MITIGATION AND RESTORATION PLAN
FOR THE COLUMBIA RIVER ESTUARY

Columbia River Estuary Study Taskforce

MITIGATION AND RESTORATION PLAN

FOR THE COLUMBIA RIVER ESTUARY

Columbia River Estuary Study Taskforce

John L. Marshall
David Fox
Mark Barnes
Hilar West

September 1987

Columbia River Estuary Study Taskforce (CREST)
750 Commercial Street, Room 214
Astoria, Oregon 97103
(503) 325-0435

The preparation of this plan was financially aided through a grant from the National Coastal Resources Research and Development Institute with funds obtained from the National Oceanic and Atmospheric Administration, and appropriated for Section 309 of the Coastal Zone Management Act of 1972.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

LIST OF FIGURES (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

1. INTRODUCTION

1.1 PURPOSE AND CONTENT

This document revises and updates the Mitigation Plan for the Columbia River Estuary developed in 1983 by the Columbia River Estuary Study Taskforce (CREST). The 1983 Plan designated mitigation sites in the Columbia River Estuary. The Plan also provided a method to determine estuarine mitigation site area and type requirements [now adopted into Oregon state estuarine mitigation law (ORS 541.626)].

After four years of reviewing permits requiring mitigation under the 1983 Plan, it became apparent certain revisions were required. With regard to policies, a more detailed review of government policy and legislation was completed and CREST policies were revised to address current local, state, and federal policy concerns. Also, recent research on wetland mitigation feasibility and on cumulative wetland impacts was used to help guide CREST mitigation policy revisions. New information on potential development scenarios and mitigation site designations is also included. This document embodies these Plan alterations and will be incorporated into the 1987 Columbia River Estuary Regional Management Plan (CREST Plan). The CREST Plan will be submitted to local jurisdictions and recommended for adoption.

Mitigation is defined here as any action that diminishes the degree of impact of development on wetlands and shallow subtidal aquatic areas. Mitigation is categorized as project design mitigation (planning developments to avoid impacts in order to conserve wetland area and values) and compensatory mitigation (wetland creation, restoration, or enhancement at a site other than the impact site to compensate for lost wetland area and values).

Restoration is treated as a management strategy separate from mitigation in portions of the Plan. That is, restoration of severely diminished habitat types is considered a worthwhile management directive for its own sake. Unless otherwise specified, this document considers restoration as a component of mitigation in the mitigation related sections and as a separate management option in the restoration related sections.

Section 2 of this Plan reviews current state and federal government definitions that are used in statutes and policies pertaining to mitigation and restoration. These definitions were used to help form definitions used in the policy and standard section (Section 8) of this Plan and the mitigation and restoration section in the CREST Plan.

Section 3 discusses current federal and state regulations and policies that guide mitigation and restoration efforts in the Columbia River Estuary. These regulations and policies were used as a basis for determining standards and policies listed in this Plan (Section 8) and in the mitigation and restoration section of the CREST Plan.

Section 4 reviews a study by Duncan Thomas (1983) that compares present day habitat types in the Columbia River Estuary with habitat types mapped in the estuary in the mid 1860's and 1870's. Historical changes in aerial extent and spatial distribution of habitat types are discussed. Cumulative impacts on habitat types are documented. The most severely depleted habitat types are used as the basis for weighting the relative ranking of present day habitat types in the Columbia River Estuary (Smith 1983).

Section 5 summarizes the method used to determine the relative values of estuarine habitat types and how those values are used to determine mitigation requirements. A more detailed discussion of the method is discussed in the 1983 CREST Mitigation Plan (Smith 1983).

Section 6 briefly discusses state and federal efforts toward restoration efforts outside of the context of mitigation. Potential legal mechanisms and funding sources are described.

Section 7 briefly reviews recent ideas regarding the technical feasibility of mitigation and restoration. It also reviews a series of suggested approaches of implementing mitigation and restoration actions.

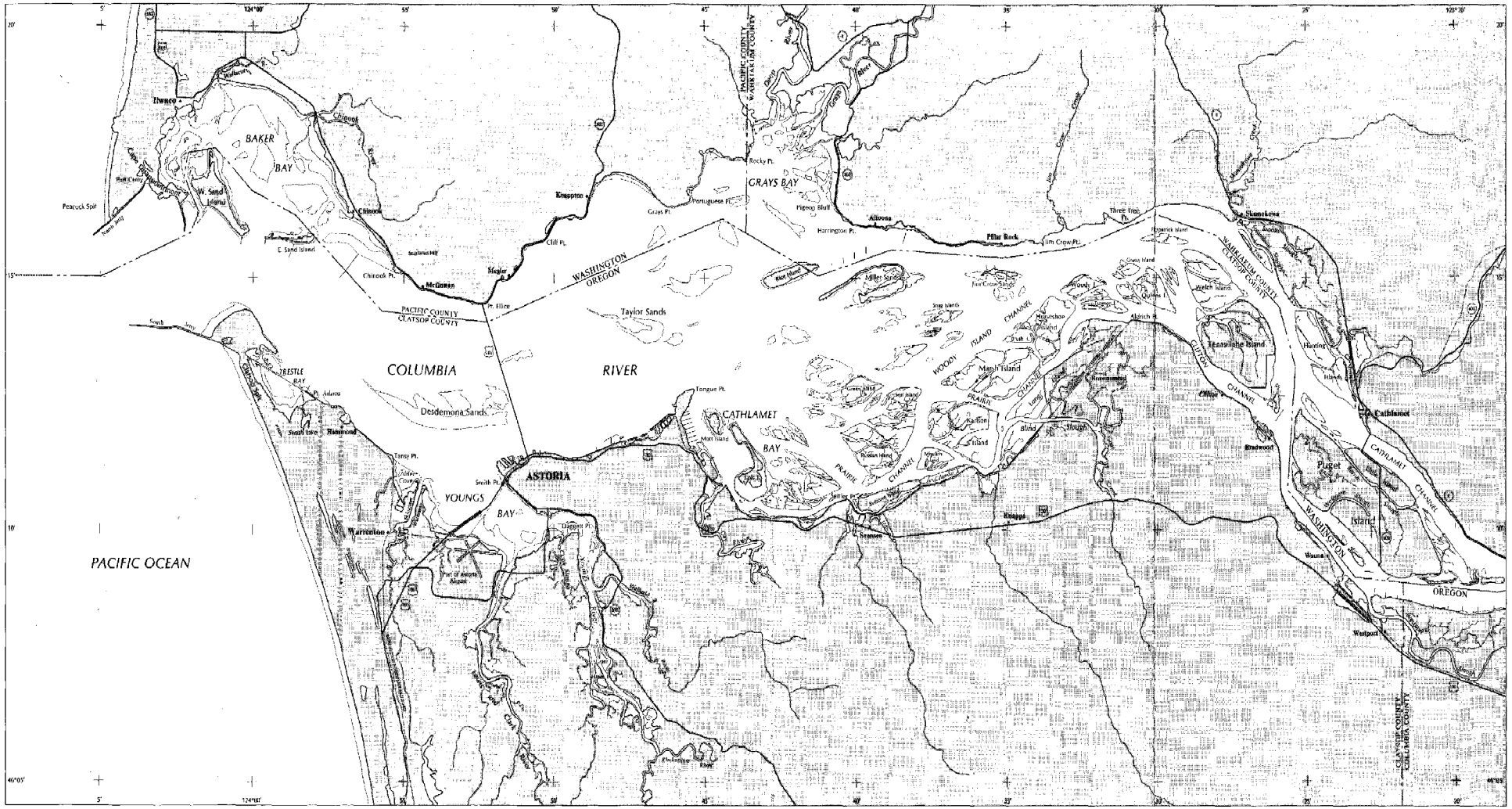
Section 8 lists CREST Mitigation and Restoration Plan policies and standards that will be recommended for adoption in local Comprehensive Plans in Oregon and Shoreline Master Plans in Washington. These policies and standards are based on information discussed in sections 1 - 7 of this Plan and recommendations from the Columbia River Estuary Mitigation and Restoration Plan Advisory Committee.

Section 9 discusses specific mitigation and restoration sites available in the Columbia River Estuary. Sites are classified and protected at different priorities and levels based on the certainty of developments they are matched with. Private landowner rights vs. public need issues concerning mitigation are briefly discussed. Site selection strategies were reviewed by the Columbia River Estuary Mitigation and Restoration Plan Advisory Committee and concerned landowners. Modifications of protection language and site selection were made using input from the Advisory Committee and landowners.

1.2 THE CREST PLANNING AREA

The Columbia River Estuary planning area (Figure 1) includes aquatic areas and shorelands from the mouth of the Columbia River, upstream to the eastern border of Wahkiakum County in Washington (River Mile 53) and the eastern border of Clatsop County in Oregon (River Mile 45). All tributary streams to the head of tide and adjacent shorelands are part of the estuary planning area.

In Washington, the jurisdictional shorelands area includes all land 200 feet from the ordinary high water mark of designated shorelines of the State, floodways and contiguous floodplain areas landward two hundred feet from such floodways, and all marshes, bogs, swamps, and river deltas associated with shorelines of the state (as defined by the



Columbia River Estuary

Scale 1:160,000

0 1 2 3 4 5 6 7 8 9 10 Kilometers

0 1 2 3 4 5 6 Miles

Map produced in 1983 by Northwest Cartography, Inc.
for the Columbia River Estuary Data Development Program

- Shoreline (limit of non-aquatic vegetation)
- Intertidal vegetation
- Shoals and flats
- Lakes, rivers, other non-tidal water features
- Major highways
- Cities, towns
- Railroads
- Other cultural features

Figure 1. Columbia River Estuary Study Taskforce Planning Area

Washington Shoreline Management Act).

In Oregon, the jurisdictional estuary shorelands area includes all lands 50 feet of the landward limit of aquatic vegetation, or where there is no vegetation, Mean Higher High Water. Land with the following characteristics is also included (as listed in Oregon Statewide Planning Goal 17):

a) Lands subject to ocean flooding;

b) Areas of geologic instability;

c) Riparian Resources;

d) Significant shoreland and wetland biological habitats;

e) Areas necessary for water-dependent and water-related uses (e.g., mitigation and dredge material disposal sites);

f) Areas of exceptional aesthetic or scenic quality; and

g) Coastal headlands.

In addition, dikes and their associated tow drains have been included within shorelands in the CREST Mitigation and Restoration Plan and in the CREST Plan.

2. SUMMARY OF FEDERAL AND STATE AGENCY DEFINITIONS GERMANE TO MITIGATION AND RESTORATION POLICIES AND REGULATIONS

The following definitions are excerpts from existing federal and state (Oregon and Washington) policies and statutes. They are listed here to allow the reader to compare the various interpretations of these terms. CREST Mitigation and Restoration Plan definitions (Section 9) are based on definitions in this section.

Mitigation:

U. S. Environmental Protection Agency
U. S. Fish and Wildlife Service
U. S. Army Corps of Engineers [1]

Mitigation includes:

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.

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 during the life of the action.

e. Compensation for the impact by replacing or providing substitute resources or environments.

Oregon Division of State Lands
Oregon Department of Land Conservation and Development

The creation, restoration, or enhancement of an estuarine area to maintain the functional characteristics and processes of the estuary, such as its natural biological productivity, habitats, and species diversity, unique features and water quality (ORS 541.626). [2]

Washington Department of Ecology
Washington Department of Fisheries
Washington Department of Wildlife
(WAC 197-11-768 State Environmental Policy Act Rules and WAC

---

1 This definition applies to mitigation for impacts on all Section 9, 10 and 404 wetlands.

2 This definition specifically addresses estuarine wetlands. A similar definition for nontidal freshwater wetland mitigation does not exist in DLCD Goals or Oregon State Removal-Fill Law.

220-110-020 Hydraulic Code Rules).

Mitigation means:

a. Avoiding the impact altogether by not taking a certain action or parts of a certain 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 during the life of the action;

e. Compensating for the impact by replacing, enhancing, or providing substitute resources or environments; and/or

f. Monitoring the impact and taking appropriate corrective measures.

Restoration

Oregon Department of Land Conservation and Development

Revitalizing, returning, or replacing original attributes and amenities, such as natural biological productivity, aesthetic and cultural resources, which have been lost or diminished by past alterations, activities, or catastrophic events. For the purpose of Goal 16, estuarine restoration means to revitalize or reestablish functional characteristics and processes of the estuary diminished or lost by past alterations, activities, or catastrophic events. A restored area must be a shallow subtidal or an intertidal marsh area after alteration work is performed, and may not have been a functioning part of the estuarine system when alteration work began.

Active Restoration involves the use of positive remedial actions, such as removing fills, installing water treatment facilities, or rebuilding deteriorated urban waterfront areas.

Passive Restoration is the use of natural processes, sequences, and timing which occurs after the removal or reduction of adverse stresses without other specific positive remedial action.

Wetlands:

U. S. Army Corps of Engineers

Areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

U. S. Fish and Wildlife Service

Lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. Wetlands must have one or more of the following three attributes:

1. At least periodically, the land supports hydrophytes,

2. The substrate is predominantly undrained hydric soil,

3. The substrate is nonsoil [3] saturated with water or covered by shallow water at some time during the growing season of each year.

Oregon Division of State Lands

"Wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency or duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands include swamps, marshes, bogs, and similar areas.

Oregon Department of Land Conservation and Development

Land areas where excess water is the dominant factor determining the nature of soil development and the types of plant and animal communities living at the soil surface. Wetland soils retain sufficient moisture to support aquatic or semi-aquatic plant life. In marine and estuarine areas, wetlands are bounded at the lower extreme by extreme low water; in freshwater areas, by a depth of six feet. The areas below wetlands are submerged lands. [4]

Washington Department of Ecology
Washington Department of Fisheries
Washington Department of Game

Washington's Shorelands Wetland Definition:

Lands extending landward for 200 feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward 200 feet from such floodways; and all marshes, bogs, swamps, and river deltas associated with streams, lakes, and tidal waters which are subject to the provisions of chapter

---

[3] Parent material (e.g., rocky shores or gravel beaches).

[4] Recent state legislation, Section 4 of HB 2950, stipulates that state agencies or local governing bodies may not define areas that are otherwise considered wetlands as wetlands if they were created by human activity that is either directly or indirectly related to development. This does not include wetlands that are created for mitigation purposes or Section 404 Clean Water Act wetlands.

90.58.030 RCW.

Washington's Biophysical Wetland Definition:

Lands transitional between terrestrial and aquatic systems where saturation with water is the dominant factor determining plant and animal communities and soil development. For the purpose of this definition, these areas must have one or both of the following attributes:

- At least periodically, the land supports predominantly hydrophytes, and/or
- The substrate is predominantly undrained hydric soil.

3. EXISTING FEDERAL AND STATE MITIGATION REGULATIONS AND POLICIES

Mitigation regulations and policies are applied by federal, state, and local levels of government in the Columbia River Estuary. Each level consist of several agencies that share mitigation policy decision responsibility and regulation authority within and between government levels. This section discusses current federal and state regulations and policies germane to mitigation and restoration efforts in the Columbia River Estuary and the agencies that implement them. These policies and regulations were used as a basis for derivation of CREST Mitigation and Restoration Plan policies and standards listed in Section 8.

3.1 FEDERAL AGENCIES WITH MITIGATION POLICY RESPONSIBILITIES

Federal agencies involved with wetland permit issues and mitigation requirements include the U. S. Army Corps of Engineers (COE), Environmental Protection Agency (EPA), U. S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and the U. S. Coast Guard (CG). The COE has permit authority over waters of the United States (e.g., wetlands and aquatic areas) through Section 10 of the 1899 Rivers and Harbors Act and Section 404 of the 1977 amendments to the Clean Water Act. The Coast Guard has permit authority over all bridge and causeway projects over navigable waters through Section 9 of the Rivers and Harbors Act. These agencies are further authorized, through the National Environmental Policy Act and the Fish and Wildlife Coordination Act, to make mitigation requirements conditions of permit approval. Other resource agencies review permit applications and make comments to the Corps of Engineers and the Coast Guard.

3.2 FEDERAL REGULATORY JURISDICTION OVER WETLANDS AND AQUATIC AREAS

Section 404 of the 1977 amendments to the Clean Water Act gives the Corps of Engineers regulatory jurisdiction over discharge of fill material into the nation's waters, including wetlands, in accordance with guidelines established by EPA. While the act was originally interpreted to regulate water quality only in navigable waters, a subsequent broader interpretation has been made by federal courts to include all waters of the United States (U. S. Congress, Office of Technology Assessment 1984). This is important in the Columbia River Estuary planning area because it broadens the responsibility of the Corps of Engineers to freshwater nontidal wetlands. The Environmental Protection Agency (EPA) recently ruled that isolated wetlands that support migratory birds or endangered species shall be considered waters of the United States and, therefore, regulated by the Corps of Engineers (FR/51, 219/1986). All development in navigable waters is regulated under Section 10 of the 1899 Rivers and Harbors Act.

3.2.1 General Overview of the Section 404 Permit Process

Once the Corps of Engineers (COE) receives a wetland fill permit application, notices are mailed to state and federal resource agencies and other interested parties for review. This review is an effort to determine if permit issuance is in the best public interest.

When considering permit issuance, the COE conducts a public interests review and must assure compliance with Environmental Protection Agency guidelines stipulated in Section 404 (b)(1) of the Clean Water Act (Shipley 1974). The COE must also obtain a water quality certification statement from the state water quality agency (Department of Environmental Quality in Oregon and Department of Ecology in Washington), and, for coastal areas (Section 307 of Coastal Zone Management Act), an approval from the coastal zone management agency (Department of Land Conservation and Development in Oregon, and Department of Ecology in Washington).

Federal agencies must also comply with Section 404(b)(1) guidelines before discharging dredged or fill material into wetlands. All federal agencies, except the Corps of Engineers must apply for a section 404 permit under the same process as a private applicant. The U.S. Army Corps of Engineers addresses its 404 requirements in-house. While the COE addresses project impacts under NEPA requirements, and project notices are circulated to federal and state agencies, local governments, and other interested parties, there is no actual permit issued. The final decision on project approval is made by the Office of Chief Engineers. The governor of the state with jurisdiction has an opportunity to review and comment on the project. All federal projects in the coastal zone must demonstrate consistency, to the extent practicable, with the state's federally approved coastal zone management program (Washington State Coastal Zone Management Program 1978).

3.2.2 The Legal Basis for Federal Mitigation Policies

Mitigation policy is authorized at the federal level through several statutes: The 1969 National Environmental Policy Act (NEPA), 1977 Clean Water Act (CWA), and the 1958 Fish and Wildlife Coordination Act (FWCA).

Current federal mitigation policy stems largely from the National Environmental Policy Act (NEPA). In 1978, NEPA guidelines were codified (FR/43, 230/1978) to stress the following mitigation actions:

- Avoiding the impact altogether by not taking a certain action or parts of an action;
- Minimizing impacts by limiting degree or magnitude of the action and its implementation;
- Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment;
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and

- Compensating for the impact by replacing or providing substitute resources or environments.

Any combination of the above mitigation actions may be required as a condition of permit approval by appropriate federal agencies.

The Clean Water Act (CWA), Section 404(b)(1), requires all permit applicants with projects that discharge dredged or fill material into wetlands to demonstrate public need, water dependency and unavailability of alternative non-wetland sites. The Corps must consider economic, engineering, and environmental factors when evaluating "practicable" alternatives. In addition, it requires permit applicants to demonstrate that water quality will not be adversely affected by the project. Mitigation for unavoidable adverse impacts in wetlands is also required under this section. Federal and state resource agencies must submit comments on assessments of potential adverse project impacts to aid decision-making regarding permit issuance and mitigation requirements (Blomberg 1987).

The Fish and Wildlife Coordination Act (FWCA) emphasizes integration of public interest with economic and resource concerns (Blomberg 1987). It is implemented through coordination with state and federal resource agencies who review project permits.

Under Section 662(b) of the FWCA, the U.S. Fish and Wildlife Service is required to provide a written analysis of development proposals that adversely affect wildlife. The reports must describe measures to mitigate and compensate for damages to wildlife and wildlife habitat (Blomberg 1987).

3.2.3 The Role of Federal Agencies in Implementing Mitigation Policies

U. S. Fish and Wildlife Service (USFWS).

The USFWS reviews project impacts on fish and wildlife and determines suitable mitigation strategies for the impacts. USFWS mitigation policies (FR/46, 15/1981) uses four levels of habitat value or resource categories (Table 1) for considering mitigation strategies during permit review.

For wetland development projects, the USFWS will look most favorably at projects that are clearly water-dependent, demonstrate a strong public need, demonstrate all upland alternatives are impractical, are in a Resource Category 2 site or lower (4 = lowest), and demonstrate a sequential approach to mitigation has been applied; considering avoidance first and out-of-kind/off-site replacement last. Also, creation and restoration actions will be considered before enhancement.

The Service may use a Habitat Evaluation Procedure (HEP) to determine habitat values (U. S. Fish and Wildlife Service 1980). HEP is a numerical wildlife habitat evaluation method. Users of HEP select key indicator species and numerically compare their respective idealized

habitat characteristics with habitat conditions at a particular site. A suitability index is derived that ranges from 0 to 1, with 0 being the worst and 1 the best habitat conditions for the indicator species. This index is multiplied by the area of habitat to determine "Habitat Suitability Units." These units become the measure of habitat value of the area lost to development and of compensatory requirements.

Other evaluation methods may be used in cases where HEP is impractical. The method used is often left to the discretion of the evaluation team reviewing the project (often comprised of representatives from other resource agencies).

U. S. Environmental Protection Agency (EPA).

The EPA mitigation policy supports mitigation for all projects subject to Section 404 of the Clean Water Act, in accordance with the sequential system outlined in the EPA Region 10 Mitigation Policy consistent with requirements of National Environmental Policy Act regulations, the USFWS Mitigation Policy and Section 404(b)(1) Guidelines (EPA 1985).

While EPA mitigation policies strongly resemble USFWS mitigation policies, the Habitat Evaluation Procedures (HEP) are not addressed at the same level of detail. EPA policy references a wider spectrum of wetland values based on (Adamus 1983 and Adamus and Stockwell 1983):

- Groundwater Recharge and Discharge
- Flood Storage and Desynchronization
- Shoreline Anchoring and Dissipation of Erosive Forces
- Sediment Trapping
- Nutrient Retention and Removal
- Food Chain Support
- Habitat for Fisheries
- Habitat for Wildlife
- Active Recreation
- Passive Recreation and Heritage Value

HEP is acceptable to EPA on occasions where habitat value is the overriding concern and when other values are dealt with separately.

Differences in wetland assessment techniques applied by federal agencies may materialize in the form of inconsistent decisions on degree of impacts and mitigation requirements. However, the EPA does cooperate with federal and state fish and wildlife agencies when making mitigation decisions, particularly when habitat value is the primary or sole

Table 1. U.S. Fish and Wildlife Resource Categories.

Resource Category 1

Habitat to be impacted is of high value for evaluation species and is unique and irreplaceable on a national basis or in the Columbia River Estuary section.

Mitigation Goal

No loss of existing habitat value.

Resource Category 2

Habitat to be impacted is of high value for evaluation species and is relatively scarce or becoming scarce on a national basis or in the Columbia River Estuary section.

Mitigation Goal

No net loss of in-kind habitat value.

Resource Category 3

Habitat to be impacted is of high to medium value for evaluation species and is relatively abundant on a national basis.

Mitigation Goal

No net loss of habitat value while minimizing loss of in-kind habitat value.

Resource Category 4

Habitat to be impacted is of medium to low value for evaluation species.

Mitigation Goal

Minimize loss of habitat value.

Federal Register/Vol. 46, No. 16/1981

concern.

In cases where permit requirements are violated or unauthorized wetland fills occur (Section 301 violations cited in the Clean Water Act), the EPA has authority, under Sections 308 and 309, to pursue appropriate civil and/or criminal penalties. With respect to mitigation, the following actions may be required:

- Site Restoration;
- On-Site, In-Kind Replacement;
- Off-Site, Out-of-Kind Replacement;
- Mitigation Bank Contributions; or
- Enhancement of Existing wetlands.

The Environmental Protection Agency encourages measures that insure mitigation success (e.g., monitoring and maintenance of mitigation actions, remedial actions as determined by monitoring, mitigation methods research, and pre-application conferences to help develop acceptable mitigation proposals) and give the developer greater certainty regarding mitigation requirements (e.g., pre-permit agreements to determine project compliance with Section 404(b)(1) guidelines). On a case-by-case basis, the EPA also supports mitigation banking. Mitigation banks, if implemented correctly, can give developers a cost effective way of satisfying their mitigation obligations and insure adequate compensation for wetland impacts (EPA 1985).

National Marine Fisheries Service (NMFS).

NMFS also serves an advisory role to the Corps of Engineers on 404 permit issuance and mitigation requirements along with other federal and state agencies. However, NMFS focuses its habitat conservation goal on "improved estuarine management" (NMFS 1976 and Blomberg 1987). NMFS follows roughly the same mitigation guidelines as USFWS and EPA (e.g., water-dependency, public interest criteria, alternative site considera tions, and sequential mitigation strategies).

In addition to previously mentioned legislation, NMFS derives its management responsibilities from the Fishery Conservation and Management Act of 1976 and the Marine Protection Research and Sanctuaries Act of 1972. Under these federal mandates, NMFS habitat interests focus primarily on commercial and sport fisheries and marine mammals.

U. S. Army Corps of Engineers (COE).

The COE administers the 404 regulatory program based on EPA 404(b)(1) guidelines. Ultimate permit issuance decisions lie with the Corps unless EPA invokes a veto under 404(c) of the Clean Water Act. The district engineer considers the sequential mitigation policy strategy outlined in the NEPA laws and gathers input from all interested federal, state, and local jurisdictions as well as private groups and

individuals before making permit decisions. This input, and COE research, is used to determine the quality and quantity of the impacted environment. For compensatory mitigation, the final permit decision addresses appropriate on- and off-site areas for mitigation activities, potential mitigation site acquisitions, enhancement, and management recommendations for impacted sites (Corps of Engineers 1985).

The district engineer is not required to follow the recommendations of any other resource agency but is guided by the same national laws and policies with regard to permit issuance and mitigation requirements. If the district engineer's recommendations for mitigation differ from other agency recommendations, there must be adequate documentation for the decision (e.g., relevant supporting data, discussion of how the favorable public interest determination has been made with less or different mitigation than that recommended by the resource agencies, and a description of how mitigation measures were determined).

3.3 STATE REGULATORY RESPONSIBILITIES OVER WETLANDS AND AQUATIC AREAS IN THE IN THE COLUMBIA RIVER ESTUARY

The Columbia River Estuary is divided between two state jurisdictions - Washington and Oregon. In Washington, state level mitigation decisions are guided by several agencies:

- Washington Department of Ecology (DOE);
- Washington Department of Wildlife (WDW); and
- Washington Department of Fisheries (WDF).

Implementation of Washington's mitigation policies is the responsibility of the DOE and local governments, through the regulatory phase of the state Shoreline Management Program (SMP). Washington's SMP, applied in its coastal zone, constitutes a major component of its Coastal Zone Management Program. Washington Department of Wildlife and Washington Department of Fisheries regulate potential impacts on fish through Washington's Hydraulics Code Rules (WAC 220-110-010 - 220-110-350).

Analogous Oregon agencies include:

- Oregon Department of Land Conservation and Development (DLCD);
- Oregon Division of State Lands (DSL);
- Oregon Department of Fish and Wildlife (ODFW); and
- Oregon Department of Environmental Quality (DEQ).

Implementation of Oregon's mitigation policies is the responsibility of DSL through the state removal-fill law and local governments through their comprehensive plans. The comprehensive plans, applied in Oregon's coastal zone, constitute a major component Oregon's Coastal Zone Manage-

ment Program.

3.3.1 Washington's Shoreland and Aquatic Area Permit Review Process Under the Shoreland/Coastal Zone Management Program

Washington's shoreline management permit system is coordinated between local, state, and federal agencies. Federal section 404 and section 10 permits are forwarded to the Department of Ecology which circulates the permits and coordinates the state's response. Mitigation requirements may be appended as conditions of section 10 and 404 permit approval. Federal permits will not be approved without local and state permit approval. State and local level permit coordination is implemented primarily through three state laws: the State Environmental Policy Act (SEPA), the Shoreline Management Act (SMA), and the Hydraulic Project Approval Law (HPA). All Washington state resource agencies and local governments coordinate to implement these laws (Figure 2). Mitigation requirements may be recommended under the SEPA process and/or appended as a permit condition under the shoreline and HPA permit process.

The SEPA Process.

The Washington State Environmental Policy Act (SEPA) is administered by a "lead agency" (WAC 197-11-922 - 197-11-948) and requires coordination between local, state, and federal agencies to assess environmental impacts and to ensure social, economic, and environmental concerns are adequately addressed.

The lead agency, usually the local government, reviews the permit under SEPA statutes and makes a "threshold" determination regarding the potential adverse environmental impacts of a project. A determination of significance (DS) or non-significance (DNS) is made regarding project impacts.

If a DNS is made, the DNS is circulated with an environmental checklist to the Department of Ecology, agencies with jurisdiction, and other interested parties. A 15-day review period is allowed for comments. Unless evidence is received during the review period demonstrating a need for a Determination of Significance, the state Environmental Impact Statement (EIS) is not required, and, unless contested, permit processing continues. Pre-threshold determination agreements on mitigation measure between the developer and the lead agency may help avoid a Determination of Significance and subsequent EIS requirements. This is called a mitigated DNS.

If a Determination of Significance is made, the lead agency must prepare a draft state Environmental Impact Statement (DEIS).[5] The DEIS is then circulated to concerned agencies and other interested parties

---

5 Environmental Impact Statement preparations are usually relegated to qualified environmental consultants.

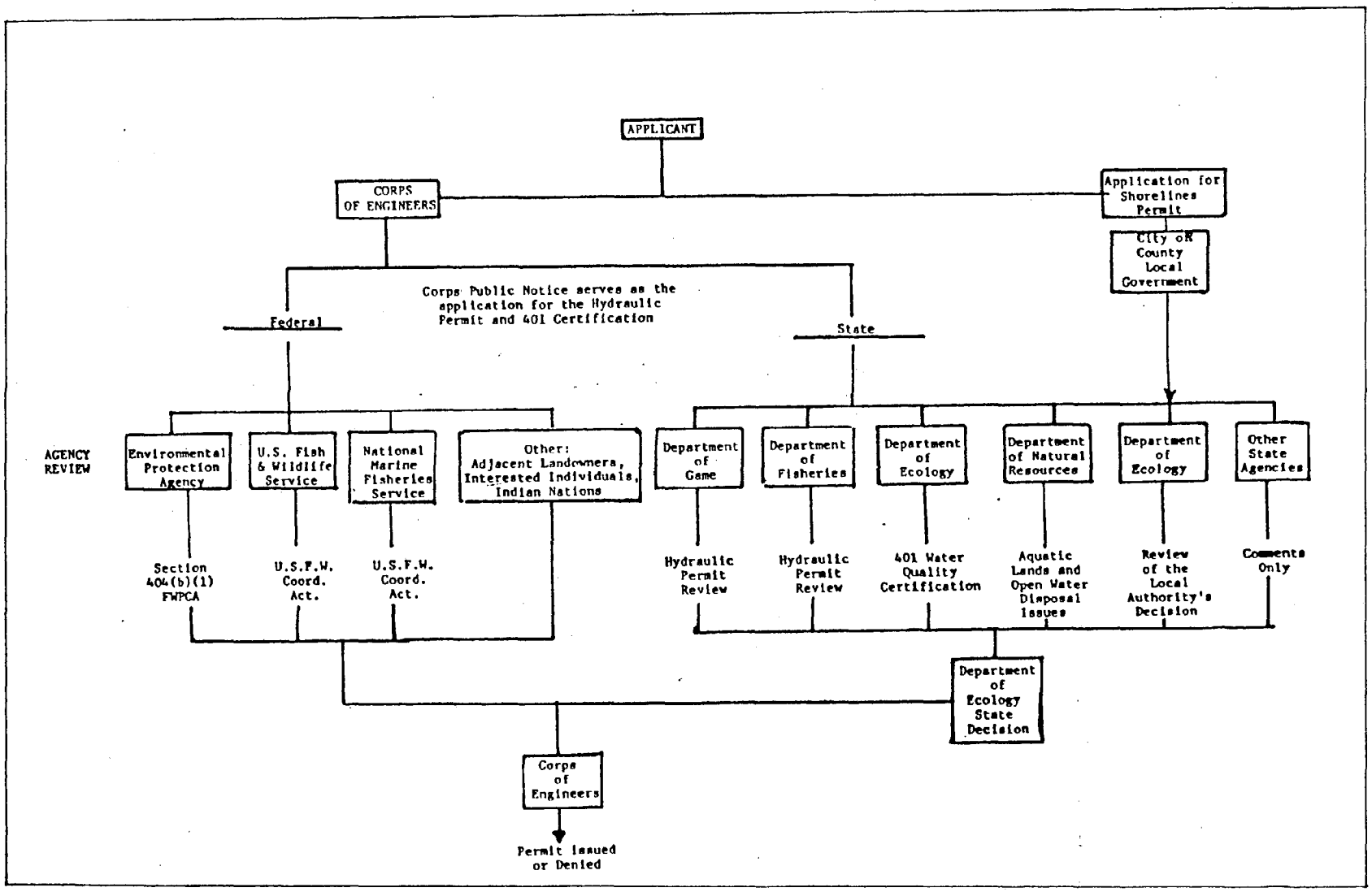


Figure 2. Washington's wetland and aquatic area development permit review process.

for review and comment. Public hearings may also be required for certain projects. After the review period a final Environmental Impact State (FEIS), and perhaps a Supplemental Environmental Impacts Statement (SEIS), is circulated.

The lead agency is then authorized to deny or allow a development proposal using the information in the Final Environmental Impact Statement as a basis for decision-making.

A State Environmental Policy Act (SEPA) analysis review may result in project denial, project authorization, or authorization with conditions that may require project changes, including mitigation for unavoidable adverse impacts (Blomberg 1987).

Under SEPA Rules (WAC 197-11-768), mitigation means: [6]

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 reduce impacts;

c) Rectifying the impact by repairing, rehabilitating, or restoring the impact over time by preservation and maintenance operations during the life of the action;

d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;

e) Compensating for the impact by replacing, or providing substitute resources or environments; and/or

f) Monitoring the impact and taking the appropriate corrective measures.

