

DRAFT FINAL

ECOSYSTEM RECOVERY PLAN



Port Susan, Stillaguamish Estuary



Snohomish Estuary

September 2016

CREDIT AND ACKNOWLEDGEMENTS

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EXECUTIVE SUMMARY

The key goals of long-term planning for ecosystem recovery are to:

- Ensure that funding is targeted at the highest priority local strategies and actions
- Coordinate recovery actions across local areas and the region

To advance these goals, the U.S. Environmental Protection Agency is supporting the Puget Sound region's Local Integrating Organizations (LIOs) in developing Ecosystem Recovery Plans and associated 2-year Implementation Plans. This focused, strategic recovery planning will achieve the following:

- Provide a roadmap for local ecosystem strategic efforts that focuses recovery planning and actions on the highest priority recovery needs
- Build on and work in coordination with existing related recovery efforts (salmon recovery planning, for example)
- Ensure consistency (in terminology, structure, and content) of local plans with the Puget Sound Action Agenda so that LIO priorities inform regional decision making and sequencing of recovery actions
- Result from a rigorous, defensible process that will identify the highest priority recovery strategies in each LIO area, thus helping to direct limited funding to where it will be most effective
- Serve as a longer-term, durable strategic framework from which local Near Term Actions (NTAs) to be included in the Puget Sound Action Agenda can be developed
- Provide accounting of existing work underway to improve the health of the LIO area and identify gaps where work is needed

Recovery Plan Status

Decisions were made by the Snohomish-Stillaguamish LIO (Sno-Stilly LIO) Committee members in 2015 and 2016 in progressing toward a draft Plan. The First Elements of the Plan were delivered in October 2015. This September 2016 draft final Ecosystem Recovery Plan (Plan) is intended to build on those First Elements and serve as a summary of progress to date. The draft will be converted to a format being developed by the Puget Sound Partnership (PSP) and the Sno-Stilly Ecosystem Recovery Coordinator.

Next Steps

Revisions, updates, and adaptive management of the Plan will continue, including incorporation of edits based on PSP review of this draft Plan and final draft vetting with appropriate LIO technical and policy bodies to finalize the Plan. This process is anticipated to culminate in submittal of the final Plan to PSP between April and June of 2017.

For more information on the Sno-Stilly LIO's approach to next steps, please see Section 6.0 of this draft Plan.

PARTICIPANTS

Project Team

Table 1 lists the project team members who took the lead in developing the products summarized in this Plan.

TABLE 1. ECOSYSTEM RECOVERY PLAN DEVELOPMENT PROJECT TEAM

Given Name	Surname	Organization	Position	Role(s)
Mary	Hurner	Snohomish County Surface Water Management	Interim LIO Coordinator	Core Team Lead/ Point of Contact
Ann	Bylin	Snohomish County Surface Water Management	Planning Supervisor	Team Member
Donald "Kit"	Crump	Snohomish County Surface Water Management	LIO Support Staff, Stillaguamish Basin Co-Lead Entity	Team Member
Beth	Liddell	Snohomish County Surface Water Management	LIO Support Staff	Team Member
Lynn	Turner	Anchor QEA, LLC	Consultant Assistant to Interim LIO Coordinator	Core Team Lead Assistant
Tracy	Drury	Anchor QEA, LLC	Consultant Technical Advisor to LIO	Team Assistant
Abby	Hook	Hook Environmental	Consultant Open Standards Advisor/Facilitator Assistant to LIO	Team Assistant
Dan	Calvert	Puget Sound Partnership	Ecosystem Recovery Coordinator	Project Advisor/ Process Facilitator

Partners and Stakeholders

Table 2 lists the organizations involved in this project. We acknowledge their critical role in ensuring that the Plan reflects the broad interests of the Sno-Stilly LIO community, and we are grateful for the contributions they have made to the Plan, its implementation, and its outcomes.

TABLE 2. PARTNERS AND STAKEHOLDERS

Organization	Role(s)
Snohomish County	Executive Committee Co-Chair Implementation Committee Member LIO Fiscal Agent and Support Staff
King County	Executive Committee Co-Chair Implementation Committee Member
Tulalip Tribes	Executive Committee Member Implementation Committee Co-Chair
Stillaguamish Tribe	Executive Committee Member Implementation Committee Member
Snoqualmie Tribe	Implementation Committee Member
Port of Everett	Executive Committee Member Implementation Committee Member
City of Everett	Executive Committee Member Implementation Committee Member
City of Arlington	Executive Committee Member
City of Snohomish	Executive Committee Member
City of Duvall	Executive Committee Member
Stillaguamish Watershed Council	Implementation Committee Co-Chair
Snohomish Basin Salmon Recovery Forum	Implementation Committee Member
Snoqualmie Watershed Forum	Implementation Committee Member
City of Stanwood	Implementation Committee Member
King Conservation District	Implementation Committee Member
Snohomish Conservation District	Implementation Committee Member
Pilchuck Audubon Society	Implementation Committee Member
Sound Salmon Solutions	Implementation Committee Member

Organization	Role(s)
Snohomish Camano ECO Net	Implementation Committee Member
Snohomish County Agricultural Advisory Board	Implementation Committee Member
Snohomish County Marine Resources Advisory Committee	Implementation Committee Member
Snohomish Health District	Implementation Committee Member
Stillaguamish Clean Water District Advisory Board	Implementation Committee Member
WSU Snohomish County Extension	Implementation Committee Member

ECOSYSTEM RECOVERY PLAN REVIEW AND APPROVAL STATUS

Plan Development and Decision-Making Process

The Sno-Stilly LIO is following guidance from PSP to develop this Plan for the Snohomish and Stillaguamish watersheds that will guide the actions and priorities for Puget Sound recovery at a local level, in alignment with the goals and strategies of the Puget Sound Action Agenda. The LIO comprises two groups: the Executive Committee (EC) and the Implementation Committee (IC). The EC is the primary decision-making body for the LIO. The IC, which was assembled to provide a strong working knowledge of local activities and capabilities, makes recommendations to the EC to help advance the Puget Sound Action Agenda.

This Plan was developed by the IC and EC, with an eye to coordination with Chinook salmon recovery work and other ongoing governmental, non-profit, and tribal projects and programs. Additional specifics regarding development of certain Plan sections are provided in the introduction to those sections of this Plan.

Sno-Stilly LIO Ecosystem Recovery Plan Review and Approval

	Reviewed	Approved
Implementation Committee	☒	☒
Executive Committee	☒	☒

1.0 LIO OVERVIEW

LIO Overview and Structure

The Sno-Stilly LIO is one of nine LIOs in the Puget Sound region. It was established in March 2012 and subsequently recognized by PSP. The purpose of the Sno-Stilly LIO is to serve as a local forum through which diverse stakeholders can work collaboratively to develop and coordinate actions to improve the health of the Snohomish and Stillaguamish watersheds and contribute to recovering Puget Sound. The LIO's EC and IC operate under adopted bylaws as well as the terms of a grant contract and work program managed by the Sno-Stilly LIO Coordinator with support from PSP. Snohomish County is the fiscal agent for the local contract and provides staff support to the LIO committees. The EC is the primary decision-making body for the LIO. The IC, which was assembled to provide a strong working knowledge of local activities and capabilities, makes recommendations to the EC to help advance the Puget Sound Action Agenda. Committee meetings are typically held at the Snohomish County Administration Building in Everett. These meetings are open to the public with opportunity for public comment.

Sno-Stilly LIO Mission and Ecosystem Recovery Plan Vision

The mission of the Sno-Stilly LIO is to: 1) coordinate with PSP and the other LIOs; 2) facilitate the integration of local governments, tribes, and other organizations in developing and implementing strategies and priorities at a local scale that advance the Action Agenda in Water Resource Inventory Areas (WRIAs) 5 and 7; and 3) communicate needed information back to the community.

The Sno-Stilly LIO's vision for this Plan is:

The *Snohomish-Stillaguamish LIO Ecosystem Recovery Plan* presents an integrated framework for progress and actions toward a healthy, resilient ecosystem that builds on current plans and policies for the protection and recovery of Puget Sound and a sustainable future for the culture and economy of our communities.

Geographic and Cultural Context in the LIO Area

Stakeholders in both the Snohomish and Stillaguamish watersheds have a long history of collaboration on issues ranging from flood protection to salmon habitat restoration. In recent years, such collaboration has focused on crafting integrated floodplain management strategies for the two basins, with the goal of reducing conflicts among proponents of salmon recovery, agricultural viability, tribal treaty rights and culture, and development. Today, numerous organizations are implementing a variety of habitat restoration, floodplain reconnection, water quality, stormwater, and education and outreach efforts in the Snohomish and Stillaguamish watersheds.

The Snohomish River Basin Salmon Recovery Forum, Snoqualmie Watershed Forum, and Stillaguamish Watershed Council include members from many of the same counties, tribes, cities, special purpose districts, and interest groups as the Sno-Stilly LIO. The Forums set recovery priorities for the Snohomish Basin in the *Snohomish River Basin Salmon Conservation Plan* (Snohomish Basin Salmon Recovery Forum

2005). The Stillaguamish Watershed Council (formerly the Stillaguamish Implementation Review Committee) is the official council for salmon recovery in the Stillaguamish Basin and set recovery priorities for that basin in the *Stillaguamish Watershed Chinook Salmon Recovery Plan* (SIRC 2005). Salmon recovery, habitat restoration, and floodplain reconnection projects are evaluated and prioritized for funding by all three groups, and they all continue to work on cooperative recovery planning efforts in the Snohomish and Stillaguamish basins.

Three tribes are located within the Snohomish and Stillaguamish watersheds and participate in the regional LIO—Tulalip Tribes, Stillaguamish Tribe of Indians, and Snoqualmie Tribe. Tulalip Tribes and Stillaguamish Tribe have federally reserved natural resource treaty rights and have associated annual commercial and subsistence fisheries. All three tribes depend on natural resources within the LIO.

The geographic area covered by the Sno-Stilly LIO includes the Snohomish River watershed (WRIA 7) and the Stillaguamish River watershed (WRIA 5), both of which are located within the Whidbey Basin. These basins contain rivers and habitat that are critical to the recovery of Puget Sound. The Snohomish and Stillaguamish Rivers, combined with the Skagit River, are a primary source of freshwater flowing into Puget Sound. The Snohomish River watershed is a major producer of coho salmon. The Skykomish River Chinook salmon population has the highest abundance target in the Puget Sound evolutionarily significant unit. Juvenile salmon from many rivers in the Puget Sound region use the pocket estuaries, river estuaries, and nearshore areas of the Snohomish and Stillaguamish River watersheds to forage and rear as they adapt to saltwater conditions.

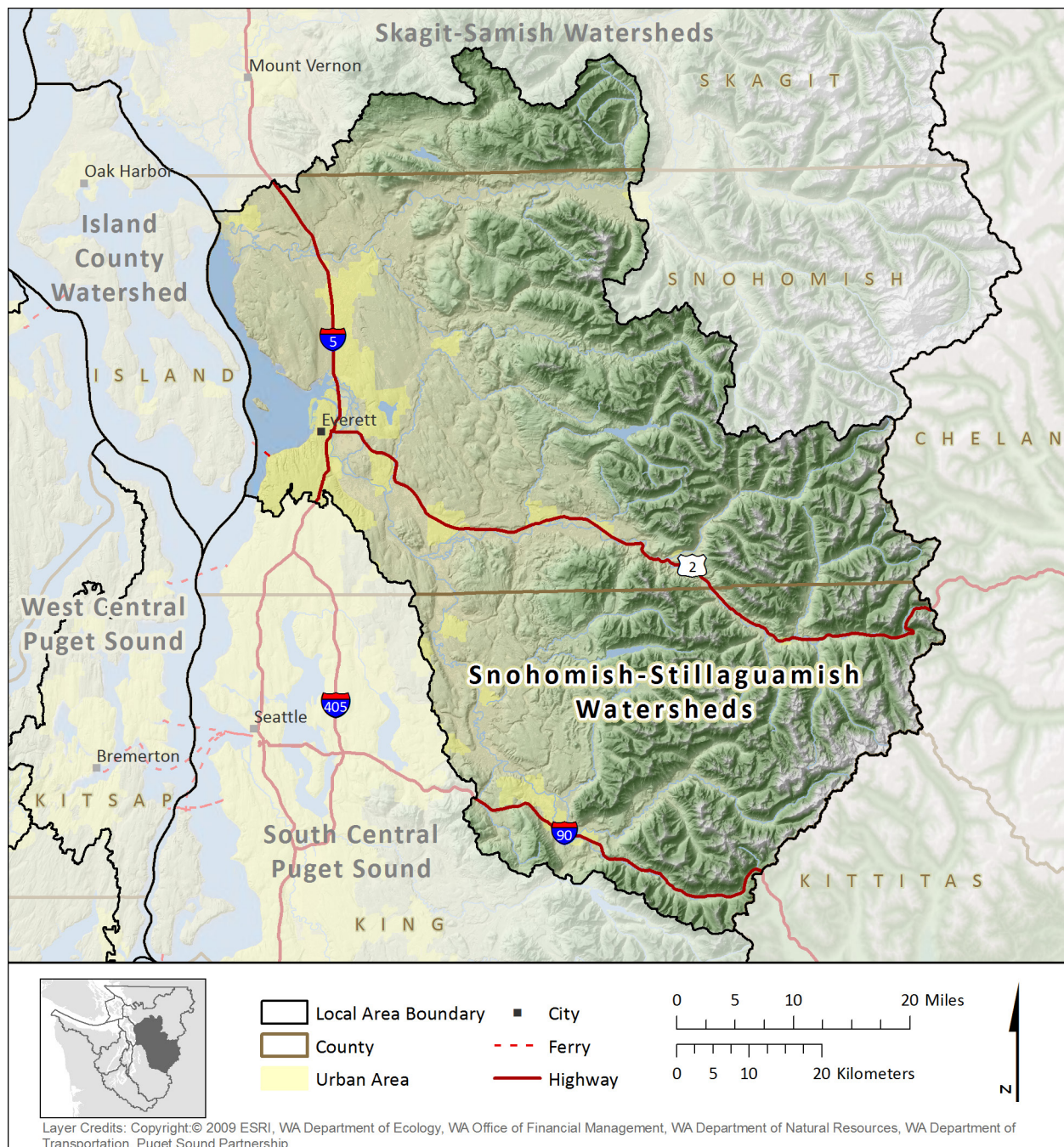


FIGURE 1. MAP OF SNOHOMISH-STILLAGUAMISH LIO

Snohomish Basin

The Snohomish River watershed is the largest watershed in Snohomish and King Counties and the second largest in the Puget Sound region. It lies almost equally within southeastern Snohomish County and northeastern King County, covering an area of 1,868 square miles and containing 2,718 river miles. The Snohomish River empties into Puget Sound north of Everett, the region's fifth largest city and a major industrial and commercial center. Its major tributaries, the Skykomish and Snoqualmie Rivers, originate in steep valleys of the Cascade Mountains and descend into broad floodplains where they converge into the Snohomish River near the city of Monroe. Nine salmonid species use the basin's rivers and estuary for spawning and rearing: Chinook, coho, chum, pink, and sockeye salmon; steelhead/rainbow, cutthroat, and bull trout; and mountain whitefish. The two Chinook salmon populations found within the watershed—the Snoqualmie and the Skykomish—along with steelhead and bull trout are listed as threatened under the federal Endangered Species Act (ESA).

The Snohomish River delta, where nutrient-rich freshwater mixes with the saltwater of Possession Sound, is the second largest estuary in Puget Sound. The estuary functions as a natural filter, cleaning water before it flows into Puget Sound. It also slows down floodwaters and provides rearing habitat for juvenile salmon. Eelgrass beds in the Snohomish River delta are among the largest in Puget Sound, providing critical spawning and foraging habitat. Historically, the Snohomish River delta was 9,750 acres. Since the late 1800s, however, about 85% of the estuary (8,270 acres) has been disconnected from the Snohomish River, mostly because of diking and other human activities. The selected restoration alternative for the estuary (i.e., moderate to high improvement) is to restore tidal inundation to 59% of the disconnected acres.

Primary land uses within the Snohomish River watershed are forestry, farming, and urban and rural residential development. Forest lands, many of which are in a protected status, cover approximately 70% of the watershed. Roughly 50% of these lands are in federal ownership. Agricultural lands comprise about 5% of the watershed. Some of the richest agricultural soils remaining in western Washington are found near the Snohomish, Skykomish, and Snoqualmie rivers. Farming is therefore a major land use along the mainstem rivers, the estuary, and some of the lowland tributaries. Rural residential and urban areas make up a large percentage of the watershed's land base. In the lower Snohomish River basin, more than 90% of the original floodplain wetlands have been drained, filled, or channeled to accommodate farming or development.

The Snohomish River watershed is one of the fastest growing areas in the Puget Sound region, with a projected population growth rate of 36.9% between 2010 and 2035. By 2035, population and employment in the basin are forecasted to increase by approximately 141,180 residents and 111,331 jobs, respectively¹. Most of this growth will occur in the western, incorporated portion of the watershed. The Snohomish Basin is divided almost evenly between King and Snohomish Counties. Incorporated areas within the watershed include the cities of Everett, Mukilteo, Marysville, portions of Arlington and Granite Falls, Snohomish, Lake Stevens, Monroe, Sultan, Gold Bar, and Index in Snohomish County; and Duvall, Skykomish, Carnation, North Bend, Snoqualmie, and portions of Sammamish in King County.

¹ Data sources: Snohomish County – MAZ 2010 Base Year and 20935 Alternative 1 Projections for the 2015 Plan Update; and King County – Census Tract 2010 and 2035 Population/FAZ 2010 and 2035 Employment from PSRC Land Use Targets Maintenance Release, April 14, 2014.

Stillaguamish Basin

The Stillaguamish River watershed is the fifth largest watershed in the Puget Sound region. It drains an area of approximately 700 square miles and includes more than 3,112 miles of river, stream, and marine shore habitat. The Stillaguamish River empties into Puget Sound at the city of Stanwood, 16 miles north of the city of Everett in northwestern Snohomish County. The North and South Forks of the river originate in the Cascade Mountains and descend to form the mainstem at a confluence at the city of Arlington. The mainstem Stillaguamish River flows westerly to Port Susan Bay, with a small portion of water flowing to Skagit Bay through the Old Stillaguamish Channel. These areas hold some of the finest estuarine habitat in Puget Sound.

Port Susan, which includes a complex system of marshes, mudflats, and channels, is the southernmost critical biodiversity area in Puget Sound. The area is also a major producer of forage fish—such as herring, sand lance, and surf smelt—and the eastern softshell clam, which is harvested commercially in South Skagit Bay. The estuary supports large numbers of shorebirds during winter periods as well as spring and fall migration. The Stillaguamish and Skagit River deltas were designated as areas of regional importance in the Western Hemisphere Shorebird Reserve Network in May 2012. Historically, the Stillaguamish River delta covered 5,048 acres. Today, it covers only 1,300 acres. Because the estuary must reach 80% of its historical size to attain Proper Functioning Condition, tidal inundation needs to be restored to at least 2,739 acres.

The Stillaguamish watershed is home to nearly all salmon and trout species found in the Puget Sound area, with 870 miles of anadromous salmonid habitat. The Stillaguamish River provides spawning and rearing habitat for nine salmonid species. Two of the 22 populations of Chinook salmon in Puget Sound that are listed as threatened under the ESA (summer and fall populations) reside in the Stillaguamish River during portions of their life cycles.

Primary land uses within the Stillaguamish watershed are forestry and farming. Federal, state, and private forest lands cover the majority of the watershed. Water quality is a key issue in the basin, as evidenced by widespread violations of surface water standards for fecal coliform bacteria and dissolved oxygen. Watershed health is currently being addressed through several collaborative efforts, including some being led by the Stillaguamish River Clean Water District and the Stillaguamish Watershed Council. Many local stakeholders, including Snohomish County, the Stillaguamish Tribe, farmers, forestland owners, citizens, and local agency representatives, are planning and implementing actions to improve water quality and salmon habitat in the basin.

In contrast with the Snohomish River watershed, half of which lies in rapidly growing King County, the Stillaguamish River watershed is largely rural and population and employment figures are significantly lower. The Stillaguamish Basin is almost entirely within Snohomish County, with limited areas in the northwest in Skagit County. Rural residential development occurs in the Snohomish County portion of the Stillaguamish Basin, and most urban development is located within the city of Stanwood and portions of the cities of Arlington and Granite Falls. Between 2010 and 2035, population in these areas is projected to increase by 37.4% and employment by 97.8%².

² Data source: Snohomish County MAZ 2010 Base Year and 2035 Alternative 1 Projections for June 10, 2015 Plan Update

2.0 PRIORITY VITAL SIGNS, ECOSYSTEM COMPONENTS, AND GOALS FOR THE LIO

This section provides a prioritized list of the components of the ecosystem and human wellbeing that the Sno-Stilly LIO is most interested in protecting and restoring. Components are the focus of the recovery effort. The strategies and actions comprising the Plan are designed to improve or protect the health of components either through restoration strategies or protection or mitigation strategies that reduce pressures on the ecosystem. LIO-specific goals were identified for priority components and, where possible and appropriate, the anticipated contribution toward the regional recovery targets is also identified. For a glossary of terms used throughout this Plan, see Appendix A.

