

Guidance for Structuring, Selecting and Prioritizing Near Term Actions for Improved Ecosystem Outcomes for 2016

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Table of Contents

A Letter from the Puget Sound Partnership	4
Executive Summary.....	5
Glossary of terms	7
1. Introduction	9
Before getting started.....	10
Engaging necessary partners	10
Setting the decision context	11
Addressing proposed and currently implemented NTAs.....	11
2. Choosing Near Term Actions.....	12
Time Requirements of each Step.....	12
Table 1. A template for 2016 NTA prioritization. Each step highlights a distinct process for establishing focal ecosystem outcomes; identifying strategies that are thought to give rise to improved ecosystem state, identifying NTAs that implement key strategies; and evaluating and prioritizing competing NTAs.	13
2.1. Identify the ecosystem outcomes you will address in 2016.....	14
2.2. Determine where an action is necessary to achieve ecosystem objectives.....	15
Developing Indicators to aid in evaluating NTAs	16
2.3. Develop a range of NTAs capable of achieving objectives.....	17
Linking NTA’s to strategies.....	17
Developing a diverse portfolio of NTAs	17
2.4. Evaluate and select potential NTAs	19
3. Next Steps: Moving Towards Implementation	22
Local NTAs versus regionally prioritized strategies	22
Making the case to potential funders for LIO prioritized NTAs	22
Closing the Loop: Monitoring Progress, Learning and Adapting	23
4. Literature Cited	23
5. Appendices.....	24
Appendix 1. Near-Term Action Development and Prioritization Checklist	25
Appendix 2. Implementing NTAs outside of the scope of the Action Agenda.....	27

A Letter from the Puget Sound Partnership

Executive Summary

The Puget Sound Partnership (PSP) Action Agenda (Agenda) contains key priorities for the Partnership and its members, describes ongoing efforts, and identifies a suite of local and regional Near Term Actions (NTAs) that are integral to making necessary progress towards the Partnership's stated objectives. These NTAs are meant to reflect shared priorities among state, federal, tribal, and local governments and their interested partners, including environmental and business groups. Resources for implementing NTAs are often limited, making the selection and prioritization of NTAs a critical concern for Local Integrating Organizations (LIOs) to ensure that resources are spent as strategically as possible.

Choosing and prioritizing NTAs is challenging given (a) a complex set of ecosystem values; (b) complex relationships between actions that could be taken and ecosystem outcomes achieved; (c) varying priorities among diverse partners; (d) a diversity of funders each with their own mandates; and (e) a diversity of human values (e.g., cost of actions, imposition on people's livelihoods, legal constraints to impose actions, etc.). This challenge is exacerbated by the fact that LIOs are in different stages of organization, priority identification, and general participation in the PSP.

Participants within the LIOs must weigh this complexity and their additional responsibilities with their desires to attract resources for important local projects and move towards a healthier Puget Sound. This need to maintain participation by LIO participants while effectively and efficiently moving toward broader ecosystem objectives requires a process that identifies important shared priorities and that is also fair and transparent. This document is to provide the LIOs with just such a process for developing, vetting, and selecting high priority NTAs that reflect the values most important to LIO constituents. Throughout the document we rely on a variety of decision-making principles to:

- **Ensure a rigorous, transparent, and defensible approach to developing and selecting NTAs.**
- **Allow identification of Inter-LIO priorities.**
- **Encourage transparency, accountability and trust within and among LIOs.**
- **Recognize the importance of human values while achieving ecosystem objectives.**

This document presents a prescriptive approach that integrates the Open Standards methodology currently employed by the Puget Sound Partnership with tools and techniques from Decision Science. Decision Science (DS) complements the PSP's Open Standards approach by focusing on balancing competing objectives to make the best possible decision (Gregory et al 2012). The ability of DS-based approaches to account for economic and societal concerns (in conjunction with ecosystem objectives) lends itself particularly well to the NTA selection process because LIOs often must balance their desired ecosystem outcomes with the social and economic objectives of their constituents. We describe a series of steps designed to guide LIOs as they: (a) identify critical ecosystem components and their pressures, (b) identify potential NTAs, (c) consider the trade-offs amongst a complex suite of ecosystem, economic and social values; (d) prioritize actions that are important to an LIO; and (e) decide which of those high priority activities make good NTAs.

A template for 2016 NTA prioritization

Much of the following document is devoted to the process of crafting (or modifying) Near Term Actions such that they can be assessed using a structured, transparent prioritization process. This process has been distilled into the following template. Each step of the template highlights a distinct process for establishing focal ecosystem outcomes; identifying strategies that are thought to give rise to improved ecosystem state; identifying NTAs that implement key strategies; and evaluating and prioritizing competing NTAs.

1. Identify the ecosystem outcomes you will address in 2016.

NTAs (developed or refined in step 3) must explicitly address desired ecosystem objectives.

- Select 5-7 ecosystem outcomes that reflect LIO and/or PSP priorities and strategic initiatives.
- Use quantitative, measurable measures of ecosystem condition to define the desired performance or progress on the ecosystem objectives.

2. Determine where an action is necessary to achieve ecosystem outcomes.

NTAs (developed or refined in step 3) must explicitly target one or more aspects of the system to achieve desired ecosystem objectives.

- Identify key stressors or threats to the ecosystem and their sources (i.e., pressures)
- Prioritize pressures based on their impact on the ecosystem objectives and your ability to affect them
- Develop a suite of strategies for reducing these key pressures
- Identify a suite of steps (if, then statements – also called results chains or logic models) that describe how these strategies achieve ecosystem objectives
- Identify additional (and potentially competing) ecosystem or non-ecosystem objectives that may be affected by each of these strategies.

3. Develop a range of proposed NTAs that enact components of key strategies and move towards ecosystem objectives.

Proposed NTAs should reflect different approaches for implementing the above strategies.

- Develop a portfolio of proposed NTAs that reflects a diversity of strategies to achieve outcomes and objectives
- Identify performance measures for each proposed NTA that track its impact on ecological, economic, political social and human health objectives.

4. Evaluate, prioritize, and select potential NTA's

Selecting NTA's requires rigorous, transparent evaluation of trade-offs in uncertainty, cost, and impact on objectives.

- Specify the likely magnitude of impact of an NTA on the desired ecosystem component.
- Estimate the uncertainty of the impact of the NTA to an ecosystem component.
- Specify the likely magnitude of impact of each NTA on economic, social, and human health performance measures
- Estimate the uncertainty of the impact of each NTA on these non-ecosystem performance measures
- Use a prioritization approach to select NTAs that balance achieving desired ecosystem outcomes, while minimizing impacts to non-ecosystem objectives and uncertainty.

Glossary of terms

Adaptive management	The incorporation of a formal learning process into ecosystem recovery. Specifically, it is the integration of project design, management, and monitoring, to provide a framework to systematically test assumptions, promote learning, and supply timely information for management decisions.
Conceptual Model	(situation analysis) A diagram that represents relationships between key factors that are believed to impact, positively or negatively, one or more focal ecosystem components. A good model should link the components to pressures, contributing factors, opportunities, stakeholders, and key intervention points (threats, opportunities, or targets) where a team can develop strategies that will influence those factors.
Contributing Factor	(indirect threat, underlying factor, root cause, opportunity) A factor identified in an analysis of the situation that contributes to the existence or persistence of direct pressures. Factors are often an entry point for recovery actions. For example, “logging policies” or “demand for fish.” Sometimes called a root cause or underlying cause. Compare with pressure.
Decision context	The setting and circumstances that determine what decision needs to be made. Defining the decision context or decision problem means determining what sort of decision needs to be made, by whom, and by when? What do we know about the context, e.g., how much do we understand about the relationship between cause and effect? What range of objectives and alternatives can be considered? What level of decision support are we likely to require, e.g., what sort of analysis needs to be done? What are the overarching, constraining, perhaps institutional factors that need to be taken into account?
Focal ecosystem component	(component) An element of the ecosystem - biophysical or human - that a project or recovery effort has chosen to focus on. A component can be a species, habitat, ecological system or process, or an aspect of human wellbeing. Ecosystem components should collectively represent the biodiversity of concern in the Puget Sound.
Indicator	A measurable entity related to a specific information need such as the status of a component or factor, change in a pressure, or progress toward an objective or goal. A good indicator meets the criteria of being: measurable, precise, consistent, and sensitive.
Key attribute (KEA)	(Key ecological attribute) Aspects of a component’s biology or ecology that if present, define a healthy component and if missing or altered, would lead to the outright loss or extreme degradation of that component over time.
Lead Organization (LO)	An agency empowered by the Environmental Protection Agency to distribute funds to enact Near Term Actions addressing Puget Sound recovery.
Local Integrating Organization (LIO)	A regionally defined collection of government and non-government organizations sanctioned to express stakeholder interests in improving ecosystem condition in the Puget Sound. LIOs usually comprise one to three watersheds within Puget Sound.
Near Term Action (NTA)	An action that can be deployed by an LIO or other partner over the course of a two year period that would implement a strategy or sub-strategy designed to improve ecosystem condition based on a specified theory of change.
Objective	A formal statement detailing a desired outcome of a project such as reducing a critical pressure. A good objective meets the criteria of being: results oriented, measurable, time limited, specific, and practical. If a recovery effort is well conceptualized and designed, realization of the effort’s objectives should lead to the fulfillment of the effort’s goals and ultimately its vision.
Outcome	The desired future state of a pressure or factor. An objective is a formal statement of the desired outcome.