If the lead agency denies a permit, it must demonstrate adverse impacts that could not be reasonably mitigated. If a lead agency approves a permit, it may require mitigation based on its policies, plans, rules, or regulations. Mitigation requirements (WAC 197-11-660) must be:

a) Clearly related to adverse environmental impacts identified in the draft and supplemental environmental impacts statements;

b) Reasonable and capable of being accomplished;

---

6 With the exception of monitoring, this definition is very similar to the definition cited in the National Environmental Policy Act.

c) The responsibility of the applicant only to the extent attributable to the adverse impact; and

d) Made with prior research regarding other mitigation requirements for the identified impact from federal, state, or local agencies.

Three Washington Departments (Washington Department of Fisheries, Washington Department of Wildlife and Washington Department of Ecology) review SEPA documents either as lead agencies or in a review capacity. This allows the agencies to anticipate effects of development and to respond with appropriate mitigation strategies.

The Washington Department of Wildlife (WDW) had adopted the SEPA definition of mitigation in a draft mitigation policy and lists an overall goal of the Department to be "that human-caused habitat alteration shall result in no net loss of wildlife carrying capacity nor of habitat characteristics indicative of carrying capacity."

The WDW draft mitigation policy uses the following sequential strategy when considering mitigation actions:

a) On-Site, In-Kind;

b) Off-Site, In-Kind;

c) On-Site, Out-of-Kind;

d) Off-Site, Out-of-Kind; or

e) A combination of the above.

The Department would like to use SEPA significance determinations to judge appropriate mitigation strategies to apply to a project. That is, a SEPA Determination of Nonsignificance for a project may only require mitigation measures that minimize loss while a Determination of Significance may call for total avoidance or total replacement.

There is an appeals process available, under WAC 197-11-680, to applicants, agencies, and other interested parties for permits that are denied or conditioned. Generally, an appeal must be filed within 30 days after notice. However, while WAC 197-11-680 relates to all agencies, there is specific appeals language for various permits and different forums under which appeals are heard.

Shoreline Master Program.

The Shoreline Management Act requires that local governments prepare and adopt Shoreline Master Programs that incorporate extensive planning regulations and policies for the state's shorelines (this Plan only considers the Columbia River Estuary shoreline). The program is administered by local jurisdictions with Department of Ecology acting in a review and supportive capacity (see RCW 90.58.050). Program amendments are routinely processed with an adoption process which includes

the SEPA Review process. The Department of Ecology, Washington Department of Fisheries, and Washington Department of Wildlife, as well as other interested parties, can comment on the proposed amendments and collectively influence Shoreline Master Program (SMP) elements.

The Shoreline Management Act requires all local incorporated cities and counties to develop shoreline programs using state goals and guidelines adopted by DOE as part of the state's Coastal Zone Management Program. Generally, shorelines include all aquatic areas and adjacent uplands extending 200 feet landward of ordinary high water.

While the Shoreline Management Act does not specifically require mitigation to be addressed in local master programs, some programs include mitigation requirements as a development review standard. Of the current CREST jurisdictions, only Pacific County has mitigation requirements incorporated into their Shoreline Master Program.

A variety of projects (WAC 173-14-010 et seq.) are considered exempt from permit requirements, but must remain consistent with the Master Program regulations. Generally, any project that exceeds $2,500 in cost is considered a "substantial development" project and requires issuance of a shoreline permit under the local shoreline master program jurisdiction. Exemptions include but are not limited to (Washington State Coastal Zone Management Program 1976):

a) Repair and maintenance of existing structures;

b) Docks costing no more than $2,500;

c) Protective bulkheads for single family residences;

d) Navigational aides;

e) Single family residences built by owners for their use; and

f) Emergency construction.

Hydraulic Projects Approval Law.

The Washington Department of Fisheries (WDF) and Washington Department of Wildlife ((WDW) also apply the 1986-1987 Hydraulics Projects Approval Law (HPA, RCW 74.20.100 and 75.20.103). Under HPA, dredge and fill in Washington's aquatic areas require hydraulic permit approval. This allows the agencies to inspect hydraulic permit applications and make recommendations addressing fish life concerns, including mitigation (Blomberg 1987).

The Hydraulic Code Rules include a mitigation definition (Section 20 of WAC 220-110-020) that essentially duplicates the SEPA definition. Under section 12 of WAC 220-110-030, WDF or WDG can deny a permit for a project that is potentially harmful to fish life unless adequate mitigation is assured through permit requirements.

The Washington Department of Fisheries (WDF) is responsible for setting regulations to control the commercial and sports harvest of food fish and shellfish stocks and for protecting habitats of these species. WDF also makes permit recommendations under the Fish and Wildlife Coordination Act to federal, state and local jurisdictions regarding permit issuance and mitigation requirements for impacts on the fisheries resource.

3.3.2 Oregon's Shoreland and Aquatic Area Permit Review Process under Statewide Land Use Planning and Oregon's Removal-Fill Law

In Oregon, the Division of State Lands (DSL) has jurisdiction over removal and fill of more than 50 cubic yards in Oregon "waters" and coordinates Section 404 permit review responsibilities with the Corps of Engineers (Figure 3). DSL circulates federal Section 404 permit applications for state and local agency review and consolidates the state's comments in a letter from the state to the regulatory branch of the Corps of Engineers.

Permit applicants are required to submit applications for development activities to their local planning departments in addition to state/federal applications. The local planning departments must determine whether the proposed activity is compatible with the local comprehensive plan and ordinances. If the activity is found not to comply with the comprehensive plan, it must either be denied or the relevant local jurisdiction must amend its plan. However, comprehensive plans must continue to comply with statewide goals as administered under the Department of Land Conservation and Development (DLCD).[7]

The Oregon Department of Fish and Wildlife (ODFW) participates in the permit issuance and mitigation regulation process by reviewing permit applications and making recommendations to the state agency with regulatory authority (e.g., Division of State Lands). The Division of State Lands compiles a report which includes Oregon Department of Fish and Wildlife comments and submits it to the U.S. Army Corps of Engineers. ODFW recommendations often materialize as permit requirements, especially with regard to mitigation (Blomberg 1987).

3.3.3 The Relationship Between Oregon's Statewide Planning Goals and Wetland Mitigation

Under Oregon's planning system, wetlands are addressed in Statewide

---

7 Under the authority of Land Conservation Development Commission each county and municipality in Oregon is required to develop comprehensive plans regarding future development in their jurisdiction. The Commission's staff (DLCD) has developed 19 statewide planning goals regarding land use in Oregon. County and municipal comprehensive plans are required to comply with each of these goals (OAR 660-31-005 to 660-31-040). The Division of State Lands is also required to comply with these goals.

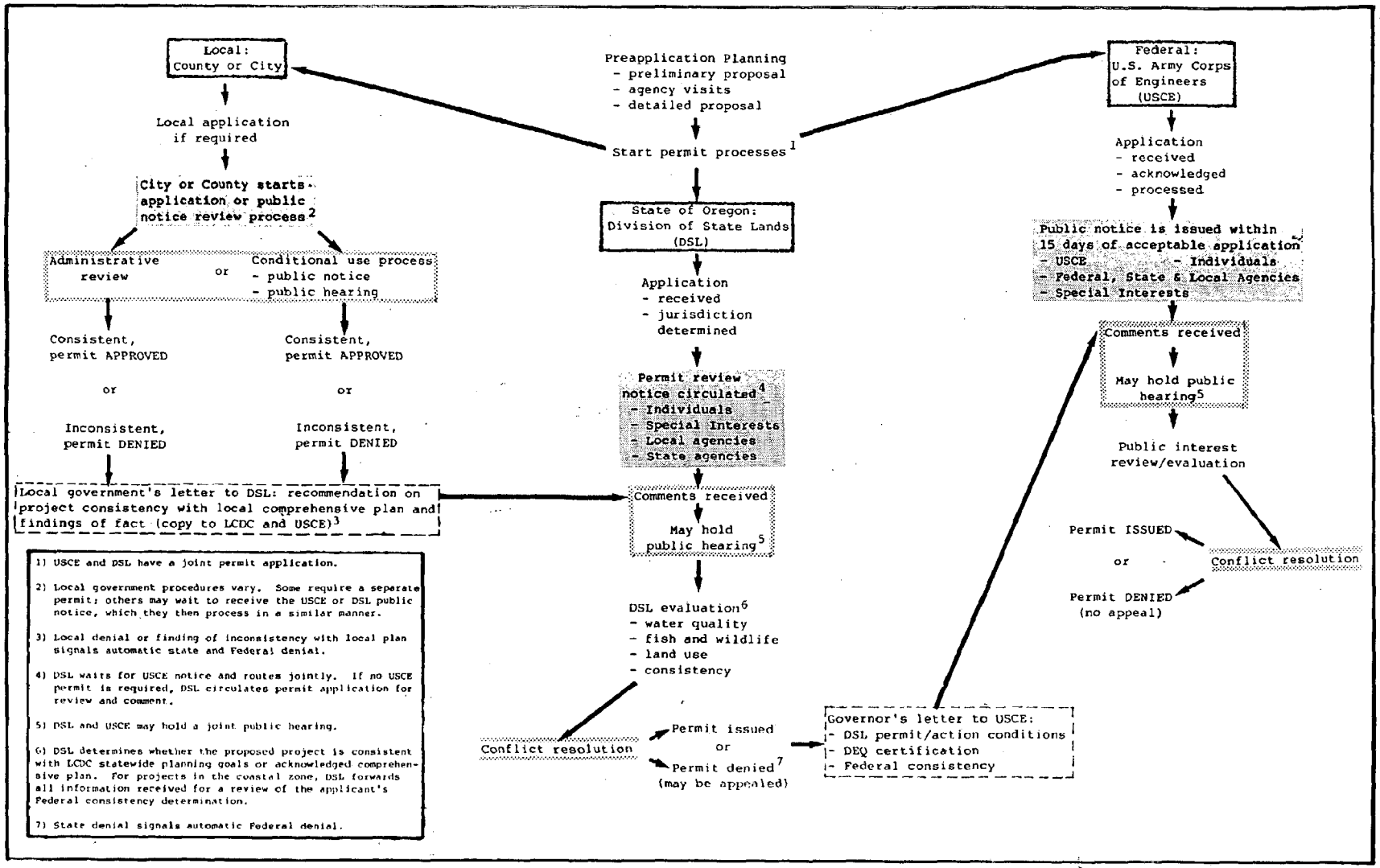


Figure 3. Oregon's wetland and aquatic area removal-fill permit review process (Oregon State University Extension 1982).

Goals 16, 17, and 5. Goal 16 applies directly to Oregon's estuaries and intertidal estuarine wetlands and Goal 17 applies to Oregon's coastal lakes and estuarine shorelands. Goal 5 applies to all significant wetlands that are not connected to the estuary and are outside of the coastal shorelands boundary. Mitigation is not required under Goals 5 and 17, although there is a guideline in Goal 17 to coordinate with Goal 16 planning requirements.

Mitigation for dredge or fill in intertidal estuarine wetland areas is defined under Goal 16 as:

> The creation, restoration or enhancement of an estuarine area to maintain the functional characteristics and processes of the estuary, such as its natural biological productivity, habitats and species diversity, unique features, and water quality.

Goal 16 requires local comprehensive plans to designate and protect specific sites for mitigation and restoration which generally correspond to the types and quantity of intertidal area designated for dredging and filling. The Goal 16 mitigation definition and requirements are reinforced in Oregon State Estuarine Mitigation Law (ORS 541.626).

3.3.4. The Relationship Between Oregon's Removal-Fill Law and Mitigation

Oregon's Fill and Removal Law (ORS 541.605 et seq.) requires permits for fill and removal of greater than 50 cubic yards of material in all of Oregon's waters. The Division of State Lands (DSL) has the responsibility for administering this law. Under OAR 141-85-040, the DSL director has authority to impose special and general conditions to carry out the removal-fill law, including "actions to reduce, eliminate, or mitigate (creation, restoration, or enhancement) adverse impacts to water resources." Although mitigation for nontidal freshwater wetland impacts is authorized through this administrative rule, there are no specific criteria for quantifying mitigation requirements.

Estuarine wetland mitigation requirements, however, are defined in detail and quantified under Oregon's Estuarine Mitigation Law (ORS 541.626). The DSL director makes the following considerations when reviewing estuarine project proposals for possible mitigation requirements: identifies adverse impacts of the activity; availability of areas where mitigation activity could be performed; provision of land use plans for the area adjacent to the proposed activity; recommendations from any interested or affected state agencies; and the type and extent of compensating activity inherent in the proposed activity.

The DSL director may partially waive mitigation requirements is:

a) There is no alternative manner in which to accomplish the purpose of the project;

b) There is no feasible manner in which mitigation could be accomplished;

c) The economic and public need for the project clearly outweigh the potential degradation of the estuary;

d) The project is for a public use; and

e) The project is water-dependent or the project is publicly-owned and water-related.

Mitigation may be waived wholly or in part for activities with negligible impacts such as:

a) Filling for repair and maintenance of existing functional dikes;

b) Riprap to allow protection of an existing bankline;

c) Filling for repair of existing roads;

d) Dredging for authorized navigation channels, jetty or navigational aid installation, or any Corps of Engineers repair or maintenance work; and

e) Dredging or filling required as part of an estuarine resource restoration or enhancement project.

Maintenance dredging and aggregate mining at a historically used site are exempt from mitigation requirements (Division of State Lands 1984a).

The director of DSL has authority to pursue civil and criminal penalties, restoration actions, and substantial fines for illegal (non-permitted) dredge and fill operations in Oregon's waters.

4. CUMULATIVE WETLAND IMPACTS IN THE COLUMBIA RIVER ESTUARY

In order to formulate policies regarding mitigation and restoration actions and to make habitat trade decisions, it is necessary to understand which habitat types have been most seriously depleted and which are currently scarce relative to other existing habitats. This information is especially important when considering migratory birds, anadromous fish, and marine species that spend part of their life cycle in estuaries (Good 1987).

For estuarine wetlands, habitat data from 1868 and 1873 surveys of the Columbia River Estuary were compared with recent habitat data for the same areas by Thomas (1983). Five estuarine habitat types were determined and mapped from the historical data:

- Deep water;
- Medium-depth water;
- Shallows and flats;
- Marshes; and
- Swamps.

These maps were compared with recent maps of existing habitat types. The results of this comparison show an overall reduction in the estuary's area from 156,190 acres in 1868-1873 to 119,000 acres in recent times, a loss of 24 percent of the historical total. The greatest change, both in acres and as a percentage, is in the tidal swamp (wooded wetland) category, which shows a reduction from 30,020 acres to 6,950 acres, a 77% loss. Tidal marshes (emergent wetland) are the next most heavily impacted habitat type with a reduction from 16,180 acres to 9,200 acres, a 43% loss. Most of this loss was due to diking of high marsh habitat. Swamps and marshes together have lost 65% of their former area; deep and medium-depth water acreages were reduced by 16 percent, while shallows and flats show a 10 percent increase in area. The distribution of these changes within the estuary are highly uneven (Thomas 1983).

Among human factors, diking and dredge spoil disposal appear to have had the greatest impacts. Dredging, filling, and construction of jetties and upriver dams are also important. Diking and fills that create uplands remove area directly from the estuary. Human factors have also accelerated shoaling in some areas in excess of that which would occur naturally. This has reduced water volume and changed relative areas of estuarine habitat types. Sedimentation does not appear to have significantly altered the overall surface area of the estuary, although it may be locally significant (Thomas 1983).

The Thomas (1983) cumulative impact study was used to help determine relative values (Section 5.1) of Columbia River Estuary habitat

types in the 1983 CREST Mitigation Plan (Smith 1983). That system has also been adopted for use in this 1987 revision of that Plan.

5. NUMERICAL MODEL FOR DETERMINING ESTUARINE WETLAND MITIGATION REQUIREMENTS

The 1983 CREST Mitigation Plan (Smith 1983) included a numerical model for determining types and area of mitigation requirements for estuarine development projects. Species abundance and diversity and habitat scarcity criteria were used to rate and relatively rank 19 estuarine habitat types in the Columbia River Estuary (defined by elevation, substrate, salinity, and vegetation). The model allowed habitat trade decisions to be made while theoretically allowing no net loss of estuarine habitat value. This system has been modified and adopted into Oregon State Mitigation law (ORS 541.626) as administered by the Division of State Lands under the law's administrative rule (OAR 141-85-240 et seq.). It is currently used for estimating impacts and mitigation in all of Oregon's estuaries (Division of State Lands 1984a). It is also used in this Plan to match mitigation sites with proposed developments in the Columbia River Estuary.

The model was developed using estuarine resource data, provided by the Columbia River Estuary Data Development Program (CREDDP), and other research. These data were used to compare certain Columbia River Estuary habitat characteristics with associated biota. The comparisons were used to derive a list of habitat characteristics important in defining biotic communities, and, subsequently, for habitat classification purposes. The habitat classes were then numerically assessed for their respective fish and wildlife habitat values.[8]

A generalized habitat type value assessment was considered the most appropriate method given the level of scientific information available and the state-of-the-art of assessment methods. The system was based on the following assumptions:

a) The resource information available was adequate to develop a management program that would meet the mandates of federal and state agencies, protect estuarine values, and offset development impacts.

b) A numerical model incorporating physical and biological site characteristics could serve as the primary vehicle for program implementation.

c) A model that displays the relative values of Columbia River Estuary habitat types would be adequate for mitigation decision-making purposes.

---

8 Wildlife and fisheries habitats (based on diversity, productivity, and scarcity) were the only estuarine wetland and aquatic area values assessed under the model. Other values (e.g., water quality, flood mitigation and desynchronization, and recreation) were not addressed.

5.1 COLUMBIA RIVER ESTUARY HABITAT CLASSIFICATION AND VALUE ASSESSMENT

Four habitat characteristics were reviewed by CREST:

- o Salinity Regime;
- o Tidal Regime;
- o Vegetation; and
- o Substrate Type.

These characteristics were used to define 19 habitat classes (Figure 4).

Each of the habitat types were numerically assessed for their "relative resource value." Resource value is defined as "fish and wildlife habitat value based on total biomass production and diversity criteria."

The CREST model uses numeric ratings to measure habitat values. Numeric habitat values were estimated using five major steps:

1) Resource value rating classes (Table 2) were defined for selected taxa in the Columbia River Estuary [low = 0; medium = 1; and high = 2)].

2) Taxa were displayed in the habitat types in which they occur along with their respective resource value rating classes (Table 3).

3) The subsequent resource value ratings (based on abundance or productivity) for each habitat type were summed. This procedure weights habitat types higher as the number (diversity) of taxa increases. The sum represents a habitat rating based on productivity and diversity (Figure 5).

4) Habitat ratings were divided into four ranks (1 = lowest) using a "natural break" method (Figure 5). The habitats are displayed by rank in Table 4.

5) One point is added if the habitat type meets historical scarcity criteria and one point is added if the habitat type meets present-day scarcity criteria (Table 5).

The final numbers represent the relative values of the 19 respective habitat types. These numbers are presented in a chart that displays their association with the habitat characteristics used to determine the habitat types (Figure 6). The habitat value assessment is used to make numerical value trade decisions and mitigation requirements for development projects. A relative value trade formula is used: AM = AD x (RVd/RVm); provided AM/AD is not less than 1.0 where:

AM = area of mitigation site

AD = area of development site

RVm = relative value of mitigation site habitat

RVd - relative value of development site habitat

The requirement that AM/AD is not less than 1 addresses a policy of conservation of estuarine surface area. In words, the mitigation formula reads:

> The area required for mitigation (AM) is equal to the relative value of the habitat at the development site (RVd) divided by the relative value of the habitat at the mitigation site (RVm) multiplied by the area impacted at the development site (AD), provided that the mitigation area is never allowed to be less than the development area.

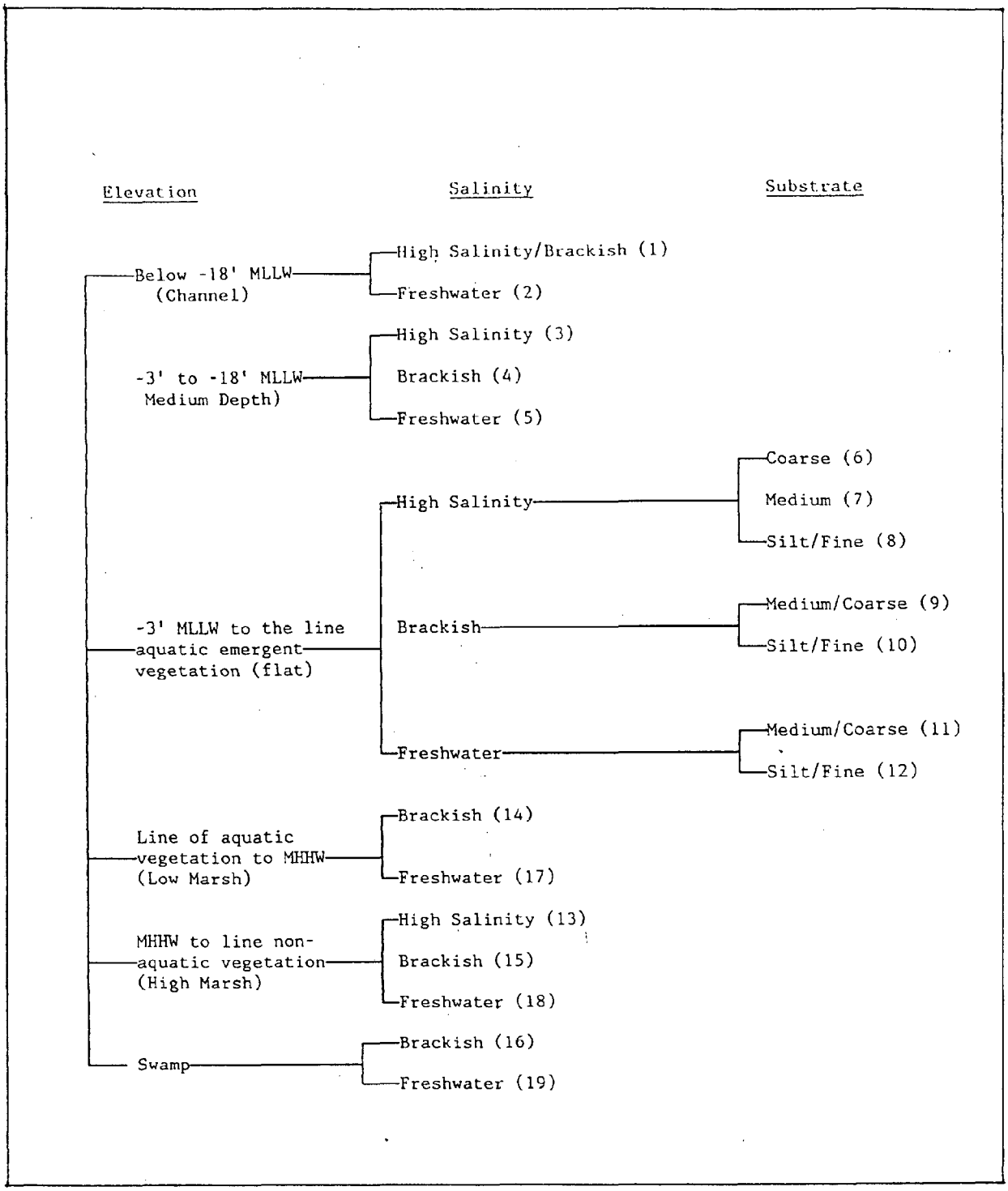


Figure 4. The Columbia River Estuary habitat classification (Smith 1983).

Table 2. Resource Value Rating Classes (Smith 1983).

species or group	value: low	moderate	high
Primary producers			
phytoplankton		shallows	deeper water
benthic microalgae ($mgC \cdot m^{-2} \cdot hr^{-1}$)	<10	10–40	>40
emergent plants ($g\ dr\ wt \cdot m^{-2} \cdot yr^{-1}$)	— all are high, where vegetation cover is high —		
eel grass beds	— define in terms of presence or absence —		
Middle food chain organisms			
Zooplankton ($\# \cdot m^{-2}$)			
small forms (marine copepods, *Eurytemora*, *Canuella*, *Cyclops*, *Daphnia*)	<1,000	1,000–10,000	>10,000
large forms (*Archeomysis*, *Neomysis*)	< 100	100–1,000	>1,000
Benthic infauna ($\# \cdot m^{-2}$)			
small crustaceans (*Corophium* and other amphipods), oligochaetes, small polychaetes (*Hobsonia*, etc.)	< 100	1,000–10,000	>10,000
bivalves, chironomid larvae, large polychaetes (*Neanthes*, etc.)	< 500	500–1,000	>1,000
Epibenthic organisms ($\# \cdot m^{-2}$)			
epibenthic zooplankton	< 4,000	4,000–40,000	>40,000
epibenthic microfauna	< 0.1	0.1–0.5	> 0.5
Higher trophic levels			
Fish Avifauna Wildlife and marine mammals	— population estimates on these groups are unavailable or uncertain. The abundant species will be listed —		

Table 3. Habitat Value Ratings of 19 Columbia River Estuary Habitat Types (Smith 1983).

Resource value	Habitat types 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Primary Producers																			
water column primary producers	2	2	2	2	2	1	1	1	1	1	1	1							
benthic primary producers (microalgae)							2	2	1	2	1	1	1	2	1		2	1	
eel grass beds						1	1	1											
emergent plant primary producers													2	2	2	2	2	2	2
detrital production and potential export to other areas														2	1	1	2	1	1
Middle Food Chain Organisms																			
marine mysid (Archeomysis)	2		2	1		1	2	2											
marine pelagic copepods (Arcartia, Calanus)	1		1			1	1	1											
brackish/freshwater mysid (Neomysis)	1	1		1	1				1	1	1	1							
brackishpelagic copepods (Eurytemora, Canuella)	2	2	2	2		1	2	2	2	2									
freshwater pelagic zooplankton (Daphnia, Cyclops)		1			1						1	1							
amphipods (mainly Corophium)				1	1				2	2	2	2		1			1		
polychaetes			1	1		1	1	1	1	2			no data						
marine/brackish bivalves (Macoma, Mya)			2	1		1	2	2	1	1									
freshwater bivalve (Corbicula)					1				1	1	1	1							
aquatic chironomid larvae					1				1	1	1	1		2	1	1	2	1	1
adult terrestrial insects														2	2	2	2	2	2
epibenthic zooplankton	2	1	1	2	1		2	2	2	2	1	1							
dungeness crab	1		1	1		1	1	1											
sand shrimp (Crangon franciscorum)	1		1	1	1	1	1	1	1	1									
crayfish											1	1		2	2	2	2	2	2
Higher Trophic Levels																			
juvenile salmonid feeding/nursery area				1	1				1	2	1	2		2			2		
anadromous fish migration/transition area	2	2		1	1				1	2									
non-salmonid fish feeding area - mainly pelagic	2	2	2	2	1	1	2	2	2	2	1	1							
non-salmonid fish feeding area - mainly demersal			1	1	1	1	2	2	1	2	1	2		1			1		
non-salmonid fish nursery area		2		1	1		1	1	2	2	2	2		1			1		
shorebirds and blue herons						1	2	2	2	2	1	1	2	1			1		
pisciverous pursuit divers (cormorants and grebes)	2	2	2	2	2	1	1	1	1	1	1	1							
waterfowl feeding/nesting area			1	1	1	1	2	2	2	2	2	2	1	2	1	1	2	1	1
bald eagle feeding/nesting area											1	1							1
small mammals															1	1		1	1
aquatic furbearers														2	2	2	2	2	2
Columbian white-tailed deer																			2
marine mammals	1		1	1															

0 = low 1 = medium 2 = high

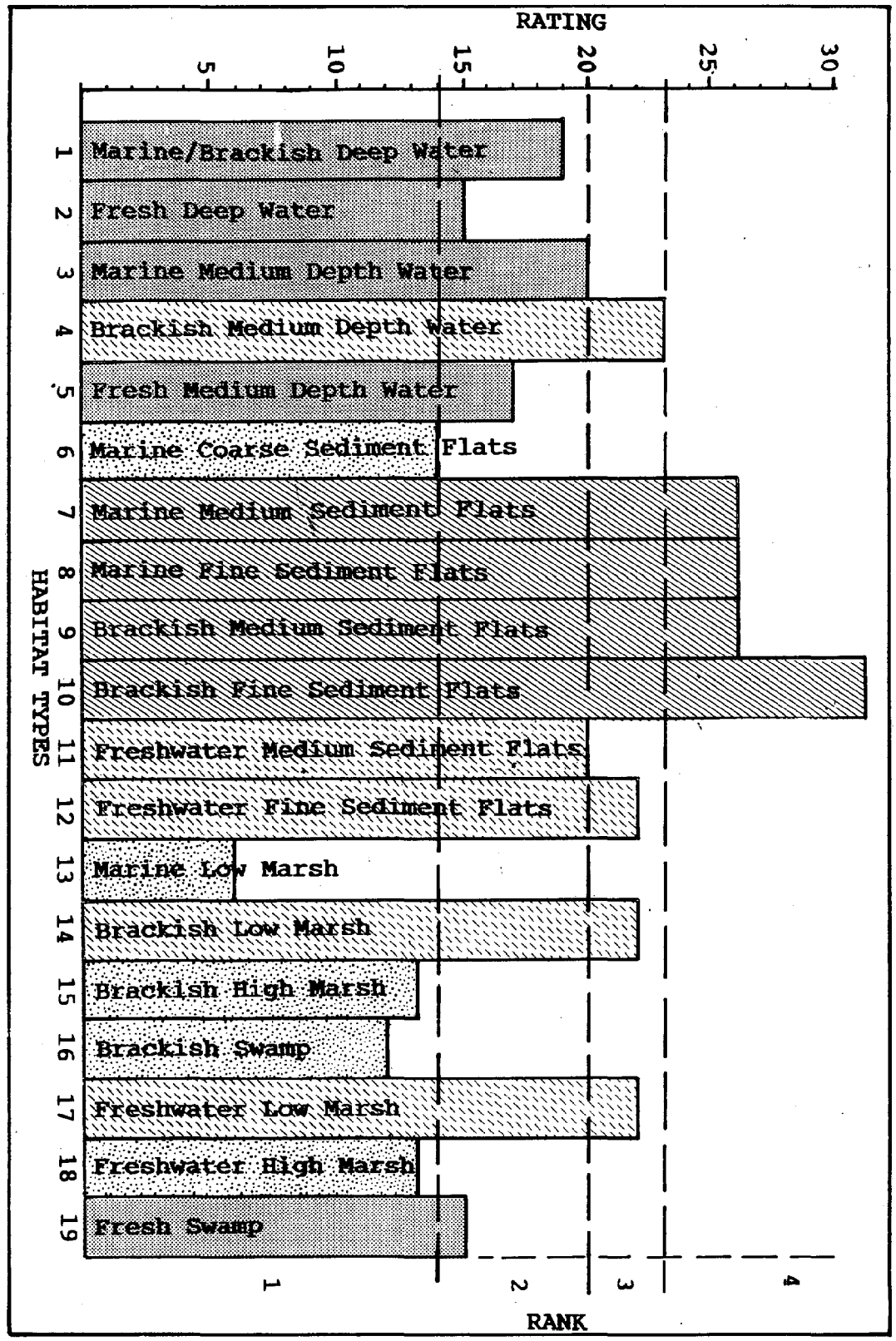


Figure 5. Relative ranking of 19 Columbia River Estuary habitat types (modified Smith, 1983).

Table 4. Relative Ranking of 19 Columbia River Estuary Habitat Types (Smith 1983).

Habitat Type #		Rank
7	Marine medium sediment flats	4
8	Marine fine sediment flats	4
9	Brackish medium sediment flats	4
10	Brackish fine sediment flats	4
11	Freshwater medium sediment flats	3
12	Freshwater fine sediment flats	3
4	Brackish medium depth	3
14	Brackish low marsh	3
17	Freshwater low marsh	3
1	Marine/brackish deep water	2
2	Fresh deep water	2
3	Marine medium depth	2
5	Fresh medium depth	2
19	Fresh swamp	2
15	Brackish high marsh	1
16	Brackish swamp	1
18	Fresh high marsh	1
6	Marine coarse sediment flats	1
13	Marine low marsh	1

Table 5. Historical and Present Day Scarcity Weighting System of Columbia River Estuary Habitat Types.

Habitat Type Number	Relative Rank	Historical Losses	Present Day Scarcity	Relative Value
1	2	-	-	2
2	2	1	-	3
3	2	1	-	3
4	3	-	-	3
5	2	1	-	3
6	1	1	1	3
7	4	1	1	6
8	4	1	1	6
9	4	-	-	4
10	4	-	-	4
11	3	-	-	3
12	3	-	-	3
13	1	-	-	1
14	3	1	1	5
15	1	1	1	3
16	1	1	1	3
17	3	-	-	3
18	1	-	-	1
19	2	1	-	3

HABITAT TYPE KEY

Subtidal

1 = Marine and brackish channel, below - 18 ft. MLLW
2 = Fresh channel, below - 18 ft. MLLW
3 = Marine, between - 18 ft. and - 3 ft. MLLW
4 = Brackish, between - 18 ft. and - 3 ft. MLLW
5 = Fresh, between - 18 ft. and - 3 ft. MLLW

Intertidal

6 = Marine intertidal sand flats
7 = Marine intertidal sand/mud flats
8 = Marine intertidal mud flats
9 = Brackish intertidal sand/mud flats
10 = Brackish intertidal mud flats
11 = Fresh intertidal sand/mud flats
12 = Fresh intertidal mud flats
13 = Marine low marshes
14 = Brackish low marsh
15 = Brackish high marsh
16 = Brackish swamp
17 = Fresh low marsh
18 = Fresh high marsh
19 = Fresh swamp

COLUMBIA RIVER ESTUARY

GENERALIZED SUBSTRATE CHARACTERISTICS	GENERALIZED PRODUCTIVITY CHARACTERISTICS 1/					SALINITY REGIME 2/
	SUBTIDAL HABITATS	INTERTIDAL HABITATS				
	FLATS	FLATS	LOW MARSH	HIGH MARSH	SHRUB-FORESTED SWAMP	
SAND 0.0625mm to 1.0mm	3.0	3.0	3.0	1.0	3.0	FRESH
	3.0	4.0	5.0	3.0	3.0	BRACKISH
	3.0	3.0	1.0	[illegible]	[illegible]	MARINE
SANDY - MUD	3.0	3.0	3.0	1.0	3.0	FRESH
	3.0	4.0	5.0	3.0	3.0	BRACKISH
	3.0	6.0	1.0	[illegible]	[illegible]	MARINE
MUD <0.0625 mm	3.0	3.0	3.0	1.0	3.0	FRESH
	3.0	4.0	5.0	3.0	3.0	BRACKISH
	3.0	6.0	1.0	[illegible]	[illegible]	MARINE

1/ RELATIVE VALUES ARE BASED ON NATURAL BIOLOGICAL PRODUCTIVITY AND SPECIES DIVERSITY OF SPECIFIC HABITAT TYPES. A " [illegible] " MEANS THE HABITAT TYPE PROBABLY DOES NOT EXIST.