The Sno-Stilly LIO's process for developing the information in this section was as follows:

- In 2015, Sno-Stilly LIO Committee members identified 18 of PSP's original 21 Vital Signs as being present in the Snohomish and Stillaguamish watersheds. Of those 18, six were identified as very high priority (Chinook salmon, estuaries, floodplains, freshwater quality, land cover and development, and summer stream flows) through a committee discussion of the relative condition of each of the Vital Signs present in the two watersheds and their respective 2020 ecosystem recovery targets. Because this was consistent with PSP's requirements for the Plan, the LIO initially chose to focus the plan on the six very high priority Vital Signs as well as high priority Vital Signs (determined in 2016), with an acknowledgement of the remaining lower priority Vital Signs.
- In March 2016, Sno-Stilly LIO IC members were asked to provide feedback on the Vital Signs/components that were not previously identified as very high priority. These Vital Signs were discussed during the IC meeting and then further refined by the EC. The Committees included two habitat components important in the Sno-Stilly LIO watersheds that are not included in the regional Vital Sign list: 1) freshwater wetlands; and 2) marine shorelines and nearshore. The Committees decided to include many of PSP's new Human Health and Quality of Life Vital Signs, with the exception of air quality, which was not carried forward as a local priority component.
- In April 2016, IC members began prioritizing the additional selected Vital Signs/components, and the compiled results were presented for discussion at an IC meeting. As a result of that discussion, IC members moved additional Vital Signs up to the high priority category and reduced the rankings from the four categories proposed by PSP (very high, high, medium, and low) down to three categories (high, medium, and low).
- Following the May 2016 IC meeting, members were asked to review the prioritized list with their organizations and provide final comments. Comments from IC members were presented at the June IC meeting for discussion and comment/response resolution, resulting in a consensus decision on a list to present to the EC for review and a decision. In June 2016, the EC indicated their support for eventually reducing the number of high priority components, but reached a consensus to approve the current IC-recommended list, shown in this section.
- In July 2016, statements of local goals for recovery and protection of some of the priority Vital Signs were developed by an LIO IC sub-group and several goals subcommittees within the Sno-Stilly LIO, and were reviewed by the LIO committees.

Sno-Stilly LIO Priority Components and Vital Signs

The Sno-Stilly LIO priority ratings shown below reflect the group’s understanding of the ecosystem components that are most threatened and where opportunities to address them currently exist. The prioritization represents current thinking on how to sequence recovery actions. In addition to using ranked categories, the Sno-Stilly LIO emphasized that all of the identified components are important to long-term recovery of the Snohomish and Stillaguamish watersheds, and future adjustments to strategies will address them (see Table 3).

The LIO also recognized the strong link between human wellbeing and ecosystem health, and determined that most of the human health and human quality of life components would be best addressed alongside all of the ecosystem components/Vital Signs—embedded within the approach to each ecosystem component—rather than prioritized within the list of ecosystem components.

High Priority Ecosystem Component Vital Signs		Human Health and Quality of Life Linkages	
Chinook Salmon * ¹	Freshwater Quality * ³	Good Governance	Economic Vitality
Floodplains *	Shoreline Armoring	Cultural Wellbeing	Sense of Place ¹⁰
Estuaries * ²	Marine Water Quality	Sound Stewardship	Outdoor Activity ¹¹
Land Development and Cover *	Shellfish Beds ⁴		
Summer Stream Flow *	Toxics in Fish		
Medium Priority Ecosystem Component Vital Signs			
Marine Shorelines and Nearshore +	Freshwater Wetlands +		
Onsite Sewage Systems ⁵	Drinking Water ⁷		
Eelgrass ⁶	Marine Sediment Quality		
Low Priority Ecosystem Component Vital Signs			
Pacific Herring ⁸	Birds		
Orcas	Local Foods ⁹		

Notes:

* Six components identified as very high priority in 2015

+ Habitat components identified by Sno-Stilly LIO that were not included in the regional PSP Vital Sign list

¹ Includes other salmonids

² Includes smaller streams, estuarine wetlands, tidal marshes, and mudflats

³ Includes stormwater

⁴ Includes all classified commercial/recreational shellfish beds

⁵ Includes wastewater discharged to sewer systems, and municipal sewage

⁶ Includes other habitat-forming submerged vegetation (bull kelp, etc.)

⁷ Includes groundwater

⁸ Includes Pacific herring, surf smelt, sand lance, and other forage fish

⁹ Includes fish, shellfish, wild game, fowl, and plants (but not farmed species/crops, which are included in the Shellfish Beds, Economic Vitality, and Cultural Wellbeing vital signs)

¹⁰ Includes shoreline access

¹¹ Includes beaches and all nature-based recreation and work

TABLE 3. SUMMARY OF HIGH PRIORITY ECOSYSTEM COMPONENTS AND GOALS

High Priority Ecosystem Component	Description of Component	Local Goals	Contributions Toward Regional Vital Sign Targets
Chinook Salmon	Chinook is the most culturally, economically, and recreationally significant salmonid in the region. Coordination with Chinook recovery work is essential to work on this component. As an ecosystem component, this is assumed by PSP to be an umbrella for all salmonids. The Sno-Stilly LIO is focused on Chinook salmon abundance as an indicator for the four Chinook populations in the LIO (Snoqualmie, Skykomish, summer-fun Stillaguamish, and fall-run Stillaguamish). Three notable examples of projects implemented to improve salmon habitat in the Snohomish River watershed are King County's Upper Carlson Floodplain Reconnection Project, Snohomish County's Smith Island Restoration Project, and the Tulalip Tribes' Qwuloolt Estuary Restoration Project. Three notable examples of habitat projects implemented in the Stillaguamish watershed are Snohomish County's North Meander Phase III Reconnection Project, the Stillaguamish Tribe's acquisition of key floodplain parcels, and The Nature Conservancy's Port Susan acquisition/restoration project.	• By 2055, Skykomish Chinook salmon abundance target is 39,000 adult spawners (range 17,000 to 51,000), based on a productivity of 1. • By 2055, Snoqualmie Chinook salmon abundance target is 25,000 adult spawners (range 17,000 to 33,000), based on a productivity of 1. • By 2055, North Fork Stillaguamish Chinook salmon abundance target (for both summer and fall runs) is 18,000 (range 18,000 to 24,000), based on a productivity of 1. • By 2055, South Fork Stillaguamish Chinook salmon abundance target (for both summer and fall runs) is 15,000 (range 15,000 to 20,000), based on a productivity of 1.	• To be developed in a future Plan update.

High Priority Ecosystem Component	Description of Component	Local Goals	Contributions Toward Regional Vital Sign Targets
Floodplains	Floodplains provide flood storage, habitat, food, and fresh water, as well as good agricultural land through soil and habitat formation. Reconnection of floodplain habitat is a key strategy for recovery as identified in both basins' salmon recovery plans. Floodplains have been a priority of the watersheds and the Washington State Legislature for the past few years. Work on floodplains also aligns with the Washington State Department of Ecology Floodplains by Design program.	To be developed in a future Plan update.	To be developed in a future Plan update.
Estuaries	Estuaries (river deltas and nearshore environments) provide important feeding and resting habitat for young salmonids, migratory birds, and many other species that cannot find these irreplaceable benefits in any other place in our landscape. Improving ecosystem health of the Snohomish and Stillaguamish River estuaries would have a large impact on Puget Sound recovery. In addition, the Sno-Stilly LIO has 2 of the 16 Puget Sound river deltas within its boundaries. As an ecosystem component, "estuaries" is assumed to be an indicator for a category that includes smaller streams, estuarine wetlands, tidal marshes, and mudflats. This ecosystem component is inextricably linked to the Chinook salmon component, as young salmon that can rear longer in delta estuaries grow faster and are more likely to survive their ocean migration.	- Stillaguamish: By 2055, provide 4,039 acres of functional estuary restoration. - Stillaguamish: By 2025, achieve 40% of this goal. - Snohomish: By 2025, provide 1,237 acres of functional estuary restoration.¹	Estuaries in the North Sound have the greatest potential to reach the 2020 Action Agenda Estuary Vital Sign target of 7,380 acres.

High Priority Ecosystem Component	Description of Component	Local Goals	Contributions Toward Regional Vital Sign Targets
Land Development and Cover	Although the watersheds are dominated by forestland in the upper reaches, development (including agriculture) has occurred and is occurring in close proximity to rivers. This development can affect temperatures in the rivers, due to the loss of vegetative cover, and increase surface water runoff (e.g., sediment or chemicals). Development has also reduced the ability to restore natural floodplain processes, which are crucial to sustainable ecosystem recovery. This Vital Sign combines two different but intertwined concepts.	• Stillaguamish: The 2055 goal for riparian acres is 8,000 acres. • Stillaguamish: The 10-year goal is 400 acres planted. • Snohomish: The 10-year goal is 256 acres of restored riparian habitat.¹	• To be developed in a future Plan update.
Summer Stream Flow	Although seasonal variation is normal, low summer flows can affect salmon runs, wildlife, and our water supply. Increasing withdrawals for irrigation and residential uses, along with past and continued filling of wetlands, draining of fields and wetlands for agriculture, and increased impervious surface areas, reduces resiliency for maintaining summer stream flows. It is clear that the ecosystem challenges presented by the 2015 drought and the accelerating issues of climate change will need to be incorporated as we develop local goals. Some of the LIO's habitat restoration efforts mentioned above are also helping to address summer stream flows.	• To be developed in a future Plan update.	• To be developed in a future Plan update.

High Priority Ecosystem Component	Description of Component	Local Goals	Contributions Toward Regional Vital Sign Targets
Freshwater Quality	Freshwater supports human quality of life as well as habitat for salmonids and other species. Improving freshwater quality will enrich fish runs in the Snohomish and Stillaguamish basins as well as regionally and protect local shellfish areas for commercial and recreational harvesting. Three key indicators help us monitor the health of Puget Sound: the number of impaired waters, the Water Quality Index, and the Benthic Index of Biotic Integrity (B-IBI). Under the federal Clean Water Act of 1972, waters that fail to meet water quality standards are considered impaired. As an ecosystem component, “freshwater quality” is assumed to be an indicator for a category that also includes stormwater concerns.	• By 2055, 100% of long-term monitoring stations on large rivers and small streams maintain flow-adjusted scores of 80 or above on the Water Quality Index. • Five-year baseline monitoring goals for temperature: commit to establishing baseline sites (not necessarily creating new sites but designating existing sites as official baseline sites) that provide sufficient data to measure compliance with 10-year and longer-term goals and determine number and location of baseline sites. • Ten-year goals for temperature: 1) Average Daily Max Goal: reduce the site-specific number of average days above 7DADMAX during the core salmonid summer critical period (June 15 to September 15) over a 10-year period 2) Lethal Temperature Limit for Salmon during the Summer Critical Period Goal: no sites above 21° C during the core salmonid summer critical period (June 15 to September 15) • 2065 goals for temperature based on TMDL: 1) Average system potential (determined by modeling) 2) Zero days above state limit	• To be developed in a future Plan update.
Shoreline Armoring	Shoreline armoring is a priority pressure, not an ecosystem component, and is further detailed in Section 3.0 of this Plan.	• To be developed in a future Plan update.	• To be developed in a future Plan update.

High Priority Ecosystem Component	Description of Component	Local Goals	Contributions Toward Regional Vital Sign Targets
Marine Water Quality	Marine waters support a multitude of fish, seabird, invertebrate, and plant species as well as the human population. Marine water quality is affected by many factors including weather and climate, inflow from rivers and streams, discharges from wastewater treatment plants and industries, offshore ocean conditions, stormwater runoff, and even groundwater. Excess pollution can force beach closures and shellfish harvesting restrictions and may cause algae blooms.	To be developed in a future Plan update.	To be developed in a future Plan update.
Shellfish Beds	Gathering shellfish is a time-honored tradition for tribes and the public, and today it is an industry that supports thousands of jobs and brings millions of dollars into the region. However, the beds are often closed due to pollution, most of which comes from fecal bacteria from humans, livestock, and pets. When fecal bacteria and other contaminants get into the water, they contaminate the areas where these prized oysters, clams, and other bivalve shellfish grow. As an ecosystem component, “shellfish beds” is intended to include all classified commercial/ recreational beds producing oysters, clams, mussels, and other shellfish.	To be developed in a future Plan update.	To be developed in a future Plan update.

High Priority Ecosystem Component	Description of Component	Local Goals	Contributions Toward Regional Vital Sign Targets
Toxics in Fish	Toxic pollutants in our waterbodies are showing up in the fish that live here, causing them to become diseased and posing a health threat to humans who consume the fish. Pollutants in the Puget Sound ecosystem include several important classes of chemicals including polychlorinated biphenyls (PCBs), polybrominated diphenyls ethers (PBDEs), polycyclic aromatic hydrocarbons (PAHs), and Endocrine Disrupting Compounds (EDCs).	To be developed in a future Plan update.	To be developed in a future Plan update.

Note:

1 These Snohomish goals are from the 2005-2015 Snohomish Salmon Plan goals; these goals will be revised during the plan update process.

3.0 KEY PRESSURES IN THE LIO

Pressures are the human actions or natural processes that cause stress on the ecosystem but also may provide benefits to humans. By understanding the pressures and the underlying sources and stressors, our LIO can better define the context within which we are working and where we need to intervene to make progress on recovery. This section provides the Sno-Stilly LIO's determination of how and why the high priority Vital Signs identified in the previous section continue to show signs of stress and degradation.

Sno-Stilly LIO Process for Identifying and Prioritizing Pressures

Sno-Stilly LIO Committee members identified high and very high priority stressors (symptoms of degradation) and their sources (human activities) that interact with the high priority Vital Signs in the Snohomish and Stillaguamish watersheds by first reviewing PSP's regional pressure assessment and refining it with input from IC members. In May 2016, the IC members reviewed the regional pressure taxonomy and regional rating with their organizations and provided feedback on the pressures that were preliminarily identified.

The regional pressure assessment was evaluated to determine where local changes should be made or where it made sense to adopt the regional assessments. In June 2016, comments from IC members were presented at an IC meeting for discussion and comment/response resolution, resulting in a consensus decision to present a revised matrix to the EC for review and a decision. The EC indicated their support for the IC-recommended matrix (presented in Table 4) of pressure sources and stressors associated to the Vital Signs. The Lead Entities (Snohomish and Stillaguamish) are using identical pressure and stressor definitions as the Sno-Stilly LIO, in an effort to align prioritization and strategies across Puget Sound. This will help reduce the impacts of these common pressures by leveraging the efforts of different recovery groups.

TABLE 4. PRIORITY PRESSURES AND THEIR RELATIONSHIP TO VITAL SIGNS AND COMPONENTS IN THE LIO

"Very High" and "High" Pressures		Interaction of Pressures With Highly Ranked Components and Vital Signs									
		Shoreline Armoring	Marine Water Quality	Shellfish Beds	Toxics in Fish	Estuaries	Chinook Salmon	Land Development & Land Cover	Floodplains	Summer Stream Flows	Freshwater Quality
A1. Conversion of land cover for residential, commercial, and industrial use	Development: Housing and Urban Areas, Commercial and Industrial Areas, Tourism and Recreation Areas	VH	H	VH	H	H	H	VH	VH	VH	
A2. Conversion of land cover for natural resource production	*Agriculture and Aquaculture: Annual and Perennial Non-Timber Crops, Wood and Pulp Plantations, Livestock Farming and Ranching			H		VH	VH	VH	VH	VH	
A3. Conversion of land cover for transportation and utilities	**Transportation and Service Corridors: Roads and Railroads, Utility and Service Lines, Shipping Lanes and Dredged Waterways	H	H	H	H	H	H	H	H	H	
C. Shoreline hardening	Natural System Modification: Freshwater Levees, Floodgates and Tidegates; Marine Levees, Floodgates and Tidegates; Freshwater Shoreline Infrastructure; Marine Shoreline Infrastructure	VH		VH		VH	VH		VH	H	
I. Derelict fishing gear	Biological Resource Use: Fishing and Harvesting Aquatic Resources					H	H				
M2. Other (not in-channel) structural barriers to water, sediment, debris flows	Natural System Modification: Freshwater Levees, Floodgates and Tidegates; Marine Levees, Floodgates and Tidegates; Freshwater Shoreline Infrastructure; Marine Shoreline Infrastructure	VH		VH		VH	VH	VH	VH	VH	VH
N. Animal harvest	Biological Resource Use: Hunting and Collecting Terrestrial Animals, Fishing and Harvesting Aquatic Resources			H			H				
R2. Displacement by non-native species	Biological Resource Use: Hunting and Collecting Terrestrial Animals, Fishing and Harvesting Aquatic Resources			H			H				
S1. Spread of disease and parasites to native species	Pollution: Domestic & Municipal Wastewater to Sewer, Domestic & Municipal Wastewater to Onsite Sewage Systems, Runoff from Residential and Commercial Lands, Agricultural & Forestry Effluents, Garbage and Solid Waste		H	VH	VH		H				
T1. Air pollution from mobile sources	**Transportation and Service Corridors: Roads and Railroads, Shipping Lanes and Dredged Waterways		H		H						
T2. Air pollution from stationary sources			H		H						
U1. Point source, persistent toxic chemicals in aquatic systems	Pollution: Domestic and Municipal Wastewater to Sewer, Industrial Wastewater		H	H	VH	H	H		H		H
U2. Non-point source, persistent toxic chemicals in aquatic systems	Pollution: Domestic and Commercial Wastewater to Onsite Sewage Systems, Runoff from residential and commercial lands, Industrial Runoff, Agriculture and Forestry Effluents, Garbage and Solid Waste, Air-borne Pollutants		VH	VH	VH	VH	VH		VH		VH
V1. Point-source, non-persistent toxic chemicals in aquatic systems	Pollution: Domestic and Municipal Wastewater to Sewer, Industrial Wastewater		VH		VH						
V2. Non-point source, non-persistent toxic chemicals in aquatic systems	Pollution: Domestic and Commercial Wastewater to Onsite Sewage Systems, Runoff from residential and commercial lands		VH	VH	VH	VH	VH		VH		VH
W. Large spills	Pollution: Oil Spills		VH	VH	VH	VH		VH			VH
X1. Point-source conventional water pollutants	Pollution: Domestic and Municipal Wastewater to Sewer, Industrial Wastewater		H	VH	H						
X2. Non-point source conventional water pollutants	Pollution: Domestic and Commercial Wastewater to Onsite Sewage Systems, Runoff from residential and commercial lands, Industrial Runoff, Agriculture and Forestry Effluents, Garbage and Solid Waste, Air-borne Pollutants		VH	VH	VH	VH	H		VH		VH
Y. Harmful algal blooms			H	H	H						
BB. Sea level rise	Pollution: Air-Borne Pollutants	VH	H	H	H	H			H		
CC. Changing ocean condition	Pollution: Air-Borne Pollutants		H	H	H	H	H				

*left off finfish and shellfish aquaculture
**left off flight paths

VH
H

Very High
High

4.0 CURRENT CONTEXT IN THE LIO

Ecosystem Recovery Context and Conceptual Models

Understanding the current context within which the LIO operates will contribute to development of a more successful Plan. We use Conceptual Models to build and illustrate a common understanding of the ecological, social, economic, cultural, technical, political, and institutional systems (context) within which the LIO is operating, and highlight the deepest concerns. (Note that the term “situation analysis” is often used to refer to a conceptual model and related description of the recovery context, but for simplicity this section will only refer to Conceptual Models.)

Sno-Stilly LIO Process for Developing Conceptual Models

Following development of the pressure matrix presented in Table 4, we documented the relationships between pressure stressors/sources and the high priority Vital Signs as an overview Conceptual Model in the Miradi program (a screenshot is shown on the next page).

During discussion of the pressure and Vital Sign relationships, committee members emphasized a desire to focus on cross-cutting opportunities—particularly on pressures that impact multiple Vital Signs—for maximum impact. In meetings during May and June 2016, the Sno-Stilly LIO IC group developed Conceptual Models examining the technical, social, political, and legacy reasons why some of these priority, cross-cutting pressures continue to affect the high priority Vital Signs in the Snohomish and Stillaguamish watersheds. These more focused Conceptual Models are presented on the following pages, after the relationship overview Conceptual Model. Each Conceptual Model also has a range of current and possible strategies and specific actions identified to specify where context is expected to change. A brief narrative description is also provided for each Conceptual Model, to summarize the Sno-Stilly LIO’s understanding of the context affecting the high priority pressure-Vital Sign relationships.