Performance Measure	A specific metric for assessing and reporting how well an action such as an NTA performs with respect to an objective or outcome.
Potential Effects Table	A matrix that characterizes the potential effects of proposed actions such as NTAs with respect to each objective. Generally, it will also contain information about performance measures, used to more precisely define the meaning of objectives.
Pressure	(Direct threat) Primarily human actions that immediately degrade one or more conservation targets. For example, “logging” or “fishing.” They can also be natural phenomena altered by human activities (e.g., increase in extreme storm events due to climate change). Typically tied to one or more stakeholders. Sometimes referred to as a “source of stress.”
Pressure Assessment	The systematic evaluation and comparison of the relative potential impact of pressures on ecosystems and ecosystem components, generally within the context of specific ecosystem management or recovery goals.
Results Chain	A graphical depiction of a recovery effort’s core assumptions, the logical sequence linking project strategies and actions to desired outcomes, including pressure reduction outcomes and one or more ecosystem components. In scientific terms, it lays out hypothesized relationships. See also Theory of Change.
Stakeholder	Any individual, group, or institution that has a vested interest in or can influence the natural resources of the recovery area and/or that potentially will be affected by identified activities and have something to gain or lose if conditions change or stay the same. Stakeholders are all those who need to be considered in achieving project goals and whose participation and support are crucial to its success.
Strategy	A set of actions with a common focus that work together to achieve specific goals and objectives by targeting key intervention points, integrating opportunities, and limiting constraints. A good strategy meets the criteria of being: linked, focused, feasible, and appropriate.
Sub-strategy	A set of actions with a common focus that work to achieve specific aspects of a strategy
Target	A time-bound, quantitative or qualitative recovery goal related to the status of an ecosystem component. PSP has defined a suite of 2020 Ecosystem Recovery Targets for Puget Sound. See also Focal Ecosystem Component
Theory of Change	A formal logical statement linking hypothesized causes and effects that would result in an altered state of a pressure or an ecosystem component given a set of actions. See also Results Chain.
Threat	See Pressure.
Threats Assessment	A synonym for Pressure Assessment.
Threshold	The level of some attribute above or below which some critical state is expected to suddenly change.

1. Introduction

The Puget Sound Partnership has created a series of documents to structure and guide actions aimed at improving the ecosystem condition of the Puget Sound. Among these, the Puget Sound Action Agenda (hereafter Agenda) serves as one of the primary guiding documents in the Puget Sound Partnership's (PSP) efforts to restore the health of the Puget Sound by 2020. The Agenda contains key priorities for the Partnership, describes ongoing efforts, and identifies a suite of local and regional Near Term Actions (NTAs) that are integral to making necessary progress towards the Partnership's stated objectives. These NTAs are meant to reflect shared priorities among state, federal, tribal, and local governments and their interested partners, including environmental and business groups. Resources for implementing NTAs are often limited, making the selection and prioritization of NTAs a critical concern for Local Integrating Organizations (LIOs) to ensure that resources are spent as strategically as possible. In addition, a rigorous process clearly linked to the objectives of the PSP should make an LIO's NTAs more competitive for funding from Lead Organizations (LOs) or other funders thereby creating more resources for accomplishing NTAs.

Choosing and prioritizing NTAs is challenging given (a) a complex set of ecosystem values (<http://www.psp.wa.gov/vitalsigns/>); (b) complex relationships between actions that could be taken and ecosystem outcomes achieved; (c) varying priorities among diverse stakeholders; (d) a diversity of LO funders each with their own mandates; and (d) a diversity of human values (e.g., cost of actions, imposition on people's livelihoods, legal constraints to impose actions, etc.). This challenge is exacerbated by the fact that LIOs are in different stages of organization, priority identification, and general participation in the PSP.

The objective of this document is to provide the LIOs with a process for developing, vetting and selecting high priority NTAs that reflect the values most important to LIO constituents. Throughout this process we rely on key decision-making principles that:

- **Ensure a rigorous, transparent, and defensible approach to developing and selecting NTAs.** Maintaining buy-in of elected officials, resource management staff, and the general public can be a significant challenge. The principles we introduce in this document should allow clear identification of why a particular action was selected, the criteria evaluated when making that selection, and the expected outcomes of the decision. Such an approach is critical when defending difficult decisions and ensuring that partners feel they are treated fairly even when their proposed NTA is not selected.
- **Allow identification of Inter-LIO priorities.** The ability to leverage existing resources and compete for future resources makes the ability to work across LIOs increasingly important. Additionally, the scope of many of the issues facing the Puget Sound requires coordinated efforts whereby the "whole is more than the sum of its parts". Although the LIOs may differ in many important ways, the principles we introduce can facilitate the more efficient identification of these shared priorities by virtue of a common process for selecting NTAs.
- **Encourages transparency, accountability and trust within and among LIOs.** Encouraging transparency, accountability and trust engenders the capacity for partnership building and cross-LIO learning, an attribute that has been recognized as needing improvement (After Action Review). The principles we introduce facilitate an open and constructive dialogue among the LIOs by using a common language and a common set of steps to select objectives, define performance measures, evaluate the effectiveness of previously selected NTAs, and prioritize NTAs.
- **Recognizes the importance of human values while achieving ecosystem objectives.** The LIOs represent communities that depend on the Sound for a variety of services from aesthetic to economic. Restoring the health of the Puget Sound is critical to maintaining these services; however, the actions taken to achieve this

Objectives for the document:

Establish a process for developing and ranking NTAs that:

- **Ensures a rigorous, transparent, and defensible approach to developing and selecting NTAs.**
- **Allows identification of Inter-LIO priorities.**
- **Encourages transparency, accountability and trust within and among LIOs.**
- **Recognizes the importance of human values while achieving ecosystem objectives.**

objective will differ in their impacts to various parts of the local communities. The principles we introduce here allow each LIO to evaluate potential NTAs both in terms of their ability to achieve ultimate ecosystem objectives and in terms of potential trade-offs with other values of the LIO's constituents.

A variety of approaches for developing actions and prioritizing decisions has been developed to assist in collaborative decision-making. Rather than focus on a particular approach, we describe a number of best practices for prioritizing NTAs. This document is necessarily focused on a transparent, repeatable, and rigorous process for making decisions like those faced by the PSP and its LIOs. We forego many ecological, social, and economic details in order to maintain focus on the steps in this process. Readers should be able to evaluate where they are in the NTA development or prioritization process and skip to the appropriate stage in order to move forward efficiently and effectively. This document presents a prescriptive approach to (a) identify critical ecosystem components and their pressures; (b) identify potential NTAs; (c) consider the trade-offs amongst a complex suite of ecosystem, economic and social values; (d) prioritize actions that are important to an LIO; and (e) decide which of those high priority activities make good NTAs.

We use a process of *identifying actions* that map to *strategies* to improve *ecosystem condition* by identifying key ecosystem *pressures* (CMP 2013). Identifying actions requires a clear understanding of desired ecosystem outcomes and developing a logic model that suggests why a particular strategy will work to reduce a pressure and result in ecosystem condition improvement. This guidance provides a roadmap for developing a theory of change that details a working model to explain why an action is expected to have an impact on that ecosystem component. We then describe a process to evaluate competing potential actions that might impact an ecosystem component, and prioritize actions that are practical, feasible and are likely to have a high impact on valued ecosystem components.

