

# NO NET LOSS FRAMEWORK

Ideas for Measuring and Maintaining Ecological Functions  
to Achieve No Net Loss

NFWF Project: 2010-0060-002 Protect Puget Sound Shoreline  
Ecosystems

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## Introduction

With the passage in 1971 of the Shoreline Management Act<sup>1</sup> (SMA or the Act), the State Legislature established a cooperative program of shoreline management between the state and 260 local jurisdictions. By acknowledging that “*the shorelines of the state are among the most valuable and fragile of its natural resources and that there is great concern throughout the state relating to their utilization, protection, restoration, and preservation*” the Legislature required local jurisdictions to create shoreline master programs (SMPs) to achieve the policies and goals of the Act.

In its 2003 update of the Shoreline Management Act implementing regulations (known as the shoreline Guidelines<sup>2</sup>) the state specified that shoreline master programs must protect shoreline resources such that there is “no net loss” (NNL) of ecological functions. Local governments were tasked with updating their shoreline master programs to meet this standard. In setting this as a key benchmark for shoreline management, the State, with the support of business and environmental organizations, signaled its intent to substantially strengthen protection for Puget Sound and other state shorelines. Seven years have passed since the mandate was put forth yet the path for achieving no net loss is still somewhat unclear. One reason that state and local governments are grappling with the concept of no net loss is because there is no agreement on how to measure baseline ecological conditions or assess changes over time.

Our current approach for addressing no net loss in the context of the Shoreline Management Act faces several additional challenges, including but not limited to the following:

- We lack a standardized approach for relating shoreline inventory information to shoreline master program decisions and implementation;
- We have not established conceptual models linking shoreline master program decisions to shoreline functions. Doing so would help delineate and clarify the role and function of the Shoreline Management Act within larger efforts to protect and restore Puget Sound;
- We have not determined how to use potential indicators of ecological function to assess no net loss;
- We do not have a consistent method for connecting parcel, reach- and jurisdiction-level activities to Sound-wide assessments of progress;
- We often fail to prioritize and customize management strategies to address areas that are at high risk of losing functions; and
- Monitoring and adaptive management are and have been underfunded and underutilized.

Resource agencies, shoreline property owners, businesses, environmental groups and tribes have acknowledged the need for greater clarity concerning no net loss. The Puget Sound Partnership’s Action Agenda specifically identifies a need to “produce and make available a template for monitoring no-net-loss and guidance on avoidance and minimization of impacts.” To help fulfill this need, the National Fish and Wildlife Foundation (NFWF) is funding an initial effort to design a technical approach and public engagement process that can create a framework for measuring, planning, and monitoring to achieve no net loss of ecological functions through shoreline master programs. The NFWF grant outcomes will be applied in a pilot effort by Clallam and Jefferson counties with funding from the Environmental Protection Agency (EPA). The conceptual framework funded by NFWF

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<sup>1</sup> Revised Code of Washington (RCW) 90.58

<sup>2</sup> Washington Administrative Code (WAC) Chapter 173-26, Part III

outlines potential steps for identifying and quantifying baseline ecological conditions using indicators of ecological functions and assessing how future land use actions might affect these functions over time. This framework builds upon the interconnected efforts of the Partnership, Department of Ecology, the Puget Sound Nearshore Ecosystem Restoration Program (PSNERP) and others to identify and apply ecological indicators<sup>3</sup> for assessing and managing Puget Sound. Such a framework will hopefully aid in the process of updating and implementing shoreline master programs through planning, permitting, monitoring, technical assistance, and enforcement.

## Report Purpose

This report presents preliminary ideas about how to better address no net loss in the context of updating and implementing shoreline master programs. The ideas were developed by Jim Kramer, Carol MacIlroy, and Margaret Clancy (consultants with experience in shoreline management in Washington State), under contract to NFWF. The authors' goal is to describe a framework for understanding what no net loss means and to illustrate how indicators of ecological function being selected by Ecology, PSNERP, and the Partnership could be used during the shoreline master program update process, during shoreline master program implementation, and over time to track accountability for no net loss.

The ideas presented here are general and conceptual and will require considerable additional investigation, examination and testing to ensure their feasibility, applicability, and scientific integrity. As a result, readers should not assume that the concepts or ideas presented here have been fully vetted. This report is not a thorough analysis of the science involved in measuring or documenting ecological functions; rather it is a planning level description of how Ecology and local governments might better measure, manage, and track ecological conditions via the Shoreline Management Act. The authors assume that readers have a basic understanding of the Shoreline Management Act and of shoreline master planning in general. Figure 1 shows the six phases of the shoreline master program update process as outlined by Ecology.

One of the primary purposes of this report is to outline ideas that can be tested during a shoreline master program update and during implementation of an updated shoreline master program. To that end, the report authors collaborated with Clallam and Jefferson counties to help them apply for additional grant funding (from the U.S. EPA) to apply the concepts presented here in the context of their shoreline master programs (Clallam is just beginning to update their shoreline master program and Jefferson has a new locally adopted shoreline master program). Thus, this report should be viewed not as a stand-alone work ready for use, but as a scoping document that illustrates issues that Clallam and Jefferson counties should address with the awarded EPA funds.

The no net loss framework described here was shared (in the form of a power point presentation) with scientists and staff from various local, state, and federal agencies and tribes. Feedback provided by these groups is summarized at the end of this report as well as next steps.

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<sup>3</sup> The initial list of indicators includes attributes such as % forest cover, % of shoreline armoring, # or area of overwater structures, % floodplain connectivity, etc.

