

Chapter 4

No Net Loss of Shoreline Ecological Functions

All phases Shoreline Master Program Planning Process

Introduction

The Shoreline Management Act (SMA) provides a broad policy framework for protecting the natural resources and ecology of the shoreline environment. The SMP Guidelines establish the standard of “no net loss” of shoreline ecological functions as the means of implementing that framework through shoreline master programs. [WAC 173-26-186\(8\)](#) directs that master programs “include policies and regulations designed to achieve no net loss of those ecological functions.” (The specific sections of the Guidelines addressing the NNL requirement are included at the end of this chapter.)

RCW 90.58.020: The legislature finds 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... This policy contemplates protecting against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the state and their aquatic life...

The SMP Guidelines, adopted in 2003, constitute the first actual rule (WAC) in Washington State to incorporate the no net loss requirement. The concept of no net loss in this State originated with earlier efforts to protect wetlands. In 1989, Governor Booth Gardner signed an Executive Order establishing a statewide goal regarding wetlands protection. "It is the interim goal...to achieve no overall net loss in acreage and function of Washington's remaining wetlands base. It is further the long-term goal to increase the quantity and quality of Washington's wetlands resource base." (E.O. 89-10).

What does no net loss mean?

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. Both protection and restoration are needed to achieve no net loss. Restoration activities also may result in improvements to shoreline ecological functions over time.

Local governments must achieve this standard through both the SMP planning process and by appropriately regulating individual developments as they are proposed in the future. No net loss

should be achieved over time by establishing environment designations, implementing SMP policies and regulations that protect the shoreline, and restoring sections of the shoreline. Based on past practice, current science tells us that most, if not all, shoreline development produces some impact to ecological functions. However, the recognition that future development will occur is basic to the no net loss standard. The challenge is in maintaining shoreline ecological functions while allowing appropriate new development, ensuring adequate land for preferred shoreline uses and public access. With due diligence, local governments can properly locate and design development projects and require conditions to avoid or minimize impacts.

No net loss incorporates the following concepts:

- The existing condition of shoreline ecological functions should not deteriorate due to permitted development. The existing condition or baseline is documented in the shoreline inventory and characterization. (See Chapter 7.) Shoreline functions may improve through shoreline restoration.
- New adverse impacts to the shoreline environment that result from planned development should be avoided. When this is not possible, impacts should be minimized through mitigation sequencing.
- Mitigation for development projects alone cannot prevent all cumulative adverse impacts to the shoreline environment, so restoration is also needed.

Practices that help achieve no net loss

The following SMP update practices will help to meet the no net loss requirement:

- **Locate, design and mitigate development within a watershed context.** During the SMP update process, use the characterization of ecosystem processes and functions to identify the best areas for future development and mitigation. The characterization can provide important information regarding areas that have a high potential for restoration and can be used for offsite mitigation. Such an approach can use a combination of onsite and offsite mitigation that helps restore critical processes and generates a greater “lift” in ecosystem functions.
- **Prohibit uses** that are not water-dependent or preferred shoreline uses. For example, office and multi-family housing buildings are not water-dependent or preferred uses. There is no requirement to provide a place for all types of uses within shoreline jurisdiction.
- **Require that all future shoreline development**, including water-dependent and preferred uses, is carried out in a manner that limits further degradation of the shoreline environment. No uses or activities, including preferred uses, are exempt from the requirement to protect shoreline ecological functions.
- **Require buffers and setbacks.** Vegetated buffers and building setbacks from those buffers reduce the impacts of development on the shoreline environment.
- **Establish appropriate shoreline environment designations.** The environment designations must reflect the inventory and characterization. A shoreline landscape that is relatively unaltered should be designated Natural and protected from any use that would

degrade the natural character of the shoreline. (In practice, this would avoid future impacts, the first objective of no net loss.) New shoreline development in such environs is limited, resulting in avoidance of new impacts.)

- **Establish strong policies and regulations.** Policies and regulations will define what type of development can occur in each shoreline environment designation, determine the level of review required through the type of shoreline permit, and set up mitigation measures and restoration requirements.
- **Develop policies and requirements for restoration.** These should be consistent with the shoreline restoration plan prepared during the SMP planning process.
- **Recommend actions outside shoreline jurisdiction.** The master program or an SMP supporting document can recommend actions for properties that are outside shoreline jurisdiction but have impacts on shorelands. For example, the SMP could call for improved stormwater treatment of runoff from roads, or replacement of septic systems with sewers. Recommending these actions could help create awareness of problems and provide support for them, although outside the authority of the SMP. Such recommendations could be included in the shoreline management strategy or in a brief chapter within the SMP. This would also satisfy the SMA adjacent lands policy (RCW 90-58.340) that local governments are obligated to meet.
- **In all cases, require mitigation sequencing.** The SMP must include regulations that require developers to follow mitigation sequencing: avoid impacts, minimize impacts, rectify impacts, reduce impacts over time, compensate for impacts, monitor impacts and take corrective measures. Avoiding impacts means not taking an action or part of an action in order to prevent impacts to ecological functions. Impacts can be avoided in many different ways: structures may be sited further from properly functioning shoreline areas; different landscaping plants or techniques may be used; a less impactful use may be substituted; or a proposal may be redesigned altogether.

How to demonstrate no net loss

Local governments demonstrate no net loss at two levels -- through the comprehensive SMP update planning process and over time, during the project review and permitting processes (in other words, during SMP implementation).

No net loss in the SMP planning process

The following graphic provides a visual description of the role of the SMP update in achieving no net loss. Through mitigation and restoration, a jurisdiction would achieve no net loss of shoreline ecological functions.

