PUGET SOUND
nearshore
PROJECT

A partnership among local, state and tribal governments in Washington state, the U.S. Army Corps of Engineers and other federal agencies, industries and environmental organizations.

Our mission: Protect and restore the functions and natural processes of Puget Sound nearshore ecosystems in support of the natural resources and beneficial uses of Puget Sound and the Puget Sound basin.

Guidance for Protection and Restoration of Nearshore Ecosystems of Puget Sound

The **Puget Sound Nearshore Ecosystem Restoration Project (PSNERP)** Nearshore Science Team has developed a general guidance document to assist PSNERP and others to develop, select and evaluate actions that protect and restore Puget Sound nearshore ecosystems. A working draft of this document provides interim guidance for use in advance of future decision tools (e.g. interactive models) that will allow for better understanding of the outcome of single and interrelated actions.

The Guidance Document is organized into three sections:

1. Definitions, principles and concepts
2. Elements of a strategic plan
3. Criteria for developing and selecting nearshore protection and restoration projects

Definitions, Principles and Concepts

The PSNERP Nearshore Science Team believes that ecological principles should drive the identification, development, selection and implementation of restoration and protection actions. Our guidance to develop, select and evaluate actions that will protect and restore the Sound is based on our shared understanding of certain basic ecological principles as they relate to the Puget Sound nearshore. For more information on these guiding principles and concepts, please see another PSNERP fact sheet about the Strategic Principles and Concepts.

Definitions

Disturbance: Any relatively discrete event in time and space that disrupts or alters some portion of an ecosystem. Disturbances are important factors that affect the character and state of ecosystems. Examples from nearshore ecosystems include:

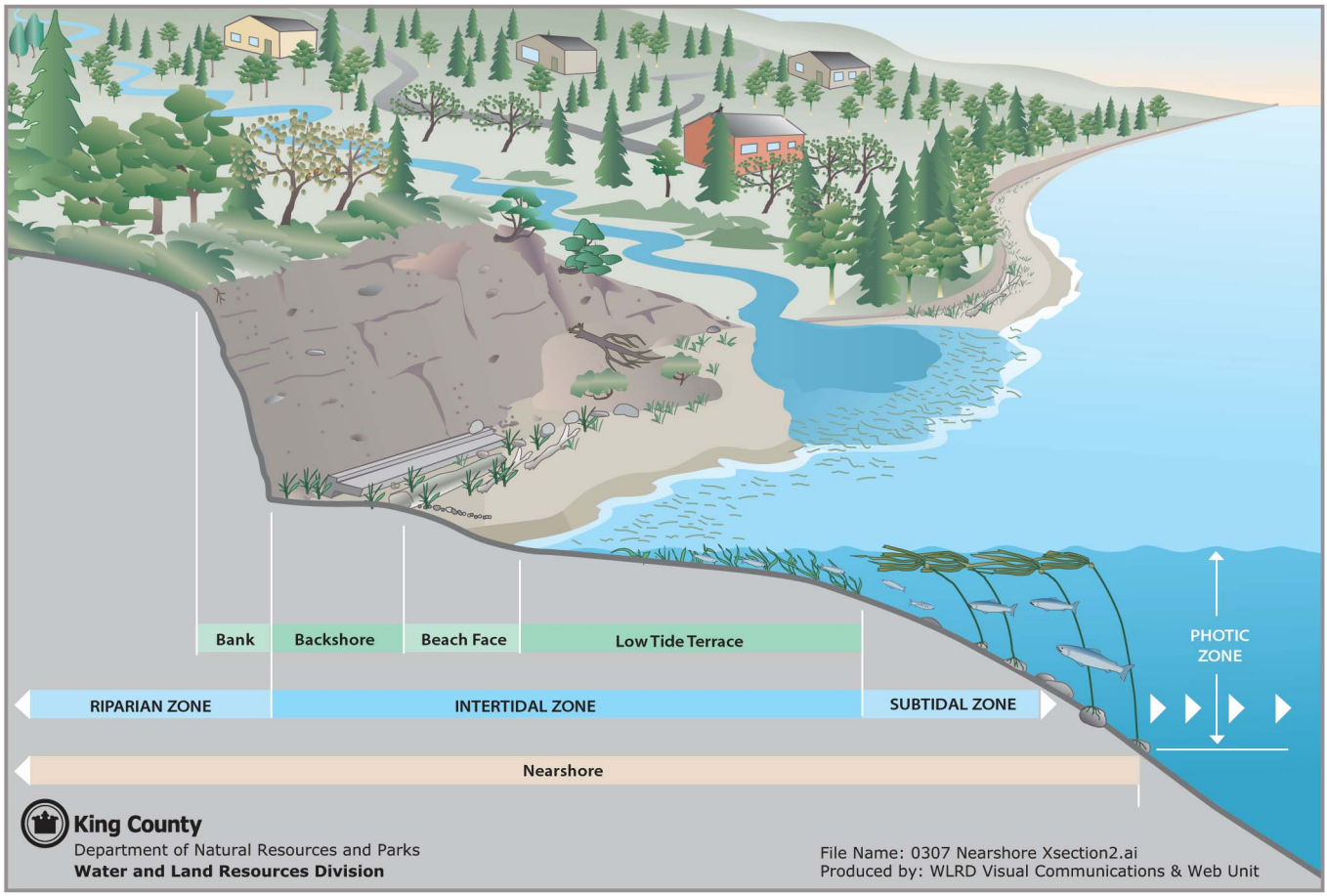
- Winter storms, which move large quantities of organic (e.g., logs) and inorganic (e.g., sand) materials that can reshape beaches.
- Landslides, which deposit sand and gravel from bluffs onto beaches and into nearshore marine waters.
- Shifts in ocean currents, which can result in changes in nutrient availability, water temperature, primary production, and food web relationships.