Priority Pressures and Vital Signs Overview

Snohomish-Stillaguamish LIO

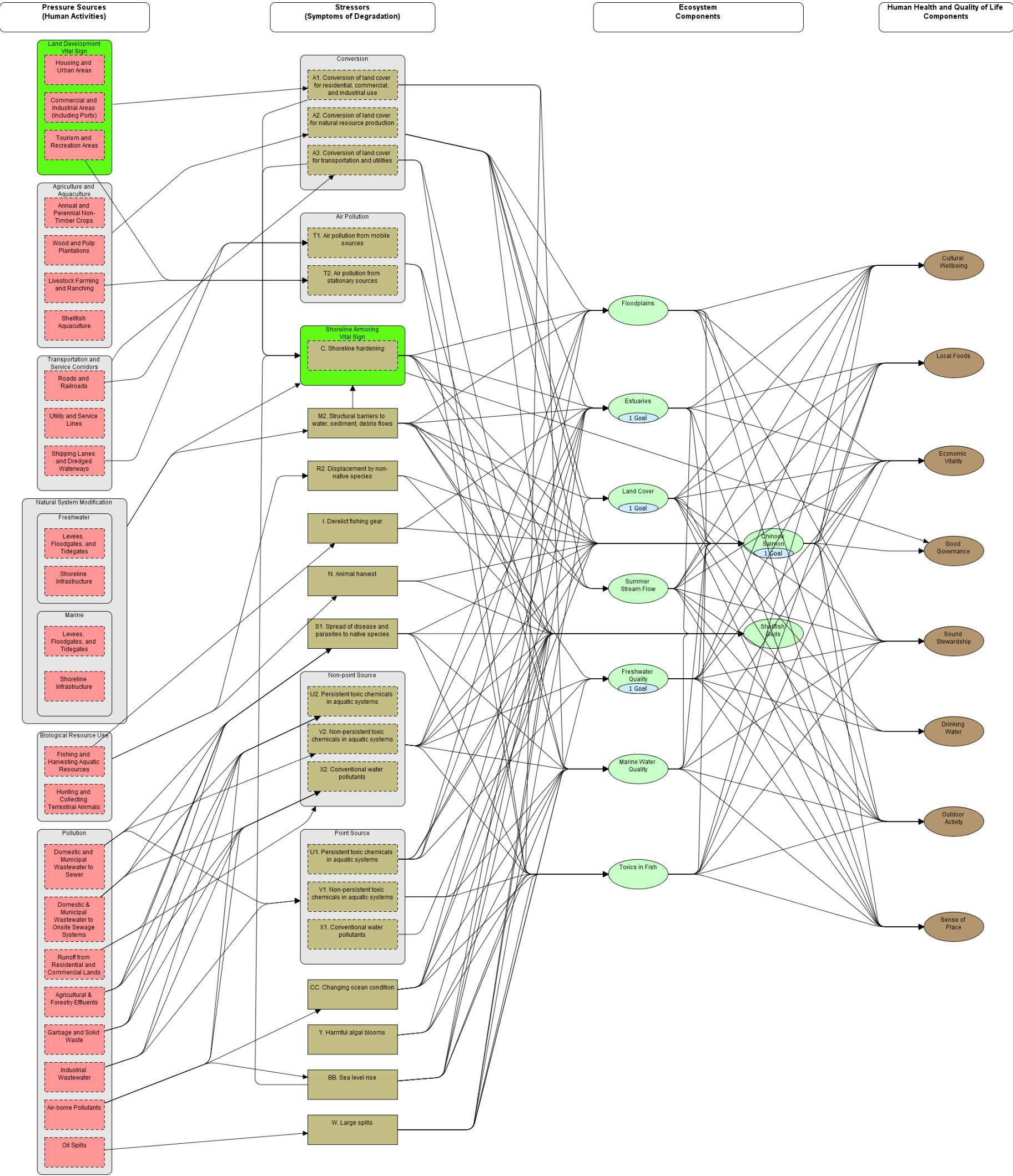


FIGURE 2. PRIORITY PRESSURES AND VITAL SIGNS OVERVIEW CONCEPTUAL MODEL

Freshwater Levees in Floodplains Conceptual Model and Recovery Context Summary

Levees and tidegates continue to degrade many ecosystem components in the Sno-Stilly LIO by encouraging shoreline hardening, altering flows, impeding vital floodplain connection and sediment delivery processes, and causing changes in water temperature. Levees remain and some are expanded because they protect developed areas of the floodplain and estuary (such as farms, railroads, and utilities) and because they are expensive to remove.

Although flooding creates farmable soils and construction of levees has caused subsidence, agriculture productivity can also depend on the protection that levees provide. However, the need for farmland protection can conflict with areas identified for salmon habitat restoration. Levees continue in their role of reducing farmland flooding, as funding needed for levee setback projects to improve habitat is often not available or cannot be accessed quickly enough to implement a restoration project.

In developed areas, residents and businesses depend on levees and tidegates to keep communities safe from floods. Market values of developed land can drive building to expand in areas that require levee protection. Where zoning allows and with supplemental best available science covering critical areas on site, floodplain managers oversee compliance with building codes intended to reduce future flood damage to buildings and infrastructure and maintain public safety.

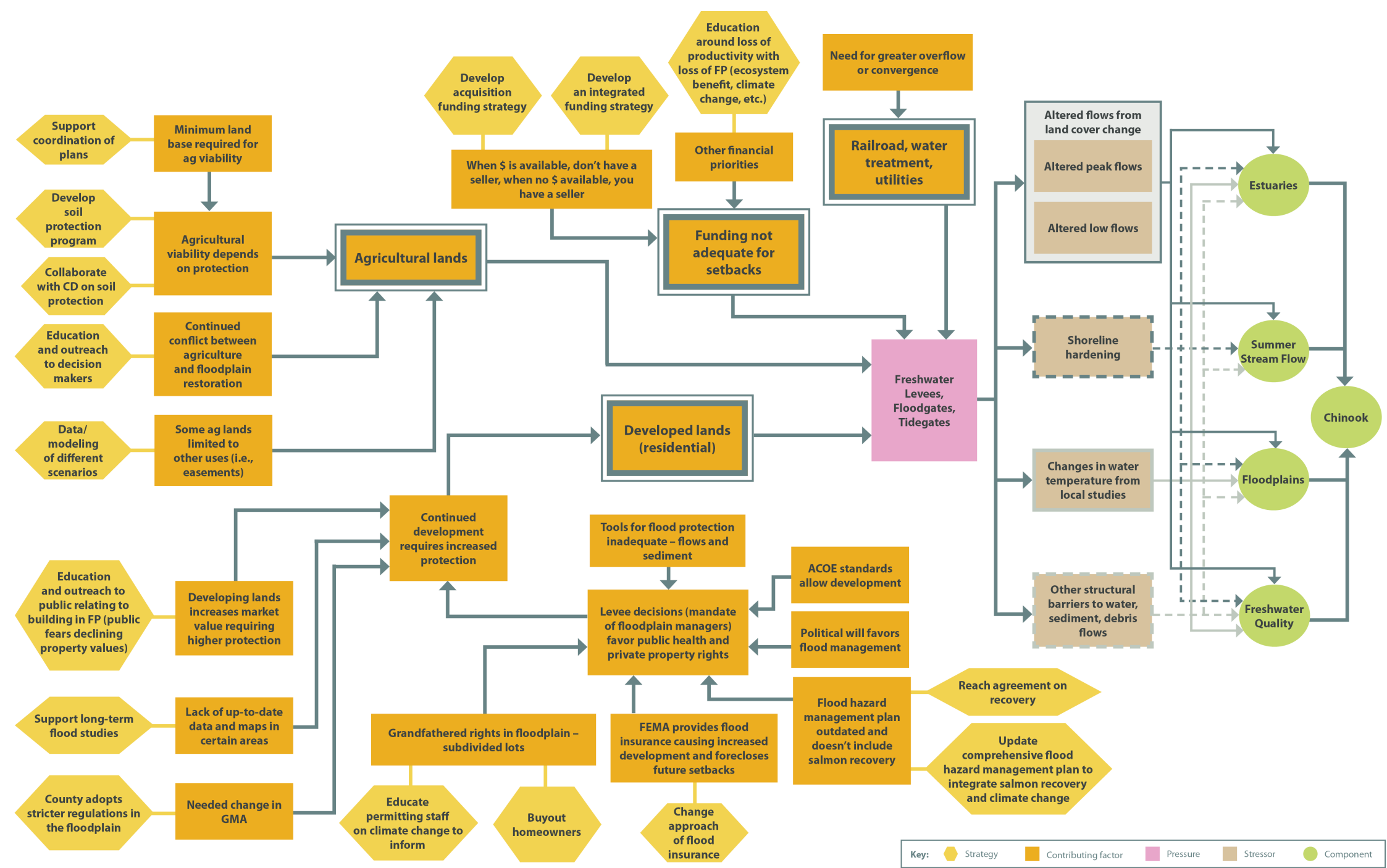


FIGURE 3. FRESHWATER LEVEES IN FLOODPLAINS CONCEPTUAL MODEL

Shoreline Armoring in the Nearshore Conceptual Model and Recovery Context Summary

Shoreline armoring alters the input, erosion, movement, and deposition of sediment along beaches, and affects other related ecosystem components. Armoring that is used to stabilize beaches and shorelines in the nearshore negatively affects these important natural shoreline processes along with numerous dependent biological ecosystem components. Waterfront development has an economic dependence on shoreline hardening, and it is allowed to protect water-dependent uses supported by the Shoreline Master Program (SMP). These include protecting piers, marinas, and other waterfront development; utilities; railroads; and single-family homes. Some of this armoring precedes the SMP, some is newer, and permitted repairs and expansions are undertaken both independently and as regulations allow.

Residents also use shoreline hardening techniques to protect homes from perceived erosion threats, including changes from sea level rise and storm surges. Residents may add shoreline armoring on their own, to protect septic systems, in response to faster flows, or other factors. Some residents do this without a permit, not knowing they need one; others do not want to go through the permit process. Still others add armoring after they have completed land clearing for development, with the intent of creating views but with the unintended consequence of destabilizing the slopes.

Enforcement capacity is often inadequate to address illegal armoring. Prosecution is limited as local governments want to work with landowners to give them the opportunity to do the right thing, and use their resources to invest in solutions. Permit staff inform residents of softshore stabilization techniques, which support the ecosystem. However, residents may have difficulties locating an installer or with the functionality of this solution for the subject property.

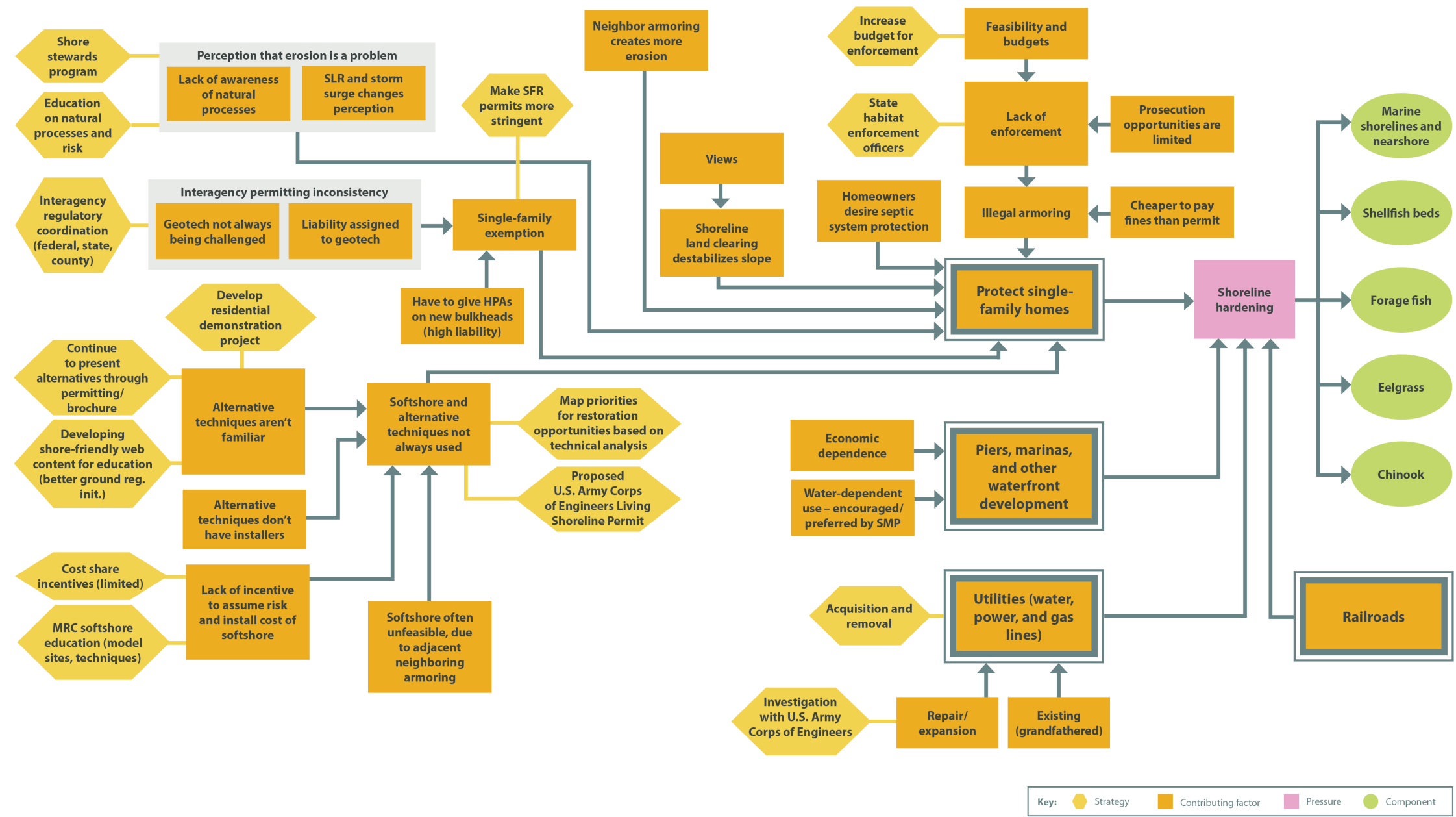


FIGURE 4. SHORELINE ARMORING IN THE NEARSHORE CONCEPTUAL MODEL

Freshwater Shoreline Armoring Conceptual Model and Recovery Context Summary

In the freshwater system, shoreline armoring can cause disconnected and degraded estuaries and floodplains, and interrupt hydrologic connections (reducing stream flow). Many of the factors associated with shoreline armoring in the nearshore (detailed on the previous page) also apply to the freshwater system.

To the detriment of salmon habitat, shoreline armoring continues to be used along rivers and lakes to protect residential, commercial, and industrial property, railroads and utilities, roads, bridges, and farmland. Bridges in Snohomish and Stillaguamish watersheds face problems related to river channel migration and erosion, and undersized (old style) footings. Funding for replacing or retrofitting bridges is limited. Residents living on the rivers are using shoreline hardening to protect structures and septic fields and to address flows that have increased due to neighboring armoring, areas without riparian buffers, and the changing climate.

Agricultural land has historically been protected by public and private levees and armoring, and is often lacking natural riparian buffers. Changing existing agricultural shoreline conditions to those with natural riparian buffers is complicated by traditional ways of farming, few changes that would trigger requirements, and limited incentives for change.

Shoreline bank armoring continues to be installed both legally and illegally in areas where erosion is a real or perceived risk. This armoring often leads to the need for more armoring up and downstream as the hardening of shorelines changes river dynamics. This occurs contrary to the stated goals of shoreline armoring removal for salmon habitat restoration.

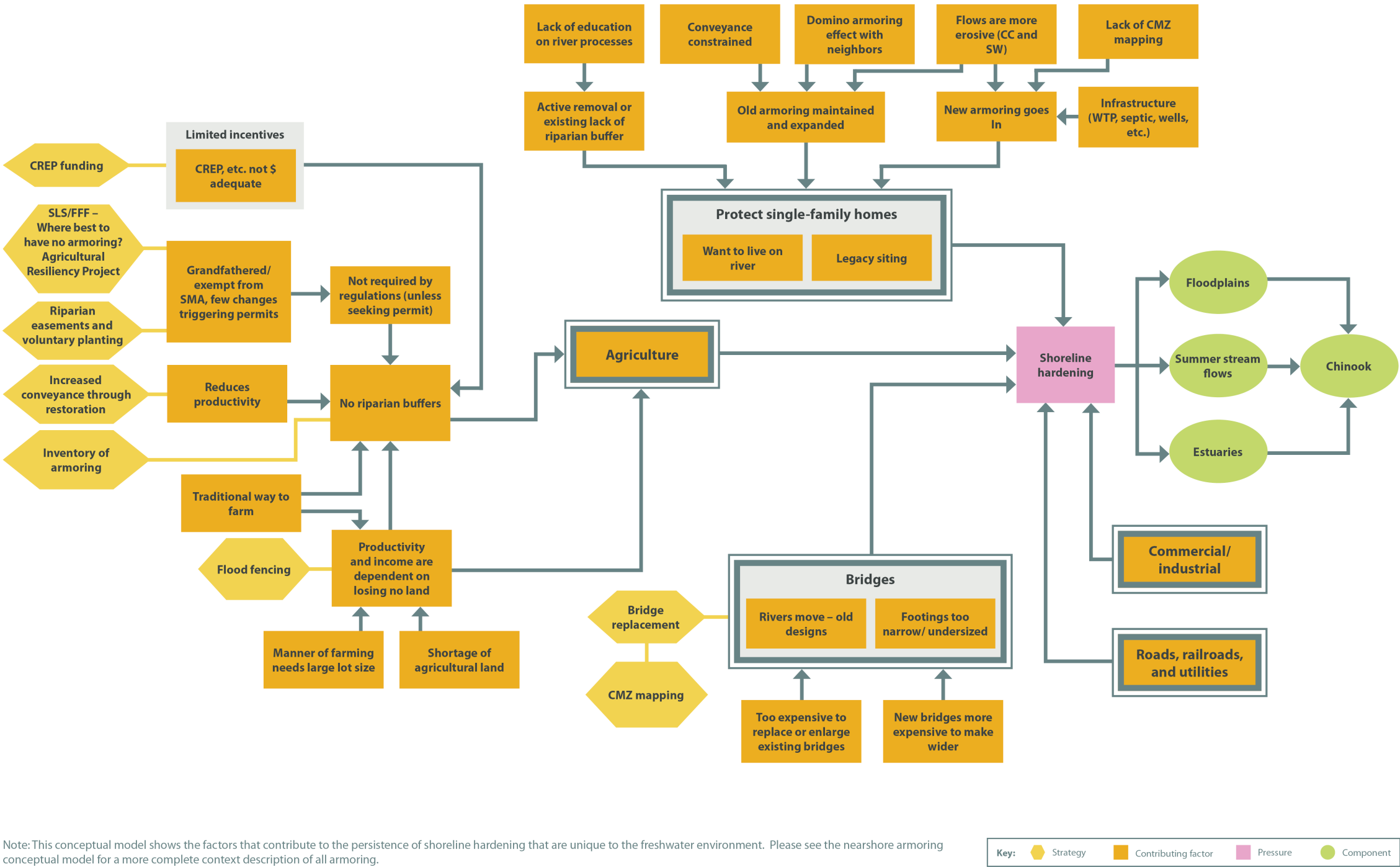


FIGURE 5. FRESHWATER SHORELINE ARMORING CONCEPTUAL MODEL

Development Conversion Conceptual Model and Recovery Context Summary

Within Snohomish County, most development and land conversion is happening in the southwest portion of the County, in the Lake Washington sub-basins. More than 85% of growth in the County occurs inside urban growth areas (UGAs), consistent with Growth Management Act (GMA) goals and regional planning requirements. Growth outside of the UGA in rural and resource areas is also consistent with GMA goals and regional planning requirements.

A portion of the development in agricultural areas is often in river floodplains to support or improve the existing farms. This includes agriculture accessory structures, utility and road installations, repairs, or maintenance. Occasionally a farm house will be constructed or rebuilt. Where development occurs in rural and resource areas in compliance with permit requirements, landowners and the landscapes alike can benefit from increased alignment of federal, state, and local (county or city) regulations. Improving the clarity of regulations and streamlining requirements will help the landowner/developer build in a manner that reduces the negative impacts to the environment. One complication is that the lag time in the application of various regulations makes the cumulative impacts of the regulations difficult to assess. Another is the lack of widespread integrated planning on where conversions could likely have the most impact in the future, including data such as climate change and agricultural viability information.

The lack of restoration back to natural conditions in agricultural areas is largely because people are still using the area for active farm-related purposes or planning to return it to those uses. Overall, the average farmer is now in his or her late 50s. Some farmers would like to keep their land in agricultural production for future generations and are seeking options to reach that goal. For those farmers, our community would benefit from stronger farmland preservation incentives and programs. Other farmers will prefer to secure their retirement by selling their farm. The Sustainable Lands strategy is used to restore habitat and protect agricultural lands. This is intended to meet the County's dual responsibilities to protect agricultural land and habitat under GMA as well as meet the County's need to restore threatened salmon species under ESA.

Development that occurs in rural and resource areas without observing permit requirements is subject to code enforcement, when complaints are registered with the County. The number of code enforcement officers to follow up on these complaints for the size of the jurisdiction is quite limited. Funding for an increased number of staff to address code enforcement complaints would improve efficiency in following up and reconciling these issues.