2/ FRESH WATER SALINITY RANGE IS 0 ‰ TO 0.5 ‰. BRACKISH WATER SALINITY RANGE IS 0.5 ‰ TO 25 ‰. MARINE WATER SALINITY RANGE IS 20 ‰ TO 35 ‰.

Figure 6. Relative values of selected Columbia River Estuary habitat types (Division of State Lands 1984).

6. WETLAND RESTORATION IN THE COLUMBIA RIVER ESTUARY PLANNING AREA

This section briefly reviews the existing framework for wetland restoration, as a separate management strategy from mitigation, in the Columbia River Estuary Planning area. Research shows significant estuarine wetland losses during the past 100 years (Thomas 1983). Given that mitigation only preserves currently existing wetland values, restoration outside of mitigation is the only method for regaining a substantial portion of this valuable resource.

Oregon's Coastal Zone Management Program, Goal 16 and, to a lesser degree, Goal 17, directs federal and state agencies to help local governments identify and restore certain resources. These resources include: areas of riparian vegetation, heavy erosion or sedimentation, degraded fish and wildlife habitat, anadromous fish spawning area, abandoned diked estuarine marsh areas, and areas where water quality restricts use of estuarine waters for fish and shellfish harvest and production, or for human recreation (LCDC 1985). This directive is being administered by the Oregon Department of Land Conservation and Development (DLCD). In the Columbia River Estuary, the Columbia River Estuary Study Taskforce (CREST) is responsible for accounting for these implementation requirements through planning and for submitting the plans to local governments and recommending their adoption (this is also done for Washington even though there is no clear directive for restoration outside of mitigation in Washington revised codes). This section focuses on restorations requiring fill removal or dike breaching in areas formerly hydrologically connected to the Columbia River Estuary.

With regard to wetland habitat, federal and state policies on restoration are less developed than those for mitigation. Also, as with mitigation, wetland restoration efforts have primarily focused on estuarine wetlands as opposed to nontidal freshwater wetlands.

Specific areas in the Columbia River Estuary were identified as candidates for restorations in the US Fish and Wildlife Concept Plan for Waterfowl Wintering Habitat Preservation (USFWS 1979). They include Youngs River Valley, Lewis and Clark River Valley, Svensen Island and Westport Slough.

Properties in these areas were recommended for acquisition through fee simple purchase or protection with wildlife easements. Funding for acquisition and/or protection was to come from Migratory Bird Funds. At present, eight years after these areas were identified, no active restorations have occurred outside of the context of mitigation in the Columbia River Estuary.

Recently, a new funding instrument for wetland protection has emerged that may also be helpful in encouraging wetland restorations. A Memorandum of Understanding (MOU) between the Farmers Home Administration (FmHA) and the US Fish and Wildlife Service (USFWS) has been established that will allow potential opportunities for protection and restoration of significant or potentially significant wildlife habitat on lands subject to FmHA loan obligations.

Essentially, the MOU allows FmHA to sell easements, development rights, or fee simple ownerships to federal, state and local governments and private nonprofit land trusts for the purpose of wildlife protection. Lease/deed restrictions are also measures available under the MOU. The US Fish and Wildlife Service is the technical consultant to the Farmers Home Administration on implementation of their obligations under the Memorandum of Understanding. The legal basis for the MOU comes from Section 1314 and 1318 of the 1985 Food Security Act and Executive Order 11990.

This tool promises to help strengthen the farm economy by providing financial relief to farmers applying for or holding FmHA loans against properties with existing or potential wildlife value. It serves as a financial incentive for habitat protection and restoration. However, funding is presently unavailable for implementing a restoration action (e.g., excavation, dike clearing, or new dike building). Other funds may have to be tapped to finance restoration implementation.

There are restoration efforts in other Oregon estuaries that demonstrate potential funding sources for restoration implementation. For example, an interagency analysis of potential flood control solutions for about 60 acres behind the deteriorated Libby Dike in the Coos River Estuary found a nonstructural approach (e.g., occupant evacuation and dike breaching) to be the preferred alternative under economic and environmental criteria (Corps of Engineers 1987). Funding is to be provided by the federal government (75%) and the state of Oregon (25%). A fisheries enhancement proposal is associated with the project and is considered to substantially increase the potential benefits obtainable through dike breaching. Therefore, flood control and fisheries enhancement promise to be important levers for obtaining funds for restoration actions, especially on marginally productive farm land (Sill 1987).

7. TECHNICAL FEASIBILITY OF MITIGATION AND RESTORATION

The technical feasibility of mitigation and restoration of wetlands and aquatic areas in the Pacific Northwest is uncertain. Most permitted mitigation sites in the Northwest are less than five years old (Kentula 1986). Monitoring of these sites has been inconsistent. However, information is available and promises to increase dramatically in the near future.

In 1978, a diked wetland was restored to tidal influence in the Salmon River Estuary, about 80 miles south of the Columbia River Estuary (Mitchell 1981). The area was believed to have been high marsh prior to diking. Considerable subsidence occurred during the period of diking. After removing the dike, the area changed from an upland pasture character to a low transitional salt marsh. While an estuarine wetland had been created, the original wetland type was probably not restored. However, marsh succession may eventually facilitate high marsh restoration in this area (Jefferson 1974).

In the Columbia River Estuary, a 2.5-year study by the Corps of Engineers was done on Miller Sands Island. The study reviewed a wetland rehabilitation/creation project on a dredged material disposal island in the Columbia River. Pre- and post-project inventories documented changes in physical and biological conditions on the island. Certain emergent wetland plants were successfully established from sprigs at elevations greater than 2 feet above MLLW. Almost no plants were established from seeding (Kentula 1986).

Also in the Columbia River Estuary, Oregon's first mitigation bank was developed by relocating the Astoria airport dike to restore tidal influence from Youngs Bay and the lower Lewis and Clark River to 33 acres of freshwater wetland (the area was historically diked and used for agriculture). Since the restoration action was done in advance of potential developments, credits are held in reserve until they are needed as compensation for wetland and aquatic area impacts by development. However, once credits were estimated for the Bank, there was no attempt to retain their connection to the habitat types at the bank. Therefore, in-kind mitigation cannot be calculated for developments matched with the bank. Baseline data on hydrology and vegetation were collected prior to dike removal in the summers of 1985 and 1986. Post restoration monitoring is being implemented to determine the success of this attempt at estuarine wetland restoration as a mitigation strategy (Jackson, et al. 1986). Presumably, most existing trees and shrubs will die and the area will revert to low and high brackish marsh (Figure 10). The Oregon Division of State Lands owns the bank and administers the bank's credits.

7.1 MITIGATION AND RESTORATION IMPLEMENTATION TECHNIQUES

The state-of-the-art of wetland mitigation feasibility is in its early developmental stages. However, considerable efforts are being made in the Northwest to increase our knowledge on what techniques are necessary to make a given mitigation action successful (Fishman et al.

1987). This section briefly explores the findings of several researchers and agencies involved in mitigation planning and implementation.

7.1.1 Mitigation and Restoration Site Selection for Tidal Wetlands

One of the first steps for wetland mitigation and restoration implementation is to define a suitable location for the mitigation site. Generally, site selection should be based on site characteristics within the framework of related state and federal policies and economic considerations.

In most cases, mitigation sites should be as close to potential development sites as possible (in some cases the degraded nature of the area by development activities will make off-site mitigation more desirable). There is a federal and state agency preference for on-site/in-kind mitigation. The site should demonstrate low suitability for fish and wildlife (e.g., diked pasture or sparsely vegetated upland accretion areas adjacent to estuarine waters) and have no substantial structures or other potential conflicting uses. Lands that are producing a low or negative net income for the land owner are prime candidates for mitigation uses. The sites should be located in areas that can be zoned for mitigation use. Ideally, a reserve of a number of sites of different sizes with a variety of potential salinity, sediment and tidal inundation regimes is desirable. This will facilitate more in-kind/-on-site mitigation options (Smith 1983).

Restoration sites can be inventoried using the same criteria used for mitigation sites. However, they do not necessarily have to be near development areas and, in many cases, probably should be located away from developments in order to avoid conflicting development uses and competition with mitigation sites.

7.1.2 Compensatory Mitigation and Restoration Action Guidelines

The next step is to plan and implement the mitigation or restoration project (we will assume the habitat type and area requirements have already been determined). Two approaches are taken to provide guidelines for this phase of the mitigation plan. The first is a review of recommendations by field biologists and agencies that have experience in implementing mitigation projects. The second is a review of criteria that have been developed to evaluate existing wetland characteristics and subsequent values. The rationale here is that wetland characteristics that are considered desirable in existing wetlands are desirable characteristics to recreate in wetland mitigation and restoration projects. These approaches are reflected in the following list of wetland mitigation/restoration project guidelines:

Suggested Estuarine-wide goals (Goner 1979):

a) Increase total area available at different tidal elevations to maximize intertidal diversity (the lower the angle of slope, the greater the area at each elevation).

b) Maximize macrophyte production to increase the supply of plant detritus to the estuarine system.

c) Excavate shoreline in an irregular fashion to maximize total length of shoreline adjacent to the estuarine wetlands.

d) Make conservation of total estuarine area a major priority.

Guidelines for Wetland Mitigation Projects (modified, Larson 1976): [9]

a) If possible, use mitigation sites to restore rare habitat types and endangered species (e.g., restoring rare plant communities and planting historically associated rare plants).

b) Where appropriate, plant flora with high visual value.

c) Where feasible, plan wetland type and vegetation community configurations to allow the maximum amount of edge habitat.

d) Where waterfowl habitat is desired, provide an adequate ratio between open water and feeding and nesting areas (about 1:1).

e) Where an option is available, select sites that have a high opportunity for viewing, i.e., at the bottom of cliffs or in valleys where a good overlook is available.

f) In many cases, it is desirable to combine mitigation areas to facilitate creation/restoration of a few large sites as opposed to a large number of small sites (this option may be selected when on-site mitigation is not possible or where on-site mitigation includes an area designated to accumulate a number of mitigation projects).

g) If relatively proximate sites must be separate, link the sites with vegetation and surface water corridors.

h) Where diversity is desired, plan for a variety of plant community types and wetland classes.

i) Locate mitigation sites adjacent to areas that are relatively undisturbed and/or buffered by land forms or vegetation.

j) Where appropriate, make the perimeter of the wetland irregular in shape and plant a substantial vegetation buffer around sections of the wetland subject to potential human disturbance (e.g., where urban parks or industrial developments are adjacent or near the wetland edge).

k) Creation of a diversity of upland land forms in and near the

---

[9] The original criteria were designed to evaluate freshwater wetlands. Therefore, modifications were made to convert them to estuarine wetland mitigation guidelines.

wetland may be appropriate in some cases (e.g., islands, levees, dunes, etc.).

Guidelines for Wetland Mitigation Projects (Garbisch 1986).

a) In most cases, only indigenous perennial plants should be used (sometimes exotic plants are used for their food values).

b) Transplanted peat potted plants, plugs, springs, and dormant underground plant parts are usually most successful.

c) Marsh planting success is often correlated with spacing distances. Generally, dense plantings (1 plant per square foot) will have higher success than sparser plantings but are more expensive.

d) Depending on the site, planting may be done mechanically or by hand in temporarily drained areas. Plants adapted to a broad tidal range or water regime have lower mortality.

e) Small experimental plants should be established for plants with questionable survivability.

Guidelines for Wetland Mitigation Projects (Josselyn, M. N., James W. Buchholz and Paul Romberg 1984).

a) Fine grained sediments (e.g., silt and clay) indicate low-energy (low wave and current action) zones which have greater potential for vegetation establishment.

b) The fetch (distance which wind blows over the surface of the water) strongly influences wave height at time of impact with the shore. Plant establishment met with greatest success where the fetch was less than 1 km (.62 miles).

c) Planting success is greater in protected coves than near headlands.

d) Plants can help dampen wave impacts. Effectiveness, is greater when water depth is less than plant height. Therefore, periods where plants are emergent should coincide with periods of heavy wave action.

e) Emergent and submerged plants can reduce turbulence and, therefore, indirectly contribute to sedimentation.

f) Hydrology is a crucial aspect of marsh restoration projects. Hydrology affects the growth rates of marsh vegetation, movements of invertebrates, fish, nutrient and organic matter exchange, species distribution, etc.

g) Natural channels are very intricate and diverse compared to artificially established channels. However, artificial channels tend to adopt natural characteristics over time.

h) Channel construction is expensive and unless area is dewatered for a sufficient period of time, it is very difficult to use heavy equipment.

i) Once established, channels may go through a gradual filling, partly from slumping of channel sides onto the bottom.

j) Erosion occurring in a newly excavated channel is due to an inadequate cross section area relative to tidal prism and drainage volume, i.e., narrow channels facilitate higher stream velocities and greater erosion.

k) Since some channel filling is to be expected, it is probably desirable to excavate below the level you wish to ultimately maintain.

l) Marsh design must account for hydrologic variables on a case-by-case basis. The overall elevation with respect to tidal flow, micro-topographical variations, location in the estuary and vegetation all affect tidal velocity and distribution.

m) Marsh designers should establish criteria for shoreline protection and channel construction.

n) Vegetation structure is very important with respect to defining wildlife use of an area. Vegetation cover designs can be used to develop conditions for preferred species or conditions for a diversity of species.

o) Generally, areas with a dense vegetation cover provide nesting and escape cover for a variety of species.

p) Vegetation is also very important to the community with respect to its food production role, which includes its role in detritus production.

q) Generally filter feeders (e.g., bivalves and amphipods) are abundant in areas where current is sufficient to suspend and transport organic matter.

r) Sediment types affect the types and abundance of organisms that occupy an area (e.g., polychaetes tend to be more abundant on soft muds along channels).

s) High marshes frequently contain mosquito larvae. Drainage ditches can be used to increase tidal flushing which, to some extent, helps control mosquito populations. Also, some research indicates larger open water ponds ($> 100\ m^2$ with < 30% vegetation) have fewer mosquito larvae.

t) Sloughs and their tributaries form an important link between the marsh and the estuary. In addition to aquatic related exchanges, vegetation along the corridors provides food and

nesting for a variety of wildlife.

u) Suggested Monitoring Program:

Goal	Technique	Frequency	Time
Vegetation Establishment	Photos and Mapping	Annually	10 - 20 Days
Vegetation Growth	Minimum/Maximum Biomass at 10-12 Sites	Twice Per Year	10 - 20 Days
Fish Habitat	Trawl or minnow trap in marsh channels during summer	During seasons of use	3 - 6 Days
Bird Habitat	Population Surveys and nest site determinations	During seasons of use	10 - 15 Days
Tidal Flushing	Sediment Markers	Twice Per Year	5 - 10 Days
Endangered Species	Monitor	Once Per Year	5 - 10 Days

7.2 FUTURE MITIGATION RESEARCH NEEDS

The state-of-knowledge on the technical feasibility of mitigation is at a rudimentary level of development. The ecological literature documenting post-mitigation physical and biological data is sparse. This section briefly reviews current mitigation research needs identified by the Environmental Protection Agency (EPA) in their 1985 Wetlands Research Plan (Zedler and Kentula 1985).

The EPA identifies two major types of mitigation when determining research needs:

- o impact avoidance and minimization; and
- o compensatory mitigation

This discussion focuses on compensatory mitigation research.

An overall goal of mitigation research is to develop a knowledge base that may be used to improve mitigation project design and to judge the potential success of a variety of mitigation proposals. However, before this can be accomplished "success" must be defined. The EPA suggests that the barometers for success are "natural" systems. That is, the test of success will be when artificially created habitats cannot be distinguished from the natural systems they are attempting to emulate.

Since ecosystems are spatially and temporally complex, single variable comparisons (e.g., vegetative cover) are inadequate. A number of variables must be identified (e.g., plant height, number of species, hydroperiod, salinity, and sediment type) and used to identify the similarity of the artificially created system. Various multivariate techniques can be used to make these comparisons.

While goals for habitat replication (mitigation) may be based on comparisons with model "natural" habitats, the ultimate decisions regarding types of habitats to replicate and when a replication is successful are based on human centered concerns (Frenkel 1987). These concerns should be addressed in the form of mitigation goals that are stipulated in a mitigation plan. These goals can be used as a baseline for determining mitigation project success. However, it is unclear at this time what goals are reasonable and what methods are best applied to achieve them.

The EPA recognizes this dilemma and subsequently has identified a research approach that focuses on long term monitoring of mitigation projects that can be artificially manipulated for experimental purposes. This type of research promises to provide answers to specific research questions (Zedler and Kentula 1985):

How do various hydrological conditions (e.g., flow rate and inundation regime) affect the community structure and functional values of a wetland?

What are the hydroperiod and depth inundation requirements of new systems vs. mature systems, if any?

How should plant material used in mitigation projects be collected and handled prior to planting?

What planting scheme will establish the desired vegetation most quickly?

Should planting densities reflect differences in hydroperiods, soils and proximities to channels?

Under what conditions and time frames will natural colonization occur?

What size wetland is necessary to be functional?

What configuration and arrangement of individual wetlands is most attractive to water-dependent wildlife?

The Environmental Protection Agency will be using a variety of past mitigation projects and dredge disposal sites to help them answer these questions and others. While EPA is considering controlled experimental research in the future, at this time, very little work of this type has been done or planned. Also, EPA research in the Northwest is focusing primarily on freshwater nontidal wetlands (Zedler and Kentula 1985).

8. MITIGATION AND RESTORATION POLICIES AND STANDARDS FOR THE COLUMBIA RIVER ESTUARY

The purpose of this section is to present mitigation and restoration policies and standards derived through review of existing federal and state mitigation and restoration policies and through consultation with a Mitigation and Restoration Plan Advisory Committee. With respect to mitigation, the policies and standards outlined here assume water dependency, public need and practicable alternative issues have been considered and a permit will be issued with mitigation requirements appended. The primary issues at this stage are the determination of the Resource Category, as defined by the U. S. Fish and Wildlife Service, and appropriate mitigation strategies.

These policies and standards will be incorporated in the mitigation and restoration element of the 1987 Columbia River Estuary Regional Management Plan (CREST Plan). They are presented in seven major sections:

8.1 Definitions

8.2 Mitigation Policies for Wetlands and Aquatic Areas

8.3 Restoration Policies for Wetlands and Aquatic Areas

8.4 Restoration Standards for Wetlands and Aquatic Areas

8.5 Long Term Wetland and Aquatic Area Mitigation and Restoration Policies

8.6 Restoration Policies for Resources other than Wetlands and Aquatic Areas

8.7 Mitigation Standards for Wetlands and Aquatic Areas

The 1987 CREST Plan will be presented to local jurisdictions in the Columbia River Estuary (Clatsop County, Port of Astoria, City of Astoria, City of Warrenton, Town of Hammond, Pacific County, Town of Ilwaco, Port of Ilwaco, Wahkiakum County and Town of Cathlamet. Each jurisdiction will review the policies. Policies are recommended for adoption and incorporation into local plans. Policies adopted by Washington jurisdictions will be incorporated into local Shoreline Master Plans and policies adopted by Oregon jurisdictions will be incorporated into local Comprehensive Plans.

8.1. DEFINITIONS

Beneficiary (with respect to this Plan):

Any living organism, including human, that benefits from values and functions of wetlands and aquatic areas.

In-Kind:

Any actions that duplicate the full array of wetland and aquatic area characteristics that are lost or impaired by a development action.

Mitigation:

Any action that, to some degree, softens the impact of development on wetlands and aquatic areas. This may include all or any one of the following actions:

1. Avoiding the impact altogether by not taking a certain action or parts of an action;

2. Minimizing impacts by limiting the degree of magnitude of an action and its implementation;

3. Rectifying the impact by repairing; rehabilitating; or restoring the affected environment;

4. Reducing or eliminating the impact over time by preservation and maintenance operations; and

5. Compensating for the impact by creation, restoration, or enhancement of wetlands and aquatic areas to maintain their functional processes, such as natural biological productivity, habitats, and species diversity, unique features and water quality.

Any mitigation action or combination of actions may involve monitoring and remedial follow-up measures.

Off-Site:

An area separated from the impact area by a significant distance and that offers little or no opportunity for reestablishing lost values and functions to original beneficiaries.

On-Site:

An area adjacent to or near the impact area that offers a reasonable opportunity for reestablishing lost values and functions to original beneficiaries.

Out-of-Kind:

Any action that replaces wetland or aquatic area characteristics that have been impaired or lost due to a development action with a different set of characteristics that are judged to be of equal resource value.

Restoration:

Revitalizing, returning, or replacing original attributes and amenities, such as natural biological productivity, aesthetic and cultural resourc-

es, which have been diminished or lost by past alterations, activities, or catastrophic events. For the purpose of Oregon Statewide Planning Goal 16, estuarine restoration means to revitalize or reestablish functional characteristics and processes of the estuary diminished or lost by past alterations, activities, or catastrophic events. A restored area must be a shallow subtidal or an intertidal or tidal marsh area after alteration work is performed, and may not have been a functioning part of the estuarine system when alteration work began.

Active Restoration involves the use of specific remedial actions, such as removing fills, installing water treatment facilities, rebuilding deteriorated urban waterfront areas, or returning diked areas to tidal influence.

Passive Restoration is the use of natural processes, sequences, and timing which occurs after the removal or reduction of adverse stresses without other specific positive remedial action.

Wetlands:

In Washington:

Shoreline Definition

Lands extending landward for 200 feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous flood plain areas landward 200 feet from such floodways; and all marshes, bogs, swamps, and river deltas associated with the streams, lakes, and tidal waters.

Biophysical Definition

Lands transitional between terrestrial and aquatic systems where saturation with water is the dominant factor determining plant and animal communities and soil development. For the purpose of this definition, these areas must have one or more of the following attributes:

1. At least periodically, the land supports predominantly hydrophytes; and/or

2. The substrate is predominantly undrained hydric soil.

In Oregon:

Land areas where water is the dominant factor determining the nature of soil development and the types of plant and animal communities living at the soil surface. Wetland soils retain sufficient moisture to support aquatic or semi-aquatic plant life. In marine and estuarine areas, wetlands are bounded at the lower extreme by extreme low water; in freshwater areas by a depth of 6 feet. The areas below wetlands are submerged lands or aquatic areas.

Wetland Creation:

Alteration, by excavation or other means, of upland areas to allow local hydrologic conditions to convert soils and vegetation to a hydric character.

Wetland Enhancement:

An action which results in a long-term improvement of existing wetland functional characteristics and processes that is not the result of a creation or restoration action.

8.2 MITIGATION POLICIES FOR WETLANDS AND AQUATIC AREAS

Policies in this section are applicable to estuarine restoration and mitigation projects on Columbia River Estuary aquatic areas and shorelands.

1. Any dredge or fill activities that are permitted in the Columbia River Estuary intertidal or tidal areas or fill activites in shallow subtidal areas shall be mitigated through project design and/or compensatory mitigation (creation, restoration or enhancement of another area) to ensure that the integrity of the estuary ecosystem is maintained. In Oregon, Comprehensive Plans shall designate and protect specific sites for mitigation which generally correspond to the types and quantity of intertidal area proposed for dredging or filling, or make findings demonstrating that it is not possible to do so.

2. Mitigation for removal and fill in intertidal or tidal areas or fill in shallow subtidal areas of the Columbia River Estuary planning area shall be implemented, to the extent feasible, through the following Mitigation actions:

Project Design Mitigation Actions

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 action and its implementation;

c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment (this would include removing wetland fills, rehabilitation of a resource use and/or extraction site when its economic life is terminated, etc.);

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

Compensatory Mitigation Actions

e) Creation, restoration, or enhancement of an estuarine area to maintain the functional characteristics and processes of the

estuary, such as its natural biological productivity, habitats, and species diversity, unique features and water quality.

Any combination of the above actions may be required to implement mitigation requirements. The compensatory mitigation actions listed in section (e) shall only be implemented after impact avoidance, reduction and rectification techniques have been considered, and there are still unavoidable impacts.

3. Pre-permit application meetings and site visits shall be encouraged.

4. The initial site visit coordinated between the local government and federal and state agencies shall be structured such that key issues will be addressed and consensus, to the degree possible, is established on each issue. This will require a structured format listing goals, objectives, and specific activities.

5. The full array of wetland and aquatic area benefits shall be addressed when making mitigation site decisions and when designing mitigation action requirements. The list includes but is not limited to: flood storage and desynchronization, food chain support, passive recreation, shoreline anchoring and water purification functions.

6. All mitigation actions shall be required to begin prior to or concurrent with the associated development action.

7. Developments in low value diked freshwater nontidal wetlands can be mitigated by treating estuarine restoration or creation as in-kind mitigation actions.

8. If out-of-kind mitigation is found to be the only option, the applicant shall first seek restoration of historically and/or present-day scarce habitat types.

9. All completed mitigation sites shall be adequately buffered from development and other activities to minimize the potential adverse impacts on the mitigation site.

10. No mitigation action shall endanger or obstruct adjacent properties. The potential for present or future endangerment or obstruction shall be determined in advance of the mitigation action. Responsibility shall be determined prior to permit approval.

11. CREST will cooperate with local jurisdictions in the Columbia River Estuary area and state and federal resource agencies in the periodic review of the region's mitigation plan. Reviews shall occur every 4-7 years. The review shall include reexamination of site availability, degree of plan implementation, changed policies and legal requirements and possible new projects that may require mitigation.

12. Estuarine alterations in Washington can be mitigated by actions in Oregon and vice versa if:

Local and state authorities from both states and federal authorities with statutory responsibility for administering mitigation requirements approve the mitigation site selected and the mitigation action proposed.

13. Mitigation can be considered a permitted or conditional use in any zone, management unit, or environment adopted in a local comprehensive plan or shoreline master plan except, in Oregon, on shorelands designated Especially Suited for Water Dependent Development (ESWD), Goal 3 agricultural lands and Goal 4 forest lands.

14. Full consideration shall be given to existing significant Goal 17 resources or Resource Category 1 and 2 habitats when designing a mitigation project that may potentially alter, impair or destroy all or any portion of these resources. The minimum consideration will be to discount existing values from the credit potential of the mitigation action proportional to the value of the Goal 17 resource. A goal exception shall be required where damage to Goal 17 resources is a concern.

15. Any acquisition strategy for bringing designated mitigation sites (pre or post mitigation action) into public ownership or into ownership of a private nonprofit land trust is encouraged.

16. All mitigation sites designated on public lands shall remain in public ownership.

17. An area in productive use and considered for mitigation purposes shall be evaluated for its present use value and compared with its potential value as a wetland before conversion of the site is acceptable.

18. Adequate mitigation sites shall be designated and protected in the Comprehensive Plan (in Oregon) and Shoreline Master Plans (in Washington) to satisfy anticipated mitigation credit and habitat needs in the Columbia River Estuary.

19. Additional mitigation sites shall be designated by local jurisdictions as the need arises. New designations shall be coordinated with CREST, local governments, state and federal resource agencies. New sites shall be subject to the same policies and standards as sites presently designated.

20. Mitigation sites designated in Wahkiakum County, Washington shall be reserved only for development project match-ups that directly benefit the economy of Wahkiakum County.

21. A developer may create, restore or enhance more wetland area than required for immediate development impacts. Subject to federal, state and local agency approval, this "excess mitigation" may be credited against future development by the developer. The reserve wetland area shall not be considered a mitigation bank unless it is acquired and managed by a federal or state land and resource management agency.

8.2.1 Mitigation Bank Policies

1. Any area where a mitigation action has taken place and mitigation credits are available for future development and the site is owned and managed by a federal or state land management agency, shall be designated as a mitigation bank. The federal or state agency shall be responsible for administration of a mitigation bank area, throughout the period it serves as a bank.

2. A memorandum of agreement among local, state and federal authorities shall serve as the implementing instrument establishing the mitigation bank and for continuing management of the bank. Such an agreement is necessary to document the initial conditions of the bank's formation, including the means by which the mitigation bank shall be administered. The agreement shall also detail ownership of the site and include an itemized presentation of project costs, a technical plan outlining the habitat mitigation action, and include the number of mitigation credits available in the bank. A plan for monitoring the mitigation site shall be provided, including the goals, costs, and responsibility of the monitoring program. The agreement shall specify the mechanisms by which mitigation requirements for future estuarine development will be transferred to the bank, the type of activity qualifying for use of the bank, and the means by which proportional mitigation bank development costs will be assessed by development sponsors.

3. Mitigation credits in mitigation banks shall be reserved for use by small scale development projects (5 acres or less of impacted wetland and/or aquatic area).

4. A variety of habitats shall be created whenever possible, such that the opportunity of replacement for wetland resources lost to a variety of development activities is possible. The mitigation bank shall be of sufficient capacity to meet the requirements of a number of expected development projects.

5. Mitigation banks, in Oregon, shall be created by written agreement with the Director of Oregon Division of State Lands (DSL) and shall be administered but not necessarily owned by DSL. Such agreements shall provide the basis for creation and operation of the bank and shall specifically provide for the following:

a) The exact location of the real property.

b) Proof of ownership or control, i.e., deed or title report.

c) The nature and extent of the mitigation action. This analysis shall require information about the site salinity, elevation, wave and current actions, substrate, and other physical and biological characteristics.

d) How and when the mitigation action shall be performed.

e) A statement of informed opinion as to what habitat shall result from the action and a statement as to the relative

value of each anticipated habitat type.

f) How the resulting changes shall be monitored and evaluated [OAR 141-85-254 (12, 14)] and what contingencies are planned if goals are not satisfied within a reasonable time period.

g) How the mitigation bank shall be protected, i.e., dedication, conservation easement, deed transfer, etc.

h) How funding for necessary construction or alteration work and potential remedial action shall be guaranteed, i.e., bonding.

i) The price that may be charged for credits from the bank.

6. Applicants for removal and fill permits requiring mitigation are not obligated, or automatically entitled, to use an existing mitigation bank to meet the mitigation needs of any project. Permit applicants shall negotiate directly with the owner of the bank to secure the right to use the bank. Agreements between the owner of the bank and the permit applicant are subject to the Planning Director's approval of the number of mitigation credits charged against the bank.

8.3 RESTORATION POLICIES FOR WETLANDS AND AQUATIC AREAS

1. Restoration of tidal and nontidal wetlands in the Columbia River Estuary area may be done either as a mitigation action or as an action outside of the context of mitigation.

2. Potential restoration sites (areas suitable for restoration but not matched with a development action) may be designated as mitigation sites until they are identified for restoration outside of the context of mitigation. At this time, they shall be designated as restoration sites.

3. All restoration projects shall serve to revitalize, return, replace or otherwise improve the wetland and aquatic ecosystems in the Columbia River Estuary area. Examples include restoration of natural biological productivity, fish and wildlife habitat, aesthetic or historic resources that have been diminished or lost due to past alterations, activities, or catastrophic events. In selecting projects, priority shall be given to those projects which provide substantial public benefits and which restore those wetland and aquatic habitat types, resources, or amenities which are in shortest supply compared to past abundance.

4. The following framework for restoration implementation is recommended for the Columbia River Estuary:

a) To develop and provide educational materials for landowners explaining the benefits of natural area protection and various options for restoring land to natural conditions and protecting the restored land.

b) To establish an incentive system in the Columbia River Estuary area whereby landowners can effectively utilize a variety of

options for restoration and protection of their land.

c) To identify landowners with economically marginal production land (e.g., forest or crop production), that was historically wetland, and to inform them of the incentive-oriented restoration system being devised and encourage their participation.

d) To differentiate between areas that are mitigation site candidates as opposed to restoration site candidates. Any potential restoration that is not matched with a proposed development can be a candidate.

5. The following techniques are suggested as potential methods to establish a wetland restoration and protection incentive system:

a) Development of effective acquisition power through private nonprofit land trusts and federal and state grants (acquisition may be through sale, trade or land donations). Public ownership is encouraged.

b) Protection through restrictions while landowners retain title to the land, i.e, conservation easements, mutual covenants, deed restrictions and leases.

c) Provide tax incentives for landowners that allow restoration to take place on their land.

d) Deed restrictions, wildlife easements or fee acquisition on Farmers Home Administration farm foreclosure inventory lands.

6. Restoration actions that flood farm properties, forest lands, sites designated as Especially Suited for Water-dependent Development and significant Goal 17 resources shall require full consideration to trade-offs associated with each action.

7. After a restoration takes place the local jurisdiction shall amend its plan and implement a zone change to reflect the aquatic natural character of the created wetland and/or aquatic area.

8. Restoration of economically marginal and unused low-lying diked areas to estuarine wetland shall be encouraged; active restorations to provide potential for diverse habitat (e.g., mudflat and marsh) as well as passive restorations are encouraged. Except through public condemnation procedures, removal of dikes or excavation on private lands shall not occur without consent of the landowner.

8.4 RESTORATION STANDARDS FOR WETLANDS AND AQUATIC AREAS

1. In Oregon, a goal exception shall be required to implement restoration actions on Goal 3 agricultural land and Goal 4 forest land.

2. In Oregon, a goal exception shall be required to implement restoration actions in areas designated Especially Suited for Water Dependent

Development (ESWD) and areas where restoration may deleteriously affect significant Goal 17 resources.

8.5 LONG TERM WETLAND and AQUATIC AREA MITIGATION and RESTORATION POLICIES

1. Federal and state resource agencies shall be requested to intensify existing programs to identify Resource Categories of wetlands and section 404 wetlands in the Columbia River Estuary area with the purpose being to give greater certainty to developers regarding available development sites and potential mitigation requirements. The net result shall be greater certainty for developers and a more streamlined permit process.

2. CREST shall make an effort to develop a program to identify and assess the relative values of the nontidal wetlands in the CREST planning jurisdiction. This inventory effort shall provide baseline data that can be used to give greater certainty to development interests regarding site potential for development. It will serve to help alleviate the problem of lengthy and costly after the fact permits and restoration orders. It will also serve to give greater certainty to appropriate mitigation and dredge disposal site selection.