SMP updates: Achieving no net loss of ecological function

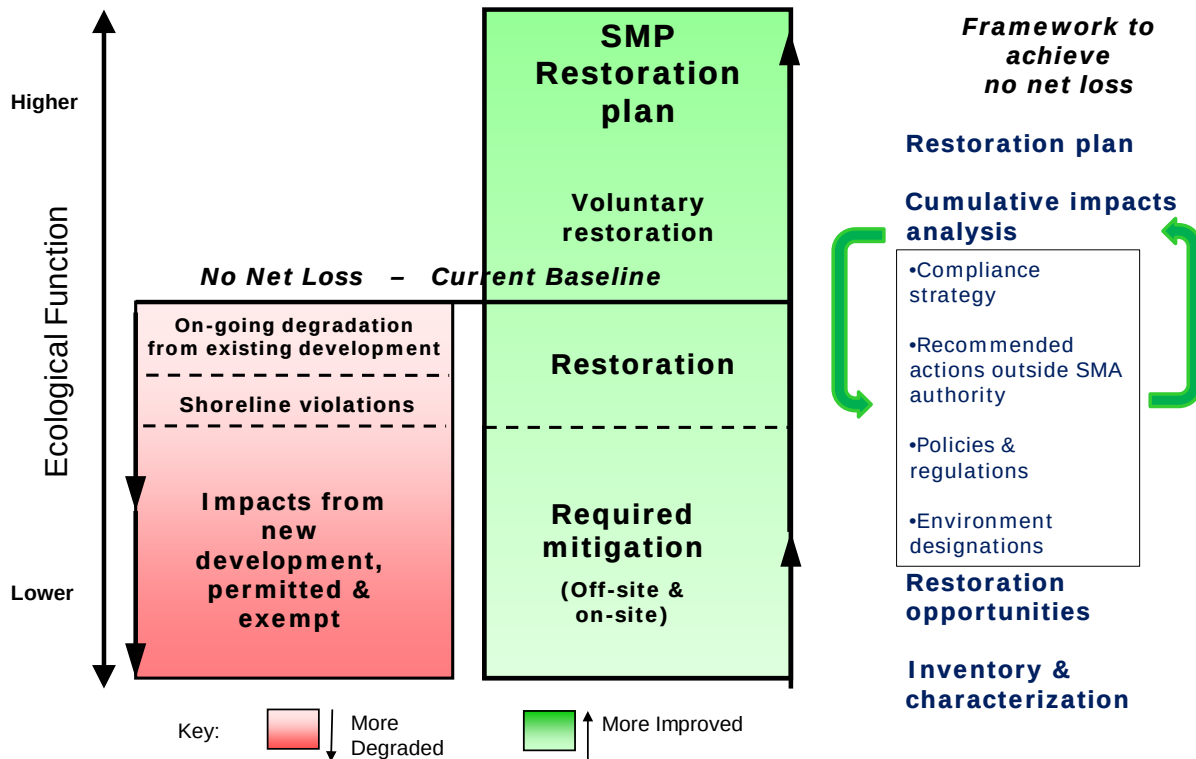


Figure 4-1: During the SMP update process, local governments should use existing shoreline conditions as the baseline for measuring no net loss of shoreline ecological functions.

Local governments show that their updated SMP will result in no net loss of ecological function by completing several tasks in the comprehensive SMP update process, including:

- **Shoreline inventory and characterization.** The shoreline inventory documents shoreline baseline conditions and the characterization analyzes shoreline functions and processes. (See SMP Handbook Chapter 7.
- **Shoreline use analysis.** The use analysis estimates the future demand for shoreline space and potential use conflicts over a minimum 20-year planning period and projects future trends.
- **Shoreline management recommendations.** Management recommendations translate the inventory and characterization findings into SMP policies, regulations, environment designations and protection strategies for each shoreline planning unit.
- **Restoration plan.** The restoration plan includes restoration opportunities, priorities and timelines for shoreline restoration.
- **Cumulative impacts analysis.** This analysis assesses the cumulative impacts on shoreline ecological functions from “reasonably foreseeable future development” allowed by the SMP, considering at a minimum habitat, hydrology and water quality functions.

Analyzing cumulative impacts is necessary to identify and compensate for the total predictable, incremental effects on shoreline functions after applying mitigation measures and restoration.

- **No net loss summary.** This narrative provides an overall picture of how the jurisdiction will meet the NNL requirement. This “executive summary” will explain how information from the supporting documents listed above was applied in developing and revising policies and regulations within the updated SMP. The summary should compare the conclusions of the supporting documents with the environment designations and use regulations to demonstrate how these provisions avoid, reduce, and mitigate reasonably foreseeable impacts in order to achieve NNL. This summary should provide a general chronology of the update while providing reference to the specific chronology captured in the SMP checklist. The purpose of this summary and other supporting documents is to ensure that the SMP environment designations, policies, regulations and shoreline restoration plan are based on the findings of the inventory and characterization and the cumulative impacts analysis and will achieve NNL. Documentation of this information will also provide a record of the jurisdiction’s decisions on SMP policies and regulations in relation to NNL.

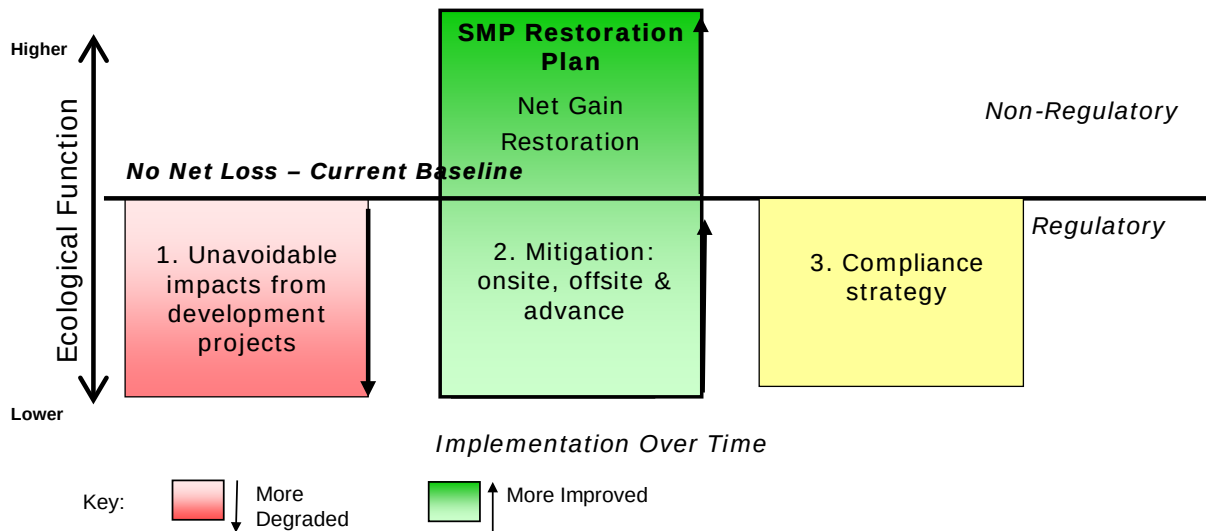
To approve a comprehensive SMP update, Ecology’s Director must formally conclude that the proposed SMP, when implemented over its planning horizon, typically 20 years, will result in “no net loss of ecological functions necessary to sustain shoreline natural resources.” This conclusion will be based upon the documents listed above, a completed SMP submittal checklist and supporting map portfolio.