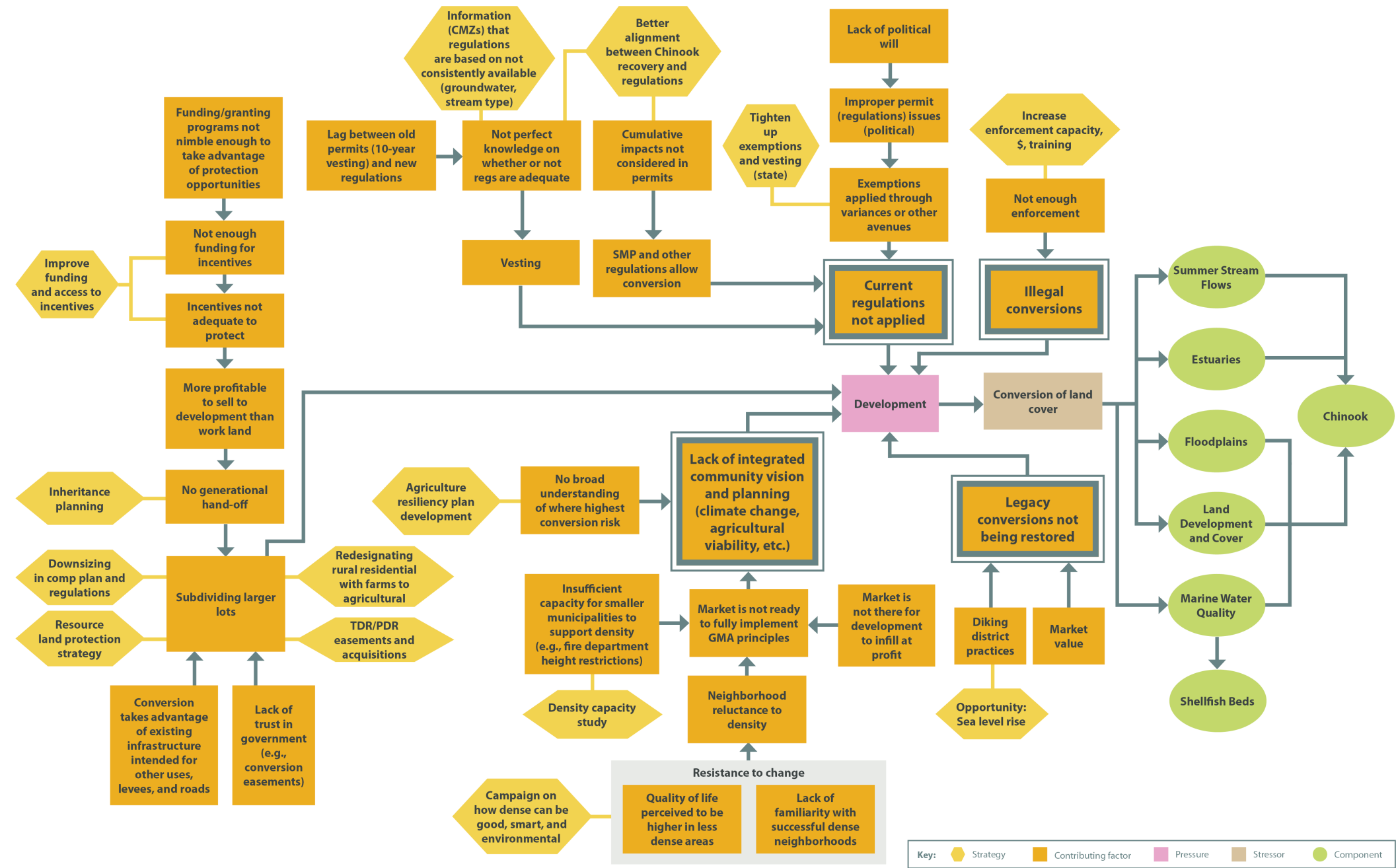


FIGURE 6. DEVELOPMENT CONVERSION CONCEPTUAL MODEL

Stormwater Non-Point Source Pollution Conceptual Model and Recovery Context Summary

Non-point source pollution, carried by stormwater runoff over and through the ground, has a variety of harmful impacts on water quality, fish, shellfish, and human health. In the Sno-Stilly LIO, the sources, types, and scale of non-point source pollutants and chemicals in stormwater are not entirely understood and are not easy to address. Some of the sources include urban and suburban residences, rural residential and agricultural areas, commercial and industrial properties, septic systems, and impervious surfaces in municipal areas.

Contributing factors in urban residential areas are a lack of understanding of the non-point source pollution problems and alternatives that might be available, and the social pressure to maintain green landscapes, as well as a lack of easily accessible alternatives to certain common but environmentally harmful products. In rural residential areas, contributing factors can include improper animal waste management, certain farm practices, and septic systems that are not properly maintained or sized. Commercial agriculture (dairies, beef cattle farms, horse stables, and other kinds of animal handling facilities) are also a significant source of bacterial and nutrient pollution.

On other commercial and industrial properties, landscaping chemical and nutrient runoff can be a similar contributing factor as in residential areas, but dumpster runoff and impervious surfaces in parking lots also contribute. Municipal impervious surfaces are problematic because there is a lack of healthy soils to filter stormwater and runoff emanating from a high volume of vehicle traffic. Some older and outdated stormwater treatment systems, along with altered urban stream structures, focus on conveying water quickly downstream instead of treating pollutants through infiltration, and may not address all modern pollutants of concern, such as pharmaceuticals.

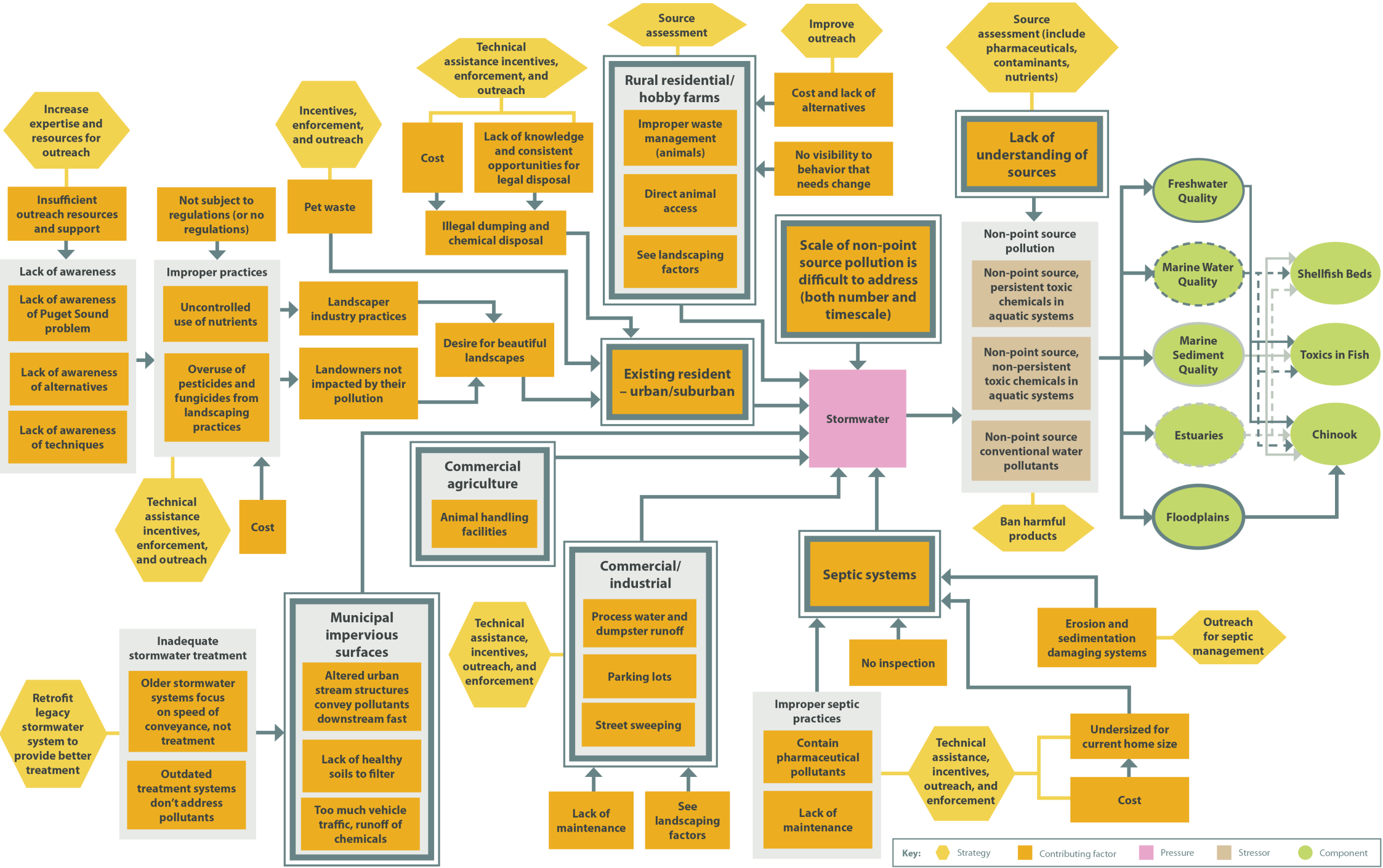


FIGURE 7. STORMWATER NON-POINT SOURCE POLLUTION CONCEPTUAL MODEL

Summer Stream Flows Conceptual Model and Recovery Context Summary

There are two primary human activities affecting summer stream flows:

- Commercial and residential development, which is resulting in altered flow patterns
- Direct water withdrawals

Commercial and residential development results in conversion of natural soil cover to impervious surfaces. For new and legacy development, there is not a strong scientific understanding about the cumulative effects of conversions and natural soil loss on low summer flows. Although new stormwater regulations require all water be stored on site, new impervious surfaces are still allowed, such as parking lots. Other impacts may arise from existing long-standing developments (prior to environmental regulations) as well as more recent developments vested under older critical area regulations. Legacy development did not always promote hydrological connections and on-site storage and infiltration. There are few incentives to replace these legacy issues with infrastructure such as permeable pavement.

Both legal and illegal water withdrawals are occurring in the Snohomish and Stillaguamish basins. There is limited enforcement for illegal withdrawals. Legal withdrawals are not being limited, even though many of the Washington State Department of Ecology (Ecology) instream flow rules are not being met. Exempt wells are still legal, regardless of summer stream flow levels, as they are politically difficult to limit and there is not good data or modeling that links the continued exempt well expansion to depressed low flows.

The interaction of groundwater resources needs to be considered in the Sno-Stilly LIO’s future work to address summer stream flows.

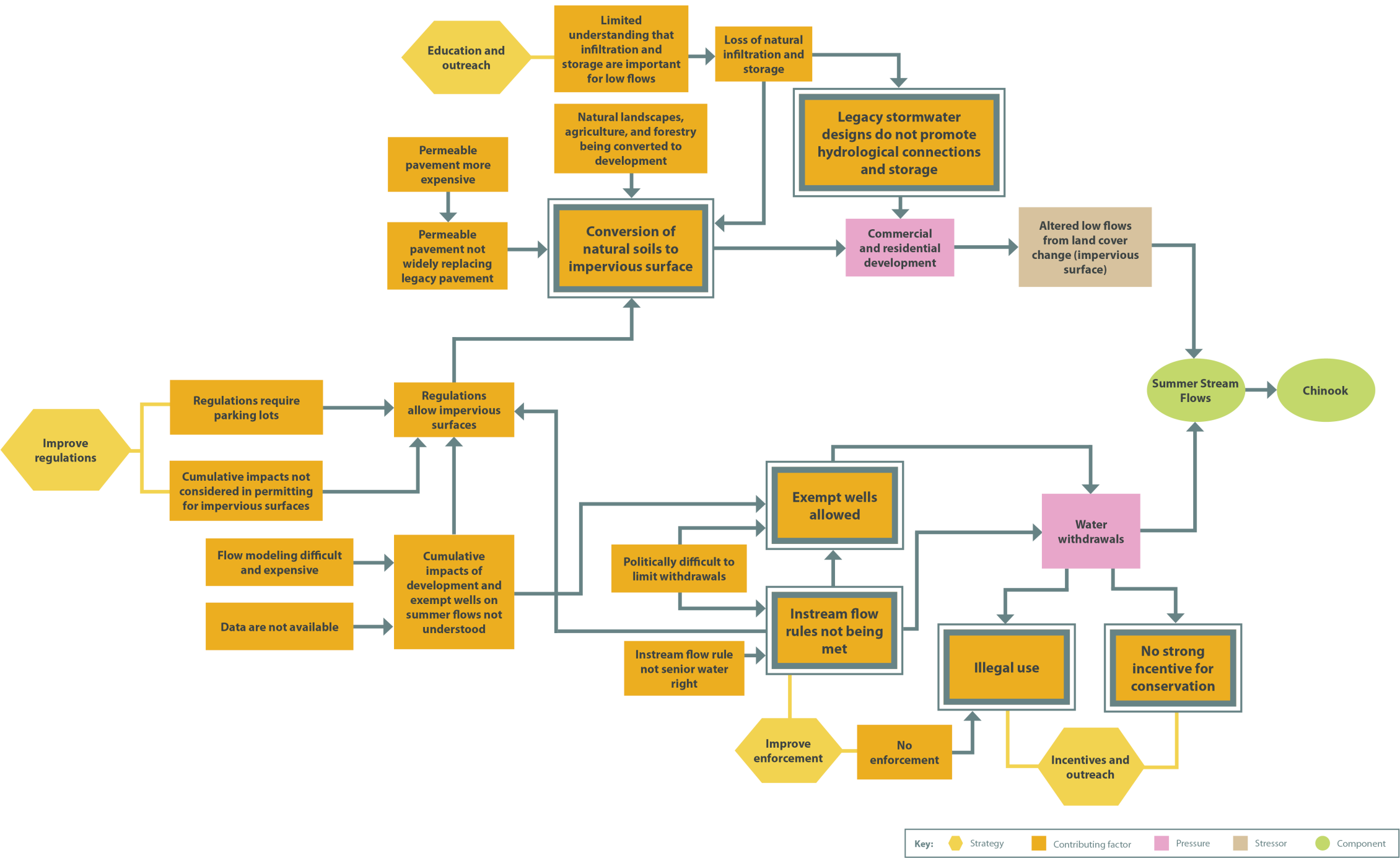


FIGURE 8. SUMMER STREAM FLOWS CONCEPTUAL MODEL

5.0 STRATEGIES AND ACTIONS

After the LIO described the natural, social, and political environment in which they are operating and what they want to achieve, they next considered the types of actions that need to occur. Good strategic planning involves determining where and how the LIO will take action—as well as where the LIO will not take action. To document and test assumptions about how specific strategies and actions are intended to effect change in the ecosystem, the LIO developed theories of change associated with specific strategies or suites of strategies in the form of results chains. Results chains help to build shared understanding of the context within which local recovery occurs. They help the LIO illustrate the logic behind recovery strategies to hypothesize if recovery efforts are likely to achieve near-term objectives and longer-term goals. Results chains also provide a structure for assessing the effectiveness of specific actions and for redirecting efforts if a specific action is determined to be ineffective. In addition, the LIO can use the results chains to identify how future development of local NTAs for the Puget Sound Action Agenda align with regional priorities.

Sno-Stilly LIO Process for Identifying Strategies

As a part of the Conceptual Model development, ongoing and potential future actions and strategies were identified. In late June 2016, IC members were asked to review the resulting list of strategies with their organizations and provide feedback and prioritization based on the following criteria:

- **Potential Impact** – the degree to which the strategy (if implemented) will lead to desired changes in the LIO, via pressure reduction and/or Vital Sign improvement
- **Feasibility** – the degree to which the LIO could implement the strategy within likely time, financial, technical, and other constraints
- **Readiness for Implementation** – the degree to which the social and/or political context is ripe for successful implementation of the strategy

Comments from IC members were compiled and scores were averaged. The feedback and prioritization data were discussed by the IC, resulting in refinements to weight the “Potential Impact” criteria greater than the “Feasibility” and “Readiness for Implementation” criteria. Using the initial prioritization results, IC members came to consensus on strategies that were bundles of actions intended to provide cross-cutting opportunities to improve multiple Vital Signs. The strategies were consolidated where possible and/or necessary and are intended to support the first round of actions associated with the 2016 Action Agenda and associated NTA funding. The IC and EC members further refined the strategies in July and August of 2016.

More strategy recommendations are expected to emerge in future rounds of strategic planning, as successes are realized from current work and other pressures are addressed. The strategies included in this Plan represent a broad planning-level approach and may become more targeted when addressed to specific projects. Strategies are summarized in Table 5, followed by results chains that depict the logic and theories of change behind the Sno-Stilly LIO recovery strategies.

Some of the strategies included in this Plan were evaluated as lower for feasibility but higher for potential impact by the Sno-Stilly LIO. They are included in this Plan in order to highlight where regional assistance may be necessary in addition to the LIO’s expected contributions to ecosystem recovery.

TABLE 5. SUMMARY OF SNO-STILLY LIO STRATEGIES

ID*	Recovery Strategy	Description	Notes/Comments
SSLIO 01.1	Nearshore protection	Develop and implement nearshore protection actions to minimize new shoreline armoring, including educating homeowners on ecological services and risks, strengthening the permit requirements for single-family residences, improving enforcement (capacity and consistency), and improving regulatory consistency and alignment.	Numerous suggestions in this strategy are already in progress, and there are a few 2016 NTAs also shown on the results chain. Strengthening permits and improving/aligning regulations would require a change in state law. Special attention will be paid to climate impacts and potential sea level rise when designing actions to align with this strategy.
Notable related 2016 Action Agenda sub-strategies: AA8.2 – Support local governments to adopt and implement plans, regulations, and policies that protect the marine nearshore and estuaries, and incorporate climate change forecasts, AA16.1 – Permanently protect priority nearshore physical and ecological processes and habitat, including shorelines, migratory corridors, and vegetation, particularly in sensitive areas such as eelgrass beds and bluff backed beaches, and AA26.2 – Collaboratively develop and promote science-based targeted communications and behavior change strategies across the region			
SSLIO 01.2	Nearshore restoration	Develop and implement nearshore restoration to reduce shoreline armoring, including mapping high priority opportunities; educating homeowners on ecological services and erosion risks; developing and implementing softshore protection techniques; and, where possible, removing, relocating, or redesigning infrastructure (bridges, roads, and utilities) that requires shoreline hardening.	This strategy includes actions to remove, relocate, or redesign infrastructure that were ranked lower for feasibility but higher for impact, to highlight needed regional assistance. This infrastructure work is not currently shown on the results chain. It is currently unclear whether there is enough illegal armoring to justify an enforcement capacity increase, but that effort would be anticipated to require regional assistance. Changing the regional culture of the nearshore is linked to success with this strategy. Special attention will be paid to climate impacts and potential sea level rise when designing actions to align with this strategy.
Notable related 2016 Action Agenda sub-strategies: AA8.3 – Improve, strengthen, streamline nearshore & marine implementation & enforcement, AA16.2 – Improve, strengthen and streamline nearshore and marine implementation and enforcement, and AA16.3 – Remove armoring, and use soft armoring replacement or landward setbacks when armoring fails, needs repair, is non protective, and during redevelopment			

ID*	Recovery Strategy	Description	Notes/Comments
SSLIO 02.1	Integrated planning	Develop integrated planning for multi-benefits across land uses (agriculture, flood risk, and habitat) to include future projections (e.g., climate change and growth) and resiliency planning.	This effort will need to be linked to the ongoing processes that support land use planning. Currently, regulatory updates are separate from ecosystem recovery efforts.
Notable related 2016 Action Agenda sub-strategies: AA1.1 – Identify and prioritize areas for protection, restoration, and best suitable for (low impact) development, AA11.1 – Target voluntary and incentive-based programs that help working farms contribute to Puget Sound recovery, AA5.3 – Protect & maintain intact & functional floodplains, and AA5.4 – Implement & maintain priority floodplain restoration projects			
SSLIO 03.1	Improve funding for restoration	Develop an integrated funding strategy for large capital levee setback or removal projects.	No 2016 NTAs were identified for this strategy, but it is included in this Plan because the Sno-Stilly LIO evaluated the strategy as lower for local feasibility but higher for potential impact. The strategy’s inclusion in this Plan is intended to highlight where regional assistance may be necessary in addition to the LIO’s expected contributions to ecosystem recovery.
There were no 2016 Action Agenda sub-strategies specifically focused on funding; however, it was an early result in many of the logic models.			
SSLIO 04.1	Outreach for stormwater stewardship	Implement an outreach campaign—building on existing outreach efforts—to change behaviors of residential and commercial/industrial property owners related to the products they use and the manner in which they dispose of them, and to improve stormwater management practices to reduce non-point source pollution.	This strategy should proceed alongside Strategies 05.1, 06.1, and 07.1.
Notable related 2016 Action Agenda sub-strategy: AA10.5 – Provide focused stormwater-related education, training, and assistance			

ID*	Recovery Strategy	Description	Notes/Comments
SSLIO 05.1	Non-point source assessment and product stewardship	Investigate non-point source contaminants and sources, provide corrective measures where possible, and implement product stewardship (e.g., pharmaceuticals and fertilizers) management strategies.	This strategy should proceed alongside Strategies 04.1, 06.1, and 07.1. This strategy includes product stewardship actions and coordination with manufacturing and retail that were ranked by the Sno-Stilly LIO as lower for feasibility but higher for impact, to highlight needed regional assistance. Notable related 2016 Action Agenda sub-strategies: AA10.4 – Control sources of pollutants, AA11.2 – Ensure compliance with regulatory programs designed to reduce, control, or eliminate pollution from working farms, AA21.4 – Develop and implement local and tribal pollution identification and correction (PIC) programs, and AA27.1 – Implement a long-term, highly visible, coordinated public-awareness effort using the Puget Sound Starts Here brand
SSLIO 06.1	Stormwater retrofit and LID	Retrofit legacy stormwater systems for better treatment and infiltration.	This strategy should proceed alongside Strategies 04.1, 05.1, and 07.1. Notable related 2016 Action Agenda sub-strategy: AA10.3 – Fix problems caused by existing development (structural upgrades, regular and enhanced maintenance)
SSLIO 07.1	On-site sewage system management	Provide outreach, technical assistance, incentives, and enforcement for improved on-site septic system management.	This strategy should proceed alongside Strategies 04.1, 05.1, and 06.1. This strategy will also need to rely on technical assistance, outreach, and funding, which are not shown on this results chain but can be cross-referenced to the related stormwater strategies. Many on-site sewage system problems will be very difficult for individuals, especially in low-income populations, to fix without financial assistance. Notable related 2016 Action Agenda sub-strategies: AA13.1 – Effectively manage & control pollution from small OSS, AA13.2 – Effectively manage & control pollution from large OSS, and AA13.3 – Improve and expand funding for small OSS and local OSS programs