3. A method of quantifying enhancement credits for mitigation shall be determined.

4. A mechanism through which a transfer of development rights can occur shall be researched and, if feasible, installed into local planning ordinances.

5. A system shall be devised whereby wetland impacts that are allowed under a regional or nationwide permit and that do not require a permit procedure to be followed, shall be reported to the local government so that an accurate record of cumulative wetland impacts can be maintained.

8.6 RESTORATION POLICIES FOR RESOURCES OTHER THAN WETLANDS AND AQUATIC AREAS

1. Consideration shall be given to restoring water circulation in historically shoaled areas. Circulation enhancements must outweigh any potential damages to wetlands before they are implemented.

2. Old piling, navigational structures, and buildings that are a hazard to navigation and contribute to excessive shoaling, or pose a threat to life or property shall be removed. Prior to removal, the costs and benefits associated with removal shall be evaluated. Factors requiring consideration include:

- Potential erosion or sedimentation problems that may result from removal;
- The structure's habitat value and probable longevity; and

o The structure's historic and scenic values.

3. Restoration of riparian vegetation around wetlands and waterways in the Columbia River Estuary Planing area is a high priority. Protection of these areas shall be implemented using various strategies, i.e., zoning, acquisitions, easements, transfer of development rights (if possible), etc.

4. Shoreland and wetland areas that have had the vegetation cover removed by development activities shall be revegetated to the extent practicable with wildlife value, aesthetics and erosion control being the primary objectives.

8.7 MITIGATION STANDARDS FOR WETLANDS AND AQUATIC AREAS

Standards in this section are applicable to estuarine mitigation projects on Columbia River Estuary wetlands, aquatic areas and adjacent shorelands.

1. Any dredge or fill activities that are permitted in the Columbia River Estuary intertidal or tidal areas or fill activities in shallow subtidal areas shall be mitigated through project design and/or compensatory mitigation (creation, restoration or enhancement of another area) to ensure that the integrity of the estuary ecosystem is maintained. In Oregon, Comprehensive Plans shall designate and protect specific sites for mitigation which generally correspond to the types and quantity of intertidal area proposed for dredging or filling, or make findings demonstrating that it is not possible to do so.

2. Mitigation for removal and fill in the Columbia River Estuary intertidal areas or fill in shallow subtidal areas shall be implemented, to the extent feasible, through the following Mitigation actions:

Project Design Mitigation Actions

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 action and its implementation;

c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment (this would include removing wetland fills, rehabilitation of a resource use and/or extraction site when its economic life is terminated, etc.);

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

Compensatory Mitigation Actions

e) Creation, restoration, or enhancement of an estuarine area to maintain the functional characteristics and processes of the

estuary, such as its natural biological productivity, habitats, and species diversity, unique features and water quality.

Any combination of the above actions may be required to implement mitigation requirements. The compensatory mitigation actions listed in section (e) shall only be considered when, after consideration of impact avoidance, reduction or rectification, there are still unavoidable impacts.

3. If any of the compensatory mitigation actions are required, the local government shall request that the U. S. Fish and Wildlife Service make a Resource Category determination for the site proposed for development. The classification shall be listed on the permit application and review notice. If the area subject to impact is in a Resource Category 1 site, it shall be protected, if it is in a Resource Category 2 or lower (4 = lowest), the flowing sequence of mitigation options shall be considered:[10]

- o In-Kind/On-Site
- o In-Kind/Off-Site
- o Out-of-Kind/On-Site
- o Out-of-Kind/Off-Site

The following list summarizes the mitigation goal for each resource category:

a) Resource Category 1:

Habitat to be impacted is of high value for evaluation species and is unique and irreplaceable on a national basis or in the Columbia River Estuary area.

Mitigation Goal: No loss of existing habitat value.

b) Resource Category 2:

Habitat to be impacted is of high value for evaluation species and is relatively scarce or becoming scarce on a national basis or in the Columbia River Estuary area.

Mitigation Goal: No net loss of in-kind habitat value.

c) Resource Category 3:

---

10 Generally, the requirements for considering each option before moving on to the next shall be stricter for higher Resource Categories.

Habitat to be impacted is of high to medium value for evaluation species and is relatively abundant on a national basis.

Mitigation Goal: No net loss of habitat value while minimizing loss of in-kind habitat value.

d) Resource Category 4:

Habitat to be impacted is of medium to low value for evaluation species.

Mitigation Goal: Minimize loss of habitat value.

4. All initial mitigation site work shall be reviewed against predesignated performance specifications, i.e., starting date, a negotiated completion date, grade specifications, area and elevation specifications of dike removal, channel specifications, seeding or planting specifications, etc. Any specifications not addressed or satisfied shall be cause to require remedial follow-up measures to satisfy the performance specification(s). Remedial work shall also be required for dredge or fill impacts not specified in the permit.

5. All mitigation actions shall be required to begin prior to or concurrent with the associated development action.

6. All mitigation permit requirements shall address specific mitigation goals, and to the extent practicable, measurable objectives (e.g., the amount of vegetative cover that will be established in a specific area over a specified time period). These goals and objectives shall be determined by the local government in coordination with state and federal resource agencies. The purpose of the goals and objectives is to provide a standard by which to measure the success of a particular mitigation action. The permit shall not be approved until determination has been made that the goal and objective statements are satisfactory. "Satisfactory" means that post-mitigation monitoring can use the goal and objective statements on the permits to judge the success of the projects.

7. Post-mitigation monitoring of project design and compensatory mitigation sites shall be required over a 2-5 year time period, depending on the size and complexity of the mitigation project.

a. Local governments, in cooperation with state and federal resource agencies, shall design and implement the monitoring.

b. Developer accountability requirements shall be based on anticipated financial and environmental risk factors.

c. A bond, or any legal mechanism that serves as a bond, shall be required to hold the developer accountable to remedial follow-up requirements.

d. Potential remedial follow-up actions shall be identified in a

well structured contingency plan. The contingency plan shall be required as a condition of permit approval.

e. The developer shall not be responsible for project problems not addressed in the contingency plan nor for any expenses over the amount estimated in the contingency plan.

f. Any portion of monies held and not used for remedial work shall be refunded to the developer.

g. A waiver of the 2-5 year monitoring requirement shall be granted if, at any time during the 2-5 year period, the project is judged successful.

h. If a mitigation project fails to satisfy the original goals and objectives after the designated time period, and the developer has met all the site design and contingency plan requirements, then the developer is not responsible for remedial action. However monitoring may still be required up to a predetermined time period to help agencies determine workable strategies for future mitigation efforts.

i. The contingency plan shall include statements of potential courses of action, or corrective measures to be taken, in the event of sub-optimal project performance (based on project goals and objectives).

8. For estuarine wetlands in Oregon, once a compensatory mitigation action is required, the habitat types displayed in Figure 4 shall provide the basis for comparing development activities and possible mitigation areas. The mitigation trade method described in Section 5.1 shall be used to determine acreage requirements for mitigation sites.

9. For nontidal wetlands in Oregon, once a compensatory mitigation action is required, local governments shall determine habitat trade requirements in coordination with appropriate state and federal agencies. Mitigation requirements shall be made on a case by case basis using determinations made by these agencies.

10. For estuarine and nontidal wetlands in Washington, once a compensatory mitigation action is required, local governments shall determine baseline habitat carrying capacity in coordination with appropriate state and federal agencies. Mitigation requirements shall be made on a case by case basis using the determinations made by these agencies.

11. In Oregon, removal and fill actions exempt from estuarine mitigation requirements include: [11]

---

[11] These activities are not necessarily exempt from federal mitigation requirements. For example, with regard to riprap projects, the U.S. Army Corps of Engineers may require design modifications. Also maintenance dredging projects may have timing restrictions imposed.

a) Removal or fill of less than 50 cubic yards of material;

b) Filling for repair and maintenance of existing functional dikes where there is negligible physical or biological damage to tidal marsh or intertidal area;

c) Riprap to allow protection of existing bank line with clean, durable material provided that the need for riprap protection is demonstrated and that this need cannot be met with natural vegetation, and no appreciable increase in upland occurs;

d) Filling for repair and maintenance of existing roads where there is negligible physical or biological damage to tidal marsh or intertidal areas;

e) Dredging or filling required as part of an estuarine resource creation, restoration, or enhancement project agreed to by local, state, and federal agencies; and

f) Maintenance dredging.

g) Any proposed alteration that would have negligible adverse physical or biological impact on the estuarine resources.

12. Actions not considered as mitigation in Oregon or Washington include:

a) Conversion of an existing wetland type to another wetland type as mitigation for impacts on another wetland shall not be allowed. Diked nontidal wetlands with low wildlife value can be discounted and restored to tidal influence as mitigation for impacts in diked nontidal wetlands. Also, enhancement of an existing wetland can be considered mitigation for impacts in another wetland;

b) Transfer of ownership of existing wetlands to public ownership.

c) Dedication of existing wetlands for natural uses;

d) Provision of funds for research; or

e) Monetary compensation for lost wetlands.

13. The following criteria shall be considered when selecting and including potential mitigation sites in the Columbia River Estuary Mitigation Plan (not in order of priority):

a) Proximity to potential development sites.

b) Opportunity to create or restore habitat conditions similar to those at the impacted sites or historically and presently scarce habitat types.

c) Character of potential sites (e.g., low habitat value and no conflicting uses).

d) Potential for protection through zoning.

e) Amount of new dike requirements

14. Mitigation site designations not established in the Plan shall be made using criteria itemized in Standard 15. In addition, sites selected shall have enough area and/or credits to accommodate the mitigation requirement as stipulated by:

a) In Oregon:

- The Oregon Division of State Lands relative value trade formula (OAR 141-85-256) for Oregon's portion of the Columbia River Estuary.

- The Habitat Evaluation Procedures, Adamas Model, or professional judgment of federal and state wildlife biologists for Oregon's nontidal freshwater wetlands.

b) In Washington:

- For estuarine and nontidal wetlands, once a compensatory mitigation action is required, local governments shall determine baseline habitat carrying capacity in coordination with appropriate state and federal agencies. Mitigation requirements shall be made on a case by case basis using the determinations made by these agencies.

15. The following approach shall be used to protect sites selected for compensatory mitigation actions:

a) All mitigation sites shall be designated in local Comprehensive Plans in Oregon and Shoreline Master Programs in Washington.

b) All sites are classified under one of three priorities (based on need) and one of four levels of protection (based on need and landowner concerns):

1. Priority	Need	Level	Protection
1	High	1	
Matched with Mediated Development, Port Plan or Permit	Landowner not concerned about restrictions		Uses that preclude use of the site for mitigation purposes (e.g., substantial topographic alterations or alterations or structural improvements) are not allowed without a plan amendment.

2. Priority	Need	Level	Protection
1	High	2	
Matched with Mediated Development Port Plan or Permit	Landowner concerned about property restictions		Substantial topographic alterations and structural improvements allowed under a conditional use permit. Conditions are (1) no deviation from conditions allowed under existing underlay zone (e.g., EFU) and (2) if diked, demonstration that a predetermined amount of dike frontage and contiguous diked area be retained for mitigation purposes. If upland, then demonstration a predetermined amount of contiguous area is available for excavation to allow tidal influence or capable of being inundated through some water level control procedure.

3. Priority	Need	Level	Protection
2	Medium	3	
Matched with non-mediated development			A 30 day freeze on permit applications to give public agencies time to review potential effects on mitigation use and current need for mitigation use at the site.

4. Priority	Need	Level	Protection
3	Low	4	
Not matched with a development			No restrictions, listed for inventory purposes only.

16. For mitigation sites on Exclusive Farm Use land (in Oregon), farm related structures valued at $ 5,000 or less shall be considered exempt from permit requirements.

17. A Plan amendment shall be required to remove a Priority 1 mitigation site from the mitigation overlay. A Plan amendment shall require a demonstration that there is no longer a need for the site or that a suitable alternative mitigation site has been designated and protected.

18. A Priority 2 site shall be totally removed from the mitigation overlay if the landowner proposes a development that would preclude its use for mitigation and, 30 days after the permit application has been circulated, a negotiated agreement to sell the land, or certain landownership rights, for mitigation use has not been made. The negotiation

shall be between the landowner and any interested buyer. The site shall not be removed from the overlay until the development is completed.

19. A Priority 2 site shall be partially removed from the mitigation overlay if the landowner proposes a development that would partially preclude its use for mitigation and, 30 days after the permit application has been circulated, a negotiated agreement to sell the land, or certain landownership rights, for mitigation use has not been made. The negotiation shall be between the landowner and any interested buyer. The partial removal shall not take place until the development is completed.

20. The local jurisdiction shall make the determination of whether a development will preclude all or some of the potential use of the site for mitigation purposes.

21. If the landowner is a public entity, and the proposed mitigation site is in a protected zone and managed under protection oriented directives, a protection requirement shall not be imposed on the site.

22. After a mitigation action takes place, the local jurisdiction shall amend its plan and implement a zone change to reflect the aquatic natural character of the created wetland and/or aquatic area.

23. Private landowners shall be compensated, by the developer, with payment equal to fair market value for land used for mitigation actions on their ownerships.

24. The developer implementing a mitigation action shall be responsible for all costs associated with the mitigation project.

9. SITE SPECIFIC MITIGATION STRATEGIES FOR THE COLUMBIA RIVER ESTUARY

This section describes methods and results of pairing development sites and mitigation sites in the Columbia River Estuary.

9.1 METHODS OF SITE SELECTION

Development scenarios are based on a review of the CREST Mediation Panel Agreements (CREST 1981), Port of Astoria Marine Terminals Development Plan (Port of Astoria 1986), Lower Columbia River Assessment of Oregon Deep Draft Sites (Ogden Beeman and Associates 1986) and the CREST Mitigation Plan for the Columbia River Estuary (CREST 1983). These documents, in conjunction with zoning information and knowledge of CREST staff, were used to determine the amount and type of intertidal and shallow subtidal habitats that may be impacted by development in the Columbia River Estuary. Development sites were mapped and classified by habitat type. Acreages for these sites were determined either through prior documentation or through planimeter measurements on 1:4,800 and 1:1,200 scale County Assessors maps.

Initially, 54 potential mitigation and restoration sites were identified using prior inventories and an examination of 1:9,600 and 1:12,000 true color aerial photographs (Corps of Engineers Photogrametry 1977 and 1978). Diked tidelands and uplands adjacent to the estuary were examined using these photographs. Areas that were not occupied by structures (e.g., houses, farm buildings, etc.) and that did not appear to support significant upland or freshwater nontidal wetland wildlife habitat were selected. Each site was visited and screened under the following criteria:

- Low existing wildlife habitat value:
  - Low layer and cover type diversity
  - General absence of bodies of water
  - General absence of hydric plants
- Low conflicting uses:
  - Absence of significant structures

Of these 54 sites, 34 were selected as final inventory sites. Sites were eliminated that were not near identified potential wetland or aquatic development areas or that required relatively large sections of new dike work.

9.2 METHODS OF ASSIGNING NEED AND PROTECTION STATUS OF MITIGATION SITES

Each of the final inventory sites is assigned to a priority class based on the anticipated future need of the site. There are three priority classes with Priority 1 sites representing highest anticipated

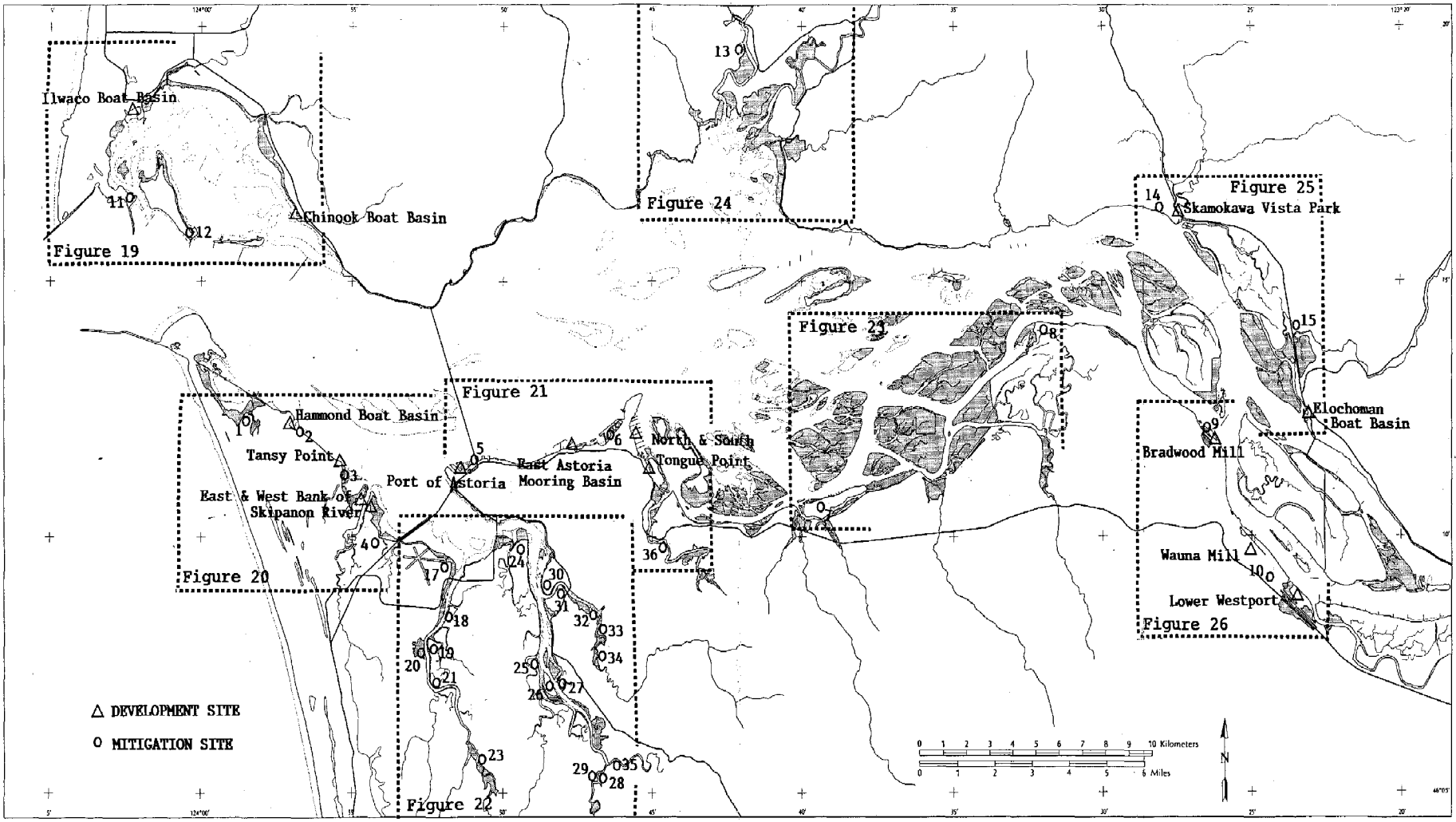


Figure 7. Mitigation and development sites in the Columbia River Estuary.

need. Need is judged to reflect the degree a given site has been committed to mitigation use. In 1981, CREST Mediation Agreement Proceedings were held to discuss future development on the Oregon side of the Columbia River Estuary. The product of those proceedings was a document, referred to here as the Mediation Panel Agreement, that reflects negotiated development scenarios for certain controversial areas in the Estuary. Negotiators included federal and state agencies and local governments. A relatively high degree of certainty is associated with development scenarios outlined in the Mediation Panel Agreements. Therefore, any mitigation sites matched with developments outlined in the Mediation Panel Agreement are considered to have a high certainty of need. One development site, East Bank Skipanon, and one mitigation site, Holbrook Slough, were specifically matched under the Mediation Agreement Proceedings. Also, the Port of Astoria Development Plan and the Tansy Point Industrial Park barge moorage permit application are considered representative of highly certain development scenarios. Therefore, mitigation sites matched with these developments are also given Priority 1 status.

Priority 1 sites are discussed in detail. They were mapped by elevation, and predicted habitat overlays were developed based on six assumptions:

- Areas below - 3 feet MLLW would develop into subtidal channel or unvegetated flats.
- Areas between - 3 feet MLLW and + 3 feet MLLW would develop into intertidal channel or unvegetated flats.
- Areas between + 3 feet and + 8 feet MLLW would develop into low marsh habitat.
- Areas between + 8 feet and + 11 feet MLLW would develop into high marsh habitat.
- Areas above + 11 feet MLLW would be upland.
- Once released to unrestricted tidal influence, these potential habitats will eventually resemble nearby undisturbed habitats at the same elevation.

There are potential development areas in the Columbia River Estuary not discussed in the Mediated Panel Agreement. These are sites that have historically demonstrated impacts on aquatic and/or wetland areas and that are in shoreland and aquatic development zones. Any mitigation site matched with one of these areas is considered a Priority 2 site.

Finally, mitigation sites were identified that are not attached to any development. The anticipated need for these sites is low. They are considered Priority 3 sites in the Plan.

In Oregon, Goal 16 implementation requirements state that "specific mitigation sites shall be designated and protected to generally corre-

spond to the types and quantity of intertidal area proposed for dredging or filling, or make findings demonstrating it is not possible to do so." In order to address the protection language in this requirement, four hierarchical levels of protection (1 being the highest) were attached to mitigation sites. Levels of protection are proportional to anticipated need of the site. They are, therefore, assigned a fixed association with Priority classes. Priority 1 sites are associated with a higher level of protection than Priority 2 sites and Priority 3 sites are not protected.

Pacific and Wahkiakum counties, in Washington, have no implementation requirement to protect mitigation sites in their Shoreline Master Plans. For these areas, CREST Mitigation and Restoration Plan recommendations for sites are advisory and carry no statutory support from the state of Washington. All sites identified in Washington were placed in the Priority 2, Level 3 status.

This system of Priority classes and hierarchical protection levels is also an attempt to address landowner concerns regarding restrictions of property rights. It is an alternative to a blanket protection mechanism with no flexibility or sensitivity to a realistic projection of need or to property owner concerns. The system is outlined below:

Priority 1 Site:

Mitigation site linked with Mediated Panel Agreement, Port of Astoria Development Plan or Tansy Point Industrial Park barge moorage development site.

a) Landowner(s) not concerned with retaining development opportunities allowed prior to Mitigation Overlay designation.

Level 1 Protection:

No topographic or structural improvement without a plan amendment in a fixed mitigation overlay zone.

b) Landowner(s) concerned about retaining development opportunities allowed prior to Mitigation Overlay designation.

Level 2 Protection:

Topographic or structural improvements permitted, subject to a conditional use permit, in a floating mitigation overlay zone. Conditions for development would require (1) no deviation from conditions allowed under existing underlay zone and (2) if diked, demonstration that a predetermined amount of dike frontage and contiguous diked area be retained for mitigation purposes. If upland, then demonstration a predetermined amount of contiguous area is available for excavation to tidal influence or capable of being inundated through some water level control procedure.

Priority 2 Site:

Mitigation site linked to a development area that has historically demonstrated impacts on aquatic and/or wetland areas or that are near aquatic and wetland areas that are in development zones. No formal permits or agreements regarding development exist.

Level 3 Protection:

Topographic and structural improvements are permitted uses within the context of existing zoning restrictions but a 30 day freeze is imposed on the permit decision to allow any potential developer/buyer requiring a mitigation site, time to negotiate with the landowner for use of the property.

Priority 3 Site:

Mitigation site not linked to any specific development sites.

Level 4: Inventory site with no restrictions.

These Priority 1 sites were matched to development sites based on the following criteria:

- The proximity of the mitigation site to the development site;
- The present use of the proposed mitigation site (public ownership was considered higher priority);
- The availability of in-kind mitigation credits; and
- The availability of adequate credits with respect to credit requirements.

These criteria were applied to Priority 1 mitigation sites in the following way. First, mitigation sites that are in the general area (within a 3 mile radius) and the same salinity regime as a given top priority development site were considered high priority sites under the proximity criterion. Second, a site was evaluated for its present use and ownership. Sites that were not committed to preemptive alternative uses, and those in public ownership were given higher priority. Third, specific habitat types impacted at the development sites were matched to mitigation sites with potential to develop similar habitat types. Therefore, the potential for in-kind and acre-for-acre mitigation actions is increased. Sites that demonstrated in-kind habitat trade opportunities were given higher preference in mitigation/development site match-ups.

Priority 2 site match-ups were based on proximity, present use and ownership, existing habitat value, and conflicting use criteria. Areas that were relatively near the development area, had relatively low existing habitat values, displayed no conflicting uses, and were publicly owned were considered the best match-up candidates. Since developments associated with Priority 2 sites have no area delineations, it is not possible to calculate credit trades for their respective match-ups.

Priority 3 sites were not matched with any development areas.

It is not possible to have complete adherence to these criteria in all cases. For example, certain public lands were moved from the Priority 2, Level 3 designation and placed in a Priority 2, Level 4 or a Priority 3, Level 4 category because of ownership concerns regarding designations on their properties.

Priority 2 sites are listed in a match-up table and in an overall inventory list that includes zoning, ownership, acreage, etc. Mitigation need and an analysis of compensation are briefly discussed. Priority 3 sites are listed on the inventory list with information regarding ownership, zoning, area, location, etc. These sites are not matched with any developments. Therefore, need and compensation are not discussed for these sites.

In Oregon, the number of mitigation credits needed at each development site is determined by the trade formula in the Oregon Mitigation Law Administrative Rule (OAR 141-85-256) and the number of mitigation credits available at identified mitigation sites. This criterion addresses the Oregon Goal 16 implementation requirement to designate and protect specific sites for mitigation which generally correspond to the types and quantity of intertidal area proposed for dredging or filling.

There are no Priority 1 mitigation sites in Washington. However, even if there were, the Oregon credit trade system cannot be legally applied in another state. Therefore, mitigation type and area requirements are made on a case by case basis in Washington.

The findings accompanying each match-up do not preclude or restrict other potential mitigation match-up options. They are displayed to help expedite the mitigation site search, acquisition, and mitigation action implementation for developments that are required to provide compensatory mitigation. It is recognized that new and innovative mitigation actions not included in the Plan may be proposed. The Columbia River Estuary Mitigation and Restoration Plan is flexible enough to accommodate such proposals provided they adhere to the mitigation policies and standards contained in Section 8.

9.3 LANDOWNER CONCERNS

A great deal of effort has been made to develop a Plan that is sensitive to landowners that have ownerships designated or inventoried in the Plan. Hence, the prioritization and hierarchical levels assigned the various mitigation sites. This Plan significantly reduces the levels of restrictions imposed on many landowners in the 1983 Mitigation Plan. It offers compromises that promise to allow landowners to realize all or most of any use benefits allowed under their current zoning. The Plan encourages active citizen involvement in formulating a just system through which private landowners and the public can benefit from mitigation and restoration actions in the Columbia River Estuary.

During public Mitigation and Restoration Plan Advisory Committee

meetings, several landowners with ownerships under mitigation overlay designations raised the issue of regulatory taking without just compensation. The CREST staff have addressed this issue by reviewing restrictions recommended for mitigation site designations in the Plan against findings of three US Supreme Court cases: Pennsylvania Coal Co. v. Mahon (1922), First English Evangelical Lutheran Church v. County of Los Angeles (1987) and Nollan v. California Coastal Commission (1987). The following text constitutes a summary of our conclusions.

The test regarding a finding of a legally defined regulatory taking appears to rest with one question. Does the landowner retain a reasonable set of ownership rights and opportunities to realize a reasonable economic benefit from his/her property? If the answer is yes, a taking has not occurred. If the answer is no, it has. The answer, therefore, depends on where the line between reasonable and unreasonable is placed. When does a regulation go too far and, therefore, constitute a taking? The criteria for drawing this line have not been defined by past Supreme Court decisions. Generally, courts have upheld that down zoning is legal and necessary to regulate land use for the public good.

Protection levels and subsequent restrictions proposed for mitigation sites in the CREST Mitigation and Restoration Plan clearly do not (emphasis added) take all reasonable property ownership rights nor preclude all reasonable opportunities for the landowner to realize economic benefits.

Under a Priority 1, Level 1 protection mitigation overlay zone, no uses that would preclude the use of the site for mitigation purposes (e.g., significant topographic changes or significant structural improvements) are allowed without a plan amendment. This level does not restrict all potential use of the property. For example, under the Clatsop County Comprehensive Plan, a site designated in an Exclusive Farm Use zone could still be used to generate profits from raising, harvesting and selling crops or by the feeding, breeding, management and sale of, or the produce of, livestock, poultry, fur bearing animals or honeybees or for dairying and the sale of dairy products or any agricultural or horticultural use or animal husbandry or any combination thereof. Also, farm structures under $ 5,000 in value are are not considered "significant structural improvements" structures and are exempt from restrictions imposed under the mitigation overlay zone.

Under a Priority 1, Level 2 protection mitigation overlay zone, topographic or significant structural improvements are allowed to the degree stipulated in the existing base zone. However, a floating zone within the mitigation overlay zone is imposed. The floating zone can take a variety of shapes and, therefore, allows the landowner flexibility in determining development locations. Within the floating zone, no uses that would preclude the use of the site for mitigation purposes (e.g., significant topographic changes or significant structural improvements) are allowed without a plan amendment. With respect to the floating zone, a stipulation is made that a predetermined amount of dike frontage and contiguous diked area shall be protected for mitigation purposes (area will be based on estimated requirement to compensate for matched development based on formula cited in OAR 141-85-256).

Exemptions allowed under Priority 1, Level 1 also apply to the floating zone.

This level is less restrictive than the Priority 1, Level 1 protection mitigation overlay zone. For example, an area zoned for Exclusive Farm Use with this level of restriction would allow farm uses, roadside stands for selling farm products, propagation or harvesting of a forest product, utility facilities for noncommercial public service, single family dwelling on a parcel 38 acres or greater if necessary for farm use, operations for exploring geothermal resources, and a residence on previously occupied lot if occupied by immediate relative of farm operator in the area not occupied by the floating zone. Conditional uses in this same area would include dwellings or mobile homes needed for farm use on less than 38 acre parcels, single family dwellings not associated with farm uses, commercial developments in conjunction with farm uses (e.g., veterinary office, feed store, winery, or farmers market), mining operations, government or nonprofit parks, playgrounds, schools, golf courses, horse boarding for profit, personal airports, solid waste disposal, or churches. In the floating zone, for areas where a mitigation overlay is on an EFU base zone, all uses listed in Priority 1, Level 1 are allowed including "non-significant" ($ 5,000 or less) farm related structures.

Priority 2, Level 3 mitigation overlay designations are initially as restrictive as Priority 1, Level 1 designations, but only over a 30 day review period (beginning after a permit application is circulated). During this time any developers interested in using all or part of the site for mitigation have an opportunity to negotiate with the landowner. If at the end of 30 days the landowner has agreed to sell all or portions of the site, or certain property rights, the permit would be cancelled. If an agreement could not be made, and the application satisfies local zoning requirements, the permit would be granted. During the 30 day review period, all uses allowed under the a Priority 1, Level 1 designation would be allowed, including exemptions.

Priority 3, Level 4 mitigation overlay zones impose no restrictions. They are listed for informational purposes. Existing base zone regulations do apply to these sites.

Since reasonable uses and opportunities for economic benefit are retained at each level of protection, and since the mitigation overlay serves to facilitate the public good, and since the Supreme Court does not define the threshold of a regulatory taking, CREST submits that the mitigation overlay zone system described above does not constitute a regulatory taking (for an opposing opinion, see Appendix 2).

9.4 PRIORITY 1 MITIGATION SITE DESCRIPTIONS

All sites listed in this section are considered Priority 1 Mitigation Sites. They have been selected out of the inventory as the most suitable sites for match-up with Mediated Panel Agreement, Port Development Plan and Tansy Point Industrial Park permitted development sites in the Columbia River Estuary.

Information contained in the general site descriptions of the mitigation sites for salinity regimes, tidal range, elevation, vegetation and fauna were obtained from the CREST Columbia River Estuary Regional Management Plan (McColgin et al. 1979), the CREST Inventory (Seaman et al. 1979), the CREST Atlas (Fox et al. 1984), the 1983 CREST Mitigation and Restoration Plan (Smith 1983) and site visits. Locations of mitigation and restoration sites are provided in Figure 7 and Figures 19 through 26.

Since there were no Priority 1 Washington sites, credit values of mitigation sites (potential) and development sites (existing) were derived using the system defined in Oregon State Estuarine Mitigation Law (ORS 541.626) and its associated Administrative Rule (OAR 141-85-240 et seq.). Using this system, credits were derived by:

- o Itemizing potential or existing habitat types at each site;
- o Assigning each habitat type a relative value as defined by OAR 141-85-256;
- o Determining the total acreage of each habitat type; and
- o Multiplying the acreage of each habitat type by its respective relative value. These numbers represent the number of credits each habitat type is contributing or potentially contributing to the site.

Development sites were matched with mitigation sites using this system. Development credits were subtracted from mitigation credits derived in the same habitat class. This was considered in-kind mitigation. If there were more credits available than required, the transaction was termed a credit surplus. If a given mitigation habitat class could not compensate for all the required credits for the corresponding class at the development site, the transaction was termed a credit deficit. In the case of a deficit, if there were surplus credits available in another habitat type, the deficit credits were subtracted from the surplus credits. This was termed out-of-kind mitigation. Deficit or surplus acreages were not determined. However, they can be derived by dividing the deficit or surplus credits by the relative value of each respective deficit or surplus habitat type:

Example

DEVELOPMENT

Habitat Type	Relative Value	Acres	Credits
Brackish Intertidal Low Marsh	5	2	10

MITIGATION

Brackish Intertidal Low Marsh	5	5	25

HABITAT TRADE

Credits Available	Credits Required	Net Credits
25	10	15

15 Credits/5 Relative Value = 3 acres brackish low marsh remaining

9.4.1 Site # 3. TANSY POINT (Figure 8)

Status: Priority 1, Level 1

Location: T8N, R10W, Section 9D

Size: Approximately .5 acres (Potential Low or High Marsh or Sand/ Mud Flats).

Potential Habitat Types/Relative Values:

Table 6. Relative Values of Potential Habitat Types at the Tansy Point Mitigation Site.