Ecosystem: Community of organisms and their physical and chemical environment interacting as an ecological unit.

Ecosystem process: Any interaction among physical, chemical and biological elements of an ecosystem that involves a change in character or state of that system. In nearshore ecosystems, some examples include the following:

- Changes in chemical composition of the water or sediment that occur as part of nutrient uptake and transformation.
- Movement and mixing of fresh and salt water through an estuarine delta.
- Sediment transport along the shoreline.

THE NEARSHORE...Vital Connection Between Land and Water



Graphic courtesy of King County Department of Natural Resources and Parks

A typical cross section of the Puget Sound nearshore extends from the top of the adjacent bluff to the limits of the photic zone (depth of light penetration in water, approximately 10 meters in Puget Sound).

Ecosystem recovery: Taking actions that allow an ecosystem to generate and maintain processes that result in desirable ecosystem structure (e.g., habitats for valued species) and functions (e.g., forage fish production).

Habitat: The physical, chemical and biological characteristics of a specific spatial unit or geographic area of the environment occupied by specific biota (e.g., we refer to "Pacific sand lance habitat" and "sand beach ecosystems"). To define habitat, it is necessary to know the spatial extent in the ecosystem of a specific habitat for the plant or animal considered, and the attributes of the habitat that support growth and survival of that organism.

Nearshore: The estuarine/delta, marine shoreline and areas of shallow water from the top of the coastal bank or bluffs to the water at a depth of about 10 meters relative to Mean Lower Low Water. (This is the average depth limit of light penetration.) This zone incorporates those geological and ecological processes, such as sediment movement, freshwater inputs, and subtidal light penetration, which are key to determining the distribution and condition of aquatic habitats. By this definition, the nearshore extends landward into the tidally influenced freshwater heads of estuaries and coastal streams.

Principles and Concepts

A fundamental hypothesis of PSNERP is that recovery of nearshore ecosystems and the habitats they create and sustain, can best be achieved by re-establishing or significantly improving ecosystem processes.

From this perspective, recovery of the nearshore must be integrated with other elements of the landscape (e.g., freshwater, terrestrial, marine). Therefore, a restoration plan must integrate the tightly linked freshwater-nearshore-marine gradient of interacting ecosystems.

