



Preliminary Synthesis of LIO Ecosystem Recovery Plans: Strategies, Gaps, Barriers, and Opportunities

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Executive Summary

Long-term planning for ecosystem recovery can accomplish a number of goals. Primarily these planning efforts help to ensure that funding is targeted at the highest priority actions while also creating a framework for which local and regional recovery efforts are coordinated across geographies.

Along with the Implementation Strategies and Tribal Priorities, the LIO Plans will form the basis for the 2018 Action Agenda regional priorities and NTA solicitation.

Nine Local Integrating Organization (LIO) Ecosystem Recovery Plans (Plans) collectively represent one of three primary sources that determine areas of focus and regional priorities for Puget Sound recovery. Along with tribal priorities and established Implementation Strategies, the LIO Plans submitted to the Puget Sound Partnership in December 2016 are the foundation of documents that

inform how we, as a region, focus our limited resources to make relevant recovery and protection plans. The LIO Plans will be used to inform the 2018 Action Agenda Update and development of Implementation Strategies. This document synthesizes the common elements of the LIO Plans, including ecosystem components and Vital Signs, recovery strategies, pressure sources, stressors, and the gaps and barriers to successful implementation of Plans.

Collectively, the LIO Plans identify 229 strategies that support progress toward Puget Sound recovery. The strategies address several common themes, including habitat protection and restoration, stormwater pollution reduction, shellfish protection, reduction of pressures associated with development, and others. Of the 25 Puget Sound Vital Signs, Marine Water Quality, Chinook Salmon and Freshwater Quality are the most commonly addressed by LIO strategies. All Vital Signs are addressed in at least one LIO Plan.

The LIO Plans identified 105 gaps and 136 barriers that stall, impede or prevent ecosystem recovery. The gaps and barriers are organized and described in four categories:

- **Physical/technical gaps and barriers**, which include gaps in needed scientific data, extent of barrier to recovery, problems with or lack of technology and tools, and status of knowledge about recovery.
- **Community/institutional gaps and barriers**, which include communication ineffectiveness, taxonomy variations between local and regional vocabulary, planning and information silos, lack of public engagement, coordination flaws, and other issues.
- **Legal/regulatory/policy gaps and barriers**, which include enforcement and compliance barriers, insufficient laws, and lack of policy tools that would help to incentivize or act as a disincentive to recovery-appropriate actions
- **Financial gaps and barriers**, which include restrictive funding requirements, inequitable distribution of funds, and general challenges related to funding and staff resources. Most gaps and barriers within each primary category can be relieved with increased funding.

There are commonalities across LIO Plans in terms of strategies, gaps and barriers, but there are also distinct differences that represent local context.

Research questions

Because the data included in the LIO Plans varies in availability and completeness, this assessment is by nature preliminary and requires refinement. All data synthesized comes from the LIO Plans (Dec. 2016) and the associated results chains. We analyzed and synthesized the data to answer four main questions:

Primary Questions	Preliminary Results from Synthesis
What Puget Sound recovery strategies did LIOs identify in the Ecosystem Recovery Plans? Are they the same as the 2016 Action Agenda sub-strategies, or are revisions or entirely new strategies proposed?	• 239 strategies are identified in all nine plans. ○ 11% are new strategies ○ 55% are strategies that are similar to strategies included in the 2016 Action Agenda, but slightly narrowed or broadened in scope
What strategies are the LIOs using to reduce pressure sources and stressors, and what does this tell us about local approaches to reducing pressures?	• Strategies are focused on ○ Implementing high-priority projects related to salmon recovery and freshwater restoration ○ Supporting local government to adopt and implement plans ○ Enabling and encouraging citizenry
What strategies are the LIOs using to support Vital Sign recovery, and what does this tell us about local approaches to recovering Vital Signs?	• Focal components for at least eight, and possibly nine, LIOs encompass the following: ○ Chinook Salmon ○ Freshwater Quality ○ Marine Water Quality ○ Summer Stream Flows ○ Shoreline Armoring ○ Land Development and Cover
What gaps and barriers do LIOs see to Puget Sound recovery, and what solutions have they identified to address these gaps and barriers?	• 241 gaps and barriers are identified in the nine LIO Plans. Most-listed barriers: ○ Lack of consistent funding ○ Lack of coordination between local and regional entities ○ Lack of monitoring and lack of funding for it ○ Deficiencies in enforcement and compliance

While more in-depth analysis may reveal that further assessment of these LIO Plans is necessary to affirm the regional priorities that will inform the 2018 Action Agenda Update, this preliminary synthesis is an important first step. It begins to illustrate common approaches and challenges to Puget Sound recovery, as well as innovative local approaches to recovery from which the region can learn.

The results of this initial synthesis illustrate not only common approaches and challenges to Puget Sound recovery, but innovative local approaches to recovery from which the region can learn.

The synthesis of LIO Plans is an ongoing effort and will continue to build and develop over the next few years. The LIO Plans are themselves in draft form and in the process of being vetted. The LIO Plans will continue to change as they are adaptively managed to meet the changing needs and priorities of localities.

The synthesis should be used as a platform for discussion rather than a pathway for action. It is up to the collective partners to decide what this information means and how to put value to it over the coming years.

The synthesis should be used as a platform for discussion rather than as direction for action.

Next steps and intended uses

The content of the LIO Plans and this synthesis are intended to inform the policy and planning decisions summarized below.

Action Agenda Implementation Plan Update

The focal components prioritized by LIOs will be used to help define which Vital Signs and pressures will be included in the area of focus for the 2018 Action Agenda. LIO recovery strategies that align with the Vital Signs and pressures in the area of focus will be used (1) when identifying and selecting regional priorities for the 2018 solicitation for Near Term Actions (NTAs) and (2) describing the local context in the solicitation for the regional priorities. Alignment of 2016 NTAs with LIO strategies in LIO Plans will be helpful when determining 2016 NTA alignment with regional priorities for the solicitation of gap-filling actions. The LIOs will also use the LIO Plans to support NTA development and during NTA review.

Action Agenda Comprehensive Plan Update

New or suggested revisions to focal components, strategies, and goals in the LIO Plans will be considered when reviewing Vital Signs, indicators, and targets for the 2022 Action Agenda Update.

Implementation Strategy Development

One of the foundational aspects of building an Implementation Strategy is making use of current resources, including strategic planning documents that identify key pressures, challenges, and barriers to recovery, as well as strategies to address them and geographic priorities. LIO Plans are a critical source of existing information that will be used to develop the content for new Implementation Strategies. In addition, LIO Plans will be consulted when existing Implementation Strategies are updated and improved. This is a crucial component of adaptive management.

Gaps and Barriers to Puget Sound Recovery

The LIO Plans include information about barriers to ecosystem recovery; this information will help to inform adaptive management forums. These forums are intended to be a coordinated effort to identify and address specific barriers to implementing the Action Agenda. The forums will take place at Partnership board meetings, primarily the Ecosystem Coordination Board, but may involve other boards as appropriate. Partnership staff will look at gaps and barriers identified and synthesized and compare them with gaps and barriers identified in existing implementation strategies. Existing NTA's will then be analyzed to determine which, if any, gaps and barriers are currently being addressed and which are in need of support. The proposed outcome of the forums is a set of recommendations and next steps – which could include associated assignments – that board members can take individually or collectively to help overcome an identified barrier or barriers, including timeframes. These forums are a variant of the “Report Card Forums” that took place before September 2015 with the Leadership Council.

Contents

Preliminary Synthesis of LIO Ecosystem Recovery Plans:	i
Strategies, Gaps, Barriers, and Opportunities	i
Executive Summary.....	ii
Research questions	iii
Next steps and intended uses.....	iv
Introduction	1
Methods.....	1
Strategies assessment.....	2
Gaps and barriers assessment	3
Results.....	4
Which Vital Signs are LIOs focusing on?	4
What are the sources of environmental pressure in the LIO geographies?	6
What are the stressors that LIOs are experiencing in their geographies?.....	10
What strategies are being used to address stressors and sources and improve Vital Signs?	13
Alignment with Action Agenda sub-strategies	14
Strategies Aligned with Action Agenda 2016 sub-strategies	17
Strategies, Pressure Sources and Vital Signs.....	19
Gaps and Barriers.....	27
Gaps and Barriers by Category.....	28
Physical & Technical Gaps and Barriers	28
Community & Institutional Gaps and Barriers	30
Legal, Regulatory and Policy Gaps and Barriers.....	31
Financial Gaps and Barriers.....	32
Solutions.....	32
Emerging Themes.....	33
Oil Spills and Response	33
Concluding remarks	36
Appendix A: Concept Models and Results Chain	37
Results Chain.....	37
Appendix B : Barriers to Ecosystem Recovery	39
Appendix C: Vital Sign Comparison Between LIO Plan Narrative and Miradi Files.....	40
Appendix D: Recovery strategies linked to Vital Signs.....	40

Appendix E: Gaps and Barriers, by Local Integrating Organization..... 59

 Alliance for a Healthy South Sound (South Sound)..... 59

 Hood Canal Coordinating Council 61

 Island LIO..... 61

 San Juan LIO 62

 Snohomish-Stillaguamish LIO..... 62

 South Central Action Area Caucus Group 64

 Strait Ecosystem Recovery Network 65

 West Central 68

 Whatcom LIO 69

Appendix F: Gaps and Barriers associated with Oil Spill and Response 69

Appendix G: Solutions to Barriers..... 72

Introduction

Local Integrating Organizations (LIOs) enable Puget Sound communities to guide the implementation of Action Agenda priorities at an ecosystem scale, and to prioritize local actions for investment. To date, the Puget Sound Leadership Council has recognized local integrating organizations in nine geographic areas.

In 2016, all nine LIOs undertook the building of local, long-term recovery strategies from which high-priority recovery actions could be developed over the next 5 to 6 years. The resulting Ecosystem Recovery Plans chart the course for ecosystem recovery and protection at the local level. The Puget Sound Partnership is using the LIO Plans to help develop future Puget Sound Action Agenda updates and explain how LIOs are helping to advance Puget Sound recovery and make progress on the 22 Vital Signs.

2018 Action Agenda Update

Key to developing the 2018 Action Agenda Update is defining the regional priorities for Puget Sound recovery. The 2018 priorities will be determined through the following major inputs:

- Vital Sign Implementation Strategies
- LIO Ecosystem Recovery Plans
- Tribal Priorities

The LIO Plans identify and describe focal ecosystem components¹ (components), strategies, pressures, pressure sources, recovery² actions, and priorities within each local area. The plans also define the relationships that these have through results chains and concept maps ([Appendix A](#)).

Puget Sound Partnership staff reviewed the LIO Plans and synthesized the information in January and February 2017. This preliminary synthesis provides an initial input to the regional priority-setting process. The intent is to begin to analyze information across the nine draft LIO Ecosystem Recovery Plans. Each LIO developed its recovery plan over the past year or more, many with significant constraints in timelines and stakeholder participation. This synthesis is the first iteration to identify key points of commonality and differences between LIO Plans and the 2016 Action Agenda. The information analyzed includes strategies, pressure sources, stressors, Vital Signs, and other ecosystem or human wellbeing components, as well as regional and local gaps, barriers, and needs.

Methods

Partnership staff completed the synthesis of LIO Plans in two phases to address four research questions:

- The strategies assessment phase addressed three questions:
 - What strategies did LIOs identify in the Ecosystem Recovery Plans? Are these strategies the same as the 2016 Action Agenda sub-strategies, or were there revisions or entirely new strategies proposed? What can the region learn from LIOs?
 - What strategies are the LIOs using to support Vital Sign progress, and what does this tell us about local approaches to recovering Puget Sound?

¹ Focal components are the parts of the ecosystem or the attributes of human wellbeing that are the focus of the LIO's ecosystem recovery efforts, regional taxonomy of focal components refer to these as, 'Vital Signs'

² "Recovery" in this context includes both restoration and protection efforts.

- What strategies are the LIOs using to reduce pressure sources and stressors, and what does this tell us about local approaches to reducing pressures?
- The gaps and barriers assessment phase addressed one question:
 - What gaps and barriers do LIOs see to Puget Sound recovery, and what solutions have they identified to address these gaps and barriers?

The data sources for both assessments were the nine LIO Plans (submitted Dec. 31, 2016) and LIO Miradi™ project³ files, in particular results chains. LIOs followed best practices as defined in the *Open Standards for the Practice of Conservation*⁴ (Open Standards) to plan for ecosystem recovery across Puget Sound. The LIO Plans are a testament to the intensive, detailed process each LIO undertook to follow the Open Standards process, many for the first time. There also are many areas for improvement with how the Partnership uses the Open Standards process and software. Adaptive management of the LIO Plans will be an important input to process improvements.

Before all nine LIO Plans were available, the LIO synthesis project team determined which elements of the LIO Plans would be most crucial to analyze first. Prioritizing the synthesis effort was essential due to limited staff time and resources. Through a series of meetings that reviewed LIO data availability and opportunities for informing the Action Agenda Update and Implementation Strategies, the project team decided to examine strategies, gaps, and barriers for the preliminary synthesis. These elements were selected to be the first of many analyses across the nine LIO Plans.

Strategies assessment

The LIO Miradi™ project files were the primary data source for the strategies assessment. The results chains were assumed to comprise the highest priority near-term strategies and actions for recovery in the LIOs. In addition to reviewing the results chains themselves for linkages between strategies, pressures, and Vital Signs, the project team generated summary reports to identify ecosystem and human wellbeing components, pressure sources, stressors, and strategies included in the LIO results chains. LIO Plan reports were used to confirm, expand upon, or clarify information in the Miradi™ files.

The project team pulled all the strategies identified in the LIO Plans from the Miradi™ project files and results chains, and cross-walked this information to information from the LIO narrative report strategy tables. The team then reviewed each strategy for consistency with the 2016 Action Agenda Update sub-strategies to determine if the current Action Agenda is consistent with what is happening throughout the region, or if LIOs are proposing new or revised strategies.

A second element of strategies assessment was to demonstrate the linkages between the LIO strategies and the Puget Sound Vital Signs, pressure sources, and stressors. This comparison suggests which Vital Signs, pressure sources, and stressors each LIO sees as important to Puget Sound recovery and which strategies the LIOs think will be most effective at reducing pressures and improving status of the Vital Signs. To make the comparison, the project team compiled the strategies from the Miradi™ project files and results chains. Each strategy was linked to the Vital Signs, pressure sources, and stressors identified in the results chain.

³ Miradi Share™ <<https://www.miradi.org/about-miradi/>>

⁴ *Open Standards for the Practice of Conservation* <<http://cmp-openstandards.org/>>

Local Variation in a Regional Roll-Up

The LIOs developed their recovery plans within a regional framework. In doing so, the LIOs were guided to approach their plans depending on the unique situation within their watershed.

As a result of local needs and unique approaches to those needs, there are differences in how each LIO identified the pressure sources, stressors, and ecosystem and human wellbeing components in the results chains. Some LIOs used the Puget Sound taxonomy for pressure sources and stressors, while others modified it to their local context and needs. Similarly, some LIOs linked the strategies in the results chains to ecosystem and human wellbeing components as Puget Sound Vital Signs, while others used LIO-specific components. To synthesize and compare information across all LIOs and with the Action Agenda, interpretation to align with a common taxonomy was necessary. Partnership staff completed this task in January 2017; LIO coordinators reviewed the result in February 2017. Future discussions with LIOs and adaptive management of the LIO Plans will be used to refine and improve this preliminary interpretation.

Where LIOs listed an element that was inconsistent with a Vital Sign, pressure source, or stressor, the project team linked the element to what they interpreted as the most relevant Vital Sign, pressure source, or stressor. The original element was preserved and recorded in this analysis, to provide a record of the interpretation.

Gaps and barriers assessment

Each LIO identified barriers, gaps, and solutions in a table format in their plan. The table identified each element as a gap or barrier and provided the title of the gap or barrier, a detailed description, and resources needed to fill or overcome the gap or barrier. The barriers and gaps sections are expected to change as the LIO Plans are implemented.

The project team compiled information from all the barriers tables from the LIO Plans. To better categorize the data, the project team developed a list of common barriers and solutions based on those identified in the LIO Plans. This list was coded and then applied to each of the barriers, gaps, and solutions listed in each plan. (See [Appendix B](#) for a list of barriers.) Next, the project team calculated the frequency and distribution across LIO plans.

After reviewing the list of barriers across all LIOs, the project team organized and analyzed the barriers under four categories commonly used in ecosystem recovery barriers analysis.⁵

- Physical/Technical
- Community/Institutional
- Legal/Regulatory/Policy
- Financial

Recognizing that these categories can and do overlap, they are nonetheless helpful to understand and address the foundation of the barriers, gaps, and needs identified. Most LIOs framed gaps and barriers gaps in funding for a particular activity. Partnership staff categorized these gaps not as a funding gap,

⁵ Murphy, Thomas W. and Ryan-Peñuela, Erin and McCarty, Kacie and Ramos, Alexa and Kelly, Alicia and Molnar, Darin and Ward, Dave, Green Infrastructure Policy Integration in Puget Sound Municipalities: An Ethnographic Perspective (August 24, 2015). Puget Sound Partnership Technical Report 2015-02. Available at SSRN: <https://ssrn.com/abstract=2726321>

but rather a gap in the activity that the funding would address. For example, lack of funding for monitoring post restoration riparian projects would be categorized under lack of monitoring rather than lack of funding. Funding was then cited as a solution to the gap.

Local variation in gaps and barriers

A challenge of compiling information from multiple, independently developed plans is the variation in scale of barriers described in the plans. For example, while some LIOs stated “lack of data” as a gap or barrier, others were more specific and created multiple gaps that could fall under the category “lack of data.” For example, one LIO identified the following as a gap: “Parcel-by-parcel assessments of floodplains for the entire LIO geography is lacking,” while another identified a gap as “Lack of historical information about ecosystem health for all Ecosystem Components and indicators.” To address these differences in scale across LIOs, the total number of barriers in each barrier subcategory is assessed along with the number of LIOs identifying the barrier or gap. The results show spikes in certain areas, suggesting areas for near-term action.

Along with variation in scale, the description of the barrier, gap, or solution was lengthy in some LIO Plans and included multiple barriers in the detailed description. To fully capture the scope of barriers identified in the LIO Plans, the project team assigned these multi-dimensional barriers to each applicable sub-category, rather than assigning it to just one. This explains why, in some descriptive statistics, the total number of barriers is more than the number of individually identified barriers, gaps, and needs listed in the tables of the LIO Plans. After project staff completed categorizing barriers, the LIOs reviewed the result.

Results

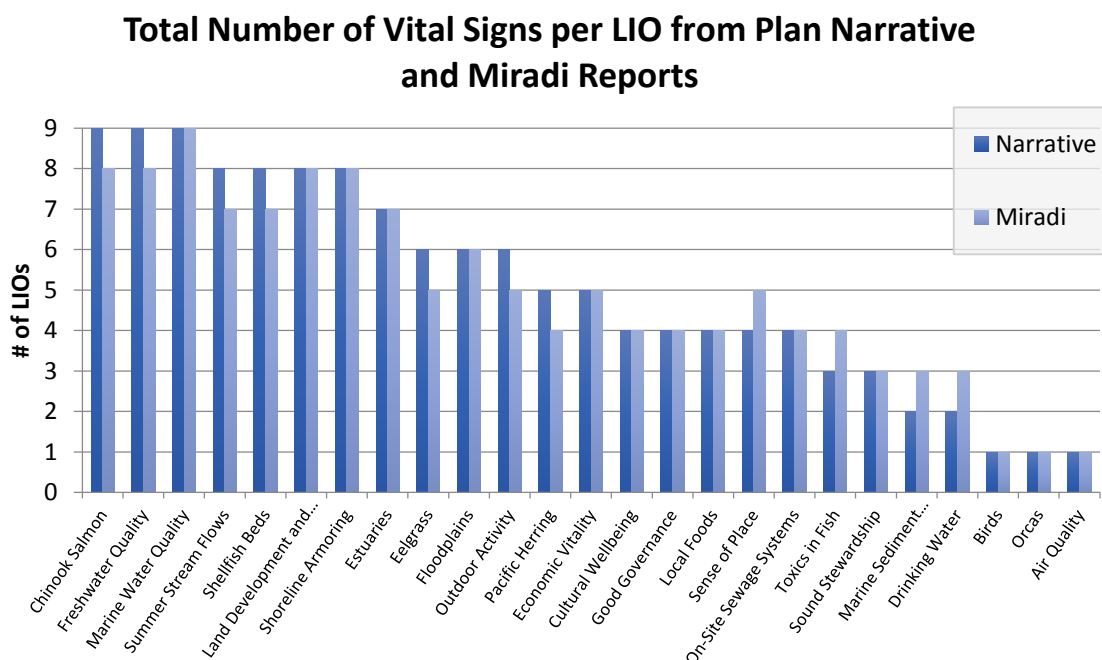
Which Vital Signs are LIOs focusing on?

Vital Signs are the regional taxonomy for the focal components of ecosystem recovery and protection. In the LIO Plans, LIOs determined which components to prioritize for work effort and to use as metrics for recovery status. These priorities, also called focal components, could be pressures (such as shoreline armoring), human well-being (such as cultural practices), or biophysical components (such as estuaries). Each LIO Plan included a series of conceptual models describing the current context in the LIO’s geographic area and results chains describing the LIO’s recovery approaches after they determined the focal components and the associated pressures on that focal component. Most LIOs used Vital Signs or a Vital Sign variant as their focal component; however, some of the focal components do not clearly align with the regional Vital Sign taxonomy (Figure 1). These may be considered as additions or amendments to Vital Signs as the Partnership reviews and updates Vital Signs in the future.



Figure 1: Regional taxonomy of Vital Signs

Figure 2: Vital Signs per LIO Plan, from narrative and Miradi™



There are a few cases where an LIO identified a Vital Sign of priority in the narrative plan but the Vital Sign was not explicit in the results chain, suggesting the Vital Sign is not addressed by any current recovery strategies. In the results chain, Vital Signs are linked to strategies that follow a logic model through interim outcomes, pressure sources, stressors, and ecosystem or human well-being components associated with Vital Signs (See [Appendix C](#)). In the narrative plan, Vital Signs are listed as associated with LIO focal components. The differences between the results chains in Miradi™ and the written narrative could be due to a number of reasons, for example:

- The LIO did not have sufficient time or capacity to build a strategy and associated results chain for all Vital Signs.
- The priority Vital Sign listed in the narrative is not clearly identified in the results chain and so was missed in the Miradi™ summaries.
- The chosen Vital Sign was a lower priority than some of the other chosen Vital Signs and was not addressed directly in the draft recovery plan.

A Vital Sign could be identified in the Miradi™ file but not the narrative for the following reason: LIOs chose to identify cascading improvements, or multi-benefits, across many Vital Signs in addition to the one of focus (in other words the one identified as a priority in the narrative report)

New focal components are demonstrative of local context and help us ask the question, “Does the regional taxonomy accurately represent the needs of the LIOs?”

Following are examples of priority focal components identified by LIOs that do not clearly relate to a Vital Sign.

- Beaches and nearshore
- Drift cells
- Rockfish
- Public safety

Why specific Vital Signs are chosen and prioritized varies among LIOs. Examples of criteria for this prioritization and focus include the following excerpts from LIO Plans:

“...priority focal components were selected because of their importance to local communities, their emphasis in numerous management and conservation plans, and their links to other focal components.”
-Hood Canal Coordinating Council (pg. 11)⁶

“After identifying the important ecological species and functions, the Steering Committee organized the various Components into categories. It was evident that there were three general categories around which the Ecosystem Components were organized: watersheds, forests, and riparian areas; shellfish beds; and nearshore habitat including submerged aquatic vegetation. These became the initial three priority Ecosystem Components.” – West Central (pg. 17)⁷

“The Human Wellbeing Components identified for the Puget Sound Action Agenda were considered in identifying human components for the Whatcom LIO. In most cases, however, modifications were made because the regional naming and/or definitions did not necessarily reflect local circumstances. Definition of the human components incorporated in the Whatcom LIO’s Ecosystem Recovery Plan will be included in the ... 2017 version of the LIO ERP. As part of their approval to submit the December 30, 2016 [Plan] the Policy Boards emphasized that the next steps include further refining objectives and strategies that meet multiple interests and that equally consider human elements (e.g., economy, recreation, culture)”
Whatcom (pg. 23)⁸

What are the sources of environmental pressure in the LIO geographies?

Pressures are the human actions or natural processes that give rise to stress on the ecosystem. Pressures often provide benefits to humans. By understanding the pressures and their underlying sources and stressors, LIOs can better define the context they are working within and where they need to intervene to make progress on recovery while also considering trade-offs and potential impacts to human wellbeing. Pressure sources are the root causes of stressors to Vital Signs or focal components. For example, land development (pressure source) is one cause of land conversion (stressor).

The LIO Plans link pressure sources to associated stressors, which are then linked to Vital Signs. Pressure sources and stressors can be linked to multiple Vital Signs, and Vital Signs can be linked to multiple pressure sources. Where an LIO Plan listed a pressure source similar to that of Puget Sound regional taxonomy, synthesis project staff linked the source to the closest pressure source. When an LIO Plan

⁶ Hood Canal Local Integrating Organization Ecosystem Recovery Plan, December 2016 Draft <
<https://pspwa.box.com/s/k3e537fz0tp57v83gdypxt9exi786xp4>>

⁷ West Central Local Integrating Organization Ecosystem Recovery Plan, December 2016 Draft <
<https://pspwa.box.com/s/qdiu529v9fni23kzcepubyhscun9vav>>

⁸ Whatcom Local Integrating Organization Ecosystem Recovery Plan, December 2016 Draft <
<https://pspwa.box.com/s/x7hxoc3pej2i4oqf56lyxfnsacrp3clb>>

identified a source that did not clearly relate to the pressure source taxonomy, the project team did not tag the source to the taxonomy and did not include it in the charts. The team made note of such sources for future discussions with LIOs and consideration for improvements to the Puget Sound pressure source taxonomy.