**Figure 1. The Shoreline Master Planning Process (source: Ecology)**

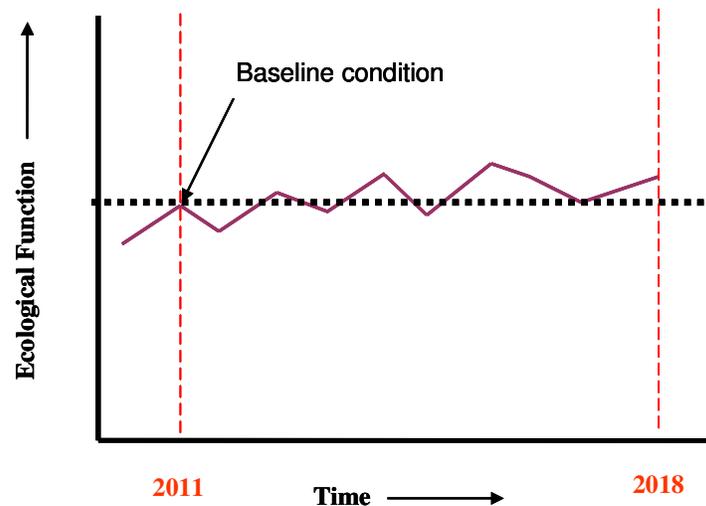
SMP UPDATE PROCESS	SPECIFIC PLANNING TASKS	PRODUCTS
<b>Phase 1: Preliminary Shoreline Jurisdiction and Public Participation Plan</b>	Task 1.1: Identify preliminary shoreline jurisdiction - shorelines & shorelands Task 1.2: Develop public participation plan (citizen, technical, Ecology, other stakeholders) Task 1.3: Demonstrate how Phase 1 complies with Guidelines	Product 1.1: Preliminary map of local shorelines & shorelands subject to the SMP Product 1.2: Public participation plan Product 1.3: Documentation in SMP submittal checklist
<b>Phase 2: Shoreline Inventory &amp; Shoreline Analysis &amp; Characterization</b>	Task 2.1: Complete shoreline inventory Task 2.2: Conduct shoreline analysis Task 2.2.1: Characterize ecosystem-wide processes Task 2.2.2: Characterize shoreline functions Task 2.2.3: Conduct shoreline use analysis, analyze public access opportunities Task 2.3: Prepare shoreline inventory and characterization report Task 2.4: Demonstrate how Phase 2 complies with Guidelines	Product 2.1: Draft list of inventory data sources, digital maps of inventory information Product 2.3: Shoreline inventory and characterization report with, map portfolio & GIS data, including: <ul style="list-style-type: none"> <li>• Characterization of ecosystem-wide processes</li> <li>• Characterization of shoreline functions</li> <li>• Identification of potential protection and restoration areas</li> <li>• Shoreline use &amp; public access analyses</li> <li>• Shoreline management recommendations</li> </ul> Product 2.4: Documentation in SMP submittal checklist
<b>Phase 3: Shoreline Environment Designation, Policy &amp; Regulation Development; Cumulative Impacts Analysis</b>	Task 3.1: Conduct community visioning process Task 3.2: Develop general goals, policies & regulations Task 3.3: Develop environment designations Task 3.4: Develop shoreline use & modifications policies, regulations & standards Task 3.5: Develop administrative provisions Task 3.6: Prepare preliminary cumulative impacts analysis Task 3.7: Demonstrate how Phase 3 complies with the Guidelines	Product 3.1: Shoreline management strategy Product 3.2-3.5: Complete Draft SMP, including: <ul style="list-style-type: none"> <li>• Draft general goals, policies &amp; regulations</li> <li>• Draft environment designations</li> <li>• Draft shoreline use &amp; modifications policies, regulations &amp; standards</li> <li>• Draft administrative provisions</li> </ul> Product 3.6: Preliminary cumulative impacts analysis Product 3.7: Documentation in SMP submittal checklist
<b>Phase 4: Restoration Plan; Revisiting Phase 3 Products as Necessary</b>	Task 4.1: Prepare restoration plan Task 4.2: Revisit environment designations, policies and regulations; finalize jurisdiction maps Task 4.3: Demonstrate how NNL is achieved Task 4.4: Demonstrate how Phase 4 complies with Guidelines	Product 4.1: Restoration plan Product 4.2: Revised SMP, cumulative impacts analysis & jurisdiction maps Product 4.3: No net loss report Product 4.4: Documentation in SMP submittal checklist
<b>Phase 5: Local Approval</b>	Task 5.1: Assemble complete draft SMP and submit to Ecology for informal review Task 5.2: Complete SEPA review, documentation Task 5.3: Provide GMA 60-day notice of intent to adopt Task 5.4: Hold public hearing Task 5.5: Prepare responsiveness summary and respond to public comments Task 5.6: Adopt SMP and submit to Ecology Task 5.7: Demonstrate how Phase 5 complies with Guidelines	Product 5.1: Final draft SMP Product 5.2: SEPA products (checklist, MDNS/EIS; SEPA notice) Product 5.3: Evidence of compliance with GMA notice requirements Product 5.4: Public hearing record Product 5.5: Responsiveness summary Product 5.6: Complete SMP submittal package Product 5.7: Documentation in SMP submittal checklist
<b>Phase 6: State Approval</b>	Task 6.1: Provide public notice & opportunity for comment; respond to comments received Task 6.2: Prepare decision packet including findings & conclusions, transmittal letter, conditions of approval (if any), & responsiveness summary Task 6.3: Work with local government to finalize local adoption	Product 6.1: Responsiveness summary Product 6.2: Decision package submitted to local government Product 6.3: Final SMP adoption incorporating any Ecology conditions of approval; SMP takes effect

## Background and Context

### What is No Net Loss?

There is no official definition for *no net loss* in the Shoreline Management Act or in the shoreline Guidelines.<sup>4</sup> That said, Ecology provides an explanation in the new shoreline master program handbook: *Over time, the existing condition of shoreline ecological functions should remain the same as the SMP is implemented. Simply stated, the no net loss standard is designed to halt the introduction of new impacts to shoreline ecological functions resulting from new development.*<sup>5</sup> In other words, no net loss means that as shoreline development occurs, ecological functions stay the same (or are improved) over time. This definition presupposes several things:

1. That we can ‘measure’ ecological conditions to establish a baseline;
2. That our assessment of ecological *conditions* can be described in terms of ecological *functions*;
3. That development actions (and subsequent mitigation or restoration) will cause ecological conditions/function to fluctuate over time;
4. That we can compare conditions at some future point in time to the existing conditions to determine whether the level of function has increased, decreased, or remained the same as the graph (Figure 2) depicts; and
5. That we can make explicit connections between development on the shoreline and changes to ecological function, i.e., armoring of feeder bluffs affects eelgrass and the productivity of the food web.



**Figure 2. No Net Loss.**

*Purple line shows ecological conditions fluctuating in response to development actions and other activities. Red lines show two random points in time over which changes can be measured.*

<sup>4</sup> Chapter 173-26 Washington Administrative Code, part III

<sup>5</sup> See <http://www.ecy.wa.gov/programs/sea/shorelines/smp/handbook/Chapter4.pdf>

Although we may not be able to effectively accomplish all of the things listed above with scientific certainty, we need a process for proceeding forward (with caution) and adapting our methods as we go based on lessons learned. This paper attempts to describe a process for assessing changes to shoreline conditions that may have effects on shoreline function (either positive or negative) and using that assessment to shape management decisions. That said, the paper does not define how to measure ecological functions. It also does not identify specific function thresholds or answer the question of how to balance impacts and improvements to prevent a “net” loss. Those outcomes will be important, but are beyond the scope of this initial effort. The test application in Clallam and Jefferson counties will hopefully begin to address these and other issues.

The no net loss standard discussed here is specific to the Shoreline Management Act. Local governments are held accountable for achieving this through shoreline master programs. However, we also need to stop the decline of ecosystem functions at the broader scale of Puget Sound recovery. Development actions within the narrow ribbon of land and water under the jurisdiction of local shoreline master programs are only a subset of the actions that can affect ecological functions. We need to be better able to differentiate ecological changes that occur due to SMA-regulated development from those that occur due to actions outside shoreline jurisdiction. This can be a significant challenge. For example, it can be difficult to determine whether something such as erosion of beach substrate within a drift cell is caused by a permitted bulkhead that disrupted sediment delivery, changes in river sediment transport rates caused upstream forest practices, or increased storm/wave activity associated with global climate change. In all likelihood many of the changes in ecological function are influenced by a combination of actions. Although we may not always be able to conclusively determine cause and effect, we need to create a better system of accounting for and managing functional losses across a suite of regulatory and non regulatory programs including shoreline master programs, the Puget Sound Action Agenda, PSNERP, and others. Hopefully, this effort to define and measure no net loss will serve as a template for how to create management accountability systems for the other programs that affect ecosystem functions in Puget Sound.