No net loss in the permit process

When the SMP goes into effect, careful and thorough implementation will be necessary to achieve no net loss. For example, if the SMP prohibits office buildings and condominiums in the Conservancy environment, then your jurisdiction should not approve these uses in that environment. The cumulative impacts analysis would have shown that no net loss would be achieved if office buildings and condominiums are prohibited in the Conservancy environment. Allowing offices and condominiums under this scenario would result in a loss of shoreline functions.

When implementing the updated SMP, no net loss principles (first avoiding, then minimizing and compensating for ecological impacts) are applied again as individual shoreline project applications are reviewed and approved, conditioned, or denied. The following graphic demonstrates how the no net loss requirement is partially achieved during the permit process.

Achieving no net loss of ecological functions at the project level



1. Impacts from shoreline development projects, after mitigation and restoration measures. SMP should encourage appropriate use of innovative measures such as clustering, TDRs, site specific BMPs, etc. to reduce impacts.

2. On-site, off-site and advance mitigation. SMPs should lay out the conditions when off-site mitigation will be allowed or preferred. Innovative techniques such as wetland banking (advance mitigation) should be addressed in SMPs. SMP restoration plans should help identify priority sites and types of sites for the most effective off-site restoration activities.

3. A compliance strategy should include a mechanism to document project review actions and a method to periodically evaluate the cumulative effects of authorized shoreline development. The compliance strategy should include inspection of development projects, and identify priorities for enforcement to improve protection of the most significant shoreline features and functions.

Figure 4-2: SMPs must include regulations that require developers to follow mitigation sequencing. Restoration will also be needed in order to achieve no net loss.

During the planning process, incomplete information about a potential future development and its impacts limits your ability to address no net loss. To close this information gap, unanticipated development impacts are identified through more detailed, site-specific information received at the permit review level.

Project review completes the Guidelines' combined planning and permit review framework for achieving no net loss. It assures that unanticipated impacts will still be subject to a cumulative impacts evaluation as applications for shoreline exemptions, conditional uses, and shoreline permits are reviewed.

One way to comply with the SMP Guidelines requirement is to apply an established mitigation sequence such as that in the State

WAC 173-26-201(3)(d)(iii): For development projects that may have unanticipated or uncommon impacts that cannot be reasonably identified at the time of master program development, the master program policies and regulations should use the permitting or conditional use permitting processes to ensure that all impacts are addressed and that there is no net loss of ecological function of the shoreline after mitigation.

Environmental Policy Act (*SEPA* - WAC 197-11-768) on a case-by-case basis during project review.

Another way is through a conditional use permit (CUP). CUPs are automatically required for unanticipated types of development (“unclassified” uses). The SMP also may require CUPS for developments in which the impacts cannot be fully known at the planning level. Through the CUP review process, “consideration shall be given to the cumulative impact of additional requests for like actions in the area” [WAC 173-27-160(2)].

Potential no net loss indicators

Local planners working on SMP updates have asked for a tool to measure no net loss. In response, Ecology staff scientists and planners, with input from several state agencies and local governments, developed a list of potential No Net Loss indicators for Shoreline Master Programs (Table 4-1, below). This table of indicators can be used by local governments to help track the status of shoreline functions. Tracking several indicators can help to meet the “no net loss” of shoreline ecological functions standard of the SMP Guidelines.

The table shows 15 potential indicators and the type of measurement for each, such as acres, linear feet, number, percent cover, etc. The table shows the shoreline functions – water quality, water quantity and habitat – that are affected by the indicator, as well as specific impairments related to the indicator. Other columns include limitations for using the indicators, where the indicators are best used, and the availability of data. The indicators are limited to the area within shoreline jurisdiction where SMP regulations are implemented.

Measuring and continuing to track these indicators can give you a picture of shoreline conditions and ecological functions. The indicators can be measured to track loss or gain. For example, the length of shoreline stabilization may increase or decrease, or the acreage of riparian vegetation may increase or decrease. As conditions change over time, you may need to make changes to your SMP if tracking the indicators shows that your community is not achieving “no net loss” of shoreline ecological functions.



Figure 4-3: The linear length or area of bulkheads may be used as an indicator of no net loss of shoreline ecological functions. Photo by Hugh Shipman.

TABLE 4-1: POTENTIAL NO NET LOSS INDICATORS for SHORELINE MASTER PROGRAMS

Indicator (all in shoreline jurisdiction)	Functions affected – key categories – water quality, water quantity and habitat	Type of Impairment**	Limitations of indicator	Where	Is data available or reasonable to obtain
Forest cover: <u>Acres</u> converted from forest land to other land uses.	Water quality-sediment, nutrients & toxic filtration, conversion, and/or retention; temperature regulation. Water quantity-flow regulation. Habitat-structure for habitat life needs; input of organics & LWM*.	Reduces forest buffers and decreases filtering, conversion, and/or retention of pollutants from surface & subsurface flow; increases quantity of pollutants to aquatic habitats. Alters the delivery and timing of water to aquatic areas, increasing quantity of water delivered to aquatic habitats during high and low flows, which affects habitat structures. Increases water temperature. Loss of nesting sites, rearing, refuge & foraging areas.	Doesn't identify future land use. May be difficult to determine acres in shoreline jurisdiction without finer scale analysis.	Rural.***	Details of application available from DNR and local government. Class IV forest practice applications. CCAP data.
Shoreline stabilization: <u>Linear length</u> or area of bulkheads, revetments, bioengineering, seawalls, groins, retaining walls,	Habitat-Riparian and aquatic habitat, sediment supply. Input of organics, prey base, & LWM. Structure for habitat life needs.	Interrupts habitat-forming processes, such as beaches & channel migration, by impacting sediment supply and transport. Loss of nesting sites, rearing, refuge & foraging areas. Loss of prey base with	Combines different types of stabilization measures into one general category; impacts may vary.	Rural, urban.	Is data available from local government, including permits & SDP exempt projects? Can locals track over time? HPA information can supplement other data, but is not sufficient on