LIOs identified pressure sources by using existing local and regional pressures assessments. One example is the Puget Sound Pressure Assessment from 2014⁹.

Below is an example of how an LIO identified its pressures:

“..[we] identified pressures using existing assessments. Most pressures assessments, including the ones used here, focus at least in part on the prevalence of the pressure in the environment. This means places that are relatively less impacted by existing pressures, or pressures that have not yet been fully expressed, may show up as ‘lower’ priority when, in fact, they should be the focus of special attention to prevent adverse impacts in the future. Similarly, pressures operate differently on different natural process or species endpoints – so a pressure that may appear less important overall may nonetheless be critically important to a particular species in a particular place.”

-Alliance for A Healthy South Sound (pg. 22)¹⁰

The data below highlight key questions that we can be asking ourselves:

- *Why are some pressure sources not identified by any LIO?*
- *Which pressure sources are not priorities?*
- *Which are simply irrelevant to Puget Sound recovery?*
- *Are these pressure sources being addressed by similar strategies at the LIO and Sound-wide scales?*

Answering these questions may help the region better address relevancy versus prioritization, as well as how to focus on pressure sources in the Action Agenda. Also, pressures exist at different scales. A pressure that is identified by only one LIO in a specific region may be a stronger pressure against recovery than a pressure source identified by many LIOs but with less relative impact.

Using the Miradi™ files, the project team compiled a list from all nine LIO Plans of the

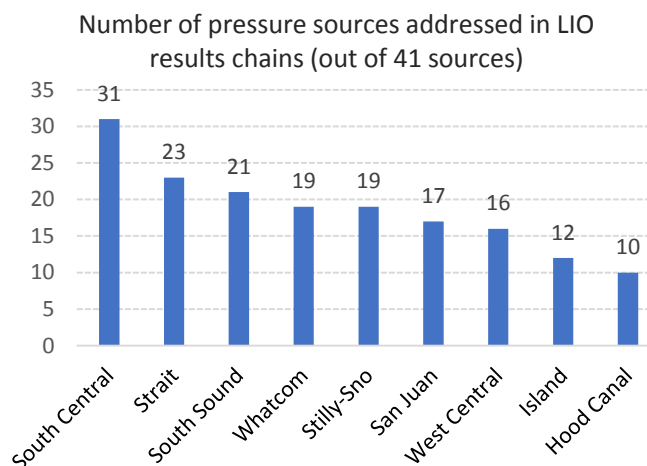


Figure 3: Number of pressure sources addressed in LIO Plan results chains

⁹ McManus, E., K. Jenni, M. Clancy, K. Ghalambor, I. Logan, S. Redman, B. Labiosa, K. Currens, T. Quinn, W. Landis, K. Stiles, J. Burke. 2014. The 2014 Puget Sound Pressures Assessment. Puget Sound Partnership. Publication #2014--04. Tacoma, WA.

¹⁰ Alliance for Healthy South Sound Ecosystem Recovery Plan, December 2016 Draft <<https://pspwa.box.com/s/3ys2vrb0ldrx1wob14e05fdqj74n8je7>>

pressures linked to Vital Signs and strategies. Of the 41 pressure sources, 18 (44 percent) were identified in at least half of LIO Plans (Figure 3, Table 1). Thirteen (32 percent) of the 41 pressure sources were identified in seven or more LIO Plans (Figure 3, Table 1). The only two pressure sources identified in all nine LIO Plans were housing and urban areas and runoff from residential and commercial lands (Table 1).

Of the 41 pressure sources, 17 (41 percent) were not addressed in any LIO Plan (Table 1), suggesting these are pressure sources either irrelevant or low priority in all nine LIO geographies. Five pressure sources (12 percent) were identified by one of nine LIOs:

- Marine and freshwater finfish aquaculture, mining and quarrying, recreational activities, and fire and fire suppression (South Central LIO)
- Hunting and collecting terrestrial animals (Stillaguamish-Snohomish LIO)

The South Central LIO identified the most pressure sources (31, or 76 percent of the pressure source types), while the Hood Canal LIO identified the fewest pressure sources (10, or 24 percent of the pressure source types).

Table 1: LIOs addressing each pressure source

Pressure Sources	# of LIOs addressing source	South Central	Strait	South Sound	Stillaguamish-Snohomish	Whatcom	San Juan	West Central	Island	Hood Canal
1.1 Housing & urban areas	9									
9.1.2 Runoff from residential and commercial lands	9									
4.1 Roads & railroads (including culverts)	8									
7.2.2 Abstraction of groundwater	8									
7.4 Marine shoreline infrastructure	8									
9.3 Agricultural & forestry effluents	8									
1.2 Commercial & industrial areas (including ports)	7									
2.3 Livestock farming & ranching	7									
4.3 Shipping lanes and dredged waterways	7									
9.1.1.1 Domestic & municipal wastewater to sewer	7									
9.1.1.2 Domestic and commercial wastewater to OSS	7									
9.2.1 Oil spills	7									
9.5 Air-Borne Pollutants	7									
7.2.1 Abstraction of surface water	6									
7.2.5 Marine Levees, Floodgates, Tidegates	6									
7.3 Freshwater shoreline infrastructure	6									
2.1 Annual & Perennial Non-Timber Crops	5									

Pressure Sources	# of LIOs addressing source	South Central	Strait	South Sound	Stillaguamish-Snohomish	Whatcom	San Juan	West Central	Island	Hood Canal
9.2.4 Industrial runoff	5									
1.3 Tourism & Recreation Areas	4									
5.4 Fishing & Harvesting Aquatic Resources	4									
7.2.3 Dams	4									
7.2.4 Freshwater Levees, Floodgates, Tidegates	4									
9.2.3 Industrial wastewater	4									
9.4 Garbage & Solid Waste	3									
9.6 Release of Excess Energy (light, heat, sound)	3									
2.2 Wood & Pulp Plantations	2									
2.5 Marine shellfish aquaculture	2									
4.2 Utility & Service Lines	2									
5.3 Logging & Wood Harvesting	2									
6.2 War, Civil Unrest & Military Exercises	2									
2.4 Marine & Freshwater Finfish Aquaculture	1									
3.2 Mining & Quarrying	1									
5.1 Hunting & Collecting Terrestrial Animals	1									
6.1 Recreational Activities	1									
7.1 Fire & Fire Suppression	1									
3.1 Oil & Gas Drilling	0									
3.3 Renewable Energy	0									
4.4 Flight Paths	0									
5.2 Gathering Terrestrial Plants	0									
6.3 Work & Other Activities	0									
9.2.2 Seepage from mining	0									
Total # of pressure sources identified by LIO in results chains		31	23	21	19	19	17	16	12	10

Some LIOs rated or prioritized their pressure sources based on their own criteria and assessment, by using information from the 2014 regional Puget Sound Pressure Assessment, or by a combination and/or refinement of one or both. Examples of criteria used in vulnerability assessments include scope, severity, and irreversibility. Some LIOs linked a pressure source to a Vital Sign and rated it as high or very high. This gave even more detail to understanding which pressure sources are affecting which Vital Sign and to what degree of threat.

What are the stressors that LIOs are experiencing in their geographies?

Stressors represent the biophysical factors altered by pressure sources or the proximate cause of change in the Puget Sound ecosystem. Examples of stressors include land conversion due to development, altered flows due to climate change, shoreline hardening associated with shoreline infrastructure, or shading of shallow water habitat.

In the Miradi™ version of the plans, stressors are linked to their associated Vital Sign and strategy. Stressors could be linked to multiple either Vital Signs or strategies, or both, and vice versa. In cases where a locality had a stressor that was similar to the Puget Sound taxonomy, Partnership staff linked the LIO stressor to the closest stressor in the taxonomy. At times, an LIO used a stressor that did not correlate clearly with the Puget Sound taxonomy. As with sources that did not align with the taxonomy, these were not tagged and not represented in the charts but are being tracked for future discussions with the LIOs and for consideration as the stressor taxonomy is revised and improved.

Of the 47 stressors, 25 (53 percent) were recognized by five LIOs; and 14 (30 percent) were selected by seven or more (78 percent or more) of LIOs (Figure 4, Table 2).

Five of the 47 pressure stressors were addressed by none of the LIOs (Figure #, Table #), these included:

- O. Bycatch
- P2. Non-timber plant harvest
- Q1. Predation from increased native species
- Q2. Displacement by increased native species
- R1. Predation from non-native species

Three of the 47 pressure stressors (or 6 percent) were addressed by just one LIO.

The Strait LIO identified the most stressors (34, or 72 percent). The Island LIO addressed the fewest pressure sources (18, or 38 percent) (Figure 4).

Examples of stressors that did not correlate either by subject or scale with regional taxonomy include the following: hydrological cycles altered, OSS inundated (a pressure source), erosion, food web disruption, aquaculture impaired, fire risk increase.

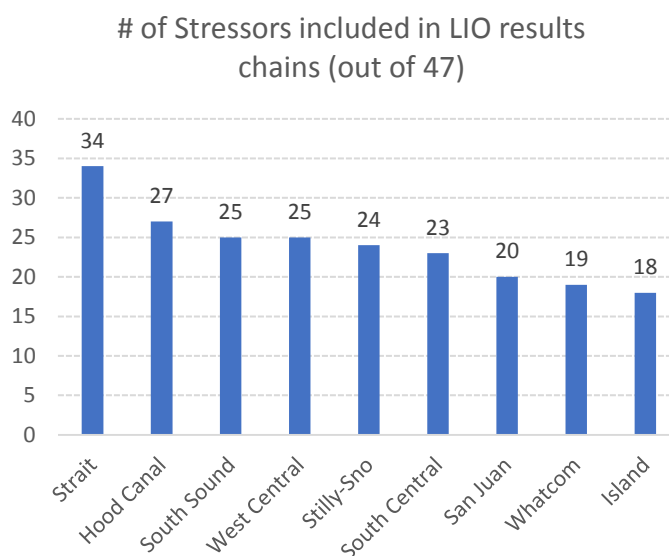


Figure 4: Stressors affecting LIO geographies addressed by LIO Plans

Table 2: LIOs addressing each stressor

Stressors	# LIOs addressing stressor	Strait	Hood Canal	South Sound	West Central	Stillaguamish-Snohomish	South Central	San Juan	Whatcom	Island
A1. Conversion of land cover for residential, commercial, and industrial use	9									
C. Shoreline hardening	9									
J1. Altered peak flows from land cover change	9									
X2. Non-point source conventional water pollutants	9									
X3. Changes in water temperature from local causes	9									
E2. Culverts and other fish passage barriers	8									
K1. Altered low flows from land cover change	8									
M2. Other structural barriers to water, sediment, debris flow	8									
U2. Non-point source, persistent toxic chemicals in aquatic systems	8									
W. Large spills	8									
A3. Conversion of land cover for transportation and utilities	7									
K3. Altered low flows from withdrawals	7									
V2. Non-point source, non-persistent toxic chemicals in aquatic systems	7									
BB. Sea level rise	6									
CC. Changing ocean condition	6									
G1. Terrestrial and freshwater species disturbance in human dominated areas	6									
H. Species disturbance - marine	6									
S2. Introduction, spread, or amplification of human pathogens	6									
A2. Conversion of land cover for natural resource production	5									
B. Terrestrial habitat fragmentation	5									
K2. Altered low flows from climate change	5									
M1. In-channel structural barriers to water, sediment, debris flow	5									
R2. Displacement by non-native species	5									
U1. Point-source, persistent toxic chemicals in aquatic systems	5									

Stressors	# LIOs addressing stressor	Strait	Hood Canal	South Sound	West Central	Stillaguamish-Snohomish	South Central	San Juan	Whatcom	Island
D. Shading of shallow water habitat	4									
E1. Dams as fish passage barriers	4									
J2. Altered peak flows from climate change	4									
S1. Spread of disease and parasites to native species	4									
V1. Point-source, non-persistent toxic chemicals in aquatic systems	4									
Y. Harmful algal blooms	4									
L. Flow regulation -- prevention of flood flows	3									
N. Animal harvest	3									
X1. Point-source conventional water pollutants	3									
Z. Changing air temperature	3									
AA. Changing precipitation amounts and patterns	2									
F. Barriers to terrestrial animal movement and migration	2									
G2. Terrestrial and freshwater species disturbance in natural landscapes	2									
I. Derelict fishing gear	2									
T1. Air pollution from mobile sources	2									
P1. Timber harvest	1									
R3. Non-native genetic material	1									
T2. Air pollution from stationary sources	1									
O. Bycatch	0									
P2. Non-timber plant harvest	0									
Q1. Predation from increased native species	0									
Q2. Displacement by increased native species	0									
R1. Predation from non-native species	0									
Total number of stressors identified by LIO in results chains		34	27	25	25	24	23	20	19	18

What strategies are being used to address stressors and sources and improve Vital Signs?

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

Results chains and associated strategies describe both the high-level and more detailed theories of change that LIOs have identified to support ecosystem recovery by directly restoring or protecting Vital Signs and by reducing pressure sources and stressors. Collectively, the LIOs identified 229 strategies to make progress toward Puget Sound recovery.

LIOs developed their results chains by using existing chains taken from the Action Agenda and by using results chain strategies developed as part of the Phase I monitoring and adaptive management (M&AM) plans for salmon recovery.

Three of the nine LIOs used existing results chains from the Action Agenda, Implementation Strategies, or Chinook salmon recovery plans to describe their strategies:

- South Sound LIO
- Island LIO
- West Central LIO

Six of the nine LIOs revised all or some of the existing results chains to describe their strategies:

- Hood Canal Coordinating Council LIO
- San Juan LIO
- Stillaguamish-Snohomish LIO
- South Central LIO
- Strait Ecosystem and Recovery Network LIO
- Whatcom LIO

Hood Canal LIO accounted for nearly half of the strategies identified (93, or 41 percent), while South Sound LIO accounted for just 4 percent of the strategies identified, with a total of 10 strategies (Table 5). The relatively high number of strategies in the Hood Canal LIO Plan reflects the LIO's efforts to more finely define six primary strategies with five to 35 sub-strategies under the primary strategy. Many other

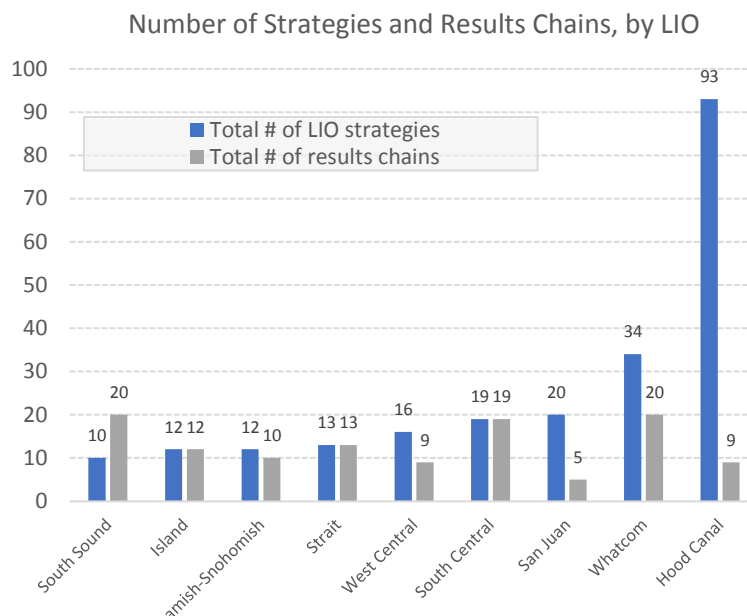


Figure 5: Number of strategies and RC by LIO

LIOs defined strategies at a coarser scale, combining detailed recovery approaches into fewer, higher-level strategies.

Alignment with Action Agenda sub-strategies

LIO-defined strategies relate to Action Agenda sub-strategies in three different ways: Some LIO strategies are aligned with the existing Action Agenda sub-strategies (replicating the sub-strategy verbatim); some are similar to existing sub-strategies but suggest revisions, expansions, or narrowing of focus; and some represent entirely new strategies (Table 3). There are 76 (33 percent) LIO strategies that replicate an Action Agenda sub-strategy verbatim. There are 127 (56 percent) LIO strategies that are stated similarly to those of the AA, however are either more narrowly defined or broadened in scope. In many cases these are also informed by Salmon Recovery M & AM development. There are 26 (11%) new LIO strategies, and these are described further below.

Table 3: Strategy relationship to Action Agenda sub-strategies

LIO	Strategy relationship to Action Agenda sub-strategies			
	Verbatim	Similar (revisions to existing sub-strategies)	New	Summary of revisions
Hood Canal	x (11 of 93)	x (82 of 93)		Generally more focused than existing strategies
Island	X (12 of 12)			N/A
San Juan	x (9 of 20)		x (11 of 20)	New strategies
South Central	X (19 of 19)			N/A
South Sound	x (2 of 10)	x (7 of 10)	x (1 of 10)	Despite revisions, remains generally consistent with strategies and sub-strategies
Stillaguamish-Snohomish		x (11 of 12)	x (1 of 12)	Generally a combination of multiple sub-strategies
Strait		X (13 of 13)		Generally combined and expanded on multiple sub-strategies
West Central	X (16 of 16)			N/A
Whatcom	x (7 of 34)	x (14 of 34)	x (13 of 34)	• Some expansion • Some more focused on a portion of a strategy • Some are combinations of existing strategies

Hood Canal LIO

The Hood Canal LIO generally developed strategies by revising existing Action Agenda sub-strategies to be more finely defined and focused. However, most of the Hood Canal Shellfish Initiative strategies (5 of 8) were consistent with Action Agenda sub-strategies.

Examples of the revised Hood Canal strategies include the following:

- Remove, soften and prevent shoreline armoring
- Restore and protect priority estuarine, nearshore, freshwater, and upland salmonid habitat

- Prevent pollution sources from entering Hood Canal marine and freshwaters
- Hood Canal Forests and Open Space Strategy, and the Hood Canal Shellfish Initiative
- Proactively prepare for climate change impacts across Hood Canal
- Maintain Role as Central Information Source on Hood Canal Ecosystem Recovery

San Juan LIO

San Juan LIO developed 11 new strategies. Half of these support freshwater restoration (Table 4).

Table 4: San Juan Strategies unaligned with AA sub-strategies

High-Level Strategy (Results Chain Title)	New strategies
Freshwater Restoration	• Augment summer low flows in surface waters to support salmonid habitat • Restore floodplain connectivity (this is a secondary strategy) • Implement freshwater restoration projects to restore native salmonids and cutthroat • Restore native riparian vegetation (this is a secondary strategy) • Restore wetlands (this is a secondary strategy) • Restore instream habitat (this is a secondary strategy)
Large Oil Spills / Vessel Traffic Impacts	• Protection strategy (under development with tribal partners)
Shoreline Hardening	• Encourage bulkhead removal for private residential properties where appropriate • Implement and enforce Shoreline Master Plan to promote avoidance of bulkhead construction • Manage stormwater runoff to protect shoreline from erosion
Stormwater Protection	• Manage stormwater to protect water quality

South Sound LIO

The South Sound LIO developed strategies that were generally consistent with the Action Agenda sub-strategies. Most included minor revisions to tailor strategies to local priorities regarding the following:

- Urban growth and land management plans and regulations
- Reducing pollutant and nutrient loading
- Watershed-scale local stormwater management
- Support for natural resource programs
- Implementation of high-priority habitat protection and restoration projects.

One new strategy to “provide support to land owners to limit pollutant loads to surface water through best management practices” was also developed.

The region can learn about what new strategies localities are using and then better support them at a regional level.

Stillaguamish-Snohomish LIO

Stillaguamish-Snohomish LIO generally combined multiple Action Agenda sub-strategies to develop most of their strategies. The focus was on crosscutting opportunities that address pressures impacting multiple ecological and human wellbeing components for maximum impacts. These combined strategies cover the following:

- Nearshore, freshwater, and estuarine protection and restoration
- Stream flow protection
- Integrated planning
- Outreach for stormwater stewardship
- Reducing pollutants and nutrients from non-point source contaminants, legacy stormwater systems and on-site septic systems
- Implementation of the Growth Management Act (GMA) recognizing Puget Sound recovery goals and regional coordination

This LIO also developed two new strategies to “improve funding for restoration” and provide “education about the real results of illegal armoring.”

Strait LIO

Strait LIO generally combined and expanded on multiple Action Agenda sub-strategies to develop their individual strategies. Their strategies cover the following:

- Floodplain, estuary (pocket and natal), shoreline and land use protection and restoration
- Drift cell and shoreline conservation and restoration
- Eliminate fish passage barriers and improve instream habitat
- Enhance native fish and shellfish populations
- Implement or enhance implementation of:
 - Water quality cleanup plans
 - Highest priority climate change adaptation strategies for the north Olympic Peninsula
 - Local water resource, shoreline, land use and watershed-scale stormwater management
- Improve freshwater and marine riparian management
- Enhance:
 - Support for oil spill preparedness, prevention and response
 - Local communication, education, behavior change and public involvement programs

Whatcom LIO

The Whatcom LIO generally developed new strategies (Table 4) or revised existing strategies by expanding them, combining them or focusing on a portion of an existing strategy. The revised strategies cover the following:

- Cross-cutting strategies around improvements to regulations and policies; implementing education, outreach, and incentive and cost-share programs; and U.S./Canadian coordination over transboundary impacts to water resources
- Climate change assessment and adaptation
- Habitat strategies to inform adaptive management for salmon recovery and develop an integrated floodplain management plan

- Shellfish strategies to provide technical assistance for reducing bacterial pollution and perform effectiveness monitoring
- Water quality strategies to prevent and reduce the risk of petroleum oil spills, watershed-scale stormwater management and expand the OSS program

Table 5: Whatcom strategies unaligned with Action Agenda sub-strategies

High-Level Strategy (Results Chain Title)	New strategies
Develop binding agreements to resolve water quantity, water quality, habitat and drainage issues	• Develop binding agreements to resolve water quantity, water quality, habitat and drainage issues
Implement and expand incentive/cost-share programs	• Develop funding strategy
Water supply/use studies and solutions	• Quantify water availability, water use and water supply needs • Identify, evaluate and support solutions for meeting water supply needs
Habitat restoration and protection	• Land acquisition, conservation easements, farm transition, and/or landowner agreements
Salmon recovery research, monitoring, and adaptive management;	• Technical assessments and WRIA 1 SRP update
Stormwater characterization and monitoring	• Stormwater characterization and monitoring
<i>None provided</i>	• Select and adopt new instream flows • Adjudicate/define federally-reserved and state-based water rights • Support water management research • Coordinate salmon recovery plan implementation • Improve petroleum oil spill response planning, capacity

Strategies Aligned with Action Agenda 2016 sub-strategies

There are 203 LIO strategies that are either verbatim aligned with or similar to the Action Agenda (AA) 2016 sub-strategies. Some of the LIO strategies that are deemed “similar” align with more than one AA sub-strategy. The LIO strategies that clearly align with the AA sub-strategies are compiled in Table 5. This list shows that a few sub-strategies represent a common focus of many LIOs. For example, the following five AA sub-strategies are aligned with eight or more LIO strategies:

- (1.2) Support local governments to adopt and implement plans, regulations and policies consistent with protection and recovery targets, and incorporate climate change forecasts
- (2.2) Implement and maintain priority freshwater and terrestrial restoration projects
- (6.1) Implement high-priority projects identified in each salmon recovery watershed's three-year work plan
- (6.3) Implement harvest, hatchery, and adaptive management elements of salmon recovery
- (26.3) Enable and encourage residents to take informed stewardship actions addressing infiltration, pollution reduction, habitat improvement, forest cover, soil development, critical areas, reductions in shoreline armoring, and specific actions identified in other sub-strategies

Table 6: Sub-strategies with four or more LIO strategies associated

Strategy ID	Strategy Description Sub-Strategies with at least 4 LIO strategies associated are listed in this table	# of LIO Strategies aligned or similar
6.1	Implement high-priority projects identified in each salmon recovery watershed's 3-year work plan	20
6.3	Implement harvest, hatchery, and adaptive management elements of salmon recovery	18
1.2	Support local governments to adopt and implement plans, regulations and policies consistent with protection and recovery targets, and incorporate climate change forecasts	14
2.2	Implement and maintain priority freshwater and terrestrial restoration projects	8
26.3	Enable & encourage residents to take informed stewardship actions addressing infiltration, pollution reduction, habitat improvement, forest cover, soil development, critical areas, reductions in shoreline armoring, and specific actions identified in other sub-strategies	8
10.1	Manage urban runoff at the basin and watershed scale	7
10.3	Fix problems caused by existing development	7
21.4	Develop and implement local and tribal pollution identification and correction programs	7
5.4	Implement and maintain priority floodplain restoration projects	6
10.4	Control sources of pollutants	6
16.1	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	6
1.1	Identify & prioritize areas for protection, restoration, & best suitable to low impact development	5
5.3	Protect and maintain intact and functional floodplains	5
11.1	Target voluntary and incentive-based programs that help working farms contribute to Puget Sound recovery	5
16.2	Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands	5
16.3	Remove armoring, and use soft armoring replacement or landward setbacks when armoring fails, needs repair, is non protective, and during redevelopment	5
8.2	Support local governments to adopt and implement plans, regulations, and policies that protect the marine nearshore and estuaries, and incorporate climate change forecasts	4
10.5	Provide focused stormwater-related education, training, and assistance	4

16	Protect and restore nearshore and estuary ecosystems	4
21	Address and clean up cumulative water pollution impacts in Puget Sound	4

Strategies, Pressure Sources and Vital Signs

The following section looks at the seven most common Vital Signs identified by LIOs and identifies which stressors their strategies are addressing. These Vital Signs were chosen as focal components by at least eight of the nine LIOs: Chinook, Freshwater Quality, Marine Water Quality, Summer Stream Flows, Shellfish Beds, Shoreline Armoring, and Land Development and Cover. Many LIO strategies related to these Vital Signs address multiple stressors and are also linked to other Vital Signs, suggesting that improvement of one Vital Sign in an LIO will likely benefit multiple Vital Signs in the same area.

