplands

Includes upland areas, or geomorphic surfaces with no defined channel, associated with Chinook habitats. These areas may include isolated wetlands.
Currently tracking imperviousness and forest cover for all subwatersheds. Have many watershed wide program/policies that effect upland habitats.

Current Status of Uplands

Fair -

Goals for Uplands

This table shows recovery goals that were included in the 2005 plan as well as those that have been adopted since 2005 through the 3-year Work Plan and other processes.

ID	GOAL	DETAILS
Overall	Overall	Protect, rehabilitate, and enhance habitat to support viable salmonid populations in response to the Endangered Species Act listing of Chinook salmon and bull trout using an ecosystem approach. This approach will also benefit other non-listed aquatic species.
Goal 1	Processes & Habitats	Protect and restore physical, chemical, and biological processes and the freshwater, estuarine, and marine nearshore habitats on which salmonids depend.-- Protect and restore natural ecosystem processes; where restoration is not possible, consider sustainable engineered solutions;-- Protect currently functioning habitat;-- Protect and restore headwater areas, streams, and wetlands where feasible;-- Encourage management of flows to support habitat-forming processes; and-- Encourage management of land use changes and development standards to minimize impacts.
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Goal 4	Implement Plan	Provide an implementable plan that supports salmon recovery.-- Promote informed, sustained commitment of key watershed interests;-- Implement an adaptive management approach to respond to changes and to ensure continued effectiveness;-- Develop a strategy to secure adequate funding for implementation;-- Obtain support of WRIA 9 interlocal agreement member jurisdictions, federal and state agencies, Tribes, the agricultural community, and the business community in their recovery efforts;-- Provide public outreach and education, and engage the public in stewardship, restoration, and enhancement activities;-- Coordinate with other WRIA

ID	GOAL	DETAILS
		9 planning activities; and-- Provide management actions that are doable, practical, and effective.

Monitoring the health of Uplands

This table shows the attributes used to assess the health of this component, along with the indicators that will be measured periodically to assess progress toward recovery goals.

KEY ECOLOGICAL ATTRIBUTE (KEA)	INDICATOR	INDICATOR DETAILS
Sediment dynamics - sediment delivery	(GRUP UG 1) Forest cover (GRUP MG 1) Forest cover (GRUP LG1) Forest Cover (GRUP DU 1) Forest Cover (GRUP NRM 1) Forest Cover (GRUP NRV 1) Forest Cover (GRUP UG2) Percent Pervious Surface by Subbasin (GRUP MG 2) Percent Pervious Surface by Subbasin (GRUP LG) Percent Pervious Surface by Subbasin (GRUP DU 2) Pervious Surface by Subbasin (GRUP NRM) Percent Pervious Surface by Subbasin () BIBI Scores (GAP) Number of Landslides	(GRUP UG 1) Upper Green, NOAA CCAP data (GRUP MG 1) Middle Green, NOAA CCAP data (GRUP LG1) Lower Green, NOAA CCAP data (GRUP DU 1) Duwamish, NOAA CCAP data (GRUP NRM 1) Nearshore-Mainland, NOAA CCAP data (GRUP NRV 1) Nearshore - Vashon, NOAA CCAP data (GRUP UG2) Upper Green, DOE/NOAA CCAP Data (GRUP MG 2) DOE/NOAA CCAP Data (GRUP LG) Lower Green, DOE/NOAA CCAP Data (GRUP DU 2) Duwamish, DOE/NOWW CCAP Data (GRUP NRM) Nearshore Mainland, DOE/NOAA CCAP Data () King County Data (GAP)
Organic matter - inputs	(GRUP UG 3) Forest Cover (GRUP MG 3) Forest Cover (GRUP LG 3) Forest Cover (GRUP DU 3) Forest Cover (GRUP NRM 3) Forest Cover (GRUP NRV 3) Forest Cover	(GRUP UG 3) Upper Green, NOAA CCAP data (GRUP MG 3) Middle Green, NOAA CCAP data (GRUP LG 3) Lower Green, NOAA CCAP data (GRUP DU 3) Duwamish, NOAA CCAP data (GRUP NRM 3) Nearshore - Mainland, NOAA CCAP data (GRUP NRV 3) Nearshore-Vashon, NOAA CCAP data

5.0 Key Pressures to Chinook and Chinook Habitats

A successful recovery plan will address the need to both restore Chinook and their habitats as well as protect against the primary pressures contributing to ongoing and future degradation or impairment of habitat and Chinook populations within the watershed. In this step of Phase I, watersheds were asked to translate existing information about limiting factors, threats, pressures and vulnerabilities from the 2005 plan chapter and subsequent 3YWPs using a taxonomy of common sources of pressure developed by the Puget Sound Partnership (PSPA 2014). Some watersheds also identified the stressors, or the proximate actors on the ecosystem, present in their watershed if sufficient information was available and time allowed. The stressors were also selected from a common taxonomy of stressors for Puget Sound (PSPA 2014). Watersheds then described the cause and effect relationships between pressures, stressors (if available) and the ecosystem by building links between these elements in their conceptual models. Using consistent terms and methods to describe pressures and their effects on the ecosystem will improve our ability to address these pressures at the local and the regional scale.

Pressures are defined as human activities or natural processes that have caused, are causing, or may cause the destruction, degradation, and/or impairment of ecosystem components and/or their KEAs. Pressures include the sources of stress (e.g., residential and commercial development) and associated stressors (e.g., habitat conversion due to development). The ultimate result of a source-stressor pair acting on the ecosystem is the degradation of one or more key ecological attributes of one more components.

In Table 2 below, information from the 2005 recovery plan chapter and subsequent 3YWPs was used to identify relationships between the pressures and priority ecosystem components in the watershed. A colored cell including the text ”Not Specified” identifies places where a relationship between a pressure and a component has been identified in the watershed, but not yet characterized in the M and AM project. A complete table of pressures with definitions is included in Appendix A.3.

Table 2. Pressures and their relationship to ecosystem components in the watershed.

	Ecosystem Components											
Pressures	**Uplands**	**Side channels**	**Non-Channel Lakes & Wetlands**	**Coastal landforms**	**Species & food webs**	**Chinook salmon**	**Channels <50m Bankfull Width**	**Pocket estuaries**	**Natal Chinook estuaries**	**Channels >50m Bankfull Width**	**Bluff backed beaches**	**Summary Pressure Rating**
Abstraction of ground water	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
Abstraction of surface water	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
Agricultural & Forestry Effluents	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
Annual & Perennial Non-Timber Crops	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
Commercial & Industrial Areas (Including Ports)	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
Dams	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked
Fishing & Harvesting Aquatic Resources						Linked						Linked
Freshwater Levees, Floodgates, Tidegates	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked
Freshwater shoreline infrastructure	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked
Housing & Urban Areas	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
Industrial Runoff	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked

	Ecosystem Components											
Pressures	**Uplands**	**Side channels**	**Non-Channel Lakes & Wetlands**	**Coastal landforms**	**Species & food webs**	**Chinook salmon**	**Channels <50m Bankfull Width**	**Pocket estuaries**	**Natal Chinook estuaries**	**Channels >50m Bankfull Width**	**Bluff backed beaches**	**Summary Pressure Rating**
Livestock Farming & Ranching	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
Logging & Wood Harvesting	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
Marine & Freshwater Finfish Aquaculture	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
Marine Levees, Floodgates, Tidegates	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked
Marine shoreline infrastructure	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked
Mining & Quarrying	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
Oil Spills	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
OSS - Domestic and Commercial Wastewater to Onsite Sewage Systems (OSS)												Linked
Recreational Activities						Linked						Linked
Release of Excess Energy (light, heat, sound)	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
Roads &	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked

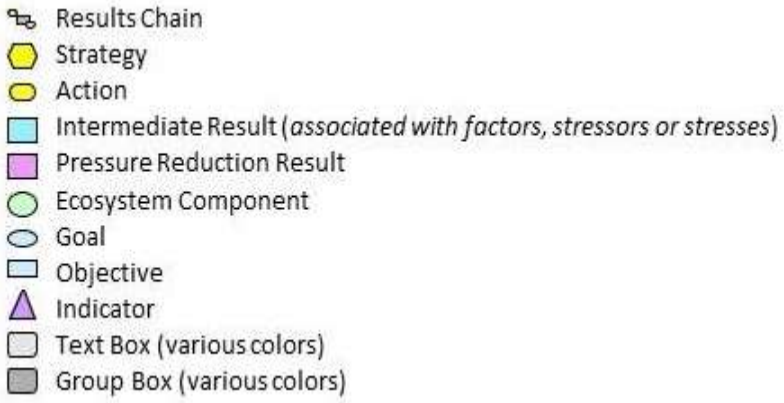
	Ecosystem Components											
Pressures	**Uplands**	**Side channels**	**Non-Channel Lakes & Wetlands**	**Coastal landforms**	**Species & food webs**	**Chinook salmon**	**Channels <50m Bankfull Width**	**Pocket estuaries**	**Natal Chinook estuaries**	**Channels >50m Bankfull Width**	**Bluff backed beaches**	**Summary Pressure Rating**
Railroads (Including Culverts)												
Runoff from residential and commercial lands	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
Sewer - Domestic & Municipal Wastewater to Sewer	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
Shipping Lanes and Dredged Waterways	Linked	Linked	Linked	Linked		Linked	Linked	Linked	Linked	Linked	Linked	Linked
Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked	Linked

6.0 Our Strategies and Actions

In order to document and test assumptions about how specific strategies and actions are intended to effect change in the ecosystem, watersheds developed results chains articulating the theories of change associated with specific strategies or suites of strategies. These results chains not only describe the hypotheses associated with specific strategies and actions but also include strategy effectiveness measures—including objectives and indicators—for expected intermediate outcomes along the way.

Results chains help build shared understanding of the context within which Chinook recovery occurs. They help the watershed explain the logic behind Chinook recovery strategies to determine if they are likely to achieve near-term objectives and longer-term habitat and Chinook population goals. They also provide a structure for assessing the effectiveness of project interventions and for redirecting efforts if a specific course of action is determined to be ineffective.

Key and Definitions for Results Chains



In this section, we use the following terminology to describe our theories of change:

A strategy is a bundle of actions that, when combined, are intended to achieve a common goal. Strategies are intended to mitigate pressures or their underlying conditions and root causes, restore ecosystems or species populations, or provide capacity to achieve goals. Strategies include one or more actions (capital projects, programs, etc.) and are designed to achieve specific outcomes, objectives, and goals.

Actions focus on delivery of a specific outcome or output associated with a desired result. Actions include capital projects (e.g. restoration and acquisition), program development or implementation, education and outreach, research, etc. Actions can be completed on a near-term (i.e. 2 years or less) or longer-term time scale.

Intermediate results are the expected changes following the implementation of a strategy or action that are necessary steps toward achieving a desired future status or goal. Within a results chain, intermediate results may be identified for results boxes (blue) as well as pressure reduction boxes (purple).

Objectives are the desired outcomes for a subset of intermediate results, most often those which are easily monitored or those which provide the most useful information about effectiveness of a specific course of action.

Effectiveness indicators are most often developed for critical intermediate results within a results chain, or those that can provide the most information about whether actions are having the desired effects. They can include indicators of implementation, effectiveness, or validation and are used to assess whether progress is being made toward specific objectives and goals. In the *Measuring Effectiveness* tables in the following section, indicators are rated as follows: 4 = Very High Priority, 3 = High Priority, 2 = Medium Priority, 1 = Low Priority, blank = Priority Not Specified.

Summary of Watershed Strategies

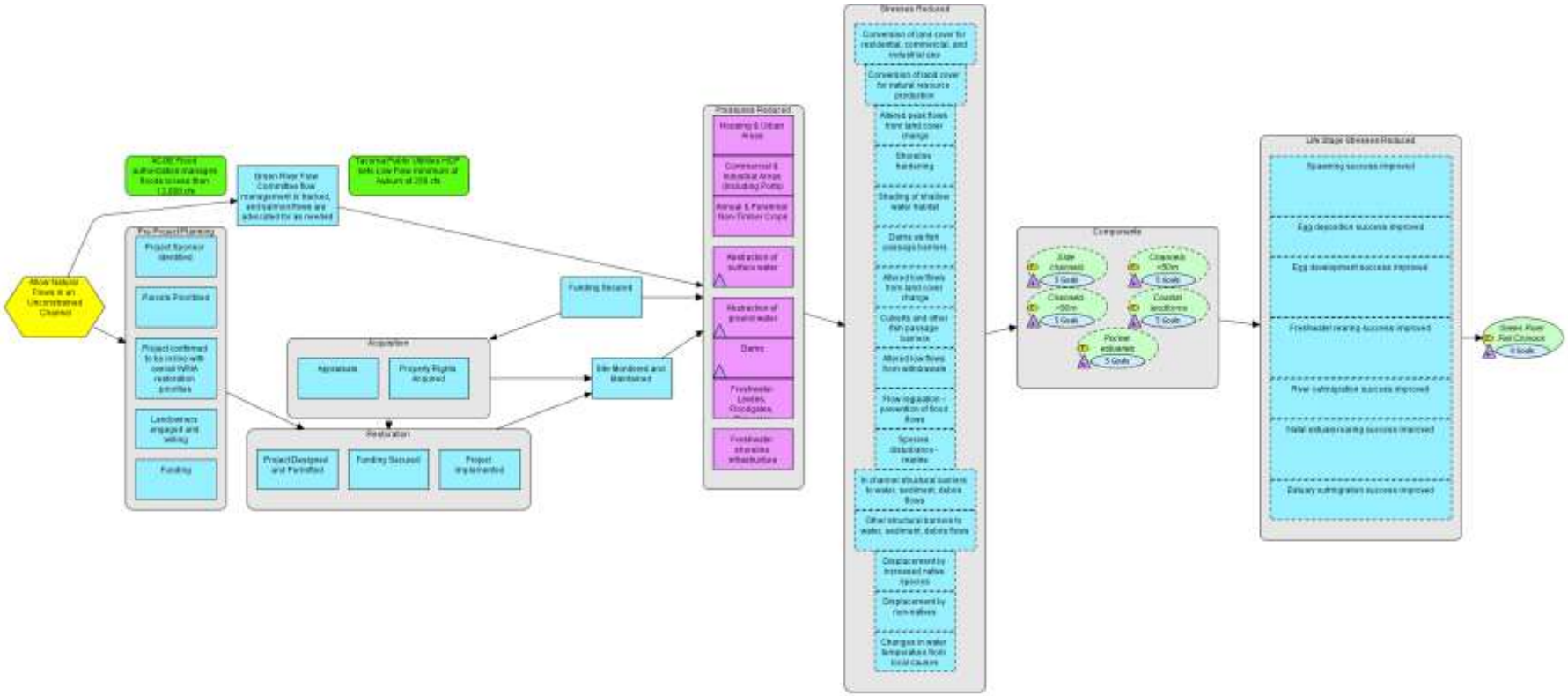
This table lists all strategies currently identified in our watershed. The following pages show our assumptions about how each of these strategies and associated actions contribute to our recovery goals, and how we are monitoring their effectiveness.

ID	STRATEGY	DESCRIPTION
	Prevent New and Remove Shoreline Armoring	Preventing new bank/shoreline armoring and fill and removing existing armoring, fill and other impediments (e.g., levees) will enhance habitat quality and quantity and lead to improved juvenile salmon survival, spatial distribution, and diversity.
	Funding	Because of the importance of the transition zone and the negative effect on habitat recovery efforts upstream if a server transition zone habitat limitation does exist, 40% of funding for management action recovery efforts will be focused on the transition zone,. The remaining 60% of funding for management action recovery efforts will be split 30% for the rearing habitats and 30% for spawning habitats.
	Reduce Upland Impacts	Preserving and protecting against watershed and upland impacts by implementing Low Impact Development techniques, including minimizing impervious surfaces, will maintain habitat quality by helping maintain flow, maintain water quality, and reduce sedimentation, thereby leading to greater salmon survival. Maintaining regional groundwater recharge and base flows to the mainstem Green River through forest retention and Low Impact Development techniques will maintain spawning and rearing habitat.
	Protect and Improve Riparian Vegetation	Protecting and improving riparian zone conditions by adding native riparian vegetation will enhance habitat quality by improving water quality, stabilizing streambanks, providing overhanging vegetation and large woody debris (LWD), and contributing organic matter, nutrients, and terrestrial prey items, there by leading to greater juvenile salmon growth and higher survival.
	Protect and restore sediment process in the Middle and Lower Green	Protecting and restoring natural sediment recruitment (particularly spawning gravels) by reconnecting sediment sources to the river will help maintain spawning habitat.
	Protect and restore nearshore sediment processes	Protecting and restoring nearshore sediment transport processes by reconnecting sediment sources and removing shoreline armoring that impacts sediment transport will lead to greater prey production, greater juvenile salmon growth, and higher survival.
	Provide Fish Passage at Howard Hansen Dam	Preserving and restoring spawning and rearing habitat in lower Newaukum and Soos Creeks will increase habitat quality and quantity, thereby increasing productivity and spatial structure of Green River Chinook salmon.
	Protect and Restore Rearing/Refuge Habitat	Protecting, creating, and restoring habitat that provides refuge (particularly side channels, off channels, and tributary access) and habitat complexity (particularly pools) for juvenile salmon in the Middle and Lower Green subwatersheds over a range of flow conditions and at a variety of locations (e.g., mainstem channel edge, river bends, and tributary mouths) will enhance habitat quality and quantity and lead to greater juvenile salmon residence time, greater growth, and higher survival. Expanding and enhancing the Duwamish estuary, particularly vegetated shallow subtidal and intertidal habitats and brackish marshes by restoring dredged, armored, and filled areas, will enhance habitat quantity and quality and lead to greater juvenile salmon residence time, greater growth, and higher survival.