Many LIOs must balance their desired ecosystem outcomes with the social and economic objectives of their constituents. Decision Science (DS) complements the PSP's Open Standards approach by focusing on balancing competing objectives to make the best possible decision (Gregory et al 2012). As such, DS lends itself particularly well for weighing economic and societal concerns alongside ecosystem goals for NTA *prioritization*. Hence, we integrate decision principles throughout this document using a standard common lexicon, as defined in the glossary. Our focus is on useful tools for ensuring that LIOs can select NTAs that are clearly linked to critical ecosystem components but that also evaluate trade-offs amongst competing NTAs based on the values of individual LIOs.

We rely on a running example constructed using objectives and approaches similar to those employed by the PSP to illustrate key points throughout the document. The technical details of this hypothetical case study are not as important as the guiding principle illustrated with its use: robust NTA prioritization will include a very clear logical connection from the action to the pressure(s) that the action is envisioned to relieve and then to the ecosystem component(s) relieving those pressures will improve. In developing this example, we impose our values on the problem. LIOs will carry a broader range of actual values. Nonetheless, the guidance and associated example is intended to illustrate a process by which LIOs can integrate a variety of decision support tools to prioritize actions to achieve ecosystem outcomes.

Before getting started

The bulk of this document deals with issues related to developing and prioritizing NTAs for inclusion in the 2016 Action Agenda. A number of issues need to be addressed, however, before an LIO can successfully embark on this process. These include ensuring that all of the necessary partners are engaged, developing a shared understanding of the context for the decision, and addressing NTAs that were developed (and potentially implemented) as a result of previous efforts.

Engaging necessary partners

Prioritization of NTAs within an LIO is likely to be a contested decision: not everyone will get everything that they want. As a consequence, establishing a process that confers legitimacy to the prioritization is critical. The first step in attaining any decision that will be supported by the group is to ensure that everyone who needs to be involved in the decision is at the table. Stakeholder engagement requires careful consideration of the varied components of societal interests that matter in setting priorities. LIOs generally have this structure in place through their member organizations. Nevertheless, prioritization can be a time consuming endeavor. If the right people from the organizations do not pay attention to the process and agree to it, then the prioritization risks losing legitimacy and member organization support. These issues matter when it comes time to ask for funding, provide logistical support for the funding received, and endorse and permit actions that result from the funding.

Setting the decision context

Ensuring that all partners have a shared expectation of what is “on the table” prior to beginning the development and prioritization process is key to avoiding frustration later. To that end, LIOs should address the following questions to ensure a shared understanding for the level of detail they will seek from the process we introduce:

- **Should we prioritize?** Prioritization is appropriate if there is a desire or need to determine the extent to which broad based support exists for subsets of the different potential actions. An LIO may see value in preparing a recommendation that reflects the joint deliberations and multiple perspectives of the whole group. Prioritization is an effective way to look outside of and across individual domains of responsibility to attempt to identify the most pressing needs of the local ecosystem as a whole. We presume that the diversity of partners, uncertainty of outcomes, and facing limited resources will invariably lead to some need for identifying priorities. However, participants in the process should ask explicitly, up front, whether the benefits of prioritization are likely to outweigh any negatives, such as alienation of particular stakeholders or partners, or excluding inexpensive options that could be implemented without funding.
- **How strict or specific a level of prioritization do we want?** Carefully prioritizing NTAs is an investment of time and resources that depends on the level of specificity required and the level of agreement among participants. Increasing levels of specificity in prioritization of actions enable greater levels of focus and targeting of the personnel and funding resources required to carry out the desired actions, but may be extremely challenging if uncertainty is high and agreement is low. An unranked list says that resources should be targeted to the actions in the list but does not specify where among those actions to begin. Such an unranked list is often made possible using a simple screening to determine whether or not NTA's exceed some threshold of importance, or impact in order to make it onto a priority list. In contrast, a ranked list says exactly where to start, then which action to undertake second, third, and so on. Arriving at a ranked list will often require a more rigorous process to document various trade-offs, uncertainties, and assumed results such that the priorities do not appear arbitrary. As a final note, tiered categories support an intermediate level of focus and targeting. The more the LIO members agree upon priorities and hypothesized impacts of proposed NTA's, the easier the prioritization process. The difficult task of actually prioritizing tasks requires more work, but is likely to result in a more robust outcome that would be easier to support in proposing actions for funding. Having a shared understanding of the required level of specificity ensures that participants will be able to see the process through and that the process will meet the needs of the participants. Identifying key dates for completion of each step we introduce can provide a helpful structure for avoiding “perpetual process”.
- **How much do we know already?** Every NTA is linked to its projected impact on ecosystems, as well as its impact on society with some degree of uncertainty. The PSP has relied on Situation Analyses and Pressure Assessments to document these projected links and associated uncertainties. Efficiency here depends on pressure assessments that are up-to-date, access to information on the effectiveness of previous actions, and an idea of how much uncertainty remains with respect to a particular pressure, strategy, action or outcome. Regardless of the information available (assuming uncertainty persists), pressure prioritization (wherein an LIO selects which pressures it will target) should be done carefully with assumptions well-documented (e.g., through a theory of change or results chain).

Addressing proposed and currently implemented NTAs

In many cases, LIOs already have adopted a suite of NTAs through a range of processes (e.g., pressure prioritization, selection of “legacy” projects, etc.). Before developing new NTAs for 2016 the LIOs will likely need to evaluate these NTAs to determine if they remain appropriate for prioritization in 2016. Hence, LIOs must start the 2016 prioritization process with the difficult conversation regarding the fate of existing, unaccomplished NTAs. Each likely has advocates within the LIO and not revisiting these NTAs but retaining them is likely the easiest way forward. However, it also is possible that unfunded NTAs may have been unsuccessful as a consequence of not being clearly linked to ecosystem benefit. Whatever the specific reason, adopting a view that all 2016 NTAs need to be vetted through the decision

process that evaluates their likely costs and benefits against every other candidate NTA will result in the best decision process.

The first step in addressing existing NTAs is to decide whether or not implemented NTAs have shown sufficient progress toward pressure reduction and ecosystem outcomes. There is an established process for recording data regarding implemented NTAs, which is intended to evaluate effectiveness of the NTA (indeed the PSP is currently preparing an Adaptive Management guide to provide guidance on these key considerations). We do not discuss that here, but assume that through that process LIOs will have the necessary information to determine whether a particular NTA is performing well enough (relative to its expectation) to warrant crafting new NTAs that extend these actions to additional areas or implementing NTAs that may be the logical next step (based on an existing theory of change or results chain). See also <http://gismanager.rco.wa.gov/ntaportal>.

NTAs that are not performing well (not being implemented in a cost-effective manner; causing unduly negative social consequences, not altering the physical environment as envisioned, or not resulting in the envisioned ecosystem benefit), as well as those that were not implemented, require further scrutiny to determine how they should be altered so as to improve their chance of impact to ecosystem outcomes. In many cases the linkage between NTAs and the ecosystem outcome they are intended to achieve (or the strategy they are implementing) may be unclear. In other instances, there may be a need to “fine tune” existing NTAs to better specify their potential role in achieving ecosystem outcomes. This fine-tuning may result as a consequence of: (a) deployed actions effectively having reducing pressures, (b) new or increasing pressures to the system, (c) learning from past actions, and/or (d) new regional priorities being identified. This fine-tuning can be achieved (and LIO NTA proposals significantly strengthened) by evaluating existing NTAs alongside newly developed NTAs within the process we describe in Section 2.

2. Choosing Near Term Actions

We decompose the selection and prioritization of NTA’s into four discrete steps (Table 1). LIOs may use this guidance by entering at any step. For example, step one identifies focal ecosystem outcomes for 2016 NTAs. However, focal ecosystem outcomes have already been identified at a regional level (Vital Signs) and perhaps for most LIOs, suggesting that less time is required for this step. Still we encourage LIOs to revisit work already done for two reasons. First, things change; previously identified priorities might not remain top priorities for the future. Second, every iteration of prioritization is a rough draft of the next effort. LIOs should be getting better at NTA prioritization, and should not consider previous efforts flawless.

Time Requirements of each Step

Because so much depends on what has been done already and how well it has been done, it is hard to link each of the following steps with accurate time requirements. Instead, we emphasize that there is great benefit in taking a quick run through the whole template—all the way through—and seeing where the weak links are and where the strong points are (so there is work to be done on the former, no work to be done on the latter). This should be done at a very early stage in the process and should take no more than a half-hour, or, in rare cases, one hour. What is to be avoided is LIOs proceeding very carefully through the whole template and putting lots of time into areas that turn out, in an absolute or relative sense, to be unimportant.