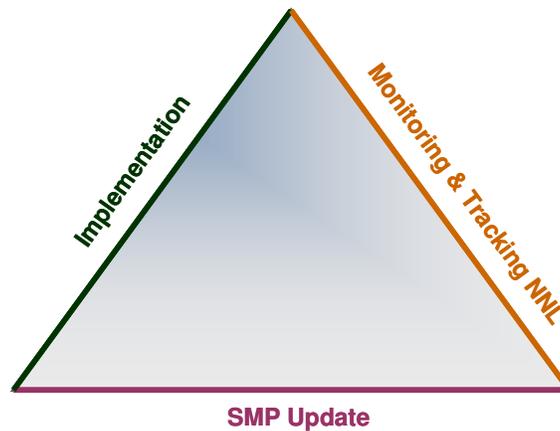
### ***Framework Description and Goals***

In creating a framework for no net loss it is first important to think about the general purpose of a framework. A framework is a support structure. A framework is also a set of assumptions, concepts and practices that constitutes a way of viewing reality or a well defined tactic used to master complex systems with simplicity. A framework allows one to handle different objects in a homogenous way.

A no net loss framework must possess these defining characteristics. It must support local government efforts to draft and implement shoreline master programs. It must also clarify the assumptions and practices for using indicators to assess functions, and provide a method for treating different geographies and jurisdictions in a similar manner. Importantly, a no net loss framework must achieve the following three main goals:

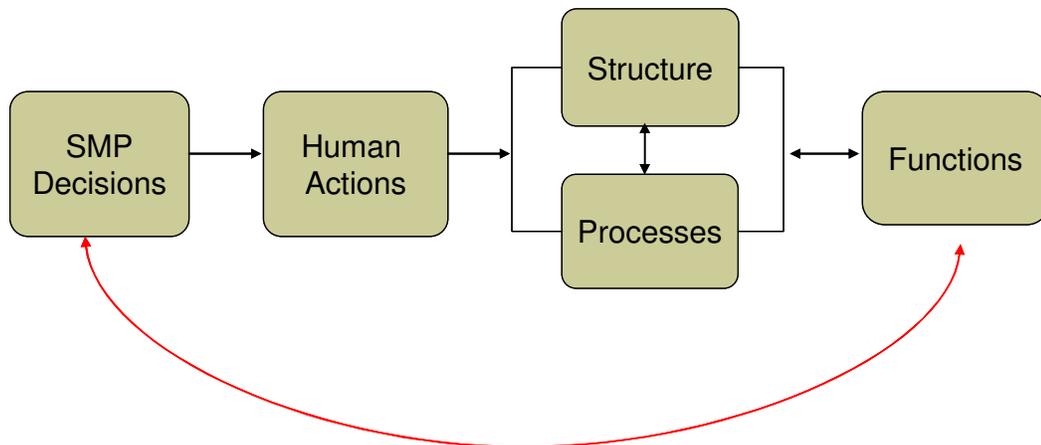
1. Provide a systematic way to support shoreline master program updates by quantitatively relating shoreline master program management decisions to ecological functions;
2. Provide site- and reach-specific information to support shoreline master program implementation, namely permitting and technical support/outreach to shoreline property owners; and
3. Enable quantitative and spatially explicit monitoring and assessment to document changes in ecological conditions over time.

These three goals correspond to three phases of shoreline planning: shoreline master program updates, implementation, and monitoring and tracking (Figure 3).



**Figure 3. A no net loss framework would serve three main aspects of shoreline planning**

Conceptual models are a helpful tool for understanding how to achieve the goal of systematically and quantitatively linking shoreline master program decisions to changes in ecological condition/function. Diefenderfer et al. (2007)<sup>6</sup> describe a basic conceptual model that links natural disturbances and human impacts or “stressors” to controlling factors, which in turn affect ecosystem structures and ecosystem processes, which together produce ecosystem functions as shown in the simplified model below (Figure 4).

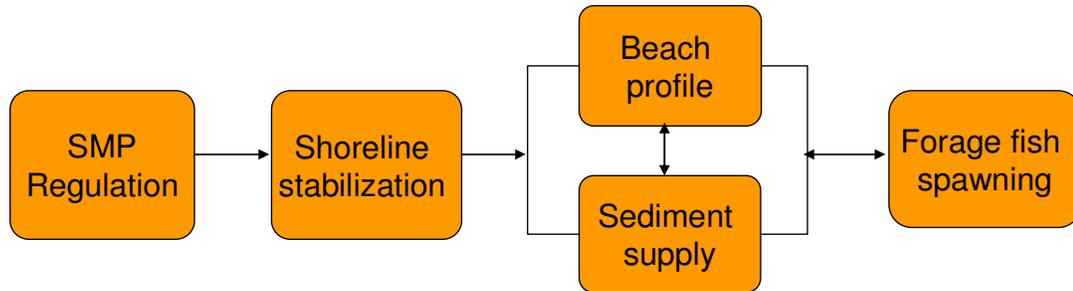


**Figure 4. General conceptual model**

This conceptual model works in the context of shoreline master planning (Figure 5). Shoreline Management Act policies and regulations influence human actions that serve as stressors affecting shoreline processes, structures, and functions. As an example, shoreline master programs regulate when and how shorelines can be stabilized (human actions). The stabilization approach can affect the

<sup>6</sup> Multi-Scale Analysis of Restoration Priorities for Shoreline Master Planning. Heida L. Diefenderfer, Kathryn L. Sobocinski, Ronald M. Thom, Christopher W. May, Susan L. Southard, Amy B. Borde, Chaeli Judd, John Vavrinec, and Nicole K. Sather. 2007. Battelle Marine Sciences Laboratory. Sequim, Washington. Report No. PNWD-3762.

beach profile and sediment supply processes, which ultimately affects the availability of forage fish spawning habitat (structure and processes). These changes result in gains or losses in forage fish spawning (functions).



**Figure 5. Example conceptual model linking SMP regulations to functions**

## Addressing No Net Loss during SMP Updates

If local governments use available scientific information to describe linkages between shoreline master program actions and shoreline functions (documenting uncertainty) as the conceptual models suggest, then they will be able to create better policies, regulations, and restoration strategies for shorelines than they otherwise would. To begin to accomplish this one needs a systematic way of identifying baseline ecological conditions and examining potential changes associated with shoreline use and development. This is one of the desired outcomes of a standard shoreline master program update process, but the procedures and methods vary by jurisdiction and many jurisdictions fail to link the ecological conditions to the expected land use changes in a spatially explicit way. This makes it difficult to employ a unified management strategy across the Sound or even across a single watershed.