Salinity	Tidal Regime	Vegetation	Substrate	Relative Value
1. Brackish	Low Intertidal	Marsh	Sand and/ or Mud	5
2. Brackish	High Intertidal	Marsh	Sand and/ or Mud	3
3. Brackish	Low Intertidal	None	Sand and/ or Mud	4

Potential Credits: As a wetland creation site, all three habitat type potentials are feasible. Therefore, potential credits for each respective habitat type (1 - 3) are: 2.5, 1.5, and 2.0.

Site Description: The Tansy Point area is divided into two sections based on land use. The northern section of the area is heavily developed while the southern portion still retains a predominantly natural character. The southern portion encompasses the area to be used for mitigation. This site description focuses on the southern section.

Elevation: Variable

Vegetation/Wildlife: Significant stands of riparian vegetation border the southern boundary of the proposed mitigation site. Species include: Sitka spruce, Crabapple, hooker willow, hawthorn, and slough sedge. The eastern section consists of Estuarine and Palustrine emergent wetlands that form the vegetative transition between deep water wetland and upland. These wetlands will link the mitigation wetland with the estuary. The wetland transition is: intertidal high marsh (reed canary grass, pacific silverweed, birdsfoot-trefoil), low marsh (water parsley, cattails and bull rush) and intertidal sand/mud flats. Wildlife observed in this area include King Fishers, Great Blue Herons, cormorants, gulls and variety of waterfowl.

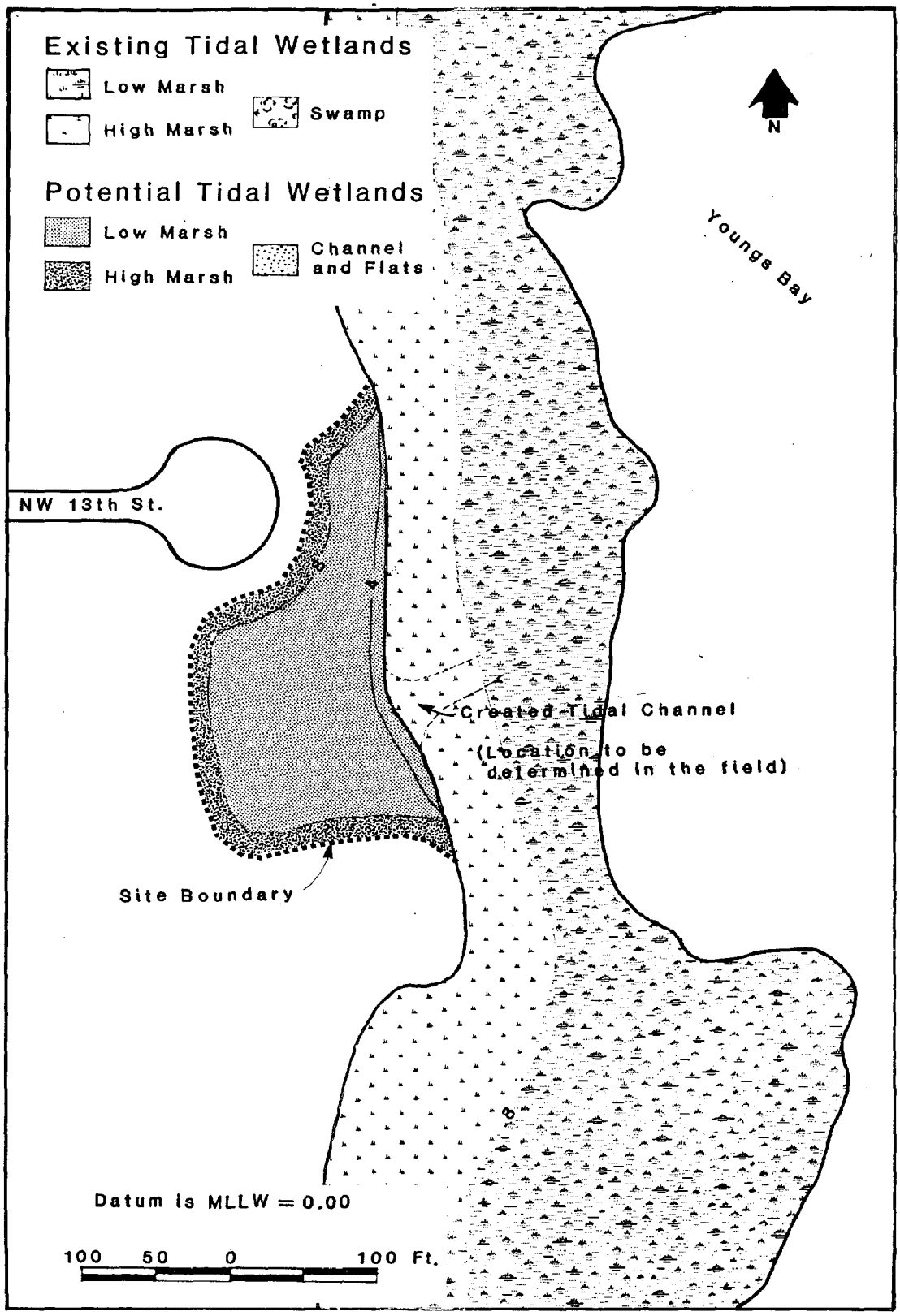


Figure 8. Tansy Point mitigation site (Barnes 1987).

Zoning Authority and Designation:

City of Warrenton

Shoreland: Water Dependent Industrial
Aquatic: Aquatic Natural

Ownership:

Shoreland: City of Warrenton
Aquatic: State of Oregon

Potential Mitigation Action:

The creation of low and high intertidal marsh by excavation of uplands to the intertidal regime and channel excavation to provide adequate flushing with the estuary.

Estimated Cost of Mitigation (Karnosh pers. communication):

Excavation:	$ 2.00 cubic yard
Loading:	.75 cubic yard
Short Haul:	.25 cubic yard/mile
Long Haul:	.20 cubic yard/mile
Disposal:	.25 cubic yard

Three possible wetland creation scenarios were evaluated for mitigation at Tansy Point: 1. Excavation and immediate side casting, 2. Excavation, loading, hauling and disposing near excavation (less than 1 mile), and 3. Excavation, loading, hauling, and disposing five miles from excavation. Assuming the overburden at the Tansy Point site is about 6 feet deep, one acre of removal would constitute about 9,860 cubic yards. Factoring in a 3% slope, over a hypothetical 208 ft. run, towards the shoreline leaves about 5000 cubic yards/acre. Based on this standard, the cost of the respective mitigation scenarios cited above are projected:

1. Immediate Sidecasting: $ 2.00 x 5,000 cu. yds. = $ 10,000.00/acre

2. Move Material (< 1 mile): $ 2.00 + .75 + .25 + .25 = $ 3.25
$ 3.25 x 5000 cu. yds. = $ 16,250.00/acre

3. Move Material (5 miles): $ 2.00 + .75 + 1.25 + .25 = $ 4.25
$ 4.25 x 5000 cu. yds. = $ 21,250.00/acre

1. .5 acres x $ 10,000.00 = $ 5,000.00
2. .5 acres x $ 16,250.00 = $ 8,125.00
3. .5 acres x $ 21,250.00 = $ 10,625.00

It should be noted that the owners of the wood processing facility own their own earth moving equipment and that the equipment and operators are available on a regular basis. Therefore, the costs of the mitigation actions cited above may be substantially less than projected here.

Potential Conflicting Uses:

There are no conflicting uses identified with the mitigation use of this site. However, additional mitigation actions will probably be precluded by industrial development on the north and west and significant riparian and wetland vegetation on the south and east.

Conclusion:

A Priority 1, Level 1 classification of this site will adequately protect the site from development pressures in adjacent areas.

9.4.2 Site # 4. HOLBROOK SLOUGH (Figure 9)

Status: Priority 1, Level 1

Location: T8N, R10W, Section 22 AC and AD; On Youngs Bay shore immediately west of Holbrook Slough.

Size: 40 acres (Potential 24.2 acres low marsh, 11.5 acres high marsh and 4.3 acres channel)

Existing and Potential Habitat Types/Relative Values:

Table 7. Relative Values of Existing Habitat Types at the Holbrook Slough Mitigation Site.

	Salinity	Water Regime*	Vegetation	Substrate	Relative Value
1.	Fresh	Semi-permanently or Seasonally Inundated	Marsh	Sand and/or Mud	3
2.	Fresh	Seasonally Inundated	Marsh	Sand and/or Mud	1
3.	Fresh	Semi-permanently Inundated	None	Sand and/or Mud	3
4.	Fresh	Intermittently Flooded (nonwetland)	Meadow/Shrub Riparian	Silty Clay Loam	0

* (Cowardin et al. 1979).

Potential Habitat Types:

Table 8. Relative Values of Potential Habitat Types at the Holbrook Slough Mitigation Site.

	Salinity	Tidal Regime	Vegetation	Substrate	Relative Value
1.	Brackish	Low Intertidal	Marsh	Sand and/or Mud	5

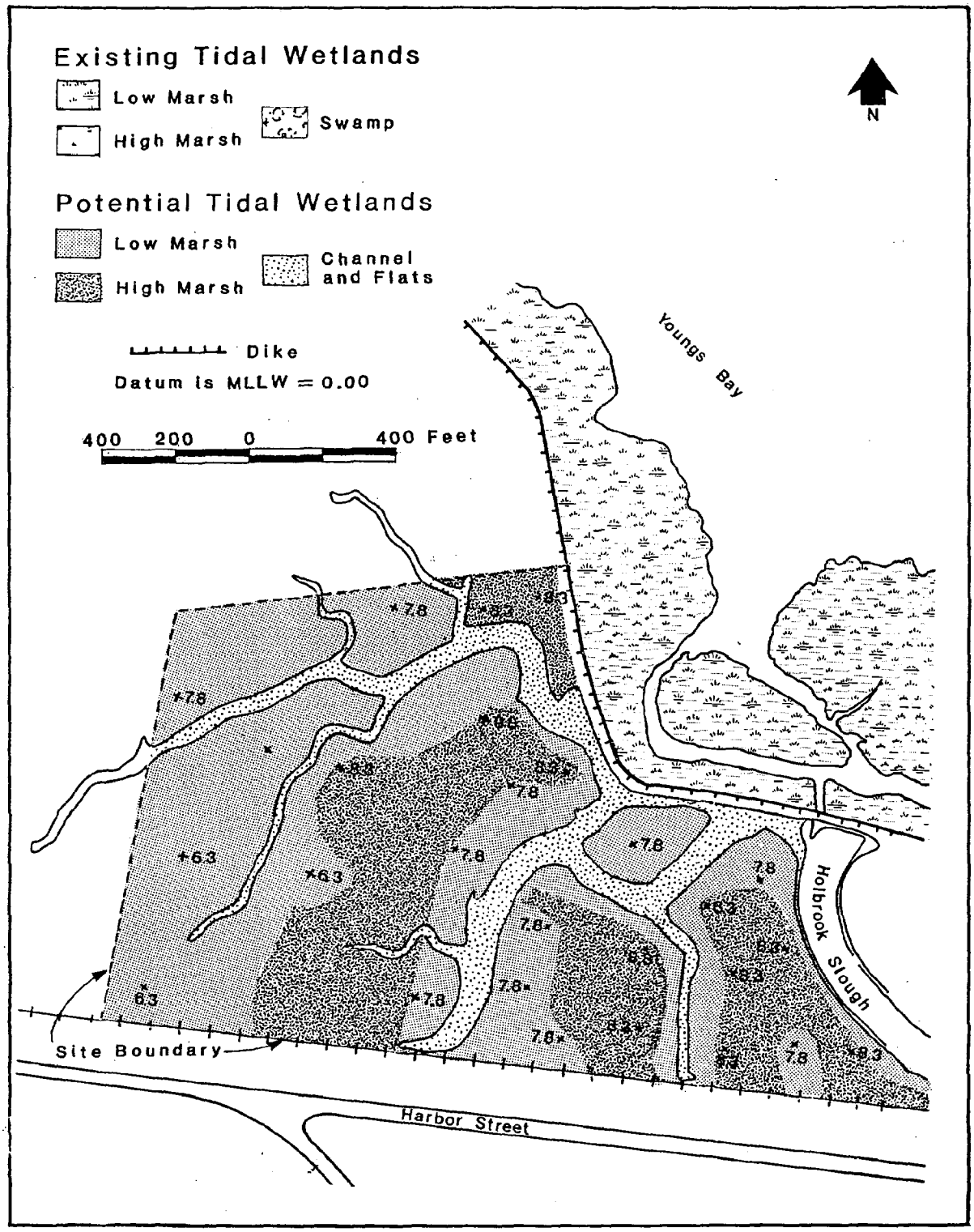


Figure 9. Holbrook Slough mitigation site (Smith 1983).

Table 8. Relative Values of Potential Habitat Types at the Holbrook Slough Mitigation Site. (continued)

2. Brackish	High Intertidal	Marsh	Sand and/ or Mud	3
3. Brackish	Low Intertidal	None	Sand and/ or Mud	4

Potential Credits: The Holbrook site contains existing nontidal freshwater wetlands over some of its area. These wetlands are assumed to have existing value and are, therefore, discounted in the credit evaluation for the site. However, due to time constraints, wetland boundary and area calculations were not made. Two alternative credit assessments (low and high) were derived. The low assessment assumes the entire area is comprised of wetlands that are discounted from the post-restoration value. The high assessment assumes there are no wetlands present at the site and that zero credits need to be discounted. The outcomes of the two assessments are suggested lower and upper limits to the range of mitigation credits that may be available at Holbrook Slough.

The low estimate of available post-restoration credits was derived by assuming the values displayed in the Oregon State Mitigation Law Administrative Rule (OAR 141-85-256) for freshwater intertidal wetlands are the same for freshwater nontidal wetlands with the same vegetation and substrate types. The Holbrook Slough site was then assessed both as a freshwater and brackish wetland (Tables 7 and 8). The freshwater credits were subtracted from the brackish credits and the net credits were considered the minimum net value of the mitigation site after the restoration action (Table 9).

A maximum post restoration value was derived by assuming the area contains no freshwater wetlands and has zero value. Under this assumption, zero credits are discounted against the maximum potential credits. Therefore, the minimum number of post restoration credits available is 75.7 and the maximum number available is 172.7. The actual credits will be somewhere between these high and low figures, probably closer to the high. Resource agencies will make the final determination.

Table 9. Comparison Between Existing Freshwater Nontidal and Potential Brackish Tidal Values for Holbrook Slough Mitigation Site.

Habitat	Brackish Tidal	Freshwater Nontidal	Net Credits
Low Marsh	121.0	72.6	48.4
High Marsh	34.5	11.5	23.0
Channel	17.2	12.9	4.3
Total:	172.7	97.0	75.7

Site Description: The site is diked tideland that contains a few remnant tidal channels. It is characterized by a predominantly nonwetland flora with isolated areas of freshwater marsh (emergent) and scrub-shrub (swamp) wetland.

Elevation: + 4 to + 11 feet MLLW

Vegetation/Wildlife: Vegetation is a mixture of mesic grasses, blackberries, soft-rush, slough sedge, and willow shrubs. The area gets some use by cattle. Small mammals, Short-eared Owls and Northern Harriers use this area.

Zoning Authority and Designation:

City of Warrenton
Shoreland: Mediated Development with Mitigation and Dredge Disposal Overlay

Ownership:

Port of Astoria

Potential Mitigation Action:

Restoration through dike breaching. About 3,450 feet of new dike will be constructed adjacent to the railroad and on the northwest side of Holbrook Slough. Once the new dike is stabilized, the existing dike would be breached in a way that would provide strong scour action to keep the openings from filling in. Existing drainage channels would be connected to facilitate flushing with Youngs Bay.

Estimated Cost of Mitigation:

Land Value:	$ 2,000/acre [based on appraisal of similar land at the Airport Mitigation Bank prior to breaching (Oregon Division of State Lands 1985)].
Acres:	40

Dike Construction Costs: $ 132/ft. (Bierly pers. com.) [12]

Dike Length:	3,450 feet
Total Land Cost:	$ 80,000
Total Dike Cost:	$ 455,400
Total Cost:	$ 535,400

---

12 This is a general estimate based on a 20% increase in the estimate used in the 1983 CREST Mitigation and Restoration Plan. Figures provided by Gamble (1987) and Karnosh (1987) roughly correspond to this estimate.

Minimum Credits
Available: 75.7 (use for high estimate cost/credit)

Maximum Credits
Available: 172.7 (use for low estimate cost/credit)

Potential Conflicting Uses:

The Holbrook Slough Mitigation Site is in a development zone and a designated dredge material disposal site. The Mediated Panel Agreement allows for development of the site if the Skipanon peninsula is committed to developments that do not require fill. Therefore, the site could conceivably be under development pressure at some time in the future. Also, as a mitigation site, the area has been committed to potential developments on the East Bank, Skipanon River through the 1981 CREST Mediated Panel Agreement. If development at the East Bank reaches its full potential, and credits lost are charged against Holbrook Slough, the site may be unavailable for match-up with other projects.

Conclusion:

A Priority 1, Level 1, classification will adequately protect this site from conflicting uses.

The recent history of development in this region indicates that it is unlikely that Mediated Panel Agreement development scenarios will be realized in totality. Also, should credits at Holbrook Slough become committed to other projects, and there are no alternative Priority 1 sites available, it is possible to reclassify Priority 2 or 3 sites to Priority 1 based on a judgement of a need change. Under these assumptions, mitigation area requirements and subsequent protection measures for this site are judged to be adequate.

9.4.3 Site # 17. AIRPORT MITIGATION BANK (Figure 10)

Status: Priority 1, Level 1

Location: T8N, R10W, Section 25 and 24 DC

Size: 33.8 acres (Existing: 11 acres brackish intertidal marsh, 16.3 acres brackish intertidal swamp, 2.0 acres estuarine channel, 3.0 acres dike, 1.5 acres pond.

Table 10. Relative Values of Existing Habitat Types at the Airport Mitigation Bank Site.

Salinity	Tidal Regime	Vegetation	Substrate	Relative Value
1. Brackish	Low Intertidal	Marsh/Pond	Sand and/ or Mud	5
2. Brackish	High Intertidal	Marsh	Sand and/ or Mud	3
3. Brackish	High Intertidal	Swamp	Sand and/ or Mud	3
4. Brackish	Intertidal Channel	None	Sand and/ or Mud	4

Potential Credits: The Airport Mitigation Bank Credits have been discounted for nontidal freshwater wetland values existing at the site prior to dike breaching. There are currently 58.75 credits available at the Bank. These credits are not tied to any specific habitat type.

Site Description: This area was formerly diked tideland converted to farm uses (e.g., pasture). In recent years freshwater wetland vegetation had been invading the former pasture land as grazing pressure diminished. The Division of State Lands now owns the property and has implemented a restoration project through dike breaching. The Division now manages the site as a Mitigation Bank.

Elevation: + 6 to + 11 feet MLLW

Vegetation/Wildlife: The vegetation at the site is expressed in a complex mosaic of wetland classes (low marsh, high marsh, scrub-shrub and forested swamp). However, biologists expect most of the trees and shrubs to die after prolonged tidal influence. Figure 10 displays the potential habitat types that will dominate after several years of tidal exposure. Several tidal channels have been established to facilitate tidal flushing of the site. Parts of the old dike were left as "wildlife" islands. Wildlife observed in

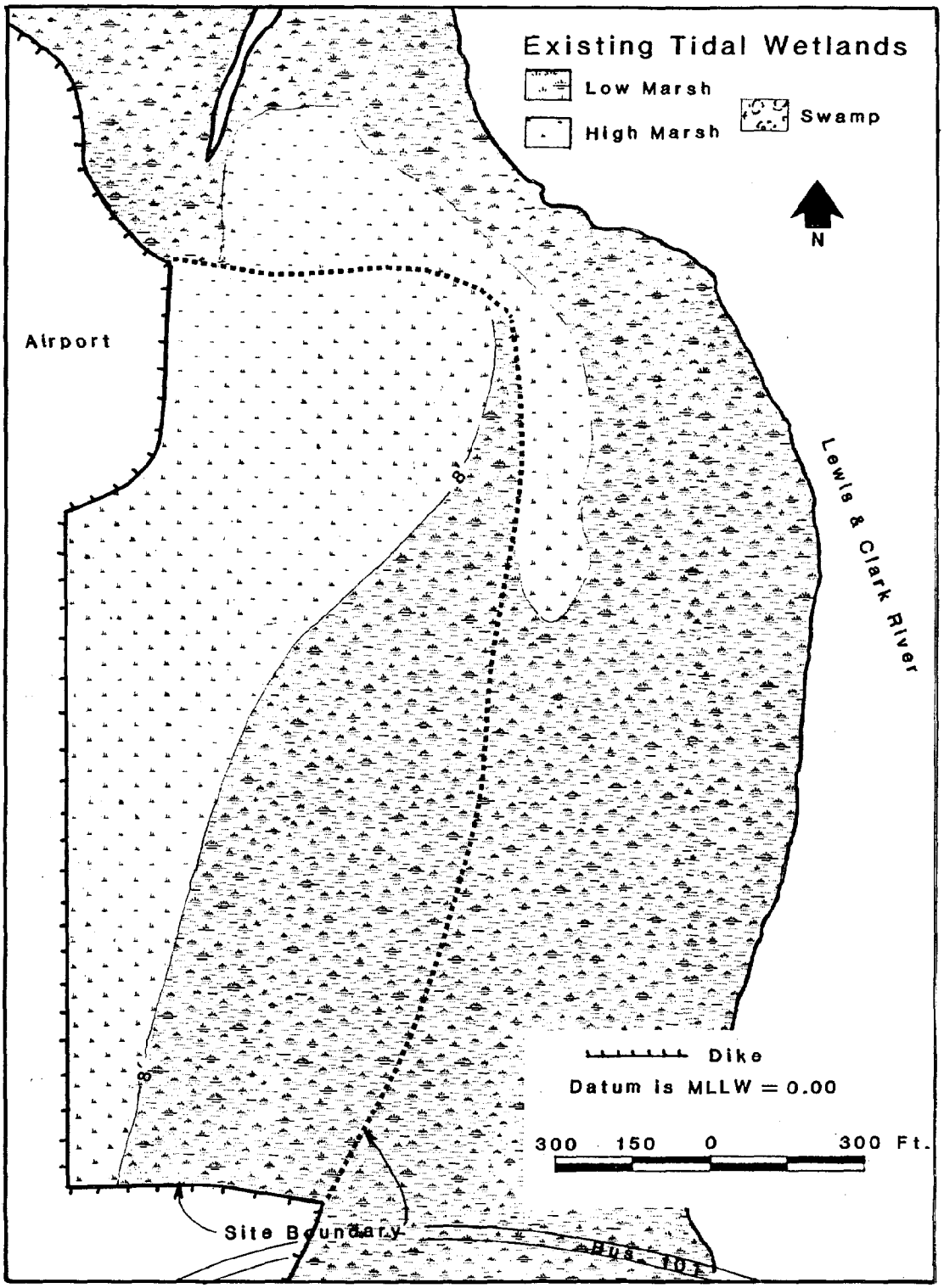


Figure 10. Astoria Airport Mitigation Bank (Oregon Division of State Lands 1986).

this area include Bald Eagles, Northern Harriers, Great Blue Herons, deer, elk, muskrat and a variety of waterfowl.

Zoning Authority and Designation:

City of Warrenton
Industrial Development with Mitigation Overlay
(This will be changed to Aquatic Natural)

Ownership:

Oregon Division of State Lands

Potential Mitigation Action:

The mitigation action (restoration through dike breaching) has already occurred. The credits are "banked" for compensation for future development.

Cost of Mitigation:

Mitigation Credits are available from the Bank through the Division of State Lands. Each Credit costs $ 4,800.00 (Bierly pers. com.).

Potential Conflicting Uses:

Recent Oregon legislation (HB 3382 added to and made part of ORS 541.605 - 541.685) places a 5 acre ceiling on size of developments that can be charged against mitigation banks in Oregon. While this 5 acre limitation is also a CREST Policy, the Port of Astoria has been considering charging development actions exceeding 5 acres against the Bank. A decision from the Attorney General regarding this issue is pending.

A Memoranda of Agreement has been signed by Oregon Division of State Lands, Oregon Department of Fish and Wildlife, Oregon Department of Land Conservation and Development, US Fish and Wildlife Service, National Marine Fishery Service, US Environmental Protection Agency, and US Army Corps of Engineers regarding an establishment of a system of interagency operating procedures and credit allocation for the Astoria Airport Mitigation Bank. The Memoranda stipulates that the bank will only be available for projects between the tip of Tongue Point and the West Bank, Skipanon River along the Oregon side of the Columbia River Estuary. However, additions to ORS 541.605 - 541.685 allow Oregon estuarine banks to be used for projects within 40 miles and the same estuarine ecological system. Details concerning projects chargeable to the bank (e.g., projects approvable under Oregon's Removal-Fill Law and federal Section 10 and 404 requirements) monitoring, credit accounting and the price of credits are discussed in the Memoranda. Also, the Memoranda would allow more than 5 acres of development to be charged against the bank.

Conclusion:

Given the uncertainty regarding the size of projects and proximity criterion for use of the bank, assumptions on these issues must be made in order to project a plan. The assumptions made here are that the Attorney General will determine use of the site is allowed for Port of Astoria Dock projects and that the interagency agreement regarding range of area that can be applied against the bank will override the 40 mile range allowed under ORS 541.605 - 541.685. These assumptions are based on the extent and history of the Port's involvement with the establishment of the bank and on the fact that federal agencies are not bound by the state statute.

9.4.4 Site # 7. WEST SVENSEN ISLAND (Figure 11)

Status: Priority 1, Level 1

Location: T8N, R8W, Sec. 15, Columbia River Mile 23 (Adjacent to Prairie Channel).

Size: 183 acres [92 acres low fresh nontidal marsh (non-significant wetland), 59 acres low fresh nontidal marsh and swamp (significant Goal 17 wetland), 16 acres fresh nontidal channel (significant Goal 17 wetland), 8 acres of flood protection area with mixed development and low fresh nontidal marsh].

Table 11. Relative Values of Potential Habitat Types at the West Svensen Island Mitigation Site.

	Salinity	Tidal Regime	Vegetation	Substrate	Relative Value
1.	Fresh	Low Intertidal	Marsh	Sand and/ or Mud	3
2.	Fresh	High Intertidal	Marsh	Sand and/ or Mud	1
3.	Fresh	Intertidal Channel	None	Sand and/ or Mud	3

Potential Credits: The West Svensen Island site contains existing soft-rush dominated nontidal freshwater wetlands over most of its interior. Also, 75 acres of Goal 17 wetland divides the north and south sections of the site. Since a restoration action would also be freshwater, the credit discount system used for Holbrook Slough cannot be applied (see Section 9.4.2). That system would allow no credit gain for restoration at West Svensen Island. A more refined system that is sensitive to different levels of freshwater wetland habitat values needs to be developed. The system should also be designed to allow value comparisons between tidal and nontidal wetlands. For current planning concerns, an arbitrary discount factor of .2 (1/5) is used for comparing nontidal freshwater soft-rush meadows with their potential value under tidal influence. Also, an arbitrary factor of .6 (3/5) is used for discounting the existing value of the Goal 17 wetland. Potential credit availability is displayed as a range. High credit potential is determined by assuming no discount factors and a low credit potential is determined by assuming the discount factors described above are fully applied. Resource agencies will make the final decision regarding credit availability. The range of credits (317 - 509) displayed here assumes about 8 acres with existing structures will be protected from flooding by new dike.

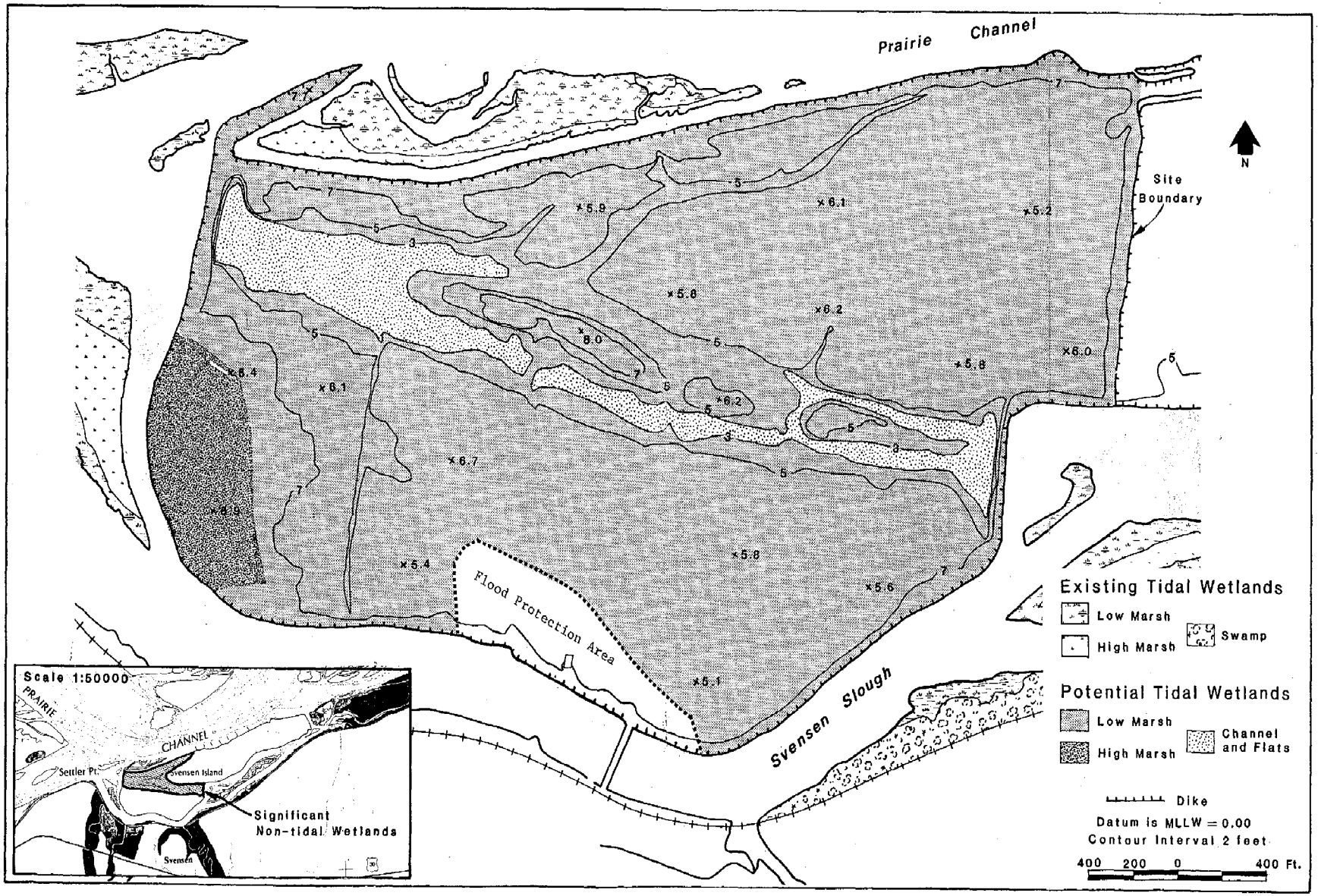


Figure 11. West Svensen Island mitigation site (Smith 1983).

Table 12. Potential Credits Available at West Svensen Island Mitigation Site (Low Estimate).

Habitat Type	Acres	Relative Value	Discount	Credits Available
Low Marsh	92	3	.2	220.8
Low Marsh (Goal 17)	59	3	.6	70.8
Channel (Goal 17)	16	3	.6	19.2
High Marsh	8	1	.2	6.4
Flood Protection Area	8	0	N/A	0.0
	183			317.2

Table 13. Potential Credits Available at West Svensen Island Mitigation Site (High Estimate).

Habitat Type	Acres	Relative Value	Credits Available
Low Marsh	92	3	276
Low Marsh (Goal 17)	59	3	177
Channel (Goal 17)	16	3	48
High Marsh	8	1	8
Flood Protection Area	8	0	0
	183		509

Site Description: This area is former tidal wetland that has been diked and converted to farm uses (e.g., pasture). In recent years freshwater

wetland emergent vegetation has been invading the pasture. Seventy-five acres of freshwater swamp (forested wetland), marsh (emergent wetland) and open water wetland divide the north and south sections of West Svensen Island. Also, there are significant structural improvements located near the southern dike (Oregon Division of State Lands 1984b).

Elevation: 5 to 9 feet MLLW

Vegetation/Wildlife: Stands of willow border the previously identified marsh/open water wetland. Pastures have been invaded by dense stands of soft-rush over much of their interiors. Much of West Svensen Island could now be considered freshwater nontidal emergent (marsh) wetland. Some of the area is grazed by cattle. Northern Harriers, ducks, Canada geese and swallows represent some of the animals using habitats found on West Svensen Island.

Zoning Authority and Designation:

Clatsop County

Exclusive Farm Use with Mitigation and Dredge Material Disposal Overlay and Goal 17 Wetland

Ownership: Charles and Marie Haglund

Potential Mitigation Action:

Mitigation by restoration of tidal wetlands through dike breaching.

Cost of Mitigation:

There are several alternative mitigation scenarios for West Svensen Island. The cost figures displayed here represent costs associated with building new dike to protect existing structures from flooding, raising the elevation of the road accessing east Svensen Island and protecting its landward bank and strengthening the cross dike between the eastern and western portions of the Island. Dollar costs associated with this alternative are compared with the dollar costs of purchasing the entire site, including structures. The results of the comparison provides a financial framework for reviewing other alternatives. Alternative number one is recommended for adoption by Clatsop County.

Alternative Number 1:

Land Value: $ 800 - $ 1100/ acre (Jacobe pers. com.)

Acres:

Low Estimate: $ 140,000
High Estimate: $ 192,500

Dike Work:

Dike Construction Costs: $ 132/ft. (Bierly pers. com.)
Dike Length: 4,200 feet
Estimate: $ 554,400

Total:

Low Estimate: $ 694,400
High Estimate: $ 746,900

Alternative Number 2:

Land/Structures: $ 243,121 (Oregon Division of State Lands 1984b)

Dike Work:

Dike Construction Costs: $ 132/ft. (Bierly pers. com.)
Dike Length: 2,500 feet
Estimate: $ 330,000

Total Estimate: $ 573,121

Potential Conflicting Uses:

Owners of property are considering expanding pasturage of dairy and beef cattle. Structural improvements currently exist near the southern dike and owners are considering other improvements. Dredge material disposal may also be a conflicting use.