ID	STRATEGY	DESCRIPTION
	Protect and Restore Spawning and Rearing Habitat in Soos and Newaukam Creeks	Preserving and restoring spawning and rearing habitat in lower Newaukum and Soos Creeks will increase habitat quality and quantity, thereby increasing productivity and spatial structure of Green River Chinook salmon
	Protect and Improve Water Temperature	Protecting and improving water temperature by addressing point and nonpoint sources will enhance habitat quality and lead to greater juvenile salmonid growth, disease resistance, and survival. Improved water quality will also enhance survival of adult salmon.
	Allow Natural Flows in an Unconstrained Channel	Allowing natural flows (including low flows and habitat-forming flows) in a relatively unconstrained river channel will enhance habitat diversity and provide habitats that can support spawning and rearing salmon at a greater variety of flow conditions, thereby leading to expanded salmon spatial distribution, greater juvenile salmon growth, and higher survival.
	Protect and Restore Natural Sediment Process in the Duwamish	Protecting and restoring natural sediment process (supply-transport-delivery) in the Duwamish will increase the quantity and quality of available juvenile salmon rearing habitat, including salmon prey production.

THEORY OF CHANGE: Allow Natural Flows in an Unconstrained Channel

The diagram below illustrates our assumptions about how the strategies and actions included in the results chain are intended to help reduce pressures and achieve our habitat and Chinook recovery goals. A larger, higher resolution results chain image is also included in Appendix A.2.



Description of theory of change associated with Allow Natural Flows in an Unconstrained Channel

Allowing natural disturbance-type flows in a relatively unconstrained river channel will enhance habitat diversity and will provide habitats that can support spawning and rearing salmon at a greater variety of flow conditions (compared with high flows in a constrained channel), thereby leading to expanded salmon spatial distribution, greater juvenile salmon growth, and higher survival.

Objectives associated with Allow Natural Flows in an Unconstrained Channel

Below is a list of specific objectives, or performance measures, associated with each results chain. We have noted key gaps where we'd like to develop objectives to help us track reduction of pressures and implementation or effectiveness.

Pressure Reduction Objectives: None identified.

Intermediate Objectives: None identified.

Monitoring Effectiveness of Allow Natural Flows in an Unconstrained Channel

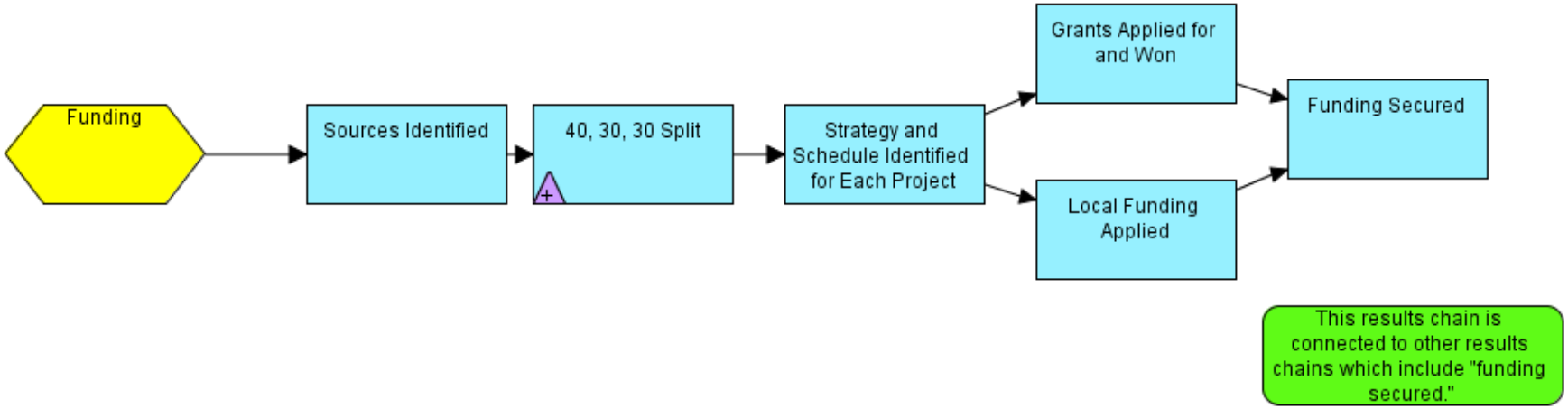
This table lists the measures we will use to assess progress on the implementation and effectiveness of the strategies and actions included in this results chain. For a complete list of effectiveness monitoring indicators and priorities, see Appendix A.5

Pressure Reduction and Intermediate Result Indicators:

ID	INDICATOR	DESCRIPTION	COMMENTS	PRIORITY	CURRENT MEASURE	DESIRED FUTURE MEASURE
	Habitat Forming Flows	Number of days with habitat forming flows (>8829 CFS) per water year		4	:	:
	Daily Average Flows at Auburn	Number of days daily average flow <300 CFS at Auburn			:	:
	Daily Average Flows at Auburn	Number of days daily average flow <300 CFS at Auburn			:	:

THEORY OF CHANGE: Funding (Policy MS-1)

The diagram below illustrates our assumptions about how the strategies and actions included in the results chain are intended to help reduce pressures and achieve our habitat and Chinook recovery goals. A larger, higher resolution results chain image is also included in Appendix A.2.



Description of theory of change associated with Funding

The focus of management action implementation efforts in this habitat plan will be on the following distinct habitats that are limiting viable salmonid populations in WRIA 9:
-- Duwamish Estuary transition zone habitat;
-- Middle Green River, Lower Green River, Duwamish Estuary, Marine Nearshore rearing habitat; and
-- Middle Green and upper Lower Green River spawning habitat.

Because of the importance of the transition zone and the negative effect on habitat recovery efforts upstream if a severe transition zone habitat limitation does exist, 40% of funding for management actions recovery efforts will be focused on the transition zone. The remaining 60% of funding for management action recovery efforts will be split 30% for the rearing habitats and 30% for the spawning habitats as described above. This allocation of funding would apply over the first 1o year period of the Habitat Plan (i.e., annual funding allocations could vary from this distribution) and would be subject to change as part of adaptive management.

Objectives associated with Funding

Below is a list of specific objectives, or performance measures, associated with each results chain. We have noted key gaps where we'd like to develop objectives to help us track reduction of pressures and implementation or effectiveness.

Pressure Reduction Objectives: None identified.

Intermediate Objectives: None identified.

Monitoring Effectiveness of Funding

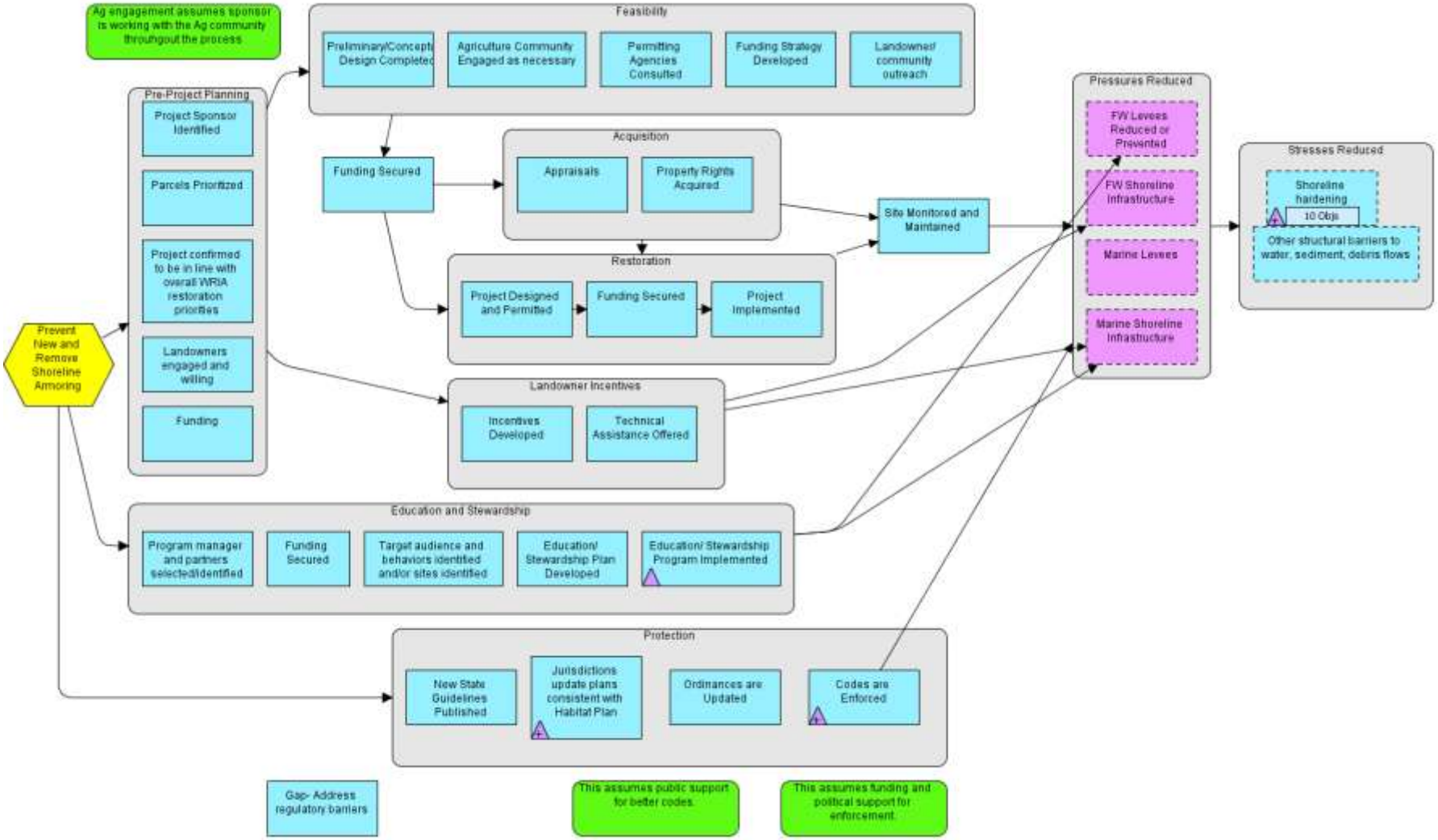
This table lists the measures we will use to assess progress on the implementation and effectiveness of the strategies and actions included in this results chain. For a complete list of effectiveness monitoring indicators and priorities, see Appendix A.5

Pressure Reduction and Intermediate Result Indicators:

ID	INDICATOR	DESCRIPTION	COMMENTS	PRIORITY	CURRENT MEASURE	DESIRED FUTURE MEASURE
	Forum Directed Funding	Forum-directed restoration/protection funding		4	:	:
	Total Restoration Funding	Total restoration funding in the watershed		4	:	:
	MS-1	40-30-30 split according to policy MS-1		4	:	:

THEORY OF CHANGE: Prevent New and Remove Shoreline Armoring ()

The diagram below illustrates our assumptions about how the strategies and actions included in the results chain are intended to help reduce pressures and achieve our habitat and Chinook recovery goals. A larger, higher resolution results chain image is also included in Appendix A.2.



Description of theory of change associated with Prevent New and Remove Shoreline Armoring

Preventing new bank and shoreline armoring and fill and removing existing armoring, fill, and other impediments (e.g., levees) will enhance habitat quality and quantity and lead to improved juvenile salmon survival, spatial distribution, and diversity.

Objectives associated with Prevent New and Remove Shoreline Armoring

Below is a list of specific objectives, or performance measures, associated with each results chain. We have noted key gaps where we'd like to develop objectives to help us track reduction of pressures and implementation or effectiveness.

Pressure Reduction Objectives: None identified.

Intermediate Objectives:

- **. Protect Nearshore Shoreline -** Ten - Year Goal: 5 miles
- **. Restore Nearshore Shoreline -** Ten-Year Goal: 13,500 feet
- **. Restore Duwamish shallow water habitat -** Ten-Year Goal: 26.5 acres
- **. Restore Duwamish shoreline bank -** Ten-Year Goal: 3 miles
- **. Complete Lower Green levee setbacks -** 13,300
- **. Complete Middle Green levee setbacks -** 15,00 feet**.**
- **. Protect Middle Green shoreline –** None identified.

Monitoring Effectiveness of Prevent New and Remove Shoreline Armoring

This table lists the measures we will use to assess progress on the implementation and effectiveness of the strategies and actions included in this results chain. For a complete list of effectiveness monitoring indicators and priorities, see Appendix A.5

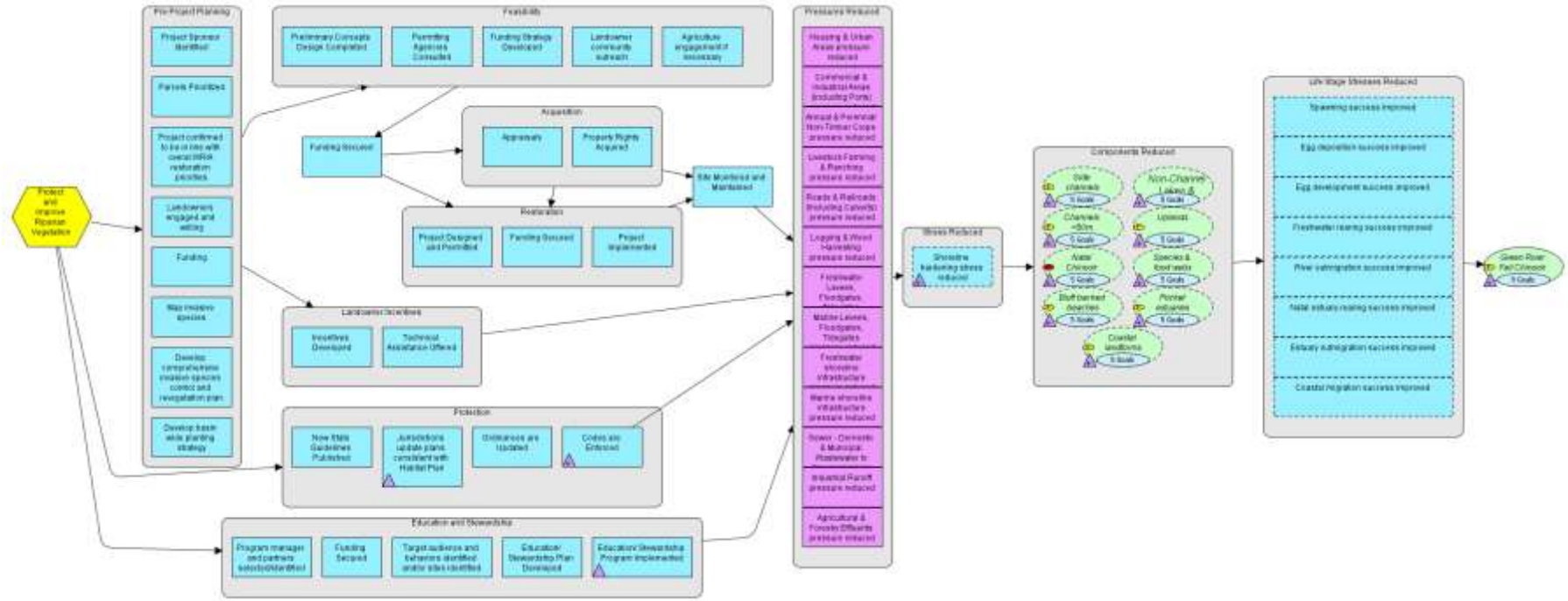
Pressure Reduction and Intermediate Result Indicators:

ID	INDICATOR	DESCRIPTION	COMMENTS	PRIORITY	CURRENT MEASURE	DESIRED FUTURE MEASURE
	Jurisdictional Surveys	Biannual survey of jurisdictions to verify they are implementing the plan's policies/goals		2	:	:
	SMP consistent with Habitat Plan	# of SMPs consistent with Habitat Plan		2	:	:
	Jurisdictions with Funding for Enforcement			3	:	:
	Acres Lost to Non-Permitted Actions			3	:	:

ID	INDICATOR	DESCRIPTION	COMMENTS	PRIORITY	CURRENT MEASURE	DESIRED FUTURE MEASURE
	Acres Lost to Variances			3	:	:
	Feet of shoreline restored -- NS	Feet of shoreline restored in the nearshore		4	:	:
	miles of shoreline protected -- NS	Miles of shoreline protected in the nearshore		4	:	:
	Miles of Unarmored Shoreline -- NS	Miles of unarmored shoreline in the nearshore		4	:	:
	Feet of shoreline restored -- DUW	Feet of shoreline restored in the Duwamish		4	:	:
	Feet of shoreline restored -- LG	Feet of shoreline restored in the Lower Green		4	:	:
	Feet of shoreline restored -- MG	Feet of shoreline restored in the Middle Green		4	:	:
	Feet of shoreline restored -- UG	Feet of shoreline restored in the Upper Green		4	:	:
	Feet of shoreline restored -- All	Feet of shoreline restored in the entire watershed		4	:	:
	miles of shoreline protected -- DUW	Miles of shoreline protected in the Duwamish		4	:	:
	miles of shoreline protected -- LG	Miles of shoreline protected in the Lower Green		4	:	:
	miles of shoreline protected -- MG	Miles of shoreline protected in the Middle Green		4	:	:
	miles of shoreline protected -- UG	Miles of shoreline protected in the Upper Green		4	:	:
	miles of shoreline protected -- All	Miles of shoreline protected in the entire watershed		4	:	:
	Miles of Unarmored Shoreline - DUW	Miles of unarmored shoreline in the Duwamish		4	:	:
	Miles of Unarmored Shoreline -- LG	Miles of unarmored shoreline in the Lower Green		4	:	:
	Miles of Unarmored Shoreline -- MG	Miles of unarmored shoreline in the Middle Green		4	:	:
	Miles of Unarmored Shoreline -- UG	Miles of unarmored shoreline in the Upper Green		4	:	:
	Miles of Unarmored Shoreline -- All	Miles of unarmored shoreline in WRIA 9		4	:	:
GAP	Behavior changed?			3	:	:

THEORY OF CHANGE: Protect and Improve Riparian Vegetation ()

The diagram below illustrates our assumptions about how the strategies and actions included in the results chain are intended to help reduce pressures and achieve our habitat and Chinook recovery goals. A larger, higher resolution results chain image is also included in Appendix A.2.