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gabions. (Includes decrease in length, change to soft structure.)		associated loss of riparian vegetation.			its own. Detailed aerial photos may also show stabilization changes.
Marine & freshwater riparian vegetation: <u>Linear measurement</u> of mature native riparian vegetation of a given width (buffer width) or <u>percent cover</u> of different vegetation classes.	Water quality-sediment, phosphorus & toxic filtration, conversion, and/or retention; temperature regulation. Water quantity-flow regulation. Habitat-input of organics, prey base, & LWM. Structure for habitat life needs.	Removes capacity of riparian vegetation to filter surface flows, sediment, phosphorous and toxics; subsurface removal or conversion of nitrogen, pathogens. Increases overland and subsurface flows. Increases water temperature. Reduces prey base. Loss of LWM that provides instream structure. Loss of nesting sites, rearing, refuge & foraging areas.	No permit, so no record of change. Focused project needed to track. Useful only if a baseline exists. Methodology needs to be able to measure change. May be difficult to measure over short time frame.	Rural, urban.	Can locals measure and track? Use sample areas, aerial photos. Puget Sound LIDAR consortium has some data.
<u>Acres</u> of permanently protected areas, with no or limited development: Public ownership, current use/PBRS, conservation	Water quality-sediment, phosphorus & toxic filtration, conversion, and/or retention; temperature regulation. Water quantity-flow regulation.	Loss of nesting sites, rearing, refuge & foraging areas.	How measure degree of protection? Limit to protected areas with no development? Difficult to connect with specific functions.	Rural, urban.	Need info on ownership, PBRS, easements. Other info available from county auditor and assessor? Land trusts. NRCS and state agencies are also

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easements, fee ownerships, NGOs.	Habitat- Riparian and aquatic habitat, sediment supply. Input of organics, prey base, & LWM. Structure for habitat life needs.				sources for permanently protected lands.
Piers/docks/floats, overwater structures: <u>Number</u> of structures, <u>square footage</u> of new and replacement. Or track grating, piling, construction materials.	Habitat. Water quality-toxics.	Increase in predation, reduction in light and aquatic vegetation and simplification of food web.	All docks not same – i.e. grating, materials vary, location affects impacts. New docks partially mitigate impacts.	Rural, urban.	Is data available from local government, including permits and SDP exempt projects? Can locals track over time? Use DNR data – number of and area over water. HPA information can supplement other data, but is not sufficient on its own. Good to monitor late spring/early summer.
Road lengths (<u>feet</u>) within 200 feet of water body.	Water quantity. Water quality. Habitat- connectivity.	Intercepts and changes timing of flows to aquatic habitat. Increases sediment and toxics.	Is there much new road development in shoreline jurisdiction?	Rural, urban.	Data available from DNR, local governments and WSDOT. CCAP data needs analysis to provide relevant information.
<u>Number</u> of road crossings of water bodies -bridges, culverts.	Habitat - Instream functions. Water quality.	Simplifies stream habitat structure, increases channel confinement and interrupts habitat forming processes.	Is there much new road development in shoreline jurisdiction? Distinguishing between fish friendly crossings	Rural, urban.	Culvert inventories vary in quality. WDFW has fish passage barrier data, but it is incomplete. Remote sensing data? SHIAPP

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Indicator (all in shoreline jurisdiction)	Functions affected – key categories – water quality, water quantity and habitat	Type of Impairment**	Limitations of indicator	Where	Is data available or reasonable to obtain
		Increases delivery of pollutants.	and others. Combining broad range of activities.		data? CCAP data needs analysis to provide relevant information.
Water quality: 303(d) <u>list</u>. All water quality parameters such as temperature, dissolved oxygen, fecal coliform, heavy metals, toxics, organics and biological indices (e.g., Biological Index of Biotic Integrity). Shellfish listings <u>closures</u>.	Water quality.	Impairment is specific to type of listed 303(d) issue (e.g. increased temperature, low dissolved oxygen, increased fecal coliform, heavy metals and toxic organics.)	How relate to functions? Some impacts from outside shoreline jurisdiction. Only impaired waters are listed & measured; no WQ improvement project in place. No criteria to remove from list. Sampling methodology changes, not always comparable. Marine & fresh water lists updated in alternating 2-year cycles. Some impacts from outside shoreline jurisdiction and municipality. Emergency closures updated regularly. Uneven data. Changes may be too frequent for>NNL purposes. Limited to	Rural, urban.	Accessible data from Ecology. Is water body on or off list? In some cases, only a portion (e.g., reach) of a water body is listed. 303(d) – comprehensive, Dept of Health Shellfish Program.

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			fecal coliform. Reflects impacts on human health, not shellfish health.		
Levees/dikes: <u>Linear feet</u> , floodplain area gained from levee setbacks.	Water quality –sediment removal, temperature regulation. Water quantity–water storage, flooding. Habitat–structure for habitat life needs (e.g., low LWM, stream bed aggradation, river mouth progradation).	Impairs natural flooding regime. Reduces floodplain sediment retention, denitrification and hyporheic functions. Decreases groundwater storage and base flows. Interferes with formation of habitat structure such as distributary channels in tidal and riparian and in-channel and off-channel habitat in freshwater settings. Removes habitat structure for nesting, rearing, refuge and foraging.	Can change in habitat quality as a result of levee/dikes be easily measured? Various types and locations of levees & dikes are lumped together. Types of openings in levees and dikes vary; impacts may vary.	Rural, urban.	Measure increase/decrease in lineal feet, quality of levee related to riparian vegetation & slope. Is data from local governments or FEMA?
Floodplain area: <u>Acres</u> allowed to flood –tidal and river (lack of flood control and lack of other structures such as houses.)	Water quality – removal of toxics, sediment, phosphorous and pathogens through adsorption, filtration and retention. Removal of nitrogen through	Impairment similar to that for levees & dikes with loss of floodplain from diking & filling.	Availability of data, maintenance of data.	Rural, urban.	Do local governments measure this for shoreline inventory? FEMA floodplain info available.

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	denitrification. Temperature regulation. Water quantity – water storage and flow regulation and reduction in downstream flooding. Habitat – formation of habitat structure from LWM, vegetation communities and sediment type/channel configuration that support habitat life needs. Input of organics and prey base.				
<u>Number of bald eagle & osprey nests & roosts & great blue heron rookeries.</u>	Habitat – structure for habitat life needs.	Indicator of impaired habitat.	More suitable for counties than cities.	Rural.	WDFW data – most up- to-date for eagles.
<u>Percent cover of invasive species in riparian zones.</u>	Habitat – Riparian and aquatic habitat, sediment supply. Input of organics & LWM. Structure for habitat life needs.	Overwhelms native plants, compromising ecosystem. Potential effect on physical structure and food web dynamics.	Requires field work. May be useful if data set is available. Use Noxious Weeds list to define invasive species?	Rural, urban.	Is data available? Conservation districts? WA Invasive Species Council? (working on baseline assessment due in May 2011)
<u>Impervious surface area.</u>	Water quality – removal of toxics, sediment, phosphorous and	Reduces vegetative buffers and decreases filtering of	Covered by other indicators? Percentage increase in developed	Urban	Aerial photos or other remote sensing techniques show