1. Identify the ecosystem outcomes you will address in 2016.

NTAs (developed or refined in step 3) must explicitly address desired ecosystem objectives.

- Select 5-7 ecosystem outcomes that reflect LIO and/or PSP priorities and strategic initiatives.
- Use quantitative, measurable measures of ecosystem condition to define the desired performance or progress on the ecosystem objectives.

2. Determine where an action is necessary to achieve ecosystem outcomes.

NTAs (developed or refined in step 3) must explicitly target one or more aspects of the system to achieve desired ecosystem objectives.

- Identify key stressors or threats to the ecosystem and their sources (i.e., pressures)
- Prioritize pressures based on their impact on the ecosystem objectives and your ability to affect them
- Develop a suite of strategies for reducing these key pressures
- Identify a suite of steps (if, then statements – also called results chains or logic models) that describe how these strategies achieve ecosystem objectives
- Identify additional (and potentially competing) ecosystem or non-ecosystem objectives that may be affected by each of these strategies.

3. Develop a range of proposed NTAs that enact components of key strategies and move towards ecosystem objectives.

Proposed NTAs should reflect different approaches for implementing the above strategies.

- Develop a portfolio of proposed NTAs that reflects a diversity of strategies to achieve outcomes and objectives
- Identify performance measures for each proposed NTA that track its impact on ecological, economic, political social and human health objectives.

4. Evaluate, prioritize, and select potential NTA's

Selecting NTA's requires rigorous, transparent evaluation of trade-offs in uncertainty, cost, and impact on objectives.

- Specify the likely magnitude of impact of an NTA on the desired ecosystem component.
- Estimate the uncertainty of the impact of the NTA to an ecosystem component.
- Specify the likely magnitude of impact of each NTA on economic, social, and human health performance measures
- Estimate the uncertainty of the impact of each NTA on these non-ecosystem performance measures
- Use a prioritization approach to select NTAs that balance achieving desired ecosystem outcomes, while minimizing impacts to non-ecosystem objectives and uncertainty.

Table 1. A template for 2016 NTA prioritization. Each step highlights a distinct process for establishing focal ecosystem outcomes; identifying strategies that are thought to give rise to improved ecosystem state, identifying NTAs that implement key strategies; and evaluating and prioritizing competing NTAs.

2.1. Identify the ecosystem outcomes you will address in 2016

The ability to develop and prioritize alternative actions (NTAs or otherwise) requires a clear articulation of what these alternative actions are designed to achieve. Thus, the first task is to identify the top priority ecosystem outcomes. That is – which components of the ecosystem do you hope to change? How will you change them? How will you know they have changed?

This can be a challenging exercise, but can be made much easier by developing (or using an existing conceptual model that identifies the 5 to 7 focal ecosystem components that matter the most; identify key attributes that represent these focal ecosystem components; identify quantifiable indicators of the key attributes; and have a clear causal linkage that links these together such that you can assert that if the indicator levels are met, then the attributes are in good condition and that this would suggest that the focal ecosystem component is in good condition. For example, a focal ecosystem component may be marine fish populations; a key attribute of that component may be population abundance of a forage fish such as herring, and an indicator of herring may be a specified spawning biomass.

Linking components to attributes to indicators can be a challenging exercise. Thankfully, many resources exist to help an LIO with the technical aspects of this process (Box: Resources for Identifying and Specifying Ecosystem Outcomes).

As you consider which ecosystem components you will focus on for 2016, we also recommend taking a moment to determine how your LIO's priority ecosystem components align with those that have been expressed regionally. Doing so will allow you to clearly link your activities to the priorities of the Partnership and allow you to identify important opportunities to leverage the work of other Partnership participants. A good place to begin to evaluate whether or not existing LIO ecosystem components, key attributes and indicators align with regional priorities is the Puget Sound Vital Signs portal (<http://www.psp.wa.gov/vitalsigns/>), which identifies six focus areas for ecosystem recovery that are consistent with PSP's broader ecosystem recovery goals (healthy human populations, human quality of life, species and food webs, protecting and restoring habitats and assuring for adequate water quantity and high water quality). Within these six focus areas are 21 vital signs, each representing a specific recovery target and its associated indicators (e.g., pacific herring for species and food webs). Further specification of these ecosystem components is found in the 2012/2013 Action Agenda for Puget Sound (Puget Sound Partnership 2012). Together these documents guide LIOs to a vision of what is regionally important. It is

then up to LIOs to develop a local expression of those ecosystem components, attributes and indicators that are important locally. This might be the same set, a sub-set, or a non-over-lapping set. The important thing to do is develop consensus on what is important to the LIO.

Identifying what is important is a necessary first step. It is, however, not sufficient. It is critical to specify quantifiable, time referenced outcomes in order to assess progress toward recovery. What indicators will be used to measure ecosystem improvement? How much improvement in designated indicators is desired? How long do we envision this improvement to take? Being able to answer these three simple questions will become critically important when trying to

Box 2.1: Identifying ecosystem outcomes:

Using the Vital Signs Indicators and 2020 Targets, the Example LIO is attempting to specify the ecosystem outcomes that the 2016 NTAs will help them accomplish. For the 2016 Action Agenda, the Example LIO will focus on "water quality" and "protect and restore habitat" ecosystem outcomes.

Good

Change water quality within the Example LIO.

Restore habitat within the Example LIO.

These statements align with the PSP Vital signs and suggest that the LIO will do something, but they don't say anything about the what outcome is desired, where they will achieve it, or how long it might take.

Better

Improve marine water quality within the Example LIO.

Increase Pacific herring habitat by restoring degraded habitat within the Example LIO.

These statements provide more detail about the direction of change (improve/increase) the LIO is hoping for and provides more detail about what the LIO is actually trying to change (marine water quality/Pacific herring habitat). They do not, however, specify how much change is necessary or what indicators they might use to assess that change

Best

Increase dissolved O₂ by an average of 0.1 mg/L at 10 key monitoring locations within the Example LIO by 2020.

Increase the size of eelgrass stands by 25% in all known Pacific herring spawning locations within the Example LIO by 2020.

These statements specify what specific attribute (amount of DO; eelgrass area) they hope to affect, how much change is necessary, and when they will achieve this change.

Resources for Identifying and Specifying Ecosystem Outcomes:

- "Identification of Ecosystem Components and Their Indicators and Targets (PSP 2009).
- Biophysical framework (from Kari)
- Chinook/Steelhead recovery goals
- Others?

prioritize actions because we will only be able to predict whether or not one action or another would be preferred with respect to ecosystem improvement by drawing a linkage from the action to the ecosystem indicator to estimate the magnitude and time course of the ecosystem improvement expected by any particular action.

Hence, a critical component of this step is to examine not just the critical ecosystem components, but how their condition is indicated, whether those indicators remain relevant given past learning, and what are the anticipated benefits of action and do these remain relevant.

2.2. Determine where an action is necessary to achieve ecosystem objectives.

Developing specific, quantitative ecosystem outcomes is critical for describing what LIOs hope to achieve. Similarly, having well-defined indicators that are linked to those outcomes provide LIOs with a means of knowing when they have actually achieved their outcomes. The next step is to identify the strategies (and sub-strategies) that provide the greatest likelihood of achieving these outcomes.

In general, there are two primary strategies for achieving an ecosystem outcome. The first involves acting directly on the outcome. For example, if an LIO wants to improve water quality by reducing the effects of nitrogen on dissolved oxygen, they may do so by banning all pollutants that impact water quality (assuming for the sake of this example that this is possible). Alternatively, strategies may focus on reducing or eliminating pressures, those components of the ecosystem that are currently preventing the desired outcome from being realized or are actually moving the system away from the desired outcomes. For example, the LIO interested in water quality may limit the amount of polluted water entering the system (via stormwater management) rather than act on the pollutants themselves. Achieving desired ecosystem outcomes through direct action is often extremely challenging, expensive, and may fail to result in results that are sustainable over longer time periods. As such, we limit the remaining discussion of strategy development and selection to those that reduce pressures.

Pressure-reduction strategies require a clear articulation of the relationship between the pressure and the ecosystem component(s) it is affecting. This is often achieved through a pressure assessment. The PSP has already developed a number of pressure assessments for pressures that have region-wide impacts. Additionally, several of the LIOs have conducted pressure assessments to prepare previous NTAs. LIOs should consult these existing resources to determine whether previous pressure assessments reflect the current situation well enough within their LIO to be leveraged for the 2016 Action Agenda update.