Conclusion:

Alternatives 1 and 2 are considered comparable with respect to cost due to the coarse nature of the figures used to estimate dike work. Since Alternative 1 protects existing structures without significantly increasing the cost of mitigation or the availability of credits, it is considered the preferred alternative. These estimates were also used to consider two other alternatives:

- Establish a floating mitigation zone; or
- Purchase entire island, evacuate residents, and breach dike.

With respect to the floating mitigation zone, Alternative 1 demonstrates the cost of minimum new dike work to protect 8 acres. A floating zone may allow more than 40 acres to be protected from flooding. The amount of dike work required to protect these kinds of acreages is judged to be cost prohibitive.

Purchasing the entire island and evacuating residents would probably be the most cost effective approach since new dike work would not be required. However, the uncertainty of need for this amount of mitigation credit and the potential hardship this option would impose on the

residents were judged to make this a low priority option.

A Priority 1, Level 1 mitigation overlay designation for 175 acres of the site and removal of the existing mitigation overlay on 8 acres will allow the landowners reasonable flexibility to realize income producing benefits of their property while maintaining the mitigation potential of the site.

9.4.5 Site # 36. ERP TRACT (Figure 12)

Status: Priority 1, Level 1

Location: T8N, R9W, Sec. 24; Tax Lot 3400

Size: 15.6 acres (14.3 acres potential low marsh and 1.3 acres potential high marsh)

Potential Relative Values:

Table 14. Relative Values of Potential Habitat Types at the Erp Tract Mitigation Site.

	Salinity	Tidal Regime	Vegetation	Substrate	Relative Value
1.	Fresh	Low Intertidal	Marsh	Mud	3
2.	Fresh	High Intertidal	Marsh	Mud	1

Potential Credits: The Erp Tract contains existing soft-rush dominated nontidal freshwater wetlands over much of its interior. However, since a restoration action would also be freshwater, the credit discount system used for Holbrook Slough cannot be applied. That system would allow no credit gain for a restoration at Erp tract. A more refined system that is sensitive to different levels of freshwater wetland habitat values needs to be developed. For current planning concerns, an arbitrary factor of .2 (1/5) is suggested for use when discounting existing values of nontidal freshwater soft-rush marsh (Table 15 and 16). The 35.36 and 44.20 credit availability alternatives displayed below represent the high and low limits to a range of credit availability. Resource agencies will make the final determination with regard to credit availability.

Potential Credits Available:

Table 15. Potential Credits Available at Erp Tract Mitigation Site (Low Estimate).

Habitat Type	Acres	Relative Value	Discount	Credits Available
Low Marsh	14.3	3	.2	34.32
High Marsh	1.3	1	.2	1.04
	15.6			35.36

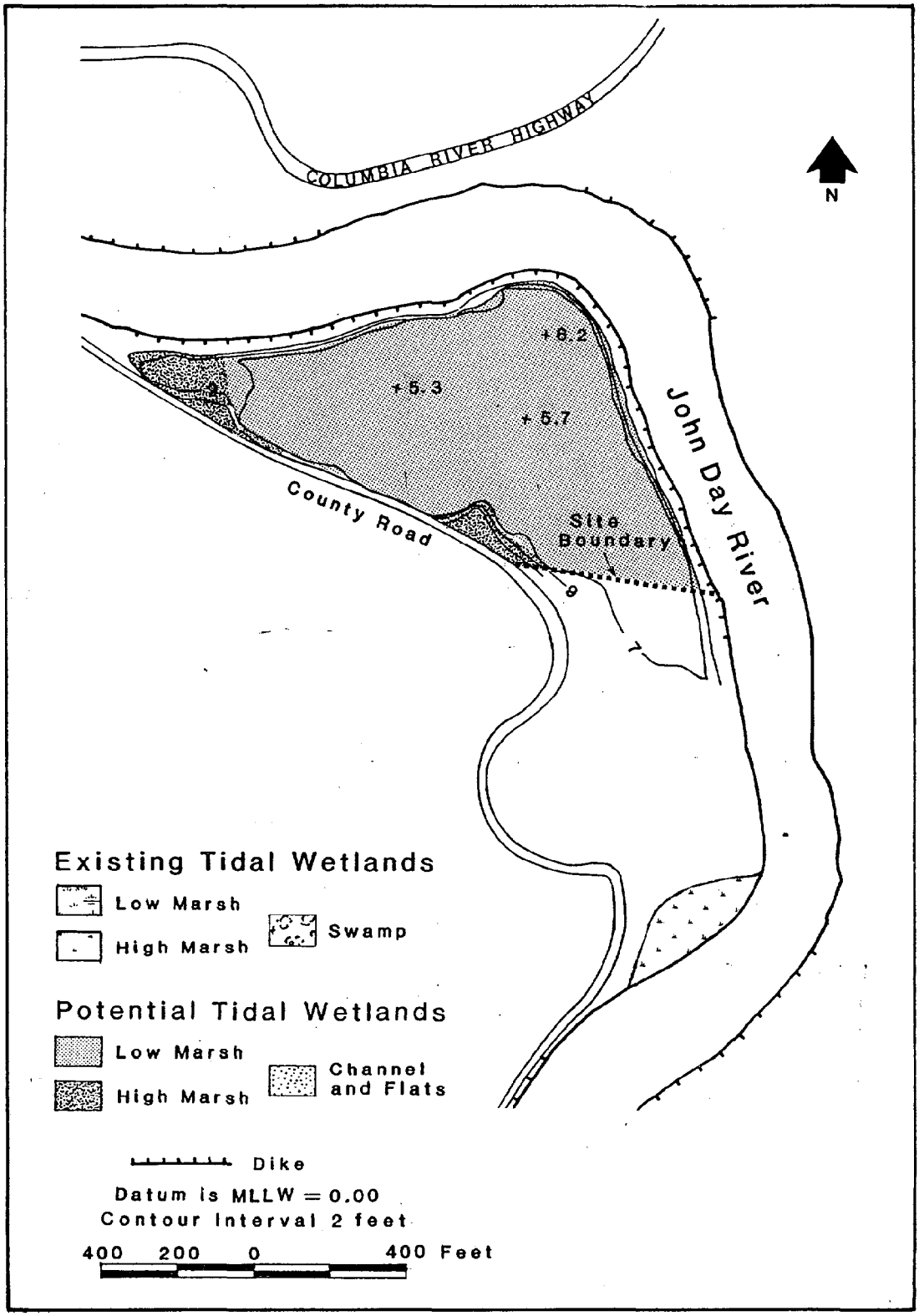


Figure 12. Erp Tract mitigation site (Smith 1983).

Table 16. Potential Credits Available at Erp Tract Mitigation Site (High Estimate).

Habitat Type	Acres	Relative Value	Credits Available
Low Marsh (nonsig.)	14.3	3	42.9
High Marsh (nonsig.)	1.3	1	1.3
	15.6		44.2

Site Description: This area is former tidal wetland that has been diked and converted to farm uses (e.g., pasture). In recent years some freshwater wetland vegetation has been invading the pasture.

Elevation: 5.3 to 6.2 feet MLLW

Vegetation/Wildlife: The pasture has been invaded by dense stands of soft rush over some of its interior. Some of the area is grazed by cattle.

Zoning Authority and Designation:

Clatsop County

Residential/Agriculture with a Mitigation Overlay

Ownership: Wallace Erp

Potential Mitigation Action:

Mitigation by restoration of tidal wetlands through dike breaching.

Cost of Mitigation:

Land Value: $ 800 - $ 1,100/acre (Jacobe pers. com.)
Number of Acres: 15.6
Dike Construction Costs: $ 132/ft. (Bierly pers. com.)
Amount of Dike: 680 feet

Low Estimate: $ 800 x 15.6 acres = $ 12,480
$ 132 x 680 feet = $ 89,760
$ 102,240

High Estimate: $ 1,100 x 15.6 acres = $ 17,160
$ 132 x 680 feet = $ 89,760
$ 106,920

Potential Conflicting Uses:

Owner of property is currently grazing cattle.

Conclusion:

A Priority 1, Level 1 classification for this site will adequately protect the site and impose no restrictions on current uses of the site.

9.5 PRIORITY 1 DEVELOPMENT/MITIGATION SITE MATCH-UPS

This section displays the match-ups of all development sites discussed in the CREST 1981 Mediated Panel Agreement and their respective selected mitigation sites.

Table 17. Priority 1 Development/Mitigation Site Match-ups.

Development Sites	Mitigation Sites
Tansy Point Industrial Park	Tansy Point
West Bank, Skipanon River	Holbrook Slough
East Bank, Skipanon River	Holbrook Slough
Port of Astoria Docks	Airport Mitigation Bank
North Tongue Point	West Svensen Island
South Tongue Point	Erp Tract

9.5.1 TANSY POINT INDUSTRIAL PARK - TANSY POINT

Development Action (Figure 13):

Dredging to -15 feet MLLW for barge moorage access.

Location:

T8N, R10W, Section 9D; Columbia River Mile 10.

USFWS Resource Category: 2 (Ingles pers. com.)

Credits Required:

Area of Impact: .84 acres (.34 acres brackish subtidal sand flats and .50 acres of intertidal sand flats)

ORS 541.626 Relative Value: Brackish Subtidal Sand Flats (RV3)
Brackish Intertidal Sand Flats (RV4)

.50 acres x (RV4) = 2.0 Credits

.34 acres x (RV3) = 1.02 Credits [13]

Zoning Authority and Designation:

City of Warrenton

Shoreland: Water-Dependent Development
Aquatic: Aquatic Development.

Ownership:

Shoreland: City of Warrenton.
Aquatic: Oregon Division of State Lands

Site Description (Physical/Biological):

Shoreland: The upland region (adjacent to the dredging area) is characterized by predominantly sandy soils that have a perennial high water table. The upland portion of the development is separated from the aquatic portion by a Corps of Engineers riprap bank. The elevation difference between the top and toe of the revetment is approximately 30 feet (+15 MLLW to - 15 MLLW). There is no riparian vegetation in this area subject to damage from the development.

Intertidal: Sediments are medium to fine grain sand flats and salinity is considered brackish. There is no marsh vegetation. Benthic organisms may include: Corophium, Eohaustorius, nemerteans, and oligocheates. Birds using the area include: Great Blue Herons, shorebirds,

---

13 There will be no mitigation requirement for the subtidal dredging.

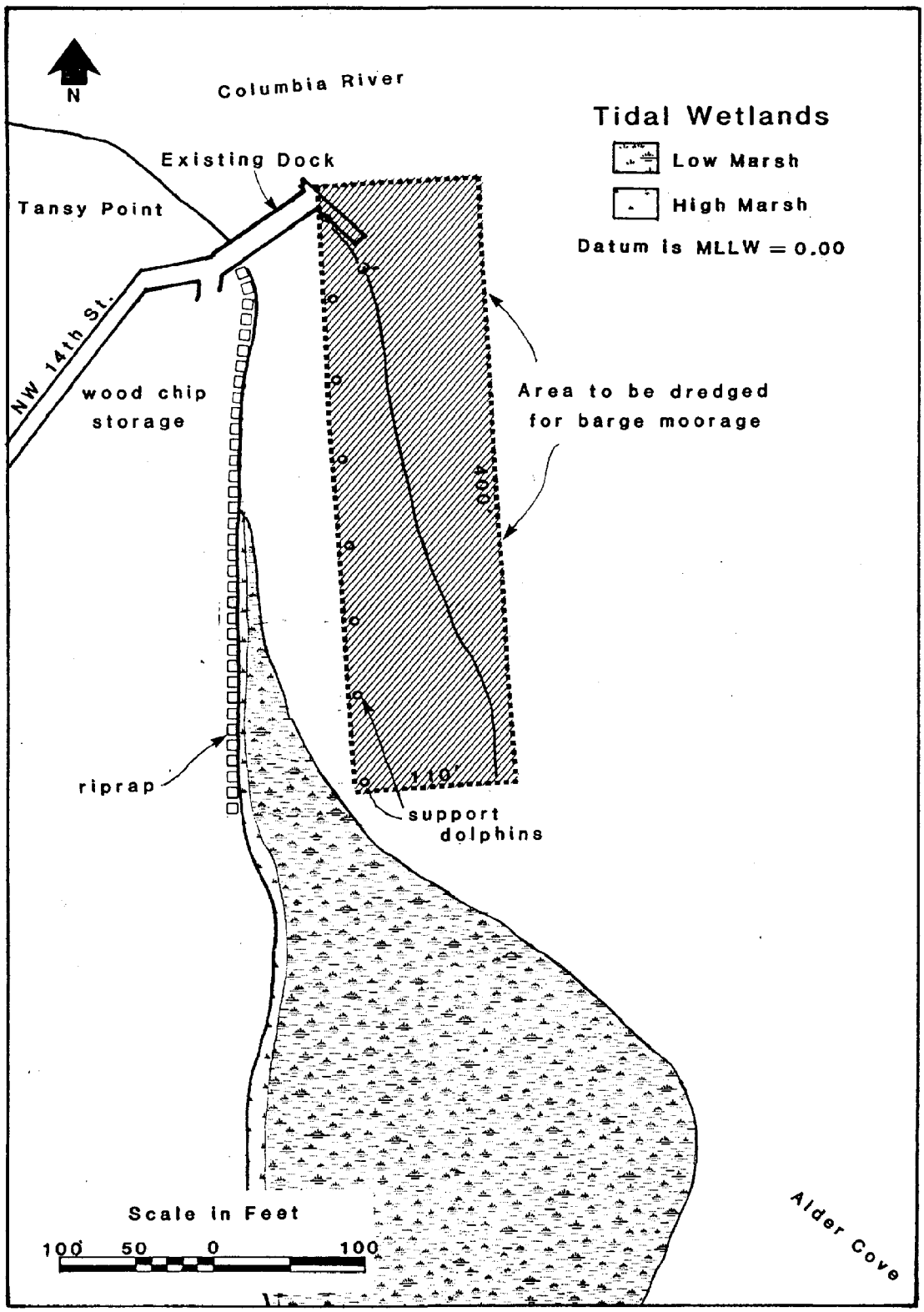


Figure 13. Tansy Point Industrial Park dredging project (Barnes 1987).

waterfowl and terns.

Subtidal: Maximum salinity intrusion can be greater than 30 ppt during low river flow but generally the area is considered in the brackish water regime (.5 - 30 ppt). Sediments are subtidal sand flats that range from medium sand to fine sand. Net primary productivity of phytoplankton is rated relatively high and gross benthic primary productivity is rated relatively low. Total standing crop of benthic infauna is rated high. Fish observed include Pacific herring, Northern anchovy, Pacific staghorn sculpin, English sole, starry flounder, longfin smelt, shiner perch, American shad, chinook and coho salmon. Birds include: waterfowl, cormorants and gulls.

General Background (Development) :

The proposed dredging will encompass a 110-foot x 400-foot rectangle oriented north northwest. The intertidal portion of the development consists of about 1/2 acre of brackish unvegetated sand flats. The subtidal portion consists of about 1/3 acre of sand flats.

Since 1985, the Tansy Point Industrial Park has been developed to accommodate an integrated wood products processing facility. All of the existing development has occurred on uplands but the recently proposed dredging may be a precursor to further aquatic development in the area.

The Tansy Point Industrial Park is part of the CREST (1981) Mediated Agreement and has been designated in the City of Warrenton Comprehensive Plan as a Water-Dependent Development area. This area was designated for industrial development for the following reasons:

- It is relatively close to the Columbia River Mouth (River Mile 10);
- Fewer biological impacts associated with major development were identified at this location than in other areas evaluated from comparable development;
- A relatively large area (80-100 acres) is available for development; and
- The site location allows ship access to the longest tidal window in the Columbia River Estuary.
- The site is relatively close to deep water.

Alternatives Mitigation Sites:

1. Tansy Point (Site 3)
2. Swash Lake (Site 2)
3. Holbrook Slough (Site 4)

Findings:

1. Proximity: There is an on-site opportunity to create (through upland excavation) intertidal sand flats at Tansy Point. This opportunity

ranks highest under the proximity criterion. The next closest site is Holbrook Slough, which is about 1.5 miles from the Tansy Point Industrial Area. Swash Lake is about 2.5 miles from the development area.

2. Present Use and Ownership: Tansy Point is in public ownership, City of Warrenton, and designated for water dependent industrial uses. Much of its shoreline aquatic area is in the Aquatic Development Zone. The northern section of the area is currently committed to heavy industrial uses. The southern portion of the area is more natural in character. There are significant stands of riparian vegetation interspersed with emergent freshwater wetland areas south of the developed area. Also, the riparian fringe borders tidal wetlands that are zoned Aquatic Natural. The City of Warrenton has agreed to allow 1/2 acre in this area, an upland area adjacent to tidal marsh and riparian vegetation, to be used for mitigation of development in the Tansy Point area.

Holbrook Slough is also publicly owned (Port of Astoria) and is currently designated as a mitigation site in Warrenton's Comprehensive Plan. However, it has been matched with developments on the East Bank, Skipanon River.

Swash Lake is publicly owned and managed as part of a state park. However, it is reserved for state park, state highway, and Hammond Boat Basin development projects.

Therefore, Tansy Point is the preferred alternative under this criterion.

3. Mitigation Trade: Tansy Point and Swash Lake both offer in-kind mitigation opportunities and therefore rank equally under this criterion. Holbrook Slough mitigation would be out-of-kind.

4. Mitigation Credit Requirements and Availability:

Tansy Point Industrial Park - Tansy Point Credit Match

Tansy Point Industrial Park (Development)

Brackish Intertidal Sand Flats: 2 Credits

Tansy Point (Mitigation)

Brackish Intertidal Sand Flats: 2 Credits

Table 18. Tansy Point Industrial Park - Tansy Point Match-up.

Credits Available	Credits Required	Net Credits	Mitigation Trade
2.0	2.0	0	in-kind

Cost of Mitigation:

Assuming the creation (excavation) site is less than 1 mile from the disposal site, (see Tansy Point Mitigation Site Description), the following represents an estimate of potential costs of lowering .5 acres of upland at Tansy Point to intertidal sand flats:

$ 8,125.00 (see Section 9.4.1)

Conclusion:

The on-site/in-kind alternative ranks highest under the proximity, mitigation kind, and ownership and use criteria. Adequate credits are available for the mitigation action. Therefore, Tansy Point is considered the preferred alternative.

The Mediated Panel Agreement allowed for 27 acres for Aquatic Development off the shoreline west of the geographic Tansy Point. Nearly all this area is deep subtidal sand flats. Strong currents in the area have forced developers to move into Alder Cove where barge moorage is sheltered from the currents (exchange of materials between boat and land is considered hazardous in the channel). Any future development in this north shore area will probably be for deep draft port facilities. Most or all of this development will probably use pile supported structures, thereby minimizing impacts that would require compensatory mitigation.

9.5.2 WEST BANK, SKIPANON RIVER - HOLBROOK SLOUGH

Development Action (Figure 14):

Filling of intertidal wetlands on the West Bank of the Skipanon River.

Location:

T8N, R10W, Sec. 15, Columbia River Mile 11.

USFWS Resource Category: 2 (Ingles pers. com.)

Credits Required:

Area of Impact: 7.8 Acres (5.8 acres brackish intertidal high marsh and 2 acres brackish intertidal low marsh).

ORS 541.626 Relative Value:

Brackish Intertidal High Marsh (RV3)
Brackish Intertidal Low Marsh (RV5)

5.8 acres x (RV3) = 17.4 Credits
2.0 acres x (RV5) = 10.0 Credits

17.4 + 10 = 27.4 Credits

Zoning Authority and Designation:

City of Warrenton

Shoreland: Water Dependent Development
Aquatic: Aquatic Development

Ownership:

Cavenham Forest Products

Site Description (Physical/Biological):

Shoreland: The shoreland area consists primarily of heavily developed log storage area and fringing marsh and tideflats. The upland soils are primarily sandy dredged material.

Intertidal: The area consists of a brackish marsh that has established on the lower elevations fringing the dredged material shoreland. Species present at the high to mid marsh elevations include: reed canary grass, birdsfoot-trefoil, Pacific silverweed, willow, Lyngby's sedge, tufted hairgrass, and water parsley. Lower marsh species included: Lyngby's sedge, cattail, yellow iris, and bullrush. Birds observed include: Great Blue Herons, shorebirds, Caspian Terns, gulls, Turkey Vulture and Cedar Waxwings.

Aquatic: The general salinity regime of this area is brackish.

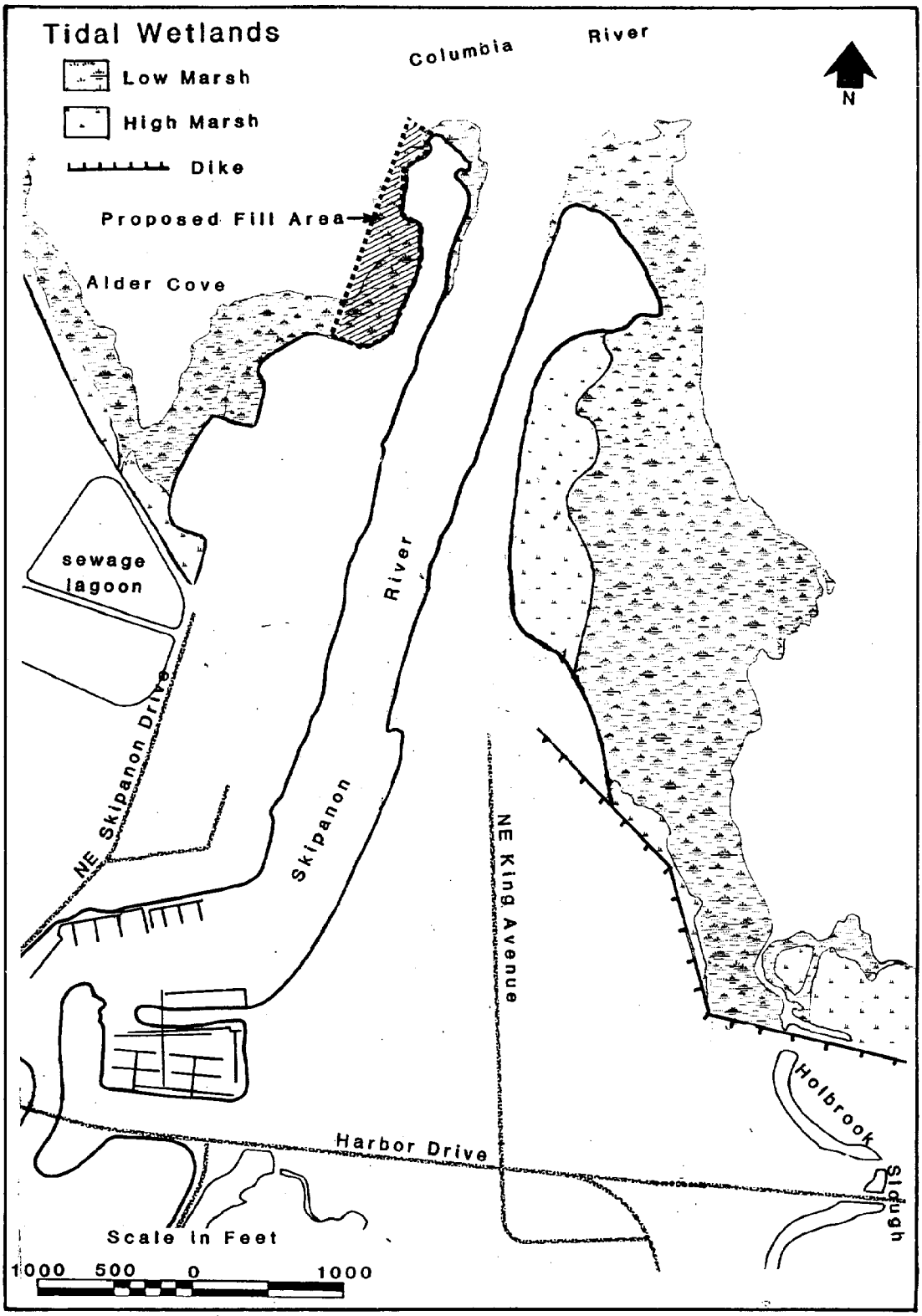


Figure 14. West Bank Skipanon River proposed fill area (CREST 1981).

Sediments are generally very fine, sandy silt. Net primary productivity is considered high. Total benthic infauna standing crop is high. The standing crop of epibenthic organisms is judged high based on samples collected in Youngs Bay in the same habitat type (Tidal Flat Estuarine Mixing). Fish commonly found in the area include: Pacific herring, Pacific staghorn sculpin, English sole, starry flounder, longfin perch, shiner perch, American shad and chinook and coho Salmon. A variety of birds use these areas including: Loons, cormorants, grebes, waterfowl, etc.

General Background (Development):

The west peninsula of the Skipanon River is presently occupied by the Cavenham lumber mill. Cavenham is the largest employer in the City of Warrenton and continues to make substantial investments in its facilities. Expansion has been discussed that would involve development of a 2-berth log and lumber shipping facility on the Skipanon River.

The Mediation Panel Agreement would allow Cavenham to develop a log and lumber loading facility that would require approximately 20 acres of "back-up" area next to the ship berths. This area would have to be directly adjacent to the loading dock in order to avoid double handling of logs and lumber at the mill site. A wide back-up area, of shallow depth, is found to allow the greatest storage capacity per unit of area. Adjacent storage reduces hauling distances, equipment requirements and labor time commitments. In order to accommodate two ships, with approximately 1,500 feet of "loading edge", the 20 acre storage area would be 580 feet in depth.

The construction of a shipping facility and back-up area on the west peninsula would have impacts on wetlands in Alder Cove. The 580 ft. x 1,500 ft. storage area would require fill of about 7.8 acres of intertidal marsh area. While there are no current actions being made to implement this development, it is considered allowable under the 1981 CREST Mediation Panel Agreement (CREST 1981).

Alternative Mitigation Sites:

1. Holbrook Slough (Site 4)
2. Airport Mitigation Bank (Site 17)

Findings:

1. Proximity: Holbrook Slough is the closest mitigation site alternative (about 1 mile) to the West Bank, Skipanon development site. The next closest site (Airport Mitigation Bank) is nearly 3 miles in distance and it is uncertain whether the bank will be available to projects west of the Skipanon River. Holbrook Slough, therefore, is the first priority site under the proximity criterion.

2. Present Use and Ownership: The Holbrook Mitigation site is zoned for Mediated Development with a Mitigation Overlay in the City of Warrenton Comprehensive Plan. It has traditionally been used for cattle grazing

and adjacent areas are used for dredge disposal. The site is owned by the Port of Astoria. Public ownership and the mitigation designation make this site an attractive alternative. However, the site is tied to proposed developments on the East Bank, Skipanon River through the 1981 CREST Mediation Panel Agreement. If the maximum development agreed upon for the East Bank occurs, there may be insufficient credits available at the Holbrook site to trade for credits lost at the West Bank development site.

The Airport Mitigation Bank is owned by the Oregon Division of State Lands and administered as a mitigation credit reserve for relatively proximate development projects in the Columbia River Estuary (between Skipanon River and Tongue Point). Recent legislation may impose a limit (5 acres) on the size of development sites that can be charged against the bank. If this occurs, the West Bank, Skipanon development site may exceed this limit. Also, even if this limit is not imposed on the bank, the Port of Astoria will most likely use most or all of the credits available at the bank for proposed developments at the Port of Astoria Docks.

3. Mitigation Trade: High and low marsh are available at both the Holbrook site and the Airport Mitigation Bank. However, since the bank is now operated on a credit system that is no longer connected to habitat areas, in-kind vs. out-of-kind trade decisions cannot be made using the formula in OAR 141-85-256. Nevertheless, these habitat types are existing or potentially existing on the site. Therefore, Holbrook Slough and the Airport mitigation bank are not distinguished under this criterion.

4. Mitigation Credit Requirements and Availability:

West Bank, Skipanon - Holbrook Slough Credit Match

West Bank (Development)

Brackish Intertidal High Marsh:	17.4 Credits
Brackish Intertidal Low Marsh:	10.0 Credits
	27.4 Total

Holbrook (Mitigation)

The Holbrook site contains existing nontidal wetlands over some of its area. Therefore, the nontidal wetland values are discounted in the credit evaluation for this site (See Section 9.4.2). Two alternative credit assessments (low and high) are used for match-up purposes. The low and high figures displayed here are suggested upper and lower limits to the range of mitigation credits that may be available at Holbrook Slough. The range of availability will affect the ability of the site to compensate for credits lost to development. Tables 19 and 20 display the effects of differences in credit availability on the West Bank Holbrook Slough match-up.

Low Assessment (see Table 9):

Brackish Intertidal High Marsh:	23.0 Credits
Brackish Intertidal Low Marsh:	48.4 Credits
Brackish Intertidal Channel:	4.3 Credits
Minimum Total Credits:	75.7

Table 19. West Bank Skipanon - Holbrook Slough Match-up (Low Estimate).

Credits Available	Credits Required	Net Credits	Mitigation Trade
23.0	17.4	+ 5.6	in-kind
48.4	10.0	+ 38.4	in-kind
4.3	0.0	+ 4.3	no trade
75.7	27.4	48.3 =	Minimum Surplus

High Assessment (see Table 9):

Brackish Intertidal High Marsh:	34.5 Credits
Brackish Intertidal Low Marsh:	121.0 Credits
Brackish Intertidal Channel:	17.2 Credits
Maximum Total Credits:	172.7

Table 20. West Bank Skipanon - Holbrook Slough Match-up (High Estimate).

Credits Available	Credits Required	Net Credits	Mitigation Trade
34.5	17.4	+ 17.1	in-kind
121.0	10.0	+ 111.0	in-kind
17.2	0.0	+ 17.2	no trade
172.7	27.4	145.3 =	Maximum Surplus

West Bank, Skipanon - Airport Mitigation Bank Credit Match

West Bank (Development)

Brackish Intertidal High Marsh:	17.4 Credits
Brackish Intertidal Low Marsh:	10.0 Credits
Total Credits:	27.4

Airport (Mitigation)

Credits are no longer linked to habitat types. Therefore, a determination on "kind" credit trade cannot be made.

Table 21. West Bank Skipanon - Airport Mitigation Bank Match-up.

Credits Available	Credits Required	Net Credits	Mitigation Trade
58.75	27.4	+ 31.35	N/A
		31.35 = Surplus	

A maximum size limitation on development (5 acres) may be imposed on projects that can use the bank. The West Bank, Skipanon development (7.8 acres) would exceed this size limitation. If this limitation is upheld, the Airport Mitigation Bank will not be a mitigation site alternative for this project. Also, there is some uncertainty regarding whether the Airport Mitigation Bank will be allowed to match with development projects west of the Skipanon River (Section 9.4.3).

Estimated Cost of Mitigation (Holbrook Slough):

Land: $ 80,000.00
Dike: $ 455,400.00 (Section 9.4.2)
Total: $ 535,400.00

Cost/Credit:[14]

$ 7,070 (use 75.7 for high estimate cost/credit)

$ 3,100 (use 172.7 for low estimate cost/credit)

High Cost Estimate: 27.4 x $ 7,070 = $ 193,720 with 48.3 Credit Surplus

Low Cost Estimate: 27.4 x $ 3,100 = $ 84,940 145.3 Credit Surplus

14 The actual cost of mitigation will be $535,000 for a developer that does not own the land and $455,000 for the developer that owns the site. The cost per credit is only valid if surplus credits can be sold or traded in the future.

Moderate Estimate: (193,720 + 84,940)/2 = $ 139,330

Estimated Cost of Mitigation (Airport Mitigation Bank):

Cost/Credit: $ 4,800 (Bierly pers. com)

Estimate: 27.4 x $ 4,800/Credit = $ 131,520.00 with 31.35 Credit Surplus

Conclusion:

The Holbrook site is the first priority alternative based on proximity and availability of in-kind mitigation credits. The sites are considered comparable in terms of ownership and use. Holbrook Slough is considered to be the preferred alternative with regard to availability of credits. While there is some concern regarding its overall availability, the availability of the airport site is even less certain. It is also difficult to compare costs because the final credit availability at Holbrook Slough is unknown and the cost per credit cited for the mitigation bank is still tentative (Bierly pers. com.). At this time the Plan considers the costs comparable and does not distinguish the Holbrook and Airport Bank sites using this criterion.

9.5.3 EAST BANK, SKIPANON RIVER - HOLBROOK SLOUGH

Development Action (Figure 15):

Fill for bulk storage area.

Location:

T8N, R10W, Section 15, Columbia River Mile 11.

USFWS Resource Category: 2 (Ingles pers. com.)

Total Credits Required:

Area of Impact: 25 acres (6.9 Acres brackish low marsh and 18.1 acres brackish high marsh).

ORS 541.626 Relative Value: Brackish Intertidal High Marsh (RV3)
Brackish Intertidal Low Marsh (RV5)

6.9 acres x (RV5) = 34.5 Credits
18.1 acres x (RV3) = 54.3 Credits
34.5 + 54.3 = 88.8 Credits

Zoning Authorization and Designation:

City of Warrenton

Shoreland: Mediated Water Dependent Development
Aquatic: Mediated Aquatic Development

Ownership:

Port of Astoria, Cavenham, State of Oregon

Site Description (Physical/Biological):

Shoreland: The shoreland area is predominantly dredge disposal sand with a grass/soft rush-cover. It is currently used as pasture for cattle.

Intertidal: The intertidal marsh is in the brackish salinity regime with a substrate of very fine sand and silty clay. The higher elevation areas of fringing marsh consist primarily of soft rush, Pacific silverweed, and water parsley. The mid to low elevations of the marsh were represented by soft rush, Pacific silverweed, Lyngby's sedge (heavily grazed), cattail and bulrush. Birds observed in August included: Northern Harrier, Turkey Vulture, Caspian Terns, and Barn Swallows. Over 20 Caspian Terns were observed in the marsh.