To improve our approach to updating shoreline master programs we recommend four steps that are designed to put local governments in a better position to achieve no net loss. Each of these steps is described in greater detail below:

1. Quantify and document baseline conditions (using indicators of ecological function specific to shoreline master program jurisdiction);
2. Evaluate potential land use changes;
3. Determine potential for functional loss; and
4. Tailor shoreline master program standards based on type and level of expected loss and associated uncertainties

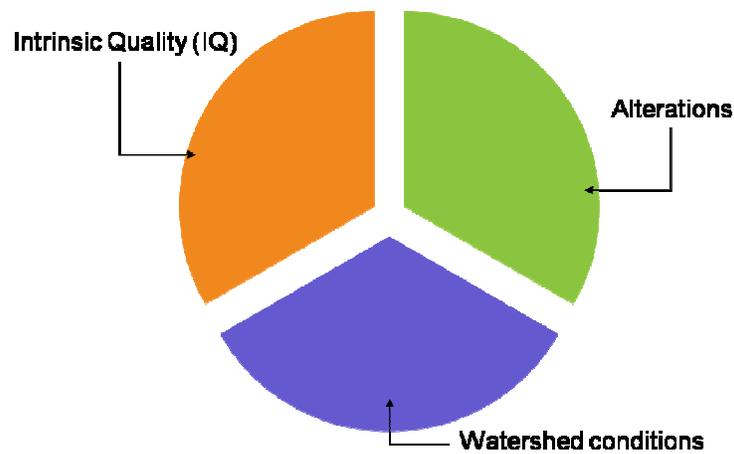
### **Step 1: Quantify and Document Baseline Conditions**

This step involves documenting baseline conditions of each shoreline segment or reach. We suggest that, for the purposes of shoreline master program updates, baseline conditions are the result of three main attributes (Figure 6):

- the intrinsic quality of the shoreline,
- the degree of shoreline alteration, and
- the condition of the surrounding watershed.

We define *intrinsic quality* (IQ) as a measure of the relative importance of a shoreline segment or reach in performing ecological functions or processes. The IQ concept is based on the assumption that not all shorelines are created equally and some by their inherent nature play a more vital role in maintaining or influencing shoreline processes and the resulting functions. This idea is similar to the concept of ‘important areas’ in the Department of Ecology’s watershed characterization project (available at: [http://www.ecy.wa.gov/mitigation/landscapeplan/technical\\_document.pdf](http://www.ecy.wa.gov/mitigation/landscapeplan/technical_document.pdf)).

In addition to IQ, the degree of *shoreline alteration* is a key determinant of baseline conditions. Shorelines that are characterized by lack of native vegetation or extensive bulkheading can be said to be in poorer condition ecologically than forested shorelines with intact banks. Finally, the baseline condition of each shoreline segment will be influenced by the *condition of the watershed* that drains to it.



**Figure 6. Baseline conditions are the result of three components: Intrinsic Quality, the degree of alteration, and the condition of the surrounding watershed**

Each of the three components that collectively comprise baseline conditions could be described using specific indicators of ecological function. The indicators are not direct measures of function, but are indirect surrogates for direct functional measurements. In other words, the presence of a feeder bluff within a shoreline reach is an indicator that the reach plays a role in sediment supply. Similarly, the presence of eelgrass is an indicator that the reach is important for primary productivity or food web functions.

Ecology has created a preliminary list of no net loss indicators (Appendix A), but has not yet provided direction to local governments on how to use the indicators in the context of preparing or implementing a shoreline master program. Therefore, a key outcome of Step 1 is providing a pathway for using these (or other) predefined indicators to assess and document IQ and shoreline alterations (Figures 7 and 8) and linking the indicators to shoreline master program decisions. Ideally, local governments need to know how to use the indicators to: make policy decisions during the update process, support shoreline permitting, and form a baseline against which no net loss can be measured over time.

Table 1 identifies some of the indicators that could be used for each component of the baseline conditions assessment. This list will need to be refined and/or supplemented to ensure that we are assessing the right attributes in a scientifically defensible way. Ecology is in the process of characterizing watershed conditions throughout the Puget Sound basin. The first phase of this characterization (completed in 2010) evaluates the relative importance of water flow processes among different analysis units of a watershed and the relative impairment to these processes from human activity. PSNERP has performed a similar analysis of nearshore processes<sup>7</sup> and has created a relative ranking of 812 drift cells and 16 delta units across Puget Sound. The outputs from these basin wide analyses could be used to derive the watershed condition component of the baseline conditions assessment.

**Table 1. Some potential indicators for each component of the Step 1 the baseline conditions assessment**

	Baseline Condition Component		
	Intrinsic Quality (IQ)	Shoreline Alteration	Watershed Condition
<b>Explanation</b>	<i>Affected by factors such as location, shore type, etc.</i>	<i>Affected by past development practices</i>	<i>Overall condition of the contributing basin</i>
<b>Potential Indicators<sup>8</sup></b>	Eelgrass and kelp Forage fish Wetlands / salt marshes* Feeder bluffs Proximity to natal streams Priority habitat /species	Loss of nearshore/riparian forest cover* Overwater structures* Armoring* Bank modification Restricted shellfish harvest* Confined floodplain (levees)* Fish migration barriers*	PSNERP watershed ranking or Ecology watershed characterization score
* Indicator is on Ecology’s preliminary list of no net loss indicators. Some of Ecology’s indicators are not shown here.			

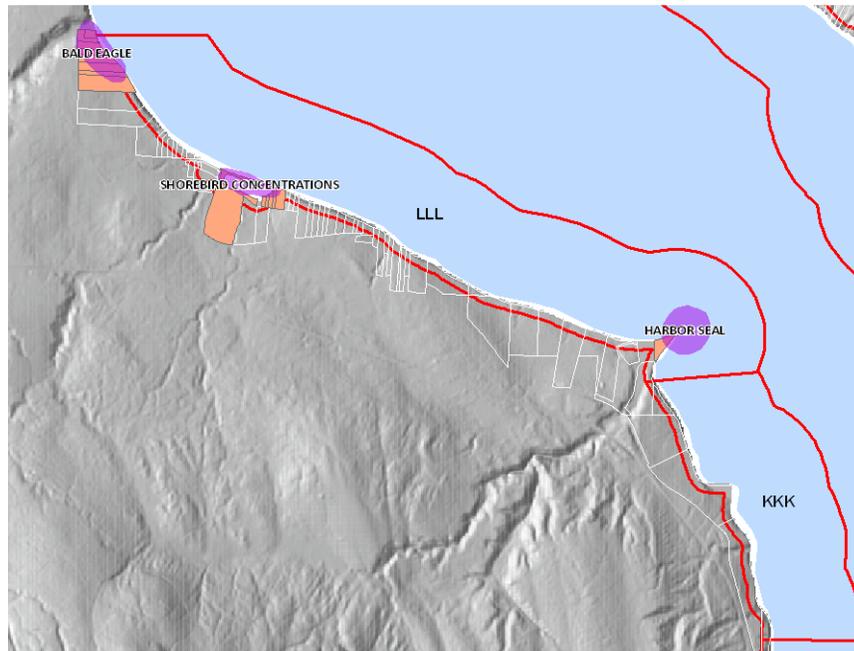
To make the baseline conditions assessment useful and feasible several issues will need to be addressed including: scale (at what scale are we measuring and accounting for changes in shoreline conditions?); data availability (we need consistent data sets that are available across Puget Sound); transparency (the analysis has to be verifiable and apparent to decision makers and the public); and scientific credibility (we need to be able to show the relationship between the indicator and the functions we are concerned about).