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	pathogens through adsorption, filtration and retention. Removal of nitrogen through denitrification. Temperature regulation. Water quantity – water storage and flow regulation and reduction in downstream flooding. Habitat – formation of habitat structure from LWM, vegetation communities and sediment type/channel configuration that support habitat life needs. Input of organics.	pollutants from surface & subsurface flow. Alters the delivery and timing of water to aquatic areas, increasing quantity of water and pollutants delivered to aquatic habitats during high and low flows, which affects habitat structure. Increases water temperature Reduces prey base (by associated removal of vegetation) Loss of nesting sites, rearing, refuge & foraging areas.	urban areas would be small and may not be useful indicator. Some land surface cover layers are inaccurate, e.g. showing impervious for clearcut forest.		impervious cover. Local governments require new impervious information in permit applications.
Wetlands <u>acreage</u>: Fill of natural wetlands and constructed or engineered wetlands. This includes nearshore tidal estuaries.	Water Quality – Wetlands filter pollutants and store sediment. Water Quantity – Affect groundwater storage and flow regulation. Habitat – Affects habitat structure, results in loss of wetland vegetation	Changes to natural hydrological, chemical, and physical regimes affect the production and succession of a wetland's ecology, and therefore its functions and values.	Difficult to track. Could be covered in other indicators (impervious surface and water quality), however other indicators don't get at wetland conversion to non-impervious land use such as landscaping or	Rural, urban	Is data available? Local permit tracking? Ecology? Core of Engineers?

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	communities that support habitat life needs.		agriculture. May require field work.		
<u>Area</u> of seagrasses, kelp and emergent aquatic vegetation.	Habitat - structure for habitat life needs, including food and shelter for many species.	Decreases in aquatic vegetation such as eelgrass and kelp results in loss of food and shelter for many species.	Multiple factors affect growth and sustainability of aquatic vegetation.	Aquatic	Seagrass, kelp and emergent aquatic vegetation data along shoreline available from DNR Shorezone. (1994- 2000) More recent local data available at those sites that are among the stratified randomly sampled sites.

* LWM - Large Woody Material

** For some indicators, decreasing the length or area of the indicator would result in a benefit to shoreline functions (e.g., shoreline stabilization, piers & docks.) For other indicators, increasing the length or area of the indicator would result in a benefit to functions (e.g. forest cover, riparian vegetation.)

*** Rural includes rural residential, agricultural and forestry areas.

CCAP - Coastal Change Analysis Program

NGO - Non-government organization

PBRS - Public Benefit Rating System

NRCS - National Resource Conservation Service

Inventory provides baseline

A baseline of shoreline ecological conditions is necessary in order to use indicators. You need a starting point. Fortunately, the shoreline inventory and characterization provide the baseline for measuring no net loss. The best time to collect data related to the indicators is during the shoreline inventory.

Some local governments have completed their inventory, and don't plan on collecting new data in the near future. Existing inventory data should provide good information for some of the indicators – impervious surfaces, levees and dikes, shoreline stabilization, floodplains, vegetation, overwater structures – as they are required as part of the inventory, to the extent that such information is available.

If you are working on the inventory now or will be in the future

Look at the indicators list. Consider what you now know about your shorelines. Are you aware of extensive riparian vegetation, a large number of eagle nests, water quality problems or limited shoreline armoring? Would these indicators be able to be counted as part of the inventory and tracked over time? What about other indicators? As you work on the inventory, keep the potential indicators in mind. If you find out there aren't any eagle nests, they would not be a good indicator for your community. If you learn there are many feet of roads in shoreline jurisdiction, and there are also long-term plans to remove some road lengths, road length may be a good indicator. Keep in mind that data about the indicators needs to be available now and in the future.

If your inventory is complete

Look at the indicators list. Consider your shoreline conditions and the inventory information that you have available. Are several of the indicators on the list reflected in your inventory? Does your inventory include the amount of shoreline stabilization or overwater structures such as piers and docks (this information is commonly included in inventories.) If so, you can choose several indicators from the list. If Ecology's potential indicators are not applicable to your shorelines, what inventory information could be useful as one or more indicators?

Selecting other indicators

If Ecology's potential indicators are not appropriate for your shoreline, you may develop your own. Your local government may have data specific to your shorelines that could be useful for indicators. These indicators should be relevant to the regulatory authority that your local government has over factors that affect the indicators. If an upstream city's activities have significant effects on water quality along your shoreline, then water quality is not an appropriate indicator to measure net loss or gain that can be attributed to your local government's actions. When determining what indicators to use, consider the following criteria:

- Data are available, reliable and can be gathered in a consistent manner over time.
Note that data may be specific for some areas and not available for other areas

within your jurisdiction. Example, current eelgrass data are available for some nearshore areas and not others.

- The data selected for measurement provide an indication of ecological function within shoreline jurisdiction.
- Indicators are relevant to implementation of local policies and regulations. The number of orcas that pass by offshore is not a reflection of your local SMP's effectiveness, as orcas can range through the waters of many jurisdictions, even going out of state or country.
- Data have the potential to show change over a relatively short time period.
- Indicators are used by other agencies such as the Puget Sound Partnership.

An indicator may be present throughout your shoreline jurisdiction, such as impervious surfaces in urban areas, or limited to one or several shoreline reaches, such as freshwater riparian vegetation. A small percent reduction of impervious surfaces throughout shoreline jurisdiction could have significant positive effects on shoreline functions. On the other hand, the loss of riparian vegetation in one or several reaches could have significant detrimental impacts on shoreline functions. You could choose one or two indicators that occur throughout shoreline jurisdiction and several other indicators that occur in one or several reaches where a gain or loss represents a substantial change to shoreline functions.

Choosing appropriate indicators

Choose indicators that represent habitat, water quantity and water quality in your community. For example, shoreline stabilization affects habitat; forest cover affects habitat, water quantity and water quality; and the 303(d) list reflects water quality. This combination of indicators, if they adequately represent your shorelines, would be good to track.

The indicators you choose should take into account the anticipated future development along your shorelines. Projecting “reasonably foreseeable future development and use of the shoreline” is part of the Cumulative Impacts Analysis. If you expect that urban, suburban or high intensity development will occur along the shoreline, consider indicators related to such development. These may include impervious surface area, shoreline stabilization, overwater structures, riparian vegetation, road lengths or invasive species, among others.



Figure 4-4: Riparian vegetation, overwater structures and impervious surfaces are potential indicators of no net loss.