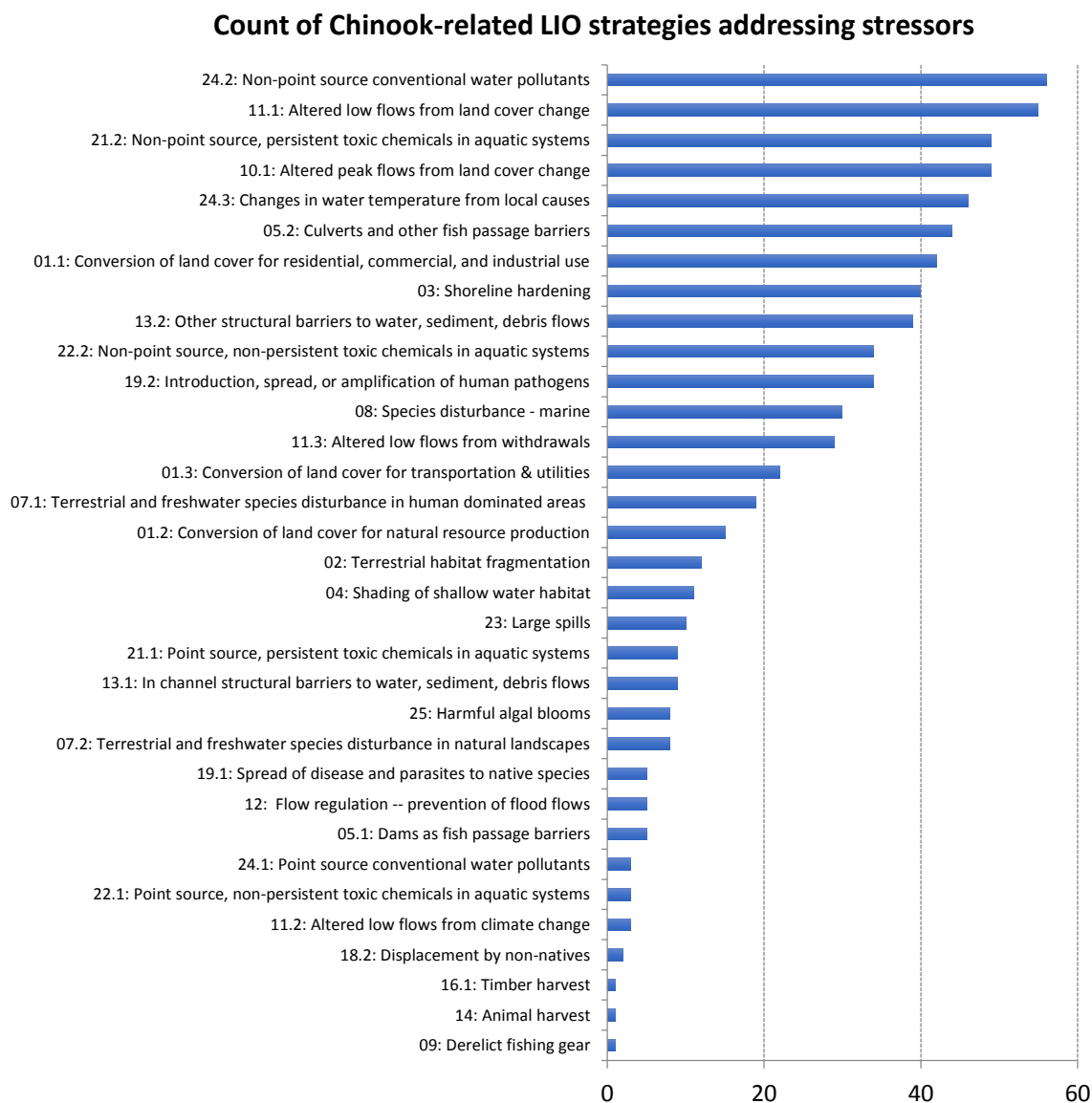
[Appendix D](#) notes the specific strategies associated with these seven Vital Signs. The data used in this synthesis are from the Miradi™ files.

Chinook salmon

There are 113 strategies that have Chinook salmon as a focal component. These 113 strategies address many stressors. Figure 8 shows the common stressors addressed by the 113 strategies.

Of all of the stressors addressed by LIO strategies intended to recover the Chinook Vital Sign, the most common stressors addressed include altered low flows and peak flows from land cover change, water quality issues, land conversion, culverts and fish passage barriers and shoreline hardening.

Figure 8: Count of Chinook-related LIO strategies addressing pressure stressors

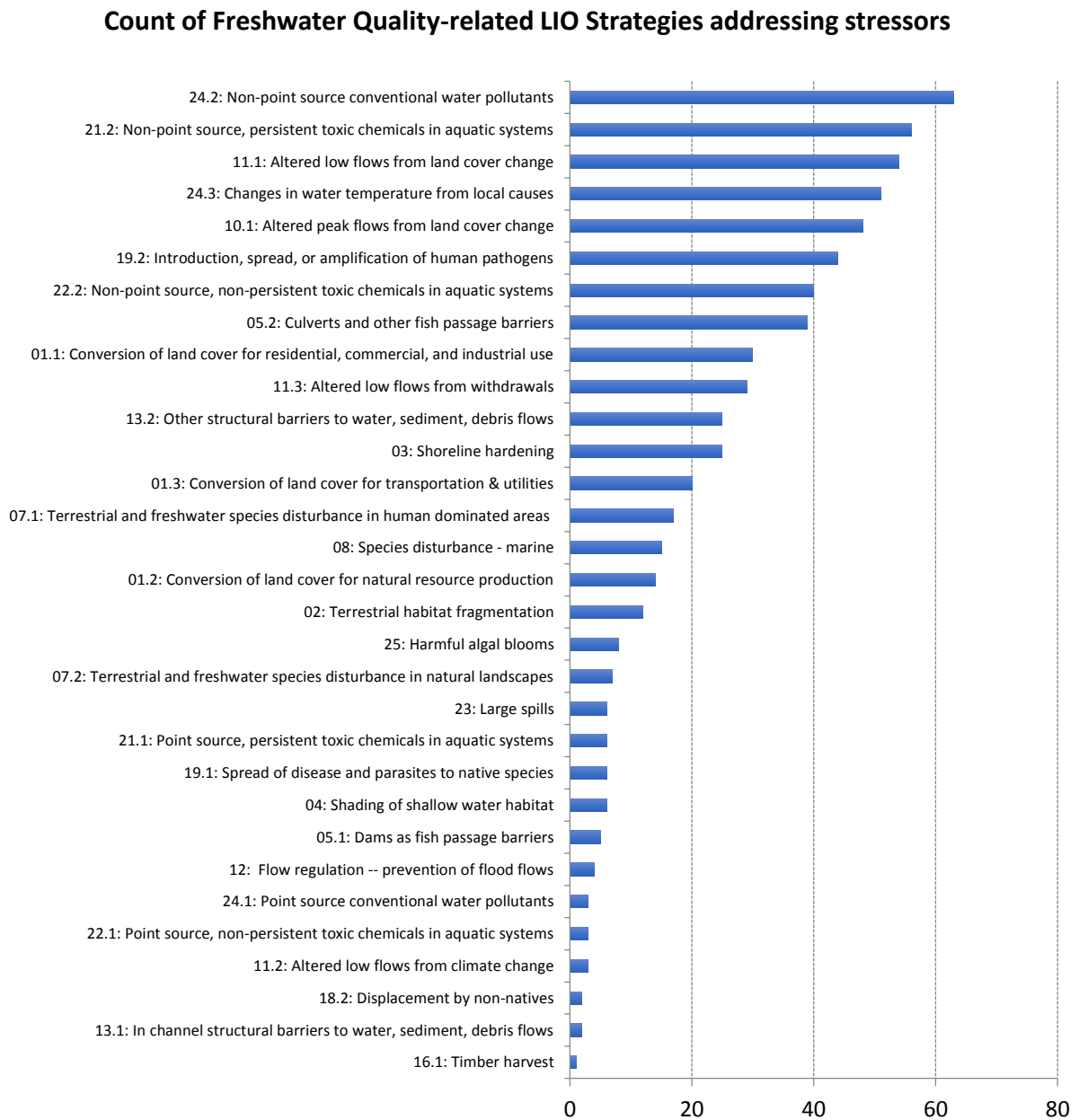


As a Vital Sign, Chinook has significant focus of all the LIOs. The stressors that are addressed by more of the Chinook-related LIO strategies can tell us where LIOs are focusing their efforts to intervene to recover the Chinook Vital sign. As the LIO plans and the completeness of data in the Miradi project files continues to be adaptively managed, these numbers will become more precise.

Freshwater Quality

93 LIO strategies address Freshwater Quality as a focal component. The five most common stressors addressed by LIO strategies focused on Freshwater Quality relate to non-point source pollution, water temperature, and altered flows (Figure 8).

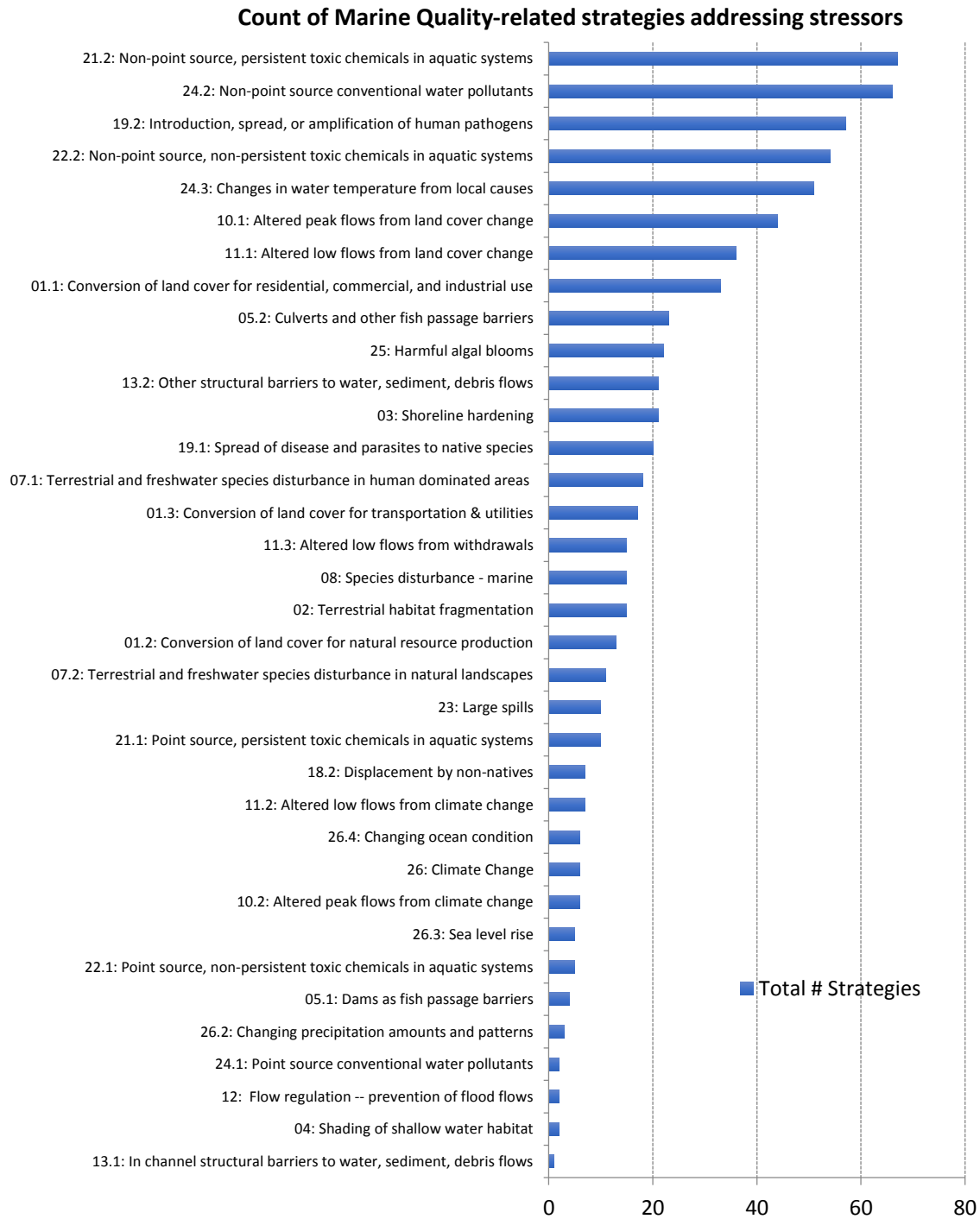
Figure 8: Count of Freshwater Quality-related LIO strategies addressing pressure stressors



Marine Water Quality

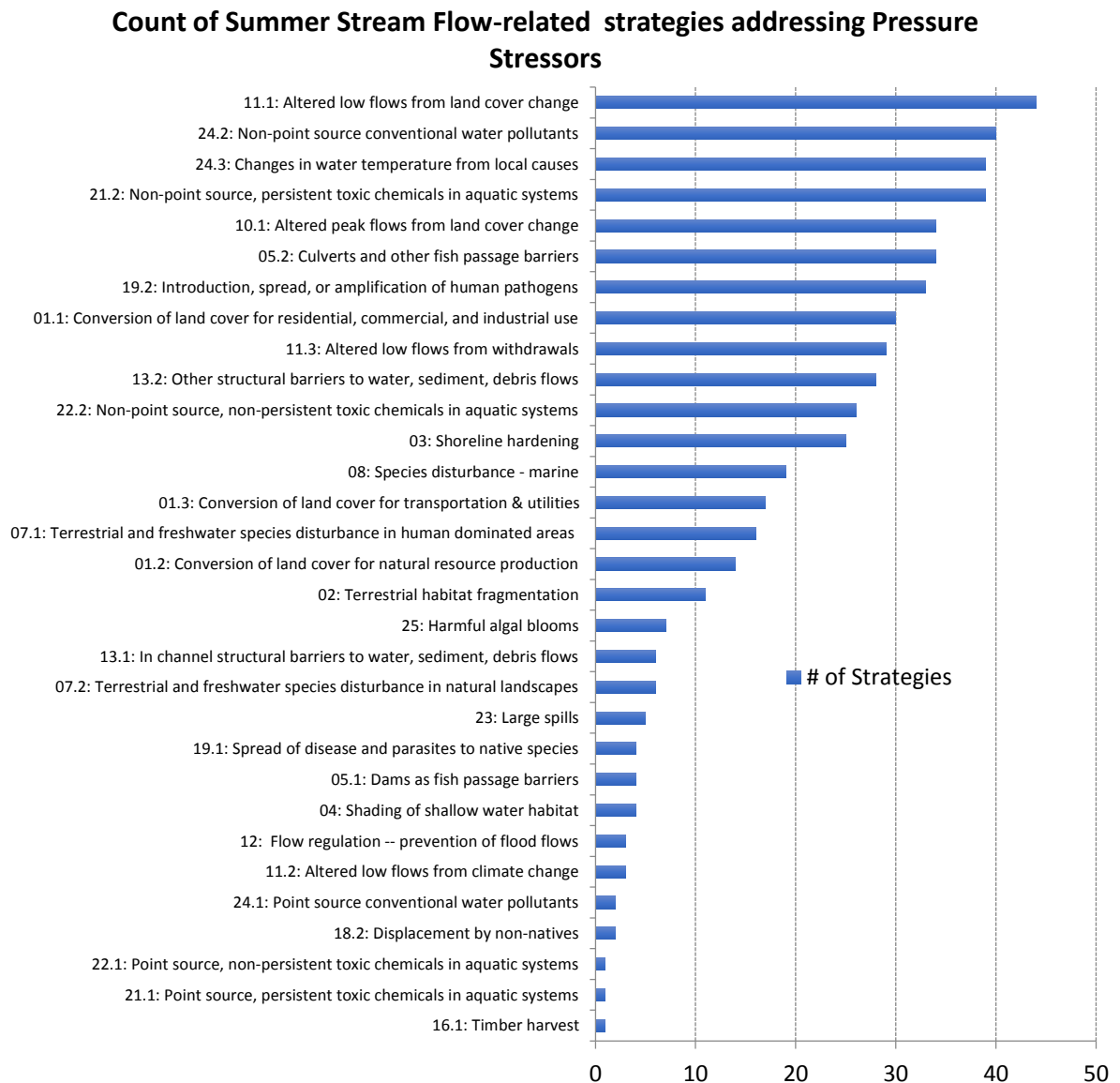
98 LIO strategies address Marine Water Quality as a focal component. The most common five stressors that are the focus of LIO strategies include: non-point source pollutants, changes in water temperature, and the introduction, spread or amplification of human pathogens (Figure 9).

Figure 9: Count of Marine Quality-related LIO strategies addressing pressure stressors



68 LIO strategies address Summer Stream Flows. The top four stressors that are most commonly addressed by LIO strategies include altered flows from land cover change, non-point source water pollutants, and changes in water temperature from local causes.

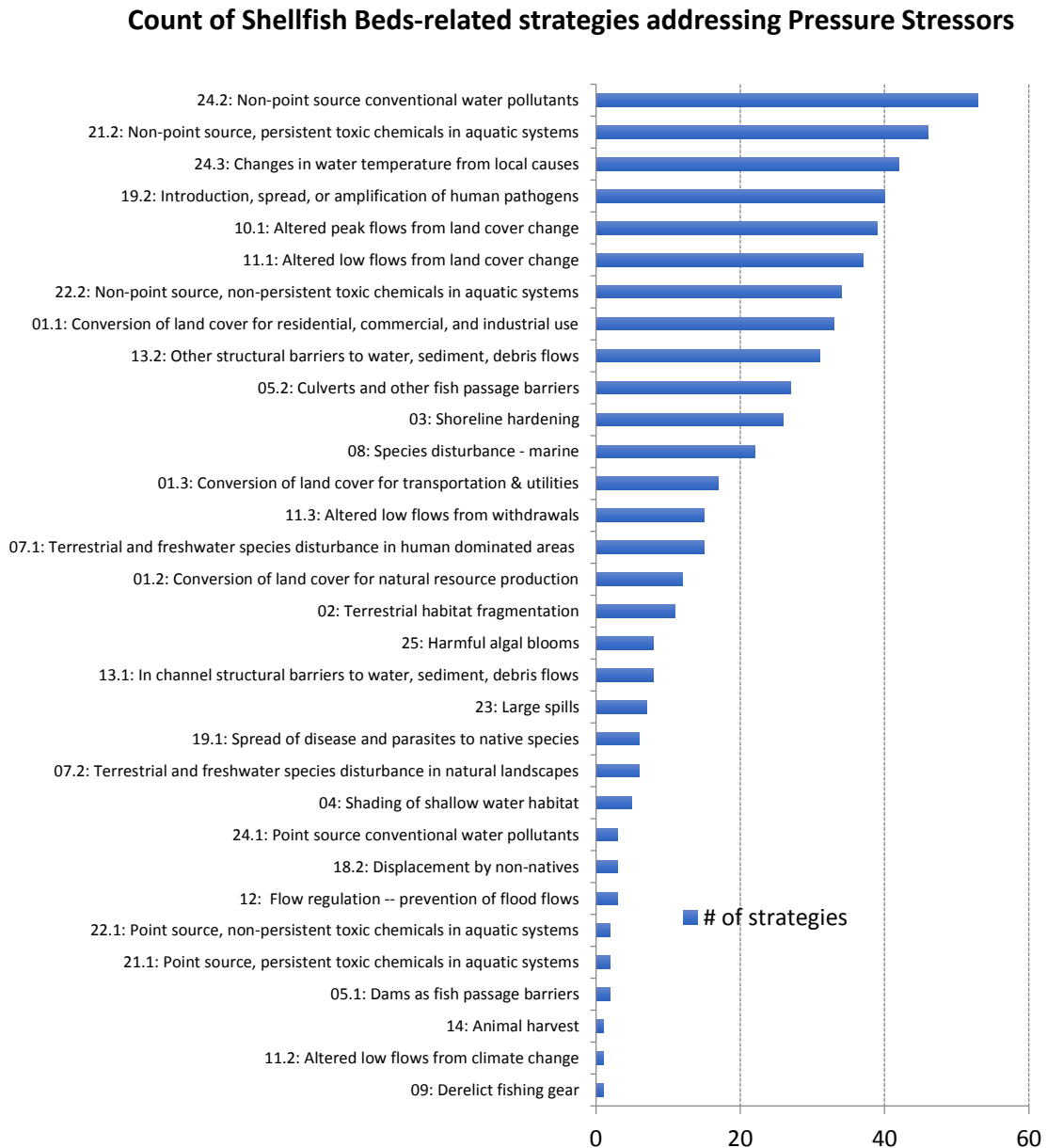
Figure 10: Count of Summer Stream Flow-related strategies addressing pressure stressors



Shellfish Beds

80 LIO strategies address shellfish beds, many of these strategies are the same as those focused on freshwater and marine water quality. It is not surprising then to see the same common stressors addressed by LIO strategies focused on shellfish beds: non-point source pollution, human pathogens, water temperature, and altered flows (Figure 9).

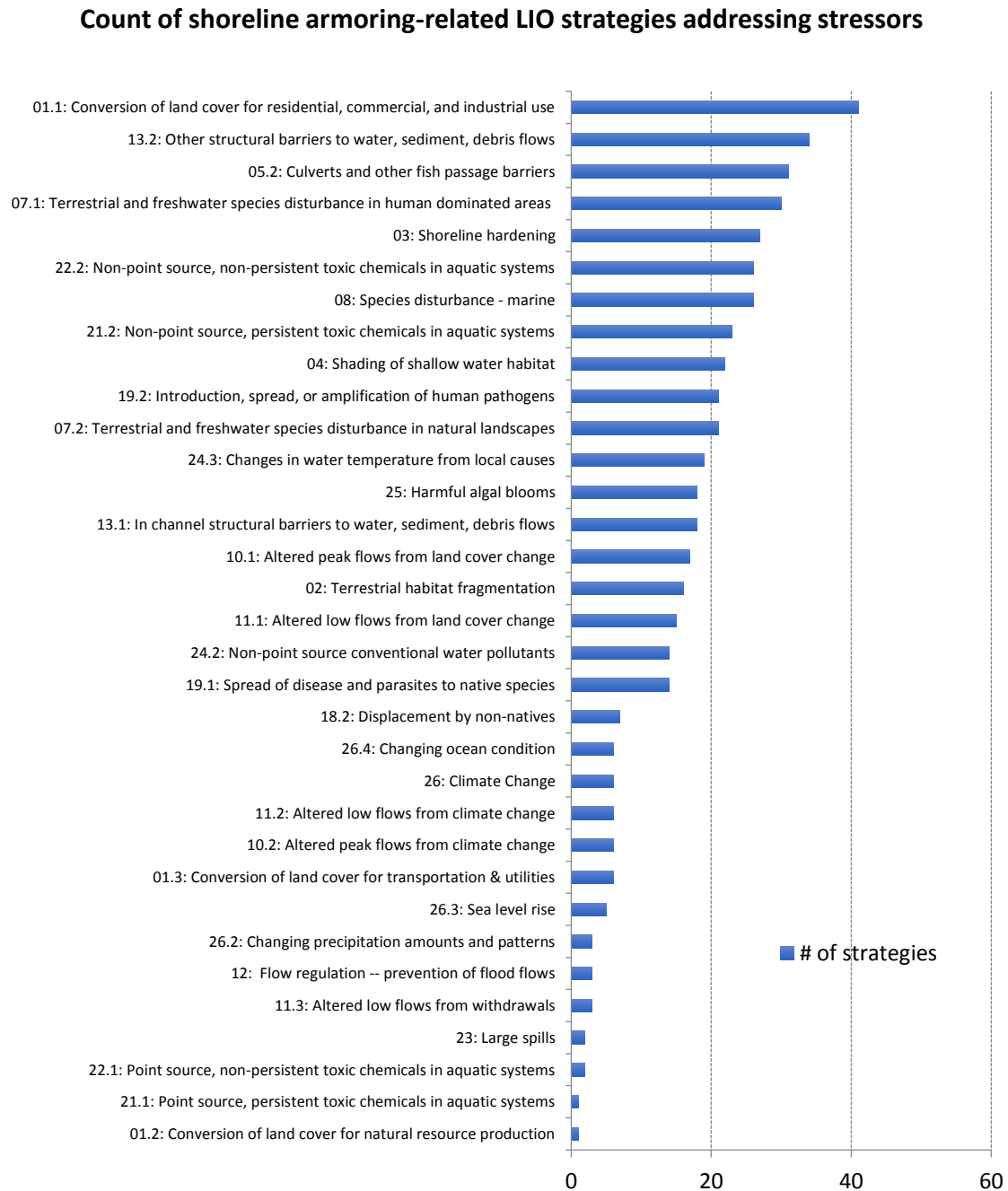
Figure11: Count of shellfish-related strategies addressing pressure stressors



Shoreline armoring

91 LIO strategies address shoreline armoring. Shoreline armoring is itself a stressor, represented as shoreline hardening in the Puget Sound stressor taxonomy. Other stressors that are also commonly addressed by LIO strategies related to shoreline armoring include conversion of land cover for residential, commercial and industrial use, other structural barriers to water, sediment and debris flow, culverts and other fish passage barriers, and species disturbance.