Description of theory of change associated with Protect and Improve Riparian Vegetation

Protecting and improving riparian zone conditions by adding native riparian vegetation will enhance habitat quality by improving water quality, stabilizing streambanks, providing overhanging vegetation and large woody debris (LWD), and contributing organic matter, nutrients, and terrestrial prey items, thereby leading to greater juvenile salmon growth and higher survival.

Objectives associated with Protect and Improve Riparian Vegetation

Below is a list of specific objectives, or performance measures, associated with each results chain. We have noted key gaps where we'd like to develop objectives to help us track reduction of pressures and implementation or effectiveness.

Pressure Reduction Objectives: None identified.

Intermediate Objectives: None identified.

Monitoring Effectiveness of Protect and Improve Riparian Vegetation

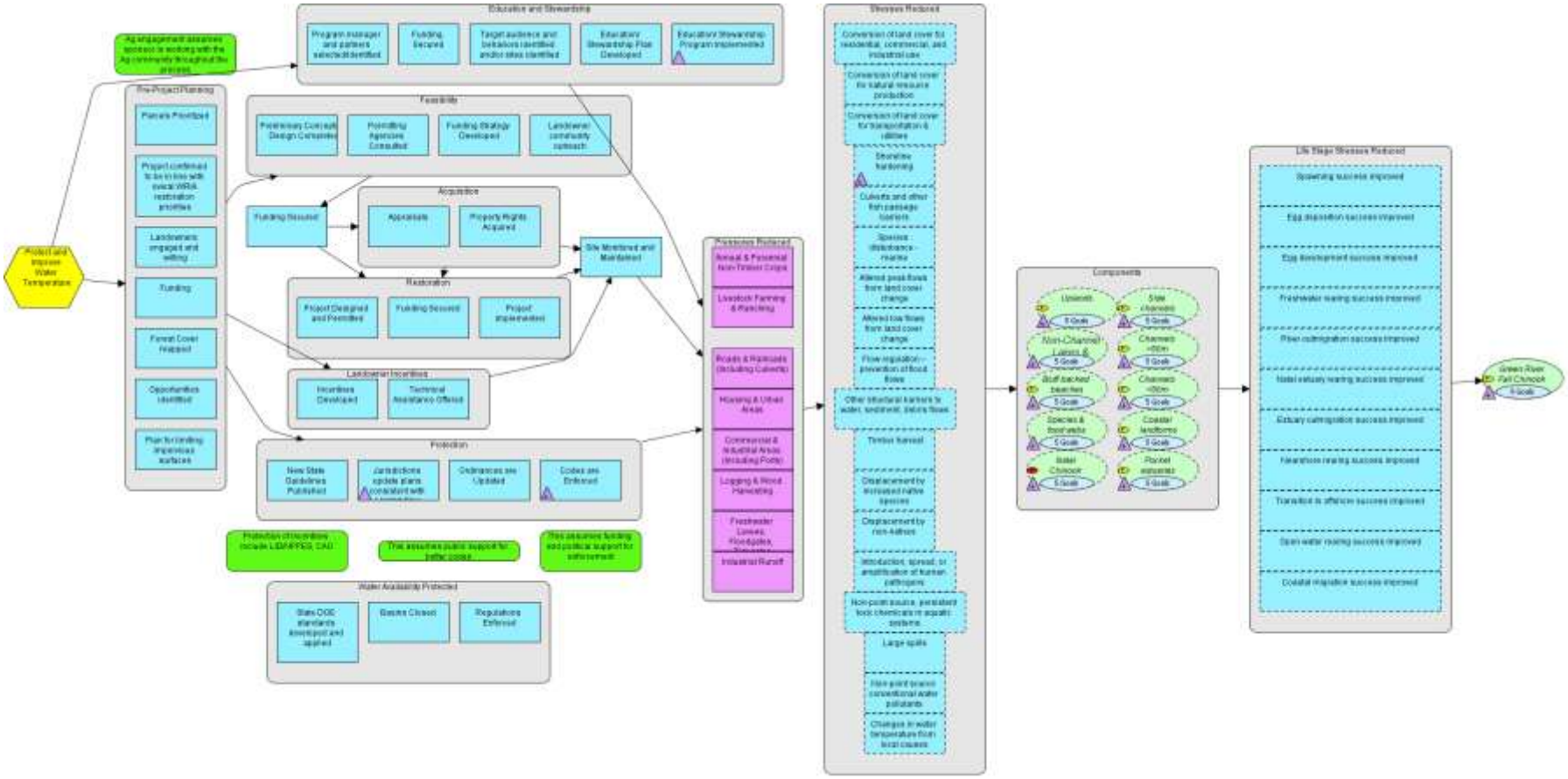
This table lists the measures we will use to assess progress on the implementation and effectiveness of the strategies and actions included in this results chain. For a complete list of effectiveness monitoring indicators and priorities, see Appendix A.5

Pressure Reduction and Intermediate Result Indicators:

ID	INDICATOR	DESCRIPTION	COMMENTS	PRIORITY	CURRENT MEASURE	DESIRED FUTURE MEASURE
	Jurisdictional Surveys	Biannual sruvey of jurisdictions to verify they are implementing the plan's policies/goals		2	:	:
	Acres Lost to Non-Permitted Actions			3	:	:
	Acres Lost to Variances			3	:	:
	Jurisdictions with Funding for Enforcement			3	:	:
	% of CMZ with Trees -- MG	Percent of channel migration zone with trees in the Middle Green		4	:	:
	% of Banks Lined with Trees -- LG	Percent of channel migration zone with trees in the Lower Green		4	:	:
	% of Banks Lined with Trees -- DUW	Percent of channel migration zone with trees in the Duwamish		4	:	:
	% of Banks Lined with Trees -- Soos	Percent of channel migration zone with trees in Soos Creek		4	:	:
	% of Banks Lined with Trees -- NWK	Percent of channel migration zone with trees in Newaukum Creek		4	:	:
	% Length of Shoreline wiht Trees (Dense and Patchy) -- NS	Percent length of shoreline with trees (dense and patchy) in the nearshore		4	:	:
GAP	Behavior changed?			3	:	:

THEORY OF CHANGE: Protect and Improve Water Temperature ()

The diagram below illustrates our assumptions about how the strategies and actions included in the results chain are intended to help reduce pressures and achieve our habitat and Chinook recovery goals. A larger, higher resolution results chain image is also included in Appendix A.2.



Description of theory of change associated with Protect and Improve Water Temperature

Protecting and improving water temperature by addressing point and nonpoint sources will enhance habitat quality and lead to greater juvenile salmonid growth, disease resistance, and survival. Improved water quality will also enhance survival of adult salmon.

Objectives associated with Protect and Improve Water Temperature

Below is a list of specific objectives, or performance measures, associated with each results chain. We have noted key gaps where we'd like to develop objectives to help us track reduction of pressures and implementation or effectiveness.

Pressure Reduction Objectives: None identified.

Intermediate Objectives: None identified.

Monitoring Effectiveness of Protect and Improve Water Temperature

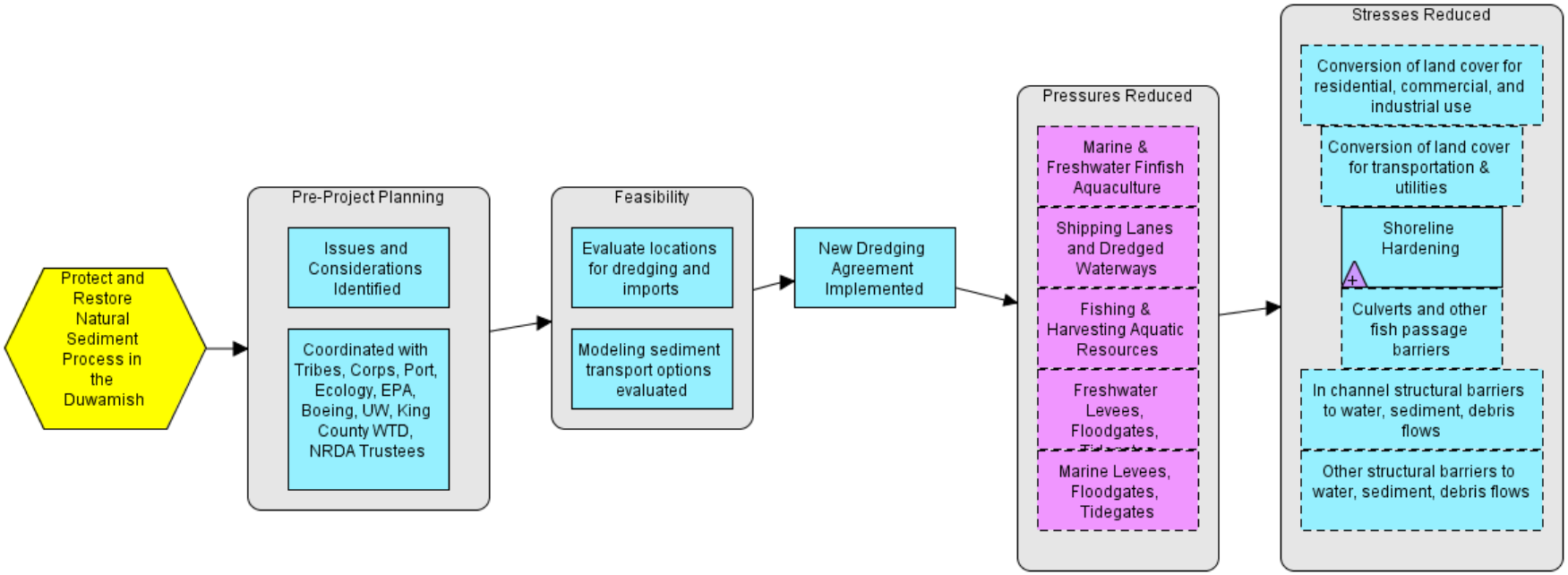
This table lists the measures we will use to assess progress on the implementation and effectiveness of the strategies and actions included in this results chain. For a complete list of effectiveness monitoring indicators and priorities, see Appendix A.5

Pressure Reduction and Intermediate Result Indicators:

ID	INDICATOR	DESCRIPTION	COMMENTS	PRIORITY	CURRENT MEASURE	DESIRED FUTURE MEASURE
	Jurisdictional surveys			2	:	:
	Acres Lost to Non-Permitted Actions			3	:	:
	Acres Lost to Variances			3	:	:
	Jurisdictions with Funding for Enforcement			3	:	:
GAP	Behavior changed?				:	:
	% of CMZ with Trees -- MG	Percent of channel migration zone with trees in the Middle Green		4	:	:
	% of Banks Lined with Trees -- LG	Percent of channel migration zone with trees in the Lower Green		4	:	:
	% of Banks Lined with Trees -- DUW	Percent of channel migration zone with trees in the Duwamish		4	:	:
	% of Banks Lined with Trees -- Soos	Percent of channel migration zone with trees in Soos Creek		4	:	:
	% of Banks Lined with Trees -- NWK	Percent of channel migration zone with trees in Newaukum Creek		4	:	:
	Days Above ECY 7-DADMax Summer Standard	Number of days above the Washington Department of Ecology's 7-DADMax Summer Standard		4	:	:

THEORY OF CHANGE: Protect and Restore Natural Sediment Process in the Duwamish ()

The diagram below illustrates our assumptions about how the strategies and actions included in the results chain are intended to help reduce pressures and achieve our habitat and Chinook recovery goals. A larger, higher resolution results chain image is also included in Appendix A.2.



Description of theory of change associated with Protect and Restore Natural Sediment Process in the Duwamish

Protecting and restoring natural sediment process (supply-transport-delivery) in the Duwamish will increase the quantity and quality of available juvenile salmon rearing habitat, including salmon prey production.

Objectives associated with Protect and Restore Natural Sediment Process in the Duwamish

Below is a list of specific objectives, or performance measures, associated with each results chain. We have noted key gaps where we'd like to develop objectives to help us track reduction of pressures and implementation or effectiveness.

Pressure Reduction Objectives: None identified.

Intermediate Objectives: None identified.

Monitoring Effectiveness of Protect and Restore Natural Sediment Process in the Duwamish

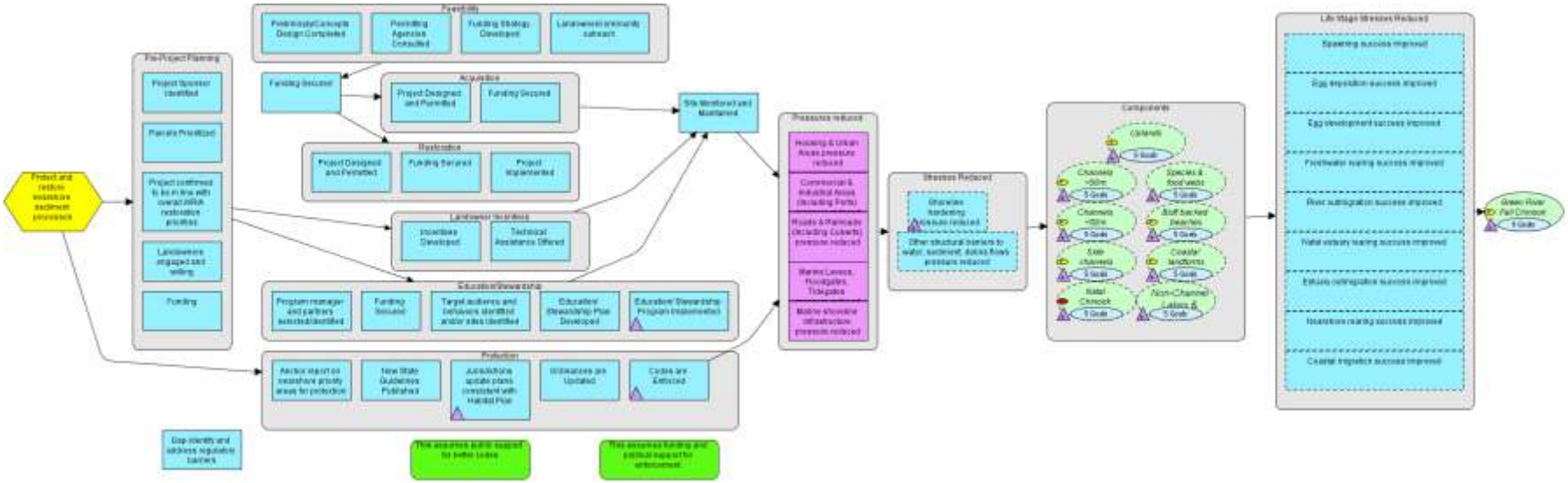
This table lists the measures we will use to assess progress on the implementation and effectiveness of the strategies and actions included in this results chain. For a complete list of effectiveness monitoring indicators and priorities, see Appendix A.5

Pressure Reduction and Intermediate Result Indicators:

ID	INDICATOR	DESCRIPTION	COMMENTS	PRIORITY	CURRENT MEASURE	DESIRED FUTURE MEASURE
	Miles of Unarmored Shoreline - DUW	Miles of unarmored shoreline in the Duwamish		4	:	:
	Linear feet of bank restored -- DUW	Feet of bank restored in the Duwamish		4	:	:
	Shallow Water Habitat	Area of shallow water habitat		4	:	:

THEORY OF CHANGE: Protect and restore nearshore sediment processes ()

The diagram below illustrates our assumptions about how the strategies and actions included in the results chain are intended to help reduce pressures and achieve our habitat and Chinook recovery goals. A larger, higher resolution results chain image is also included in Appendix A.2.



Description of theory of change associated with Protect and restore nearshore sediment processes

Protecting and restoring nearshore sediment transport processes by reconnecting sediment sources and removing shoreline armoring that impacts sediment transport will lead to greater prey production, greater juvenile salmon growth, and higher survival.

Objectives associated with Protect and restore nearshore sediment processes

Below is a list of specific objectives, or performance measures, associated with each results chain. We have noted key gaps where we'd like to develop objectives to help us track reduction of pressures and implementation or effectiveness.

Pressure Reduction Objectives: None identified.

Intermediate Objectives: None identified.

Monitoring Effectiveness of Protect and restore nearshore sediment processes

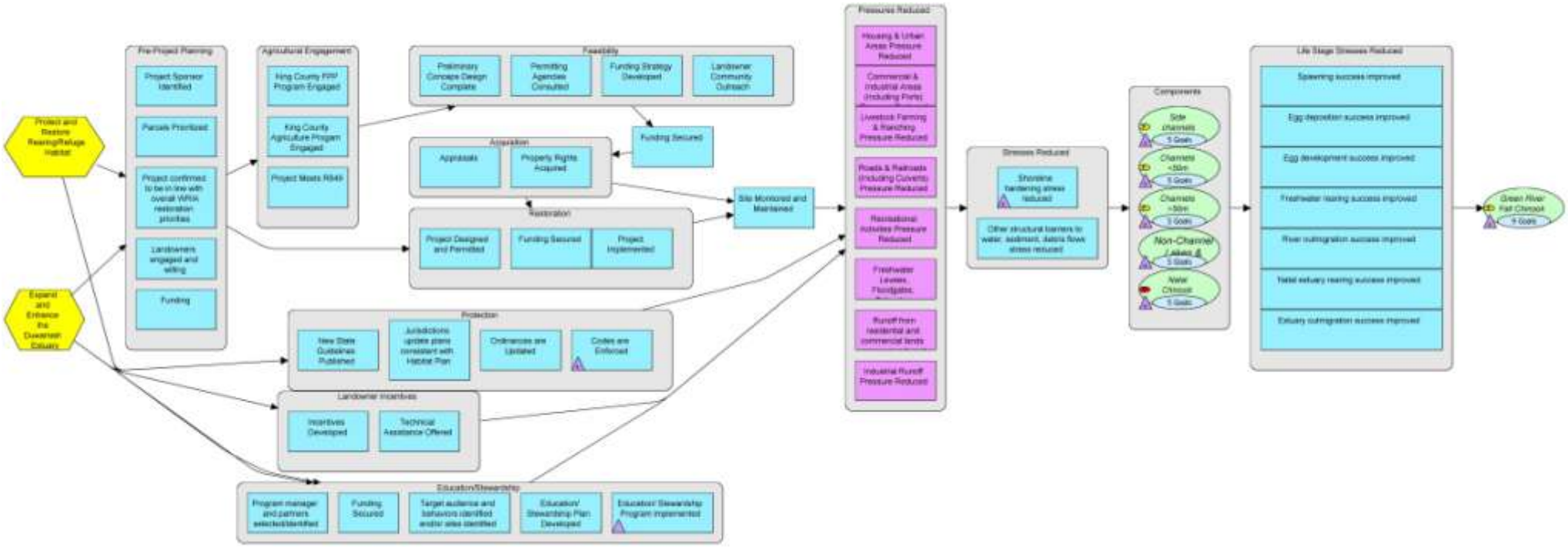
This table lists the measures we will use to assess progress on the implementation and effectiveness of the strategies and actions included in this results chain. For a complete list of effectiveness monitoring indicators and priorities, see Appendix A.5

Pressure Reduction and Intermediate Result Indicators:

ID	INDICATOR	DESCRIPTION	COMMENTS	PRIORITY	CURRENT MEASURE	DESIRED FUTURE MEASURE
	Jurisdictional Surveys	Biannual sruvey of jurisdictions to verify they are implementing the plan's policies/goals		2	:	:
	Jurisdictions with Funding for Enforcement			3	:	:
	Miles of Unarmored Shoreline	Miles of unarmored shoreline		4	:	:
	% Sediment Source Intact by Drift Cell	Percent sediment source intact by drift cell (5 categories)		4	:	:
	Amount of Intact Intertidal Areas	Amount of intact intertidal areas, or its inverse, the amount of intertidal area filled		4	:	:
GAP	GAP -- Number of Landslides	Number of landslides		2	:	:
GAP	Behavior changed?			3	:	:

THEORY OF CHANGE: Protect and Restore Rearing Refuge and Habitat, Expand and Enhance the Duwamish Estuary ()

The diagram below illustrates our assumptions about how the strategies and actions included in the results chain are intended to help reduce pressures and achieve our habitat and Chinook recovery goals. A larger, higher resolution results chain image is also included in Appendix A.2.