ID*	Recovery Strategy	Description	Notes/Comments
SSLIO 08.1	Implementation of GMA recognizing Puget Sound recovery goals	Increase support for a regionally consistent high standard for local interpretation and implementation of the GMA, including mapping where increased density would be more appropriate and reducing inappropriate conversion from development. Strategy actions include a funding, outreach, and assistance package; mitigation where needed; changes to the Comprehensive Plan designations and associated zoning regulations that guide permitting; improved enforcement capacity, funding, and training; and an outreach campaign to appropriate communities to increase demand for directed density.	This strategy should proceed alongside Strategies 02.1 and 09.1. This strategy also connects to the analysis provided in the <i>Death by a Thousand Cuts</i> report (Gray et al. 2016) and a recent briefing document for regulatory harmonization (Tulalip Tribes 2016). Planning for an increasing population while protecting natural resources includes actions ranked by the Sno-Stilly LIO as lower for feasibility but higher for impact, to highlight needed regional assistance.
Notable related 2016 Action Agenda sub-strategies: AA4.2 – Provide infrastructure and incentives to accommodate new and re-development within urban growth areas			
SSLIO 09.1	Stream flow protection	Develop a stream flow protection strategy to better define the relationship between land use, withdrawals, and summer flows; and provide protection to improve low flows.	This strategy also relates to the recent planning work in the <i>Snohomish Basin Protection Plan</i> (Snohomish County Surface Water Management et al. 2015). Special attention will be paid to climate impacts.
Notable related 2016 Action Agenda sub-strategies: AA1.2 – Support local governments to adopt and implement plans, regulations, and policies consistent with protection and recovery targets, and incorporate climate change forecasts, and AA7.1 – Update instream flow rules to encourage conservation			
SSLIO 10.1	Freshwater and estuarine protection	Develop and implement freshwater and estuarine protection to minimize new armoring and levees, including updating regulations to incorporate salmon recovery, improving regulatory consistency and alignment, educating homeowners on ecological services and risks, and providing outreach around the benefit of floodplain ecosystems.	This strategy also relates to Salmon Recovery planning work and the recent analysis provided in the Multiscale Impacts of Armoring on Salish Sea Shorelines article (Dethier et al. 2016). Special attention will be paid to climate impacts and potential sea level rise when designing actions to align with this strategy.
Notable related 2016 Action Agenda sub-strategies: AA1.2 – Support local governments to adopt and implement plans, regulations, and policies consistent with protection and recovery targets, and incorporate climate change forecasts, and AA5.3 – Protect & maintain intact & functional floodplain			

ID*	Recovery Strategy	Description	Notes/Comments
SSLIO 10.2	Freshwater and estuarine restoration	Develop and implement freshwater and estuarine restoration to reduce armoring and levees, including mapping restoration opportunities; educating homeowners on ecological services and risks; developing and implementing softshore protection techniques; providing incentives in the riparian zone; and, where possible, removing, relocating, or redesigning infrastructure (bridges, roads, and utilities) that requires shoreline hardening.	This strategy also relates to Salmon Recovery planning work and the recent analysis provided in the Multiscale Impacts of Armoring on Salish Sea Shorelines article (Dethier et al. 2016). This strategy includes actions to remove, relocate, or redesign infrastructure that were ranked by the Sno-Stilly LIO as lower for feasibility but higher for impact, to highlight needed regional assistance. This infrastructure work is not currently shown on the results chain. Special attention will be paid to climate impacts and potential sea level rise when designing actions to align with this strategy.
Notable related 2016 Action Agenda sub-strategies: AA1.1 – Identify and prioritize areas for protection, restoration, and best suitable for (low impact) development, AA5.4 – Implement & maintain priority floodplain restoration projects, and AA6.1 – Implement high priority projects identified in each salmon recovery watershed’s 3-year work plan			

* ID indicates the source of the strategy, if applicable: Action Agenda substrategy, Chinook strategy, or LIO-proposed strategy. The order and numbering of the strategies is for organizational purposes and does not represent priority or rank.

Theories of Change and Results Chains

This section describes theories of change documenting our assumptions about how strategies and actions are intended to help reduce pressures and achieve the LIO's ecosystem and human wellbeing recovery goals. Results chains are included to illustrate the cause-and-effect relationships, linking action implementation to desired intermediate and long-term results.

Strategies 01.1 and 01.2: Nearshore Protection and Restoration

The goal of these two strategies is to reduce shoreline armoring and increase use of softshore protection techniques in the nearshore. Numerous suggestions in this strategy are already in progress, and there are also 2016 NTAs shown on the results chain. Initially, a GIS analysis would be used to identify and map areas that currently have intact function. This information, cross-referenced with existing permits, should reveal paths for protection and restoration.

For protection paths, outreach and education can increase the number of property owners who understand the value of protecting natural functions on their property and make decisions that support these natural functions. In some cases, that protection may be secured through regulations by strengthening and enforcing permitting requirements for shoreline development activities. In other cases, protection may be secured through softshore armoring. Under this scenario, a target audience would need to be identified, qualified installers secured, and incentives and technical assistance made available. A demonstration project may also help encourage landowners to choose and implement softshore approaches over either new (or replacement) traditional bulkheads.

The restoration path involves addressing illegal armoring through improved enforcement capacity and consistency. The second restoration path focuses on successfully implementing restoration projects in already-identified priority restoration areas.

The overall nearshore protection and restoration strategy will allow for protection of current intact function and the lower-impact shoreline infrastructure through the installation of softshore techniques and the restoration of degraded areas. This, in turn, would reduce the overall impact of shoreline infrastructure and improve habitat connectivity and complexity, which supports Chinook salmon and shellfish components.

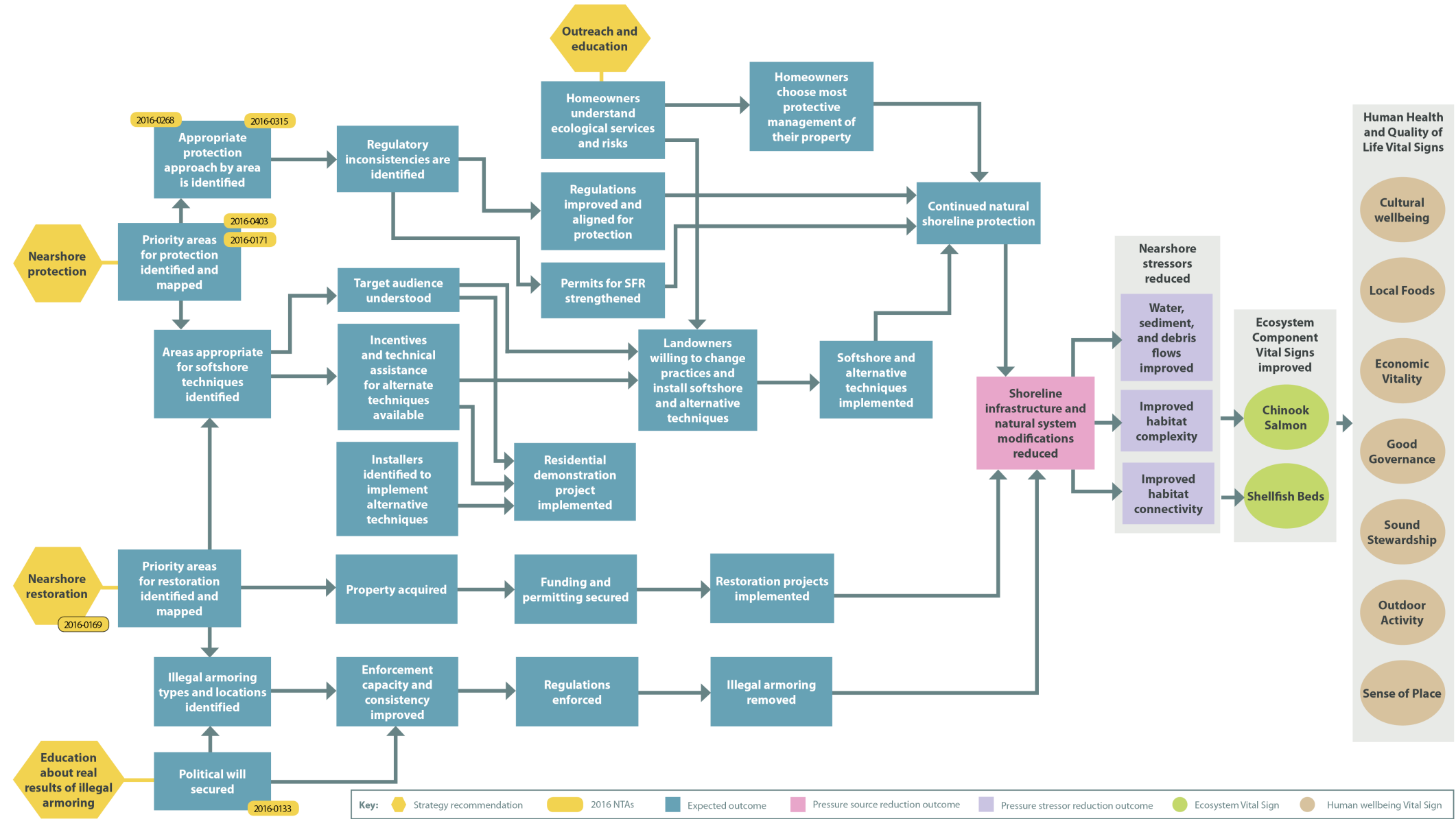


FIGURE 9. NEARSHORE PROTECTION AND RESTORATION STRATEGIES RESULTS CHAIN

NTA ID	NTA Owner/Title	NTA Short Description
2016-0403	Snohomish County: Shoreline Inventory	Supplement the inventory and analysis of shoreline conditions in Snohomish County.
2016-0171	Snohomish County MRC: Marine Resources Committee, Port Susan	Reduce and prevent new construction of shoreline armoring in the Port Susan Marine Stewardship Area. Target communication with landowners of priority sites for armor removal, protection, and restoration.
2016-0315	WSU Extension: Model Volunteer Program for Oil Spill Response/Assessment	Create and implement a community-based oil spill assessment and response effort that will serve as a model for other regions. Expand nearshore benthic/intertidal citizen science data collection and quality.
2016-0133	Sound Salmon Solutions: Watershed Education for Decision Makers, Stillaguamish Basin	Increase the awareness and involvement of local decision-makers in local environmental issues, especially related to water quality, stormwater, shellfish protection, and salmon recovery. <i>Note this NTA is also shown on Strategies 08.1: Implementation of GMA Recognizing Puget Sound Recovery Goals and 10.1 and 10.2: Freshwater Protection and Restoration</i>
2016-0169	Snohomish County MRC: Marine Resources Committee, Snohomish Estuary Cleanup	Restore estuarine and nearshore habitats. Remove derelict vessels and creosote to improve habitat in the Snohomish Estuary for a number of species, including Chinook salmon.
2016-0268	Expand Conservation District Shoreline Technical Assistance in Puget Sound	Establish a network of conservation district programs to collaborate with shoreline landowners and promote naturally functioning marine shorelines using outreach, technical assistance, site assessments, design, and cost-share for restoration and protection projects.

Strategy 02.1: Integrated Planning

The goal of this strategy is to develop reach-scale integrated planning across land uses (agriculture, flood risk, and habitat) to incorporate future projections (e.g., climate change and growth) and resiliency planning. This effort will need to be linked to the ongoing processes that support land use planning, because regulatory updates are currently separate from ecosystem recovery efforts. This strategy will confirm that productive agriculture will be protected and communities will be safe from floods.

In the integrated planning strategy, parties must first be willing to come to the table, benefits and challenges must be identified and communicated, and data for various land uses must be made available. These enabling conditions will allow development of strategic approaches for meeting community needs and goals. For agriculture, this may include land base needs, drainage and flood protection assurances, and an ongoing voice in planning processes. For developed areas, strategic plans could include better growth planning and flood protections for homes, businesses, and critical infrastructure. Finally, the ecosystem recovery community and tribes will likely look to existing salmon recovery plans that identify the most critical areas to restore through levee setback and riparian zone planting for fish.

Once each community's needs are transparent and better understood, local communities can work to define an integrated approach. With these agreements, projects will be implemented in lands that are identified as being the most appropriate and yield the biggest gains for the investment. Finally, monitoring, feedback, and conversations with each land use community will inform changes in iterative plans to ensure that all parties continue to meet their goals. The result of integrated planning will be a decreased impact from development and agriculture through the reduction of shoreline armoring and levees, resulting in an improvement in floodplains, estuaries, land cover, salmon, summer stream flows, and freshwater quality.

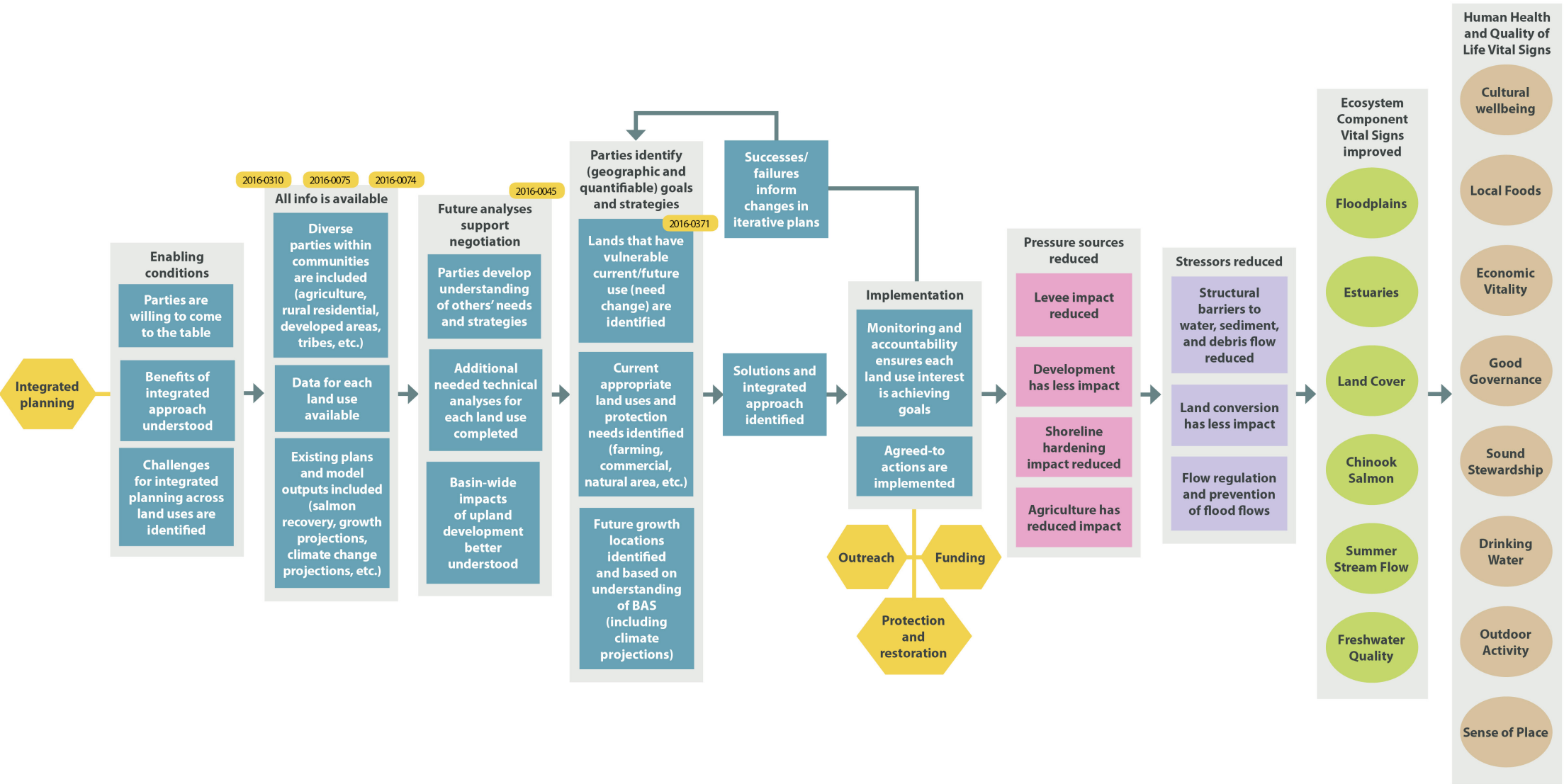


FIGURE 10. INTEGRATED PLANNING STRATEGY RESULTS CHAIN

NTA ID	NTA Owner/Title	NTA Short Description
2016-0310	Snohomish County: Integrated Floodplain Management	Facilitate the implementation of multiple-benefit floodplain restoration and protection projects in the Snohomish and Stillaguamish basins by increasing cooperation and coordination among fish, farm, and flood control stakeholders.
2016-0075	Snohomish CD: Snohomish County Climate Resilient Agriculture Strategy	Develop an agriculture strategy for Snohomish County that incorporates climate change projections into a plan for a resilient, economically viable, and community-sustaining agricultural industry into the future.
2016-0074	Snohomish CD: Climate Resiliency in Snohomish River Floodplain	Develop climate-resilient approaches to achieving net benefits to agriculture and salmon habitat in the Snohomish River floodplain.
2016-0045	King County: Balancing Fish, Farms, and Floods in King County's Snoqualmie Watershed	Implement a buffer task force initiative to provide a riparian buffer strategy that balances salmon recovery with agricultural viability, and develop a long-term strategy for agricultural land management in the Snoqualmie Agricultural Production District.
2016-0371	Retention of Agricultural Lands at Risk of Conversion in Puget Sound	Identify the projected risk of agricultural land conversion to nonagricultural uses using the Washington State Parcel Database developed by the University of Washington School of Environmental and Forest Sciences.

Strategy 03.1: Improve Funding for Restoration

The primary goal of this strategy is to develop an integrated approach to funding for large capital levee setback or removal projects. No 2016 NTAs were relevant to this strategy, but it is included in this Plan because the Sno-Stilly LIO evaluated the strategy as lower for local feasibility but higher for potential impact. The strategy’s inclusion in this Plan is intended to highlight where regional assistance may be necessary in addition to the LIO’s expected contributions to ecosystem recovery.

In a successful funding strategy for Sno-Stilly LIO restoration projects and other efforts related to ecosystem recovery, the first set of outcomes that would need to be attained are controlled at the regional level. These include more consistently available funding with minimum of 5-year funding windows. Additionally, regional policies around funding would need to change, resulting in funding, administration, and regulatory coordination; allowances for projects that demonstrate multi-benefits; and improved nimbleness of funding. The ongoing investments made by LIO stakeholders should be also better presented to justify increased state and federal funding.

If regional funding mechanisms were improved, then the LIO could expect that regional sources would be identified for each local project and local sources could be more effectively understood and used. If these two results were in place, the LIO might next see members having an easier time accessing funding and that funding would be easily justifiable because strategic plan priorities are clear. That would result in funding being secured and projects implemented.

Monitoring of projects will allow for adaptive management of the strategic plan, thereby improving implementation over time.