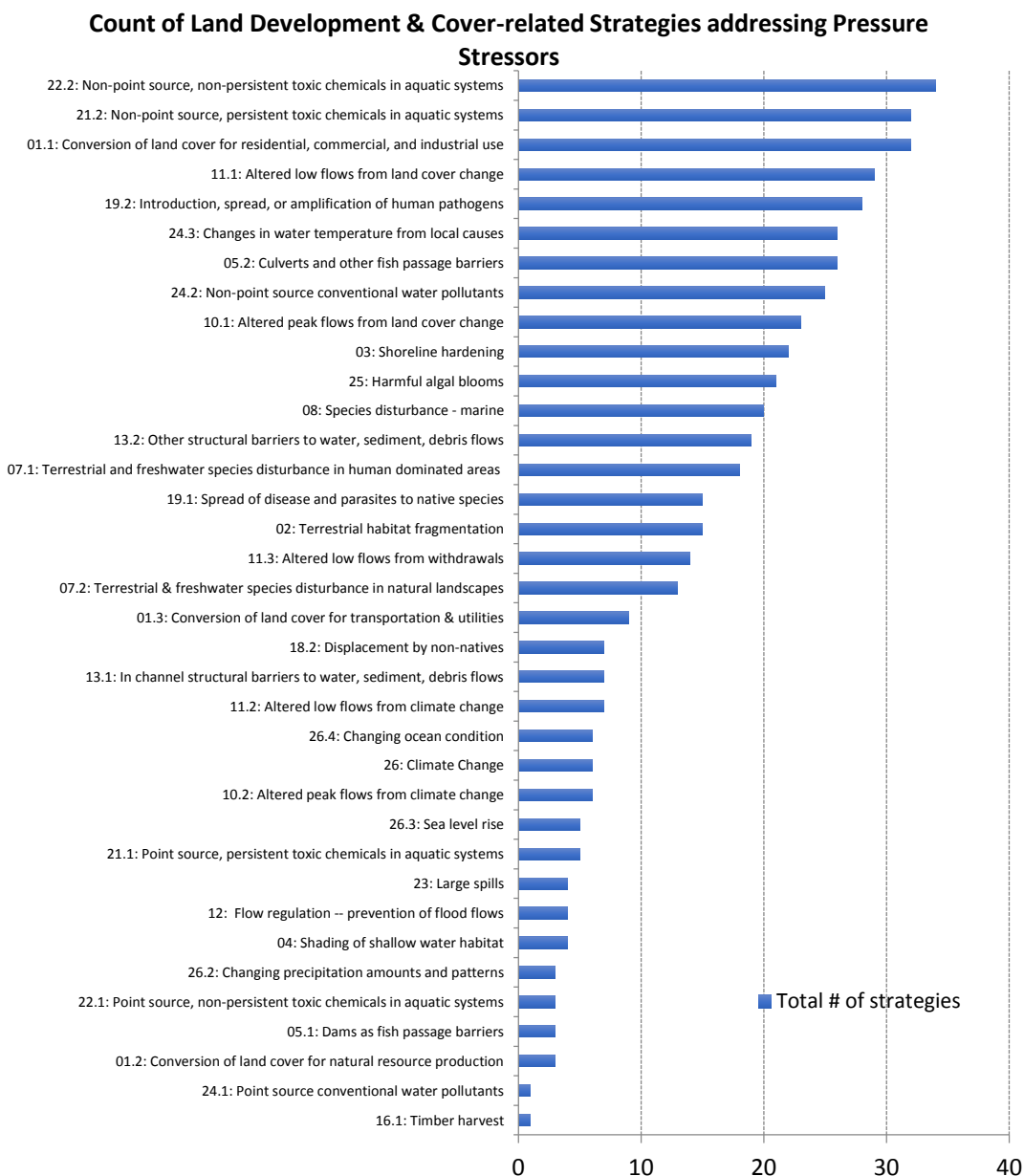
Figure 12: Count of shoreline armoring-related LIO strategies addressing stressors



Land Development and Cover

99 LIO strategies address land development and cover. The Land Development and Cover Vital Sign is a complex Vital Sign covering both the pressures of land development and forest cover and riparian areas—or land cover. Not surprisingly, many LIO strategies related to land development and cover address multiple Vital Signs or focal components and the pressure sources and stressors that are affecting them. Like other Vital Signs, non-point source pollution is a focus of many LIO strategies addressing land development and cover. Here we also see significant focus of LIO strategies on conversion of land cover for residential, commercial, and industrial use (Figure 13).

Figure13: Count of Land Development & Cover-related strategies addressing pressure stressors



Gaps and Barriers

The success of Puget Sound recovery and protection is dependent on local and regional entities addressing the gaps and barriers that restrict efficiency, action, accountability, and collaboration. As a region, understanding the barriers and gaps that are pervasive across all LIOs will enable local and regional entities to focus efforts on overcoming these barriers through shifts in allocation of staff time, funding, and other resources. This is part of the ongoing effort to provide

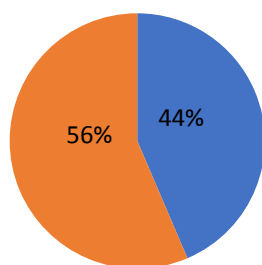
Understanding the barriers and gaps that are pervasive across all LIOs will enable local and regional entities to focus efforts on overcoming these barriers

systemic actions that improve our collective ability to solve complex problems.

Figure 14: Total Gaps & Barriers from LIO Plans

Total Gaps and Barriers

■ Gaps (105) ■ Barriers (136)



The total number of gaps and barriers identified across all nine LIOs is 241 (Figure 14). These gaps and barriers were taken from tables in the LIO Plans along with conceptual models where some LIOs identified gaps and barriers as “contributing factors.” Of these, 105 are gaps, and 136 are barriers. All gaps could be labeled as barriers and in some cases the LIO did this. Each LIO categorized the gap or barrier as “gap,” or “barrier.” If the gap or barrier was not categorized by the LIO, Partnership staff made the interpretation.

The nine LIOs each identified a different number of barriers and gaps (Table 7). The scale of each of the gaps and barriers, as mentioned above in *Methods*, is varied. This is evident especially between the Strait, Snohomish-Stillaguamish, South Sound who all identified a large number of gaps and barriers and the other six LIOs who identified a limited number. The Strait LIO identified 91 unique gaps and barriers, Snohomish-Stillaguamish identified 45 unique gaps and barriers and South Sound identified 42 gaps and barriers. All other LIOs identified between four and 18 gaps and barriers.

Table 7: Gaps and Barriers by LIO

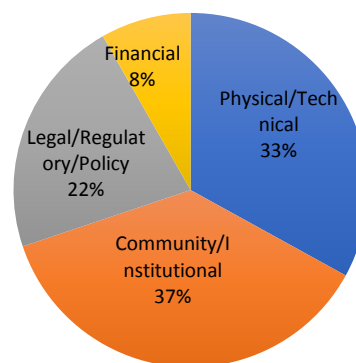
	Hood Canal	Island	San Juan	South Central	South Sound	Snohomish-Stillaguamish	Strait	West Central	Whatcom	Total
Gaps	0	9	2	11	25	9	39	4	6	105
Barriers	4	4	4	7	17	36	52	5	7	136
Total	4	13	6	18	42	45	91	9	13	241

Gaps and Barriers by Category

Each of the 241 gaps and barriers were coded using primary and sub categories. The coding was completed by Partnership staff and reviewed by LIO coordinators in February of 2017. The primary categories include the following:

- Physical/Technical
- Community/Institutional
- Legal/Regulatory/Policy
- Financial

Gaps and Barriers by Primary Category



The sub-categories for each of these primary categories can be found in [Appendix B](#). Many

Figure 15: Gaps and Barriers by primary category

of the LIOs listed barriers or gaps that were complex and encompassed more than one sub-category of a barrier or gap. In this case, Partnership staff coded the barrier or gap under all appropriate sub-categories. This coding was reviewed by LIO. While there are a total of 241 gaps and barriers, each fell into one or more subcategories, resulting in 315 sub-categorizations from the 241 gaps and barriers. Figure 15 summarizes the 315 barriers that were identified from the 241 individual gaps or barriers listed in LIO Plans.

An example of a single LIO barrier that includes multiple barrier types is “lack of regional guidance surrounding local/regional indicators.”

The LIO explains,

“lack of regional guidance around specific metrics and protocols that should be used to ensure consistency across watersheds. The need for regional guidance is important, as there are many different entities collecting data (e.g., Snohomish County, King County, Tulalip Tribes, and Snohomish Conservation District). This need is also important because the metrics are the basis for goal statements.” There are two issues within this one barrier/gap, including lack of regional guidance and the need to establish local indicators. The first falls under the community/institutional primary category and the second falls under technical/physical primary category.

Figure 16: Physical/Technical Gaps and Barriers

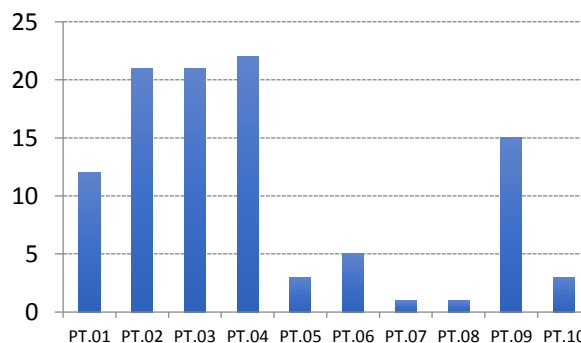
The specific coding can be found in [Appendix B](#).

Physical & Technical Gaps and Barriers

Physical and Technical gaps and barriers comprise 33 percent of all gaps and barriers.

Physical and technical gaps and barriers relate to scientific data gaps, extent of the problem in

Total Count of Physical/Technical Gaps and Barriers identified by LIOs



the ecosystem, problems with or lack of technology and tools, and status of recovery knowledge (Figure 16). There are 10 sub-categories the Partnership identified using the LIO Plans that fall under physical/technical gaps and barriers. Figure 16 shows the number of gaps and barriers that fall into each sub-category. In the table below, the number of LIOs identifying at least one gap or barrier in the sub-category is shown. For example, a total of 15 gaps or barriers identified by LIOs fall under “PT.09 Issue too large/complex for single LIO,” however these were identified by only four of the nine LIOs (Table 8).

Table 8: Number of LIOs identifying barrier or gap sub-categories

Sub Categories of gaps and barriers			# LIOS
Physical/Technical	PT.01	Lack of baseline and historical data	9
	PT.02	Lack of data on species and ecosystems (salmonids, herring, wetlands, DO, NPS pollutants, hydrology)	8
	PT.03	Lack of data regarding infrastructure inventory/assessment/prioritization (shoreline armoring, green infrastructure effectiveness studies, fish passage barriers)	6
	PT.04	Lack of monitoring and project assessment	9
	PT.05	Climate change uncertainties	3
	PT.06	Lack of LIO-specific Vital Sign target status information (from Partnership)	3
	PT.07	Biennial Science Workplan needs more metrics (ex. Chinook)	1
	PT.08	Concerns about Vital Sign Framework (too broad, too specific, other)	2
	PT.09	Issue is too large/complex for single LIO	4
	PT. 10	Lack of technology and tools to adequately address problem	1

Community & Institutional Gaps and Barriers

Community and Institutional gaps and barriers comprise just over 37 percent of all barriers and gaps identified by LIOs.

Community and Institutional Barriers include communication ineffectiveness, poor leadership, institutional taxonomic discrepancies, information and process silos, and lack of public engagement and coordination flaws, among others. There are 18 subcategories that the Partnership identified as falling under community and institutional gaps and barriers (Figure 17). As with the previous category, the total number of gaps or barriers of each subcategory type identified by all LIOs is summarized in Figure ## and the number of LIOs including these barriers and gaps is presented in Table 9.

Figure 17: Community/Institutional Gaps & Barriers

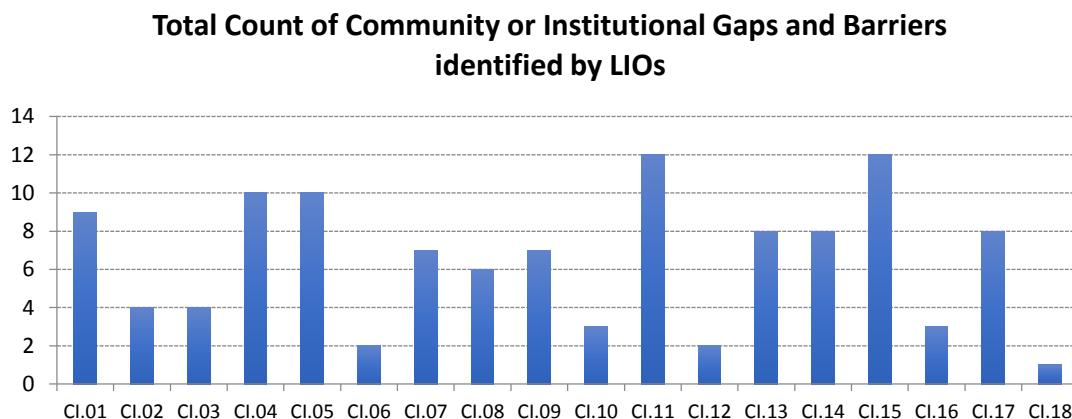


Table 9: Number of LIOs identifying gap or barrier sub-categories

Sub Categories of gaps and barriers		# LIOs
Community/Institutional	CI.01 Too much planning (reduced capacity for implementation)	7
	CI.02 Costs of regional participation high when benefits low	2
	CI.03 Policy, research, and project timeframes misaligned	3
	CI.04 Regional taxonomy of Strategies, Vital Signs, and targets don't reflect local goals	3
	CI.05 Lack of coordination between local and regional entities (ex. Lack of involvement between SI Leads and NTA owners)	6
	CI.06 Lack of local and regional project integration	2
	CI.07 Concerns, participation, and disagreement within LIO	2
	CI.08 Jurisdictional, agency, programmatic silos	4
	CI.09 Lack of community engagement and public support	5
	CI.10 Jargon restricts access to, understanding by, and participation from public and elected officials	2
	CI.11 Lack of public behavior change	4
	CI.12 Lack of salmon recovery integration	2
	CI.13 Lack of best available science integration into policy and planning	3
	CI.14 Conflicting values	4
	CI.15 Challenge in prioritization of components, pressures, strategies and/or implementation	5
	CI.16 Lack of US-Canada trans-boundary communication/coordination	2

CI.17	Taxonomy discrepancies (ex. PSPA)	2
CI.18	Criteria for ranking NTA's too qualitative	1

Legal, Regulatory and Policy Gaps and Barriers

Legal, regulatory and policy gaps and barriers comprise 22 percent of the total barriers classified.

Legal, regulatory, and policy gaps and barriers include enforcement and compliance barriers, policy maker and elected official disengagement (although this could also be categorized under community/institutional), as well as imperfect laws and lack of policy tools that would help to facilitate solutions. Although many individual barriers were identified for some sub-categories, for example 20 barriers or gaps related to LR.01 Deficiencies in enforcement and compliance, fewer than half of the LIOs, and in most cases only one LIO, included barriers under any of these sub-categories. As with the previous category, the total number of gaps or barriers of each sub-category type identified by all LIOs is summarized in Figure 18 and the number of LIOs including these barriers and gaps is presented in Table 10.

Figure 18: Legal/Regulatory/Policy Gaps & Barriers

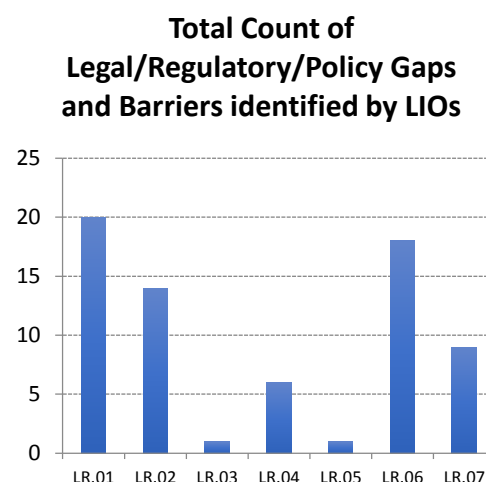
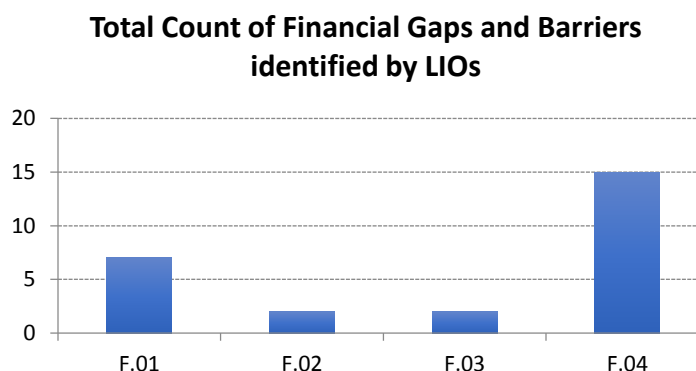


Table 10: Number of LIOs identifying Legal/Regulatory/Policy gap and barrier sub-categories

Sub Categories of gaps and barriers			# LIOs
Legal/Regulatory/Policy	LR.01	Deficiencies in enforcement and compliance	4
	LR.02	Regulatory inconsistencies and lag between old and new regulation adoption	4
	LR.03	Policy effectiveness unclear or unknown	1
	LR.04	Lack of comprehensive ecosystem services valuation (was PT.10)	1
	LR.05	Lack of policy maker & elected official engagement	1
	LR.06	Current law insufficient (ex. Doesn't match local needs; inequitable; too many exemptions)	1
	LR.07	Lack of adequate policy incentives and/or disincentives	2

Financial gaps and barriers comprise approximately 8 percent of all barriers and gaps. This could be seen as misleading, or suggesting that funding is not a major common barrier if taken on its own, but it should be noted that many of the other barriers related to technical, institutional and regulatory issues are compounded by financial gaps and barriers (Figure 19). Most of the gaps and barriers listed by LIOs listed funding as the primary solution to the barriers.



Financial barriers and gaps are those that encompass issues around requirements and consistency of funding sources, along with barriers listed as generalized funding gaps. Without adequate and appropriate funding mechanisms, none of the barriers and gaps listed within each category will be overcome. As with the previous category, the total number of gaps or barriers of each sub-category type identified by all LIOs is summarized in Figure 19 and the number of LIOs including these barriers and gaps is presented in Table 11.

Table 11: Number of LIOs identifying financial gap & barrier sub-categories

Sub Categories of gaps and barriers		# LIOs
Financial	F.01 Lack of consistent funding from State and Federal sources	5
	F.02 Requirements for funding are too restrictive (ex. matching funds)	1
	F.03 Inequitable funding distribution (ex. Allocation formula, competition, resources to acquire funding unequal)	2
	F.04 General funding and staff resources	6

Solutions

LIOs proposed 119 solutions to the 219 gaps and barriers. We categorized the solutions as follows:

- Capacity
- Political or Policy
- Planning and Process
- Funding
- Technical

- Community
- Uncategorized

[Appendix G](#) lists each of the solutions prosed by LIOs.

Funding was listed as the primary solution to the barriers. Consistent and nimble funding is needed and LIOs listed assessments, monitoring and behavior change programs as some of the top needs for funding.

Technical solutions include data, research and analysis. Many of the solutions highlighted the need for baseline data and establishing metrics. There were other technical needs related to technologies. For example, “Advance OSS technology to effectively filter or treat for nutrients and pathogens (fecals).”

Process and planning solutions included coordination, planning requirements and needs for taxonomy revisions, among others. Many LIOs listed better local and regional coordination as a solution, this included a more robust project integration across local and regional scales, “Regional and local project integration, efforts to combine similar projects under regional partnerships could be more efficient and mutually beneficial to both large and small stakeholders.”

Community solutions include citizen engagement, public awareness and behavioral change advocacy. These solutions could fall under other categories, however the project team thought it useful to highlight the LIO-identified need for better citizen engagement, “Investment in public engagement is required to ensure adequate stakeholder feedback.”

Capacity could also fall under funding. A few LIOs cited more capacity in staff resources as a solution to many barriers, “Funding for sufficient staff capacity to coordinate local processes (such as LIO, Lead Entity, Marine Resource Committees)”

Emerging Themes

Beyond the Puget Sound Vital Signs, there are other pressures and strategies that are emerging as common priorities identified by multiple LIOs and therefore important to understanding the local context of Puget Sound recovery.

Oil Spills and Response

Although not a Vital Sign, oil spill and response is identified by a number of LIOs as either a focal component, a high priority pressure source, or as a focus of their priority strategies. Oil spills are defined as the accidental, episodic, and potentially catastrophic spill of oil and hazardous waste in aquatic and terrestrial environments. This includes oil spills from pipelines, vessels, marine terminals and industrial facilities. Oil spill and response were also the focus of 26 gaps and barriers identified by LIOs. Due to their inherent high cost to ecosystems and the associated ecosystem services, oil spills continue to feature prominently in the recovery plans of multiple LIOs.

Island, San Juan, Strait, West Central & Whatcom

Large oil spills and vessel traffic impacts are among San Juan, West Central, Whatcom, Island and Straits’ high priority pressure sources (from LIO Plan narratives). San Juan, Island, Whatcom and Strait LIOs are collaborating on vessel traffic and oil spill preparedness, prevention, and response strategies. In September of 2016, San Juan, Strait, Whatcom, and Island LIOs convened a workshop on the topic.

Vital Signs that Whatcom, San Juan, West Central, Island and Strait identify as at risk from oil spills include the following:

- Marine Water Quality
- Chinook
- Freshwater Quality
- Birds
- Eelgrass
- Estuaries
- Herring
- Shellfish/ Finfish harvest
- Outdoor Recreation/ Swimming beaches

Oil Spill and Response Strategies and Actions

Eight strategies proposed by four of the five LIOs discussed above address oil spill and response directly (Table 11). These strategies align with three Action Agenda sub-strategies (20.1, 20.3, 26.3) and include three new or revised strategies proposed by LIOs.

Table 12: Oil Spill & Response Strategies

Whatcom	(20.1) Prevent and reduce the risk of petroleum oil spills
Whatcom	(New Strategy) Improve petroleum oil spill response planning, capacity
Whatcom	(20.3) Promote US/Canada coordination over transboundary impacts to water resources
West Central	(New Strategy) Strengthen and integrate spill response readiness of the state, tribes, and local governments
West Central	(26.3) Enable and encourage residents to take informed stewardship actions addressing infiltration, pollution reduction, habitat improvement, forest cover, soil development, critical areas, reductions in shoreline armoring, and specific actions for the recovery of Puget Sound.
San Juan	(20.1) Prevent and reduce the risk of oil spills
San Juan	(20.3) Respond to spills and seek restoration using the best available science and technology
Strait	(New Strategy) L. Enhance support for oil spill preparedness, prevention and response

Currently there are four Near Term Actions that support these strategies and will make improvements in oil spill prevention, preparedness, and response within the Strait Action Area and adjacent waters. All have yet to be funded (Table 12).

Table 13: Oil Spill and Response Near Term Actions

ID	Near Term Action	Description
	2016-0362 Transboundary Vessel Safety Summit2	Promote and coordinate the proactive use of maritime risk assessments by holding a transboundary vessel safety summit in 2017 to establish strategic priorities for enhancing vessel oil spill prevention, preparedness, and response in the region.
	2016-0400 Higher Volume Port Area Evaluation	Complete a study, based on the 2010 Puget Sound Vessel Traffic Risk Assessment Final Report, to verify that the maritime shipping community has sufficient, highly capable oil spill response resources available to respond to major oil spills to support Puget Sound recovery.

ID	Near Term Action	Description
	2016-0359 Establish a Tribal Oil Spill Caucus2	Expand tribal participation in the Vessel Traffic Risk Assessment steering committee and other regional forums addressing vessel traffic and oil spills.
	2016-0138 Oil Spill Trainings to Increase Preparedness of the Local Communities	Increase the capacity of volunteers to assist in an oil spill response by providing Hazpower and oiled wildlife trainings. Raise the general awareness in the communities about oil spills and how residents can contribute to cleanup efforts.

Oil Spill and Response Gaps, Barriers and Solutions

There are 26 identified gaps or barriers related to oil spill and response. Below are five. See Appendix F for all 26 identified oil spill and response barriers and gaps. All 26 barriers and gaps come from San Juan, Strait, or Island LIO.

A few solutions proposed include the following:

- Technical capacity and political support is needed to maintain and enforce the Magnuson Amendment.
- Regional Support to assure that State and Federal entities with responsibilities and/or opportunities to participate in addressing oil spills coordinate their mandates,
- Take advantage of local knowledge and leverage Puget Pound Partnership archives and policies to advance the work.