Aquatic: The salinity regime is considered brackish. Sediments are comprised of medium to fine sand and very fine sand, silt and clay. Gross benthic primary productivity is considered low and net phytoplankton productivity is considered relatively high. Total benthic infauna productivity is considered high. Standing crop of epibenthic

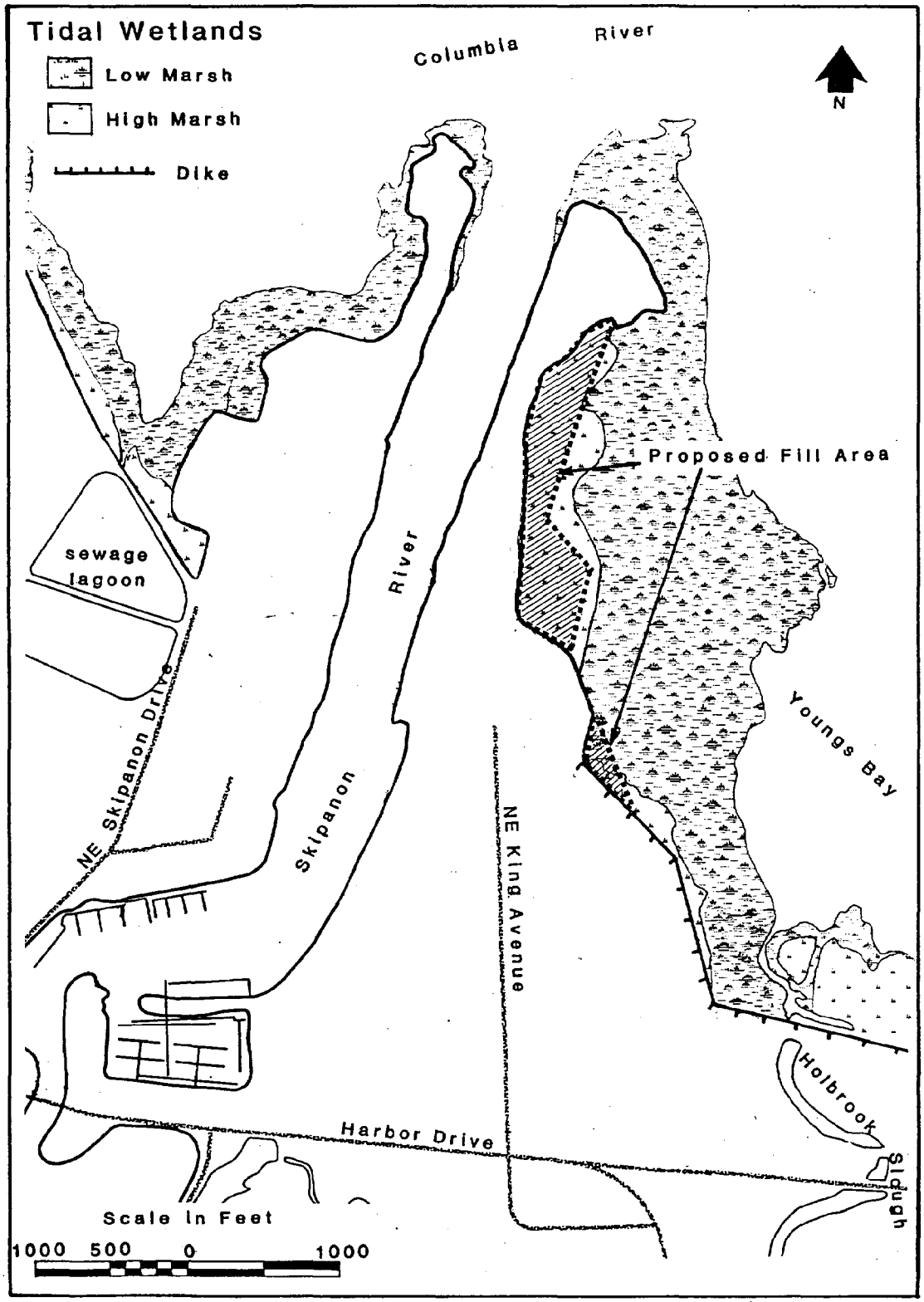


Figure 15. East Bank Skipanon River proposed fill area (CREST 1981).

zooplankton is high and standing crop of mobile macroinvertebrates is considered moderate. Fish species observed in this area include: Pacific herring, Pacific staghorn sculpin, starry flounder, longfin smelt, American shad, chinook and coho salmon. A variety of birds including grebes, cormorants, and waterfowl use these areas.

General Background (Development):

The East Bank of the Skipanon River has been designated in the CREST Mediated Agreement as a water-dependent development zone. Development potential is enhanced by proximity to the 40-foot Columbia River channel and proximity to the river mouth (River Mile 11). Approximately 200 acres of upland and 1,500 feet of Skipanon River frontage are potentially available for construction of bulk commodity storage, industrial development, and ship berthing.

The Skipanon Channel is maintained at 13 to 15 feet deep. However, it is federally authorized to be dredged to 30 feet deep and 200 feet wide. Conveyor galleries could provide an alternative to dredging with regard to access to the main channel. While capital expenditure for the conveyor may exceed initial dredging costs, the elimination of maintenance dredging requirements may justify this alternative.

Filling of 25 acres of Youngs Bay intertidal wetlands adjacent to the East Bank, Skipanon is allowed in the 1981 CREST Mediation Panel Agreement. A fill project in this area will require mitigation.

Alternative Mitigation Sites:

1. Holbrook Slough
2. Airport Mitigation Bank

Findings:

1. Proximity: Holbrook Slough is less than one mile from the East Bank, Skipanon River development site. The next closest site, the Airport Mitigation site, is over two miles from the site. Therefore, Holbrook Slough is the first priority with regard to the proximity criterion.

2. Present Use and Ownership: The Holbrook Slough site is zoned for Mediated Development with a Mitigation Overlay Zone in the City of Warrenton Comprehensive Plan. It has traditionally been used for cattle grazing and adjacent areas are designated for dredge material disposal. A public entity, the Port of Astoria, owns the site. While the Airport Mitigation Bank is also publicly owned (Division of State Lands) and designated for mitigation purposes, Holbrook Slough is directly tied to the proposed 25 acre fill at East Bank, Skipanon through the 1981 CREST Mediation Panel Agreement. Therefore, Holbrook Slough is the first priority mitigation site option for East Bank, Skipanon under the use and ownership criterion.

3. Mitigation Trade: Holbrook Slough offers in-kind compensation for the high and low marsh in the East Bank proposed development areas. The

Airport Mitigation Bank credits cannot be tied to acreage. Therefore, Holbrook Slough is the preferred alternative under this criterion.

4. Mitigation Credit Requirements and Availability:

East Bank, Skipanon - Holbrook Slough Credit Match

East Bank: Brackish Intertidal High Marsh: 54.3 Credits
Brackish Intertidal Low Marsh: 34.5 Credits
Total Credits: 88.8

Holbrook: The Holbrook site contains existing freshwater wetlands over much of its interior. Therefore, the freshwater wetlands are discounted in the credit evaluation for this site (See Holbrook Slough Mitigation Site Description). Two alternative credit assessments (low and high) were used for matching purposes. The low and high figures displayed here are suggested upper and lower limits to the range of mitigation credits that may be available at Holbrook Slough. The range of availability will affect the ability of the site to compensate for credits lost to development. Tables 22 and 23 display the affects of differences in credit availability on the East Bank - Holbrook Slough match-up.

Low Assessment (see Table 9):

Brackish Intertidal High Marsh: 23.0 Credits
Brackish Intertidal Low Marsh: 48.4 Credits
Brackish Intertidal Channel: 4.3 Credits
Minimum Total Credits: 75.7

Table 22. East Bank Skipanon - Holbrook Slough Match-up (Low Estimate).

Credits Available	Credits Required	Net Credits	Mitigation Trade
23.0	54.3	- 31.3	in-kind
48.4	34.5	+ 13.9	in-kind
04.3	0.0	+ 4.3	no trade
75.7	88.8	- 13.1	= Maximum Deficit
		Iteration 1	
13.9	31.3	- 17.4	out-of-kind
		Iteration 2	
4.3	- 17.4	- 13.1	out-of-kind
		- 13.1	Maximum Deficit

High Assessment (see Table 9):

Brackish Intertidal High Marsh:	34.5 Credits
Brackish Intertidal Low Marsh:	121.0 Credits
Brackish Intertidal Channel:	17.2 Credits
Maximum Total Credits:	172.7

Table 23. East Bank Skipanon - Holbrook Slough Match-up (High Estimate).

Credits Available	Credits Required	Net Credits	Mitigation Trade
34.5	54.3	- 19.8	in-kind
121.0	34.5	+ 86.5	in-kind
17.2	0.0	+ 17.2	no trade
172.7	88.8	83.9 =	Maximum Surplus
		Iteration 1	
86.5	19.8	66.7	out-of-kind
17.2	0.0	17.2	no trade
103.7	19.8	83.9 =	Maximum Surplus

East Bank, Skipanon - Airport Mitigation Bank Credit Match

The second priority alternative is the Airport Mitigation Bank. The Airport Mitigation Bank is managed solely on a credit basis. Therefore, in-kind habitat replacement considerations are precluded in mitigation bank transactions. The following calculations assume all 58.75 credits currently in the Airport Mitigation Bank are available:

East Bank:	Brackish Intertidal High Marsh:	54.3 Credits
	Brackish Intertidal Low Marsh:	34.5 Credits
	Total Credits:	88.8

Table 24. East Bank Skipanon - Airport Mitigation Bank Match-up.

Credits Available	Credits Required	Net Credits	Mitigation Trade
58.75	88.8	- 30.05	N/A
		30.05 = Deficit	

A maximum size limitation on development (5 acres) may be imposed on projects that can use the bank. The East Bank, Skipanon development (25 acres) would exceed this size limitation. If this limitation is upheld, only 5 acres of the development may be chargeable to the bank.

Estimated Cost of Mitigation: (Holbrook Slough):

Land: $ 80,000.00
Dike: $ 455,400.00 See Section 9.4.2
Total:$ 535,400.00

Cost/Credit: [15]

$ 7,070.00 (use 75.7 for high estimate cost/credit)

$ 3,100.00 (use 172.7 for low estimate cost/credit)

High Cost Estimate: $ 7,070 x 75.7 = $ 535,400 with 13.1 Credit Deficit

Low Cost Estimate: $ 3,100 x 88.8 = $ 275,300 with 83.9 Credit Surplus

Moderate Estimate: ($ 535,400 + $ 275,300)/2 = $ 405,350

Estimated Cost of Mitigation (Airport Mitigation Bank):

Airport Bank: 58.75 Credits

Total Costs:

Cost/Credit: $ 4,800
Estimate: 58.75 x $ 4,800/Credit = $ 282,000 with 30.05 Credit Deficit

Conclusion:

Holbrook Slough is the preferred alternative due to its proximity to the development area and its ability to provide in-kind mitigation. Also, while both sites are publicly owned and designated for mitigation purposes, the Airport Bank can only accommodate approximately 66% of the required mitigation credits. Further, the bank may be limited to trades with small developments of 5 acres or less. For these reasons, Holbrook Slough is the preferred alternative over the Airport Bank. Costs of mitigation are considered comparable at this time. This decision is based on the uncertainty of credits available at Holbrook Slough and the uncertainty of price and availability of credits at the Airport Bank.

---

[15] The cost of mitigation will be $535,400 if the developer does not own the land and about $455,500 if the land is already owned. Credit surpluses are only valid if the credits can be sold or traded at at future date.

9.5.4 PORT OF ASTORIA - ASTORIA AIRPORT MITIGATION BANK

Development Action (Figure 16):

Subtidal and intertidal fill at the Port of Astoria Docks.

Location:

T8N, R10W Sec. 12, R9W Sec. 7., Columbia River Mile 13.

USFWS Resource Category: 2 or 3 depending on use by juvenile salmonids (Ingles pers. com.)

Total Credits Required:

Area of Impact: 27 acres (18 acres subtidal brackish sand/mud flats and 9 acres of brackish intertidal sand/mud flats).

ORS 541.626 Relative Value:

Brackish Subtidal Sand/Mud Flats (RV3)
Brackish Intertidal Sand/Mud Flats (RV4)

18 acres x (RV3) = 54 Credits Subtidal
9 acres x (RV4) = 36 Credits Intertidal
90 Credits Total

Zoning Authority and Designation:

City of Astoria

Shoreland: Water Dependent Development
Aquatic: Aquatic Development

Ownership:

Port of Astoria

Site Description (Physical/Biological):

Shoreland: The shoreland consists almost entirely of fill material and pile supported docks. All facilities are designed to cater to the loading, unloading and berthing of ships.

Aquatic: The area is generally subtidal (depth - 8 to - 30 feet MLLW) with some intertidal sand flats. The maximum salinity intrusion is at the upper limits of brackish (25 - 30 ppt) in the finger piers and marine (> 30 ppt) in the bottom of the channels. However, the mean salinity intrusion is in the mid-brackish range (5 - 15 ppt). Sediments are generally very fine sand, silt and clay in the finger piers and coarser sand and silt near the river channel. Net phytoplankton productivity is in the medium-low range). Total benthic infauna standing crop

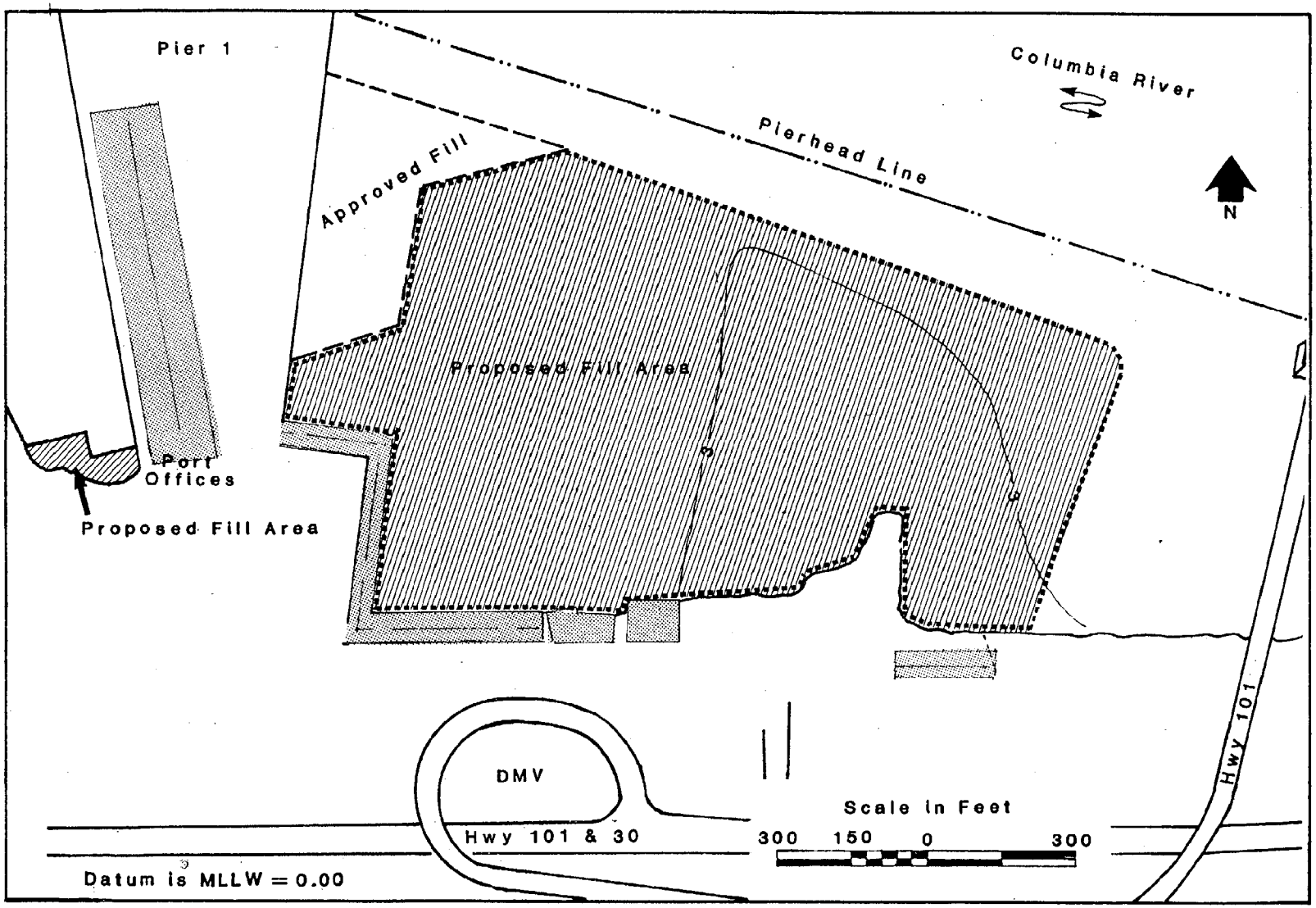


Figure 16. Port of Astoria Docks proposed fill area (Port of Astoria 1986).

is medium-high. Epibenthic zooplankton standing crops is relatively high in this area while mobile macroinvertebrate standing crop is relatively low. Fish typically found in the area include Pacific herring, Northern anchovy, Pacific staghorn sculpin, English sole, starry flounder, longfin smelt, shiner perch, American shad, chinook and coho salmon. Diving birds (e.g., Western Grebes) are sometimes observed in the finger piers.

General Background (Development):

While the Port of Astoria is ultimately working to diversify their bulk cargo storage and loading facilities, they are now primarily involved in log exports. Until recently, most of these shipments were "in-water" log rafts. However, foreign preferences for dry logs have motivated the Port to load logs from the docks rather than the water. This method of shipping requires more on-land storage space. Other Port interests include berthing, repairing, and servicing of ocean-going vessels.

During the CREST Mediated Agreement Proceedings, the Port of Astoria discussed two development proposals. The first proposal suggested filling of about 21.5 acres of intertidal area (19.4 acres between the finger piers, 2.1 acres west of the east tip of Pier 3) and 10 acres of subtidal area (located on the northwest tip of Pier 3). The second proposal suggested filling the areas between Piers 2 and 3 and about 30 acres west of Pier 3. This alternative was introduced late into the mediation process and hence, was not considered by the mediation parties. Environmental impact concerns were raised during the proceedings concerning this proposal.

More recently, the Port of Astoria has developed a Plan for Port Development. This Plan proposes about 27 acres of fill east of Pier 1. About 10 acres of this area is considered brackish intertidal wetland and the remainder is brackish shallow subtidal sand flat. Since this is the most recent proposal by the Port, it is reasonable to assume it is the most likely development scenario the Port will pursue. The Mediated Panel Agreement proposals are, however, worth noting as they reflect the general positions of the resource agencies regarding development in this area.

The Port of Astoria's Plan for Port Development has two primary goals:

1. To show staged progress toward full utilization of all present Port-owned lands between Youngs Bay and the Columbia River bridge.

2. To maximize use of Port waterfront lands for a variety of marine activities, those occurring today and those needed to meet future requirements, to the extent they can be foreseen.

Alternatives Mitigation Sites:

1. Airport Mitigation Bank
2. Holbrook Slough

Findings:

1. Proximity: The Airport Mitigation Bank is the closest mitigation site to the Port Docks (about 2 miles). Holbrook Slough is about three miles from the Docks and other site alternatives are greater than five miles in distance. Therefore, the Airport site ranks first under the proximity criterion.

2. Present Use and Ownership: The Airport Mitigation Bank, owned and administered by the Oregon Division of State Lands, is in an Industrial zone (soon to be changed to Aquatic Natural) with a Mitigation Overlay in the City of Warrenton Comprehensive Plan. Recent legislation (ORS 541.670) may impose a limit (5 acres) on the size of development sites that can be charged against the Bank. While this 5 acre ceiling has been a CREST policy for some time, the Port of Astoria's involvement in the establishment of the bank was understood to be contingent on the availability of credits from the bank for Port projects. The Holbrook Mitigation site is zoned for Mediated Development with a Mitigation Overlay in the City of Warrenton Comprehensive Plan. It has traditionally been used for low density cattle grazing and adjacent areas are used for dredge disposal. The site is owned by the Port of Astoria. Public ownership and the mitigation designation make this site an attractive alternative. However, the site is tied to proposed developments on the East Bank, Skipanon River through the 1981 CREST Mediation Panel Agreement. If the maximum development agreed upon for the East Bank occurs, there will probably be insufficient credits available at the Holbrook site to trade for credits lost at the Port of Astoria Docks development site.

3. Mitigation Trade: Neither site offers in-kind mitigation. Therefore, there is no preference assigned under this criterion.

4. Mitigation Credit Requirements and Availability:

Port of Astoria Docks - Airport Mitigation Bank Credit Match

Port Docks:	Brackish Intertidal Sand/Mud Flats:	36 Credits
	Brackish Subtidal Sand/Mud Flats:	54 Credits
	Total (Subtidal Compensation may not be required):	90 Credits

The first priority alternative is the Airport Mitigation Bank. The mitigation bank is managed solely on a credit basis. Therefore, in-kind habitat replacement considerations are not considered in mitigation bank transactions. The following calculations assume all 58.75 credits currently in the Airport Bank are available:

Table 25. Port of Astoria Docks - Airport Mitigation Bank Match-up (Intertidal only).

Credits Available	Credits Required	Net Credits	Mitigation Trade
58.75	36	22.75	N/A
		22.75	Credit Surplus

Table 26. Port of Astoria Docks - Airport Mitigation Bank Match-up (Intertidal and Subtidal).

Credits Available	Credits Required	Net Credits	Mitigation Trade
58.75	90	- 31.25	N/A
		- 31.25	Credit Deficit

A maximum size limitation on development (5 acres) may be imposed on projects that can use the bank. The Port of Astoria Docks (10 acres intertidal and 17 acres subtidal) would exceed this size limitation. If this limitation is upheld, the Airport Bank may not be a mitigation site alternative for this project. Another possibility is that the Port will charge 5 acres against the bank and look elsewhere for the balance.

Port of Astoria Docks - Holbrook Slough Credit Match

Holbrook: The Holbrook site contains existing freshwater wetlands over much of its area. Therefore, the freshwater wetlands are discounted in the credit evaluation for this site (See Holbrook Slough Mitigation Site Description). Two alternative credit assessments (low and high) were used for matching purposes. The low and high figures displayed here are suggested upper and lower limits to the range of mitigation credits that may be available at Holbrook Slough. The range of availability will affect the ability of the site to compensate for credits lost to development. Tables 27, 28, 29, and 30 display the effects of differences in credit availability on the Holbrook Slough - Port of Astoria Match-up.

Low Assessment (see Table 9):

Brackish Intertidal High Marsh:	23.0 Credits
Brackish Intertidal Low Marsh:	48.4 Credits
Brackish Intertidal Channel:	4.3 Credits
Minimum Total Credits:	75.7

Table 27. Port of Astoria Docks - Holbrook Slough Match-up (Low Estimate/Intertidal Only).

Credits Available	Credits Required	Net Credits	Mitigation Trade
75.7	36	39.7	out-of-kind
		39.7	Credit Surplus

Table 28. Port of Astoria Docks - Holbrook Slough Match-up (Low Estimate/Intertidal and Subtidal).

Credits Available	Credits Required	Net Credits	Mitigation Trade
75.7	90	- 14.3	out-of-kind
		- 14.3	Credit Deficit

High Assessment (see Table 9):

Brackish Intertidal High Marsh:	34.5 Credits
Brackish Intertidal Low Marsh:	121.0 Credits
Brackish Intertidal Channel:	17.2 Credits
Maximum Total Credits:	172.7

Table 29. Port of Astoria Docks - Holbrook Slough Match-up (High Estimate/Intertidal Only).

Credits Available	Credits Required	Net Credits	Mitigation Trade
172.7	36	136.7	out-of-kind
		136.7	Credit Surplus

Table 30. Port of Astoria Docks - Holbrook Slough Match-up (High Estimate/Intertidal and Subtidal).

Credits Available	Credits Required	Net Credits	Mitigation Trade
172.7	90	82.7	out-of-kind
		82.7	Credit Surplus

Estimated Cost of Mitigation (Airport Mitigation Bank):

Cost/Credit $ 4,800 (see Section 9.4.3)

if subtidal mitigation is not required:

Estimate: 36 x $ 4,800 = $ 172,800 with 22.75 Credit Surplus

if subtidal mitigation is required:

Estimate: 58.75 x $ 4,800 = $ 282,000 with - 31.25 Credit Deficit

Estimated Cost of Mitigation (Holbrook Slough):

Land: $ 80,000
Dike: $ 455,400 (See Section 9.4.2)
Total: $ 535,400

Cost/Credit: [16]

High Estimate: $ 7,070 (75.7 credits available)

Low Estimate: $ 3,100 (172.7 credits available)

High Estimate for Intertidal Only:

$ 7,070 x 36 = $ 254,520 with 39.7 Credit Surplus

High Estimate for Intertidal and Subtidal:

16 The total cost will be $455,400 if the developer owns the land and $535,400 if the land is not owned. Cost per credit are only relevant if surplus credits can be sold or traded.

$ 7,070 x 75.7 = $ 535,200 with 14.3 Credit Deficit

Low Estimate for Intertidal Only:

$ 3,100 x 36 = $ 111,600 with 136.7 Credit Surplus

Low Estimate for Intertidal and Subtidal:
$ 3,100 x 90 = $ 279,000 with 82.7 Credit Surplus

Conclusion:

The Airport Mitigation Bank is the first priority alternative based on proximity. There is some degree of uncertainty regarding availability of credits from the bank. There is a potential limitation on the size of developments (5 acres) that may be charged against the bank. However, it is possible this standard will be waived for the Port of Astoria Docks project or that the Port will be able to charge 5 acres against the bank and find the remaining credits at another site.

The Port of Astoria was the primary local agent responsible for the establishment of the Bank. Their involvement was at least partially based on a perception that they would be able to draw on the Bank's reserves for credits that could be used to compensate for credits lost during construction of the Port Docks. Also, there is an interagency agreement stipulating the Port's right to use the bank for Port Docks projects (Oregon Division of State Lands 1987).

If subtidal mitigation is not required for the Port Docks project, about 10 acres of intertidal brackish sand/mud flats would be the maximum acreage charged against the Bank. Subtidal mitigation has not often been required by the State of Oregon. The requirement is most likely to be imposed at the federal level if at all. Ten acres (40 credits) is within the Bank's 58.75 credit reserve.

Given the history of the Port's involvement with the Airport Mitigation Bank and the likelihood that only 10 acres would be charged against the Bank, it is judged that the Port Docks - Airport Bank match-up is a reasonable first priority option at this time.

Holbrook Slough, however, is still regarded as a second priority alternative. Costs and credit availability for the Holbrook and Airport site are probably comparable. Neither site offers in-kind mitigation. The major decision factors against a Holbrook - Port Docks match-up are proximity and Mediated Panel Agreement commitments to use the Holbrook site for projects on the East Bank, Skipanon.

9.5.5 NORTH TONGUE POINT - WEST SVENSEN ISLAND

Development Action (Figure 17):

Filling of medium depth freshwater subtidal sand flats between finger piers at North Tongue Point.

Location:

T8N, R9W, Sec. 2, Columbia River Mile 18.

USFWS Resource Category: 2 or 3 depending on use by juvenile salmonids (Ingles pers. com.)

Total Credits Required:

Area of Impact: 77 Acres (medium depth freshwater subtidal sand/mud flats)

ORS 541.626 Relative Value: Freshwater Subtidal Sand/Mud Flats (RV3)

77 acres x (RV3) = 231 Credits

Zoning Authority and Designation:

Clatsop County

Shoreland: Mediated Water Dependent Development
Aquatic: Aquatic Development

Ownership:

Oregon Division of State Lands

Site Description (Physical/Biological):

Shoreland: The shoreland is largely developed. It is predominantly characterized by a large parking lot and several warehouses at the west end. It was formerly developed as a Navel base.

Aquatic: The area proposed for fill is generally in a subtidal area (-11 to - 18 feet MLLW). While maximum salinity intrusion during low river flow is medium low (10 to 15 ppt), the mean annual salinity intrusion is in the freshwater range (<.5 ppt). The area is considered a freshwater system. Sediments are characterized by very fine sand, silt, and clay. Net phytoplankton productivity is medium-high. Total benthic infauna standing crop for the area is medium-high. Epibenthic organism standing crop and densities are generally at a medium level in this habitat type (Tidal Fluvial Demersal Slope). Fish using this area include: Pacific staghorn sculpin, starry flounder, longfin smelt, shiner perch, American shad, chinook and coho salmon, steelhead, cut-throat trout, and sturgeon.

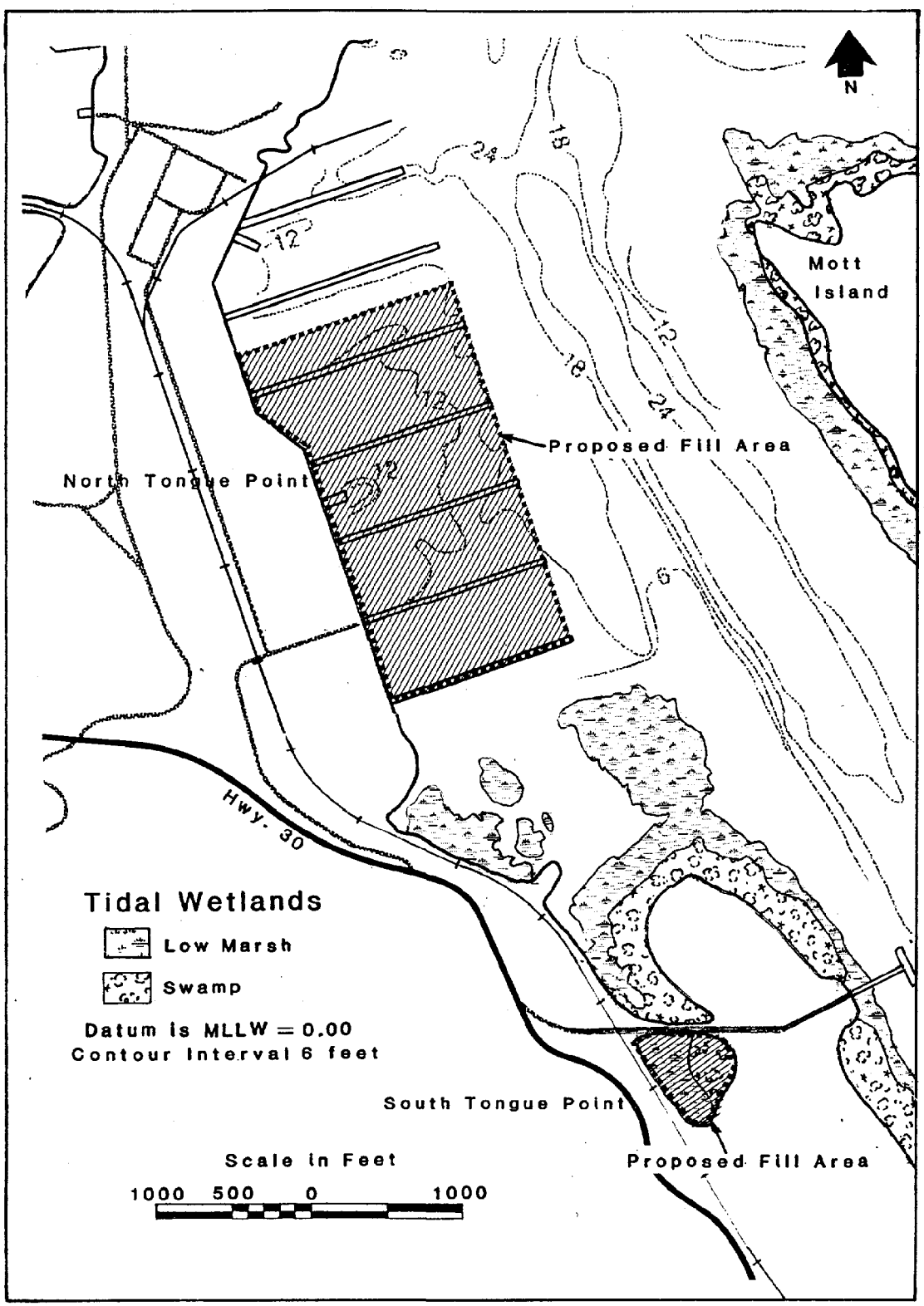


Figure 17. North Tongue Point proposed fill area (CREST 1981).

Resident and migratory birds using this area include: Double-crested Cormorants, grebes, and a variety of waterfowl. Nearby tidal flats and low marshes provide feeding areas for Great Blue Herons and shorebirds. Bald Eagles use both deep aquatic and intertidal areas for hunting.

General Background (Development):

North Tongue Point, formerly occupied by a naval base, is perceived as a Port facility for bulk storage and shipping. Its proximity to the railroad enhances its value as a transfer station between ocean import cargoes and inland markets. While maintenance costs for the railway are relatively low, capital and maintenance expenditures for dredging a deep draft connection between the docks and the main Columbia River channel may off-set this economic advantage. Federal dollars may be needed to establish the project.

The 1981 CREST Mediated Agreement allows filling up to 77 acres of fresh medium-depth subtidal sand/mud habitat between the existing finger piers. An access channel and turning basin between the existing piers and the main Columbia River navigation channel are also proposed. This will require extensive subtidal dredging and possibly the need for an adequate upland dredge material disposal site (See Section 9.5.6).

Alternative Mitigation Sites:

1. West Svensen Island (Site 7)
2. Erp Tract (Site 36)

Findings:

1. Proximity: The two closest potential mitigation sites to North Tongue Point in the freshwater salinity regime are the Erp tract and West Svensen Island. Of these, the Erp tract is much closer (about 1/2 the distance). Therefore it is the highest priority site under a strict interpretation of the proximity criterion (e.g., distance). However, the rationale for giving preference to closer sites is that these sites are more likely to be important to the ecological functions of the area impacted by development. Using this rationale, the West Svensen Island site is judged to be more potentially effective than the Erp tract. The location of Svensen Island (relative to North Tongue Point) enhances its potential value to organisms likely to be affected by the proposed fill action at North Tongue Point, i.e., one of its potential functions as an estuarine wetland would be to provide feeding habitat for juvenile salmonids originating from tributaries throughout the "accessible" Columbia River Basin. Water quality problems and the relatively limited size of the John Day River watershed limit its ability to serve this function.

The Environmental Protection Agency and US Fish and Wildlife Service give preference to mitigation sites that are "functionally" linked to the areas of development they are mitigating. Functional connectivity and relative environmental quality factors are judged to override the proximity criterion in this case. Therefore, West Svensen

Island is the preferred alternative.