Numerous pressures may act (or interact) with each other and a number of the ecosystem components that LIOs wish to affect. This is likely to necessitate a decision by the LIOs regarding which pressures to focus on for strategy development. We recommend that this decision be made based on three key criteria: 1) the strength of the relationship between the pressure and the desired ecosystem outcome, 2) the ability of the LIO to actually change the pressure, and 3) the degree of uncertainty associated with either answer to the aforementioned questions. A formal pressure assessment can greatly improve an LIO's ability to answer these questions.

HELP ON PRESSURE ASSESSMENTS:

- **Existing Assessments**
 - **Regional**
 - **Others**
- **Methodologies**
 - **PSPA**
 - **Others**

After deciding which pressures to address, LIOs can then begin developing strategies that address these pressures. Such strategies may work directly on the pressure (e.g., reduce water pollution by reducing the amount of chemicals used on the landscape) or on contributing factors (e.g., reduce water pollution by raising awareness of the dangers of water pollution resulting in fewer chemicals being used on the landscape). For each strategy (and any associated sub-strategies) it is important to develop a theory of change, a series of “if/then” statements that describe how implementation of the strategy results in a pressure reduction that results in desirable changes to the ecosystem (these are analogous to results chains or logic models as they are implemented in Miradi). This theory of change allows an LIO to determine whether strategies can be implemented in parallel or whether a sequence is necessary. It also allows LIOs to identify where additional uncertainty may lie with respect to: a) the relationship between the strategy and the pressure, b) the ability of the LIO to actually implement a strategy, or c) synergistic, antagonistic or unintended effects associated with implementation of more than one strategy.

Developing a theory of change has the added benefit of allowing the LIO to identify other objectives (e.g., minimizing cost to taxpayers, maintaining an industry that is an important part of an LIO’s identity, keeping participation within the LIO above a particular threshold) that could be affected by decisions to implement a particular strategy. These objectives may not be related to the ecosystem outcomes an LIO is concerned about, but may have significant influence on how key partners within the community perceive a strategy and their willingness to support any actions that contribute to the implementation of a strategy. These competing (and potentially mutually exclusive) objectives will be critical to differentiating among various strategies and their associated actions.

Developing Indicators to aid in evaluating NTAs

Once you have identified the pressures that you will address with your potential NTAs as well as any competing or conflicting objectives that will be affected by your efforts to reduce that pressure, it is time to identify indicators for these objectives. Ideally these indicators are clearly linked to the objectives you have identified, unambiguously stated, measurable, and consistently applicable such that they can be used to evaluate among the actions you will develop in the next step. It is worth noting that these indicators are not focused on implementation (“did the action happen?”).

Box 2.2. Where is an intervention necessary?

The Example LIO used the regional pressure assessments to guide their own process for identifying the key pressures that affect their ability to achieve the outcomes specified in Box 2.1.

Key Stressors

- Chemical Pollution – Nitrogen, Phosphorus, and other chemicals enter the water system via a variety of mechanisms and impact both dissolved O₂ and eelgrass.
- Sedimentation – Seems to impact eelgrass, but its effect on dissolved O₂ is unclear.
- Water temperature – Water temperature affects both dissolved O₂ and eelgrass,, but can vary widely due to both natural and anthropogenic factors.

The LIO decided to focus on the “Chemical Pollution” stressor because it was clearly acting on both ecosystem outcomes (as opposed to sedimentation) and because LIO members felt they had more control over pollution than water temperature. The LIO then began to develop strategies to address the “Chemical Pollution” pressure.

Key Pressures

Chemical pollution can enter the marine environment from a number of sources and through different pathways. The Example LIO chose to focus on the following key pressures (or sources of stress):

- Runoff from the built environment - Runoff from the built environment contains a number of harmful chemicals including lawn fertilizers, motor oil, and human waste.
- Agricultural fertilizer - Agricultural fertilizers are a primary source of nitrogen into both marine and freshwater environments.
- Oil spills - Oil spills from marine vessels are an infrequent by major contributor to chemical pollution within the Example LIO area.

Potential Strategies

Strategy development focused on reducing or eliminating key pressures

- Reduce runoff from the built environment
- Reduce agricultural fertilizer use
- Prevent oil spills

After significant discussion, members of the LIO agreed that although oil spills were a major concern, there were few things they could accomplish within the Action Agenda to effect oil spills. Thus, they focused on strategies related to run-off and fertilizer use. They then developed their “theories of change” for these two strategies.

Theory of Change

- Runoff – If we reduce the total amount of run-off entering aquatic systems, then we will reduce the total amount of chemicals entering those systems because run-off contains a significant amount of chemicals. If these chemicals were a major pressure affecting our desired outcomes, then we should move closer to our outcomes by successfully implementing this strategy.
- Agricultural fertilizers – If we reduce the amount of fertilizers used in agricultural production, then there will be a smaller amount of chemicals on the landscape capable of running off into our aquatic systems. If these chemicals were a major pressure affecting our desired outcomes, then we should move closer to our outcomes by successfully implementing this strategy.

Using these theories of change, the LIO then identified other objectives or stakeholders that might be impacted by enacting these strategies.

Competing Objectives

- Minimize costs to homeowners, municipalities, and agricultural producers.
- Maintain agriculture as a key component of the LIO
- Encourage economic growth in urbanizing environments.

Rather, they are designed to determine the effects of the action (“if the action happened, how did it affect those attributes tied to my objectives?”).

Many LIO coordinators have indicated that continued participation of LIO members is a key challenge during any NTA selection effort. One approach to addressing this might be acknowledging it as a specific (and potentially competing) objective and developing an indicator (e.g., change in LIO membership numbers or participation level). Doing so allows you to be explicit about any trade-offs you may be making and could lead you to develop new strategies that reduce the impacts of those trade-offs or that lead to new, more broadly acceptable NTAs.

2.3. Develop a range of NTAs capable of achieving objectives

Up to this point, we have focused on developing the linkage between ecosystem outcomes (and indicators), pressures acting on those outcomes, and developing the strategies for addressing those pressures. It is important, therefore, that Near Term Actions are recognized as specific expressions of strategies. It is this link that creates the relationship between the much shorter-term and smaller-scale NTA and the much larger ecosystem (and societal) changes that are desired by the PSP, LIOs, and their partners. In addition, it is through this link that LIOs can develop a variety of approaches for implementing strategies that can better meet their local needs.

Linking NTA’s to strategies

The PSP has identified a number of strategic initiatives at the regional level (i.e., prevent pollution from urban storm runoff, protect and restore habitat, restore and re-open shellfish beds). Ideally, these regional Initiatives are made more explicit as the LIOs develop their expressions of these initiatives (e.g., prevent stormwater runoff within a primary watershed within the LIO). In addition, LIOs may use their knowledge of the local system (biological, social, economic, and political) to develop other strategies that address different pressures than those identified at the regional level. Regardless of which strategies are selected, it is important to recognize that NTAs represent a spatially and temporally constrained expression of a strategy. That is to say, it will likely take multiple NTAs (often implemented in a specific sequence) to fully implement a strategy.

Few, if any, ecosystem changes can be achieved within the two-year time period that NTAs are meant to address. Similarly, two year funding cycles necessitate smaller, discrete actions that can be evaluated on shorter timescales. An NTA should clearly address an element (often identified as a sub-strategy or as a phase in a multi-step process) of the strategy (e.g., reduce runoff from existing development) and realistically be accomplished within two years (e.g., reduce runoff by 5% across the LIO or by 60% within a key watershed). Focusing the proposal in this manner allows partners and funders to see the link between the NTA and the broader ecosystem outcome. In addition, NTAs stated in this manner set the stage for continuation in subsequent Action Agendas or through Requests for Proposals from various funding entities, as the LIO systematically works through deploying an NTA in a suite of locations or builds on an NTA within a key location.

Following the guidance we present here (and documenting your progress through each step) is a major step towards clearly linking a localized NTA to the broader efforts of the PSP. Further, this should allow partners and funders to clearly see the logical pathway between an NTA, the pressures it is intended to reduce, and the strategies for reducing them.

Developing a diverse portfolio of NTAs

There is likely to be an extremely wide diversity of possible management, program, or project activities that could become NTAs. Such diversity is desirable assuming all possible NTAs are clearly linked to strategies that address key pressures (as outlined in the above sections). Developing a portfolio of NTAs allows LIOs to manage risk, incorporate

Developing an NTA Portfolio

- Propose multiple actions that enact different strategies for reducing a single pressure – there may be multiple ways to reduce a pressure; this approach allows for uncertainty in pressure-reduction strategies
- Propose multiple actions that act on different pressures or stressors – this approach can be helpful when uncertainty about which pressure or stressor is limiting your ability to achieve your ecosystem objectives
- Propose actions that vary in their ownership – this strategy can be helpful when the ability of a particular entity to implement the NTA is uncertain

different (and potentially competing) objectives, and allows a transparent evaluation of trade-offs associated with different approaches.