Description of theory of change associated with Protect and Restore Rearing Refuge and Habitat

Protecting, creating, and restoring habitat that provides refuge (particularly side channels, off channels, and tributary access) and habitat complexity (particularly pools) for juvenile salmon in the Middle and Lower Green subwatersheds over a range of flow conditions and at a variety of locations (e.g., mainstem channel edge, river bends, and tributary mouths) will enhance habitat quality and quantity and lead to greater juvenile salmon residence time, greater growth, and higher survival.

Expanding and enhancing the Duwamish estuary, particularly vegetated shallow subtidal and intertidal habitats and brackish marshes by restoring dredged, armored, and filled areas, will enhance habitat quantity and quality and lead to greater juvenile salmon residence time, greater growth, and higher survival.

Objectives associated with Protect and Restore Rearing Refuge and Habitat

Below is a list of specific objectives, or performance measures, associated with each results chain. We have noted key gaps where we'd like to develop objectives to help us track reduction of pressures and implementation or effectiveness.

Pressure Reduction Objectives: None identified.

Intermediate Objectives: None identified.

Monitoring Effectiveness of Protect and Restore Rearing Refuge and Habitat

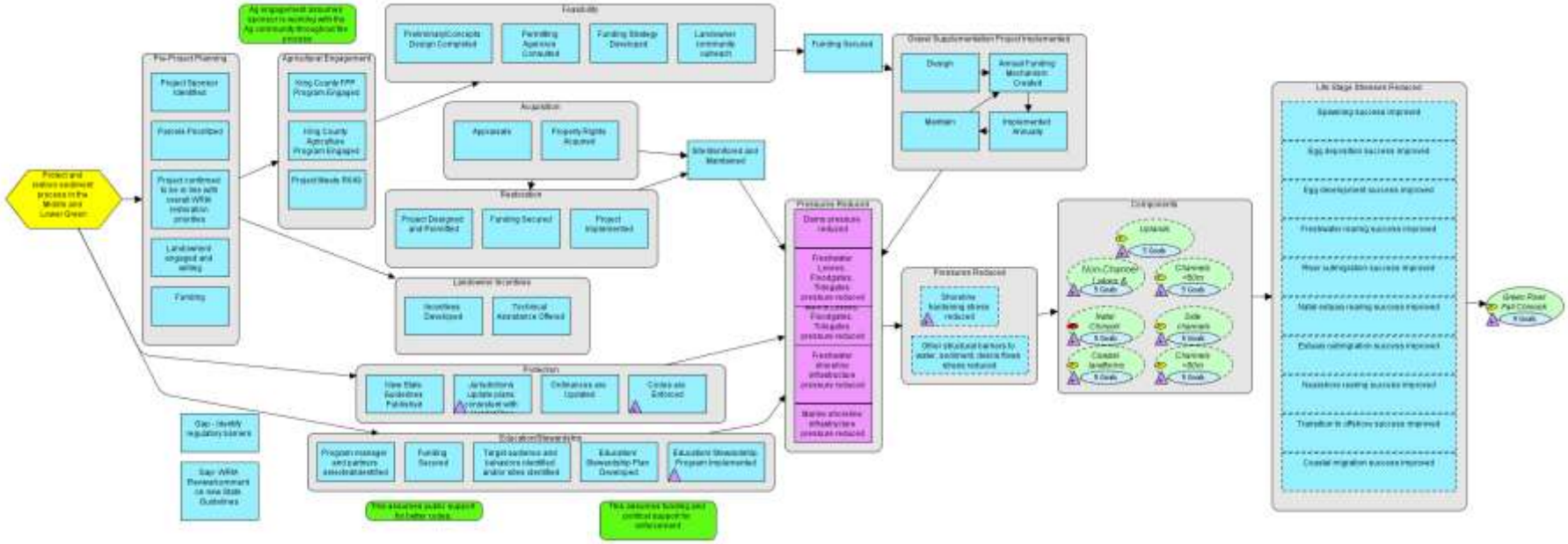
This table lists the measures we will use to assess progress on the implementation and effectiveness of the strategies and actions included in this results chain. For a complete list of effectiveness monitoring indicators and priorities, see Appendix A.5

Pressure Reduction and Intermediate Result Indicators:

ID	INDICATOR	DESCRIPTION	COMMENTS	PRIORITY	CURRENT MEASURE	DESIRED FUTURE MEASURE
	Acres Lost to Non-Permitted Actions			3	:	:
	Acres Lost to Variances			3	:	:
	Amount of Intact Intertidal Areas	Amount of intact intertidal areas, or its inverse, the amount of intertidal area filled		4	:	:
	Miles of Unarmored Shoreline	Miles of unarmored shoreline		4	:	:
	Amount of Floodplain Wetlands	Amount of floodplain wetlands		4	:	:
	Pieces of Wood Per Mile			4	:	:
	Amount of historic Floodplain Currently Accessible			4	:	:
	LWD Jams Per Mile			4	:	:
GAP	Behavior changed?			3	:	:

THEORY OF CHANGE: Protect and Restore Sediment Processes in the Middle and Lower Green ()

The diagram below illustrates our assumptions about how the strategies and actions included in the results chain are intended to help reduce pressures and achieve our habitat and Chinook recovery goals. A larger, higher resolution results chain image is also included in Appendix A.2.



Description of theory of change associated with Protect and Restore Sediment Processes in the Middle and Lower Green

Protecting and restoring natural sediment recruitment (particularly spawning gravels) by reconnecting sediment sources to the river will help maintain spawning habitat.

Objectives associated with Protect and Restore Sediment Processes in the Middle and Lower Green

Below is a list of specific objectives, or performance measures, associated with each results chain. We have noted key gaps where we'd like to develop objectives to help us track reduction of pressures and implementation or effectiveness.

Pressure Reduction Objectives: None identified.
Intermediate Objectives: None identified.

Monitoring Effectiveness of Protect and Restore Sediment Processes in the Middle and Lower Green

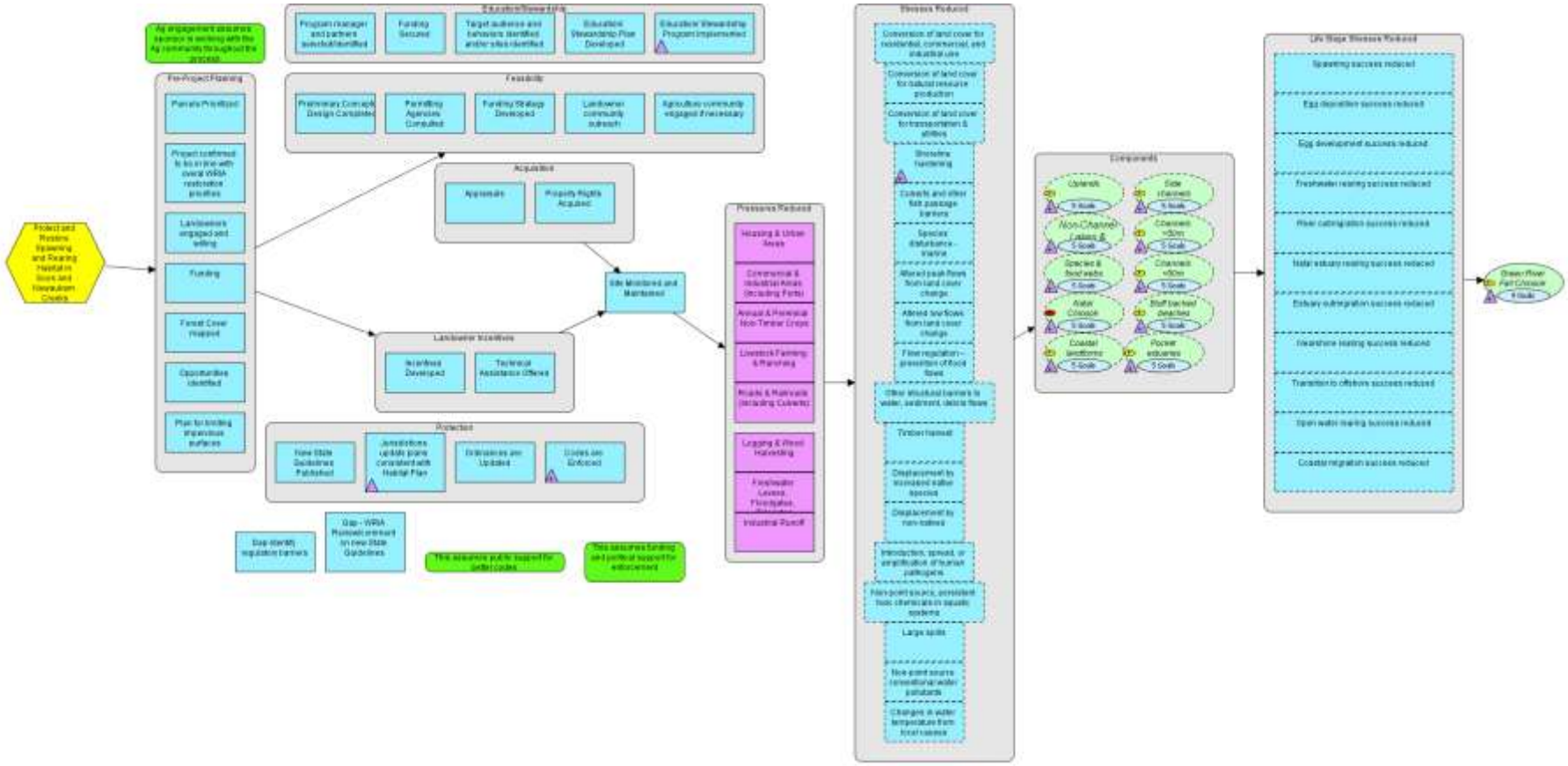
This table lists the measures we will use to assess progress on the implementation and effectiveness of the strategies and actions included in this results chain. For a complete list of effectiveness monitoring indicators and priorities, see Appendix A.5

Pressure Reduction and Intermediate Result Indicators:

ID	INDICATOR	DESCRIPTION	COMMENTS	PRIORITY	CURRENT MEASURE	DESIRED FUTURE MEASURE
	Jurisdictional Surveys	Biannual sruvey of jurisdictions to verify they are implementing the plan's policies/goals		2	:	:
	Acres Lost to Non-Permitted Actions			3	:	:
	Acres Lost to Variances			3	:	:
	Jurisdictions with Funding for Enforcement			3	:	:
	Miles of Unarmored Shoreline	Miles of unarmored shoreline		4	:	:
	Amount of Bank Sediment Available to River			4	:	:
GAP	Behavior changed?			3	:	:

THEORY OF CHANGE: Protect and Restore Spawning and Rearing Habitat in Soos and Newaukum Creeks

The diagram below illustrates our assumptions about how the strategies and actions included in the results chain are intended to help reduce pressures and achieve our habitat and Chinook recovery goals. A larger, higher resolution results chain image is also included in Appendix A.2.



Description of theory of change associated with Protect and Restore Spawning and Rearing Habitat in Soos and Newaukum Creeks

Preserving and restoring spawning and rearing habitat in lower Newaukum and Soos Creeks will increase habitat quality and quantity, thereby increasing productivity and spatial structure of Green River Chinook salmon.

Objectives associated with Protect and Restore Spawning and Rearing Habitat in Soos and Newk Creeks

Below is a list of specific objectives, or performance measures, associated with each results chain. We have noted key gaps where we'd like to develop objectives to help us track reduction of pressures and implementation or effectiveness.

Pressure Reduction Objectives: None identified.

Intermediate Objectives: None identified.

Monitoring Effectiveness of Protect and Restore Spawning and Rearing Habitat in Soos and Newk Creeks

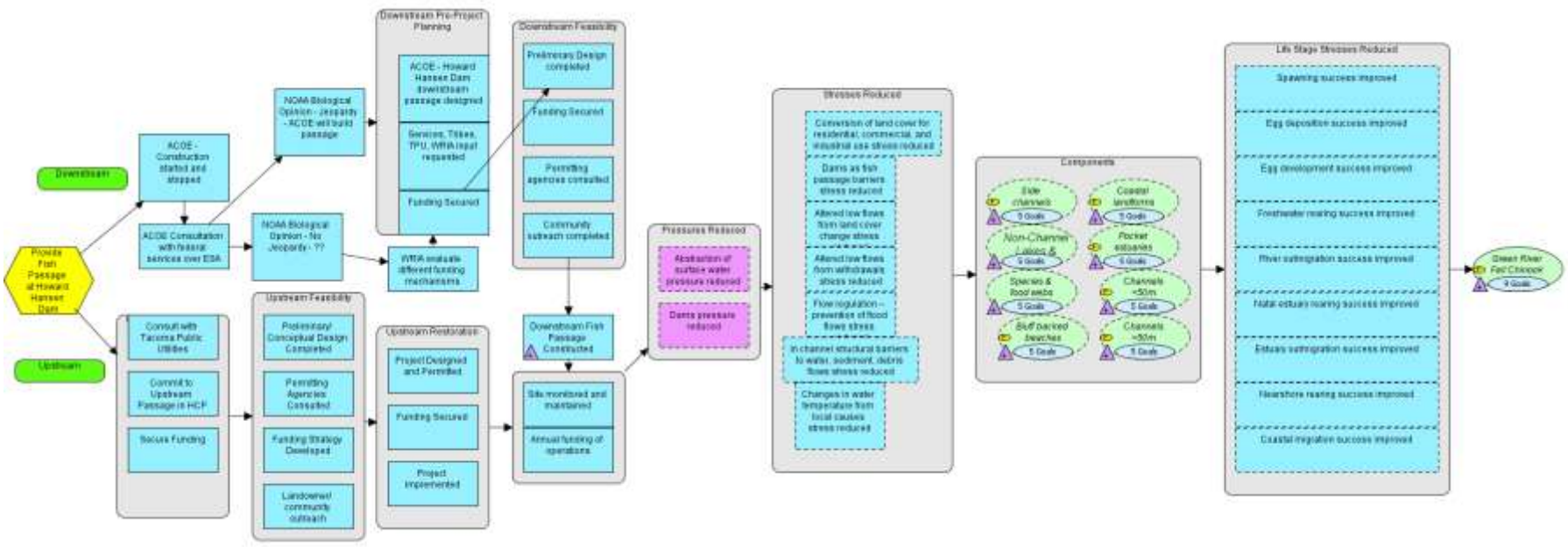
This table lists the measures we will use to assess progress on the implementation and effectiveness of the strategies and actions included in this results chain. For a complete list of effectiveness monitoring indicators and priorities, see Appendix A.5

Pressure Reduction and Intermediate Result Indicators:

ID	INDICATOR	DESCRIPTION	COMMENTS	PRIORITY	CURRENT MEASURE	DESIRED FUTURE MEASURE
	Jurisdictional surveys			2	:	:
	Acres Lost to Non-Permitted Actions			3	:	:
	Acres Lost to Variances			3	:	:
	Jurisdictions with Funding for Enforcement			3	:	:
GAP	Behavior changed?				:	:
	Miles of Unarmored Shoreline	Miles of unarmored shoreline		4	:	:
	Pieces of Wood Per Mile			4	:	:
	% of Banks Lined with Trees -- Soos	Percent of channel migration zone with trees in Soos Creek		4	:	:
	% of Banks Lined with Trees -- NWK	Percent of channel migration zone with trees in Newaukum Creek		4	:	:
	LWD Jams Per Mile			4	:	:
	Days Above ECY 7-DADMax Summer Standard	Number of days above the Washington Department of Ecology's 7-DADMax Summer Standard		4	:	:

THEORY OF CHANGE: Provide Fish Passage at Howard Hansen Dam (Upstream and Downstream)

The diagram below illustrates our assumptions about how the strategies and actions included in the results chain are intended to help reduce pressures and achieve our habitat and Chinook recovery goals. A larger, higher resolution results chain image is also included in Appendix A.2.



Description of theory of change associated with Provide Fish Passage

Preserving and restoring spawning and rearing habitat in lower Newaukum and Soos Creeks will increase habitat quality and quantity, thereby increasing productivity and spatial structure of Green River Chinook salmon.