Keep in mind any restoration that you expect to occur. If your plans call for removing bulkheads and restoring habitat, appropriate indicators might be riparian vegetation, eagle and osprey nests, and the length of shoreline armoring.

Avoid choosing an indicator that does not represent your shoreline, for example, forest cover if forest cover would not occur naturally. Avoid choosing several indicators that may represent the same impacts on ecological function – e.g., riparian vegetation in a relatively undeveloped area, and acres of permanently protected areas in the same location.

Tracking indicators

Develop a process and method to track the indicators. The SMP Guidelines state, “Master programs or other local permit review ordinances addressing shoreline project review shall include a mechanism for documenting all project review actions in shoreline areas. Local governments shall also identify a process for periodically evaluating the cumulative effects of authorized development on shoreline conditions. This process could involve a joint effort by local governments, state resource agencies, affected Indian tribes, and other parties” [WAC 173-26-191(2)(a)(iii)(D)].

Tracking your indicators can help you determine whether you are achieving no net loss. Determine how often you will measure your indicators – annually, when you update your SMP, or something in between? What do the indicators tell you compared with the baseline? How will the information be analyzed? Figure out early what you will be looking for, how it will be measured, and what it might mean.

Some options for tracking indicators:

- Track through the permit process. This may work for some development features, such as impervious surface coverage, length of bulkheads, and vegetation clearing. Developments that are exempt from the requirements for a Shoreline Substantial Development permit usually need local building or other permits. How often will these be checked? Can you keep a running tally, or run a software program annually?
- Track through local data that is updated regularly.
- Track through state or federal or other data sources. Who in your department will follow up, and when should that happen? (Refer to the indicators table for potential data sources.)
- Track changes through aerial photos or shoreline field visits, on land and water. Identify the process you will use.

Reporting use of indicators

The SMP Guidelines require local governments to show how NNL will be achieved, although specific indicators are not required. However, you are required to show in the Cumulative Impacts Analysis and No Net Loss report how the SMP will achieve no net loss when implemented over time. Your choice of indicators, rationale for choosing them, and explanation of how they will be tracked and evaluated should be discussed in these reports. Your SMP also can discuss how you will use indicators to show whether you are achieving no net loss.

Shoreline Master Program Guidelines

SMP Guidelines specifically addressing No Net Loss

WAC 173-26-186

(8) Through numerous references to and emphasis on the maintenance, protection, restoration, and preservation of "fragile" shoreline "natural resources," "public health," "the land and its vegetation and wildlife," "the waters and their aquatic life," "ecology," and "environment," the act makes protection of the shoreline environment an essential statewide policy goal consistent with the other policy goals of the act. It is recognized that shoreline ecological functions may be impaired not only by shoreline development subject to the substantial development permit requirement of the act but also by past actions, unregulated activities, and development that is exempt from the act's permit requirements. The principle regarding protecting shoreline ecological systems is accomplished by these guidelines in several ways, and in the context of related principles. These include:

(a) Local government is guided in its review and amendment of local master programs so that it uses a process that identifies, inventories, and ensures meaningful understanding of current and potential ecological functions provided by affected shorelines.

(b) Local master programs shall include policies and regulations designed to achieve **no net loss** of those ecological functions.

(i) Local master programs shall include regulations and mitigation standards ensuring that each permitted development **will not cause a net loss** of ecological functions of the shoreline; local government shall design and implement such regulations and mitigation standards in a manner consistent with all relevant constitutional and other legal limitations on the regulation of private property.

(ii) Local master programs shall include regulations ensuring that exempt development in the aggregate **will not cause a net loss** of ecological functions of the shoreline.

SMP Guidelines generally addressing environmental protection and related to No Net Loss

Scientific and technical information

WAC 173-26-201(2)(a)

(a) **Use of scientific and technical information.** To satisfy the requirements for the use of scientific and technical information in RCW [90.58.100\(1\)](#), local governments shall incorporate the following two steps into their master program development and amendment process.

First, identify and assemble the most current, accurate, and complete scientific and technical information available that is applicable to the issues of concern. The context, scope, magnitude, significance, and potential limitations of the scientific information should be considered. At a minimum, make use of and, where applicable, incorporate all available scientific information, aerial photography, inventory data, technical assistance materials, manuals and services from reliable sources of science....

Second, base master program provisions on an analysis incorporating the most current, accurate, and complete scientific or technical information available. Local governments should be prepared to identify the following:

- (i) Scientific information and management recommendations on which the master program provisions are based;
- (ii) Assumptions made concerning, and data gaps in, the scientific information; and
- (iii) Risks to ecological functions associated with master program provisions. Address potential risks as described in WAC [173-26-201](#) (3)(d).

Shoreline ecological functions

WAC 173-26-201(3)(d)(i):

(C) Shoreline ecological functions include, but are not limited to:

In rivers and streams and associated flood plains:

Hydrologic: Transport of water and sediment across the natural range of flow variability; attenuating flow energy; developing pools, riffles, gravel bars, recruitment and transport of large woody debris and other organic material.

Shoreline vegetation: Maintaining temperature; removing excessive nutrients and toxic compound, sediment removal and stabilization; attenuation of flow energy; and provision of large woody debris and other organic matter.

Hyporheic functions: Removing excessive nutrients and toxic compound, water storage, support of vegetation, and sediment storage and maintenance of base flows.

Habitat for native aquatic and shoreline-dependent birds, invertebrates, mammals; amphibians; and anadromous and resident native fish: Habitat functions may include, but are not limited to, space or conditions for reproduction; resting, hiding and migration; and food production and delivery.

In lakes:

Hydrologic: Storing water and sediment, attenuating wave energy, removing excessive nutrients and toxic compounds, recruitment of large woody debris and other organic material.

Shoreline vegetation: Maintaining temperature; removing excessive nutrients and toxic compound, attenuating wave energy, sediment removal and stabilization; and providing woody debris and other organic matter.

Hyporheic functions: Removing excessive nutrients and toxic compound, water storage, support of vegetation, and sediment storage and maintenance of base flows.

Habitat for aquatic and shoreline-dependent birds, invertebrates, mammals; amphibians; and anadromous and resident native fish: Habitat functions may include, but are not limited to, space or conditions for reproduction, resting, hiding and migration; and food production and delivery.

In marine waters:

Hydrologic: Transporting and stabilizing sediment, attenuating wave and tidal energy, removing excessive nutrients and toxic compounds; recruitment, redistribution and reduction of woody debris and other organic material.

Vegetation: Maintaining temperature; removing excessive nutrients and toxic compound, attenuating wave energy, sediment removal and stabilization; and providing woody debris and other organic matter.