Table 14: Oil Spill & Response Proposed Solutions

San Juan	Regional Pressures are too large for local actions	Local actions have limited ability to mitigate/reduce regional Pressures associated with oil spills, climate change (sea level rise, saltwater intrusion), algal blooms
Island	Regional support for Oil and Hazardous Spills	Oil and hazardous spills was selected as a high pressure by the ILIO because of the severe effects these spills can have on Chinook, shellfish, herring, estuaries, eelgrass, and marine water quality. The ILIO strategies for this pressure are focused on oil spill response to minimize the impacts to our nearshore and marine habitats from large spills.
Strait	LIO oil spill “table” capacity (Barriers – Capacity)	LIO capacity to regularly participate at oil spill “table” is insufficient [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Federal agency policy consistency and coordination (Barrier – Policy)	Policies among federal agencies (e.g., DOI, NOAA, etc.) are inconsistent and not well coordinated [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	High risk areas (Barrier – Policy)	High risk areas lack focus [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Tribal oil spill event liaisons (Barrier – Policy)	Dedicated points of contact for each Tribe are not identified to serve as liaisons during oil spill events [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil

Concluding remarks

This preliminary synthesis is a “first pass” at rolling up the LIO Plans to identify common and unique elements of local Puget Sound recovery efforts. As we improve the synthesis over time, we will learn from one another and in doing so become better versed in relating local plans and priorities to regional plans and priorities. Undoubtedly there are errors in interpretation, technical, and resource challenges to data synthesis, and incompleteness with prioritization and assessment—and there are still gaps in LIO information. The region will continue to synthesize the work that each LIO has done along with evaluating the need for Puget Sound-wide strategy, and revision of pressures and focal components through an updated comprehensive plan in 2022. In the coming months we will be assessing LIO recovery goals and further evaluating strategic priorities, key barriers, and key uncertainties, along with rectifying any oversight made in this synthesis.

Each LIO Plan represents countless hours of coordinated planning across local governments, Tribes, non-governmental organizations, and other partners. The combined practical and technical expertise and experience of these partners is immense. The LIO Plans are, therefore, a sound expression of local priorities and strategies that is an invaluable resource for Puget Sound protection and restoration

Appendix A: Concept Models and Results Chain

CONCEPTUAL MODELS

Definitions for Conceptual Models

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

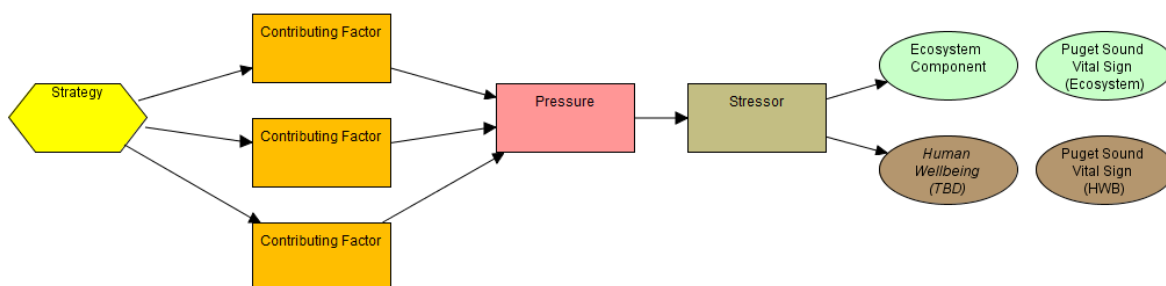
Contributing factors include the indirect threats, root causes, underlying factors, and other factors contributing to the existence or persistence of pressures. Contributing factors can be social, political or ecological and they can also include opportunities or factors outside the scope of the recovery effort, such as regional population growth or global market forces.

Pressure sources are human actions that contribute to the creation of stressors that degrade the ecosystem or human wellbeing components. Pressure sources, although often damaging to the environment are often beneficial to humans in other ways.

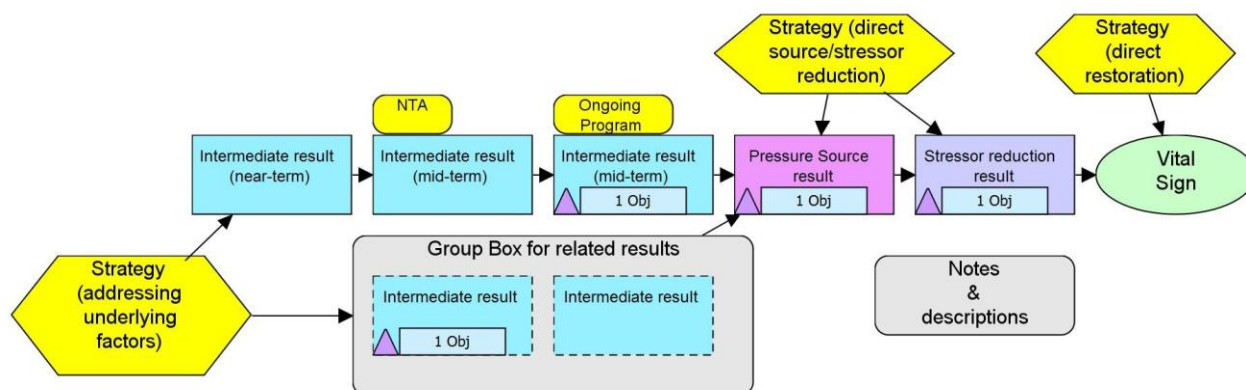
Stressors are the most proximate causes of ecosystem degradation, such as shoreline hardening, land conversion or altered flows.

Components are the parts of the ecosystem or the attributes of human wellbeing that are the focus of the LIO's ecosystem recovery efforts.

Conceptual Model



Results Chain



Results Chain Key

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

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

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

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

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

Appendix B: Barriers to Ecosystem Recovery

Master Barriers List (02/24/17)

Primary Barrier	Code	Sub-Category Barrier
Physical/Technical	PT.01	Lack of baseline and historical data
	PT.02	Lack of data on species and ecosystems (salmonids, herring, wetlands, DO, NPS pollutants, hydrology)
	PT.03	Lack of data regarding infrastructure inventory/assessment/prioritization (shoreline armoring, green infrastructure effectiveness studies, fish passage barriers)
	PT.04	Lack of monitoring and project assessment
	PT.05	Climate change uncertainties
	PT.06	Lack of LIO-specific Vital Sign target status information (from PSP)
	PT.07	Biennial Science Workplan needs more metrics (ex. Chinook)
	PT.08	Concerns about Vital Sign Framework (too broad, too specific, other)
	PT.09	Issue is too large/complex for single LIO
	PT. 10	Lack of technology and tools to adequately address problem
Community/Institutional	CI.01	Too much planning (reduced capacity for implementation)
	CI.02	Costs of regional participation high when benefits low
	CI.03	Policy, research, and project timeframes misaligned
	CI.04	PSP Strategies, Vital Signs, and targets don't reflect local goals
	CI.05	Lack of coordination between local and regional entities (ex. Lack of involvement between SI Leads and NTA owners)
	CI.06	Lack of local and regional project integration
	CI.07	Concerns, participation, and disagreement within LIO
	CI.08	Jurisdictional, agency, programmatic silos
	CI.09	Lack of community engagement and public support
	CI.10	Jargon restricts access to, understanding by, and participation from public and elected officials
	CI.11	Lack of public behavior change
	CI.12	Lack of salmon recovery integration
	CI.13	Lack of best available science integration into policy and planning
	CI.14	Conflicting values
	CI.15	Challenge in prioritization of components, pressures, strategies and/or implementation
	CI.16	Lack of US-Canada transboundary communication/coordination
	CI.17	Taxonomy discrepancies (ex. PSPA)
	CI.18	Criteria for ranking NTA's too qualitative
Legal/Regulatory/Policy	LR.01	Deficiencies in enforcement and compliance
	LR.02	Regulatory inconsistencies and lag between old and new regulation adoption
	LR.03	Policy effectiveness unclear or unknown
	LR.04	Lack of comprehensive ecosystem services valuation (was PT.10)
	LR.05	Lack of policy maker & elected official engagement
	LR.06	Current law insufficient (ex. Doesn't match local needs; inequitable; too many exemptions)
	LR.07	Lack of adequate policy incentives and/or disincentives
Financial	F.01	Lack of consistent funding from State and Federal sources
	F.02	Requirements for funding are too restrictive (ex. matching funds)
	F.03	Inequitable funding distribution (ex. Allocation formula, competition, resources to acquire funding unequal)
	F.04	General funding and staff resources

Appendix C: Vital Sign Comparison between LIO Plan Narrative and Miradi Files

LIO Plan Vital Signs COMPARISON BETWEEN LIO PLAN NARRATIVE & MIRADI FILES																														
Vital Sign \ LIO		West Central			San Juan			Island			Stilly-Sno			Hood Canal			Whatcom			Strait			South Central			South Sound			# of LIOs per VS	
Enter only numbers in this table. Make notes as "comments" or to the right.		Priority VS (Narrative)	Tiering (if applicable)	Other VS in Miradi files	Priority VS (Narrative)	Tiering (if applicable)	Other VS in Miradi files	Priority VS (Narrative)	Tiering (if applicable)	Other VS in Miradi files	Priority VS (Narrative)	Tiering (if applicable)	Other VS in Miradi files	Priority VS (Narrative)	Tiering (if applicable)	Other VS in Miradi files	Priority VS (Narrative)	Tiering (if applicable)	Other VS in Miradi files	Priority VS (Narrative)	Tiering (if applicable)	Other VS in Miradi files	Priority VS (Narrative)	Tiering (if applicable)	Other VS in Miradi files	Priority VS (Narrative)	Tiering (if applicable)	Other VS in Miradi files	Priority VS (Narrative)	Other VS in Miradi files
ECO	Birds					1					L		1							C								1	1	
ECO	Chinook Salmon	1		1	1		1	1	1	1	H	1	1		1		1	1	A	1	1		1	1		1	9	8		
ECO	Eelgrass	1		1	1		1	1	1	1	M		1						D		1		1	1		1	6	5		
ECO	Estuaries	1		1			1	1	1	H	1	1		1					1	B	1	1		1	1		1	7	7	
ECO	Floodplains	1		1				0	1	H	1	1		1	1		1	1	A	1	1		1				6	6		
ECO	Freshwater Quality	1		1	1		1	1		1	1	H	1	1		1		1	1	B	1	1		1	1		1	9	8	
ECO	Marine Sediment Quality					1					M		1						D		1		1				2	3		
ECO	Marine Water Quality	1		1	1		1	1		1	1	H	1	1		1	1	1	B	1	1		1	1		1	9	9		
ECO	Orcas				1	1					L								C								1	1		
ECO	Pacific Herring	1		1	1		1	1		1	L		1						C					1		1	5	4		
ECO	Summer Stream Flows	1		1	1		1			1	H	1	1		1		1	1	A	1	1		1	1		1	8	7		
ECO	Toxics in Fish			1		1					1	H	1	1								1		1			3	4		
HWB	Air Quality				1	1													D								1	1		
HWB	Cultural Wellbeing	1			0				1	1		1	1		1	1		1		D							4	4		
HWB	Drinking Water	1		1	1	1					M	1							C								2	3		
HWB	Economic Vitality	1			1	1		1	1		1	1	1		1	1		1		C							5	5		
HWB	Good Governance				1	1				1	1	1	1		1			1	B	1							4	4		
HWB	Local Foods	1			1	1	1	1		1	L	1	1		1				D								4	4		
HWB	Outdoor Activity	1						1	1		1	1	1		1	1		1		D		1		1	1		6	5		
HWB	Sense of Place	1		1				1	1		1	1	1		1			1	B	1							4	5		
HWB	Shellfish Beds	1		1			1	1	1	H	1	1			1		1	1	A	1	1		1	1		1	8	7		
HWB	Sound Stewardship										1	1	1		1			1	B	1							3	3		
PRES	Land Development and Cover	1		1	1		1			1	H	1	1		1	1		1	1	A	1	1		1	1		1	8	8	
PRES	On-Site Sewage Systems	1		1			1	1		M	1	1										1		1			4	4		
PRES	Shoreline Armoring	1		1	1		1	1		1	H	1	1		1			1	A	1	1		1	1		1	8	8		
Total # Vital Signs per LIO (of 25)		18		16	14		17	10		14	16		19	22		12	10		10	12		12	14		14	11		10		

Appendix D: Recovery strategies linked to Vital Signs

The following tables the strategies that are linked to the Vital Signs associated with at least eight of the nine Puget Sound Local Integrating Organizations. The data are extracted from Miradi™ files.

Chinook salmon

Note: The Hood Canal LIO has strategies associated with locally specific focal components. Strategies linked to Chinook salmon are not yet updated.

LIO	Strategy
Island	16.2 (B2.2) Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands
Island	16.1 (B2.1) 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.
Island	10.4 (C2.4) Control sources of pollutants
Island	19.1 (C7.1) Improve water quality to prevent downgrade and achieve upgrades of important current tribal, commercial and recreational shellfish harvesting areas

Island	21.4 (C9.4) Develop and implement local and tribal pollution identification and correction (PIC) programs
Island	11.1 (C3.1) Target voluntary and incentive-based programs that help working farms contribute to Puget Sound recovery
Island	10.3 (C2.3) Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
Island	2.2 (A2.2) Implement and maintain priority freshwater and terrestrial restoration projects
Island	6.1 (A6.1) Implement high priority projects identified in each salmon recovery watershed's 3 year work plan
Island	16.3 (B2.3) Remove armoring, and use soft armoring replacement or landward setbacks when armoring fails, needs repair, is non protective, and during redevelopment
South Sound	Support and implement land management plans and regulations - particularly county and city growth management, critical area, and shoreline master programs - and related education and incentive programs.
South Sound	Implement Local High Priority Capital and Non-Capital Habitat Protection and Restoration Projects
South Sound	Enhance Local Communication, Education, Behavior Change and Public Involvement Programs
South Sound	Enhance Local Compliance and Enforcement Programs
South Sound	Implement a Coordinated and Integrated Local Monitoring Program
South Sound	Implement Local Stormwater Management Programs using a Watershed Management Approach
Strait	M. Enhance Local Communication, Education, Behavior Change and Public Involvement Programs
Strait	K. Enhance Implementation of Water Quality Clean Up Plans
Strait	I. Implement Highest Priority Climate Change Adaption Strategies for the North Olympic Peninsula
Strait	J. Implement Local Stormwater Management Programs using a Watershed Management Approach
Strait	H. Enhance Ongoing Implementation of Local Shoreline and Land Use Management, Protection, Restoration, Incentive Programs and Plans
Strait	G. Implement Local Water Resource Management Programs and Rules
Strait	D. Improve Freshwater and Marine Riparian Management
Strait	L. Enhance support for oil spill preparedness, prevention and response
Strait	B. Estuary Protection and Restoration (Pocket and Natal)
Strait	C. Floodplain Protection and Restoration
Strait	F. Enhance Native Fish and Shellfish Populations
Strait	A. Drift Cell and Shoreline Conservation and Restoration
Strait	E. Eliminate fish passage barriers and improve instream habitat
West Central	20.2 Strengthen and integrate spill response readiness of the state, tribes, and local government
West Central	21.4 Develop and implement local and tribal pollution identification and correction (PIC) programs
West Central	26.3 Enable and encourage residents to take informed stewardship actions addressing infiltration, pollution reduction, habitat improvement, forest cover, soil development, critical areas, reductions in shoreline armoring, and specific actions for the recovery of Puget Sound.
West Central	11.2 Ensure compliance with regulatory programs designed to reduce, control or eliminate pollution from working farms
West Central	1.1 Identify and prioritize areas for protection, restoration, or development
West Central	2.1 Protect and conserve ecologically important lands at risk of conversion
West Central	9.6 Increase compliance with and enforcement of environmental laws, regulations, and permits
West Central	4.2 Provide infrastructure and incentives to accommodate new and re-development within urban growth areas
West Central	2.2 Implement and maintain freshwater and terrestrial restoration projects
West Central	10.3 Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
West Central	10.1 Manage urban runoff at the basin and watershed scale
West Central	7.1 Update instream flow rules to encourage conservation

West Central	7.2 Decrease water withdrawal, diversion, per capita water use
West Central	17.2 Implement and maintain priority marine restoration projects
San Juan	10.1 (C2.1) Manage urban runoff at the basin and watershed scale
San Juan	10.3 (C2.3) Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
San Juan	2.2 (A2.2) Implement and maintain priority freshwater and terrestrial restoration projects
San Juan	Augment Summer Low Flows in surface waters to support salmonid habitat
San Juan	Implement freshwater restoration projects to restore native salmonids and cutthroat
San Juan	Restore Floodplain Connectivity (Secondary)
San Juan	Restore Instream Habitat (Secondary)
San Juan	Restore Native Riparian Vegetation (Secondary)
San Juan	Restore Wetlands (Secondary)
San Juan	10.4 (C2.4) Control sources of pollutants
San Juan	11.1 (C3.1) Target voluntary and incentive-based programs that help working farms contribute to Puget Sound recovery
San Juan	Manage stormwater to protect water quality
San Juan	20.1 (C8.1) Prevent and reduce the risk of oil spills
San Juan	20.3 (C8.3) Respond to spills and seek restoration using the best available science and technology
San Juan	LIO's protection strategies under development
San Juan	16.1 (B2.1) Protect priority intact nearshore physical & ecological processes & habitat
San Juan	16.3 (B2.3) Remove armoring, use soft armoring replacement or landward setbacks
San Juan	Encourage bulkhead removal for private residential properties where appropriate
San Juan	Implement and enforce Shoreline Master Plan to promote avoidance of bulkhead construction.
San Juan	Manage stormwater runoff to protect shoreline from erosion.
Snohomish-Stillaguamish	SSLIO 04.1 Outreach for stormwater stewardship
Snohomish-Stillaguamish	SSLIO 05.1 Investigate non-point source contaminants and sources, provide corrective measures
Snohomish-Stillaguamish	SSLIO 06.1 Retrofit legacy stormwater systems for better treatment and infiltration
Snohomish-Stillaguamish	SSLIO 03.1 Improve funding for restoration
Snohomish-Stillaguamish	SSLIO 07.1 Outreach, technical assistance, incentives, and enforcement for improved on-site septic system management
Snohomish-Stillaguamish	SSLIO 01.1 Nearshore protection
Snohomish-Stillaguamish	SSLIO 01.2 Nearshore restoration
Snohomish-Stillaguamish	Education about real results of illegal armoring
Snohomish-Stillaguamish	SSLIO 10.1 Freshwater and estuarine protection
Snohomish-Stillaguamish	SSLIO 10.2 Freshwater and estuarine restoration
Snohomish-Stillaguamish	SSLIO 02.1 Integrated planning
Snohomish-Stillaguamish	SSLIO 10.1 FW Outreach and education
Snohomish-Stillaguamish	SSLIO 08.1 Implementation of GMA recognizing Puget Sound recovery goals and regional coordination

Snohomish-Stillaguamish	SSLIO 09.1 Stream flow protection
South Central	10.2 Prevent problems from new development
South Central	9.1 Implement and strengthen authorities and programs to prevent toxic chemicals from entering the Puget Sound environment
South Central	10.1 Manage urban runoff at the basin and watershed scale
South Central	2.2 Implement and maintain priority freshwater and terrestrial restoration projects
South Central	6.1 Implement high priority projects identified in each salmon recovery watershed's 3 year work plan
South Central	16.3 Remove armoring, and use soft armoring replacement or landward setbacks when armoring fails, needs repair, is non protective, and during redevelopment
South Central	8.3 Improve, strengthen, streamline nearshore & marine impl. & enforcement
South Central	16.1 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.
South Central	1.3 Improve, strengthen, streamline implementation & enforcement
South Central	5.4 Implement & maintain priority floodplain restoration projects
South Central	1.2 Support local governments to adopt and implement plans, regulations, and policies consistent with protection and recovery targets, and incorporate climate change forecasts
Whatcom	(1.2) Update and improve regulations, policies
Whatcom	(11.1) Implement and expand incentive/cost-share programs
Whatcom	(26.2) Education and Outreach
Whatcom	(9.6) Improve compliance with regs/laws/permits
Whatcom	Stormwater characterization and monitoring
Whatcom	Develop binding agreements to resolve habitat, water quality, water quantity, and drainage issues
Whatcom	(11.1) Provide technical assistance
Whatcom	(10.4) Control sources of pollutants
Whatcom	(20.3) Promote US/Canada coordination over transboundary impacts to water resources
Whatcom	Develop and implement watershed-scale plans
Whatcom	Technical assessments and WRIA 1 SRP update
Whatcom	(1.2) Develop Integrated Floodplain Management Plan
Whatcom	Develop funding strategy
Whatcom	(1.2, 2.2, 5.4, 6.1) Implement habitat restoration projects
Whatcom	(1.1) Identify and discourage growth in areas unsuitable for development
Whatcom	(10.5) Stormwater training and technical assistance
Whatcom	(10.3) Fix problems caused by existing development
Whatcom	(10.2) Prevent problems from new development at site or subdivision scale
Whatcom	(10.1) Watershed-scale stormwater management
Whatcom	(20.1) Prevent and reduce the risk of petroleum oil spills
Whatcom	Land acquisition, conservation easements, farm transition, and/or landowner agreements
Whatcom	Climate change assessment and adaptation
Whatcom	Quantify water availability, water use and water supply needs
Whatcom	Identify, evaluate, and support solutions for meeting water supply needs
Whatcom	(25.2) Implementation and effectiveness monitoring

Freshwater Quality

Island	16.2 (B2.2) Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands
Island	16.1 (B2.1) 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.
Island	10.4 (C2.4) Control sources of pollutants
Island	19.1 (C7.1) Improve water quality to prevent downgrade and achieve upgrades of important current tribal, commercial and recreational shellfish harvesting areas
Island	21.4 (C9.4) Develop and implement local and tribal pollution identification and correction (PIC) programs
Island	11.1 (C3.1) Target voluntary and incentive-based programs that help working farms contribute to Puget Sound recovery
Island	10.3 (C2.3) Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
Island	2.2 (A2.2) Implement and maintain priority freshwater and terrestrial restoration projects
Island	6.1 (A6.1) Implement high priority projects identified in each salmon recovery watershed's 3 year work plan
Island	10.5 (C2.5) Provide focused stormwater-related education, training, and assistance
South Sound	Support and implement land management plans and regulations - particularly county and city growth management, critical area, and shoreline master programs - and related education and incentive programs.
South Sound	Implement Local High Priority Capital and Non-Capital Habitat Protection and Restoration Projects
South Sound	Enhance Local Communication, Education, Behavior Change and Public Involvement Programs
South Sound	Enhance Local Compliance and Enforcement Programs
South Sound	Implement a Coordinated and Integrated Local Monitoring Program
South Sound	Implement Local Stormwater Management Programs using a Watershed Management Approach
South Sound	Collect and treat urban stormwater to reduce pollutant loading
South Sound	Concentrate growth in urban growth areas to limit the amount of new impervious surfaces created
South Sound	Providing support to land owners to limit pollutant loads to surface water through best management practices
Strait	M. Enhance Local Communication, Education, Behavior Change and Public Involvement Programs
Strait	K. Enhance Implementation of Water Quality Clean Up Plans
Strait	I. Implement Highest Priority Climate Change Adaption Strategies for the North Olympic Peninsula
Strait	J. Implement Local Stormwater Management Programs using a Watershed Management Approach
Strait	H. Enhance Ongoing Implementation of Local Shoreline and Land Use Management, Protection, Restoration, Incentive Programs and Plans
Strait	G. Implement Local Water Resource Management Programs and Rules
Strait	D. Improve Freshwater and Marine Riparian Management
West Central	20.2 Strengthen and integrate spill response readiness of the state, tribes, and local government
West Central	21.4 Develop and implement local and tribal pollution identification and correction (PIC) programs
West Central	26.3 Enable and encourage residents to take informed stewardship actions addressing infiltration, pollution reduction, habitat improvement, forest cover, soil development, critical areas, reductions in shoreline armoring, and specific actions for the recovery of Puget Sound.
West Central	11.2 Ensure compliance with regulatory programs designed to reduce, control or eliminate pollution from working farms
West Central	1.1 Identify and prioritize areas for protection, restoration, or development
West Central	2.1 Protect and conserve ecologically important lands at risk of conversion
West Central	9.6 Increase compliance with and enforcement of environmental laws, regulations, and permits
West Central	4.2 Provide infrastructure and incentives to accomodate new and re-development within urban growth areas