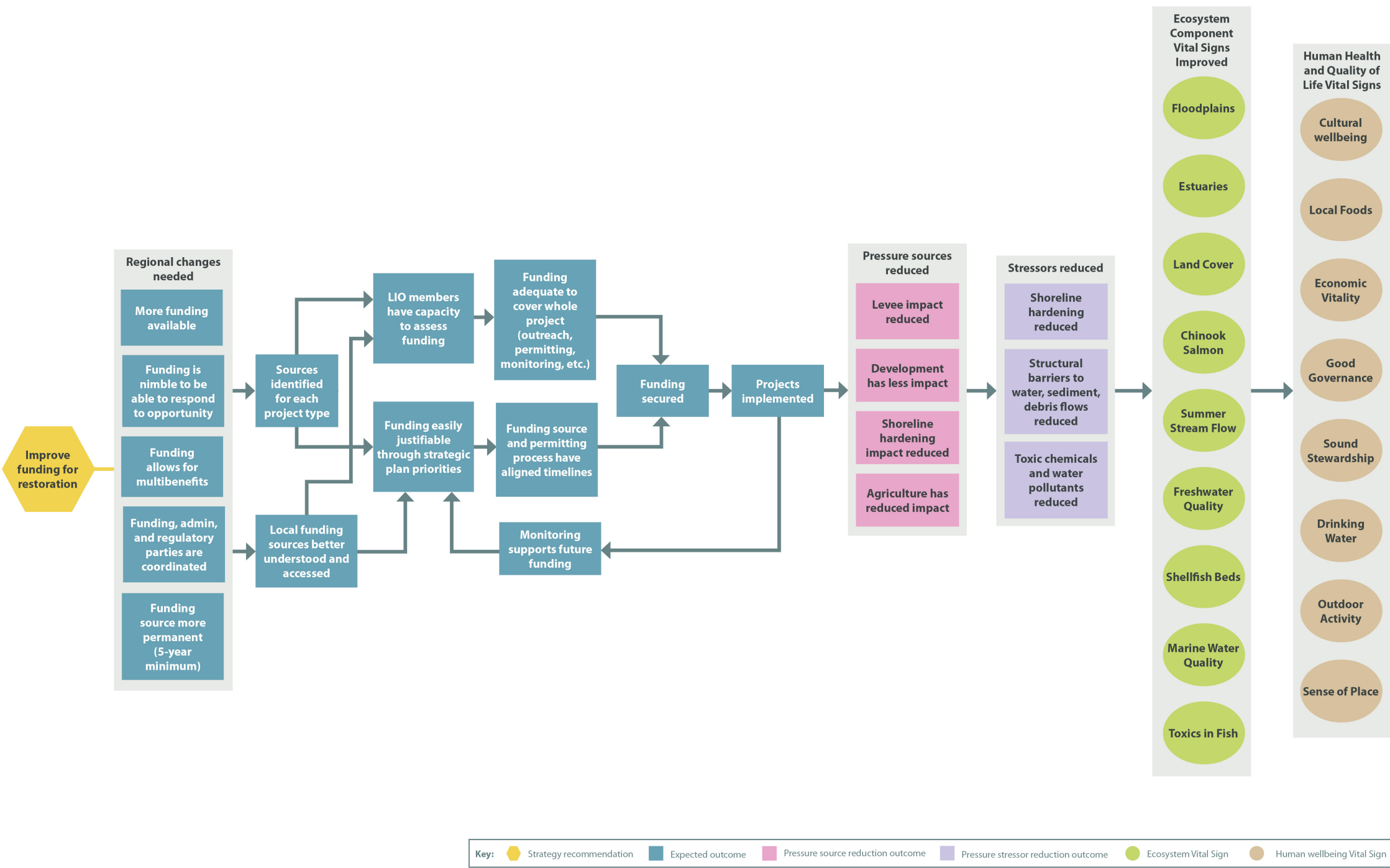


FIGURE 11. IMPROVE FUNDING FOR RESTORATION STRATEGY RESULTS CHAIN

Strategy 04.1: Outreach for Stormwater Stewardship

The goal of this strategy is to change behaviors to improve stormwater management practices and reduce non-point source pollution. Note that although these behaviors are specific to stormwater, the strategy logic could apply to other types of outreach for behavior change, as well.

Public support and behavior changes will be critical for achieving stormwater stewardship. This strategy would implement an outreach campaign—building on existing outreach efforts—to change behaviors of residential and commercial/industrial property owners related to the products they use, the manner in which they dispose of them, and improved stormwater management practices to reduce non-point source pollution. Before beginning a campaign, preliminary work would need to include securing the assistance of outreach specialists, coordinating between multiple stakeholders, and generating/locating quality data to support prioritization.

With that groundwork in place, the outreach campaign would begin by identifying priority areas and targeting specific behaviors for change, along with securing funding. To develop an appropriate message and delivery mechanism, the target audience and their needs and values would need to be understood. This should include an examination of needs and constraints across both privileged and disadvantaged communities, with considerations for social justice. Additional enabling conditions would include crafting appropriate messaging and ensuring no technical or financial barriers are in place.

The message for the target audience would include appropriate technical background information and support for their desired behavior change. When the message is received, we anticipate that a subset of the audience may change their behavior to align with the new information. Monitoring will be in place to determine whether both behavior and environmental conditions are changing as expected. The result of the outreach will be implementation of green stormwater infrastructure projects and best management practices (BMPs), and a reduction in runoff from residential and commercial lands.

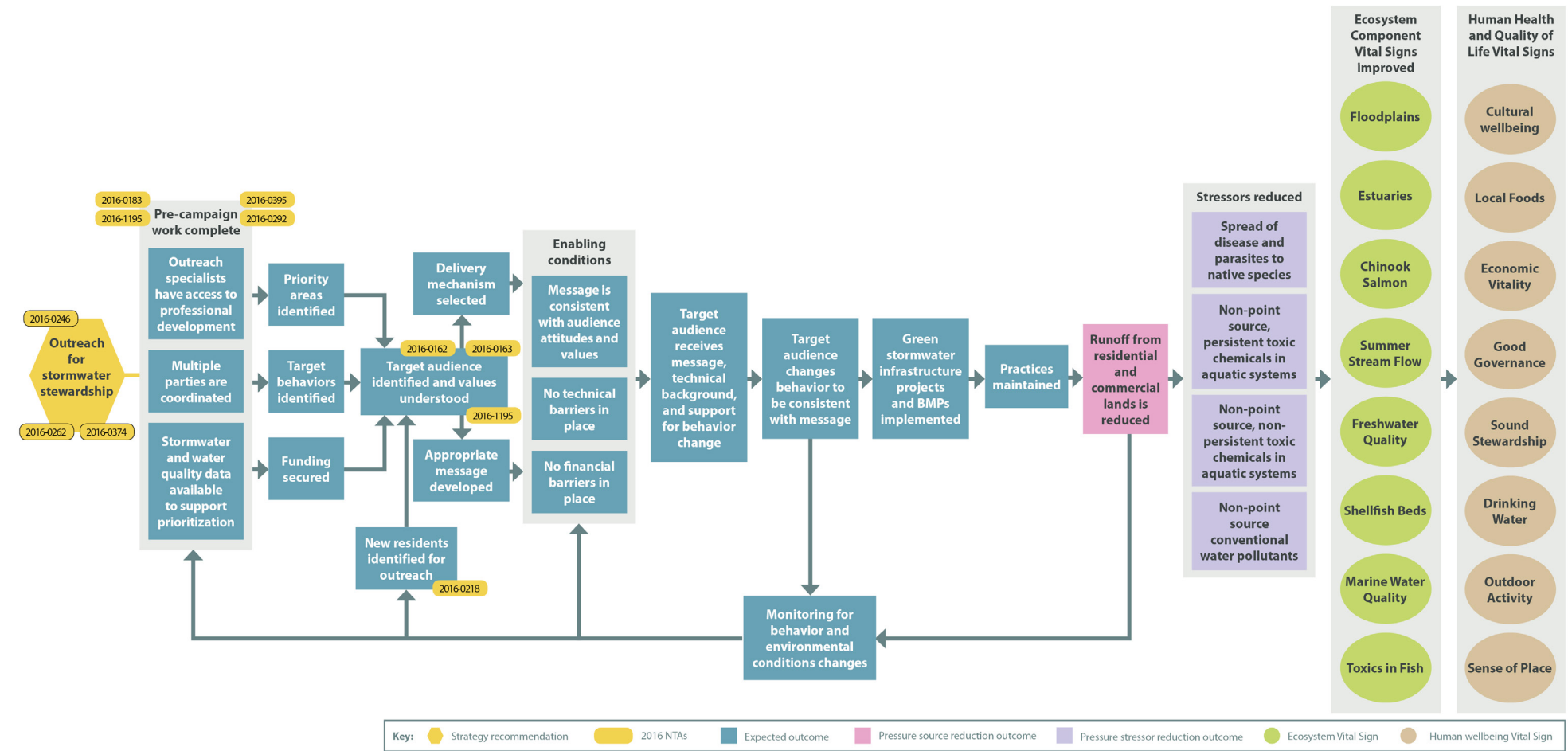


FIGURE 12. OUTREACH FOR STORMWATER STEWARDSHIP STRATEGY RESULTS CHAIN

NTA ID	NTA Owner/Title	NTA Short Description
2016-0262	Snohomish County: Natural Yard Care Behavior Change Campaign	Implement a Natural Yard Care Behavior Change campaign to decrease toxic loading in Snohomish County in alignment with King County. <i>Note this NTA is also shown on Strategy 05.1: NPS Assessment and Product Stewardship</i>
2016-0374	Snohomish CD: Urban Climate Resiliency in the Snohomish Basin	Develop social marketing strategies and two demonstration projects for urban climate resilience in new and planned developments in the Snohomish Basin.
2016-0183	WSU Extension: Stormwater Outreach and Education Collaboration and Best Management Practices Prioritization	Collaborate with organizations from the Stillaguamish/Snohomish watersheds to prioritize local stormwater best management practices that can be addressed through outreach and education. Coordinate and prioritize actions to improve on-the-ground success.
2016-0395	Snohomish County: Lower Stillaguamish Pollution Identification and Correction Program	Continue working with partner agencies to identify and remove sources of fecal coliform and nutrient pollution in the Lower Stillaguamish River basin, primarily from on-site sewage systems, livestock manure, and household pet waste. <i>Note this NTA is also shown on Strategies 07.1: On-site Sewage System Management and 05.1: Non-point Source Assessment and Product Stewardship</i>
2016-0162	WSU Extension: Latino Stormwater and Low-Impact Development Outreach Project in Southwest Snohomish County	Improve water quality conditions in selected southwest Snohomish County streams and lakes by increasing engagement with underserved local Latinos in stormwater pollution efforts.
2016-0163	WSU Extension: Pet Waste Reduction through Veterinary Clinic Outreach	Change dog owner behavior to encourage scooping, bagging, and trashing pet waste by initiating more than 16,000 conversations between vet clinic staff and clients, potentially removing more than 136,000 pounds of fecal matter in 1 year.
2016-1195	WSU Extension: Snohomish County Local Implementation of Puget Sound Starts Here	Collaborate with ECO Net partners to launch a local-scale Puget Sound Starts Here campaign in Snohomish County that is hands-on, face-to-face, and results in increased awareness and adoption of water quality behavioral changes.
2016-0218	Snohomish CD: Puget Sound Starts... at My School!	Involve students, staff, and families in the design, installation, and maintenance of four low-impact development projects on school campuses in Everett and Mill Creek.
2016-0246	Better Ground	Increase impact at the local level by providing urban and rural residents with website and outreach tools to implement best management practices on private property.
2016-0292	Puget Sound Conservation District Stormwater Action Team	Raise the capacity of stormwater services in conservation districts and their partners across Puget Sound through the replication of rain garden, sound education, de-pave, and monitoring programs.

Strategy 05.1: Non-point Source Assessment and Product Stewardship

The goal of this strategy is to determine the sources and characteristics of emerging and persistent conventional contaminants of concern, and develop programs to reduce them.

First, as new contaminants emerge as non-point source pollution problems in stormwater, this strategy would establish an ongoing investigation of the contaminants and their sources, provide corrective measures where possible, and implement product stewardship management strategies (e.g., pharmaceuticals, flame retardants, and fertilizers).

Once the investigation provides better understanding of the contaminant sources, loading, and effects, technical solutions would be explored, in coordination with product manufacturing and retail. Locally led Pollution Identification and Correction programs could also be used to identify bacterial contaminant sources, which would then allow for landowner education—paired with technical or cost-sharing resources where needed—and regulatory backstopping to ensure compliance. Meanwhile, another aspect of the investigation would be focused on the feasibility and impact of new technologies. Once those are understood, tested, and approved, they could be incorporated into the solutions.

This strategy includes product stewardship actions and coordination with manufacturing and retail that were ranked by the Sno-Stilly LIO as lower for feasibility but higher for impact, to highlight needed regional assistance.

Product stewardship and BMPs could then be implemented and water quality regulations could be updated at the state and federal level. Better management of stormwater would result, with lower pollution loading, and better safeguards for fish, wildlife, habitats, and human health and quality of life.

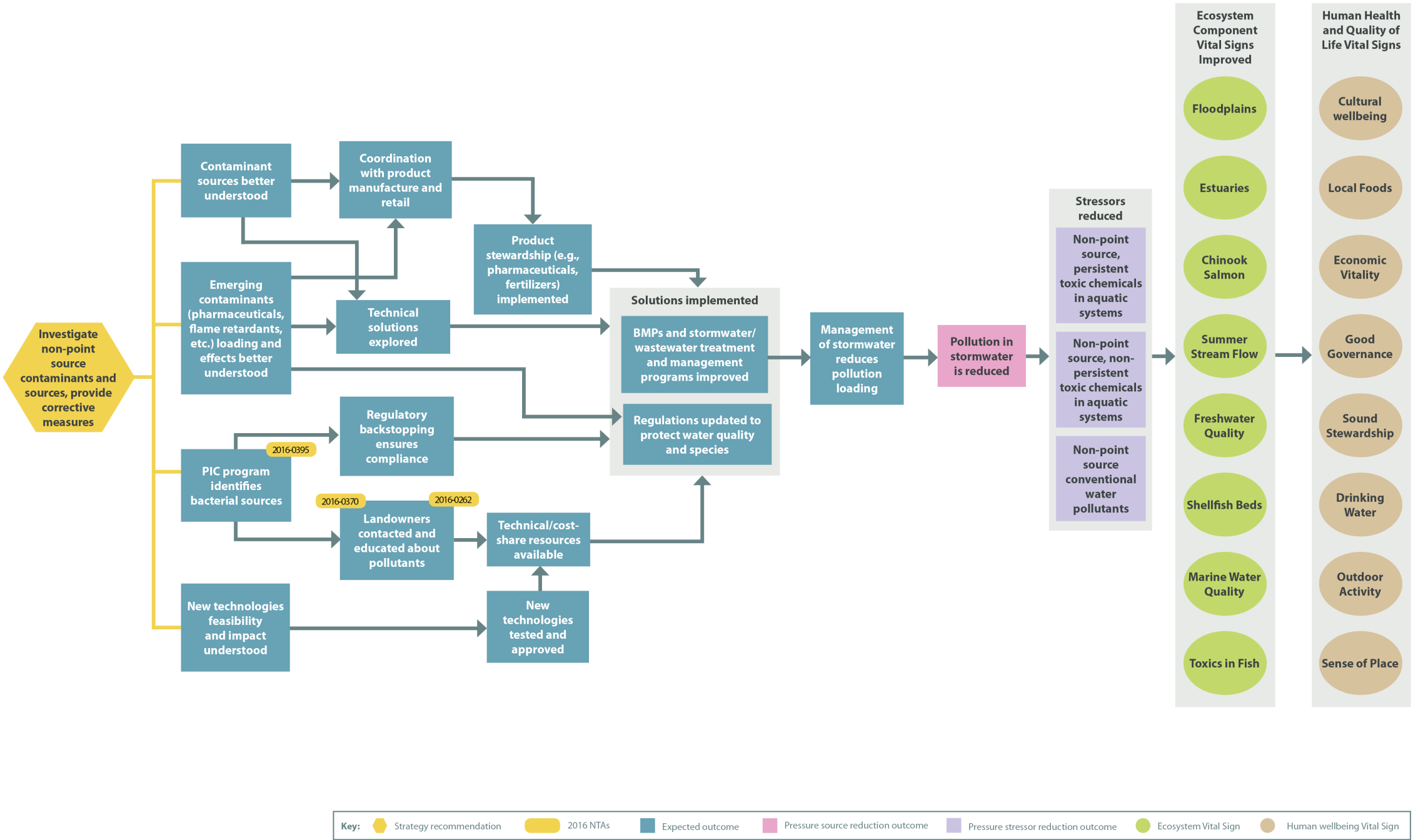


FIGURE 13. NON-POINT SOURCE ASSESSMENT AND PRODUCT STEWARDSHIP STRATEGY RESULTS CHAIN

NTA ID	NTA Owner/Title	NTA Short Description
2016-0262	Snohomish County: Natural Yard Care Behavior Change Campaign	Implement a Natural Yard Care Behavior Change campaign to decrease toxic loading in Snohomish County in alignment with King County. <i>Note this NTA is also shown on Strategy 04.1: Stormwater Outreach</i>
2016-0395	Snohomish County: Lower Stillaguamish Pollution Identification and Correction Program	Continue working with partner agencies to identify and remove sources of fecal coliform and nutrient pollution in the Lower Stillaguamish River basin, primarily from on-site sewage systems, livestock manure, and household pet waste. <i>Note this NTA is also shown on Strategies 04.1: Stormwater Outreach and 07.1: On-site Sewage System Management</i>
2016-0370	Puget Sound Clean Waters Livestock Stewardship Program	Provide enhanced educational opportunities, technical assistance, conservation planning tools, project designs, and financial assistance to livestock owners to prevent fecal coliform pollution.

Strategy 06.1: Stormwater Retrofit and LID

The goal of this strategy is to provide better treatment and infiltration of stormwater through retrofitting legacy public stormwater systems. It is intended to work in combination with other strategies directed at changing stormwater practices of private property owners and additional investigation and corrective measures directed at non-point source pollution. The strategy is expected to support both local and regional approaches.

Once public properties with stormwater problems are identified, jurisdictions could choose appropriate approaches, either retrofitting legacy systems, or promoting low-impact development and other green infrastructure approaches. For the first approach, legacy systems on public property that are retrofitted would be maintained to continue to provide improved treatment and increased infiltration. For the second approach, new development and redevelopment would be targeted for low-impact development (LID) techniques to meet stormwater regulations. In both approaches, implementation and effectiveness monitoring would be provided to ensure ongoing management is effective at increasing infiltration and treatment. To aid in the monitoring program, public green infrastructure mapping would be produced.

Not only would the quantity of stormwater runoff be reduced from present conditions, new development would have less impact, chemical loading would be reduced, and flow regulation would be improved.

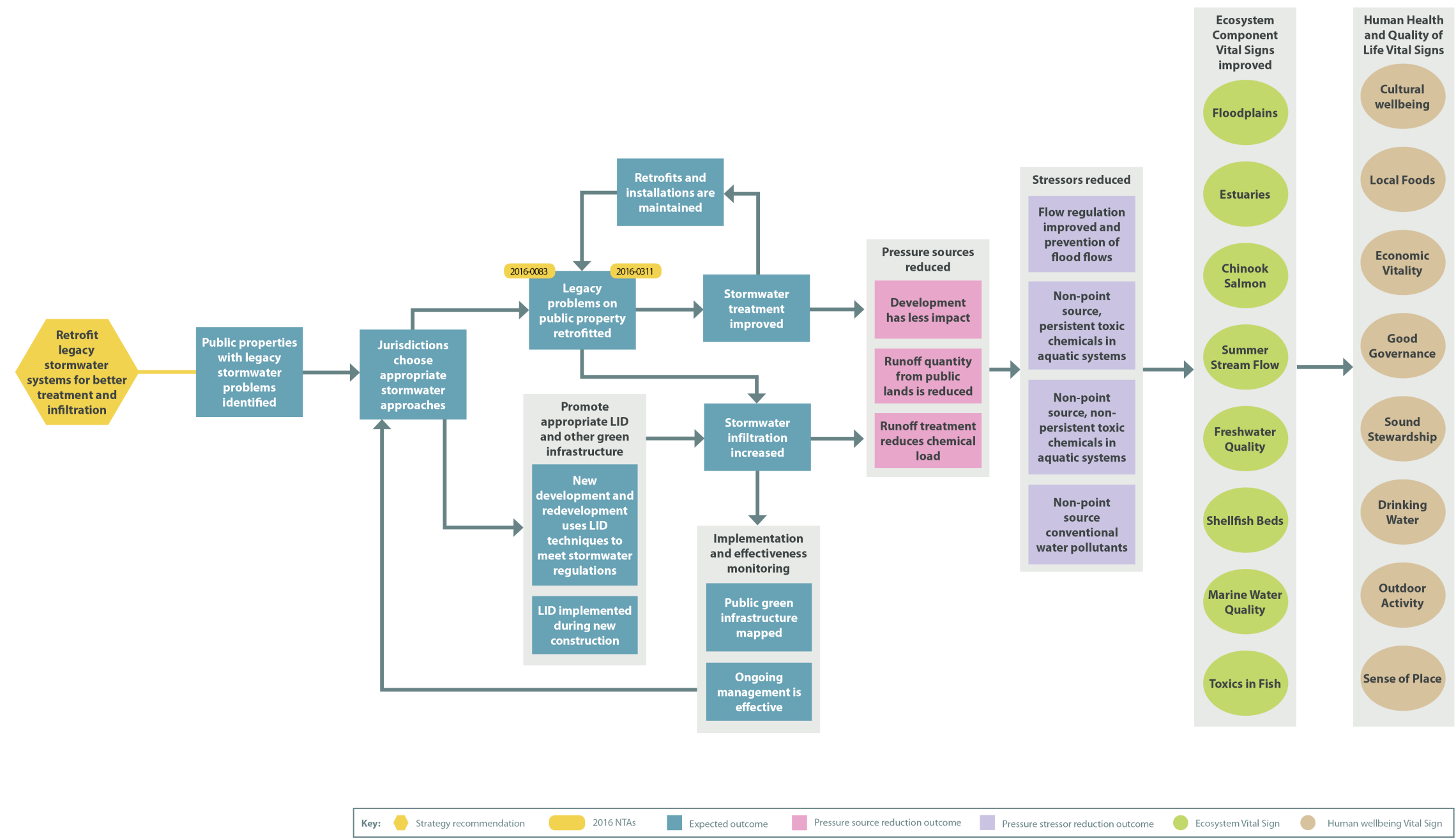


FIGURE 14. STORMWATER RETROFIT AND LID STRATEGY RESULTS CHAIN

NTA ID	NTA Owner/Title	NTA Short Description
2016-0083	City of Arlington: Arlington Stormwater Treatment and Emerging Contaminant Reduction	Complete design and install infrastructure needed to release reclaimed water to Old-town stormwater wetland to provide dry-season hydrological support and treatment of endocrine disruptors.
2016-0311	City of Everett: Fisherman's Harbor Stormwater Quality Improvement Project	Provide treatment to the primary significant sources of untreated stormwater being discharged to the Fisherman's Harbor development area including three Port of Everett and two City of Everett stormwater outfalls.