By assessing shorelines in terms of predefined indicators, one could potentially develop a composite score or rating for each shoreline reach, which could be mapped (Figure 9). This step could be accomplished using readily available data sets using GIS, with the goal of tracking indicators at the parcel scale and aggregating them to the reach scale. Detailed tabular data could be tied to each parcel

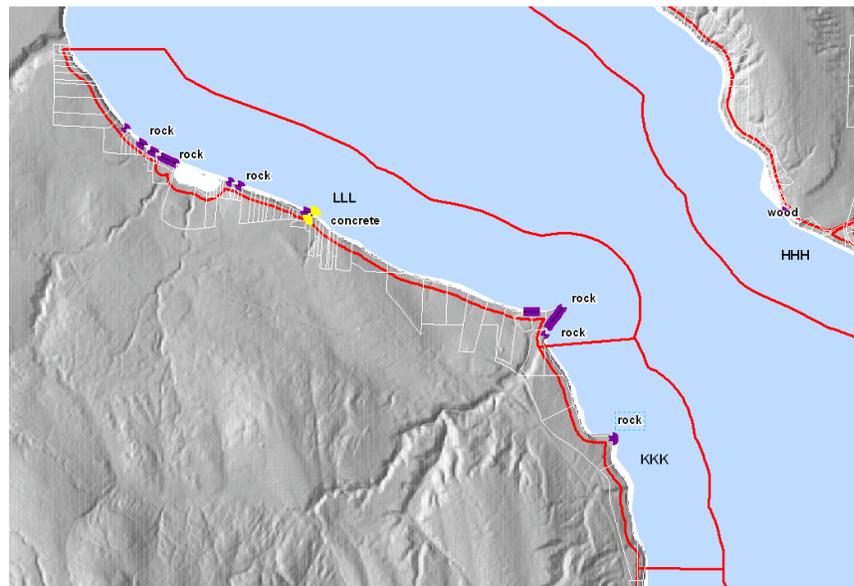
<sup>7</sup> The following processes were tested and rated for each drift cell: Sediment Input, Sediment Transport, Erosion and Accretion of Sediments, Tidal Flow, Distributary Channel Migration, Tidal Channel Formation and Maintenance, Freshwater Input, Detritus Input and Export, Exchange of Aquatic Organisms, Physical Disturbance, Solar Incidence.

<sup>8</sup> This is an initial, partial list. Additional or different indicators may need to be considered as the framework concepts evolve.

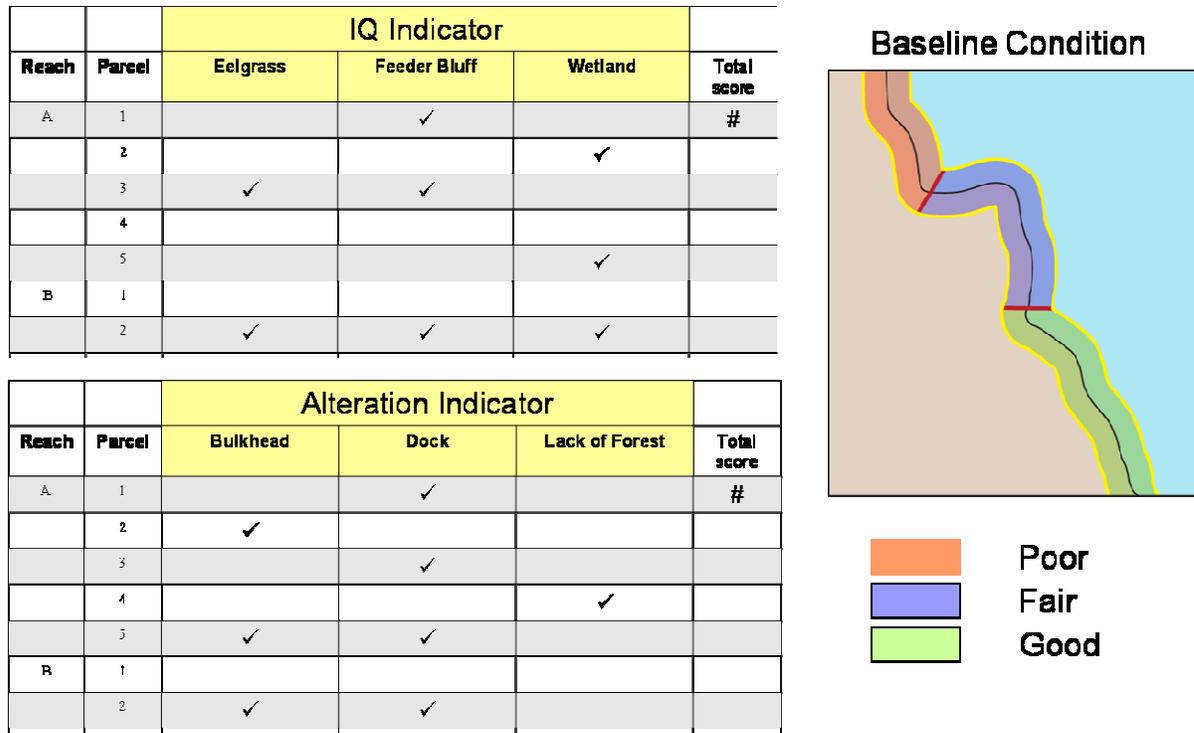
and section of the map to provide a transparent way of determining how the scores or ratings are derived. This would result in a clearer link between the shoreline inventory and characterization and shoreline environment designations, for example.



**Figure 7. Example of mapping IQ indicators (priority species habitat) at the parcel and reach scale during an SMP update**



**Figure 8. Example of mapping shoreline alteration indicators (armoring) at the parcel and reach scale during an SMP update**



**Figure 9. Preliminary mock up showing how parcel data could be used to generate a composite rating map (good/fair/poor) for one reach (Step 1 results)**

### Step 2: Evaluate Potential Land Use Changes

The second step of applying the framework in the context of a shoreline master program update is to assess existing and proposed land use to identify parcels and aggregates of parcels where actions known to impact ecological functions are likely to occur. This requires a local planner in partnership with permit staff to look at the level and type of existing development along the shoreline and determine how each shore segment is likely to change if build out occurs as planned. Zoning and comprehensive planning information can be used to help identify future land use patterns.