West Central	2.2 Implement and maintain freshwater and terrestrial restoration projects
West Central	10.3 Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
West Central	10.1 Manage urban runoff at the basin and watershed scale
West Central	7.1 Update instream flow rules to encourage conservation
West Central	7.2 Decrease water withdrawal, diversion, per capita water use
West Central	10.5 Provide focused stormwater-related education, training, and assistance
San Juan	10.1 (C2.1) Manage urban runoff at the basin and watershed scale
San Juan	10.3 (C2.3) Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
San Juan	2.2 (A2.2) Implement and maintain priority freshwater and terrestrial restoration projects
San Juan	Augment Summer Low Flows in surface waters to support salmonid habitat
San Juan	Implement freshwater restoration projects to restore native salmonids and cutthroat
San Juan	Restore Floodplain Connectivity(Secondary)
San Juan	Restore Instream Habitat(Secondary)
San Juan	Restore Native Riparian Vegetation(Secondary)
San Juan	Restore Wetlands(Secondary)
San Juan	10.4 (C2.4) Control sources of pollutants
San Juan	11.1 (C3.1) Target voluntary and incentive-based programs that help working farms contribute to Puget Sound recovery
San Juan	Manage stormwater to protect water quality
Snohomish-Stillaguamish	SSLIO 04.1Outreach for stormwater stewardship
Snohomish-Stillaguamish	SSLIO 05.1Investigate non-point source contaminants and sources, provide corrective measures
Snohomish-Stillaguamish	SSLIO 06.1Retrofit legacy stormwater systems for better treatment and infiltration
Snohomish-Stillaguamish	SSLIO 03.1Improve funding for restoration
Snohomish-Stillaguamish	SSLIO 07.1Outreach, technical assistance, incentives, and enforcement for improved on-site septic system management
South Central	1.1 Identify and prioritize areas for protection, restoration, and best suitable for (low impact) development.
South Central	10.5 Provide focused stormwater-related education, training, and assistance
South Central	27.1 Implement a long-term, highly visible, coordinated public-awareness effort using the Puget Sound Starts Here brand
South Central	10.3 Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
South Central	10.2 Prevent problems from new development
South Central	9.1 Implement and strengthen authorities and programs to prevent toxic chemicals from entering the Puget Sound environment
South Central	10.1 Manage urban runoff at the basin and watershed scale
South Central	2.2 Implement and maintain priority freshwater and terrestrial restoration projects
South Central	6.1 Implement high priority projects identified in each salmon recovery watershed's 3 year work plan
South Central	13.1 Effectively manage & control pollution from small OSS
Whatcom	(21.4) Source ID and BMP Effectiveness monitoring
Whatcom	(21.4) Coordinate shellfish protection and recovery efforts
Whatcom	(1.2) Update and improve regulations, policies
Whatcom	(11.1) Implement and expand incentive/cost-share programs

Whatcom	(26.2) Education and Outreach
Whatcom	(9.6) Improve compliance with regs/laws/permits
Whatcom	Stormwater characterization and monitoring
Whatcom	Develop binding agreements to resolve habitat, water quality, water quantity, and drainage issues
Whatcom	(11.1) Provide technical assistance
Whatcom	(10.4) Control sources of pollutants
Whatcom	(20.3) Promote US/Canada coordination over transboundary impacts to water resources
Whatcom	Develop and implement watershed-scale plans
Whatcom	Technical assessments and WRIA 1 SRP update
Whatcom	(1.2) Develop Integrated Floodplain Management Plan
Whatcom	Develop funding strategy
Whatcom	(1.2, 2.2, 5.4, 6.1) Implement habitat restoration projects
Whatcom	(1.1) Identify and discourage growth in areas unsuitable for development
Whatcom	(10.5) Stormwater training and technical assistance
Whatcom	(10.3) Fix problems caused by existing development
Whatcom	(10.2) Prevent problems from new development at site or subdivision scale
Whatcom	(10.1) Watershed-scale stormwater management
Whatcom	(20.1) Prevent and reduce the risk of petroleum oil spills
Whatcom	Land acquisition, conservation easements, farm transition, and/or landowner agreements
Whatcom	Climate change assessment and adaptation
Whatcom	Quantify water availability, water use and water supply needs
Whatcom	Identify, evaluate, and support solutions for meeting water supply needs

Marine Water Quality

Island	10.4 (C2.4) Control sources of pollutants
Island	19.1 (C7.1) Improve water quality to prevent downgrade and achieve upgrades of important current tribal, commercial and recreational shellfish harvesting areas
Island	21.4 (C9.4) Develop and implement local and tribal pollution identification and correction (PIC) programs
Island	11.1 (C3.1) Target voluntary and incentive-based programs that help working farms contribute to Puget Sound recovery
Island	10.3 (C2.3) Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
Island	10.5 (C2.5) Provide focused stormwater-related education, training, and assistance
South Sound	Enhance Local Communication, Education, Behavior Change and Public Involvement Programs
South Sound	Enhance Local Compliance and Enforcement Programs
South Sound	Implement a Coordinated and Integrated Local Monitoring Program
South Sound	Implement Local Stormwater Management Programs using a Watershed Management Approach
South Sound	Collect and treat urban stormwater to reduce pollutant loading
South Sound	Concentrate growth in urban growth areas to limit the amount of new impervious surfaces created
South Sound	Providing support to land owners to limit pollutant loads to surface water through best management practices
Strait	M. Enhance Local Communication, Education, Behavior Change and Public Involvement Programs
Strait	K. Enhance Implementation of Water Quality Clean Up Plans

Strait	I. Implement Highest Priority Climate Change Adaption Strategies for the North Olympic Peninsula
Strait	J. Implement Local Stormwater Management Programs using a Watershed Management Approach
Strait	H. Enhance Ongoing Implementation of Local Shoreline and Land Use Management, Protection, Restoration, Incentive Programs and Plans
Strait	D. Improve Freshwater and Marine Riparian Management
West Central	20.2 Strengthen and integrate spill response readiness of the state, tribes, and local government
West Central	21.4 Develop and implement local and tribal pollution identification and correction (PIC) programs
West Central	26.3 Enable and encourage residents to take informed stewardship actions addressing infiltration, pollution reduction, habitat improvement, forest cover, soil development, critical areas, reductions in shoreline armoring, and specific actions for the recovery of Puget Sound.
West Central	11.2 Ensure compliance with regulatory programs designed to reduce, control or eliminate pollution from working farms
West Central	1.1 Identify and prioritize areas for protection, restoration, or development
West Central	2.1 Protect and conserve ecologically important lands at risk of conversion
West Central	4.2 Provide infrastructure and incentives to accomodate new and re-development within urban growth areas
West Central	2.2 Implement and maintain freshwater and terrestrial restoration projects
West Central	10.3 Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
West Central	10.1 Manage urban runoff at the basin and watershed scale
West Central	10.5 Provide focused stormwater-related education, training, and assistance
San Juan	10.4 (C2.4) Control sources of pollutants
San Juan	11.1 (C3.1) Target voluntary and incentive-based programs that help working farms contribute to Puget Sound recovery
San Juan	Manage stormwater to protect water quality
Snohomish-Stillaguamish	SSLIO 04.1 Outreach for stormwater stewardship
Snohomish-Stillaguamish	SSLIO 05.1 Investigate non-point source contaminants and sources, provide corrective measures
Snohomish-Stillaguamish	SSLIO 06.1 Retrofit legacy stormwater systems for better treatment and infiltration
Snohomish-Stillaguamish	SSLIO 03.1 Improve funding for restoration
Snohomish-Stillaguamish	SSLIO 07.1 Outreach, technical assistance, incentives, and enforcement for improved on-site septic system management
South Central	10.5 Provide focused stormwater-related education, training, and assistance
South Central	27.1 Implement a long-term, highly visible, coordinated public-awareness effort using the Puget Sound Starts Here brand
South Central	10.3 Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
South Central	10.2 Prevent problems from new development
South Central	9.1 Implement and strengthen authorities and programs to prevent toxic chemicals from entering the Puget Sound environment
South Central	10.1 Manage urban runoff at the basin and watershed scale
South Central	13.1 Effectively manage & control pollution from small OSS
Whatcom	(21.4) Source ID and BMP Effectiveness monitoring
Whatcom	(21.4) Coordinate shellfish protection and recovery efforts
Whatcom	(1.2) Update and improve regulations, policies
Whatcom	(11.1) Implement and expand incentive/cost-share programs
Whatcom	(26.2) Education and Outreach

Whatcom	(9.6) Improve compliance with regs/laws/permits
Whatcom	Stormwater characterization and monitoring
Whatcom	Develop binding agreements to resolve habitat, water quality, water quantity, and drainage issues
Whatcom	(11.1) Provide technical assistance
Whatcom	(10.4) Control sources of pollutants
Whatcom	(20.3) Promote US/Canada coordination over transboundary impacts to water resources
Whatcom	Develop and implement watershed-scale plans
Whatcom	Technical assessments and WRIA 1 SRP update
Whatcom	(1.2) Develop Integrated Floodplain Management Plan
Whatcom	Develop funding strategy
Whatcom	(1.2, 2.2, 5.4, 6.1) Implement habitat restoration projects
Whatcom	(1.1) Identify and discourage growth in areas unsuitable for development
Whatcom	(10.5) Stormwater training and technical assistance
Whatcom	(10.3) Fix problems caused by existing development
Whatcom	(10.2) Prevent problems from new development at site or subdivision scale
Whatcom	(10.1) Watershed-scale stormwater management
Whatcom	(20.1) Prevent and reduce the risk of petroleum oil spills
Whatcom	Land acquisition, conservation easements, farm transition, and/or landowner agreements
Whatcom	Quantify water availability, water use and water supply needs
Strait	L. Enhance support for oil spill preparedness, prevention and response
San Juan	20.1 (C8.1) Prevent and reduce the risk of oil spills
San Juan	20.3 (C8.3) Respond to spills and seek restoration using the best available science and technology
San Juan	LIO's protection strategies under development
Hood Canal	(2.0) Protect and Improve Hood Canal water quality
Hood Canal	(2.1.1.1) Implement Hood Canal Regional PIC Program
Hood Canal	(2.1.1) Monitor priority shoreline areas for pollution and contaminants
Hood Canal	(2.1.2.1) Identify opportunities to improve and align water quality protections across Hood Canal
Hood Canal	(2.1.2) Improve planning and regulatory frameworks for water quality protection
Hood Canal	(2.1.3.1.1) Implement HCSWRP
Hood Canal	(2.1.3.1) Reduce impacts of stormwater runoff from transportation & service corridors, and urbanized areas
Hood Canal	(2.1.3.2) Reduce impacts of runoff from agricultural lands
Hood Canal	(2.1.3) Reduce impacts from stormwater runoff
Hood Canal	(2.1.4.1) Homeowner outreach & education on private property water quality protections
Hood Canal	(2.1.4.2) Decision-maker outreach on water quality protections in policy
South Central	1.3 Improve, strengthen, streamline implementation & enforcement
Hood Canal	(2.1.4.3) Public outreach & education on water quality protections for water-based activities
Hood Canal	(2.1.4) Water quality outreach and education
Hood Canal	(2.1) Prevent pollution sources from entering Hood Canal marine and fresh waters
Hood Canal	(5.0) Proactively prepare for climate change impacts across Hood Canal
Hood Canal	(5.1) Develop Hood Canal Climate Adaptation Plan
Hood Canal	(5.2) Integrate climate adaptation interventions throughout HCCC and member jurisdiction planning and programs

Hood Canal	(5.3.1) Consider climate resilience in all salmon recovery project design
Hood Canal	(5.3.2) Implement salmon recovery actions identified to benefit climate resilience
Hood Canal	(5.3) Improve climate resilience of salmon habitat
Hood Canal	(6.0) Outreach on IWP implementation effectiveness and ecosystem improvements
Hood Canal	(6.2.1) Maintain HCCC website as information resource for project partners and local decision makers
Hood Canal	(6.2.2) Maintain ecosystem status reports on OurHoodCanal.org website
Hood Canal	(6.2) Maintain role as central information source on Hood Canal ecosystem recovery

Summer Stream Flows

Island	10.4 (C2.4) Control sources of pollutants
Island	19.1 (C7.1) Improve water quality to prevent downgrade and achieve upgrades of important current tribal, commercial and recreational shellfish harvesting areas
Island	21.4 (C9.4) Develop and implement local and tribal pollution identification and correction (PIC) programs
Island	11.1 (C3.1) Target voluntary and incentive-based programs that help working farms contribute to Puget Sound recovery
Island	10.3 (C2.3) Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
Island	10.5 (C2.5) Provide focused stormwater-related education, training, and assistance
South Sound	Enhance Local Communication, Education, Behavior Change and Public Involvement Programs
South Sound	Enhance Local Compliance and Enforcement Programs
South Sound	Implement a Coordinated and Integrated Local Monitoring Program
South Sound	Implement Local Stormwater Management Programs using a Watershed Management Approach
South Sound	Collect and treat urban stormwater to reduce pollutant loading
South Sound	Concentrate growth in urban growth areas to limit the amount of new impervious surfaces created
South Sound	Providing support to land owners to limit pollutant loads to surface water through best management practices
Strait	M. Enhance Local Communication, Education, Behavior Change and Public Involvement Programs
Strait	K. Enhance Implementation of Water Quality Clean Up Plans
Strait	I. Implement Highest Priority Climate Change Adaption Strategies for the North Olympic Peninsula
Strait	J. Implement Local Stormwater Management Programs using a Watershed Management Approach
Strait	H. Enhance Ongoing Implementation of Local Shoreline and Land Use Management, Protection, Restoration, Incentive Programs and Plans
Strait	D. Improve Freshwater and Marine Riparian Management
West Central	20.2 Strengthen and integrate spill response readiness of the state, tribes, and local government
West Central	21.4 Develop and implement local and tribal pollution identification and correction (PIC) programs
West Central	26.3 Enable and encourage residents to take informed stewardship actions addressing infiltration, pollution reduction, habitat improvement, forest cover, soil development, critical areas, reductions in shoreline armoring, and specific actions for the recovery of Puget Sound.
West Central	11.2 Ensure compliance with regulatory programs designed to reduce, control or eliminate pollution from working farms
West Central	1.1 Identify and prioritize areas for protection, restoration, or development
West Central	2.1 Protect and conserve ecologically important lands at risk of conversion
West Central	4.2 Provide infrastructure and incentives to accommodate new and re-development within urban growth areas
West Central	2.2 Implement and maintain freshwater and terrestrial restoration projects
West Central	10.3 Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)

West Central	10.1 Manage urban runoff at the basin and watershed scale
West Central	10.5 Provide focused stormwater-related education, training, and assistance
San Juan	10.4 (C2.4) Control sources of pollutants
San Juan	11.1 (C3.1) Target voluntary and incentive-based programs that help working farms contribute to Puget Sound recovery
San Juan	Manage stormwater to protect water quality
Snohomish-Stillaguamish	SSLIO 04.1 Outreach for stormwater stewardship
Snohomish-Stillaguamish	SSLIO 05.1 Investigate non-point source contaminants and sources, provide corrective measures
Snohomish-Stillaguamish	SSLIO 06.1 Retrofit legacy stormwater systems for better treatment and infiltration
Snohomish-Stillaguamish	SSLIO 03.1 Improve funding for restoration
Snohomish-Stillaguamish	SSLIO 07.1 Outreach, technical assistance, incentives, and enforcement for improved on-site septic system management
South Central	10.5 Provide focused stormwater-related education, training, and assistance
South Central	27.1 Implement a long-term, highly visible, coordinated public-awareness effort using the Puget Sound Starts Here brand
South Central	10.3 Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
South Central	10.2 Prevent problems from new development
South Central	9.1 Implement and strengthen authorities and programs to prevent toxic chemicals from entering the Puget Sound environment
South Central	10.1 Manage urban runoff at the basin and watershed scale
South Central	13.1 Effectively manage & control pollution from small OSS
Whatcom	(21.4) Source ID and BMP Effectiveness monitoring
Whatcom	(21.4) Coordinate shellfish protection and recovery efforts
Whatcom	(1.2) Update and improve regulations, policies
Whatcom	(11.1) Implement and expand incentive/cost-share programs
Whatcom	(26.2) Education and Outreach
Whatcom	(9.6) Improve compliance with regs/laws/permits
Whatcom	Stormwater characterization and monitoring
Whatcom	Develop binding agreements to resolve habitat, water quality, water quantity, and drainage issues
Whatcom	(11.1) Provide technical assistance
Whatcom	(10.4) Control sources of pollutants
Whatcom	(20.3) Promote US/Canada coordination over transboundary impacts to water resources
Whatcom	Develop and implement watershed-scale plans
Whatcom	Technical assessments and WRIA 1 SRP update
Whatcom	(1.2) Develop Integrated Floodplain Management Plan
Whatcom	Develop funding strategy
Whatcom	(1.2, 2.2, 5.4, 6.1) Implement habitat restoration projects
Whatcom	(1.1) Identify and discourage growth in areas unsuitable for development
Whatcom	(10.5) Stormwater training and technical assistance
Whatcom	(10.3) Fix problems caused by existing development
Whatcom	(10.2) Prevent problems from new development at site or subdivision scale
Whatcom	(10.1) Watershed-scale stormwater management

Whatcom	(20.1) Prevent and reduce the risk of petroleum oil spills
Whatcom	Land acquisition, conservation easements, farm transition, and/or landowner agreements
Whatcom	Quantify water availability, water use and water supply needs
Strait	L. Enhance support for oil spill preparedness, prevention and response
San Juan	20.1 (C8.1) Prevent and reduce the risk of oil spills
San Juan	20.3 (C8.3) Respond to spills and seek restoration using the best available science and technology
San Juan	LIO's protection strategies under development
Hood Canal	(2.0) Protect and Improve Hood Canal water quality
Hood Canal	(2.1.1.1) Implement Hood Canal Regional PIC Program
Hood Canal	(2.1.1) Monitor priority shoreline areas for pollution and contaminants
Hood Canal	(2.1.2.1) Identify opportunities to improve and align water quality protections across Hood Canal
Hood Canal	(2.1.2) Improve planning and regulatory frameworks for water quality protection
Hood Canal	(2.1.3.1.1) Implement HCSWRP
Hood Canal	(2.1.3.1) Reduce impacts of stormwater runoff from transportation & service corridors, and urbanized areas
Hood Canal	(2.1.3.2) Reduce impacts of runoff from agricultural lands
Hood Canal	(2.1.3) Reduce impacts from stormwater runoff
Hood Canal	(2.1.4.1) Homeowner outreach & education on private property water quality protections
Hood Canal	(2.1.4.2) Decision-maker outreach on water quality protections in policy
South Central	1.3 Improve, strengthen, streamline implementation & enforcement
Hood Canal	(2.1.4.3) Public outreach & education on water quality protections for water-based activities
Hood Canal	(2.1.4) Water quality outreach and education
Hood Canal	(2.1) Prevent pollution sources from entering Hood Canal marine and fresh waters
Hood Canal	(5.0) Proactively prepare for climate change impacts across Hood Canal
Hood Canal	(5.1) Develop Hood Canal Climate Adaptation Plan
Hood Canal	(5.2) Integrate climate adaptation interventions throughout HCCC and member jurisdiction planning and programs
Hood Canal	(5.3.1) Consider climate resilience in all salmon recovery project design
Hood Canal	(5.3.2) Implement salmon recovery actions identified to benefit climate resilience
Hood Canal	(5.3) Improve climate resilience of salmon habitat
Hood Canal	(6.0) Outreach on IWP implementation effectiveness and ecosystem improvements
Hood Canal	(6.2.1) Maintain HCCC website as information resource for project partners and local decision makers
Hood Canal	(6.2.2) Maintain ecosystem status reports on OurHoodCanal.org website
Hood Canal	(6.2) Maintain role as central information source on Hood Canal ecosystem recovery

Shellfish Beds

Island	16.1 (B2.1) 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.
Island	10.4 (C2.4) Control sources of pollutants
Island	19.1 (C7.1) Improve water quality to prevent downgrade and achieve upgrades of important current tribal, commercial and recreational shellfish harvesting areas
Island	21.4 (C9.4) Develop and implement local and tribal pollution identification and correction (PIC) programs
Island	11.1 (C3.1) Target voluntary and incentive-based programs that help working farms contribute to Puget Sound recovery

Island	10.3 (C2.3) Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
Island	10.5 (C2.5) Provide focused stormwater-related education, training, and assistance
South Sound	Support and implement land management plans and regulations - particularly county and city growth management, critical area, and shoreline master programs - and related education and incentive programs.
South Sound	Implement Local High Priority Capital and Non-Capital Habitat Protection and Restoration Projects
South Sound	Enhance Local Communication, Education, Behavior Change and Public Involvement Programs
South Sound	Enhance Local Compliance and Enforcement Programs
South Sound	Implement a Coordinated and Integrated Local Monitoring Program
South Sound	Implement Local Stormwater Management Programs using a Watershed Management Approach
South Sound	Collect and treat urban stormwater to reduce pollutant loading
South Sound	Concentrate growth in urban growth areas to limit the amount of new impervious surfaces created
South Sound	Providing support to land owners to limit pollutant loads to surface water through best management practices
Strait	M. Enhance Local Communication, Education, Behavior Change and Public Involvement Programs
Strait	K. Enhance Implementation of Water Quality Clean Up Plans
Strait	I. Implement Highest Priority Climate Change Adaption Strategies for the North Olympic Peninsula
Strait	J. Implement Local Stormwater Management Programs using a Watershed Management Approach
Strait	H. Enhance Ongoing Implementation of Local Shoreline and Land Use Management, Protection, Restoration, Incentive Programs and Plans
Strait	G. Implement Local Water Resource Management Programs and Rules
Strait	D. Improve Freshwater and Marine Riparian Management
West Central	20.2 Strengthen and integrate spill response readiness of the state, tribes, and local government
West Central	21.4 Develop and implement local and tribal pollution identification and correction (PIC) programs
West Central	26.3 Enable and encourage residents to take informed stewardship actions addressing infiltration, pollution reduction, habitat improvement, forest cover, soil development, critical areas, reductions in shoreline armoring, and specific actions for the recovery of Puget Sound.
West Central	11.2 Ensure compliance with regulatory programs designed to reduce, control or eliminate pollution from working farms
West Central	1.1 Identify and prioritize areas for protection, restoration, or development
West Central	2.1 Protect and conserve ecologically important lands at risk of conversion
West Central	4.2 Provide infrastructure and incentives to accommodate new and re-development within urban growth areas
West Central	2.2 Implement and maintain freshwater and terrestrial restoration projects
West Central	10.3 Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
West Central	10.1 Manage urban runoff at the basin and watershed scale
West Central	10.5 Provide focused stormwater-related education, training, and assistance
Snohomish-Stillaguamish	SSLIO 04.1 Outreach for stormwater stewardship
Snohomish-Stillaguamish	SSLIO 05.1 Investigate non-point source contaminants and sources, provide corrective measures
Snohomish-Stillaguamish	SSLIO 06.1 Retrofit legacy stormwater systems for better treatment and infiltration
Snohomish-Stillaguamish	SSLIO 03.1 Improve funding for restoration
Snohomish-Stillaguamish	SSLIO 07.1 Outreach, technical assistance, incentives, and enforcement for improved on-site septic system management
South Central	10.2 Prevent problems from new development

South Central	13.1 Effectively manage & control pollution from small OSS
Whatcom	(21.4) Source ID and BMP Effectiveness monitoring
Whatcom	(21.4) Coordinate shellfish protection and recovery efforts
Whatcom	(1.2) Update and improve regulations, policies
Whatcom	(11.1) Implement and expand incentive/cost-share programs
Whatcom	(26.2) Education and Outreach
Whatcom	(9.6) Improve compliance with regs/laws/permits
Whatcom	Stormwater characterization and monitoring
Whatcom	Develop binding agreements to resolve habitat, water quality, water quantity, and drainage issues
Whatcom	(11.1) Provide technical assistance
Whatcom	(10.4) Control sources of pollutants
Whatcom	(20.3) Promote US/Canada coordination over transboundary impacts to water resources
Whatcom	Develop and implement watershed-scale plans
Whatcom	Technical assessments and WRIA 1 SRP update
Whatcom	(1.2) Develop Integrated Floodplain Management Plan
Whatcom	Develop funding strategy
Whatcom	(1.1) Identify and discourage growth in areas unsuitable for development
Whatcom	(10.5) Stormwater training and technical assistance
Whatcom	(10.3) Fix problems caused by existing development
Whatcom	(10.2) Prevent problems from new development at site or subdivision scale
Whatcom	(10.1) Watershed-scale stormwater management
Whatcom	(20.1) Prevent and reduce the risk of petroleum oil spills
Whatcom	Quantify water availability, water use and water supply needs
Strait	L. Enhance support for oil spill preparedness, prevention and response
Strait	B. Estuary Protection and Restoration (Pocket and Natal)
Strait	C. Floodplain Protection and Restoration
Strait	F. Enhance Native Fish and Shellfish Populations
Strait	A. Drift Cell and Shoreline Conservation and Restoration
Strait	E. Eliminate fish passage barriers and improve instream habitat
West Central	17.2 Implement and maintain priority marine restoration projects
Snohomish-Stillaguamish	SSLIO 01.1 Nearshore protection
Snohomish-Stillaguamish	SSLIO 01.2 Nearshore restoration
Snohomish-Stillaguamish	Education about real results of illegal armoring
Snohomish-Stillaguamish	SSLIO 10.1 Freshwater and estuarine protection
Snohomish-Stillaguamish	SSLIO 10.2 Freshwater and estuarine restoration
Snohomish-Stillaguamish	SSLIO 02.1 Integrated planning
Snohomish-Stillaguamish	SSLIO 10.1 FW Outreach and education
Snohomish-Stillaguamish	SSLIO 08.1 Implementation of GMA recognizing Puget Sound recovery goals and regional coordination

Snohomish-Stillaguamish	SSLIO 09.1 Stream flow protection
Island	15.3 (B5.3) Prevent and rapidly respond to the introduction and spread of terrestrial and aquatic invasive species