Strategy 07.1: On-site Sewage System Management

The goal of this strategy is to improve on-site septic system management to reduce the spread of non-point source pollutants and human pathogens. On-site sewage systems require careful siting, maintenance, and inspections to prevent impacts to groundwater and surface waterbodies. Many on-site sewage system problems are difficult for individuals, especially in low-income populations, to fix without financial assistance. This strategy seeks to provide the necessary outreach, technical assistance, incentives, and enforcement to allow for improved on-site septic system management.

With involvement of the local health jurisdiction, local Pollution Identification and Correction programs, or their equivalents, and sanitary surveys can be used to provide proactive assessment and identification of problems with failing septic systems. Where appropriate, such as in beach communities with erosion problems, the systems could be converted to sewer or small on-site community systems. In other areas, owners would be notified of the need to correct their failing systems and cost share incentives and/or loan programs would be made available. Regulatory backstopping would ensure compliance, and the failing systems are expected to be fixed.

These local programs should be assessed—and improved when necessary—to ensure they continue to use the most current BMPs and technologies and to increase their effectiveness on an ongoing basis. With good siting and design of new on-site sewage systems, continual improvements to management programs, remediation of problem systems, and owner education, on-site sewage systems should be more appropriately operated and managed and impacts are expected to be reduced.

This strategy will also need to rely on technical assistance, outreach, and funding, which are not shown on this results chain but can be cross-referenced to the related stormwater strategies.

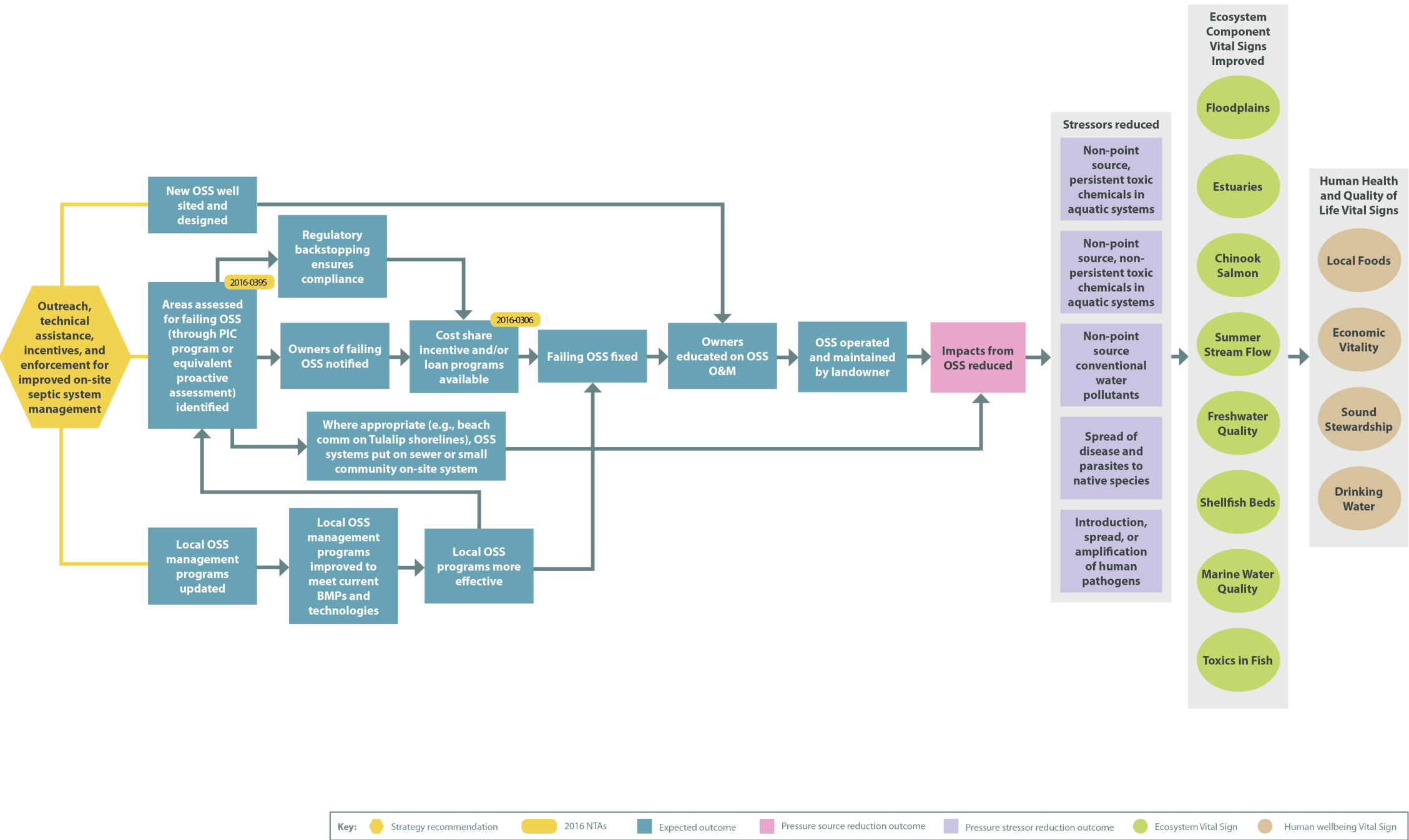


FIGURE 15. ON-SITE SEWAGE SYSTEM MANAGEMENT STRATEGY RESULTS CHAIN

NTA ID	NTA Owner/Title	NTA Short Description
2016-0395	Snohomish County: Lower Stillaguamish Pollution Identification and Correction Program	Continue working with partner agencies to identify and remove sources of fecal coliform and nutrient pollution in the Lower Stillaguamish River basin, primarily from on-site sewage systems, livestock manure, and household pet waste. <i>Note this NTA is also shown on Strategies 04.1: Stormwater Outreach and 05.1: Non-point Source Assessment and Product Stewardship</i>
2016-0306	Snohomish County: Financing Options for Healthy Onsite Sewage Systems	Provide affordable financing options and education to help residents in the Snohomish-Stillaguamish watersheds maintain healthy on-site sewage systems through grants, rebates, and workshops.

Strategy 08.1: Implementation of GMA Recognizing Puget Sound Recovery Goals

The goal of this strategy is to link Puget Sound recovery goals to implementation of the GMA by incorporating recovery goals into Comprehensive Plan goals, objectives, and policies, and initiating a culture shift so all decisions are made through a Puget Sound recovery lens. In combination with limiting growth outside the UGA, the strategy would address barriers to increasing density, including reducing costs and timelines. If this were achieved in tandem with increasing demand for dense communities—resulting in an improved market for density—then more growth would happen in UGAs. More growth in UGAs, along with reducing opportunities for conversion outside of UGAs, would result in an overall reduction of the development impact.

The Sno-Stilly LIO is emphasizing the importance of maintaining a regionally consistent high standard for local interpretation and implementation of the GMA. The first result that would need to be in place at the regional level is improved funding associated with monitoring and adaptive management, alignment, and clarity of regulations. This would allow for continual improvement of the GMA. Improved consistency in implementing the GMA, along with conversion protection and improved mapping to direct growth and UGA boundary adjustments, would result in Comprehensive Plans and associated zoning and regulations that recognize Puget Sound recovery goals.

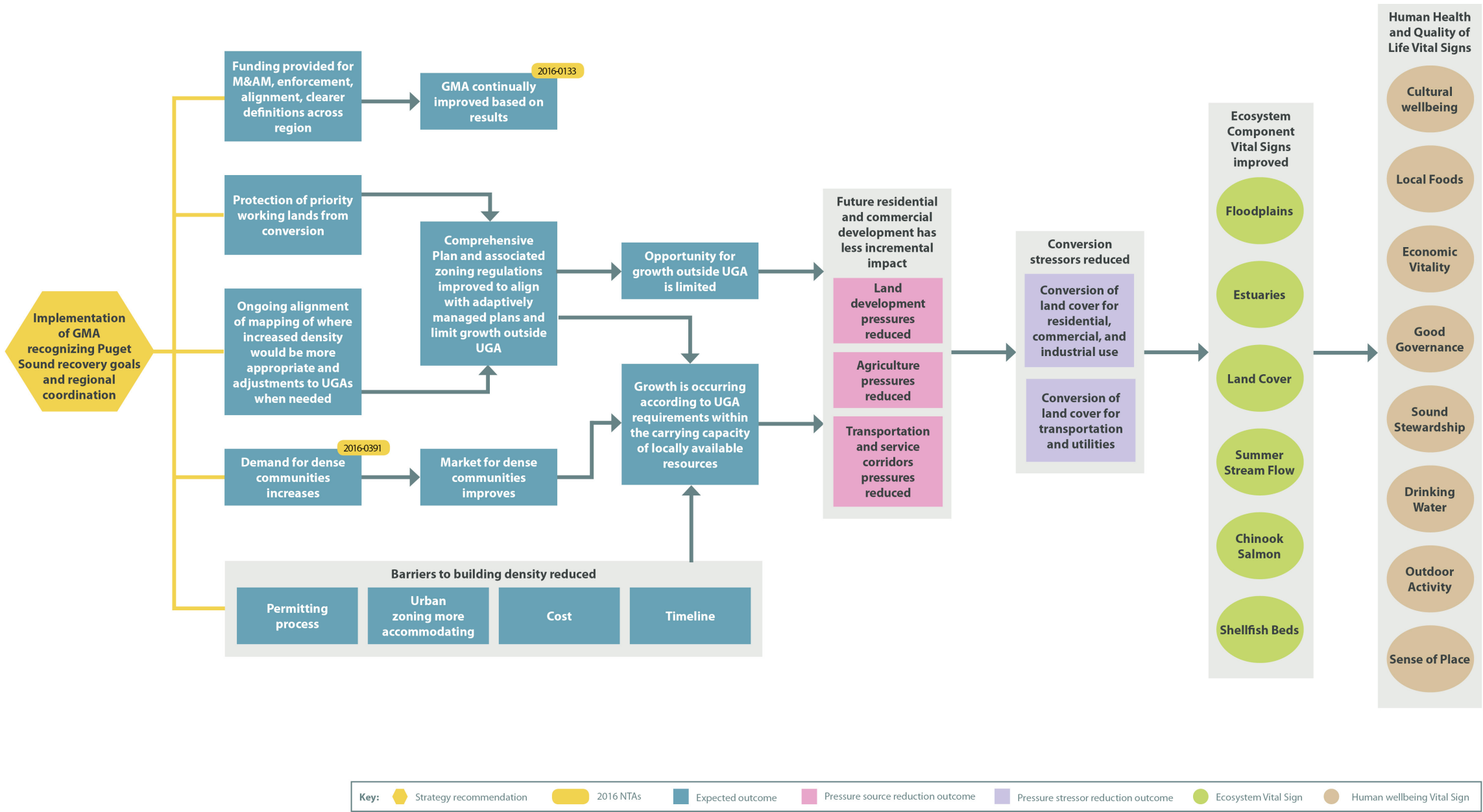


FIGURE 16. IMPLEMENTATION OF GMA RECOGNIZING PUGET SOUND RECOVERY GOALS STRATEGY RESULTS CHAIN

NTA ID	NTA Owner/Title	NTA Short Description
2016-0391	Snohomish County: Initiatives to Support Infill in Urban Growth Areas in Snohomish County	Support opportunities and incentives to increase capacity and accommodate growth in urban areas with three independent initiatives.
2016-0133	Sound Salmon Solutions: Watershed Education for Decision Makers, Stillaguamish Basin	Increase the awareness and involvement of local decision-makers in local environmental issues, especially related to water quality, stormwater, shellfish protection, and salmon recovery. <i>Note this NTA is also shown on Strategies 01.1 and 01.2: Nearshore Protection and Restoration, and 10.1 and 10.2: Freshwater Protection and Restoration</i>

Strategy 09.1: Stream Flow Protection

The goal of this strategy is to provide protection to improve low flows. This strategy also relates to the recent detailed planning work in the *Snohomish Basin Protection Plan* (Snohomish County Surface Water Management et al. 2015).

Currently, in many areas of the Sno-Stilly LIO, there is concern about stream flows—both low summer flows and high flashy flows. The stream flow protection strategy is intended to first secure data to help managers better understand the relationship between land use, withdrawals, and seasonal flows within an already naturally variable flow regime.

Once the relationships are better understood, specific geographies and hydrologic features that are critical to maintaining flows can be prioritized. Special attention will be paid to climate impacts. The prioritization will allow for identification of the proper tools to improve protection or avoidance of further degradation either by jurisdiction, land use type, or specific landscape feature. Prioritizing specific reaches will also allow for implementers to engage specific water management partners.

Finally, the result of better protection will be improved functioning for natural features, specific built solutions, and new withdrawal agreements that reduce the impact on flows.

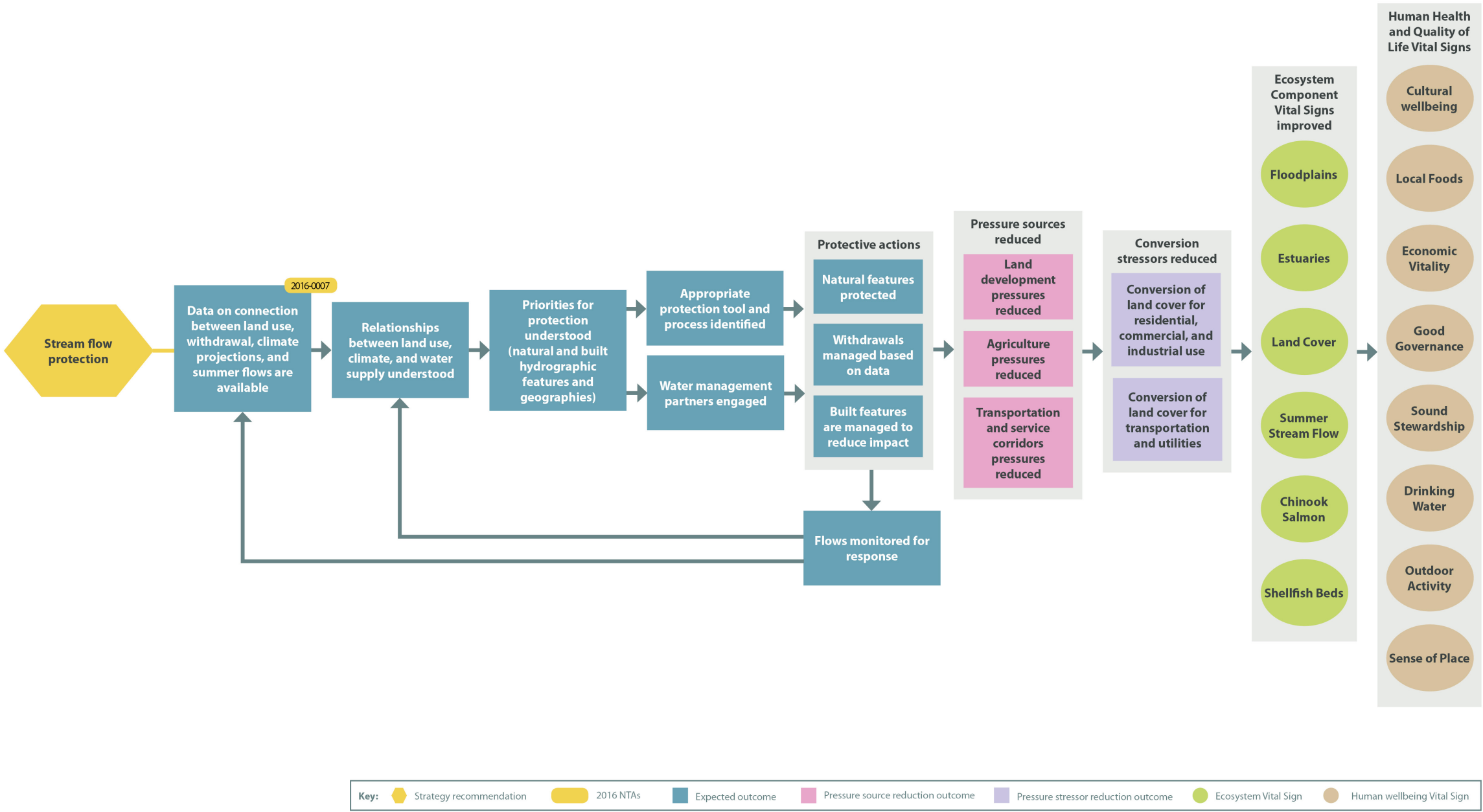


FIGURE 17. STREAM FLOW PROTECTION STRATEGY RESULTS CHAIN

NTA ID	NTA Owner/Title	NTA Short Description
2016-0007	Snoqualmie Tribe: Snoqualmie Hydrology	Investigate low-flow hydrology in the lower mainstem Snoqualmie River (below Snoqualmie Falls) and identify opportunities for habitat enhancement and protection.

Strategies 10.1 and 10.2: Freshwater and Estuarine Protection and Restoration

The goal of these two strategies is to reduce armoring and increase use of natural shoreline protection techniques. Numerous suggestions in this strategy are already in progress, and there are also many 2016 NTAs shown on the results chain. The Sno-Stilly LIO specified that integrated planning (Strategy 02.1) should precede freshwater protection and restoration. Integrated planning results would allow LIO members to agree on areas that would be targeted for projects and protection, thus limiting conflict between land uses and reducing delays in implementation.

First, monitoring data would be used to improve understanding of baseline conditions. For protection, better baseline data would allow for priority areas to be identified and mapped. This, in turn, would allow managers to align appropriate protection tools with each area. Once appropriate tools were identified, there would be a variety of results based on the tool that was applied. First, outreach and education may result in property owners understanding the value of protecting the functions on their property and next choosing the most protective property management. If incentives were made available where appropriate, property managers could manage their property to keep ecological functions intact.

If the most appropriate protection tool suggested a regulatory approach, then it would be expected that regulatory inconsistencies would be identified and salmon recovery priorities would be considered in regulations. This would result in regulations being improved and aligned for better freshwater protection.

For restoration, baseline condition understanding would also be needed in order to prioritize and map areas for projects. The next necessary outcomes would be to complete restoration design and acquire property (if necessary). Funding and permitting would need to be secured to allow for project implementation.

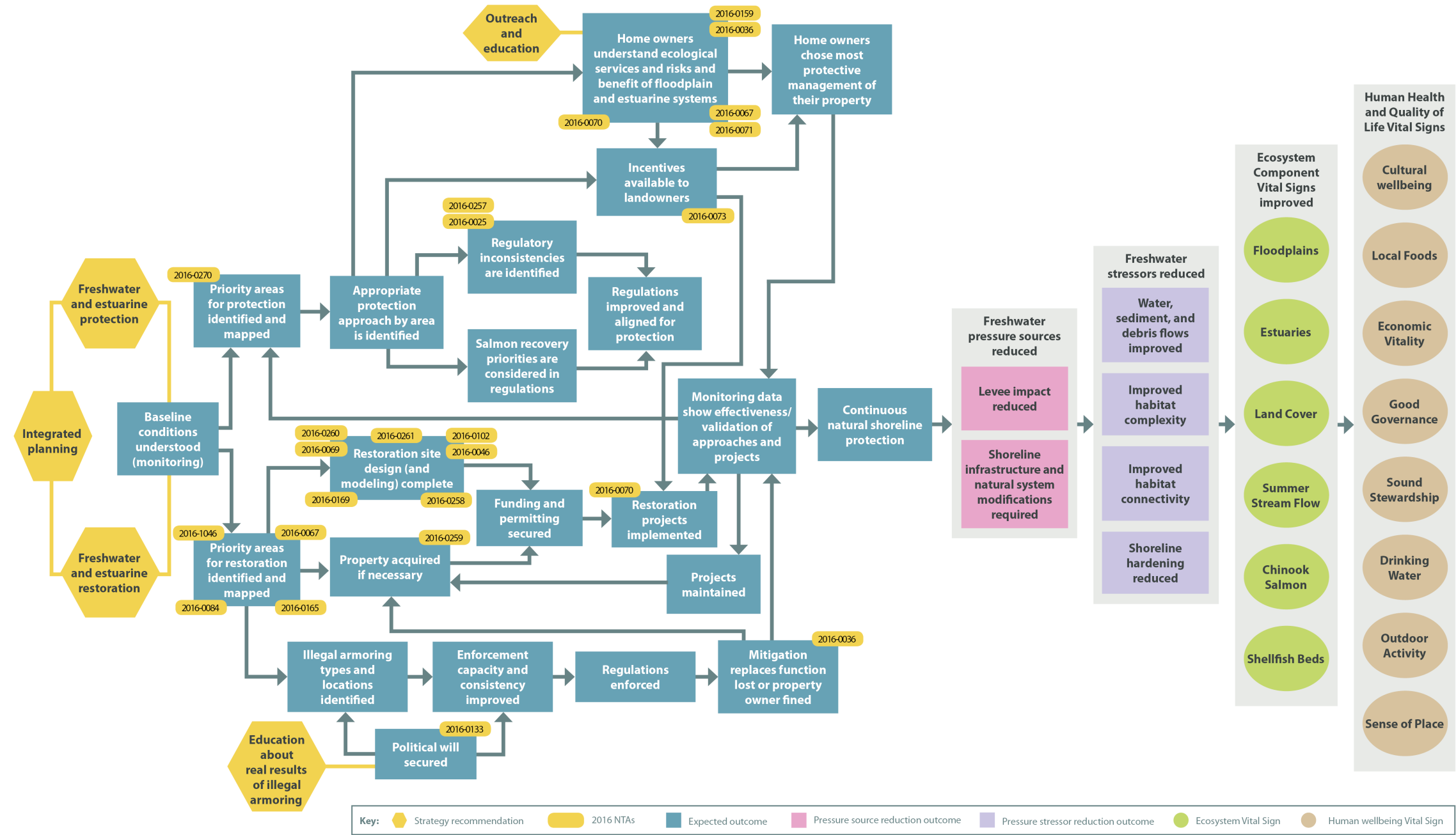


FIGURE 18. FRESHWATER AND ESTUARINE PROTECTION AND RESTORATION STRATEGIES RESULTS CHAIN

Restoration would also target illegal armoring. First, those areas would need to be identified. If illegal armoring was identified, then there would need to be improved enforcement capacity and consistency, supported by political will. Finally, this would result in regulations being enforced and either mitigation replacing lost function or the property owner being fined.