To determine existing land use, local planners would (where relevant) consider and document existing conditions related to:

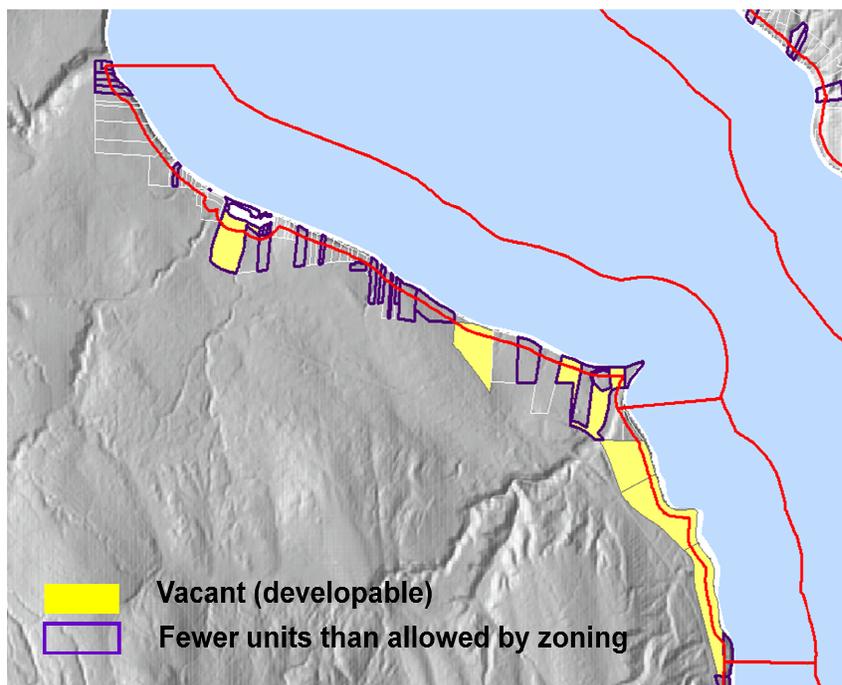
- Types of use
- Units/acre (density)
- Age of structures
- Infrastructure availability
- Lot pattern and dimensions
- Site constraints (e.g., high/low bank)
- Consistency with planning goals

Typically during the shoreline master program update processes, jurisdictions perform a qualitative analysis of existing land use by mapping zoning and comprehensive land uses at a broad scale. We

suggest a more site- or reach specific assessment of these specific attributes of land use because this begins to highlight areas where future changes are most likely to occur.

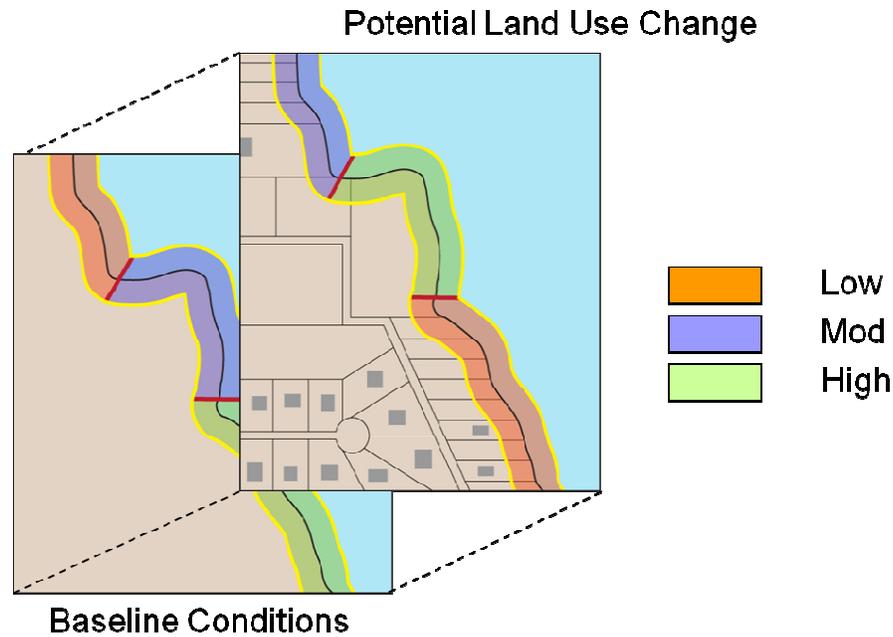
To determine how and where land use changes are likely to occur over time, planners with permit staff would assess and map attributes at the parcel scale such as the following (Figure 10):

- Whether the parcel was developed, undeveloped or underdeveloped
- Potential number of future units per acre
- Significant constraints to future development
- Infrastructure available to support future development
- Potential to create new waterfront lots through subdivision
- Presence of existing structures likely to be expanded or redeveloped



**Figure 10. Sample parcel and reach scale map showing developed, vacant and underdeveloped lots**

This assessment would allow local planners to categorize the level of change and document the specific types of changes with the potential to occur on each reach in a GIS format that can be layered with the baseline conditions noted above. The potential for change on each reach could be rated as low, moderate or high. The rating could be designed to take into account the type of change, intensity of use and a variety of the factors that help us understand potential effects on functions (Figure 11).



**Figure 11. The results of step 2 (potential land use change) can be overlaid on the baseline conditions assessment to show the relative level of change (low, moderate or high ) and where the change will occur relative to the ecologically sound or valuable shore reaches**

### ***Step 3: Determine Potential for Functional Loss***

The next step would be to assess or categorize the potential that the expected land use changes from Step 2 are going to contribute to or cause loss of ecological functions. This could be accomplished by asking a series of questions such as:

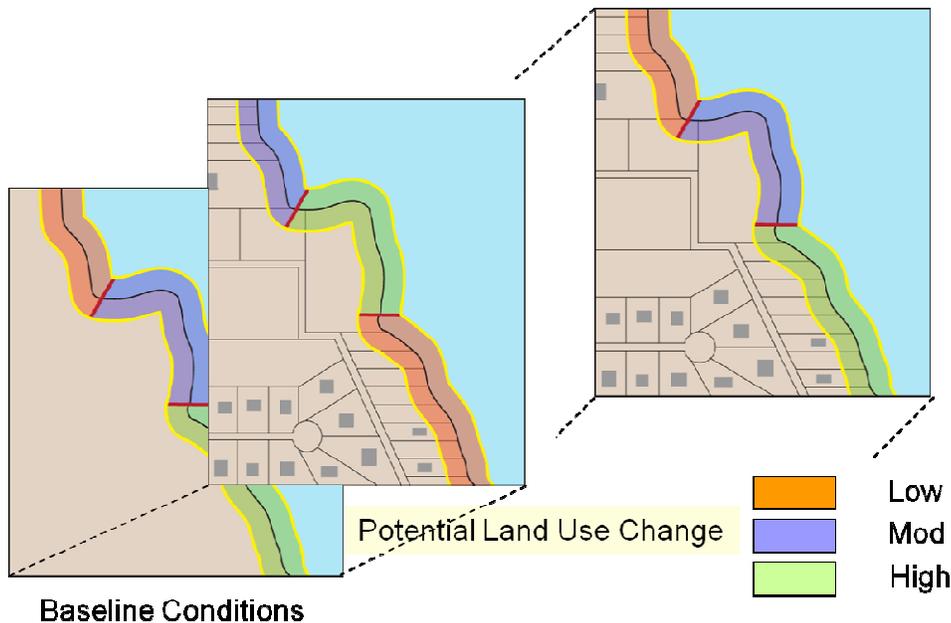
1. Will future development occur in high function areas?
  - ❖ No – go to question 2
  - ❖ Yes – go to question 3
2. Will future development occur in unaltered areas?
  - ❖ No – Risk of loss is low
  - ❖ Yes – go to question 3
3. Is the type of future development likely to cause impacts (clearing, armoring, septic systems, etc)?
  - ❖ No – Risk of loss is low
  - ❖ Yes – Risk of loss is high

The level of ‘risk’ to shoreline functions associated with Shoreline Management Act-regulated actions could then be summarized as high, moderate, or low to allow planners and permit staff to focus in on key areas of concern (Table 2).