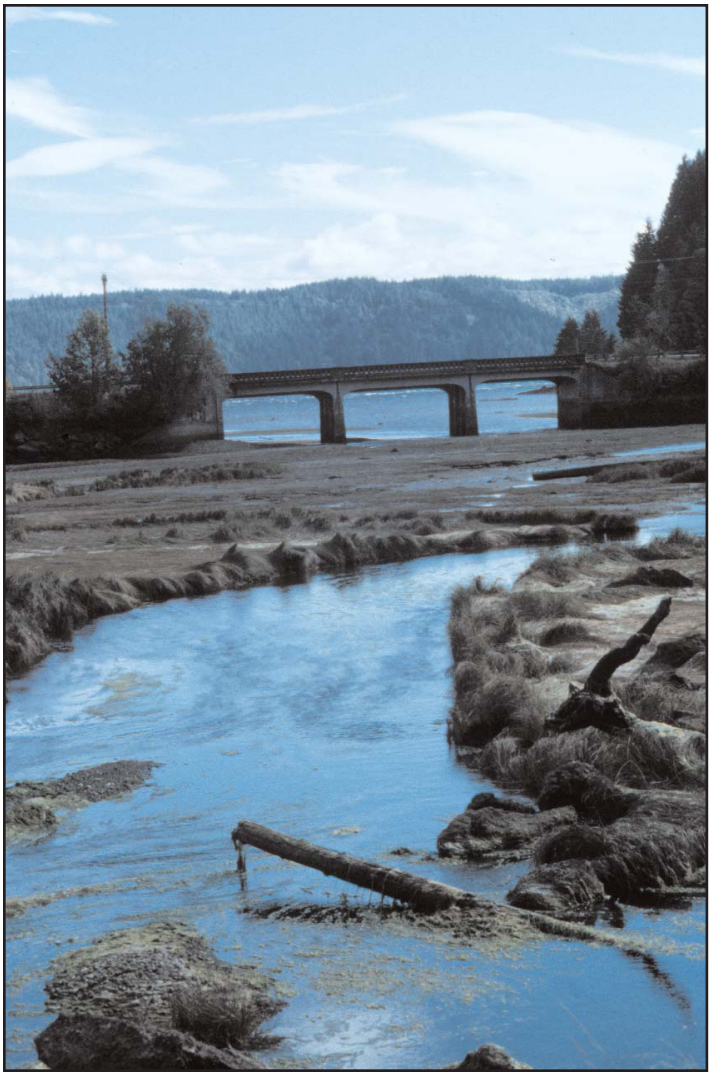


Photo courtesy of Puget Sound Action Team

Lilliwaup River flowing into Hood Canal: Any nearshore restoration plan must consider the tightly linked ecosystems of fresh and marine water.

PSNERP is working to communicate these principles and concepts to communities, tribes, industries and others to ensure that their individual actions are developed and evaluated within the context of the larger nearshore ecosystem landscape. Doing so provides important benefits, including:

- Reduces uncertainty and the risk of unintended consequences.
- Increases the probability of successfully improving conditions for the nearshore ecosystem for the benefit of multiple species or species groups.
- Designs projects to be synergistic and complementary.

Elements of a Strategic Plan for Ecosystem Restoration

PSNERP's general guidance suggests that ecosystem restoration should be based upon a strategic plan that includes the following elements:

- **Goals**—framed in terms of desired future condition.
- **Conceptual Model**—organizes understanding of how the various components of an ecosystem interact; models can be very simple or very complex.
- **Identification of impaired ecosystem processes** (what's broken)—uses analyses of current and historical conditions to generate hypotheses of what has been harmed and where this has occurred.
- **Knowledge of key organisms**—relates nearshore ecosystems to the biota which they support; e.g., how chinook salmon interact with the nearshore.
- **Identification of potential actions**—a menu of individual protection, restoration and rehabilitation opportunities.
- **Identification of high priority actions:**

  In the near term, PSNERP will place a priority on actions with a high potential for learning and a high probability for benefits.

  In the long term, PSNERP anticipates a "portfolio" of integrated actions.
- **Performance measures**—provides links between conceptual models, project objectives and monitoring.
- **Adaptive management**:

  Allows for activities to proceed despite uncertainty and risk.

  Increases knowledge by approaching actions as experiments and applies lessons to future actions.

  Increases the ultimate performance of actions that will restore or protect.
- **Monitoring**—evaluates ecosystem response to action.

Photo courtesy of John Klochak,
formerly Skagit Systems Cooperative

The Deepwater Slough project on Fir Island in the Skagit River estuary involved the complete removal of dikes. The underlying hypothesis of this project was that removal of dikes would restore a fundamental nearshore process - tidal hydrology. Restoration of tidal hydrology was expected to facilitate restoring estuarine wetland structure, including native plant community establishment and the restoration of tidal channels which provide fish access.

Criteria for Developing and Evaluating Actions

PSNERP's general guidance presents criteria that it and others can use to identify potential projects, develop and justify project ideas and evaluate projects. The guidance suggests that project proponents or reviewers address the following questions:

- **Does the project proposal have certain specific elements?**
  - Clearly stated goals and objectives.
  - Conceptual Model demonstrating how expected outcomes of the project are linked to actions.
  - The opportunity to improve understanding of the ecosystem or restoration approaches.
  - High likelihood of ecological benefits.
  - Expected outcomes that address known ecosystem problems or benefit habitats important to key biota.
- **Does the project consider relevant factors?**
  - Landscape context (e.g., the proposed actions are appropriate in relation to the processes and structure of the surrounding landscape).
  - Relationship to other land use or management actions.
  - Relationships between uncertainty, risk, benefits and potential for learning. Are the risks and uncertainty associated with the project appropriate for the expected level of benefits?
  - Costs, especially as related to other factors such as benefits and risks.
  - Land ownership.
  - Partnerships with those involved and potentially effected.
  - Self-sustainability of the proposed action: Will the project require ongoing maintenance to maintain the desired outcome?
- Does the project proposal adequately address post-project opportunities and issues?
  - Clear performance measures.
  - Rigorous monitoring plan.
  - Adaptive management.
  - Contingency measures.
  - Provisions for ongoing maintenance.

This fact sheet provides a brief introduction to one of the early products of the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) Nearshore Science Team.

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