Shoreline Armoring

Hood Canal	(1.0) Restore and protect Hood Canal shoreline
Hood Canal	(1.1) Remove / soften / prevent shoreline armoring
Hood Canal	(1.1.1) Outreach and education on shoreline protection and stewardship
Hood Canal	(1.1.1.1) Outreach and education on shoreline protection and stewardship to shoreline property owners
Hood Canal	(1.1.1.2) Outreach and education on shoreline protection and stewardship to real estate developers
Hood Canal	(1.1.1.3) Outreach and education on shoreline protection and stewardship to contractors
Hood Canal	(1.1.1.4) Outreach and education on shoreline protection and stewardship to political leaders
Hood Canal	(1.1.2) Improve shoreline planning and regulatory frameworks
Hood Canal	(1.1.2.1) Identify opportunities to align and improve shoreline protections
Hood Canal	(1.1.2.2) Develop incentives for shoreline landowners to protect shoreline habitats
Hood Canal	(1.3) Restore and protect priority nearshore salmonid habitat
Hood Canal	(1.3.1) Adaptively manage salmon recovery plans for Hood Canal (nearshore and marine habitats)
Hood Canal	(1.3.1.1) Fill information and data gaps identified to inform salmon recovery in Hood Canal
Hood Canal	(1.3.1.2) Develop and update Hood Canal & E. Strait of Juan de Fuca Summer Chum Recovery Plan
Hood Canal	(1.3.1.3) Develop and update Skokomish Chinook Recovery Plan chapter
Hood Canal	(1.3.1.4) Develop and update Mid-Hood Canal Chinook Recovery Plan chapter,
Hood Canal	(1.3.1.5) Develop and update Hood Canal Steelhead Recovery Plan
Hood Canal	(1.3.2) Prioritize & sequence salmon recovery actions across Hood Canal watersheds
Hood Canal	(1.3.3) Implement priority salmon recovery projects (nearshore and marine habitats)
Hood Canal	(1.3.3.1) HC & ESJF Summer Chum Habitat Actions
Hood Canal	(1.3.3.2) Skokomish Chinook Habitat Actions
Hood Canal	(1.3.3.3) Mid-Hood Canal Chinook Habitat Actions
Hood Canal	(1.3.3.4) Hood Canal Steelhead Habitat Actions
Hood Canal	(2.0) Protect and Improve Hood Canal water quality
Hood Canal	(2.1) Prevent pollution sources from entering Hood Canal marine and fresh waters
Hood Canal	(2.1.1) Monitor priority shoreline areas for pollution and contaminants
Hood Canal	(2.1.1.1) Implement Hood Canal Regional PIC Program
Hood Canal	(2.1.2) Improve planning and regulatory frameworks for water quality protection
Hood Canal	(2.1.2.1) Identify opportunities to improve and align water quality protections across Hood Canal
Hood Canal	(2.1.3) Reduce impacts from stormwater runoff
Hood Canal	(2.1.3.1) Reduce impacts of stormwater runoff from transportation & service corridors, and urbanized areas
Hood Canal	(2.1.3.1.1) Implement HCSWRP
Hood Canal	(2.1.3.2) Reduce impacts of runoff from agricultural lands
Hood Canal	(2.1.4) Water quality outreach and education
Hood Canal	(2.1.4.1) Homeowner outreach & education on private property water quality protections
Hood Canal	(2.1.4.2) Decision-maker outreach on water quality protections in policy

Hood Canal	(2.1.4.3) Public outreach & education on water quality protections for water-based activities
Hood Canal	(4.0) Hood Canal Shellfish Initiative
Hood Canal	(4.1) Develop and Implement Hood Canal Shellfish Initiative action plan
Hood Canal	(4.2) Support ecologically sustainable commercial shellfish operations in Hood Canal
Hood Canal	(4.3) Restore & protect Hood Canal shellfish populations
Hood Canal	(4.3.1) Restore native shellfish populations
Hood Canal	(5.0) Proactively prepare for climate change impacts across Hood Canal
Hood Canal	(5.1) Develop Hood Canal Climate Adaptation Plan
Hood Canal	(5.2) Integrate climate adaptation interventions throughout HCCC and member jurisdiction planning and programs
Hood Canal	(5.3) Improve climate resilience of salmon habitat
Hood Canal	(5.3.1) Consider climate resilience in all salmon recovery project design
Hood Canal	(5.3.2) Implement salmon recovery actions identified to benefit climate resilience
Hood Canal	(6.0) Outreach on IWP implementation effectiveness and ecosystem improvements
Hood Canal	(6.2) Maintain role as central information source on Hood Canal ecosystem recovery
Hood Canal	(6.2.1) Maintain HCCC website as information resource for project partners and local decision makers
Hood Canal	(6.2.2) Maintain ecosystem status reports on OurHoodCanal.org website
Island	16.1 (B2.1) 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.
Island	16.2 (B2.2) Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands
Island	16.3 (B2.3) Remove armoring, and use soft armoring replacement or landward setbacks when armoring fails, needs repair, is non protective, and during redevelopment
South Sound	Enhance Local Communication, Education, Behavior Change and Public Involvement Programs
South Sound	Enhance Local Compliance and Enforcement Programs
South Sound	Implement Local High Priority Capital and Non-Capital Habitat Protection and Restoration Projects
South Sound	Support and implement land management plans and regulations - particularly county and city growth management, critical area, and shoreline master programs - and related education and incentive programs.
Strait	A. Drift Cell and Shoreline Conservation and Restoration
Strait	B. Estuary Protection and Restoration (Pocket and Natal)
Strait	D. Improve Freshwater and Marine Riparian Management
Strait	H. Enhance Ongoing Implementation of Local Shoreline and Land Use Management, Protection, Restoration, Incentive Programs and Plans
Strait	I. Implement Highest Priority Climate Change Adaption Strategies for the North Olympic Peninsula
Strait	L. Enhance support for oil spill preparedness, prevention and response
Strait	M. Enhance Local Communication, Education, Behavior Change and Public Involvement Programs
West Central	1.1 Identify and prioritize areas for protection, restoration, or development
West Central	17.2 Implement and maintain priority marine restoration projects
West Central	2.1 Protect and conserve ecologically important lands at risk of conversion
West Central	2.2 Implement and maintain freshwater and terrestrial restoration projects
West Central	26.3 Enable and encourage residents to take informed stewardship actions addressing infiltration, pollution reduction, habitat improvement, forest cover, soil development, critical areas, reductions in shoreline armoring, and specific actions for the recovery of Puget Sound.
West Central	4.2 Provide infrastructure and incentives to accomodate new and re-development within urban growth areas

San Juan	10.1 (C2.1) Manage urban runoff at the basin and watershed scale
San Juan	16.1 (B2.1) Protect priority intact nearshore physical & ecological processes & habitat
San Juan	16.3 (B2.3) Remove armoring, use soft armoring replacement or landward setbacks
San Juan	Encourage bulkhead removal for private residential properties where appropriate
San Juan	Implement and enforce Shoreline Master Plan to promote avoidance of bulkhead construction.
San Juan	Manage stormwater runoff to protect shoreline from erosion.
Snohomish-Stillaguamish	Education about real results of illegal armoring
Snohomish-Stillaguamish	SSLIO 01.1 Nearshore protection
Snohomish-Stillaguamish	SSLIO 01.2 Nearshore restoration
Snohomish-Stillaguamish	SSLIO 02.1 Integrated planning
Snohomish-Stillaguamish	SSLIO 03.1 Improve funding for restoration
Snohomish-Stillaguamish	SSLIO 10.1 Freshwater and estuarine protection
Snohomish-Stillaguamish	SSLIO 10.1 FW Outreach and education
Snohomish-Stillaguamish	SSLIO 10.2 Freshwater and estuarine restoration
South Central	16.1 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.
South Central	16.2 Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands
South Central	16.3 Remove armoring, and use soft armoring replacement or landward setbacks when armoring fails, needs repair, is non protective, and during redevelopment
South Central	8.2 Support local governments to adopt and implement plans, regulations, and policies that protect the marine nearshore and estuaries, and incorporate climate change forecasts
South Central	8.3 Improve, strengthen, streamline nearshore & marine impl. & enforcement

Land Development and Cover

South Sound	Enhance Local Communication, Education, Behavior Change and Public Involvement Programs
South Sound	Enhance Local Compliance and Enforcement Programs
South Sound	Implement a Coordinated and Integrated Local Monitoring Program
South Sound	Implement Local Stormwater Management Programs using a Watershed Management Approach
Strait	M. Enhance Local Communication, Education, Behavior Change and Public Involvement Programs
Strait	I. Implement Highest Priority Climate Change Adaption Strategies for the North Olympic Peninsula
Strait	J. Implement Local Stormwater Management Programs using a Watershed Management Approach
Strait	H. Enhance Ongoing Implementation of Local Shoreline and Land Use Management, Protection, Restoration, Incentive Programs and Plans
Strait	D. Improve Freshwater and Marine Riparian Management
West Central	26.3 Enable and encourage residents to take informed stewardship actions addressing infiltration, pollution reduction, habitat improvement, forest cover, soil development, critical areas, reductions in shoreline armoring, and specific actions for the recovery of Puget Sound.
West Central	11.2 Ensure compliance with regulatory programs designed to reduce, control or eliminate pollution from working farms
West Central	1.1 Identify and prioritize areas for protection, restoration, or development

West Central	2.1 Protect and conserve ecologically important lands at risk of conversion
West Central	9.6 Increase compliance with and enforcement of environmental laws, regulations, and permits
West Central	4.2 Provide infrastructure and incentives to accommodate new and re-development within urban growth areas
West Central	10.1 Manage urban runoff at the basin and watershed scale
San Juan	10.1 (C2.1) Manage urban runoff at the basin and watershed scale
San Juan	10.3 (C2.3) Fix problems caused by existing development (structural upgrades; regular and enhanced maintenance)
San Juan	2.2 (A2.2) Implement and maintain priority freshwater and terrestrial restoration projects
San Juan	Augment Summer Low Flows in surface waters to support salmonid habitat
San Juan	Implement freshwater restoration projects to restore native salmonids and cutthroat
San Juan	Restore Floodplain Connectivity(Secondary)
San Juan	Restore Instream Habitat(Secondary)
San Juan	Restore Native Riparian Vegetation(Secondary)
San Juan	Restore Wetlands(Secondary)
Snohomish-Stillaguamish	SSLIO 03.1Improve funding for restoration
South Central	1.1 Identify and prioritize areas for protection, restoration, and best suitable for (low impact) development.
South Central	10.1 Manage urban runoff at the basin and watershed scale
South Central	2.2 Implement and maintain priority freshwater and terrestrial restoration projects
South Central	6.1 Implement high priority projects identified in each salmon recovery watershed's 3 year work plan
Whatcom	Technical assessments and WRIA 1 SRP update
Whatcom	(1.2, 2.2, 5.4, 6.1) Implement habitat restoration projects
Whatcom	Climate change assessment and adaptation
Strait	B. Estuary Protection and Restoration (Pocket and Natal)
Strait	C. Floodplain Protection and Restoration
Strait	A. Drift Cell and Shoreline Conservation and Restoration
Strait	E. Eliminate fish passage barriers and improve instream habitat
San Juan	20.1 (C8.1) Prevent and reduce the risk of oil spills
San Juan	20.3 (C8.3) Respond to spills and seek restoration using the best available science and technology
San Juan	LIO's protection strategies under development
San Juan	16.1 (B2.1) Protect priority intact nearshore physical & ecological processes & habitat
San Juan	16.3 (B2.3) Remove armoring, use soft armoring replacement or landward setbacks
San Juan	Encourage bulkhead removal for private residential properties where appropriate
San Juan	Implement and enforce Shoreline Master Plan to promote avoidance of bulkhead construction.
San Juan	Manage stormwater runoff to protect shoreline from erosion.
Snohomish-Stillaguamish	Education about real results of illegal armoring
Snohomish-Stillaguamish	SSLIO 10.1 Freshwater and estuarine protection
Snohomish-Stillaguamish	SSLIO 10.2 Freshwater and estuarine restoration
Snohomish-Stillaguamish	SSLIO 02.1 Integrated planning
Hood Canal	(2.0) Protect and Improve Hood Canal water quality

Hood Canal	(2.1.1.1) Implement Hood Canal Regional PIC Program
Snohomish-Stillaguamish	SSLIO 10.1 FW Outreach and education
Hood Canal	(2.1.1) Monitor priority shoreline areas for pollution and contaminants
Hood Canal	(2.1.2.1) Identify opportunities to improve and align water quality protections across Hood Canal
Hood Canal	(2.1.2) Improve planning and regulatory frameworks for water quality protection
Hood Canal	(2.1.3.1.1) Implement HCSWRP
Hood Canal	(2.1.3.1) Reduce impacts of stormwater runoff from transportation & service corridors, and urbanized areas
Hood Canal	(2.1.3.2) Reduce impacts of runoff from agricultural lands
Hood Canal	(2.1.3) Reduce impacts from stormwater runoff
Hood Canal	(2.1.4.1) Homeowner outreach & education on private property water quality protections
Hood Canal	(2.1.4.2) Decision-maker outreach on water quality protections in policy
Snohomish-Stillaguamish	SSLIO 08.1 Implementation of GMA recognizing Puget Sound recovery goals and regional coordination
Snohomish-Stillaguamish	SSLIO 09.1 Stream flow protection
Hood Canal	(2.1.4.3) Public outreach & education on water quality protections for water-based activities
Hood Canal	(2.1.4) Water quality outreach and education
Hood Canal	(2.1) Prevent pollution sources from entering Hood Canal marine and fresh waters
Whatcom	(25.2) Implementation and effectiveness monitoring
Hood Canal	(3.0) Protect and restore Hood Canal forests and freshwater habitats
Hood Canal	(3.1.1) Prioritize forest lands based on ecological value and risk of conversion
Hood Canal	(3.1.2.1) Identify opportunities to align and improve land use protections
Hood Canal	(3.1.2.2) Outreach to small and large forest landowners
Hood Canal	(3.1.2) Promote land use policies that support ecological protections & working forests
Hood Canal	(3.1) Hood Canal Forests and Open Space Strategy
Hood Canal	(3.2.1.1) Fill information and data gaps identified to inform salmon recovery in Hood Canal
Hood Canal	(3.2.1.2) Develop and update Hood Canal & Eastern Strait of Juan de Fuca Summer Chum Recovery Plan
Hood Canal	(3.2.1.3) Develop and update Skokomish Chinook Recovery Plan chapter
Hood Canal	(3.2.1.4) Develop and update Mid-Hood Canal Chinook Recovery Plan chapter
Hood Canal	(3.2.1.5) Develop and update Hood Canal Steelhead Recovery Plan
Hood Canal	(3.2.1) Adaptively manage salmon recovery plans for Hood Canal watersheds (freshwater habitats)
Hood Canal	(3.2.2) Prioritize & sequence salmon recovery actions across Hood Canal watersheds
Hood Canal	(3.2.3.1) HC & ESJF Summer Chum Habitat Actions
Hood Canal	(3.2.3.2) Skokomish Chinook Habitat Actions
Hood Canal	(3.2.3.3) Mid-Hood Canal Chinook Habitat Actions
Hood Canal	(3.2.3.4) Hood Canal Steelhead Habitat Actions
Hood Canal	(3.2.3) Implement priority salmon recovery projects (freshwater habitats)
Hood Canal	(3.2): Restore and protect priority freshwater salmonid habitat
Hood Canal	(4.0) Hood Canal Shellfish Initiative
Hood Canal	(4.1) Develop and Implement Hood Canal Shellfish Initiative action plan
Hood Canal	(4.2) Support ecologically sustainable commercial shellfish operations in Hood Canal
Hood Canal	(5.0) Proactively prepare for climate change impacts across Hood Canal

Hood Canal	(5.1) Develop Hood Canal Climate Adaptation Plan
Hood Canal	(5.2) Integrate climate adaptation interventions throughout HCCC and member jurisdiction planning and programs
Hood Canal	(5.3.1) Consider climate resilience in all salmon recovery project design
Hood Canal	(5.3.2) Implement salmon recovery actions identified to benefit climate resilience
Hood Canal	(5.3) Improve climate resilience of salmon habitat
Hood Canal	(6.0) Outreach on IWP implementation effectiveness and ecosystem improvements
Hood Canal	(6.2.1) Maintain HCCC website as information resource for project partners and local decision makers
Hood Canal	(6.2.2) Maintain ecosystem status reports on OurHoodCanal.org website
Hood Canal	(6.2) Maintain role as central information source on Hood Canal ecosystem recovery

Appendix E: Gaps and Barriers, by Local Integrating Organization

Alliance for a Healthy South Sound (South Sound)

Category	Gap or Barrier title
F.04	Lack of funding
F.04	Limited staff capacity
PT.04	Lack of comprehensive monitoring
LR.01	Lack of consistent enforcement
F.01	Funding not adequate for setbacks
CI.15	Financial priorities of landowners
LR.06	Some ag lands limited to other uses
F.04	High cost of relocation
LR.07	Lack of market based incentives to encourage and/or force restoration
CI.14	Lack of understanding of importance of ag and forest lands by public and landowners
LR.02	Need for plans/regulation improvements
CI.14	Desire for waterfront/rural lifestyle
F.04	High cost of relocation
	Limited ability for sewer hookup within UGAs
CI.09	Resistance to government mandates
F.04	Cost of permeable paving and stormwater BMPs
LR.07	Disincentives for BMPs

PT.02	Salmonid survival rates
PT.02	Herring abundance
PT.02	Dissolved oxygen
PT.03	Shoreline armoring
PT.02	Data layers for ecosystem attributes
PT.02	Wetland data
PT.03	Fish passage barrier prioritization
PT.03	Lack of data and modeling for different setback scenarios
LR.07	Lack of effective incentives (financial/permitting/regulatory)
CI.11	Lack of landowner understanding about drift call function and sea level rise
	Construction firms lack training
LR.07	Lack of sufficient shoreline landowner incentives program
PT.03	Lack of projects demonstrating success of armoring removal and soft armoring alternatives
LR.01	Lack of enforcement for armoring without permits
LR.02	Regulations may be insufficient
CI.09	Limited education, outreach and training to homeowners
PT.01/PT.04	Limited water quality data
F.04	Limited PIC program
LR.01	Lack of ability to enforce OSS program
PT.04	Need to identify failing OSS
CI.09/CI.11	Lack of awareness of need for stormwater management
CI.11	Lack of knowledge of interaction between runoff and water quality
LR.07	Lack of incentives for BMPs
F.04	Lack of sewage sludge disposal alternatives
CI.13	Lack of demonstrated project success

Hood Canal Coordinating Council

PT.01; PT.02; PT.03	Data	Ecological assessment data is needed to inform the development and prioritization of strategies. This includes assessments of habitat types quality and assessments of policy effectiveness.
PT.06	Target- Goal setting	Setting goals for board ecosystem components with long lag times for measurable outcomes is extremely difficult and problematic. LIOs rely on our partners to produce this science. Ideally, PSP would facilitate the dissemination of Vital Sign target status information broken out by LIO area to inform how each LIO develops strategies and evaluation the potential contribution to Puget Sound wide goals.
CI.02	Partner capacity	We rely on our member jurisdictions for much of our partner participation – this means that we ask a lot of our counties’ staff. With budget constraints, counties are often unable to dedicate their time to participate in LIO processes, either because they are not funded to do so, or they simply have no capacity within their workload. A component of this disinterest is the lack of payoff they have seen from previous efforts, especially in the 2016 NTA round. Local government and NGO staff were not pleased with the amount of work required to submit NTA proposals, and were especially disappointed when most did not receive funding for their projects.
CI.01	Planning fatigue	Partners and stakeholders are no longer interested in participating in more planning. Especially in HCCC’s case, when we had expended our partners expertise and capacity over the course of five years to develop our Integrated Watershed Plan (IWP), which had only been completed for less than two years before this planning process was initiated. To reduce the amount of work we asked of our partners, HCCC staff did much of the translating from the IWP into the LIO Ecosystem Recovery Plan, and only asked participants to vet completed drafts of plan elements.

Island LIO

PT.09; LR.01	Regional support for Oil and Hazardous Spills
PT.02	Marine Water Quality
PT.04	Herring
CI.04	Chinook
CI.09	Community Engagement [Under "Funding"]
PT.04	Nearshore Indicator Monitoring [Under "Funding"]
CI.01	Process, planning and reporting requirements [Under "Funding"]
PT.07	Chinook component [under "Research"]
CI.04; PT.08	Pocket estuaries & Estuarine Wetlands Components [under "Research"]
CI.05	NTA proposal information [under "Research"]
CI.06; CI.05	Regional NTA development [under "Recovery Planning"]
CI.17	Effects of Climate Change [under "Recovery Planning"]
CI.18	Cost Effectiveness [under "Recovery Planning"]

San Juan LIO

PT.01; CI.05	Lack of time/funding to collect and analyze data to inform baselines/numeric goals
CI.01	Overall focus on process and planning detracts from the capacity needed to implement actions
F.01; F.03; CI.14	Protection and recovery projects are not prioritized for local funding.
PT.09	Regional Pressures are too large for local actions
PT.01	Baseline data and information
PT.04	Monitoring of local and regional projects

Snohomish-Stillaguamish LIO

CI.01	Planning, process, and reporting requirements - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
CI.01; CI.15	Regional Vital Sign framework - Gaps and Barriers Related to Vital Signs and Other Components
CI.04	Regional Vital Sign framework - Gaps and Barriers Related to Vital Signs and Other Components
CI.05; CI.08	Planning inconsistency - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
CI.05; LR.05	Lack of agency and policymaker engagement - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
CI.07	Diverse culture, vision, and characteristics of two large watersheds - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
CI.07; PT.04	Monitoring gap - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
CI.07	Process - Gaps and Barriers Related to Pressure Assessment and Conceptual Modeling
CI.07	Process - Gaps and Barriers Related to Pressure Assessment and Conceptual Modeling
CI.07	Stakeholder concerns - Gaps and Barriers Related to Setting Local Recovery Goals
CI.09	Investment in public engagement - Gaps and Barriers Related to Setting Local Recovery Goals
CI.09	Lack of public support - Gaps and Barriers Related to Strategy Planning and Results Chain Development
CI.10; CI.15	Regional Vital Sign framework - Gaps and Barriers Related to Vital Signs and Other Components
CI.11	Regional culture - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
CI.14	Conflicting values, concerns, and goals - Gaps and Barriers Related to Strategy Planning and Results Chain Development
CI.17	Regional Pressure framework - Gaps and Barriers Related to Pressure Assessment and Conceptual Modeling

CI.17; CI.04	Regional Pressure framework - Gaps and Barriers Related to Pressure Assessment and Conceptual Modeling
CI.17; PT.09	Regional Pressure framework - Gaps and Barriers Related to Pressure Assessment and Conceptual Modeling
F.01	Consistent federal and state funding - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
F.01	Funding - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
F.02	Restrictive matching requirements - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
F.02; CI.01; F.04	Funding management - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
F.03	Funding sources - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
LR.01	Federal and state regulatory and enforcement support - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
LR.01; F.04	Local funding and capacity - Gaps and Barriers Related to Strategy Planning and Results Chain Development
LR.01; LR.02	Regulatory and enforcement assessment - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
LR.02	Regulatory inefficiency - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
LR.02	Regulatory lag - Gaps and Barriers Related to Strategy Planning and Results Chain Development
PT.01; CI.07	Future need to address additional components - Gaps and Barriers Related to Setting Local Recovery Goals
CI.15	Future need to address additional components - Gaps and Barriers Related to Vital Signs and Other Components
PT.04; LR.02	Regulatory inconsistency - Overarching Barriers, Process Gaps, and Regional Support/Coordination Needs
PT.04; PT.09	Regional monitoring gap - Gaps and Barriers Related to Setting Local Recovery Goals
PT.08; CI.17	Less social science focus and integration in LIO framework - Gaps and Barriers Related to Setting Local Recovery Goals
PT.08; CI.17	Regional Vital Sign framework - Gaps and Barriers Related to Vital Signs and Other Components
PT.08; CI.17	Regional Vital Sign framework - Gaps and Barriers Related to Vital Signs and Other Components
PT.08; CI.17	Regional Vital Sign framework - Gaps and Barriers Related to Vital Signs and Other Components
CI.13	Data gap related to linking water quality and development planning - Gaps and Barriers Related to Setting Local Recovery Goals
NA	Future need to address additional components - Gaps and Barriers Related to Setting Local Recovery Goals

NA	Future need to address additional components - Gaps and Barriers Related to Setting Local Recovery Goals
NA	Future need to address additional components - Gaps and Barriers Related to Setting Local Recovery Goals
NA	NTA gap analysis - Gaps and Barriers Related to Strategy Planning and Results Chain Development
NA	Process - Gaps and Barriers Related to Strategy Planning and Results Chain Development
PT.02; PT.09	Data gap - Gaps and Barriers Related to Strategy Planning and Results Chain Development
PT.03	Data gap related to linking summer flow and development withdrawals - Gaps and Barriers Related to Setting Local Recovery Goals
PT.03; CI.15	Data gaps - Gaps and Barriers Related to Strategy Planning and Results Chain Development

South Central Action Area Caucus Group

CI.07		Diverse interests at the LIO table, but too few decision makers.
CI.15		LIO has a large geography with numerous high-priority pressures that are difficult to prioritize.
CI.03		5-year timeframe is challenging for recovery planning as some vital signs will not see progress for several years, and may not be progressing for any number of confounding reasons outside of the LIO's control, making it difficult to adaptively manage.
CI.15		Reconciling priorities with mandates.
CI.01		Focus on process and planning limits capacity to focus on addressing barriers to implementation.
F.04		Limited resources to implement (staffing and funding).
CI.11	Need	Need for more effective outreach and education efforts that use proven marketing approaches (such as community-based social marketing) to reduce barriers and maximize benefits of environmentally beneficial behaviors, especially around stormwater and shellfish priorities.
CI.12	Specific funding gaps	Salmon recovery - habitat restoration and protection and restoration
F.04	Specific funding gaps	Stormwater retrofits
F.04	Specific funding gaps	Stormwater system/infrastructure operation and maintenance
CI.11	Specific funding gaps	More extensive outreach and education efforts that affect resident and business behaviors
PT.02	Specific research gaps	Quality of riparian habitat
PT.04	Specific research gaps	Monitoring and evaluation of program effectiveness

PT.03	Specific research gaps	Green and gray stormwater infrastructure costs and effectiveness
PT.03	Specific research gaps	Location, status, and extent of problems cause by OSS systems in the LIO
PT.03	Policy gaps	Product substitution for stormwater quality improvement
CI.08	Policy gaps	Jurisdictional and agency/programmatic silos – need for more collaboration and information sharing
PT.05		Uncertainty around climate change (impacts, how to incorporate into planning efforts, funding, etc.).