Habitat for aquatic and shoreline-dependent birds, invertebrates, mammals; amphibians; and anadromous and resident native fish: Habitat functions may include, but are not limited to, space or conditions for reproduction, resting, hiding and migration; and food production and delivery.

Wetlands:

Hydrological: Storing water and sediment, attenuating wave energy, removing excessive nutrients and toxic compounds, recruiting woody debris and other organic material.

Vegetation: Maintaining temperature; removing excessive nutrients and toxic compound, attenuating wave energy, removing and stabilizing sediment; and providing woody debris and other organic matter.

Hyporheic functions: Removing excessive nutrients and toxic compound, storing water and maintaining base flows, storing sediment and support of vegetation.

Habitat for aquatic and shoreline-dependent birds, invertebrates, mammals; amphibians; and anadromous and resident native fish: Habitat functions may include, but are not limited to, space or conditions for reproduction, resting, hiding and migration; and food production and delivery.

(D) The overall condition of habitat and shoreline resources are determined by the following ecosystem-wide processes and ecological functions:

The distribution, diversity, and complexity of the watersheds, marine environments, and landscape-scale features that form the aquatic systems to which species, populations, and communities are uniquely adapted.

The spatial and temporal connectivity within and between watersheds and along marine shorelines. Drainage network connections include flood plains, wetlands, upslope areas, headwater tributaries, and naturally functioning routes to areas critical for fulfilling life history requirements of aquatic and riverine-dependent species.

The shorelines, beaches, banks, marine near-shore habitats, and bottom configurations that provide the physical framework of the aquatic system.

The timing, volume, and distribution of woody debris recruitment in rivers, streams and marine habitat areas.

The water quality necessary to maintain the biological, physical, and chemical integrity of the system and support survival, growth, reproduction, and migration of individuals composing aquatic and riverine communities.

The sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

The range of flow variability sufficient to create and sustain fluvial, aquatic, and wetland habitats, the patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows, and duration of flood plain inundation and water table elevation in meadows and wetlands.

The species composition and structural diversity of plant communities in river and stream areas and wetlands that provides summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of woody debris sufficient to sustain physical complexity and stability.

(E) Local governments should use the characterization and analysis called for in this section to prepare master program policies and regulations designed to achieve **no net loss** of ecological functions necessary to support shoreline resources and to plan for the restoration of the ecosystem-wide processes and individual ecological functions on a comprehensive basis over time.

Precautionary principle

WAC 173-26-201(3)(g)

The level of detail of inventory information and planning analysis will be a consideration in setting shoreline regulations. As a general rule, the less known about existing resources, the more protective shoreline master program provisions should be to avoid unanticipated impacts to shoreline resources. If there is a question about the extent or condition of an existing ecological

resource, then the master program provisions shall be sufficient to reasonably assure that the resource is protected in a manner consistent with the policies of these guidelines.

Mitigation sequencing

WAC 173-26-201(2)

(e) Environmental impact mitigation.

(i) To assure **no net loss** of shoreline ecological functions, master programs shall include provisions that require proposed individual uses and developments to analyze environmental impacts of the proposal and include measures to mitigate environmental impacts not otherwise avoided or mitigated by compliance with the master program and other applicable regulations. To the extent Washington's State Environmental Policy Act of 1971 (SEPA), chapter [43.21C](#) RCW, is applicable, the analysis of such environmental impacts shall be conducted consistent with the rules implementing SEPA, which also address environmental impact mitigation in WAC [197-11-660](#) and define mitigation in WAC [197-11-768](#). Master programs shall indicate that, where required, mitigation measures shall be applied in the following sequence of steps listed in order of priority, with (e)(i)(A) of this subsection being top priority.

(A) Avoiding the impact altogether by not taking a certain action or parts of an action;

(B) Minimizing impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce impacts;

(C) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;

(D) Reducing or eliminating the impact over time by preservation and maintenance operations;

(E) Compensating for the impact by replacing, enhancing, or providing substitute resources or environments; and

(F) Monitoring the impact and the compensation projects and taking appropriate corrective measures.

(ii) In determining appropriate mitigation measures applicable to shoreline development, lower priority measures shall be applied only where higher priority measures are determined to be infeasible or inapplicable.

Consistent with WAC [173-26-186](#) (5) and (8), master programs shall also provide direction with regard to mitigation for the impact of the development so that:

(A) Application of the mitigation sequence achieves **no net loss** of ecological functions for each new development and does not result in required mitigation in excess of that necessary to assure that development will result in **no net loss** of shoreline ecological functions and not have a significant adverse impact on other shoreline functions fostered by the policy of the act.

(B) When compensatory measures are appropriate pursuant to the mitigation priority sequence above, preferential consideration shall be given to measures that replace the impacted functions directly and in the immediate vicinity of the impact. However, alternative compensatory mitigation within the watershed that addresses limiting factors or identified critical needs for shoreline resource conservation based on watershed or comprehensive resource management plans applicable to the area of impact may be authorized. Authorization of compensatory mitigation measures may require appropriate safeguards, terms or conditions as necessary to ensure **no net loss** of ecological functions.

Shoreline inventory and characterization

WAC 173-26-201(3)(c)

Local government shall, at a minimum, and to the extent such information is relevant and reasonably available, collect the following information:

(i) Shoreline and adjacent land use patterns and transportation and utility facilities, including the extent of existing structures, impervious surfaces, vegetation and shoreline modifications in shoreline jurisdiction. Special attention should be paid to identification of water-oriented uses and related navigation, transportation and utility facilities.

(ii) Critical areas, including wetlands, aquifer recharge areas, fish and wildlife conservation areas, geologically hazardous areas, and frequently flooded areas. See also WAC [173-26-221](#).

(iii) Degraded areas and sites with potential for ecological restoration.

(iv) Areas of special interest, such as priority habitats, developing or redeveloping harbors and waterfronts, previously identified toxic or hazardous material clean-up sites, dredged material disposal sites, or eroding shorelines, to be addressed through new master program provisions.

(v) Conditions and regulations in shoreland and adjacent areas that affect shorelines, such as surface water management and land use regulations. This information may be useful in achieving mutual consistency between the master program and other development regulations.

(vi) Existing and potential shoreline public access sites, including public rights of way and utility corridors.

(vii) General location of channel migration zones, and flood plains.

(viii) Gaps in existing information. During the initial inventory, local governments should identify what additional information may be necessary for more effective shoreline management.