Objectives associated with Provide Fish Passage

Below is a list of specific objectives, or performance measures, associated with each results chain. We have noted key gaps where we'd like to develop objectives to help us track reduction of pressures and implementation or effectiveness.

Pressure Reduction Objectives: None identified.
Intermediate Objectives: None identified.

Monitoring Effectiveness of Provide Fish Passage

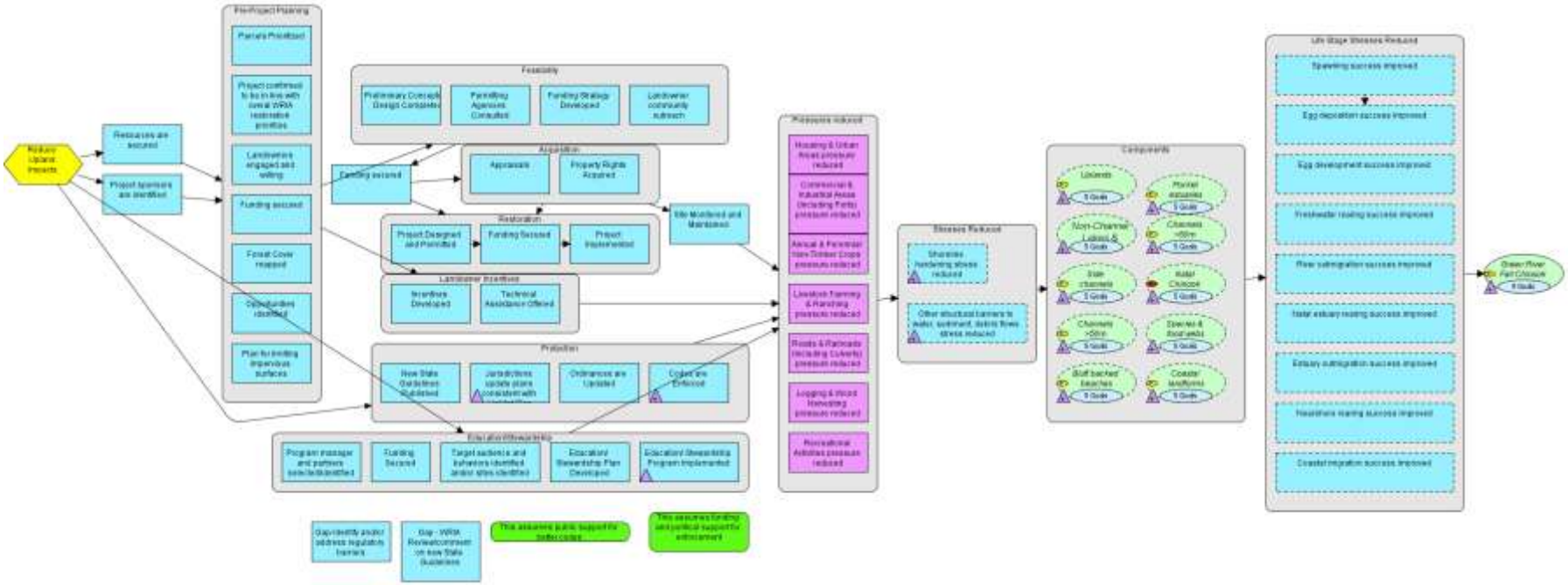
This table lists the measures we will use to assess progress on the implementation and effectiveness of the strategies and actions included in this results chain. For a complete list of effectiveness monitoring indicators and priorities, see Appendix A.5

Pressure Reduction and Intermediate Result Indicators:

ID	INDICATOR	DESCRIPTION	COMMENTS	PRIORITY	CURRENT MEASURE	DESIRED FUTURE MEASURE
	Adult Passage Facility Built	A passage facility for adult salmonids is built		3	:	:
	Juvenile Passage Facility Built	A passage facility for juvenile salmonids is built		3	:	:

THEORY OF CHANGE: Reduce Upland Impacts by protecting forest cover, limiting impervious surfaces, and implementing low impact development ()

The diagram below illustrates our assumptions about how the strategies and actions included in the results chain are intended to help reduce pressures and achieve our habitat and Chinook recovery goals. A larger, higher resolution results chain image is also included in Appendix A.2.



Description of theory of change associated with Reduce Upland Impacts by protecting forest cover, limiting impervious surfaces, and implementing low impact development

Preserving and protecting against watershed and upland impacts by implementing Low Impact Development techniques, including minimizing impervious surfaces, will maintain habitat quality by helping maintain flow, maintain water quality, and reduce sedimentation, thereby leading to greater salmon survival.

Maintaining regional groundwater recharge and base flows to the mainstem Green River through forest retention and Low Impact Development techniques will maintain spawning and rearing habitat.

Objectives associated with Reduce Upland Impacts by protecting forest cover, limiting impervious surfaces, and implementing low impact development

Below is a list of specific objectives, or performance measures, associated with each results chain. We have noted key gaps where we'd like to develop objectives to help us track reduction of pressures and implementation or effectiveness.

Pressure Reduction Objectives: None identified.

Intermediate Objectives: None identified.

Monitoring Effectiveness of Reduce Upland Impacts by protecting forest cover, limiting impervious surfaces, and implementing low impact development

This table lists the measures we will use to assess progress on the implementation and effectiveness of the strategies and actions included in this results chain. For a complete list of effectiveness monitoring indicators and priorities, see Appendix A.5

Pressure Reduction and Intermediate Result Indicators:

ID	INDICATOR	DESCRIPTION	COMMENTS	PRIORITY	CURRENT MEASURE	DESIRED FUTURE MEASURE
	Jurisdictional surveys			2	:	:
	Acres Lost to Non-Permitted Actions			3	:	:
	Acres Lost to Variances			3	:	:
	Jurisdictions with Funding for Enforcement			3	:	:
	Amount of LID -- NS	Amount of LID undertaken by area in the nearshore		4	:	:
	Amount of LID -- DUW	Amount of LID undertaken by area in the Duwamish		4	:	:
	Amount of LID -- LG	Amount of LID undertaken by area in the Lower Green		4	:	:
	Amount of LID -- MG	Amount of LID undertaken by area in the Middle Green		4	:	:
	Amount of LID -- UG	Amount of LID undertaken by area in the Upper Green		4	:	:
	% of Sub-Basin in Forest Cover -- NS	Percent of nearshore sub-basin in forest cover		4	:	:
	% of Sub-Basin in Forest Cover -- DUW	Percent of Duwamish sub-basin in forest cover		4	:	:
	% of Sub-Basin in Forest Cover -- LG	Percent of Lower Green sub-basin in		4	:	:

ID	INDICATOR	DESCRIPTION	COMMENTS	PRIORITY	CURRENT MEASURE	DESIRED FUTURE MEASURE
		forest cover				
	% of Sub-Basin in Forest Cover -- MG	Percent of Middle Green sub-basin in forest cover		4	:	:
	% of Sub-Basin in Forest Cover -- UG	Percent of Upper Green sub-basin in forest cover		4	:	:
	Percent of Sub-Basin in Pervious Surfaces -- NS	Percent of nearshore sub-basin in pervious surfaces		4	:	:
	Percent of Sub-Basin in Pervious Surfaces -- DUW	Percent of Duwamish sub-basin in pervious surfaces		4	:	:
	Percent of Sub-Basin in Pervious Surfaces -- LG	Percent of Lower Green sub-basin in pervious surfaces		4	:	:
	Percent of Sub-Basin in Pervious Surfaces -- MG	Percent of Middle Green sub-basin in pervious surfaces		4	:	:
	Percent of Sub-Basin in Pervious Surfaces -- UG	Percent of Upper Green sub-basin in pervious surfaces		4	:	:
	BIBI Scores -- NS	BIBI scores in the nearshore sub-basin		4	:	:
	BIBI Scores -- DUW	BIBI scores in the Duwamish sub-basin		4	:	:
	BIBI Scores -- LG	BIBI scores in the Lower Green sub-basin		4	:	:
	BIBI Scores -- MG	BIBI scores in the Middle Green sub-basin		4	:	:
	BIBI Scores -- UG	BIBI scores in the Upper Green sub-basin		4	:	:
GAP	Behavior changed?			3	:	:

7.0 Priorities and Gaps: Monitoring, Funding and Capacity

During Phase I of the M and AM project, watersheds identified lead entity process gaps, key information gaps, funding gaps, and/or priority monitoring needs and gaps. At the watershed scale, this information will be used to identify key next steps toward development of final watershed-scale monitoring and adaptive management plans in the future. Rolled up across all watersheds, this information begins to provide the basis for identification of the highest priority opportunities for regional technical and policy support of local Chinook recovery efforts.

The table below summarizes the gaps in the WRIA 9 plan and approved documentation that were identified during Phase 1 of the Chinook Monitoring & Adaptive Management project.

Monitoring Priorities

A list of current and proposed indicators for monitoring status and trends of ecosystem components, implementation, and effectiveness of actions are included in Tables A.4 and A.5 in the appendix. Information about monitoring priorities and associated desired outcomes is included where available.

Identified Recovery Plan Gaps

Identified Gap	Need	Notes
Gaps in Goals and/or Desired Future Status (DFS)		
Plan has an over-arching goal, and lots of KEA-specific and basin-specific goals/DFS. We do not have goals at the component level because that is not how our plan is organized.	• Guidance from the region that provides a methodology for setting quantitative DFS would be helpful. • Support from the region and/or NOAA for creating quantitative goals would also be useful.	• Need to clearly explain/describe Desired Future Status (in WRIA 9 plan as Necessary Future Conditions) in terms of requirements for recovery/ESA compliance vs. targets based on best available science or best professional judgement.
Gaps in Pressures		
Climate change, sea level rise, recreational land us, and air pollution	• Capacity to add data and strategies related to these pressures to our plan during an update • Capacity and methodology to prioritize pressures	• Reducing non-point air pollution is listed as an example action in the Conservation Hypothesis All-1, but none of the actions or programs in the Plan address this need.
River diversion	• Need to add this to the PSPA list of pressures	• The historical re-plumbing of the watershed is a major problem for water quantity, sediment delivery, and temperature
Gaps in Strategies		
The WRIA 9 plan has limited harvest and hatchery management strategies.	• Assistance with working with the Co-managers to achieve H-integration. • Assistance with working with the Co-Managers to resolve issues related to hatchery and harvest practices that do not agree with HSRG recommendations. .	• Need to resolve apparent difference in goals – recovery vs. harvest. • Need to understand why there has been reluctance by the Co-Managers to push for fish passage above Howard Hanson Dam.

Identified Gap	Need	Notes
No mention in plan of identifying and addressing barriers to implementing policies/actions and reducing pressures	• Capacity to identify and implement programmatic actions to improve regulatory effectiveness. • Assistance building political will.	• Need to make sure newly elected officials on Forum are given a primer on salmon recovery as well as ongoing education about salmon habitat needs.
Education – social marketing – more flexibility in plan to conduct social marketing to change behavior and other marketing to build public/political will for recovery actions	• Regional support for cross-WRIA social marketing efforts to promote behavioral changes leading to salmon recovery – tie in with "Puget Sound Starts Here"	•
Gaps in Monitoring of High Priority Indicators		
Regional consistency in indicators and condition bins	• Identification of a set of indicators to monitor consistently across all watersheds using consistent protocols. • Guidance from the region on how to establish condition bins for important indicators.	
Shallow water habitat in the Duwamish (DUW 1, 3, and 5)	• Funding for protocol development, initial mapping and longer term monitoring and data analysis	• Mapping of habitat types is needed
Fill in marine shorelines (NEAR-2)	• Funding for initial baseline data creation, and longer term monitoring and data analysis	•
Natural sediment recruitment in the Middle Green, the upper section of the Lower Green, and the Duwamish	• Guidance on how to monitor this effectively • Funding for monitoring and data analysis	• Need to research what was intended by Duwamish sediment strategy or come up with a new one.
Fine sediment input into the Upper Green	• Guidance on how to establish a baseline and monitor this cost effectively • Funding for monitoring and data analysis	•
More/better data about juvenile survival and project effectiveness in the Lower Green, Duwamish, and nearshore	• Funding for monitoring and data analysis	•
Gaps in Process		
WRIA 9 could improve its process to move lessons learned to implementers more effectively.	• Funding	• WRIA 9 has talked about an annual monitoring workshop for implementers, but has not had the funding or staff capacity to undertake.
WRIA 9 could improve its process to make course corrections based on new findings.	• Funding for staff to be able to undertake data analysis and plan updates	
The WRIA 9 project list is rigid, which makes addressing new opportunities challenging.	•	• Need to find a way to balance the need for a consistent, predictable process with the ability to be nimble.
WRIA 9 needs a way to hold its partners to their	• Pressure on our federal partners to finish	• Clear at recent Forum meetings that new Forum

Identified Gap	Need	Notes
commitments in a manner that still fosters partnerships.	building fish passage facilities at Howard Hanson Dam. • Guidance on how to integrate the H's effectively. • Pressure on local partners to uphold plan priorities.	members need to be brought up to speed on salmon ecology and recovery needs. • Plan has no regulatory nexus, and WRIA doesn't want this, but difficult to hold jurisdictions accountable.
Other Important Gaps or Needs		
Smolt trap funding	• The juvenile smolt trap is currently being funded annually by 4 different entities. It is not clear if all four can keep funding the trap into the future. A long term certain funding source is needed to fund the trap. It is the highest priority data need.	• This information is one of the most basic, and necessary needs for each WRIA, but there is no regional funding to accomplish. A regional funding effort should be undertaken, not just a WRIA 9 effort.
Funding for evaluating survival and productivity once downstream fish passage is achieved at Howard Hanson Dam	• Once downstream fish passage is provided at HHD, previously required monitoring agreements kick in that will require tagging of many juvenile fish high in the watershed. This will provide an unprecedented opportunity to evaluate survival/productivity at many locations within the watershed. Once downstream passage is provided, WRIA 9 will need funding assistance to take advantage of this rare opportunity to piggy back on an existing monitoring effort.	•
Bias against restoration work in urban watersheds	• Assistance from the region in overcoming the bias against restoration work in urban watersheds	•
Working with BNSF	• Continued work with BNSF to improve habitat throughout the watershed that is near the railway.	•
Levee vegetation	• Continued work with the USACE on levee vegetation management	•

8.0 Adaptive Management Cycle

Adaptive management is an iterative process intended to be used early and often during planning and other project and program stages in order to: 1) raise key questions for managers, governmental, and non-governmental entities regarding the optimum approach for achieving recovery goals; 2) design ways to answer those questions and address major issues; and 3) incorporate new monitoring data and other relevant information into decision making to improve salmon recovery program design and implementation. Adaptive management can help address questions about how to make progress and attain our recovery goals, as well as identify the impact of proposed actions. Adaptive management allows for flexibility to be incorporated into design and implementation due to uncertainty and the need to adjust based on future conditions.

Adaptive Management in the Watershed

Chapter 9 of the WRIA 9 Salmon Habitat Plan focuses on adaptive management and monitoring. Download this chapter at http://www.govlink.org/watersheds/9/reports/default.aspx#Planning. The 2006 *Implementation Guidance for the WRIA 9 Salmon Habitat Plan* document contains chapters on adaptive management and monitoring. In 2012, WRIA 9 finished a status and trends report looking at changes in habitat conditions over the first 5 years of the plan. This document includes a variety of recommendations for adapting the current plan and process within WRIA 9. WRIA 9 created a draft monitoring and adaptive management plan building off of the findings in status and trends report that will be updated based on this effort and finalized in the future.

WRIA 9 published a progress report on implementation in 2008, and one in 2012 that summarized progress during the years 2005-2011. They also published reports in 2008, 2009, and 2010 that capture their partners' accomplishments. These reports are available at http://www.govlink.org/watersheds/9/reports/default.aspx#Planning.

Current Adaptive Management System

Currently, if new information becomes available that could affect WRIA 9 strategies or chapter, the WRIA 9 Implementation Technical Committee analyzes this information and presents recommendations to the Management Committee. The Management Committee reviews and revises these as needed, and makes recommendations to the WRIA 9 Watershed Ecosystem Forum. The WRIA 9 Watershed Ecosystem Forum makes final decisions about our chapter and strategies. Depending upon the decision, a wide variety of entities could act upon it: WRIA 9 staff, Implementation Technical Committee, or any WRIA 9 member organization. The full WRIA 9 Watershed Ecosystem Forum rarely takes action as a body, although they do send comment letters.

The current WRIA 9 monitoring and adaptive management system reports on effectiveness, pressure abatement, plan implementation, and status and trends. However, WRIA 9 has not used this information to make significant changes in strategies. Part of the problem is that the pace of implementation is so slow that it's difficult to detect changes and tell if we're on the right track – whether the actions we are taking will actually lead to salmon recovery. One exception is that the WRIA 9 Implementation Technical Committee recommended to the WRIA 9 Watershed Ecosystem Forum that addressing water temperature be elevated to a higher priority. Another current opportunity is to act on the findings of the WRIA 9 Marine Shoreline Monitoring and Compliance Pilot Project. WRIA 9 staff needs to find a way to work effectively with our partners to improve compliance with existing regulations. There is concern that the actions listed in the plan are not being fully implemented. WRIA 9 does not have staff capacity to continually remind partners about the actions and strategies in the plan, without shifting the focus on implementation from projects to programs/policies/stewardship. Also, there are no regulatory teeth to enforce the plan.

Proposed New Adaptive Management System

In a workshop on April 21 of 2014, Elissa Ostergaard and Kollin Higgins prepared the draft information below.

Identifying and Using Triggers for Decision-Making

If we define triggers as indicators that we track closely and report on regularly (every few years), then the WRIA 9 Implementation Technical Committee could identify triggers. If funding were available to monitor these indicators, the Implementation Technical Committee would analyze the data and report results regularly to determine whether a change in strategy may be warranted. If the data suggests a change in strategy is warranted, the Technical Committee would move this information to the Management Committee and thence to the WRIA 9 Watershed Ecosystem Forum.