Box 2.3: Develop a range of NTAs

Now that the Example LIO has agreed to a set of strategies and mapped them to their desired outcomes, they can develop NTAs to enact parts of the strategy.

Good

Runoff

- NTA** 1a). Develop a policy to encourage homeowners to reduce stormwater runoff.
2a). Build municipal rain-gardens to reduce stormwater runoff.
3a). Mandate runoff management

Agricultural fertilizers

- NTA** 4a). Work with partners to incentivize less fertilizer-intensive agricultural approaches
5a). Develop an education program focused on the water quality concerns caused by agricultural fertilizers
6a). Reduce fertilizer use

These NTAs attempt to address both stressors and contain a mix of “shovel ready” actions and policy changes; however they lack specificity describing the action itself: where it will occur, what it will entail, what part of the system the action will affect, and when it should be complete.

Better

Runoff

- NTA** 1b). Develop an incentive system to encourage new construction to use LID technology.
2b). Build rain-gardens in Exampleville to reduce stormwater runoff
3b). Mandate LID technology in all new construction.

Agricultural fertilizers

- NTA** 4b). Develop fertilizer reduction incentive program with the NRCS and the WA Farm Bureau.
5b). Design an education program for local schools that highlights water quality concerns caused by fertilizers.
6b). Ban fertilizer use.

These NTAs are more specific, but do not describe what part of the system NTAs will affect, where they will occur, and when they will be complete.

Best

Runoff

- NTA** 1c). Develop a property-tax incentive system in 3 mid-size cities that results in 100% of new development during 2016 – 2018 implementing LID approaches.
2c). Build 3 new 10+ ac rain-gardens in Exampleville at key storm water entry points by 2018.
3c). Mandate LID technology in all new construction across the LIO during 2016-2018.

Agricultural fertilizers

- NTA** 4c). Secure \$150,000 from NRCS and WA Farm Bureau to launch a nitrogen-based fertilizer reduction program in 2017.
5c). Implement an education program at 6 rural schools that highlights water quality concerns caused by fertilizers by 2018.
6c). Ban N-based fertilizer in the three largest watersheds within the LIO.

These NTAs specifically identify what the actions will be, where they will occur, who will help implement them, and when they will be complete. This information is critical to developing results chains and evaluating the potential “consequences” of each potential NTA (next section).

The complexity of the Puget Sound results in a variety of different sources of uncertainty. For example, the ability of an NTA to meet strategic objectives may be uncertain because information on where that NTA should be deployed is lacking. Similarly, the ability of a strategy to achieve an ecosystem outcome may be uncertain because the drivers of the system may be incompletely described or understood. Uncertainty also arises in the social and economic components of the Puget Sound. A member of a particular LIO might feel that the NTAs unfairly neglect the importance of the Sound’s aesthetics to his or her health and well-being. Alternatively, economic factors (e.g., unforeseen market fluctuations) may interact with the effects of an NTA to greatly increase the economic costs of a particular choice of action. The key point is: we are rarely certain that any NTA will be the “best” at achieving our ecosystem outcomes. LIOs can minimize this risk by developing and pursuing a diverse portfolio of NTAs. This portfolio could emphasize:

- Choosing NTAs that enact multiple strategies to reduce a single pressure: This approach is helpful when the driver of the system is well-known (i.e., we know which pressure is most important), but it is less clear how that pressure can be reduced.
- Choosing NTAs that implement different aspects of a single strategy:

Partners may have different views regarding the most effective way to achieve the objectives of a particular strategy. Selecting NTAs that implement differing components of a single strategy and using adaptive management can be a key mechanism for collective learning and building trust to move forward in the future.

- Choosing NTAs that achieve similar outcomes, but differ in their costs to other partners: There are often multiple pathways to achieving ecosystem outcomes. These pathways, however, may differ substantially in their costs (both real and perceived) to members of the LIOs. Building a suite of NTAs that reflects this reality allows the LIO to both recognize the concerns of its partners and develop solutions that may be more optimal in terms of ecosystem outcome and cost.

The most important factor to remember while developing this NTA portfolio is the need to develop NTAs that reflect genuine tradeoffs among the outcomes. Science alone does not provide the answer when choices represent tradeoffs across economic, social, and ecological dimensions. Thus diverse choices can often lead to creative combinations of alternatives that can address multiple outcomes and provide a basis to discuss the real value-based tradeoffs that

inevitably exist. If the choices do not represent tradeoffs, then they are unlikely to reflect the diversity of the LIO, meaningfully address uncertainty, or allow for the innovation necessary to achieve outcomes. Although discussing tradeoffs can be controversial, this is the only way to address the concerns of different stakeholders. We address this issue in the next section.

2.4. Evaluate and select potential NTAs

Next we estimate the potential effects of the different NTAs—including any associated uncertainties. We seek predictions of how the proposed NTAs will perform in terms of their impacts on human wellbeing and the ecosystem. The question for analysis by designated experts is, given a baseline—for example, where things are today—what is the likely effect of a given NTA over the two-year NTA time horizon? This requires an approach that uses the best available information to produce predictions of how the proposed NTAs will affect ecosystem components, as well as any economic, political, social, or human health outcomes that the NTAs may also affect.

Depending on the nature of the task, information may come from experts including natural scientists, engineers, economists and other social scientists, or other knowledgeable individuals both inside and outside the LIO working group. In some settings, information sources will also include local resource users or residents of Tribal communities, some of whom may be traditional knowledge holders (Failing et al. 2007). The question of how information sources are selected is fundamental to the assessment of potential effects: too narrow a process will exclude important insights, whereas too broad a process will result in erroneous or irrelevant reports. The bottom line is that information varies with respect to both its relevance and its quality, and even experts whose knowledge appears to be extremely valuable can be subject to a variety of motivational and cognitive biases (see Kahneman 2011) that can greatly decrease the value of their input and, at the extreme, can lead to misleading testimonies and reports.

The presence of uncertainty makes the assessment of potential effects more complicated. Uncertainty may reside at the level of a particular model chosen to estimate potential effects or across a set of experts with different understandings of the problem. Uncertainty may also come from vagueness or under-specification of important details about an NTA, e.g., not knowing how large will be the scope of a proposed project will make it hard to estimate its ecosystem impacts. Even if that scope is known, the ecosystem outcomes, of proposed programs, for example, may depend on difficult-to-predict, future contingencies about how the program is ultimately implemented or received by its constituents.

The time and resources available will guide the amount of study, analysis, and data collection that can be done to attempt to estimate potential effects or reduce uncertainty about the potential effect of a given NTA or suite of NTAs. Some situations and time tables could involve quick, back-of-the-envelope calculations relying heavily on expert judgment (see discussion of Potential Effects Table below), while in other cases it may be possible and desirable for a group to reconvene after more extensive analysis has been conducted, including, for example, quantitative risk assessment or statistical analyses (e.g., Monte Carlo Carlo).

Potential effects of the NTAs should be presented in a way that facilitates the consideration of tradeoffs between them across ecological, economic, political, social, or human health outcomes. When spatial distribution of outcomes is relevant, this could be done with the help of maps. NTAs that perform poorly on all or many of the outcomes can be quickly eliminated, leaving the focus on better performing NTAs for which there are unavoidable tradeoffs, i.e., real choices to be made. Alternatively, poorly performing NTAs could be improved.

A Potential Effects Table (see Box 2.4) provides a basic framework to compare the potential outcomes, both desired effects and unintended consequences, of different proposed NTAs, with the columns designating the different proposed NTAs and the rows their expected consequences in terms of the ecological, economic, political, social, and human health outcomes under consideration. For the example in Box 2.4, each number of pluses (improvement) or minuses (worsening) represents performance relative to the baseline, represented by no pluses or minuses. Note that the simplest notion of uncertainty in expected outcomes has been indicated by using ranges in the cells of this table.