Strait Ecosystem Recovery Network

F.01	Lack of reliable and sufficient action implementation funding (Barrier - Funding)
F.04	Limited staff capacity to implement actions (Barrier - Capacity)
F.04	Limited coordination capacity (Barrier - Capacity)
LR.01; LR.02	Inconsistent implementation and enforcement (Barrier - Enforcement)
LR.02; PT.09	Water Resource Management Rule legal challenges (Barrier – Regulatory)
LR.06; PT.09	Outdated water laws (Barrier - Regulatory)
LR.06; PT.09	Outdated exempt well statute (Barrier – Regulatory)
CI.05; CI.15	WSDOT road relocation priorities (Barriers – Policy)
CI.14	Olympic Discovery Trail (ODT) railroad grade (Barrier – Policy)
CI.09; CI.11; CI.13	SMP and CAO Best Available Science (Barrier – Policy)
LR.01	SMA shoreline use enforcement (Barrier – Enforcement)
LR.01	Unpermitted shoreline armoring enforcement (Barrier – Enforcement)
LR.01	Permitted shoreline armoring enforcement (Barrier – Enforcement)
LR.01	SMA and CAO riparian area ordinance enforcement (Barrier – Enforcement)
LR.06; PT.09	WAC single family residence exemptions (Barriers – Regulatory)
LR.06; PT.09	Eminent domain acquisition authority (Barrier – Regulatory)
CI.14	Sediment-blocking shoreline structures (Barrier – Regulatory)
LR.06; CI.13	SMP and CAO bluff edge structure setbacks (Barrier – Regulatory)
LR.06; PT.09	Existing single family residence shoreline armoring (Barrier – Regulatory)
LR.06; CI.13; PT.09	Functioning pocket estuary development (Barrier – Regulatory)

LR.06; CI.13	Marine and freshwater SMP and CAO riparian protection (Barrier – Regulatory)
LR.06; PT.09	Small forest landowner riparian exemptions (Barrier – Regulatory)
LR.06; PT.09	USACE exemptions (Barrier – Regulatory)
CI.14; LR.02; PT.09	New development in active floodplains (Barrier – Regulatory)
CI.14; LR.02; PT.09	Capital facilities in Coastal Management Zones (Barrier – Regulatory)
LR.06; PT.09	Clean Water Act (CWA) / Endangered Species Act (ESA) non-flood damage exemptions (Barrier – Regulatory)
LR.06; PT.09	Non-mitigated bank hardening (Barrier – Regulatory)
LR.06; PT.09	Emergency construction permit mitigation (Barrier – Regulatory)
PT.04	Water supply monitoring (Barrier – Monitoring)
PT.04	Restoration site flow monitoring (Barrier – Monitoring)
PT.04	Harmful algal bloom monitoring (Barrier – Monitoring)
PT.04	Low-cost citizen monitoring and analyses programs (Barrier – Monitoring)
LR.01	SMA shoreline use enforcement (Barrier – Enforcement)
PT.04	Local comprehensive stormwater monitoring (Barrier – Monitoring)
PT.02	Outdated TMDL data (Barrier – Monitoring)
PT.04	Harmful algal bloom monitoring (Barrier – Monitoring)
PT.04	Low-cost citizen monitoring programs (Barrier – Monitoring)
LR.01	Limited stormwater management enforcement (Barrier – Enforcement)
LR.06; LR.07; CI.11; PT.09; PT.10	Harmful (or toxic) chemicals (Barrier – Regulatory)
CI.11; LR.07; PT.09; PT.10; LR.06	Economic incentives for safer, less toxic, chemical products (Barrier – Policy)
CI.11; LR.07	Low Impact Development (LID) disincentives (Barrier – Policy)
F.01; PT.09	Stable OSS program funding (Barrier – Capacity)
PT.04	Local water quality monitoring (Barrier – Monitoring)
PT.02	Out-of-date TMDL data (Barrier – Monitoring)
LR.01	Regulatory enforcement (Barrier – Enforcement)
PT.04	Harmful algal bloom monitoring (Barrier – Monitoring)
F.04	LIO oil spill “table” capacity (Barriers – Capacity)

LR.02; CI.08; PT.09	Federal agency policy consistency and coordination (Barrier – Policy)
CI.15; PT.09	High risk areas (Barrier – Policy)
CI.08	Tribal oil spill event liaisons (Barrier – Policy)
CI.08; PT.09	“OPA-like” regional advisory council (Barrier – Policy)
CI.16; PT.09	High-level Transboundary coordination (Barrier – Policy)
PT.02; PT.03; LR.04	Parcel-by-parcel (drift cell) analyses (Data Gap - Assessment)
PT.02; PT.03; LR.04	Parcel-by-parcel (estuary) analyses (Data Gap - Assessment)
PT.02	Functional estuary assessments (Data Gap - Assessment)
PT.01	Pocket estuary habitat trend analyses (Data Gap - Assessment)
PT.02; PT.03; LR.04	Parcel-by-parcel (floodplain) analyses (Data Gap - Assessment)
PT.02; PT.03	Recharge project hydrological constraints (Data Gap – Assessment)
PT.02	Water resource data gaps (Data Gap – Assessment)
PT.04	Local Water Resource Management Program effectiveness (Data Gap – Assessment)
LR.02; LR.06; PT.09	New domestic well metering (Data Gap – Assessment)
LR.03	SMP No Net Loss (NNL) Effectiveness (Data Gap – Assessment)
PT.10	Climate Change illustration tools (Data Gap – Habitat)
PT.02	Critical Areas flooding potential (Data Gap – Habitat)
PT.02; PT.03	Water storage and groundwater recharge options (Data Gap – Water Quantity)
LR.04	Water retention services valuation (Data Gap – Water Quantity)
PT.02	Evaluation of available water resources (Data Gap – Water Quantity)
LR.02; PT.09	Regulatory framework for water hauling / delivery (Data Gap – Water Quantity)
PT.05	Climate Change effects on hydrologic regimes (Data Gap – Water Quantity)
PT.09; PT.10; CI.11; LR.06; LR.07;	Alternatives to less-toxic chemicals (Data Gap – Assessment)
PT.09; PT.10	OSS technology limitations (Data Gap – Technical)
LR.04	Strait data gaps (Data Gaps)
LR.01; PT.09	Post-spill emergency permitting (Data Gap)
CI.15	Out-of-date Strait GRP (Data Gap)

CI.13	GRP forage fish spawning data (Data Gap)
PT.01	NRDA baseline valuation damage assessments (Data Gap)
PT.03; PT.09	“Zone of No Save” analyses incomplete (Data Gap)
LR.01; PT.09	Tug escort requirements (Data Gap)
LR.01; PT.09	Redundancy requirements, by vessel type (Data Gap)
PT.03; PT.09	Propulsion fuel carrying capacity (Data Gap)
PT.01; PT.09	Individual tanker incident and accident history (Data Gap)
CI.16; PT.09	Comparison of U.S. and Canadian vessel requirements (Data Gap)
PT.03; PT.09	Shipping lane boundary location alarms (Data Gap)
LR.04	Economic drivers as risk analyses criteria (Data Gap)
PT.03; PT.09	Carrying capacity analyses (Data Gap)
CI.05	Local and state agency preparedness inconsistency (Data Gap)
CI.15; PT.03	Response / contingency plan resource verification (Data Gap)
LR.01; PT.09	Oil dispersant policies (Data Gap)
CI.13	Best Available Technology (BAT) equipped tugs (Data Gap)
CI.11	Local behavior change research (Data Gap)
LR.01	Water Rights Rule compliance (Data Gap)

West Central

PT.01	Lack of time and funding to collect and analyze data to inform baselines and numeric goals
LR.02	Capital and non-capital (regulatory) programs not always consistent with recovery
CI.04	Some local strategies were not found in PSP’s results chains work (Miradi)
CI.01	Overall focus on process and planning detracts from the capacity needed to implement actions
PT.05	Climate change poses quickly shifting environmental conditions
PT.01; PT.06	The current status of indicators is unknown (i.e. Our vision is limited by not knowing what we’ve lost historically)
CI.05	Disconnect between regional planning and LIOs
CI.12	Local salmon recovery not well integrated in LIO planning process

CI.03	Not all 2016 NTAs line up with priority Recovery Strategies
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Whatcom LIO

CI.01; CI.02; CI.10	The focus on developing the Ecosystem Recovery Plans has been on process, which limits participation and implementation of action.
CI.05; CI.06	Lack of coordination between regional planning and LIOs
CI.16; CI.08	Lack of implementation of formal processes for addressing transboundary issues.
CI.02; CI.03; PT.04; F.01	Funding to implement existing plans, solutions, and actions and for research and monitoring is insufficient, timing does not align well and/or does not extend for multiple year duration that is needed to plan and implement actions, and funding process is too time-consuming and process-intensive for the amount of funding received
PT.04	Lack of funding for monitoring
CI.02	Cost-effectiveness of participating in regional processes.
CI.05; CI.10	Lack of coherent public message.
NA	Local goals for the following ecosystem components: floodplains, stream flows, land cover, freshwater quality
NA	Definitions and/or goals for human components incorporated in the Whatcom LIO Ecosystem Recovery Plan.
CI.03; CI.15	Strategies are too general to evaluate; need more specifics in order to determine priorities for funding. There needs to be a clear 'road map' for recovery of local priority components.
NA	Develop/update results chains.
PT.01; PT.02; PT.03; PT.06	Data and information for updating ERP issues, evaluating solutions, and identifying priority actions may not exist to the extent needed to make policy decisions.
PT.01; PT.06	The current status of local indicators may not be known.

Appendix F: Gaps and Barriers associated with Oil Spill and Response

San Juan	Regional Pressures are too large for local actions	Local actions have limited ability to mitigate/reduce regional Pressures associated with oil spills, climate change (sea level rise, saltwater intrusion), algal blooms
Island	Regional support for Oil and Hazardous Spills	Oil and hazardous spills was selected as a high pressure by the ILIO because of the severe effects these spills can have on Chinook, shellfish, herring, estuaries, eelgrass, and marine water quality. The ILIO strategies for this pressure are focused on oil spill response to minimize the impacts to our nearshore and marine

		habitats from large spills.
Strait	LIO oil spill “table” capacity (Barriers – Capacity)	LIO capacity to regularly participate at oil spill “table” is insufficient [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Federal agency policy consistency and coordination (Barrier – Policy)	Policies among federal agencies (e.g., DOI, NOAA, etc.) are inconsistent and not well coordinated [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	High risk areas (Barrier – Policy)	High risk areas lack focus [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Tribal oil spill event liaisons (Barrier – Policy)	Dedicated points of contact for each Tribe are not identified to serve as liaisons during oil spill events [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	“OPA-like” regional advisory council (Barrier – Policy)	Puget Sound lacks an “OPA-like” regional advisory council that includes Tribes and local representatives [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	High-level Transboundary coordination (Barrier – Policy)	High-level Transboundary oil spill prevention, preparedness, and response is not well coordinated [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Strait data gaps (Data Gaps)	Data gaps, including a comprehensive Ecosystem Services Valuation, remain unfilled [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Post-spill emergency permitting (Data Gap)	Post-spill emergency permitting options are not identified and available [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Out-of-date Strait GRP (Data Gap)	Strait GRP is out of date; not a high priority for Ecology to update [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	GRP forage fish spawning data (Data Gap)	Up to date forage fish spawning data are not routinely included in GRPs [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	NRDA baseline valuation damage assessments (Data Gap)	NRDA baseline valuation damage assessments are incomplete [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	“Zone of No Save” analyses incomplete (Data Gap)	“Zone of No Save” analyses is incomplete, including an Emergency Response Towing Vessel location assessment [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]

Strait	Tug escort requirements (Data Gap)	Tug escort requirements are not identified [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Redundancy requirements, by vessel type (Data Gap)	Redundancy requirements, by vessel type, are missing [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Propulsion fuel carrying capacity (Data Gap)	Propulsion fuel carrying capacities, by vessel type and size, are unknown [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Individual tanker incident and accident history (Data Gap)	History of individual tanker incidents and accidents is unknown [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Comparison of U.S. and Canadian vessel requirements (Data Gap)	Requirements for U.S. vessels relative to Canadian vessels are unclear [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Shipping lane boundary location alarms (Data Gap)	Feasibility of shipping lane boundary location alarms is unknown [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Economic drivers as risk analyses criteria (Data Gap)	Local and regional economic drivers are not integrated into risk analyses [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Carrying capacity analyses (Data Gap)	Understanding of carrying capacity of individual vessels is incomplete [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Local and state agency preparedness inconsistency (Data Gap)	Policies, data, and geographic boundaries among state and local agencies (including local emergency preparedness) are inconsistent and not well coordinated when updating GRPs [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Response / contingency plan resource verification (Data Gap)	Resources to implement response / contingency plans are not routinely verified [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Oil dispersant policies (Data Gap)	Policies on the use of dispersants during oil spill events are not well determined nor publicized [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]
Strait	Best Available Technology (BAT) equipped tugs (Data Gap)	Prepositioned BAT equipped tugs are not identified nor stationed [L. Enhance and Support Improvements to Regional, Tribal, and Local Oil Spill Preparedness, Prevention, and Response]

Appendix G: Solutions to Barriers

FUNDING SOLUTIONS
Secure stable funding for WAC mandated local OSS programs
Funding & support needed.
Funding capacity to incentivize engagement across the LIO
Funding consistency
Funding for assessments of all apparently functional estuaries
Funding for comprehensive flow monitoring at restoration sites (E19)
Funding for developing and implementing low-cost citizen monitoring and analyses programs (E10)
Funding for historical analyses of habitat trends for all pocket estuaries
Funding for local monitoring and for better collaboration with regional partners on data sharing. Assessments should be included as funded elements of grants for all projects.
Funding for parcel-by-parcel assessments of drift cells for the entire Strait ERN LIO geography
Funding for parcel-by-parcel assessments of estuarine shorelines for the entire Strait ERN LIO geography
Funding for parcel-by-parcel assessments of floodplains for the entire Strait ERN LIO geography
Funding for routinely monitor for harmful algal blooms (E11)
Funding support to assess compliance with Water Rights Rules
Funding support to conduct behavior change research along Strait of Juan de Fuca and on the North Olympic Peninsula
Funding to analyze and integrate local and regional economic drivers into all risk analyses
Funding to analyze carrying capacity for individual vessels
Funding to assess options for water storage and groundwater recharge (WS6)
Funding to assess the valuation of water retention services (WS10)
Funding to determine feasibility and a regulatory framework for hauling / delivery of water (WS23)
Funding to determine feasibility and acceptability of relocating ODT away from marine shoreline to allow for removal of hard-armored railroad grade
Funding to develop a tool to graphically illustrate local Climate Change effects (E7)
Funding to develop and implement a NNL framework to evaluate and track local SMP effectiveness on an ongoing basis
Funding to develop and implement a program to meter all new domestic wells
Funding to develop and implement a program to understand the effectiveness of local Water Resource Management Programs
Funding to develop and implement local comprehensive stormwater monitoring program, one that includes metals, toxics, and pathogens
Funding to develop maps showing flood potential, beyond FEMA, for Critical Areas (C16)
Funding to enforce stormwater management regulations and ordinances in all local jurisdictions
Funding to enhance existing water supply monitoring (WS4)
Funding to evaluate all available water resources
Funding to evaluate effects of Climate Change on hydrologic regimes
Funding to fill most important data gaps to better inform development and implementation of Water Resource Management Programs

Funding to fill the highest priority data gaps along the Strait, including completion of a comprehensive Ecosystem Services Valuation
Funding to identify and make readily available less harmful alternatives for these chemicals
Funding to understand hydrological constraints associated with recharge projects
Funding to update TMDL data in high priority watersheds
Increase availability of state/federal funds to support ecosystem protection and recovery
More funding available to smaller counties
More nimble funding
Ongoing funding to develop and implement a program to routinely monitor for harmful algal blooms
Ongoing funding to develop and implement low-cost citizen monitoring programs
Regional focus on recovery goals instead of process; more nimble funding
Reliable and sufficient funding for local actions that contribute to regional recovery projects and programs

POLITICAL OR POLICY SOLUTIONS
Policy support to assure that policies among federal agencies (e.g., DOI, NOAA, etc.) are consistent and well coordinated
Political / policy support to remove small forest landowner riparian exemptions from HCPs
Political / policy support to develop regulations and ordinances that prohibit new development in active floodplains
Political / policy support to limit USACE exemptions to only emergency actions
Policy and funding support to develop and implement an “OPA-like” regional advisory council for the Salish Sea and adjacent coast, that includes Tribal and local representatives
Political / policy support to design permits for maintaining existing SFR shoreline armoring that minimize the cumulative effects on shoreline function
Political / policy support to develop more protective marine and freshwater riparian measures in SMPs and CAOs
Policy support to significantly advance coordination of high-level Transboundary oil spill prevention, preparedness, and response
Political / policy support to ban harmful chemicals from use as a source control technique
Policy support to increase focus on high risk areas
Policy support to proactively identify dedicated points of contact for each Tribe who would serve as liaisons during spill events
Political / policy support from elected officials and staff to work together to enhance regulatory enforcement
Political / policy support to develop new regulations to prohibit development along functioning pocket estuaries
Policy and funding support to determine and publicize the use of dispersants in advance of oil spill events
Policy and funding to routinely verify resources that would be called upon when implementing response / contingency plans
Policy and funding support to assure that BAT equipped tugs are identified and prepositioned at key stations

Political – procedural requirements for process and planning need to be taken into context with the overall need for recovery as the end goal, which requires implementing actions on the ground. Additionally, all planning and process requirements need to be developed prior to initiating local processes so expectations are known and/or can be managed.
Policy support to identify and implement redundancy requirements, by vessel type
Policy support to identify and utilize propulsion fuel carrying capacities, by vessel type and size
Policy and funding support to compare and analyze requirements for U.S. and Canadian vessels
Political / policy support to modify permits for all types of emergency construction so that they are designed to effectively mitigate damage to ecosystem
Policy and funding support to complete a “Zone of No Save” analysis, including an Emergency Response Towing Vessel location assessment
Funding to complete all NRDA baseline valuation damage assessments
Policy support to include the most up to date forage fish spawning data in all GRPs
Policy and funding support to raise priority and implement an update of Strait GRP
Political / policy support to develop economic and other incentives to encourage landowners to implement LID principles and practices, including retaining vegetated cover, reducing impervious surfaces, and BMPs
Policy support to identify and implement tug escort requirements
Legislative priorities should include regional actions for protection and recovery
Political / policy support to develop more protective structure setbacks (from bluff edge) in SMPs and CAO regulations and ordinances
Policy support to identify and utilize the history of incidents and accidents, by individual vessel
Policy and funding support to determine the feasibility of shipping lane boundary location alarms
Policy and funding support to identify and allow for post-spill emergency permitting options
Political / policy support to develop economic incentives for safer, less toxic, chemical alternatives
Policy and funding support to analyze and assure that policies, data, and geographic boundaries among state and local agencies (including local emergency preparedness) are consistent and well coordinated when updating GRPs
Policy and decision makers (at regional and state agencies and planning commissions) integrate recovery plans at comprehensive planning level Continued involvement of elected officials More coordination with and/or participation from Navy, WSDOT, KC Public Works, WSWC
Political / policy support to modify single family exemption in WAC to better protect shorelines
Assure local governments have access and capacity to fully utilize BAS when updating all local SMPs and CAOs
Political / policy support to modify regulations and ordinances to prohibit bank hardening, except where mitigated, along shorelines
Political / policy support to prohibit construction of capital facilities in CMZs
Political / policy support to modify regulations to allow for eminent domain acquisition authority for restoration on private lands
Political / policy support to develop new regulations that prohibit shoreline structures that block sediment transport and deposition
Political / policy support to modify CWA / ESA to prohibit all non-flood damage exemptions
Political – procedural requirements for process and planning need to be taken into context with the overall need for recovery as the end goal, which requires implementing actions on the ground. Additionally, all planning and process requirements need to be developed prior to initiating local

processes so expectations are known and/or can be managed.
Assure local governments have consistent procedures to implement and enforce Water Resource Management Programs and Rules
Assure local governments have sufficient capacity to fully enforce SMP uses of shorelines (E14)
Assure that regulators have sufficient capacity to enforce permitted shoreline armoring
Assure that regulators have sufficient enforcement capacity to prevent unpermitted shoreline armoring
Assure that SMA and CAO regulators have sufficient capacity to enforce ordinances that are designed to protect marine and freshwater riparian areas
Assure WSDOT policies on road relocation priorities align with local ecosystem protection and recovery priorities
Good governance – policy makers focused on recovery as end goal
Local, state, federal, and tribal coordination for regulatory program alignment
Political support and capacity
Political support to update exempt well statute to meet local needs in Washington State
Political support to update water laws to meet local needs in Washington State
Regional political advocacy
Research and political support
Resolve Water Resource Management Rule legal challenges
State or federal mandate; this can involve changes in agency practices as well as changes in policy
Strong advocacy by LIO and partners directed at regional and state decision makers to address political and environmental causes of climate change, as well as urgent response therefore
Regional support to assure that WA Departments with responsibilities and/ or opportunities to participate in addressing oil spills coordinate their mandates, take advantage of local knowledge and leverage PSP archives and policies to advance the work.
TECHNICAL SOLUTIONS
Research, data collection, and analysis; the Snohomish-Stillaguamish LIO intends to use and/or expand the existing regional monitoring and adaptive management process where relevant to avoid additional or duplicated efforts
Additional future work and revisions
Advance OSS technology to effectively filter or treat for nutrients and pathogens (fecals)
Data and technical research needed for robust baseline data
Data and technical research should be shared between academia, local jurisdictions, tribes, agencies and organizations—project managers and technical staff would reach out for information needed
Robust baseline data from academic institutions and state/regional organizations
State, local, tribal, federal coordination and sharing of information and resources
DOH dissolved oxygen data.
Technical support is needed to establish a better metric for this target.
Estuaries target should be more inclusive to support smaller estuarine wetlands which are important to the survivability and abundance of salmonids.
Further research, data collection and analysis
Further research, data collection and analysis by local jurisdictions, tribes and LIO partners
State, local, tribal, and federal coordination and sharing of information and resources
Research, data collection, and analysis; regional and local integration
Research, data collection, and analysis; regional and local integration

Support monitoring and data gathering and adjust criteria to include a quantitative measures.
Technical - Data and technical research may be needed at the local level and/or improved coordination among federal, tribal, state and local entities that are collecting or compiling data.
Technical resources are needed to conduct the necessary research and assessments.
Technical resources are needed.
Technical support and political will are needed to establish metrics, and capacity is needed to measure progress
Technical support and research are needed
Technical support for regional criteria for nearshore monitoring.
Technical, capacity and political support needed including support for maintaining and enforcing the Magnuson Amendment
Technical, capacity, political - LIO participants will continue to work on defining the human components.
Technical, capacity, political - Local LIO participants will continue working on developing local goals through September 2017.
COMMUNITY-BASED SOLUTIONS
Advocacy by LIO, local jurisdictions, partners and concerned citizens to alter regulatory programs in alignment with recovery
Investment in public engagement is required to ensure adequate stakeholder feedback
Involvement of citizen groups and community-based orgs
Support for ECONet to participate in WG
Regional advocacy for behavior change
Regional advocacy for behavior change and political advocacy
PROCESS AND PLANNING SOLUTIONS
Integrate protection and recovery plans at comprehensive planning level
Biennial Science Work Plan should include nearshore metrics for juvenile Chinook.
Communication from PSP about expectations of LIOs
Consider taxonomy revision around Climate Change impacts including strategies for community resilience (especially for coastal communities).
Support for community engagement in climate change impact mitigation especially coastal community resilience.
Coordination and integration, including efforts toward projects that are mutually beneficial
Less focus on prescriptive process and planning requirements to allow for more focus on priority recovery goals
Lessen burden on process, planning and reporting requirements to allow for more project implementation. Stay consistent with a process to allow strategic planning and adaptive management.
Minimal procedural requirements for process and planning
PSP minimize procedural requirements for process and planning
Good governance – policy- and decision- makers focus on recovery, not process, as end goal
Communication from PSP about expectations of LIOs
Regional and local project integration, efforts to combine similar projects under regional partnerships could be more efficient and mutually beneficial to both large and small stakeholders.
Regional consideration of taxonomy revision
Regional focus on recovery goals instead of process; PSP/LIO communication and

reporting improvements
Regional support for forage fish monitoring.
SI Leads' participation in local planning LIO capacity to participate in SIAT
State/local/tribal/federal coordination and sharing of information and resources
The planning effort to pay-off ratio needs to be balanced for PSP processes in order to keep local stakeholders at the table.
Time to implement the plans that are in place, to evaluate effectiveness and adapt as necessary – without a new planning process or product required.
CAPACITY SOLUTIONS
Assure local governments have sufficient capacity to fully enforce SMP uses of shorelines (E14)
Funding and capacity for permit enforcement
Funding for sufficient staff capacity to coordinate local processes (e.g., LIO, Lead Entity, Marine Resource Committees)
Funding for sufficient staff capacity to implement actions