Having a basic set of indicators that the region agrees should be monitored consistently across all 16 watersheds – and regionally consistent condition bins for those indicators – would help with identifying and using triggers. For example, if WRIA 9 is stuck in the poor or fair bin and the trend is not improving, that is useful information to use as a trigger. Regionally consistent condition bins for effectiveness indicators, as well

as status and trends indicators, would be useful. Separate from a basic set of indicators, each WRIA should have a secondary set of indicators that addresses basin specific issues that not all WRIAs may care about.

Accountability for Monitoring

In large measure, funding for monitoring will drive accountability for it. The WRIA 9 Watershed Ecosystem Forum has agreed to set aside approximately $120,000 each year to fund different types of monitoring, but focused on status and trends data collection. The WRIA 9 Implementation Technical Committee is accountable for tracking the overall monitoring effort in WRIA 9. The group collects or funds data collection each year with the intent to combine everything into one status and trends report every 5 years.

Using Data to Effect Change

The Implementation Technical Committee would document new monitoring information, but needs to develop a process to take the monitoring information and use it to develop options for the WRIA 9 Watershed Ecosystem Forum to consider. WRIA 9 can develop plan amendments and update the Monitoring & Adaptive Management Framework accordingly, including updating objectives and indicators as necessary. However, WRIA 9 does not currently have staff capacity to manage a full plan update.

As noted above, once the WRIA 9 Watershed Ecosystem Forum agrees upon a change, WRIA 9 staff, committees, or partners would act on the change depending on its nature. The WRIA 9 Watershed Ecosystem Forum or Implementation Technical Committee would decide whether new triggers are needed.

Regional Annual and Biennial Reporting Cycles

WRIA 9 has not yet discussed how to respond to these cycles. One option is to hold a biennial adaptive management workshop where we review monitoring results, discuss what is working, and identify what might need to change. We could also use this opportunity to identify the requests we'd like to make of the region.

References

RITT, (2013 Draft) Puget Sound Chinook Salmon Recovery: A Framework for the Development of Monitoring and Adaptive Management Plans http://www.nwfsc.noaa.gov

Green/Duwamish and Central Puget Sound Watershed Water Resource Inventory Area 9 (WRIA 9) Steering Committee. August 2005. Salmon Habitat Plan – Making Our Watershed Fit for a King. Prepared for the WRIA 9 Forum.

Stiles, K. et al., 2014 (Draft), Puget Sound Partnership Pressure Taxonomy Working Paper. https://sites.google.com/a/uw.edu/puget-sound-open-standards---temporary-share-site/documents/pressures-taxonomy

Appendices

A.1. Priority Ecosystem Components for Chinook Recovery
A.2. Diagrams - Conceptual Models and Results Chains
A.3. Pressures
A.4. Status and Trends Monitoring Gaps and Priorities
A.5. Effectiveness Monitoring Gaps and Priorities
A.6. 3 Year Work Plan Table

A.1. Priority Ecosystem Components for Chinook Recovery

The following priority ecosystem components were identified by our watershed for Chinook recovery. The descriptions are consistent with the ecosystem components as described in the Common Framework (RITT 2013) but additional watershed context may be provided.

CHEM-C06. Natal Chinook estuaries

Includes the following shoreline types:
- Drowned channels
- River-dominated (fan) deltas
- Tidal deltas
- Delta lagoons

and the following habitat zones:
- Alluvial floodplains
- Tidal channels (e.g., distributary and blind tidal channels, lagoon inlets/outlets)
- Impoundments (e.g., lagoons, ponds, lakes)
- Tidally influenced wetlands (e.g. saltmarsh, scrub-shrub, forested)
- Tide flats, low tide terraces, subtidal flats
- All other zones possible along delta margins

It is the Duwamish Subwatershed

CHEM-C07. Coastal landforms

Coastal landforms are within the Drift Cell system type and include the following shoreline types:
- Barrier beaches (spits, cusps, tombolos)

and the following habitat zones:
- Backshores, beach faces, tide flats, low tide terraces, subtidal flats

Includes the Marine Nearshore Subwatershed. Plan uses accretion areas as the primary landform descriptor. Accessory data includes types of beach.

CHEM-C08. Bluff backed beaches

Bluff backed beaches are within the Drift Cell system type and include the following shoreline types:
- Sediment source beaches
- Depositional beaches
- Beach seeps
- Plunging sediment bluffs

and the following habitat zones:
- Marine riparian zones
- Bluff faces
- Backshores, berms, beach faces, tide flats, low tide terraces

Marine Nearshore subwatershed. Note that the plan does not use Bluff Back Beach descriptor since it is not very useful to differentiate shoretype units. Plan uses Feeder bluffs, accretion, transport, modified, no available drift areas as its shoreline types. Seeps are not mapped within WRIA 9

CHEM-C09. Pocket estuaries

Also known as embayments, Pocket estuaries are within the Drift Cell system type and include the following shoreline types:
- Drowned channel lagoons
- Tidal delta lagoons
- Longshore lagoons
- Tidal channel lagoons (or marshes)
- Closed lagoons and marshes
- Open coastal inlets

and the following habitat zones:
- Marine riparian zones
- Tidal channels (e.g., distributary and blind tidal channels, lagoon inlets/outlets)
- Impoundments (e.g., lagoons, ponds, lakes)
- Tidally influenced wetlands (e.g., saltmarsh, scrub-shrub, forested)
- Backshores, berms, beach faces, tide flats, low tide terraces

Applies to the Marine Nearshore Subwatershed. Technical documents did not identify/map pocket

estuaries by themselves, but has many strategies/actions to restore them. The WRIA does not have a good working definition that defines what subestuaries count as a pocket estuary and which ones do not.

CHFW-C02. Channels >50m Bankfull Width

Includes main channels >50 m bankfull width (BFW)Includes the following habitat types at the reach scale:Confined: Straight Unconfined: Meandering, Island-braided, BraidedIncludes the following habitat types at the habitat unit scale:Mid-channel: Pools, Glides, Riffles (boulder/cobble or cobble/gravel)Edge: Bars ,Banks (natural or hardened), Backwaters (alcoves)
Applies in the Upper, Middle, Lower Green subwatersheds Strategies are mostly watershed wide, versus subwatershed specific.

CHFW-C03. Channels <50m Bankfull Width

Includes main channels <50 m bankfull width (BFW)

Includes the following habitat types at the reach scale:
Confined - Bedrock, Colluvial
Unconfined - Alluvial - Cascades, Step pools, Plane bed, Pool riffles, Dune ripples

Includes the following additional habitat types at the habitat unit scale:
Pools, Glides, Riffles, Rapids, Runs, Cascades
Applies in the Upper, Middle and Lower Green River Subwatersheds. Also includes independent tribs to puget sound (e.g. miller-walker, Judd, shinglemill)

CHFW-C04. Side channels

Includes the following habitat types at the reach scale:
Unconfined: Alluvial - Step pools, Plane beds, Pool riffles, Dune ripples

Includes the following habitat types at the habitat unti scale:
Pools, Glides, Riffles, Rapids, Runs
Applies in the Middle Green, Upper Green and Lower Green subwatersheds-reporting is the same, strategies are different.

CHFW-C05. Non-Channel Lakes & Wetlands

Includes the following habitat types at the reach scale:
Lacustrine habitats (i.e., lakes, ponds, reservoirs) and palustrine habitats (i.e., wetlands). Includes waterbodies in which Chinook could live directly due to their connectivity with channels, and waterbodes isolated from channels and inaccessible to Chinook.
NOTE-no strategies are really associated with addressing floodplain habitats, but is described in the Necessary Future Conditions of at least the lower green section

Includes the following habitat types at the habitat unit scale:
Littoral, Limnetic
Emergent wetland, Scrub-shrub wetland, Forested wetland

CHSP-C13. Green River Fall Chinook Salmon

Green River Fall Chinook.
And future spring stock likely from White River system--to reestablish extinct spring stock in Upper Green. Many of the 22 populations use the nearshore of WRIA 9.

CHSP-C14b. Species & food webs

This component includes freshwater and nearshore/marine predators, competitors and prey of Chinook, as well as other dimensions of food webs and species that might be disease vectors or have other impacts on Chinook salmon. Indicators should address attributes across all habitat types where appropriate.
This is described in both contexts-freshwater and marine subwatersheds.

CHUP-C01. Uplands

Includes upland areas, or geomorphic surfaces with no defined channel, associated with Chinook habitats. These areas may include isolated wetlands.
Currently tracking imperviousness and forest cover for all subwatersheds. Have many watershed wide program/policies that effect upland habitats.

A.2. Diagrams - Conceptual Models and Results Chains

A.2.1 and A.2.2 - See the companion 11x17 Appendix for a complete set of high resolutions conceptual models (A.2.1) and results chains (A.2.2) for our watershed.

A.3. Pressures in Our Watershed

This table includes all of the pressures identified by the watershed. The pressures were selected from the Puget Sound Taxonomy of Sources of Pressures developed by the Puget Sound Partnership (PSPA 2014). The definitions or pressure name may have been modified from the PSPA taxonomy to better reflect conditions in the watershed.

Pressure	Details
Housing & Urban Areas	Human cities, towns, and settlements including non-housing development typically integrated with housing This class dovetails with 1.2 Commercial and Industrial Areas (including ports). As a general rule, however, if people live in the development, it should fall into this source class. This class does not include transportation and utility infrastructure, water use, shoreline armoring and overwater structures, or runoff and other pollution associated with any developed areas (see 4, 7, and 9). Examples: urban areas, suburbs, villages, ranchettes, vacation homes, shopping areas, offices, schools, hospitals, land reclamation or expanding human habitation that causes habitat conversion or degradation in riverine, estuary and coastal areas, etc.
Commercial & Industrial Areas (Including Ports)	Factories and other commercial centers Shipyards and airports fall into this class, whereas shipping lanes and flight paths fall under 4. Transportation & Service Corridors. Overwater structures and shoreline armoring associated with marinas and ports full under 7 Natural System Modifications. Water use and dams are also covered under 7 Natural System Modifications. For runoff and other pollution associated with commercial and industrial areas, see 9. Pollution. Examples: military bases, factories, stand-alone shopping centers, office parks, power plants, train yards, ship yards, ports, airports, landfills, etc.
Annual & Perennial Non-Timber Crops	Crops planted for food, fodder, fiber, fuel, or other uses This class includes small-holder farming, agro-industry farming, and rotating agriculture.
Livestock Farming & Ranching	Domestic terrestrial animals raised in one location on farmed or non-local resources (farming); also domestic or semi-domesticated animals allowed to roam in the wild and supported by natural habitats (ranching) This class includes small-holder grazing, ranching or farming, and agro-industry grazing, ranching and farming, and nomadic grazing. In farming, animals are kept in captivity; in ranching they are allowed to roam in wild habitats. Forage of wild resources for stall-fed animals falls under 5.2 Gathering Terrestrial Plants. If a few animals are mixed in a subsistence cropping system, it belongs in 2.1 Annual & Perennial Non-Timber Crops.
Marine & Freshwater Finfish Aquaculture	Finfish raised in one location on farmed or non-local resources; also hatchery fish allowed to roam in the wild This class includes pressures associated with the location, intensification, or practice of finfish aquaculture. Farmed animals are kept in captivity; hatchery fish are put into wild habitats and are the aquatic equivalent of terrestrial ranching.
Mining & Quarrying	Exploring for, developing, and producing minerals and rocks Deforestation caused by strip mining should be included here if the motivation is access to minerals. It should be included in 5.3 Logging & Wood Harvesting if the primary motivation is access to the trees. Sediment or toxic chemical runoff from mining is under 9.2 Industrial & Military Effluents. Examples: coal strip mines, alluvial gold panning, gold mines, rock quarries, sand/salt mines, coral mining, deep sea nodules, guano harvesting, dredging outside of shipping lanes, etc.
Roads & Railroads (Including Culverts)	Surface transport on roadways and dedicated tracks Off-road vehicles are treated in the appropriate category in 6. Human Intrusions & Disturbance. If there are small roads associated with a major utility line, they belong in 4.2 Utility & Service Lines. Examples: highways, secondary roads, primitive roads, logging roads, bridges & causeways, fencing associated with roads, freight/passenger/mining railroads, etc.
Shipping Lanes and Dredged Waterways	TransTransport on and in freshwater and ocean waterways This class includes vessel traffic as well as dredging and other activities that maintain shipping lanes. Wastewater discharge from tugs and non-military cargo vessels is also included here. Anchor damage from dive boats belongs in 6.1 Recreational Activities. Oil spills from ships should go in 9.2 Industrial & Military

Pressure	Details
	Effluents. Examples: canals, shipping lanes, whale-watching routes, wakes from cargo ships, etc.
Logging & Wood Harvesting	Harvesting trees and other woody vegetation for timber, fiber, or fuel This includes subsistence scale use and large scale use, both of which can have intentional and unintentional effects on target and non-target species. Felling trees to clear agricultural land goes in the appropriate category in 2. Agriculture & Aquaculture. If it is a few timber species that are planted on a rotation cycle, it belongs in 2.2 Wood & Pulp Plantations. If it is multiple species or enrichment plantings in a quasi-natural system, it belongs here. Consider the specific product(s) harvested and the method used e.g., clear cutting of hardwoods, selective commercial logging, pulp or woodchip operations, fuel wood collection, etc. Examples:
Fishing & Harvesting Aquatic Resources	Harvesting aquatic wild animals or plants for commercial, recreation, subsistence, research, or cultural purposes, or for control/persecution reasons; includes accidental mortality/bycatch This category focuses on all kinds of species that are primarily found in an aquatic environment as well as some species that live on the terrestrial/aquatic boundary. Hunting seals, whales and other marine mammals, and freshwater and marine turtles should go here. Hunting otters, beavers, amphibians, waterfowl, and sea birds should go in 5.1 Hunting & Collecting Terrestrial Animals. This class includes large scale harvest and subsistance/small scale harvest and can be a source of multiple stressors, including harvest (intentional), and discards or bycatch (unintentional). Note that associated stresses can be both ecosystem degradation and species mortality. Examples: commercial trawling, commercial long-line fisheries, whaling, seal hunting, turtle egg collection, live coral collection, seaweed collection, blast fishing, cyanide fishing, artisinal trawling, shark nets trapping non-target species, loss of a species' prey base due to over-harvesting by humans of their prey, etc. beach protection with shark nets, sharks and seals killed because they eat commercial fish species, etc.
Recreational Activities	People spending time in nature or traveling in vehicles outside of established transport corridors, usually for recreational reasons This class includes wastewater discharged from recreational vessels. It does not include work involving consumptive use of biodiversity. For example, disturbance impacts from loggers or hunters would be in the appropriate category in 5. Biological Resource Use. Vehicles in established transport corridors go in 4. Transportation & Service Corridors. The development of activities at permanent recreational or tourist facilities (such as hotels and resorts) should be included under section 1.3 Tourism & Recreation Areas rather than here. Examples: off-road vehicles, motorboats, motorcycles, jet-skis, snowmobiles, ultralight planes, dive boats, whale watching, mountain bikes, hikers, cross-country skiers, hangliders, birdwatchers, scuba divers, pets brought into recreation areas, temporary campsites, caving, rock-climbing, etc.
Abstraction of surface water	Diverting or withdrawing surface water
Abstraction of ground water	Pumping or other extraction of ground water
Dams	Construction or operation of dams used to generate hydropower or manage how and when water flows through a system Impacts associated with dams include conversion/loss or degradation of habitat, altered hydrology, and altered connectivity
Freshwater Levees, Floodgates, Tidegates	Levees & floodgates along freshwater systems to manage the hydrologic flow in a system Impacts associated with levees and floodgates include conversion/loss or degradation of habitat, altered hydrology, and altered connectivity
Marine Levees, Floodgates, Tidegates	Levees & tidegates along marine water systems to manage or exclude marine water into the freshwater system Impacts associated with levees and tidegates include conversion or degradation of habitat, altered hydrology, and altered connectivity

Pressure	Details
Freshwater shoreline infrastructure	Armoring of freshwater shorelines and overwater structures that alter, destroy, and disturb habitats and species via a nonconsumptive use, including industrial, commercial, and recreational marinas, ports and shipyards. Runoff from impervious surfaces or other water pollution should go in 9.1.
Marine shoreline infrastructure	Armoring of marine shorelines and overwater structures that alter, destroy, and disturb habitats and species via a nonconsumptive use, including industrial, commercial, and recreational marinas, ports and shipyards. Runoff from impervious surfaces or other water pollution should go in 9.1.
Sewer - Domestic & Municipal Wastewater to Sewer	Discharges from municipal WWTPs into hydrologic systems This class includes water-borne sewage that includes nutrients, pathogens, toxic chemicals, and sediments. Discharges from combined sewer overflows CSOs are included here. Onsite sewage systems (OSS) go in 9.1.1.2. This class does not include wastewater discharged from recreational and other vessels (see 4.3, 6.1 and 6.2), or biosolids applied in terrestrial environments (see 9.3).
OSS - Domestic and Commercial Wastewater to Onsite Sewage Systems (OSS)	Discharges from Onsite Sewage Systems (OSS) This class includes sewage and leachates (nutrients, toxic chemicals and/or sediment) from residences and commercial facilities not connected to a municipal system (septics, small private systems, and everything with a drain field).
Runoff from residential and commercial lands	Introduction of exotic or excess material into hydrologic system due to surface water loading and runoff from the built environment This class includes runoff from commercial and residential lands, transportation facilities and corridors, as well as hull-cleaning and other pollution from marina infrastructure and land-based boat maintenance practices (i.e. NPDES regulated activities that occur in marinas and shipyards). Loading from septic systems (OSS) goes in 9.1.1.2, combined sewer overflows (CSOs) goes in 9.1.1.1, runoff from other activities (e.g. agriculture, timber harvest) goes in 9.3, and industrial runoff goes in 9.2.4.
Oil Spills	Accidental, episodic, or potentially catastrophic spill of oil and hazardous waste in aquatic and terrestrial environments This class includes oil spills from pipelines, vessels, marine terminals, and industrial facilities. It does not include chronic or other frequent, smaller pollution events related to normal operations of vehicles, vessels, etc (see 9.1.2)
Industrial Runoff	Introduction of exotic or excess material into hydrologic system due to surface water loading and runoff from industrial lands This class includes runoff from industrial facilities and lands. Runoff from other lands (residential and commercial) goes in 9.1.2. Loading from septic systems (OSS) goes in 9.1.1.2, combined sewer overflows (CSOs) goes in 9.1.1.1, runoff from other activities (e.g. agriculture, timber harvest) goes in 9.3, and industrial runoff goes in 9.2.4.
Agricultural & Forestry Effluents	Water-borne pollutants from agricultural, silivicultural, and aquaculture systems that include nutrients, toxic chemicals and/or sediments including the effects of these pollutants on the site where they are applied This class also includes pollutants added by biosolids, herbicide, and pesticide application. Wind erosion of agricultural sediments or smoke from forest fires goes in 9.5 Air-Borne Pollutants. Examples: nutrient loading from fertilizer run-off, manure from feedlots, nutrients from aquaculture, etc.; soil erosion from overgrazing, increased run-off and hence sedimentation due to conversion of forests to agricultural lands, etc.; herbicide run-off from orchards, etc.
Release of Excess Energy (light, heat, sound)	Inputs of heat, sound, or light that disturb wildlife or ecosystems These inputs of energy can have strong effects on some species or ecosystems. Examples: lamps attracting insects, beach lights disorienting turtles, etc.; heated water from power plants, damaging atmospheric radiation resulting from ozone holes, etc.; noise from highways or airplanes, sonar from submarines that disturbs whales, etc.