**Table 2. Potential ways of characterizing the risk that land use changes will cause loss of shoreline ecological functions**

<b>High Risk</b>	<b>Moderate Risk</b>	<b>Low Risk</b>
Baseline conditions are <i>Good</i> and potential land use change is <i>High</i>	Baseline conditions are <i>Good</i> or <i>Fair</i> and potential land use change is <i>High</i> or <i>Moderate</i>	Baseline conditions are <i>Fair</i> or <i>Poor</i> and potential land use change is <i>Low</i> <b>Or</b> Baseline condition is <i>Poor</i> and potential land use change is <i>High</i>

Once areas of high and low ‘risk’ are identified, the results can be compared to the results from Steps 1 and 2 to form a more complete picture of shoreline conditions across a jurisdiction (Figure 12). Jurisdictions will likely want to develop different management strategies geared to the level and type of risk.



**Figure 12. The results of step 3 (risk of functional loss) can be overlaid on the baseline conditions assessment and land use change maps to show where functional losses might occur**

**Step 4: Tailor Shoreline Master Program Standards**

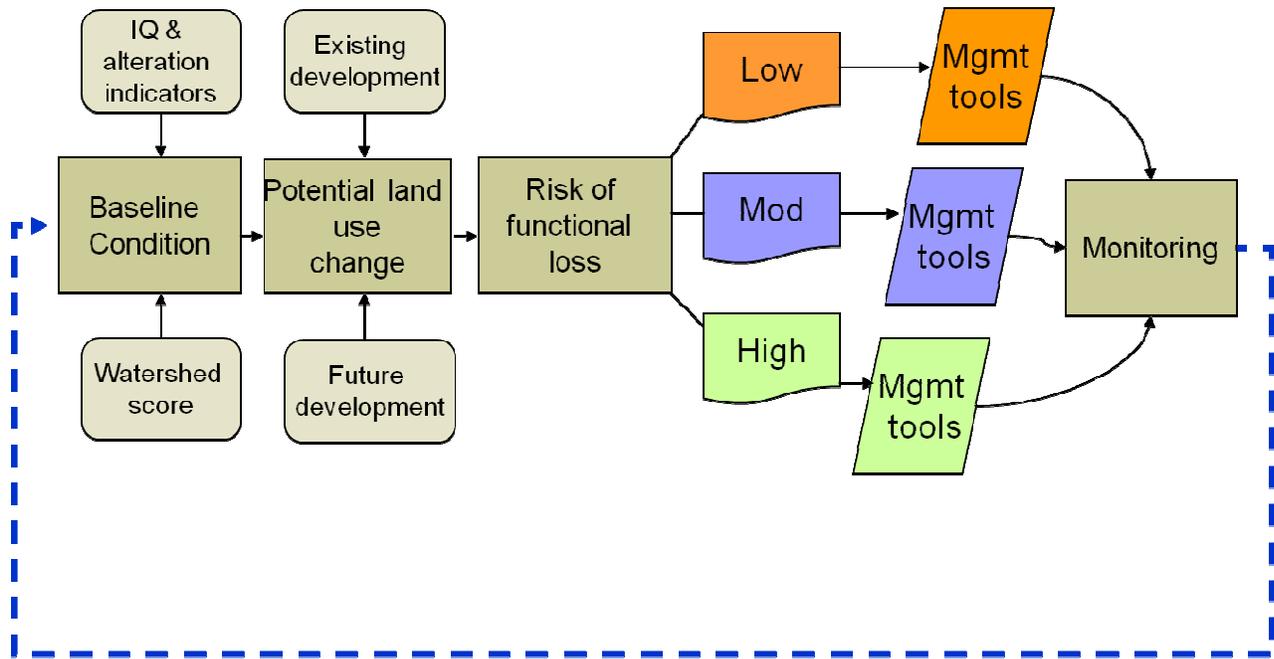
Once the risks to shoreline functions are understood in a spatially explicit way, local planners can tailor shoreline master program policies, designations and regulations to address specific risks to specific functions at specific locales. This step allows local governments to develop special shoreline environment designations and other policy or programmatic approaches that recognize and work within the legal requirements of the Shoreline Management Act. This type of focus and specificity will increase the likelihood that future loss of function can be prevented or mitigated. Understanding better in advance specifically where conflict between ecological functions and development and private property is likely will better position local governments and partners to come up with solutions by targeting and focusing voluntary incentives, acquisition and/or technical assistance in key areas.

As an example, a jurisdiction might choose to limit or prohibit certain uses in places that support extensive eelgrass beds but allow those same uses in places where eelgrass is unlikely to occur. By having better information on where and what types of impacts to expect, local governments will also be better able to make restoration decisions and seek partnerships with outside organizations that offset expected functional losses. For example, if a government knows that development of substandard shoreline lots is likely to occur on reaches that are important for sediment delivery they can take a proactive approach to protecting those shorelines to lessen the need for future hard armoring. Overall, this allows for a more informed shoreline master program wherein protection and restoration are geared to the level of risk and where management standards are designed to reduce the potential for future development to adversely impact specific resources. This represents an improvement over the current shoreline master program update process which often does not fully or purposefully depict potential land use changes against the backdrop of ecological conditions in a site-specific or systematic way.

## **Implementing SMPs to Achieve No Net Loss**

The information gleaned from Steps 1 through 4 above can also be used to support shoreline master program implementation. With data about IQ, level of alteration, and expected land use change for specific parcels and reaches, local governments can make more informed decisions about whether to permit new developments, how to condition permits, and what type of mitigation is necessary. Knowing that baseline conditions have been quantified and will be tracked over time provides support to permit staff and elected officials to make hard decisions, weigh trade-offs and positions them to more clearly articulate where regulations do not apply and other partnerships are necessary for success. Local governments and others can also use this information to make strategic decisions about which areas and parcels to target for outreach, enforcement and/or technical assistance to property owners.

By adding monitoring, local governments, in conjunction with other resource management agencies and non-profit groups can track no net loss over time (Figure 13). In this way, not only will local governments and others know how much additional bulkhead has been constructed or removed they will know if these changes occurred in areas important to supporting ecological health or in benign areas.