Prioritization approaches differ in how systematic, explicit, and quantitative they attempt to be. Explicitness has to do with stating things with clarity and detail, leaving no room for confusion about what is meant. A qualitative approach to prioritization might categorize the expected performance of an NTA in terms of a particular outcome as high, medium, or low (clearly defined), while a semi-quantitative approach might assign performance but in a way that cannot readily be combined arithmetically (see the “better” Potential Effects Table in Box 2.4). This might be, for example, a system based on a relative number of pluses and minuses or a “Consumer Reports”-style assessment of

relative performance. Again, explicitness requires definition of terms and explanation of the logic by which particular scores or ratings lead to higher rankings of NTAs.¹ Instead of this limited information, the “best” Potential Effects Table in Box 2.4 compares the relative performance of six different NTAs based on an explicit, fully quantitative analysis. This approach often requires a more explicit set of assumptions and more systematic approach to estimating outcomes that can lead to more understanding and greater confidence in how estimates were obtained. It is important to emphasize the goal that all participants are learning about why the estimated impacts are what they are. Thus, the mechanisms, supporting or dissenting studies, provenance, and expertise underlying predicted impacts should all be presented, explained, discussed, and even questioned and defended in the context of LIO deliberations. These conversations should be memorialized for future reference. Given the results in Box 2.4 (“best” Potential Effects Table), LIO participants may fairly quickly be able to reach several conclusions with respect to prioritization:

- NTA 4 dominates NTA 1. It provides greater pollution reduction at lower cost with no negative effect on economic growth. Unless improved in some way, NTA 1 might not be put forward (or might be ranked lower) for a group attempting to precisely target its resources to top-performing NTAs.
- It might be possible to agree that NTAs 2, 4, and 5 represent a group to recommend ahead of the higher cost NTAs 3 and 6 (or perhaps the reverse). This calls for a value judgment about what sort of tradeoff people desire to make. If such an agreement is not possible, a more quantitative tradeoff approach may be helpful.
- NTAs 2, 4, and 5 represent a portfolio of low cost LIOs that provide a robust though lower benefit in terms of reducing ecosystem pollution. By robust we mean that together they minimize the risks of underperformance or not receiving funding associated with any one of the three (e.g., NTA 4). They also all fall below a low cost threshold (total <\$100K), while NTAs 1, 3, and 6 are relatively expensive. This could justify inclusion in an unranked shortlist of NTAs or could satisfy budget requirements of an RFP.

Finally, an explicit, quantitative analysis might attempt to use a decision criterion such as a performance score defined as the weighted sum of NTA performance across different outcome measures. This approach readily supports systematic comparison and can be based on decision-analytic methodology.

¹ A more streamlined approach to prioritization is motivated by the consideration that it is useful for the different groups within the LIO to prioritize potential NTAs from their own perspectives and then compare how these priorities shape up. For example, an LIO might designate a simple 1 – 3 scale, where 1 indicates high and 3 indicates low. A problematic proposed NTA might be rated 1 from a technical perspective, 3 from a public values perspective, and 2 from a cost-effectiveness (bang-for-buck) perspective. Another proposed NTA might be rated 1, 1, 1 (in which case it should go ahead); and another might be rated 2, 1, and 2 (so it perhaps should go ahead, but with a more complete understanding of the technical reservations); and so on. Different groups or sub-groups would be responsible for these different assessments, and then the governing group would need to make the combined assessment, (e.g., go/no go/more assessment) across the different prioritization elements.

Box 2.4: Evaluate and select NTAs

Better

Outcome/ Objective	Indicator	NTA 1c	NTA 2c	NTA 3c	NTA 4c	NTA 5c	NTA 6c
Reduce pollution entering aquatic ecosystems	Aquatic N concentration	++ -	+++	+	+++	++ -	+++
Minimize costs to homeowners, municipalities, and taxpayers	Annual expenditures on NTA-required projects	+++ -	+++	+ -	+++ -	+++ -	+++
Maintain agriculture as a major component of the LIO	Proportion of LIO economy contributed by agricultural sector	No change	No change	No change	No change	No change	-2 - -4
Encourage economic growth in urbanizing locations	Change in GDP for major cities in LIO	-1 - -2	No change	-2	No change	No change	No change

The LIO chose to do a semi-quantitative prioritization; however several of their performance measures were not well specified. Aquatic N concentration” varies with time and water temperature, this performance measure could be improved by specifying where and when N concentration will be assessed. “Annual expenditures on NTA-required projects” is vague; how will an NTA-required project be identified from other expenditures not caused by implementation of the NTA. “Proportion of LIO economy contributed by agricultural sector” does not track the social importance of the agricultural sector. Perhaps a constructed index will better reflect the multi-dimensional nature of this objective.

Best

Outcome/ Objective	Indicator	NTA 1c	NTA 2c	NTA 3c	NTA 4c	NTA 5c	NTA 6c
Reduce pollution entering aquatic ecosystems	June and December average aquatic total N concentration (assessed at key monitoring locations) (mg/L) (cf. current = 3.5 mg/L, see USGS 2000)	2-2.5	3	1.5	2-2.5	2.5-3.5	1
Minimize costs to homeowners, municipalities, and taxpayers	Average cost of LID projects, average cost of rain garden construction, cost of taxes necessary to support incentive programs (costs accrue to different parties)	\$250-500K	\$50K	\$1-2M	\$20K	\$10K	\$1-3M
Maintain agriculture as a major component of the LIO	Constructed index of agricultural contribution†	3	3	3	3	3	-1 - -3
Encourage economic growth in urbanizing locations	Change in GDP for major cities in LIO	-0.5-1%	0	-1%	0	0	0

Here the LIO was able to do a quantitative assessment thanks to highly specific NTAs and well-specified performance measures.

† An index of agricultural condition is defined that ranges from -5 (worst condition) to +5 (best condition).

3. Next Steps: Moving Towards Implementation

Successful completion of the process we have just described will likely take some iteration and substantial support from the Partnership. This investment, however, is well rewarded by having a logical, well-defined, and implementable set of actions that can be implemented by an LIO. As importantly, by maintaining a fair and transparent process, the LIOs should be able to continue building trust within and among the LIOs that encourages continued participation and investment. Although achieving this goal is a major victory (and one that should be celebrated!), there is still substantial work to be done in developing the resources necessary to implement and monitor your NTAs and then actually doing the work. We offer some final thoughts on these issues in the next sections.

Local NTAs versus regionally prioritized strategies

Prioritizing NTAs is about what is important to the LIO. Prioritizing things that matter to LIOs will, however, result in NTAs that are of variable pertinence to different funding entities. Recognizing that this NTA is important to the LIO, but not a funding organization is the first step in considering how else this action might be accomplished (but see Appendix 2: Implementing NTAs outside of the scope of the Action Agenda). If followed, the process we introduced in the previous section should lay the groundwork for making a compelling case to any potential decision-maker or funder for the importance of that particular action.

Once NTAs have been identified and prioritized, then a separate process may be needed to identify which of these prioritized NTAs is forwarded to particular funders in response to a request for proposals (RFP). Recall that the prioritization process is designed to help a group of people, in this case an LIO, to identify what is important to them. Individual LIO priorities are not likely to map well onto all RFPs. As a consequence, LIOs should revisit their high priority NTAs to make an explicit linkage between the NTA, stated regional PSP, and funding organization priorities. This may result in an adjustment of prioritized NTAs that are pushed forward for individual funding opportunities.

Making the case to potential funders for LIO prioritized NTAs

Whether or not a particular NTA maps onto the regional priorities, it is a good idea to keep three things in mind when applying for funding: (a) do not provide easy mechanisms for proposal rejection; (b) clearly lay out the logical argument for funding your proposal and do not assume that the linkage is obvious; (c) presume that the NTA prioritization process within the PSP construct is valued by the funders and hence documenting the process that resulted in the prioritization of an NTA is part of making a cogent case for funding.

All funding processes struggle with having more proposals than they can possibly fund, usually by orders of magnitude. We would like to believe that the decision process on funding includes careful consideration of how to distribute resources to maximize impact. Although this is the intent, this can be very difficult in practice. As a consequence, less meaningful criteria are often invoked to deny a subset of proposals in most funding schemes. These can include procedural things: proposal deadline dates, length of proposals, proposal format. The first step toward success is eliminating the easy excuse to not fund your NTA. Follow the guidelines. Among other things, it tells the potential funder that you are paying attention to their needs, constraints, and priorities.

Secondly, and more importantly, be aware that the people deciding whether or not to fund your NTA were not in the room when for the process for your LIO prioritizing the NTA. They are not likely to be familiar with the specific local issue; they might not see how the NTA maps to their regional priorities; it might not be obvious how this NTA will effectively improve ecosystem conditions through the logic model that you developed.