A.4. Status and Trends Monitoring Priorities and Gaps

This table lists status and trends indicators identified by the watershed as well as key gaps where indicators of ecosystem condition are needed. The list is organized alphabetically by indicator and the relevant ecosystem components are included. Any information about monitoring priorities that was developed as part of the M and AM Phase I project is also included.

A4 – sorted first by priority, then by indicator name.

Indicator	Details	Comments	Ecosystem Component	Priority
Egg to outmigrant survival	Geographic specificity: watershed wide. WDFW smolt trap.		Green River Fall Chinook Salmon	Very High
GAP. Detritus recruitment and retention - extent of supply	Not currently being tracked, but data is available for analysis (armor above/below OHWM, 2004 drift log accumulations).		Coastal landforms	Very High
GAP. Food web community composition			Species & food webs	Very High
GAP. Food web energy & material flow			Species & food webs	Very High
GAP. Habitat connectivity Condition			Natal Chinook estuaries	Very High
GAP. Number of occupied spawning patches	Geographic specificity: Lower Green		Green River Fall Chinook Salmon	Very High
GAP. Number of occupied spawning patches	Geographic specificity: Middle Green. WDFW spawner data.		Green River Fall Chinook Salmon	Very High
GAP. Organic Matter - inputs			Non-Channel Lakes & Wetlands	Very High
GAP. Other species population condition			Species & food webs	Very High
GAP. Predator Population condition			Species & food webs	Very High
GAP. Prey population condition			Species & food webs	Very High
GAP. Prey population size			Species & food webs	Very High
GAP. Proportion of 5 and 6 year old NOS	Geographic Specificity: watershed wide. WDFW smolt Trap. No desired future status, gap for future adaptive management. Data need from WDFW in a different format.		Green River Fall Chinook Salmon	Very High
GAP. Relative abundance of Parr outmigrants	Geographic Specificity: Middle Green. WDFW smolt Trap. No desired future status, gap for future adaptive management.		Green River Fall Chinook Salmon	Very High
GAP. TIming of Peak outmigration of fry	Geographic Specificity: Middle Green. WDFW smolt Trap. No desired future status, gap for future adaptive management. Data need from WDFW in a different format.		Green River Fall Chinook Salmon	Very High
GAP. Timing of Peak outmigration of parr	Geographic Specificity: Middle Green. WDFW smolt Trap. No desired future status, gap for future adaptive management. Data need from WDFW in a different format.		Green River Fall Chinook Salmon	Very High
GAP_ GRF3. Number of emergent fry	Geographic specificity: Middle Green. WDFW smolt trap data. 2005 Plan. No desired future status, gap for future adaptive management.		Green River Fall Chinook Salmon	Very High
GAP_ MG,LG. Temperature - number of days violating state standards			Channels >50m Bankfull Width	Very High

Indicator	Details	Comments	Ecosystem Component	Priority
GAP_GRF 4. Number of parr migrants	Geographic specificity: Middle Green. WDFW smolt trap data. 2005 Plan. No desired future status, gap for future adaptive management.		Green River Fall Chinook Salmon	Very High
GAP_GRFL-DU-2. Number of days of daily average flow <300cfs	USGS data		Non-Channel Lakes & Wetlands	Very High
GAP_GRFL-LG-2. Number of day of daily average flow <300cfs	USGS data		Non-Channel Lakes & Wetlands	Very High
GAP_GRFL-MG-2. Number of day of daily average flow <300cfs	USGS data		Non-Channel Lakes & Wetlands	Very High
GRBB- NE. 2 % sediment source intact by drift cell-broken into 5 categories	Nearshore - WRIA sponsored data		Bluff backed beaches	Very High
GRBB-NE-1. Amount of unarmored bank	WRIA sponsored data		Bluff backed beaches	Very High
GRBB-NE-10. Amount of unarmored bank	WRIA sponsored data		Bluff backed beaches	Very High
GRBB-NE-3. Amount of unarmored bank	WRIA sponsored data - Mainland Nearshore		Bluff backed beaches	Very High
GRBB-VS-1. Amount of unarmored bank	WRIA sponsored data		Bluff backed beaches	Very High
GRBB-VS-10. Amount of unarmored bank			Bluff backed beaches	Very High
GRBB-VS-3. Amount of unarmored bank			Bluff backed beaches	Very High
GRCL-NE-1. Amount of unarmored bank	Mainland Nearshore - WRIA sponsored data		Coastal landforms	Very High
GRCL-NE-2. % sediment source intact by drift cell-broken into 5 categories	WRIA sponsored data		Coastal landforms	Very High
GRCL-VS-1. Amount of unarmored bank	Vashon/Maury Nearshore		Coastal landforms	Very High
GRF 1. Fall-NOS- Low productivity	Geographic specificity: Lower Green. WDFW spawner surveys as translated by NOAA, NOAA salmon opulation summary database. This is abundance when productivity numbers are low. Source - 2005 Plan.		Green River Fall Chinook Salmon	Very High
GRF 2. Fall NOS - High productivity	Geographic specificity: Lower Green. WDFW spawner surveys as translated by NOAA, NOAA salmon population summary database. This is abundance when productivity numbers are high. Source - 2005 Plan.		Green River Fall Chinook Salmon	Very High
GRFL-DU-1. number of days of RIVER habitat forming flows (> 8829cfs) per water year			Non-Channel Lakes & Wetlands	Very High
GRFL-LG-1. number of days of RIVER habitat forming flows (> 8829cfs) per water year			Non-Channel Lakes & Wetlands	Very High
GRFL-MG-1. Number of days of RIVER habitat forming flows (> 8829cfs) per water year			Non-Channel Lakes & Wetlands	Very High
GRLC - UG- 1. Unarmored Bank	Upper Green, WRIA sponsored data collection		Channels >50m Bankfull Width	Very High
GRLC DU 1. Unarmored bank	Duwamish, WRIA sponsored data colelction		Channels >50m Bankfull Width	Very High

Indicator	Details	Comments	Ecosystem Component	Priority
GRLC LG 1. Unarmored bank	Lower Green, WRIA sponsored data colelction		Channels >50m Bankfull Width	Very High
GRLC MG 1. Unarmored Bank	Middle Green, WRIA sponsored data collection		Channels >50m Bankfull Width	Very High
GRLC MG 3. Unarmored Bank	Middle Green, WRIA sponsored data collection		Channels >50m Bankfull Width	Very High
GRLC MG,LG,UG 4. Days With Habitat Forming Flows	Habitat Forming Flows are > 8829cfs. Middle Green, Lower Green, Duwamish, USGS data.		Channels >50m Bankfull Width	Very High
GRLC-DU-10. Riparian condition along banks	WRIA sponsored data collection		Side channels	Very High
GRLC-LG-10. Riparian condition along banks	WRIA sponsored data collection		Side channels	Very High
GRLC-MG-10. Riparian condition-% of CMZ	WRIA sponsored data collection		Side channels	Very High
GRLC-UG-3. Unarmored Bank	Upper Green, WRIA sponsored data collection		Channels >50m Bankfull Width	Very High
GRNE - DU - 5. Amount of unarmored bank	WRIA sponsored data collection		Natal Chinook estuaries	Very High
GRNE - DU - 6. Riparian condition along banks	WRIA sponsored data collection		Natal Chinook estuaries	Very High
GRNE DU - 2. Amount of unarmored bank			Natal Chinook estuaries	Very High
GRNE-DU-1. GRNE-DU-1 amount of unarmored bank	WRIA sponsored data collection		Natal Chinook estuaries	Very High
GRNE-DU-10. Area of shallow water habitat			Natal Chinook estuaries	Very High
GRNE-DU-10. Area of shallow water habitat			Natal Chinook estuaries	Very High
GRNE-DU-12. Amount of unarmored bank	WRIA sponsored data collection		Natal Chinook estuaries	Very High
GRNE-DU-12. Area of shallow water habitat			Natal Chinook estuaries	Very High
GRNE-DU-3. Pieces of LW per mile			Natal Chinook estuaries	Very High
GRNE-DU-3. Pieces of LW per mile			Natal Chinook estuaries	Very High
GRNE-DU-4. Number of jams per mile			Natal Chinook estuaries	Very High
GRNE-DU-9. Amount of unarmored bank	WRIA sponsored data collection		Natal Chinook estuaries	Very High
GRPE-NE-5. Amount of unarmored bank	WRIA sponsored data		Pocket estuaries	Very High
GRPE-VS-5. Amount of unarmored bank	Vashon/Maury Nearshore		Pocket estuaries	Very High
GRSC-NE-3. Riparian Condition Newaukum			Channels <50m Bankfull Width	Very High
GRSC-NE-4. Riparian condition - Newaukum	WRIA sponsored data collection		Channels <50m Bankfull Width	Very High
GRSC-SO-3. riparian condition-Soos	WRIA sponsored data collection		Channels <50m Bankfull Width	Very High
GRSC-SO-4. Riparian Condition - Soos	WRIA sponsored data collection		Channels <50m Bankfull Width	Very High
GRSD - DU - 8. Pieces of LW per mile	Duwamish		Channels >50m Bankfull Width	Very High
GRSD - LG - 8. Pieces of LW per mile	Lower Green		Channels >50m Bankfull Width	Very High
GRSD-DU-1. Amount of unarmored bank	WRIA sponsored data collection		Side channels	Very High
GRSD-DU-11. Amount of unarmored bank	WRIA Sponsored data collection		Side channels	Very High
GRSD-DU-6. Amount of unarmored bank	WRIA Sponsored data collection - Duwamish		Side channels	Very High
GRSD-DU-7. Amount of unarmored bank	WRIA sponsored data collection - Duwamish		Side channels	Very High

Indicator	Details	Comments	Ecosystem Component	Priority
GRSD-DU-8. Pieces of LW per mile	ACOE and WRIA sponsored data collection		Side channels	Very High
GRSD-DU-9. Number of jams per mile	ACOE and WRIA sponsored data collection		Side channels	Very High
GRSD-LG-1. Amount of unarmored bank	Lower Green -WRIA Sponsored data collection		Side channels	Very High
GRSD-LG-11. Amount of unarmored bank			Side channels	Very High
GRSD-LG-4. number of days of habitat forming flows (> 8829cfs) per water year	USGS data- Lower Green		Side channels	Very High
GRSD-LG-6. Amount of unarmored bank			Side channels	Very High
GRSD-LG-8. Pieces of LW per mile	ACOE and WRIA sponsored data collection		Side channels	Very High
GRSD-LG-9. Number of jams per mile	ACOE and WRIA sponsored data collection		Side channels	Very High
GRSD-MG01. Amount of unarmored bank	WRIA sponsored data collection - Middle Green		Side channels	Very High
GRSD-MG-11. Amount of unarmored bank	WRIA sponsored data collection		Side channels	Very High
GRSD-MG-4. number of days of habitat forming flows (> 8829cfs) per water year	USGS Data - Middle Green		Side channels	Very High
GRSD-MG-6. Amount of unarmored bank	WRIA sponsored data collection - Middle Green		Side channels	Very High
GRSD-MG-7. Amount of unarmored bank	WRIA Sponsored data collection - Middle Green		Side channels	Very High
GRSD-MG-8. Pieces of LW per mile	Middle Green, ACOE and WRIA sponsored data collection.		Channels >50m Bankfull Width	Very High
GRSD-MG-8. Pieces of LW per mile	ACOE and WRIA sponsored data collection		Side channels	Very High
GRSD-MG-9. Number of jams per mile	ACOE and WRIA sponsored data collection		Side channels	Very High
GRSD-UG-1. Amount of unarmored bank	WRIA sponsored data collection - Upper Green		Side channels	Very High
GRSD-UG-11. Amount of unarmored bank	WRIA sponsored data collection		Side channels	Very High
GRSD-UG-4. Number of days of habitat forming flows (> 8829cfs) per water year	USGS Data - Upper Green		Side channels	Very High
GRSD-UG-6. Amount of unarmored bank	WRIA Sponsored data collection - Upper Green		Side channels	Very High
GRSD-UG-7. Amount of unarmored bank	WRIA sponsored data collection - Upper Green		Side channels	Very High
GRSD-UG-8. Pieces of LW per mile	Upper Green, ACOE and WRIA sponsored data collection.		Channels >50m Bankfull Width	Very High
GRSD-UG-8. Pieces of LW per mile	ACOE and WRIA sponsored data collection		Side channels	Very High
GRSD-UG-9. Number of jams per mile	ACOE and WRIA sponsored data collection		Side channels	Very High
GRUP DU 1. Forest Cover	Duwamish, NOAA CCAP data		Uplands	Very High
GRUP DU 2. Pervious Surface by Subbasin	Duwamish, DOE/NOWW CCAP Data		Uplands	Very High
GRUP DU 3. Forest Cover	Duwamish, NOAA CCAP data		Uplands	Very High
GRUP LG 3. Forest Cover	Lower Green, NOAA CCAP data		Uplands	Very High
GRUP LG. Percent Pervious Surface by Subbasin	Lower Green, DOE/NOAA CCAP Data		Uplands	Very High

Indicator	Details	Comments	Ecosystem Component	Priority
GRUP MG 3. Forest Cover	Middle Green, NOAA CCAP data		Uplands	Very High
GRUP NRM 3. Forest Cover	Nearshore - Mainland, NOAA CCAP data		Uplands	Very High
GRUP NRM. Percent Pervious Surface by Subbasin	Nearshore Mainland, DOE/NOAA CCAP Data		Uplands	Very High
GRUP NRV 1. Forest Cover	Nearshore - Vashon, NOAA CCAP data		Uplands	Very High
GRUP NRV 3. Forest Cover	Nearshore-Vashon, NOAA CCAP data		Uplands	Very High
GRUP UG 3. Forest Cover	Upper Green, NOAA CCAP data		Uplands	Very High
GRUP UG2. Percent Pervious Surface by Subbasin	Upper Green, DOE/NOAA CCAP Data		Uplands	Very High
Median short-term population growth rate of NOS	Watershed wide. WDFW spawner data		Green River Fall Chinook Salmon	Very High
Percent hatchery fish spawning naturally	Geographic Specificity: Lower and Middle Green together. WDFW spawner data		Green River Fall Chinook Salmon	Very High
Recruit per NOS	Geographic specificity: watershed wide. WDFW smolt Trap		Green River Fall Chinook Salmon	Very High
Temperature for Newaukum	# of days above WADOE 7-DADMax Summer Standard. King County Data.		Channels <50m Bankfull Width	Very High
Temperature for Soos	Number of days above WADOE 7-DADMax Summer Standard		Channels <50m Bankfull Width	Very High
BIBI Scores	King County Data		Uplands	High
GAP. Fish Growth	Geographic specificity: watershed wide. Currently a GAP-considering Avg Size by date at Smolt Trap.		Green River Fall Chinook Salmon	High
GAP. Nutrient supply - nutrient cycling/flux			Channels <50m Bankfull Width	High
GAP_ GRLC MG 2. Bank Sediment Available to River	Middle Green, WRIA sponsored data collection		Channels >50m Bankfull Width	High
GAP_GRCL-NE-5. Amount of unarmored accretion areas	Data needs to be compiled		Coastal landforms	High
GAP_GRLC-LG-2. Bank Sediment Available to River			Channels >50m Bankfull Width	High
GAP_GRSD-DU-5. number of day of daily average flow <300cfs	USGS Data - Duwamish		Side channels	High
GAP_GRSD-LG-2. Amount of bank sediment available to river	WRIA sponsored data collection - Lower Green		Side channels	High
GAP_GRSD-LG-5. number of day of daily average flow <300cfs			Side channels	High
GAP_GRSD-MG-2. Amount of bank sediment available to river	WRIA Sponsored data - Middle Green		Side channels	High
GAP_GRSD-MG-5. number of day of daily average flow <300cfs	USGS data - Middle Green		Side channels	High
GRUP LG1. Forest Cover	Lower Green, NOAA CCAP data		Uplands	High
GRUP MG 1. Forest cover	Middle Green, NOAA CCAP data		Uplands	High
GRUP MG 2. Percent Pervious Surface by Subbasin	DOE/NOAA CCAP Data		Uplands	High