(ix) If the shoreline is rapidly developing or subject to substantial human changes such as clearing and grading, past and current records or historical aerial photographs may be necessary to identify cumulative impacts, such as bulkhead construction, intrusive development on priority

habitats, and conversion of harbor areas to nonwater-oriented uses.

(x) If archaeological or historic resources have been identified in shoreline jurisdiction, consult with the state historic preservation office and local affected Indian tribes regarding existing archaeological and historical information.

WAC 173-26-201(3)(d)

Analyze shoreline issues of concern. Before establishing specific master program provisions, local governments shall analyze the information gathered in (c) of this subsection and as necessary to ensure effective shoreline management provisions, address the topics below, where applicable.

(i) Characterization of functions and ecosystem-wide processes.

(A) Prepare a characterization of shoreline ecosystems and their associated ecological functions. The characterization consists of three steps:

(I) Identify the ecosystem-wide processes and ecological functions based on the list in (d)(i)(C) of this subsection that apply to the shoreline(s) of the jurisdiction.

(II) Assess the ecosystem-wide processes to determine their relationship to ecological functions present within the jurisdiction and identify which ecological functions are healthy, which have been significantly altered and/or adversely impacted and which functions may have previously existed and are missing based on the values identified in (d)(i)(D) of this subsection; and

(III) Identify specific measures necessary to protect and/or restore the ecological functions and ecosystem-wide processes.

Use analysis

WAC 173-26-201(3)(d)

(ii) **Shoreline use analysis and priorities.** Conduct an analysis to estimate the future demand for shoreline space and potential use conflicts. Characterize current shoreline use patterns and projected trends to ensure appropriate uses consistent with chapter [90.58](#) RCW and WAC [173-26-201](#) (2)(d) and 173-26-211(5).

If the jurisdiction includes a designated harbor area or urban waterfront with intensive uses or significant development or redevelopment issues, work with the Washington state department of natural resources and port authorities to ensure consistency with harbor area statutes and regulations, and to address port plans. Identify measures and strategies to encourage appropriate use of these shoreline areas in accordance with the use priorities of chapter [90.58](#) RCW and WAC [173-26-201](#) (2)(d) while pursuing opportunities for ecological restoration.

Cumulative Impacts

WAC 173-26-186

(d) Local master programs shall evaluate and consider cumulative impacts of reasonably foreseeable future development on shoreline ecological functions and other shoreline functions fostered by the policy goals of the act. To ensure **no net loss** of ecological functions and protection of other shoreline functions and/or uses, master programs shall contain policies, programs, and regulations that address adverse cumulative impacts and fairly allocate the burden of addressing cumulative impacts among development opportunities. Evaluation of such cumulative impacts should consider:

(i) Current circumstances affecting the shorelines and relevant natural processes;

(ii) Reasonably foreseeable future development and use of the shoreline; and

(iii) Beneficial effects of any established regulatory programs under other local, state, and federal laws.

It is recognized that methods of determining reasonably foreseeable future development may vary according to local circumstances, including demographic and economic characteristics and the nature and extent of local shorelines.

(e) The guidelines are not intended to limit the use of regulatory incentives, voluntary modification of development proposals, and voluntary mitigation measures that are designed to restore as well as protect shoreline ecological functions.

Restoration Planning

WAC 173-26-186(8)

(c) For counties and cities containing any shorelines with impaired ecological functions, master programs shall include goals and policies that provide for restoration of such impaired ecological functions. These master program provisions shall identify existing policies and programs that contribute to planned restoration goals and identify any additional policies and programs that local government will implement to achieve its goals. These master program elements regarding restoration should make real and meaningful use of established or funded nonregulatory policies and programs that contribute to restoration of ecological functions, and should appropriately consider the direct or indirect effects of other regulatory or nonregulatory programs under other local, state, and federal laws, as well as any restoration effects that may flow indirectly from shoreline development regulations and mitigation standards.

WAC 173-26-201(2)(f)

Shoreline restoration planning. Consistent with principle WAC [173-26-186](#) (8)(c), master programs shall include goals, policies and actions for restoration of impaired shoreline ecological functions. These master program provisions should be designed to achieve overall improvements in shoreline ecological functions over time, when compared to the status upon adoption of the master program. The approach to restoration planning may vary significantly among local jurisdictions, depending on:

- The size of the jurisdiction;

- The extent and condition of shorelines in the jurisdiction;
- The availability of grants, volunteer programs or other tools for restoration; and
- The nature of the ecological functions to be addressed by restoration planning.

Master program restoration plans shall consider and address the following subjects:

- (i) Identify degraded areas, impaired ecological functions, and sites with potential for ecological restoration;
- (ii) Establish overall goals and priorities for restoration of degraded areas and impaired ecological functions;
- (iii) Identify existing and ongoing projects and programs that are currently being implemented, or are reasonably assured of being implemented (based on an evaluation of funding likely in the foreseeable future), which are designed to contribute to local restoration goals;
- (iv) Identify additional projects and programs needed to achieve local restoration goals, and implementation strategies including identifying prospective funding sources for those projects and programs;
- (v) Identify timelines and benchmarks for implementing restoration projects and programs and achieving local restoration goals;
- (vi) Provide for mechanisms or strategies to ensure that restoration projects and programs will be implemented according to plans and to appropriately review the effectiveness of the projects and programs in meeting the overall restoration goals.

Specific Shoreline Activity and Use Standards

Numerous additional specific references exist in the SMP Guidelines, requiring SMP regulations resulting in **no net loss** of shoreline ecological functions. Specific shoreline activity standards referencing NNL are located at:

WAC 173-26-221(2)(c)(ii)(C) and (D): Geologically hazardous areas.

WAC 173-26-221(2)(c)(iii)(C): Critical saltwater habitats

WAC 173-26-221(2)(c)(iv)(C): Critical freshwater habitats

WAC 173-26-221(3): Flood hazard reduction

WAC 173-26-221(4)(d): Public access

WAC 173-26-221(5): Shoreline vegetation conservation

WAC 173-26-221(6): Water quality, storm water and nonpoint pollution

WAC 173-26-231: Shoreline modifications, including shoreline stabilization, piers and docks, fill, breakwaters, jetties, groins and weirs, beach and dunes management, dredging and dredge material disposal, shoreline habitat and natural systems-enhancement projects.

Specific shoreline use standards referencing NNL are located at:

WAC 173-26-241(2)(a)(iv), addressing the following uses:

- Agriculture
- Aquaculture
- Boating facilities
- Commercial development
- Forest practices
- Industry
- In-stream structural uses
- Mining
- Recreational development
- Residential development
- Transportation and parking
- Utilities