All protection and restoration programs and projects would be monitored and maintained over time in order to improve effectiveness and validate successes.

Special attention will be paid to climate impacts and potential sea level rise when designing actions to align with this strategy.

NTA ID	NTA Owner/Title	NTA Short Description
2016-1046	Snohomish County: Stillaguamish River Knotweed Control and Reforestation	Continue methodical downstream campaign to control and eradicate invasive knotweeds from the North Fork and South Fork Stillaguamish and follow by conifer planting. Survey and treat 70 acres per year and replant 10 acres over 4 years.
2016-0084	City of Arlington: Arlington South Slough Fish/Flood Project	Address the floodplain connectivity-limiting factor in the South Slough through flood modeling and design.
2016-0165	Snohomish County MRC: Eelgrass and Forage Fish Mapping in Snohomish County	In collaboration with the Stillaguamish Tribe, map eelgrass and forage fish throughout Snohomish County to fill existing data gaps essential to restoration planning.
2016-0067	Snohomish CD: Stillaguamish Priority Riparian Plantings	Reach out to landowners and plant riparian areas identified in the newly released Stillaguamish Temperature TMDL Adaptive Assessment and Implementation Project report completed by Snohomish County. <i>Note this NTA is shown for both the Protection and Restoration strategies in this Results Chain</i>
2016-0260	Snohomish CD: Portage Creek Culvert Barrier Removal	Remove two adjacent fish passage barriers on Portage Creek, a tributary to the Stillaguamish River, and replace it with one single crossing, thus opening approximately 9 miles of salmon bearing streams.
2016-0069	Snohomish CD: Richardson Creek Barrier Removal	Remove a passage barrier at the mouth of Richardson Creek, a high-priority salmon spawning and rearing stream in the Woods Creek watershed, opening up 3.9 miles of habitat.
2016-0261	Snohomish CD: Woods Creek Culvert Barrier Removal	Remove four fish passage barriers on Woods Creek, a tributary to the Skykomish River.
2016-0169	Snohomish County MRC: Marine Resources Committee, Snohomish Estuary Cleanup	Restore estuarine and nearshore habitats. Remove derelict vessels and creosote to improve habitat in the Snohomish Estuary for a number of species, including Chinook salmon.
2016-0102	Adopt-a-Stream Foundation: Olaf Strad Channel Relocation Design	Design plans for the relocation of 1,100 feet of the channel of Olaf-Strad Creek (part of the Quilceda Creek system) away from the road to create spawning and rearing habitat, improve water quality, and create a native riparian buffer of the creek.
2016-0046	King County: Tolt River Mouth and Frew Floodplain Reconnection Feasibility and Design	Design two floodplain reconnection projects on the Tolt River near the confluence with the Snoqualmie River. Remove and set back the left bank at the mouth of the Tolt River and Lower Frew levees to restore floodplain processes.
2016-0258	City of Everett: Bigelow Creek Re-channelization South Wetland Complex Habitat Enhance	Establish off-channel habitat, restore Bigelow Creek to its predevelopment alignment, and create intertidal habitat.
2016-0259	Snohomish CD: Haystack Creek Culvert Barrier Removal	Remove four fish passage barriers on Haystack Creek, a tributary to Tychman Slough and the Skykomish River, opening 2.3 miles of anadromous salmonid habitat.
2016-0070	Snohomish CD: Native Growth Protection Area Plantings in Priority Rural Areas	Develop targeted outreach materials and strategies to connect with high-priority native growth protection areas. Restore 4 acres of riparian habitat in Snohomish County to address documented water quality impairments. <i>Note this NTA is shown for both the Protection and Restoration strategies in this Results Chain</i>
2016-0133	Sound Salmon Solutions: Watershed Education for Decision Makers, Stillaguamish Basin	Increase the awareness and involvement of local decision-makers in local environmental issues, especially related to water quality, stormwater, shellfish protection, and salmon recovery. <i>Note this NTA is also shown on Strategies 01.1 and 01.2: Nearshore Protection and Restoration and 08.1: Implementation of GMA Recognizing Puget Sound Recovery Goals</i>
2016-0036	King County: Snohomish Watershed Floodplain Invasive Species Removal and Restoration	Restore and maintain riparian ecosystems in the Snohomish watershed by reestablishing native plant communities and engaging landowners in the long-term stewardship of their property. <i>Note this NTA is shown for both the Protection and Restoration strategies in this Results Chain</i>
2016-0159	Stillaguamish Tribe: Mountains to Sound Greenway Trust: Next Generation Education Program	In collaboration with ECO Net, coordinate the Mountains to Sound Greenway Trust’s Next Generation Education Program’s science-based environmental and outdoor education lesson plans for 4th- through 10th-grade students in the Green/Duwamish (WRIA 9), Lake Washington/Cedar/Sammamish.
2016-0071	Snohomish CD: Living with Beavers Program	Expand upon and market a technical assistance and cost-share program to encourage residents of Snohomish County to allow beavers to remain on their property.
2016-0257	Snohomish CD: Free Trees Program	Expand the Free Trees Program to reach more small-parcel landowners in urban and rural areas and provide free trees to landowners where increased forest coverage will result in a public benefit.
2016-0025	Snohomish CD: Working Buffers to Improve Riparian Buffer Width and Function	Provide technical assistance and cost-share funding to install agroforestry practices on working farms as a way of widening traditional riparian buffers.
2016-0270	Riparian Restoration Throughout the Greater Puget Sound	Expand on efforts to restore and protect naturally functioning riparian and floodplain areas by conducting planting, site maintenance, knotweed inventory, and control. Develop a unified riparian implementation tracking tool.
2016-0073	Conservation Reserve Enhancement Program Expansion	Expand the Conservation Reserve Enhancement Program statewide by completing an assessment of rivers and streams to guide future grants, identify landowner motivations to increase participation, identify additional funds required for incentives, and conduct a pilot project.

6.0 GAPS, BARRIERS, AND NEEDS

LIOs were asked to identify barriers, gaps, and resource needs as they relate to ecosystem recovery planning. These include both local and regional gaps, barriers, and needs and are summarized in Table 6.

This list will continue to be evaluated as the ecosystem recovery planning process and adaptive management continue.

TABLE 6. GAPS, BARRIERS, AND NEEDS FOR ACCOMPLISHING ECOSYSTEM RECOVERY IN THE SNO-STILLY LIO

Barrier	Description	Resources Needed to Overcome (technical, capacity, and political)
Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs		
Funding	Currently, there is limited funding expected through the LIO process, and the uncertainty of future funding opportunities tied to this strategic planning exercise is not sufficient to incentivize consistent, meaningful engagement across the LIO.	Funding capacity to incentivize engagement across the LIO
Consistent federal and state funding	The lack of consistency in federal and state funding remains a barrier to steady progress (funding has remained constant or shrunk, while costs have increased).	Funding consistency
Funding management	Existing funding is not nimble enough; the time that project sponsors spend trying to match the right dollars and manage grants takes away from time and effectiveness in implementing and managing projects.	Regional focus on recovery goals instead of process; more nimble funding
Restrictive matching requirements	Restrictive matching requirements sometimes hinder the ability to use additional funding sources.	More nimble funding
Funding sources	Smaller counties (with fewer rate payers) often lack the local funding sources available to larger counties with more local revenue streams.	More funding available to smaller counties
Planning, process, and reporting requirements	Focus on process, planning, and reporting (e.g., NTA reporting and ecosystem recovery planning) limits capacity to implement actions	Regional focus on recovery goals instead of process; PSP/LIO communication and reporting improvements
Lack of agency and policymaker engagement	The region needs to encourage/incentivize agencies and policy-makers to engage in ecosystem recovery goals in order to make this work relevant to elected officials and worth their investment of time and support.	Regional political advocacy
Regional culture	Regional social/cultural changes will be required to influence much of the behavior change needed at a local scale.	Regional advocacy for behavior change

Barrier	Description	Resources Needed to Overcome (technical, capacity, and political)
Diverse culture, vision, and characteristics of two large watersheds	The Snohomish-Stillaguamish LIO is unique in that it covers two high-value watersheds with diverse characteristics. Although these watersheds have a long history of broad collaboration, questions remain about whether the two watersheds should be addressed as separate LIOs.	Political support and capacity
Monitoring gap	Status and trends monitoring assistance and dedicated monitoring funding are needed from regional groups that could position engineers and scientists to support the efforts in the LIOs. Monitoring of NTAs will be required to determine success toward recovery goals.	Research, data collection, and analysis; the Sno-Stilly LIO intends to use and/or expand the existing regional monitoring and adaptive management process where relevant to avoid additional or duplicated efforts
Regulatory inconsistency	Federal regulatory alignment is needed to achieve local goals. For example, U.S. Army Corps of Engineers (USACE) has competing missions—flood fighting and ecosystem recovery—which allow this agency to place rock along riverbanks in emergencies that later will require (but not necessarily meet qualifications for) a permit. Also, USACE's maintenance of certified levees and the Federal Emergency Management Agency's provision of flood insurance through the National Flood Insurance Program provide enabling conditions for existing and future development, reducing the feasibility of and support for future levee setbacks.	State/local/tribal/federal coordination

Barrier	Description	Resources Needed to Overcome (technical, capacity, and political)
Regulatory inefficiency	Federal regulatory alignment is needed with state and local permit streamlining already in place for expedited fish barrier culvert replacement projects. USACE Regulatory recently determined that many culvert replacement projects within existing road prisms are not covered by the maintenance exemption, triggering costly, time-consuming Nationwide Permit reviews that delay project delivery. The review process between applicants, USACE, Tribes, and Washington State Department of Archaeology & Historic Preservation can be significantly improved so as to minimize process costs. The current regulatory process does not add value to project delivery efforts focused on fixing known impediments to salmon. Streamlining the process can decrease the cost of each project by 10 to 25%, significantly increasing the number of projects across the state that can be built. Culvert replacement projects that meet Washington Department of Fish and Wildlife standards are more than self-mitigating.	Local, state, federal, and tribal coordination for regulatory program alignment
Federal and state regulatory and enforcement support	Many of the changes that will be required at the local level to ensure ecosystem recovery are controlled by federal and state laws. Without a state or federal mandate, it is very difficult for local policies and regulations to achieve adequate levels of protection. The same goes for enforcement.	State or federal mandate; this can involve changes in agency practices as well as changes in policy
Planning inconsistency	Watershed planning concepts need to be consistent with Ecology's watershed characterization model and GMA and Puget Sound Regional Council planning terminology. Ecology has specific information on land cover planning for the purpose of watershed protection and restoration that can complement regional salmon recovery policies (and encourage land use practices better tuned to salmon recovery goals within UGAs).	State/local/tribal/federal coordination and sharing of information and resources
Regulatory and enforcement assessment	It is not always clear whether regulatory issues are related to regulations being inadequate and/or having adequate regulations that are not adequately enforced.	Research and political support

Barrier	Description	Resources Needed to Overcome (technical, capacity, and political)
Gaps and Barriers Related to Vital Signs and Other Components		
Regional Vital Sign framework	Multi-species goals are not always captured in the regional Vital Sign framework, and there are concerns that using a single species to represent many species may not have the desired results.	Regional consideration of taxonomy revision
Regional Vital Sign framework	Sno-Stilly LIO members have expressed concern with the lack of specificity in the birds Vital Sign and concern that marine birds may not encompass the range of birds of concern.	Regional consideration of taxonomy revision
Regional Vital Sign framework	Several Sno-Stilly LIO members have expressed a preference to focus work on a smaller number (three to four) higher-priority Vital Signs at a time, rather than attempting to address so many at a shallower level of detail.	Less focus on prescriptive process and planning requirements to allow for more focus on priority recovery goals
Future need to address additional components	The “priority” ratings shown in this document reflect the Sno-Stilly LIO’s understanding of the components that are most threatened and where opportunities to address them currently exist; however, all of the identified components are important to long-term recovery of the Snohomish and Stillaguamish watersheds, and the LIO anticipates that future adjustments to strategies will address everything.	Additional future work and revisions
Regional Vital Sign framework	The terms <i>high</i> , <i>medium</i> , and <i>low</i> priority could be confusing to the public, as everything on the lists is an important priority. The terms <i>first</i> , <i>second</i> , and <i>third</i> could more accurately denote the order in which we intend to sequence restoration and protection goals. The Sno-Stilly LIO is unsure whether the prioritization distinctions are critical to the regional process.	Regional consideration of taxonomy revision
Regional Vital Sign framework	It is confusing to mix pressure Vital Signs and ecological component Vital Signs.	Regional consideration of taxonomy revision
Regional Vital Sign framework	Two habitat components important in the Sno-Stilly LIO watersheds are not included in the regional Vital Signs list: 1) freshwater wetlands; and 2) marine shorelines and nearshore.	Regional consideration of taxonomy revision

Barrier	Description	Resources Needed to Overcome (technical, capacity, and political)
Gaps and Barriers Related to Setting Local Recovery Goals		
Future need to address additional components	Draft statements of local goals for recovery and protection of the priority Vital Signs are still in progress, along with information on local contributions to regional Vital Sign 2020 ecosystem recovery targets.	Additional future work and revisions
Future need to address additional components	Stormwater goals will be added to the Freshwater Quality component in the future.	Additional future work and revisions
Data gap related to linking water quality and development planning	A comprehensive assessment of rivers and streams with total maximum daily loads (TMDLs) and impairments for specific parameters needs to be linked to community development planning for water quality protection.	Research, data collection, and analysis; regional and local integration
Data gap related to linking summer flow and development withdrawals	Investigation of the connection between summer flow and development withdrawals is required for Summer Stream Flow planning.	Research, data collection, and analysis
Regional monitoring gap	Assessment of effectiveness/retrofit success in stormwater Phase II jurisdictions within the watersheds is beyond the scope of the LIO to implement.	Research, data collection, and analysis; regional and local integration
Less social science focus and integration in LIO framework	The Sno-Stilly LIO is unclear how goals will be set and progress will be measured on the new Human Health and Human Quality of Life Vital Signs.	Technical support and political will are needed to establish metrics, and capacity is needed to measure progress
Future need to address additional components	Additional work by the Snohomish Technical Committee and, to some extent, Stillaguamish staff, is needed to confirm the accuracy of existing goals and whether there is a commitment to moving the goals of the first decade of salmon recovery into the next decade.	Research, data collection, and analysis
Future need to address additional components	Some goals will need more refined objectives and indicators to make them specific enough to evaluate their effectiveness.	Additional future work and revisions

Barrier	Description	Resources Needed to Overcome (technical, capacity, and political)
Stakeholder concerns	Some goals are hindered by local stakeholder concerns related to the scope, intensity, and timeline of actions that support these goals.	Technical, capacity, and political support
Investment in public engagement	It is difficult to effectively engage the public.	Investment in public engagement is required to ensure adequate stakeholder feedback
Gaps and Barriers Related to Pressure Assessment and Conceptual Modeling		
Regional Pressure framework	A standardized regional pressure taxonomy does not always capture local variations.	Regional consideration of taxonomy revision
Regional Pressure framework	Sno-Stilly LIO members have concerns about the pressure source language (in regional taxonomy) attributing stormwater pressure to municipal systems.	Regional consideration of taxonomy revision
Regional Pressure framework	The available pressures do not necessarily encompass all the problems acting on the Vital Signs; pressure gaps include institutional processes, economic and social pressures, lack of sustained resources, resistance to change, and cultural norms. Many of these contributing factors are outside the control of the local partners and require regional support.	Regional consideration of taxonomy revision
Process	Situation analyses and the Conceptual Models produced for them are highly dependent on the local expertise in the room at the time the analysis takes place.	Additional future work and revisions
Process	Conceptual Model biases strongly influence the development of subsequent strategies and results chains.	Additional future work and revisions

Barrier	Description	Resources Needed to Overcome (technical, capacity, and political)
Gaps and Barriers Related to Strategy Planning and Results Chain Development		
Process	More strategy recommendations are expected to emerge in future rounds of strategic planning, as successes are realized from current work and other pressures are addressed. The strategies included in this document represent a broad planning-level approach, and strategy ranking will likely become more targeted when addressed to a project-level assessment.	Additional future work and revisions
Data gaps	There is a lack of knowledge about where to target certain types of strategies due to inconsistent geographic assessment and prioritization.	Technical support and research are needed
Lack of public support	A lack of landowner understanding and interest for ecosystem stewardship or conducting many of the large-scale projects, paired with a lack of support for increased regulatory enforcement, does not result in a pipeline of willing landowners. This situation often leaves acquisition as the primary strategy. There needs to be a focus on creating feedback that supports stewardship.	Regional advocacy for behavior change and political advocacy
Conflicting values, concerns, and goals	There are specific conflicts and tradeoffs between estuary restoration and farmland preservation goals. More generally, it is challenging to develop ways of protecting open space that integrate agriculture, ecosystem recovery, and flood management. Policy needs to balance flood management and floodplain restoration, and it is challenging to get a consensus from stakeholders with different values and concerns.	Coordination and integration, including efforts toward projects that are mutually beneficial
Regulatory lag	Although it is important to evaluate approaches to focus future development away from hydrologically important areas, effectiveness of current plans and ordinances is unknown. This is partially due to the lag between old permits (10-year vesting) and new regulations.	Political will; research and analysis
Local funding and capacity	Local funding is lacking to provide dedicated staffing capacity for sustainable long-term enforcement of permit violations.	Funding and capacity for permit enforcement

Barrier	Description	Resources Needed to Overcome (technical, capacity, and political)
NTA gap analysis	Gap analysis needs to be performed on the Sno-Stilly LIO NTAs, with an eye to encouraging better balance in future NTAs; the LIO currently has a shortage of shellfish and stormwater NTAs relative to an abundance of habitat NTAs.	Additional future work and revisions
Data gap	There is a lack of understanding of the emerging chemicals of concern in non-point source pollution, and the scale (both number and timescale) is difficult to address.	Research, data collection, and analysis

7.0 ADAPTIVE MANAGEMENT

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.

Recovery planning is being conducted by the Sno-Stilly LIO as a cooperative group. The Sno-Stilly LIO serves as a local forum through which diverse stakeholders can work collaboratively to develop and coordinate actions to improve the health of the Snohomish and Stillaguamish watersheds, advance the Puget Sound Action Agenda, and restore the health of Puget Sound. The Sno-Stilly LIO Committees are creating the shared roadmap of the Plan through the following well-established process:

- The IC, which was assembled to provide a strong working knowledge of local activities and capabilities, makes recommendations to the EC.
- The EC, which includes representatives from the Tulalip and Stillaguamish Tribes, King and Snohomish Counties, the Port and City of Everett, and cities in the Snohomish, Snoqualmie, and Stillaguamish basins, moves new information to decision-making.

The Committees will continue to modify, refine, and adjust information in the Plan as needed. This regular review will consider new information, data (including climate change projections), and model outputs, and will note if the context around recovery issues has changed. The review will also likely consider effectiveness and status and trends monitoring as a way of evaluating which strategies are working and which need to change. The short-term feedback will likely be considered in a similar timeframe as the Action Agenda reviews (every 2 years) with environmental indicators being considered on a slightly longer time frame (approximately every 5 years). Additionally, following submittal of the final Plan to PSP in 2017, and as new regional Implementation Strategies are developed, the Sno-Stilly LIO will consider how Implementation Strategy information can be used to adaptively manage the Plan and be considered for future NTA development. Detailed Plan updates will depend on guidance, timelines, and funding requirements from PSP and EPA.

The Sno-Stilly LIO intends to use and/or expand the existing regional monitoring and adaptive management processes where relevant to avoid additional or duplicated efforts. Crosswalks to Chinook recovery work, Department of Commerce tracking of GMA compliance, and other relevant efforts will be provided in this section during future Plan development. This will include the development of targets, indicators, and triggers for various elements in the LIO recovery planning framework and linking them to those that have already been developed for Chinook recovery.

The Sno-Stilly LIO EC will evaluate Table 6 to determine which are local needs that can be met through ongoing assessment of LIO progress, which are regional needs that require coordination with other parties outside the LIO, and which gaps are likely to be met by the related efforts discussed above. The subset of local needs will be reviewed periodically (at least annually) by the EC to determine progress and next steps.

As the ecosystem recovery program is implemented, some elements of effectiveness monitoring will continue to be conducted as they currently are by the stakeholders in the watersheds. Other necessary monitoring will be identified in results chains and specific NTAs to develop an improved learning cycle and ensure reporting on effectiveness, pressure abatement, and status and trends can be used to course-correct the Plan.

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