Indicator	Details	Comments	Ecosystem Component	Priority
GRUP NRM 1. Forest Cover	Nearshore-Mainland, NOAA CCAP data		Uplands	High
GRUP UG 1. Forest cover	Upper Green, NOAA CCAP data		Uplands	High
GAP			Pocket estuaries	Medium
GAP. Habitat Connectivity			Channels <50m Bankfull Width	Medium
GAP. Habitat Connectivity			Side channels	Medium
GAP. Habitat Connectivity			Non-Channel Lakes & Wetlands	Medium
GAP. Number of Landslides			Uplands	Medium
GAP. Nutrient Supply - water quality			Non-Channel Lakes & Wetlands	Medium
GAP. Organic inputs-Organic matter-retention processing			Channels <50m Bankfull Width	Medium
GAP. Tidal channel formation and maintenance - connectivity of channels			Natal Chinook estuaries	Medium
GAP. Tidal Circulation-extent of dependent biological activity			Coastal landforms	Medium
GAP_GRCL-NE-6. Amount of intertidal area	(Amount of intertidal fill)-There are no federal, state, county or other data sets that tackle the issue of extent of intertidal area that has been filled. WRIA 9 has targets related to shallow intertidal habitat improvements, but no existing baseline to measrue how we are doing. This is a data set WRIA 9 had suggested being created prior to the PSPMAMP process. A brand new data set will be created in near future-that will cover condition in 05 and current. This will help describe shoreline conditions waterward of OWHM as well as track implementation of projects.		Coastal landforms	Medium
GRBB-NE-11. Amount of intertidal area	(Amount of intertidal fill)-There are no federal, state, county or other data sets that tackle the issue of extent of intertidal area that has been filled. WRIA 9 has targets related to shallow intertidal habitat improvements, but no existing baseline to measure how we are doing. This is a data set WRIA 9 had suggested being created prior to the PSPMAMP process. A brand new data set will be created in near future-that will cover condition in 05 and current. This will help describe shoreline conditions waterward of OWHM as well as track implementation of projects.		Bluff backed beaches	Medium
GRBB-NE-8. Amount of intertidal area	(Amount of intertidal fill)-There are no federal, state, county or other data sets that tackle the issue of extent of intertidal area that has been filled. WRIA 9 has targets related to shallow intertidal habitat improvements, but no existing baseline to measurehow we are doing. This is a data set WRIA 9 had suggested being created prior to the PSPMAMP process. A brand new data set will be created in near future-that will cover condition in 05 and current. This will help describe shoreline conditions waterward of OWHM as well as track implementation of projects.		Bluff backed beaches	Medium

Indicator	Details	Comments	Ecosystem Component	Priority
GRCL-NE-11. Amount of intertidal area	(Amount of intertidal fill)-There are no federal, state, county or other data sets that tackle the issue of extent of intertidal area that has been filled. WRIA 9 has targets related to shallow intertidal habitat improvements, but no existing baseline to measrue how we are doing. This is a data set WRIA 9 had suggested being created prior to the PSPMAMP process. A brand new data set will be created in near future-that will cover condition in 05 and current. This will help describe shoreline conditions waterward of OWHM as well as track implementation of projects.		Coastal landforms	Medium
GAP. Competitor population condition			Species & food webs	Low
GAP. Competitor population size			Species & food webs	Low
GAP. Freshwater hydrology - condition			Natal Chinook estuaries	Low
GAP. Freshwater hydrology - dependent water condition			Natal Chinook estuaries	Low
GAP. Hydrology - high flow hydrological regime			Channels <50m Bankfull Width	Low
GAP. Hydrology - low flow hydrological regime			Channels <50m Bankfull Width	Low
GAP. Nutrient supply - nutrient cycling/flux			Side channels	Low
GAP. Nutrient supply - nutrient cycling/flux			Non-Channel Lakes & Wetlands	Low
GAP. Organic matter-retention/processing			Non-Channel Lakes & Wetlands	Low
GAP. Other species population size			Species & food webs	Low
GAP. Predator population size			Species & food webs	Low
GAP. Riparian - riparian community structure			Channels <50m Bankfull Width	Low
GAP. Tidal channel formation and maintenance - extent of channels			Natal Chinook estuaries	Low
GAP. Tidal circulation - dependent water condition			Natal Chinook estuaries	Low
GAP. Tidal circulation - extent of dependent biological activity			Pocket estuaries	Low
GAP. Tidal Hydrological dynamics - Tidal Circulation - extent of biological activity			Bluff backed beaches	Low
GAP. Water Quality			Natal Chinook estuaries	Low
GAP. Tidal channel formation and maintenance - extent of channels			Pocket estuaries	Not Specified
GRNE-DU-11. Linear feet of bank restored			Natal Chinook estuaries	Not Specified
GRSD-LG-13. Amount of historic floodplain currently accessible	Lower Green		Side channels	Not Specified
GRSD-LG-7. Amount of unarmored bank	WRIA sponsored data collection - Lower Green		Side channels	Not Specified

A.5. Effectiveness Monitoring Priorities and Gaps

This table lists all implementation and effectiveness indicators identified by the watershed as well as key gaps where indicators of progress on recovery actions are needed. The list is organized alphabetically by indicator and information about associated desired outcomes (i.e. pressure reduction and intermediate results) for which they are providing measures of progress is included. Any information about monitoring priorities that was developed as part of the M and AM Phase I project is also included.

A5 - sorted first by priority, then by indicator name.

Indicator	Details	Comments	Intermediate or Pressure Reduction Result	Priority
% Length of Shoreline with Trees (Dense and Patchy) -- NS	Percent length of shoreline with trees (dense and patchy) in the nearshore		Shoreline hardening stress reduced	Very High
% of Banks Lined with Trees -- DUW	Percent of channel migration zone with trees in the Duwamish		Shoreline hardening	Very High
% of Banks Lined with Trees -- DUW	Percent of channel migration zone with trees in the Duwamish		Shoreline hardening stress reduced	Very High
% of Banks Lined with Trees -- LG	Percent of channel migration zone with trees in the Lower Green		Shoreline hardening	Very High
% of Banks Lined with Trees -- LG	Percent of channel migration zone with trees in the Lower Green		Shoreline hardening stress reduced	Very High
% of Banks Lined with Trees -- NWK	Percent of channel migration zone with trees in Newaukum Creek		Shoreline hardening	Very High
% of Banks Lined with Trees -- NWK	Percent of channel migration zone with trees in Newaukum Creek		Shoreline hardening	Very High
% of Banks Lined with Trees -- NWK	Percent of channel migration zone with trees in Newaukum Creek		Shoreline hardening stress reduced	Very High
% of Banks Lined with Trees -- Soos	Percent of channel migration zone with trees in Soos Creek		Shoreline hardening	Very High
% of Banks Lined with Trees -- Soos	Percent of channel migration zone with trees in Soos Creek		Shoreline hardening	Very High
% of Banks Lined with Trees -- Soos	Percent of channel migration zone with trees in Soos Creek		Shoreline hardening stress reduced	Very High
% of CMZ with Trees -- MG	Percent of channel migration zone with trees in the Middle Green		Shoreline hardening	Very High
% of CMZ with Trees -- MG	Percent of channel migration zone with trees in the Middle Green		Shoreline hardening stress reduced	Very High
% of Sub-Basin in Forest Cover -- DUW	Percent of Duwamish sub-basin in forest cover		Shoreline hardening stress reduced	Very High
% of Sub-Basin in Forest Cover -- LG	Percent of Lower Green sub-basin in forest cover		Shoreline hardening stress reduced	Very High
% of Sub-Basin in Forest Cover -- MG	Percent of Middle Green sub-basin in forest cover		Shoreline hardening stress reduced	Very High
% of Sub-Basin in Forest Cover -- NS	Percent of nearshore sub-basin in forest cover		Shoreline hardening stress reduced	Very High
% of Sub-Basin in Forest Cover -- UG	Percent of Upper Green sub-basin in forest cover		Shoreline hardening stress reduced	Very High
% Sediment Source Intact by Drift Cell	Percent sediment source intact by drift cell (5 categories)		Shoreline hardening pressure reduced	Very High
Amount of Bank Sediment Available to River			Shoreline hardening stress reduced	Very High
Amount of Floodplain Wetlands	Amount of floodplain wetlands		Shoreline hardening stress reduced	Very High

Indicator	Details	Comments	Intermediate or Pressure Reduction Result	Priority
Amount of historic Floodplain Currently Accessible			Shoreline hardening stress reduced	Very High
Amount of Intact Intertidal Areas	Amount of intact intertidal areas, or its inverse, the amount of intertidal area filled		Shoreline hardening pressure reduced	Very High
Amount of Intact Intertidal Areas	Amount of intact intertidal areas, or its inverse, the amount of intertidal area filled		Shoreline hardening stress reduced	Very High
Amount of LID -- DUW	Amount of LID undertaken by area in the Duwamish		Other structural barriers to water, sediment, debris flows stress reduced	Very High
Amount of LID -- LG	Amount of LID undertaken by area in the Lower Green		Other structural barriers to water, sediment, debris flows stress reduced	Very High
Amount of LID -- MG	Amount of LID undertaken by area in the Middle Green		Other structural barriers to water, sediment, debris flows stress reduced	Very High
Amount of LID -- NS	Amount of LID undertaken by area in the nearshore		Other structural barriers to water, sediment, debris flows stress reduced	Very High
Amount of LID -- UG	Amount of LID undertaken by area in the Upper Green		Other structural barriers to water, sediment, debris flows stress reduced	Very High
BIBI Scores -- DUW	BIBI scores in the Duwamish sub-basin		Shoreline hardening stress reduced	Very High
BIBI Scores -- LG	BIBI scores in the Lower Green sub-basin		Shoreline hardening stress reduced	Very High
BIBI Scores -- MG	BIBI scores in the Middle Green sub-basin		Shoreline hardening stress reduced	Very High
BIBI Scores -- NS	BIBI scores in the nearshore sub-basin		Shoreline hardening stress reduced	Very High
BIBI Scores -- UG	BIBI scores in the Upper Green sub-basin		Shoreline hardening stress reduced	Very High
Days Above ECY 7-DADMax Summer Standard	Number of days above the Washington Department of Ecology's 7-DADMax Summer Standard		Shoreline hardening	Very High
Days Above ECY 7-DADMax Summer Standard	Number of days above the Washington Department of Ecology's 7-DADMax Summer Standard		Shoreline hardening	Very High
Feet of shoreline restored -- All	Feet of shoreline restored in the entire watershed		Shoreline hardening	Very High
Feet of shoreline restored -- DUW	Feet of shoreline restored in the Duwamish		Shoreline hardening	Very High
Feet of shoreline restored -- LG	Feet of shoreline restored in the Lower Green		Shoreline hardening	Very High
Feet of shoreline restored -- MG	Feet of shoreline restored in the Middle Green		Shoreline hardening	Very High
Feet of shoreline restored -- NS	Feet of shoreline restored in the nearshore		Shoreline hardening	Very High
Feet of shoreline restored -- UG	Feet of shoreline restored in the Upper Green		Shoreline hardening	Very High

Indicator	Details	Comments	Intermediate or Pressure Reduction Result	Priority
Forum Directed Funding	Forum-directed restoration/protection funding		40, 30, 30 Split	Very High
Habitat Forming Flows	Number of days with habitat forming flows (>8829 CFS) per water year		Dams	Very High
Linerar feet of bank restored -- DUW	Feet of bank restored in the Duwamish		Shoreline Hardening	Very High
LWD Jams Per Mile			Shoreline hardening	Very High
LWD Jams Per Mile			Shoreline hardening stress reduced	Very High
miles of shoreline protected -- All	Miles of shoreline protected in the entire watershed		Shoreline hardening	Very High
miles of shoreline protected -- DUW	Miles of shoreline protected in the Duwamish		Shoreline hardening	Very High
miles of shoreline protected -- LG	Miles of shoreline protected in the Lower Green		Shoreline hardening	Very High
miles of shoreline protected -- MG	Miles of shoreline protected in the Middle Green		Shoreline hardening	Very High
miles of shoreline protected -- NS	Miles of shoreline protected in the nearshore		Shoreline hardening	Very High
miles of shoreline protected -- UG	Miles of shoreline protected in the Upper Green		Shoreline hardening	Very High
Miles of Unarmored Shoreline	Miles of unarmored shoreline		Shoreline hardening	Very High
Miles of Unarmored Shoreline	Miles of unarmored shoreline		Shoreline hardening pressure reduced	Very High
Miles of Unarmored Shoreline	Miles of unarmored shoreline		Shoreline hardening stress reduced	Very High
Miles of Unarmored Shoreline	Miles of unarmored shoreline		Shoreline hardening stress reduced	Very High
Miles of Unarmored Shoreline -- All	Miles of unarmored shoreline in WRIA 9		Shoreline hardening	Very High
Miles of Unarmored Shoreline - DUW	Miles of unarmored shoreline in the Duwamish		Shoreline hardening	Very High
Miles of Unarmored Shoreline - DUW	Miles of unarmored shoreline in the Duwamish		Shoreline Hardening	Very High
Miles of Unarmored Shoreline -- LG	Miles of unarmored shoreline in the Lower Green		Shoreline hardening	Very High
Miles of Unarmored Shoreline -- MG	Miles of unarmored shoreline in the Middle Green		Shoreline hardening	Very High
Miles of Unarmored Shoreline -- NS	Miles of unarmored shoreline in the nearshore		Shoreline hardening	Very High
Miles of Unarmored Shoreline -- UG	Miles of unarmored shoreline in the Upper Green		Shoreline hardening	Very High
MS-1	40-30-30 split according to policy MS-1		40, 30, 30 Split	Very High
Percent of Sub-Basin in Pervious Surfaces -- DUW	Percent of Duwamish sub-basin in pervious surfaces		Shoreline hardening stress reduced	Very High
Percent of Sub-Basin in Pervious Surfaces -- LG	Percent of Lower Green sub-basin in pervious surfaces		Shoreline hardening stress reduced	Very High
Percent of Sub-Basin in Pervious Surfaces -- MG	Percent of Middle Green sub-basin in pervious surfaces		Shoreline hardening stress reduced	Very High

Indicator	Details	Comments	Intermediate or Pressure Reduction Result	Priority
Percent of Sub-Basin in Pervious Surfaces -- NS	Percent of nearshore sub-basin in pervious surfaces		Shoreline hardening stress reduced	Very High
Percent of Sub-Basin in Pervious Surfaces -- UG	Percent of Upper Green sub-basin in pervious surfaces		Shoreline hardening stress reduced	Very High
Pieces of Wood Per Mile			Shoreline hardening	Very High
Pieces of Wood Per Mile			Shoreline hardening stress reduced	Very High
Shallow Water Habitat	Area of shallow water habitat		Shoreline Hardening	Very High
Total Restoration Funding	Total restoration funding in the watershed		40, 30, 30 Split	Very High
Acres Lost to Non-Permitted Actions			Codes are Enforced	High
Acres Lost to Non-Permitted Actions			Codes are Enforced	High
Acres Lost to Non-Permitted Actions			Codes are Enforced	High
Acres Lost to Non-Permitted Actions			Codes are Enforced	High
Acres Lost to Non-Permitted Actions			Codes are Enforced	High
Acres Lost to Non-Permitted Actions			Codes are Enforced	High
Acres Lost to Non-Permitted Actions			Codes are Enforced	High
Acres Lost to Variances			Codes are Enforced	High
Acres Lost to Variances			Codes are Enforced	High
Acres Lost to Variances			Codes are Enforced	High
Acres Lost to Variances			Codes are Enforced	High
Acres Lost to Variances			Codes are Enforced	High
Acres Lost to Variances			Codes are Enforced	High
Acres Lost to Variances			Codes are Enforced	High
Adult Passage Facility Built	A passage facility for adult salmonids is built		Downstream Fish Passage Constructed	High
GAP. Behavior changed?			Education/ Stewardship Program Implemented	High
GAP. Behavior changed?			Education/ Stewardship Program Implemented	High

Indicator	Details	Comments	Intermediate or Pressure Reduction Result	Priority
GAP. Behavior changed?			Education/ Stewardship Program Implemented	High
GAP. Behavior changed?			Education/ Stewardship Program Implemented	High
GAP. Behavior changed?			Education/ Stewardship Program Implemented	High
GAP. Behavior changed?			Education/ Stewardship Program Implemented	High
Jurisdictions with Funding for Enforcement			Codes are Enforced	High
Jurisdictions with Funding for Enforcement			Codes are Enforced	High
Jurisdictions with Funding for Enforcement			Codes are Enforced	High
Jurisdictions with Funding for Enforcement			Codes are Enforced	High
Jurisdictions with Funding for Enforcement			Codes are Enforced	High
Jurisdictions with Funding for Enforcement			Codes are Enforced	High
Jurisdictions with Funding for Enforcement			Codes are Enforced	High
Juvenile Passage Facility Built	A passage facility for juvenile salmonids is built		Downstream Fish Passage Constructed	High
GAP. GAP -- Number of Landslides	Number of landslides		Shoreline hardening pressure reduced	Medium
Jurisdictional Surveys	Biannual sruvey of jurisdictions to verify they are implementing the plan's policies/goals		Jurisdictions update plans consistent with Habitat Plan	Medium
Jurisdictional surveys			Jurisdictions update plans consistent with Habitat Plan	Medium
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Jurisdictional Surveys	Biannual survey of jurisdictions to verify they are implementing the plan's policies/goals		Jurisdictions update plans consistent with Habitat Plan	Medium

Indicator	Details	Comments	Intermediate or Pressure Reduction Result	Priority
Jurisdictional surveys			Jurisdictions update plans consistent with Habitat Plan	Medium
Jurisdictional Surveys	Biannual survey of jurisdictions to verify they are implementing the plan's policies/goals		Jurisdictions update plans consistent with Habitat Plan	Medium
Jurisdictional Surveys	Biannual survey of jurisdictions to verify they are implementing the plan's policies/goals		Jurisdictions update plans consistent with Habitat Plan	Medium
SMP consistent with Habitat Plan	# of SMPs consistent with Habitat Plan		Jurisdictions update plans consistent with Habitat Plan	Medium
Daily Average Flows at Auburn	Number of days daily average flow <300 CFS at Auburn		Abstraction of surface water	Not Specified
Daily Average Flows at Auburn	Number of days daily average flow <300 CFS at Auburn		Abstraction of ground water	Not Specified
GAP. Behavior changed?			Education/ Stewardship Program Implemented	Not Specified
GAP. Behavior changed?			Education/ Stewardship Program Implemented	Not Specified