**Figure 13. Process for applying the no net loss framework**

This framework provides a number of tangible benefits compared to the current approach for dealing with no net loss:

- Creates a standardized approach for relating inventory information to shoreline master program decisions and implementation;
- Saves resources by clearly defining use and purpose for GIS gathered inventory and characterization work and creating a template for multiple jurisdictions to follow;
- Based on conceptual models linking shoreline master program decisions to shoreline functions which helps delineate and clarify the role and function of the shoreline master program within larger efforts to protect and restore Puget Sound;
- Allows for systematic assessment and monitoring using indicators;
- IQ, alterations and watershed conditions;
- Creates a structure that connects parcel level activities to Sound-wide assessments of progress;
- Creates site-specific information that clearly shows the limits of regulatory programs creating a spatially specific pathway to engage outside partners in achieving protection goals; and
- Allows local governments to prioritize and customize management strategies based on a risk assessment approach

## Feedback and Next Steps

The authors of this report are grateful to the following individuals who provided feedback on the framework ideas described here:

- Ecology Shoreline Technical Team plus Cindy Wilson (Thurston County), Tom Clingman (Department of Ecology), Naki Stevens (Department of Natural Resources), and Hugo Flores (Department of Natural Resources);

- Straits Group including Clallam Community Development Staff, Jamestown S’Klallam and Lower Elwha Klallam staff, planning staff from Port Angeles, Port Townsend and Sequim;
- Tim Quinn (WDFW), Curtis Tanner (PSNERP) and Tom Mumford (WDNR);
- Partnership staff including Martha Neuman and David St. John; and
- Tim Beechie (NOAA Science Center) and Elizabeth Babcock (NOAA Regional Office).

Overall, these individuals were supportive of the no net loss framework and its potential application in the shoreline master program update and implementation process. There was general agreement that the conceptual model and structure of the framework is a solid first step, is generally sound and appropriate for the purpose of shoreline master programs and their connection to the larger goal of ecosystem management at the Puget Sound scale. The following is a brief summary of the key issues and questions raised by the reviewers from whom we sought feedback:

1. **Balancing Actions and Interests to Achieve No Net Loss** - Reviewers noted that the term *no net loss* implies tradeoffs are being made between impacts and mitigation/restoration. Some reviewers suggested that these tradeoffs be examined in the context of developing the framework. The authors note that the Shoreline Management Act provides guidance for making tradeoffs and requires local governments to balance decisions about prohibiting uses and developments that have ecological impacts, allowing uses and developments that minimize impacts, and implementing mitigation and restoration to compensate for unavoidable impacts. Revisiting the basic policy underpinning of no net loss in the context of the Shoreline Management Act is beyond the scope of this effort. However, there is general agreement that assessing ecological conditions and potential changes at the parcel, reach and larger scales provides a better starting foundation for understanding what the tradeoffs really are. One suggestion was to track restoration and mitigation actions separately to know where functions are increased and where they are just being maintained. Testing the approach in Clallam and Jefferson counties will provide an opportunity to highlight how the policy decisions and tradeoffs can be made transparently and will allow others to see advances and shortcomings of the framework in achieving no net loss.
2. **Using Multiple Scales for Assessment and Decision-making** - The framework currently does not define a scale or threshold for measuring no net loss. Many of the reviewers liked the basic approach of accumulating data at the finest scale possible -- readily seeing that parcel-scale connections are critical for permitting decisions during implementation. They also see the importance of combining parcel-specific information within a larger landscape scale such as the reach and local jurisdiction level to determine no net loss of ecological function and connect to efforts to restore Puget Sound. As the framework develops, it will be important to select indicators that can be measured at scales that support shoreline master program decision-making, are scientifically credible, and enhance efforts to achieve overall recovery of Puget Sound. Determining the appropriate scale will need to consider:
  - How existing data sets such as those created through the PSNERP change analysis and Ecology watershed characterization efforts are constructed<sup>9</sup>;

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<sup>9</sup> Reviewers advocated that work at the shoreline reach or drift cell scale use the PSNERP delineation of drift cells and characterization of function where possible.

- SMP jurisdiction; and
  - Other ecological, social, and logistical factors.
3. **Creating Composite Scores at the Reach or Larger Scale** - The reviewers see potential value in the concept of creating a relative score for the baseline conditions and the potential for future loss of ecosystem functions. However, it is not clear yet whether this will be possible or useful for decision-making. The pilot effort in Jefferson and Clallam counties will help determine which indicators will be used based on availability of data and their applicability to shoreline master program decision-making. The test work will also guide whether creating a composite score increases the usefulness and transparency or not.
  4. **Defining Baseline Conditions** - Defining the baseline condition was an issue raised by a number of people. Some were concerned that if baseline conditions are defined as present conditions then much of the ecological function that has been lost already will not be accounted for in the analysis. The authors note that under the Shoreline Management Act, baseline conditions are defined as the conditions that exist at the time an SMP is adopted.
  5. **Using Existing Data Sets and Analysis** - Reviewers noted the tremendous information available in existing data sets and new tools for conducting spatial analysis. Additional work is needed to determine the best ways to access and use information and tools to inform shoreline planning, permitting, and monitoring.
  6. **No Net Loss within SMPs and Overall Puget Sound Recovery** - Some reviewers questioned how achieving no net loss based on present conditions fits into the overall goals for recovery that are part of the Chinook Recovery Plan and the Action Agenda for Puget Sound. Reviewers also asked if and how indicators of human health (speaking to the SMA's other key objectives of water-dependent use and public access) could or should be included in the no net loss discussion. Addressing these issues will likely require support from and coordination with the Puget Sound Partnership. Specifically, the Partnership's work to set measurable recovery goals for Puget Sound could help clarify the confusion over the role of the Shoreline Management Act in establishing baseline conditions and measuring no net loss. Additionally, the Partnership's work on identifying indicators of human health could be considered during the pilot project work.
  7. **Integrating Climate Change** - Reviewers noted the absence of climate change and sea level rise information in the presentation of the framework and acknowledged that assessments of no net loss will need to take into account implications of climate change. This is work that could potentially be addressed through the pilot effort in Clallam and Jefferson counties.
  8. **Effects on Property Owners** - Users of the framework are advised to think about how a more systematic and quantitative approach for addressing no net loss could affect property owners. At least one reviewer noted that fears about new approaches might cause some property owners to rush to vest under old rules and could inspire others to improve stewardship.

These issues and others will be examined further as part of the test application in Clallam and Jefferson counties. These issues should also be accounted for in any interim guidance provided to local jurisdictions working on no net loss before the work in the two counties is completed. Furthermore, the Partnership has separately convened a group to look at no net loss and Ecology is continuing to refine its no net loss guidance. The authors hope that these efforts will succeed in overcoming the challenges of achieving no net loss and enhance the level of protection that shorelines of the state receive.

## **Appendix A - Ecology's No Net Loss Indicators**

(included as a separate document)