Making the case for an NTA should include explicitly mapping the NTA to both a locally and a regionally prioritized management strategy. Making this case should include information from the theory of change developed in step 2.2. For example, one might say: we are proposing to address estuarine ecosystem condition in a specific location over the next two years by replacing culverts. The proposal would then need to identify the theory of change for why replacing these culverts will improve this particular estuarine system and how you would know if the action worked as intended (i.e., monitoring the performance measures to assess the outcome). Further, the proposal should identify why working on that solution was prioritized over other possible mechanisms to improve estuarine ecosystem condition, or mechanisms to improve other aspects of ecosystem condition and why that estuary is prioritized over others.

To fail to make these details explicit invites rejection. PSP hopes to invest significantly in developing the idea of using a logic model to identify why a particular action is likely to result in a desired outcome. These outcomes can be measured at a variety of scales. An NTA has at least three components of performance. First, did the action take place

(culverts were replaced), aka implementation assessment? Second, did the action reduce the pressure (new culverts changed reduced habitat fragmentation), aka effectiveness assessment? Third, did reducing the pressure result in the expected ecosystem benefit (key indicator species population sizes improved), aka status and trends or ecosystem condition assessment?

Applying the theory of change (aka results chain or logic model) framework of PSP, a proposal should appear stronger the more it adheres to framing the argument within the context of arguing how and why the NTA will both reduce a pressure and improve ecosystem outcomes. It is not sufficient to make the link to action accomplishment (culverts replaced) and assume that the reader will make the related links to the desired outcomes in the ecosystem (fragmentation reduced, populations improved).

Closing the Loop: Monitoring Progress, Learning and Adapting

The PSP is embracing adaptive management and adaptive decision-making. In addition to clearly articulating assumptions about the expected effects of priority actions, as described in this guidance document, these actions require monitoring, analysis and learning. The final steps of adaptive management relate to everything that happens subsequent to project implementation. We have relegated discussion of these important adaptive management steps to the end because this guidance document is designed as a tool to assist prioritization of proposed actions. The PSP is working elsewhere to provide guidance on monitoring, analyzing and learning. For the purposes of proposing a successful NTA, however, it is useful to consider that funded NTA's will be implemented and an expectation is that implementation will include compliance or implementation monitoring (how will you know that the action gets done), as well as two levels of outcomes monitoring, effectiveness and status and trends or condition monitoring (is the pressure reduced; is the ecosystem target improved) and possibly monitoring of an associated human well-being outcome or objective (were people's lives improved, or in the case of actions that conflict with people's goals, was this impact minimized).

Attention to stating how you will achieve these expected monitoring needs within the context of the proposal, again, provides the opportunity for EPA to fund the NTA because it is compliant with the philosophy of the overarching program. Speaking to the issue of what information will be collected and how it will be used to improve our understanding of whether actions are effective at attaining goals is critical to the process of writing a successful NTA proposal.

4. Literature Cited

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Failing, L., R. Gregory, M. Harstone. 2007. Integrating science and local knowledge in environmental science and local knowledge in environmental risk management. *Ecological Economics* 64, 47-60.

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5. Appendices

Appendix 1. Near-Term Action Development and Prioritization Checklist

LIO Name:

Project Manager:

Review Date:

Prior to Getting Started			
	Yes	No	Comments
Are all necessary LIO participants present	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with any absences.]
Do participants agree on the need to prioritize?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with any potential reservations to prioritization]
Have you agreed on the specificity desired from your prioritization?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with documentation of your desired prioritization outcome (e.g., unranked list, subset, ranked list)]
Do you have up-to-date and complete information about the system and impacts of past actions?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with any potential knowledge gaps and suggestions of how to address those gaps]
Have you evaluated the performance of previous NTA's and identified NTA's that may still be under consideration for the 2016 Action Agenda?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with a description of the NTA's that were eliminated and those that remain under consideration. Document why these decisions were made]
Identify the Ecosystem Outcomes You Will Address in 2016			
	Yes	No	Comments
Have you identified the 5-7 ecosystem components that are the most important to your LIO?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with a description of each ecosystem component of interest]
Do you have a conceptual model that describes how actions might affect these ecosystem components?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with the location/source of your conceptual model]
Have you identified the attribute you will track for each component?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with each attribute selected and its reason for selection]
Have you agreed on indicators for each attribute?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with a description of each indicator and its relationship to the attribute of interest]
Have you identified target values for your ecosystem attribute indicator that are quantifiable and specific?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with a quantitative, specific, time-limited level desired for each indicator.]

Where is an Action Necessary to Achieve Ecosystem Outcomes			
	Yes	No	Comments
Have you identified the key stressors affecting your ecosystem outcome and their sources (or pressures)?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with the location/source of your pressure assessment]
Have you prioritized pressures based on both their impact on the system and your ability to affect them?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with a description of the priority pressures and the reasoning for eliminating pressures from further consideration.]
Have you developed several strategies for addressing each pressure?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with a description of the different strategic approaches.]
Do you have a logic model that describes how the strategy achieves ecosystem objectives?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with the source/location of the logic models for each strategy.]
Have you identified any objectives or outcomes held by LIO participants that may be conflicting with the strategies you have described?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with documentation of additional ecosystem and non-ecosystem objectives that may conflict with strategies]
Develop a Range of Near-Term Actions That Enact Strategies and Move Towards Ecosystem Objectives			
	Yes	No	Comments
Have you developed a suite of potential NTAs reflecting different levels of cost?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with a description of the NTAs that reflect differing costs.]
Have you developed a suite of potential NTAs reflecting different implementation probabilities?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with a description of potential NTAs that reflect different implementation probability and what factors affect those probabilities.]
Have you developed a suite of potential NTAs that enact different strategies (or sub-strategies) to reduce a single pressure?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with a description of the strategies each NTA implements and its target pressure.]
Have you developed a suite of potential NTAs that attempt to reduce multiple pressures?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with a description of the pressures reduced by each potential NTA.]
Do you have performance measures for each NTA that track its impact on the ecosystem outcome and any competing/conflicting objectives	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with a description of the performance measures used to evaluate each NTAs impact on the desired ecosystem component and any competing/conflicting objectives.]
Evaluate, prioritize, and select potential NTAs			
	Yes	No	Comments
Have you estimated the likely impact and characterized the uncertainty associated with each NTA on the desired ecosystem component(s)?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with a description of each NTAs likely impact on desired ecosystem components and uncertainty associated with those impacts]
Have you estimated the impacts and characterized the uncertainty associated with each NTA on economic, social, and human health performance measures?	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with a description of each NTAs likely impact on competing objectives and uncertainty associated with those impacts]
Have you used a prioritization approach to select NTAs that balance attaining ecosystem outcomes with impact on non-ecosystem objectives	<input type="checkbox"/>	<input type="checkbox"/>	[Replace this text with the location of the consequences table used to prioritize NTAs]

Appendix 2. Implementing NTAs outside of the scope of the Action Agenda

The PSP is issuing a suite of priorities that apply to the Puget Sound as a whole. However, in the course of developing LIO NTAs, suppose one particular community in a region has engaged in particularly unhelpful activities with respect to surface water nutrient management and the LIOs prioritize working with these community leaders. The activity is not wide-ranging, and does not appear as a regionally prioritized action, and targets a regional strategy with a low priority. This LIO has agreed that this NTA is very important and a top priority. Should the LIO forward this to a Lead Organization as an NTA?

The answer depends on evaluating the likelihood that EPA would fund this NTA. If it is a previously recognized problem that was deliberately not prioritized, then not proposing it for funding may be the best strategy. Maybe this is a strategy that is deemed important, but often unsuccessful. You have reason to believe that you can be successful in your region. Hence, you may have a prioritized LIO NTA, but not an EPA fundable NTA. Embrace the potential for that outcome.

Alternatively, the NTA may be the sort of thing that would garner EPA support despite not being a regional priority. Within the realm of grant-writing it is common practice to query the funding program manager regarding their opinion and advice on whether or not a particular proposal would be an appropriate request. This person does not typically have the authority to unilaterally decide on the efficacy of proposing this NTA, but is likely to have sage advice on how to present an argument for an NTA that does not align well with stated regional priorities.

Finally, the success of this maverick NTA for funding requires making a cogent argument for why a locally prioritized NTA that does not map onto a regionally prioritized strategy is a good investment of funds. The EPA is investing in actions it deems as the highest priority for successful improvement of the Puget Sound. Making this case for each NTA is an important measure of success in most granting venues. Part of making that case is documenting how the LIO prioritization process followed PSP guidance that resulted in a defensible outcome within the framework recommended by PSP.