2. Present Use and Ownership: West Svensen Island is a private ownership. It is in an Exclusive Farm Use (EFU) zone. The West Svensen Island site was designated in the 1983 CREST Mitigation Plan (Smith 1983) as a mitigation site and was subsequently adopted as a mitigation site in the Clatsop County Comprehensive Plan. The Erp tract, on the John Day River, was also designated and adopted as a mitigation site in the 1983 Mitigation Plan (Smith 1983). It is also privately owned. It is zoned for Residential/Agricultural use with a minimum 2 acre lot size. This level of zoning is generally considered less restrictive than EFU zoning and therefore it might be construed that a Priority 1 mitigation designation on this site is more restrictive than the same designation on an EFU site. However, due to historic and current development trends in the John Day area, it is unclear whether this is the case. Therefore, at this time, West Svensen Island and the Erp tract are considered comparable in priority in terms of ownership and use.

3. Mitigation Trade: Both West Svensen Island and the Erp tract would be out-of-kind mitigation actions and therefore are not distinguished under this criterion.

4. Mitigation Credit Requirements and Availability:

North Tongue Point - West Svensen Island Credit Match

North Tongue Point: Freshwater Subtidal Sand/Mud Flats: 231 Credits

West Svensen Island (Low Estimate):

Freshwater Intertidal Low Marsh (Goal 17):	220.8 Credits
Freshwater Intertidal Low Marsh:	70.8 Credits
Freshwater Intertidal Channel (Goal 17):	19.2 Credits
Freshwater Intertidal High Marsh:	6.4
	317.2 Total Credits

Table 31. North Tongue Point - West Svensen Island Match-up (Low Estimate).

Credits Available	Credits Required	Net Credits	Mitigation Trade
317.2	231.0	+ 86.2	out-of-kind
		86.2	Credit Surplus

West Svensen Island (High Estimate):

Freshwater Intertidal Low Marsh (Goal 17):	276 Credits
Freshwater Intertidal Low Marsh:	177 Credits
Freshwater Intertidal Channel (Goal 17):	48 Credits
Freshwater Intertidal High Marsh:	8
	509 Total Credits

Table 32. North Tongue Point - West Svensen Island Match-up (High Estimate).

Credits Available	Credits Required	Net Credits	Mitigation Trade
509	231	+ 278	out-of-kind
		278 Credit Surplus	

North Tongue Point - Erp Tract Match-up

North Tongue Point: Freshwater Subtidal Sand/Mud Flat: 231 Credits

Erp Tract Potential Credits (Low Estimate):

Freshwater Intertidal Low Marsh:	34.32 Credits
Freshwater Intertidal High Marsh:	1.04 Credits
	35.36 Total Credits

Table 33. North Tongue Point - Erp Tract Match-up (Low Estimate).

Credits Available	Credits Required	Net Credits	Mitigation Trade
35.36	231	- 195.64	out-of-kind
		195.64 Credit Deficit	

Erp Tract Potential Credits (High Estimate):

Freshwater Intertidal Low Marsh:	42.9 Credits
Freshwater Intertidal High Marsh:	1.3 Credits
	44.2 Total Credits

Table 34. North Tongue Point - Erp Tract Match-up (High Estimate).

Credits Available	Credits Required	Net Credits	Mitigation Trade
44.2	231	- 186.8	out-of-kind
		186.8	Credit Deficit

Estimated Cost of Mitigation (West Svensen Island):

Land Value: $ 800 - $ 1,100/acre (Jacobe pers. com.)
Number of Acres: 175
Total Cost: $ 140,000 to $ 192,500

Dike Construction Costs: $ 132/ft. (Bierly pers. com.)

Amount of Dike: 4,200 feet [17]
Total Cost: $ 554,400

Estimated Project Costs:

Low Estimate: $ 694,400

High Estimate: $ 746,900

With 86 to 278 Credit Surplus

Estimated Cost of Mitigation (Erp Tract):

Land Value: $ 800 - $ 1,100/acre
Number of Acres: 15.6
Total Cost: $ 12,480 to $ 17,160

Dike Construction Costs: $ 132.00/linear foot
Amount of Dike: 680 feet
Total Cost: $ 89,760.00

Estimated Project Costs:

Low Estimate: $ 102,240

High Estimate: $ 106,920

with 187 - 196 Credit Deficit

[17] This estimate assumes 1,200 feet of cross dike strengthening, (2,640/2) feet of diking to protect the road and 1,700 feet of diking to protect existing structures are required.

Conclusion:

West Svensen Island is the preferred alternative mitigation site for development actions at North Tongue Point based on functional connectivity and credit availability.

9.5.6 SOUTH TONGUE POINT - ERP TRACT

Development Action (Figure 18):

Filling of intertidal freshwater swamp.

Location:

T8N, R10W, Section 2 and 11, Columbia River Mile 18.

USFWS Resource Category: 2 (Ingles pers. com.)

Total Credits Required:

Area of Impact: 20 Acres (intertidal freshwater swamp)

ORS 541.626 Relative Value: Freshwater Intertidal Swamp (RV3)

20 acres x (RV3) = 60 Credits

Zoning Authorization and Designation:

Clatsop County

Shoreland: Mediated Water Dependent Development
Aquatic: Aquatic Development

Ownership:

Corps of Engineers

Site Description (Physical/Biological):

Shoreland: South Tongue Point is characterized by open grasses and forested upland bordered by an intertidal swamp, marsh and tide flat fringe.

Intertidal: The intertidal swamp is characterized by a dense willow middle layer with individual or small clumps of red alder scattered in the overstory. Ground cover consists primarily of various densities and configurations of lady-fern and slough sedge. Birds include Black-capped chickadees, warblers, and bushtits.

Aquatic: Subtidal sand/mud flats predominate the surrounding aquatic areas. While maximum salinity intrusion during low river flow is in the medium-low range (brackish), mean salinity for the area is less than .5 ppt (fresh). Sediments are characterized by very fine sand, silt and clay. net phytoplankton productivity in the surrounding aquatic areas is medium-high. Gross benthic primary productivity on the fringe tide flats is medium high. Total benthic infauna is generally medium high in the surrounding subtidal areas and high in the channel. Fish observed using this area include Pacific staghorn sculpin, starry flounder, longfin smelt, American shad, chinook and coho salmon. Waterfowl, cormorants, gulls and Bald Eagles may also use this area.

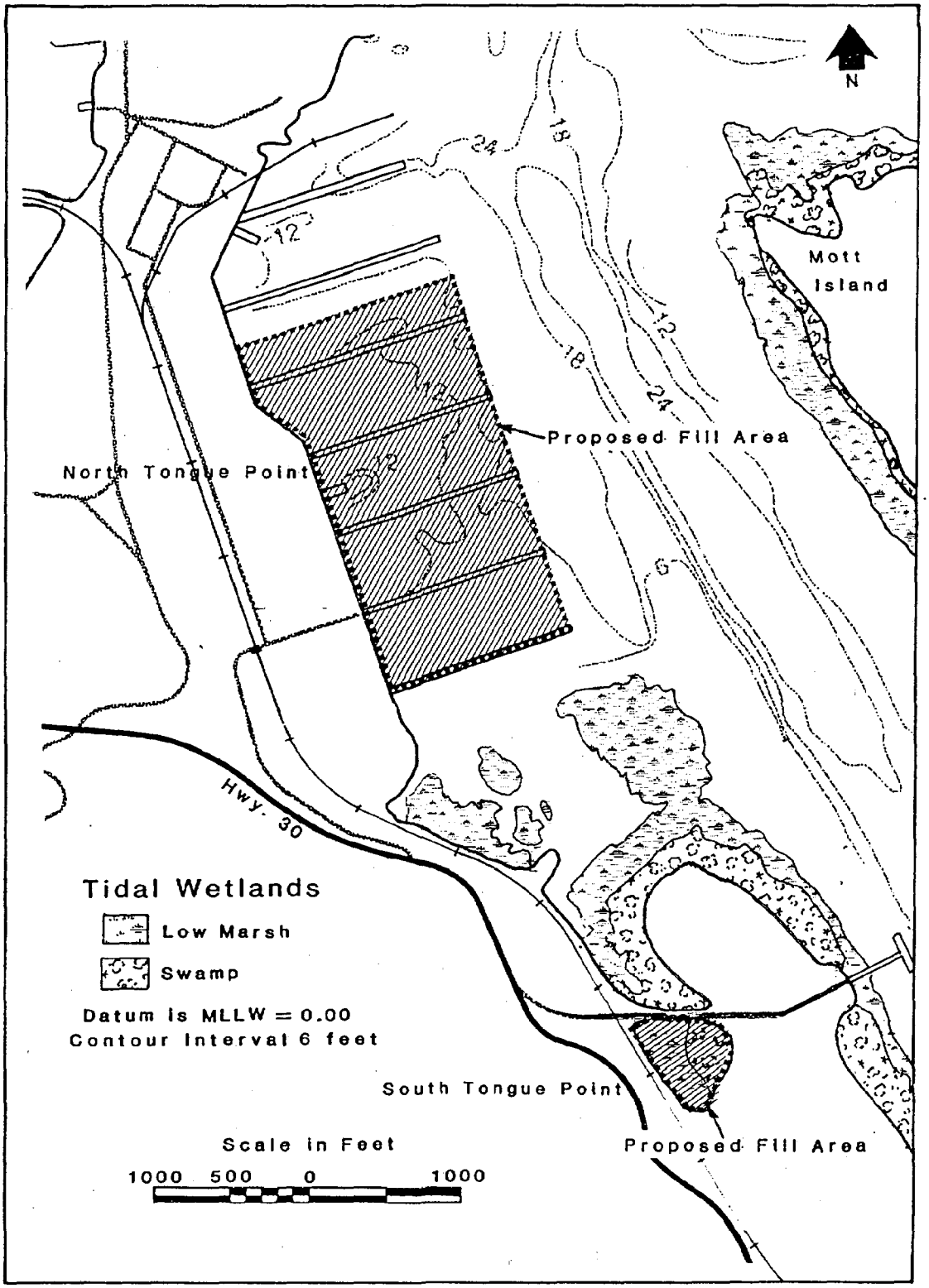


Figure 18. South Tongue Point proposed fill area (CREST 1981).

General Background (Development):

The South Tongue Point site consists of 100 acres of upland with immediate rail and highway access. Development of South Tongue Point is related to the North Tongue Point development. That is, it may become a continuation of the docking area to the north or it may serve as disposal site for subtidal dredging required to connect the North Tongue Point docking area with the main Columbia River navigation channel.

While the dredge disposal portion of the Plan describes upland areas to be the chief recipient of the dredged material, overflow onto intertidal freshwater forested wetlands and nontidal freshwater wetlands may occur. The areas of overflow may be judged to require compensatory mitigation actions.

Filling of about 20 acres of intertidal fresh swamp is allowed under the CREST Mediated Panel Agreements.

Alternative Mitigation Sites:

1. Erp Tract (Site 36)
2. West Svensen Island (Site 7)

Findings:

1. Proximity: The Erp Tract is by far the closest site (about 2.5 miles) to the South Tongue Point development area. West Svensen Island is about 4 miles in distance. Therefore, the Erp tract is the preferred alternative (functional connectivity is not judged to be a significant factor in this case).

2. Present Use and Ownership: West Svensen Island is a private ownership. It is in an Exclusive Farm Use (EFU) zone. The West Svensen Island site was designated in the 1983 CREST Mitigation Plan (Smith 1983) as a mitigation site and was subsequently adopted as a mitigation site in the Clatsop County Comprehensive Plan. The Erp tract is also privately owned. It is zoned as Residential/Agriculture - 2 and is also currently a designated mitigation site in the Clatsop County Comprehensive Plan. This level of zoning is generally considered less restrictive than EFU zoning and, therefore, it might be construed that a Priority 1 mitigation designation might significantly impair the landowner's ability to realize potential economic benefits of the property. However, due to historic and current development trends in the John Day area, it is unclear whether this is the case. At this time, West Svensen Island and the Erp tract are considered comparable in priority in terms of ownership and use.

3. Mitigation Trade: Both West Svensen Island and the Erp tract would be out-of-kind mitigation actions and are therefore not distinguished under this criterion.

4. Mitigation Credit Requirement and Availability:

South Tongue Point - Erp Tract Match-up

South Tongue Point: Freshwater Intertidal Swamp 60 Credits

Erp Tract (Low Estimate):

Freshwater Intertidal Low Marsh:	34.32	Credits
Freshwater Intertidal High Marsh:	1.04	Credits
	35.36	Total

Table 35. South Tongue Point - Erp Tract Match-up (Low Estimate).

Credits Available	Credits Required	Net Credits	Mitigation Trade
35.36	60	- 24.64	out-of-kind
		24.64	Credit Deficit

Erp Tract (High Estimate):

Freshwater Intertidal Low Marsh:	42.9	Credits
Freshwater Intertidal High Marsh:	1.3	Credits
	44.2	Total

Table 36. South Tongue Point - Erp Tract Match-up (High Estimate).

Credits Available	Credits Required	Net Credits	Mitigation Trade
44.20	60	- 15.8	out-of-kind
		15.8	Credit Deficit

South Tongue Point - West Svensen Island Match-up

South Tongue Point: Freshwater Intertidal Swamp 60 Credits

West Svensen Island (Low Estimate):

Freshwater Intertidal Low Marsh (Goal 17):	220.8	Credits
Freshwater Intertidal Low Marsh:	70.8	Credits
Freshwater Intertidal Channel (Goal 17):	19.2	Credits
Freshwater Intertidal High Marsh:	6.4	
	317.0	Total Credits

Table 37. South Tongue Point - West Svensen Island Match-up (Low Estimate).

Credits Available	Credits Required	Net Credits	Mitigation Trade
317	60.0	+ 257	out-of-kind
		257 Credit Surplus	

West Svensen Island (High Estimate):

Freshwater Intertidal Low Marsh (Goal 17):	276 Credits
Freshwater Intertidal Low Marsh:	177 Credits
Freshwater Intertidal Channel (Goal 17):	48 Credits
Freshwater Intertidal High Marsh:	8
	509 Total Credits

Table 38. South Tongue Point - West Svensen Island Match-up (High Estimate).

Credits Available	Credits Required	Net Credits	Mitigation Trade
509	60	+ 449	out-of-kind
		449 Credit Surplus	

Estimated Cost of Mitigation:

Erp Tract:

Land Value: $ 800 - $ 1,100/acre
Number of Acres: 15.6
Total Cost: $ 12,480 to $ 17,160 with

Dike Construction Costs: $ 132/ft.

Amount of Dike: 680 feet
Total Cost: $ 89,760

Project Costs Estimates:

Low - $ 102,240
High - $ 106,920

with 15.8 to 24.64 Credit Deficit

West Svensen Island:

Land Value:	$ 800 - $ 1,100/acre
Number of Acres:	175
Total Cost:	$ 140,000 to $ 192,500

Dike Construction Costs: $ 132/ft.

Amount of Dike:	4,200 feet [18]
Total Cost:	$ 554,400

Project Cost Estimates:

Low - $ 694,400
High - $ 746,900

with 257 to 449 Credit Surplus

Conclusion:

The Erp tract is much closer to South Tongue Point (about 2 miles) than West Svensen Island (about 4 miles). Both the Erp and West Svensen Island sites are considered comparable under ownership and use. Mitigation actions at both sites would be out-of-kind (although, given time, tidal swamp could conceivably be established at either site). The West Svensen Island site offers adequate credits under both the high and low credit evaluation. The Erp tract does not offer adequate credits under either the high or low credit evaluation. However, the Erp tract would be a much less expensive alternative if adequate credits were available. This could be the case if the development scenario at South Tongue Point does not require the full amount of acreage stipulated in the Mediation Agreement. Assuming adequate credits are unavailable it still might be used if: (1) West Svensen Island were being used as credit for another development and surplus credits were available or if the deficit credits from the Erp tract could be applied against the mitigation bank as compensation for development at South Tongue Point. Otherwise, West Svensen Island will be considered the preferred alternative based on credit availability.

---

18 This estimate assumes 1,200 feet of cross dike strengthening, (2,640/2) feet of diking to protect the road and 1,700 feet of diking to protect existing structures are required.

Table 39. Summary of Credits Available (Mitigation Sites) and Credits Needed (Development Sites) for Priority 1 Mitigation Sites in the Columbia River Estuary.

Mitigation Site	Credits Available	Development Site	Credits Needed	Net
Tansy Point	2.0	Tansy Point Industrial Park	2.0	0.0
Holbrook Slough	76.0 (low)	West Skipanon	27.0	49.0
	173.0 (high)			146.0
Holbrook Slough	76.0 (low)	East Skipanon	89.0	-13.0
	173.0 (high)			84.0
Airport Mitigation Bank	59.0	Port of Astoria Docks	36.0 (intertidal)	23.0
			90.0 (intertidal and (subtidal)	-31.0
West Svensen Island	317.0 (low)	North Tongue Point	231.0	86.0
	509.0 (high)		231.0	278.0
Erp Tract	35 (low)	South Tongue Point	60.0	-25.0
	44 (high)		60.0	-16.0

9.6 PRIORITY 2 DEVELOPMENT/MITIGATION SITE MATCH-UPS

This section briefly discusses mitigation sites that have been matched with areas that have historically demonstrated impacts on aquatic and/or wetland areas or that are near aquatic areas and wetlands that are in development zones. However, no formal permit or agreements regarding development exist. Each respective development site is described along with a brief statement regarding potential need for mitigation and a brief analysis of compensation. The Priority 2 Development/Mitigation Match-ups are displayed in Table 40.

Table 40. Priority 2 Development/Mitigation Site Match-ups.

Development Sites	Mitigation Sites
Hammond Boat Basin	Hammond Boat Basin *
Hammond Boat Basin	Swash Lake **
East Astoria Mooring Basin	Alderbrook
Bradwood Mill	Bradwood
Wauna Mill-Lower Westport	Wauna Mill ***
Ilwaco Boat Basin	Jetty A ****
Chinook Boat Basin	West Sand Island ****
Weyerhauser	Deep River
Skamokawa	Skamokawa Vista Park
Elochoman Slough Slough Marina	Elochoman River
South Astoria	Lee/Schwarz Tract

* Hammond Boat Basin is the only development site, other than Oregon State Highway Department and Oregon State Parks projects, that will be matched with Swash Lake. This is to insure reservation of adequate mitigation site opportunities for State Park and State Highway projects.

** While Swash Lake will continue to be considered a Priority 2 site, it will be classified under a Level 4 status of protection, that is, no restrictions. This is done on the premise that state parks are adequately protected lands and a commitment has been made by the agency to designate these lands for mitigation use in the Fort Stevens State Park Master Plan.

*** The Wauna Mill sites are reserved for use by the James River Corp. which is both the landowner and developer. Therefore, a protection requirement was judged unnecessary.

**** These are Corps of Engineer ownerships. The U.S. Army Corps of Engineers cannot, under current federal authorization, relinquish use of their Columbia River Estuary properties for the purpose of mitigation activities. Therefore, the Corps does not concur with or recognize the designation of their properties. These sites are listed in the Plan for information purposes only. There are no restrictions imposed on these sites.

9.6.1 Hammond Boat Basin/Hammond Boat Basin Match-up.

HAMMOND BOAT BASIN Site # 2. HAMMOND BOAT BASIN

Development Site	Mitigation Site
Action: Dredging	Mitigation: Creation (Excavation)
State: Oregon	State: Oregon
County: Clatsop	County: Clatsop
Location: T8N, R10W, Section 5	Location: T8N, R10W, Section 5
Landowner: Corps of Engineers Leased to Town of Hammond	Landowner: Corps of Engineers Leased to Town of Hammond
Zoning: Town of Hammond Recreation/Commercial Aquatic Development	Zoning: Town of Hammond Recreation/Commercial Aquatic Development
Habitat	Habitat
Lost: Brackish Intertidal Sand Flats	Gained: Brackish Intertidal Sand Flats
Relative Value: 4	Relative Value: 4
Area Lost: 10 - 15 acres	Area Gained: 5 acres
Credits	Credits
Lost: 40 - 60	Avail/Gained: 20/20 (in-kind)
Net	Conflicts: Development
Credits: 20 - 40 deficit	

Need: Hammond Boat Basin currently has 178 berths. Immediate plans involve addition of 50 - 100 slips. Long range plans call for a total of 350 berths. While much of the immediate dredging may be subtidal, future encroachment on intertidal areas may also occur.

Analysis of Compensation: While on-site/in-kind mitigation is generally preferable, all acreage and credit requirements cannot be met on site. Also, the Town of Hammond has plans to develop its waterfront property near the Basin. Therefore, another alternative may be required.

9.6.2 Hammond Boat Basin/Swash Lake Match-up.

HAMMOND BOAT BASIN	Site # 1. SWASH LAKE [19]
Development Site	Mitigation Site
Action: Dredging	Mitigation: Creation (Excavation)
State: Oregon	State: Oregon
County: Clatsop	County: Clatsop
Location: T8N, R10W, Section 5	Location: T8N, R10W, Section 6
Landowner: Corps of Engineers	Landowner: State Parks
Zoning: Town of Hammond Recreation/ Commercial Aquatic Development	Zoning: Clatsop County Conservation Shorelands
Habitat	Habitat
Lost: Brackish Intertidal Sand Flats	Gained: Brackish Intertidal Sand Flats
Relative Value: 4	Relative Value: 4
Area Lost: 10-15 acres	Area Available: 50 acres
Credits Lost: 40-60	Credits Avail/Gained: 200/40-60 (in-kind)
Net Credits: about 150	Potential Conflicts: None

Need: See Match-up No. 1.

Analysis of Compensation: In-kind/off-site mitigation adequate.

9.6.3. East Astoria Mooring Basin/Alderbrook Match-up

EAST ASTORIA MOORING BASIN	Site # 6. ALDERBROOK
Development Site	Mitigation Site
Action: Filling and Dredging	Mitigation: Restoration (Excavation and Enhancement
State: Oregon	State: Oregon

---

19 Hammond Boat Basin is the only development site, other than Oregon State Highway Department and Oregon State Park projects, that will be matched with Swash Lake. This is to insure reservation of adequate mitigation site opportunities for State Park and State Highway projects. Furthermore, while Swash Lake will continue to be considered a Priority 2 site, it will be classified under a Level 4 protection status. There are no restrictions imposed under this level. This is done on the premise that state parks are adequately protected lands and a commitment has been made by the agency to designate these lands for mitigation use in the Fort Stevens State Park Master Plan.

County: Clatsop
Location: T8N, R9W, Section 9
Landowner: Port of Astoria
Div. State Lands
Zoning: City of Astoria
Marine Industrial
Aquatic Development
Habitat
Lost: Brackish Subtidal
and Intertidal Sand Flats
Relative
Value: 3
Area Lost: Undetermined
Credits
Lost: Undetermined

County: Clatsop
Location: T8N, R9W, Section 3D
Landowner: Division State Lands

Zoning: City of Astoria
Dredge Material Disposal

Habitat
Gained: Brackish Intertidal
Low Marsh
Relative
Value: 5
Area Available: < 2 acres
Credits
Avail/Gained: 10/Undetermined
Potential Conflicts: Recreation

Need: The East Astoria mooring basin may require future expansion of moorage facilities or other improvements involving dredge or fill activities. There are no proposals at this time.

Analysis of Compensation: Compensation would be out-of-kind/off-site. If deep draft development were to take place here, other mitigation opportunities would have to be considered. Also, the mitigation area designated is already high marsh. While there are significant uplands in the area, the Alderbrook residents wish to retain this land in upland for low impact recreational uses (e.g., a park). Exchanging one wetland type for another wetland type is not allowed under the Estuarine Mitigation Law Administrative Rule. However, this has been done in the past by discounting existing wetland credits. Enhancement projects in existing wetlands have also been done for mitigation credit. Also, the landowner (Oregon Division of State Lands) retains the right to withdraw this site from the mitigation designation if it is determined that it will be used for development. A thorough analysis of these issues will be required before the site can be used for mitigation purposes.

9.6.4 Bradwood Mill/Bradwood Match-up

BRADWOOD MILL

Development Site

Action: Filling
State: Oregon
County: Clatsop
Location: T8N, R6W, Section 9
Landowner: Jason Whitelaw
Zoning: Clatsop County
Marine Industrial
Aquatic Development
Habitat
Lost: Fresh Intertidal
Low Marsh

Site # 9. BRADWOOD

Mitigation Site

Mitigation: Creation (Excavation)
State: Oregon
County: Clatsop
Location: T8N, R6W, Section 9
Landowner: Jason Whitelaw
Zoning: Clatsop County
Marine Industrial

Habitat
Gained: Fresh Intertidal
Low Marsh

Relative	Relative
Value: 3	Value: 3
Area Lost: about 4 acres	Area Available: 10 acres
Credits	Credits
Lost: 12	Avail/Gained: 30/12 (in-kind)
Net	Potential Conflicts: Development
Credits: 18 Surplus	

Need: No active development exists in the Bradwood area. The site was used as a mill and a large wharf for shipping lumber during the 1960's. The wharf is not serviceable at the present time. While recent investigations into development suitability and requirements for the site have not been made, there are about 4 acres of open water and marsh wetland that may be a potential fill site. The rationale for filling this area would be to connect separated developable lands in order to enhance their development potential.

Analysis of Compensation: Compensation would be in-kind and essentially on-site. Adequate credits are available with a net potential surplus of 18 credits that might be transferable to other projects.

9.5.5 Wauna Mill-Lower Westport/Wauna Mill Match-up

WAUNA MILL/LOWER WESTPORT	Site # 10. WAUNA MILL
Development Site	Mitigation Site
Action: Filling	Mitigation: Creation (Excavation)
State: Oregon	State: Oregon
County: Clatsop	County: Clatsop
Location: T8N, R6W, Sect.22 & 26	Location: T8N, R6W, Section 22
Landowner: James River Corp.	Landowner: James River Corp.
Zoning: Clatsop County	Zoning: Clatsop County
Heavy Industrial	Heavy Industrial
Lake & Wetlands	
Aquatic Development	Aquatic Development
Habitat	Habitat
Lost: Undetermined	Gained: Undetermined
Relative	Relative
Value: Not applicable	Value: Not applicable
Area Lost: Undetermined	Area Available: Undetermined
Total	
Credits	
Lost: Not applicable	
Net	
Credits: Not applicable	

Need: Part of this site is currently used as a paper manufacturing industrial site. There are no plans in the foreseeable future for developments that would involve dredging or filling of wetlands or aquatic areas. However, a large portion of the wetlands on the Wauna Mill site are in a Heavy Industrial Zone and there have been considerable wetland acreages filled in the past. By the same token, there is

also a large amount of existing upland area currently not committed to development. Therefore, while the potential for wetland impact exists, it is considered extremely low for the 4-7 year time frame of the Plan.

Analysis of Compensation: Since there are no predicted development scenarios for this area, potential impact avoidance or compensation requirements are also difficult to predict. It is important to note that Oregon's estuarine mitigation law (ORS 541.626) and associated Administrative Rule cannot be considered legally administrable in this case because the site is outside the legal boundary of the Columbia River Estuary. However, the wetlands and aquatic areas on the Wauna Mill site are under the jurisdiction of Oregon's Removal/Fill Law and the federal Section 404 and Section 10 permit regulations. Therefore, it is still likely mitigation will be required for any future wetland or aquatic area impacts.

There are two wood chip fills in existing fresh intertidal forested and emergent wetlands on the James River property. These fills could be removed from the wetlands and treated as mitigation for impacts in other wetlands nearby. Since the developer and the landowner are the same entity, there is no need to impose restrictions on the potential mitigation sites.

9.6.6 Ilwaco Boat Basin/Jetty A Match-up

ILWACO BOAT BASIN	Site # 11. JETTY A [20]
Development Site	Mitigation Site
Action: Dredging and Filling	Mitigation: Creation (Excavation)
State: Washington	State: Washington
County: Pacific	County: Pacific
Location: T10N, R11W, Sect. 33,34	Location: T9N, R11W, Section
Landowner: Port of Ilwaco Town of Ilwaco	Landowner: Corps of Engineers
Zoning: Development Shoreland Development Aquatic	Zoning: Conservation Shoreland Conservation Aquatic
Habitat	Habitat
Lost: Brackish Intertidal Sand Flats, Marsh	Gained: Brackish Intertidal Sand Flats, Marsh
Relative	Relative
Value: N/A	Value: N/A
Area Lost: Undetermined	Area Available: 40 acres

---

20 The U.S. Army Corps of Engineers cannot, under current federal authorizations, relinquish use of their Columbia River Estuary properties for the purpose of mitigation activities. There, the Corps does not concur with or recognize the designation of their properties. Jetty A is listed in the Plan for information purposes only. No restrictions are imposed on the site.

Credits Lost: N/A Net Credits: N/A	Credits Avail/Gained: N/A Potential Conflicts: Corps cannot allow mitigation use

Need: The Port of Ilwaco mooring basin provides berths for approximately 1,000 private, commercial and charter boats. During peak seasonal use 1,300 to 1,500 boats use the port facilities daily. There are three fish processing operations on the Ilwaco shoreline that are served by a growing number and variety of commercial craft. The Port's proximity to the Columbia River mouth makes it attractive to a variety of potential user groups.

The mooring basin is currently 1,200 feet long by 650 feet wide with depths to 14 feet. The port may plan to expand its port facilities to accommodate anticipated future increased demand for mooring space. Expansion would require relocation of the breakwater and extensive dredging. The impacts and subsequent mitigation requirements for these activities may also be extensive.

Analysis of Compensation: Since the amount of expansion and subsequent dredge and fill activities are at this time unplanned, mitigation area requirements cannot be estimated. Compensation would be in-kind with respect to tidal regime, salinity and substrate. Washington State agencies often use a Habitat Evaluation Procedure (HEP) to determine mitigation requirements. This is done on a case by case basis.

9.6.7. Chinook Boat Basin/West Sand Island Match-up.

CHINOOK BOAT BASIN	Site # 12. WEST SAND ISLAND [21]
Development Site	Mitigation Site
Action: Dredging	Mitigation: Creation (Excavation)
State: Washington	State: Oregon
County: Pacific	County: Clatsop
Location: T9N, R10W, Sect.17	Location: T9N, R11W, Sect.
Landowner: Port of Chinook	Landowner: Corps of Engineers
Zoning: Water Dependent Shoreland Development Aquatic	Zoning: Conservation Shoreland Conservation Aquatic
Habitat	Habitat
Lost: Brackish Intertidal & Subtidal Sand Flats, Marsh	Gained: Brackish Intertidal & Subtidal Sand Flats, Marsh
Relative	Relative
Value: N/A	Value: N/A

---

21 The Corps of Engineers cannot, under current federal authorizations, relinquish use of their Columbia River Estuary properties for the purpose of mitigation activities. Therefore the Corps does not concur with or recognize the designation of their properties.

Area Lost: Undetermined	Area Available: 6 acres
Credits	Credits
Lost: N/A	Avail/Gained: N/A
Net	Conflicts: Corps will not
Credits: N/A	allow mitigation use

Need: The Port of Chinook operates the Chinook Mooring Basin. There are slips for 323 commercial and recreational boats. Chinook is the third largest mooring basin in the CREST area and provides access to both the mouth of the Columbia River and the northern side of the estuary. The authorized basin is 500 feet by 590 feet, with depths to 18 feet. About 20,000 cu. yards of material are dredged annually from the basin. The Port has considered expansion of the basin. However, the Chinook Channel, which serves as a basin access channel, presents some problems with regards to maintenance dredging. The Port would like to see these problems resolved before expansion is seriously considered.

Expansion of the boat basin is limited on the east by the disposal area and extensive shoaling. To the west, are the Chinook and Bumble Bee facilities and a fringing tidal marsh adjacent to the maintained channel inside the breakwater. Expansion would involve relocating all or part of the present breakwater into the waters south of the Port expansion.

Expansion would entail both dredging and filling in shallow subtidal waters and possibly in a tidal marsh. These operations may require compensatory mitigation. However since specific plans for development have not been proposed, there is no means of determining the extent of potential impacts and subsequent mitigation requirements.

Analysis of Compensation: Since the amount of expansion and subsequent dredge and fill activities are at this time unplanned, mitigation area requirements cannot be estimated. Compensation would be in-kind with respect to tidal regime, salinity and substrate. Washington State agencies often use a Habitat Evaluation Procedure (HEP) to determine mitigation requirements. This is done on a case by case basis.

9.6.8 Weyerhauser/Deep River Match-up.

WEYERHAUSER LOG STORAGE SITE	Site # 13. DEEP RIVER
Development Site	Mitigation Site
Action: Filling and/or Dredging	Mitigation: Restoration (Dike Breach)
State: Washington	State: Washington
County: Wahkiakum	County: Wahkiakum
Location: T10N, R8W, Sect.29	Location: T10N, R8W, Sect. 29
Landowner: Weyerhauser	Landowner: William Wright
Zoning: Urban	Zoning: No Data
Habitat	Habitat
Lost: Undetermined	Gained: Fresh Tidal Marsh
Relative	Relative
Value: N/A	Value: N/A

Area Lost: Undetermined	Area Available: 12 acres
Credits	Credits
Lost: N/A	Avail/Gained: N/A
Net	Conflicts: None
Credits: N/A	

Need: The Weyerhauser log storage facility and the nearby community of Deep River have a history of intensive use. Given the history of land use, the urban land use designations of shoreline and adjacent aquatic areas, the potential for development expansion into wetlands and aquatic areas in this area is high. Also, the Washington State Highway Department owns a right-of-way at a bridge site north of the Weyerhauser site and Deep River. There are significant wetlands associated with the bridge. Bridge maintenance and repair may require permanent or temporary filling of wetlands. Mitigation may be required for wetland impacts in this area.

Analysis of Compensation: Since the amount of expansion and subsequent dredge and/or fill activities are at this time unplanned, mitigation area requirements cannot be estimated. Washington State agencies often use a Habitat Evaluation Procedure (HEP) to determine mitigation requirements. This is done on a case by case basis.

9.6.9 Skamokawa/Skamokawa Vista Park Match-up.

SKAMOKAWA	Site # 14. SKAMOKAWA VISTA PARK
Development Site	Mitigation Site
Action: Filling and/or Dredging	Mitigation: Restoration (Fill Removal)
State: Washington	State: Washington
County: Wahkiakum	County: Wahkiakum
Location: T9N, R6W, Sect.17,18	Location: T9N, R6W, Sect. 17,18
Landowner: Port Dist.# 2	Landowner: Port Dist. # 2
Zoning:	Zoning:
Habitat	Habitat
Lost: Undetermined	Gained: Fresh Tidal Marsh/Swamp
Relative	Relative
Value: N/A	Value: N/A
Area Lost: Undetermined	Area Available: 1.5 acres
Credits	Credits
Lost: N/A	Avail/Gained: N/A
Net	Conflicts: Recreation Uses
Credits: N/A	

Need: Proposals for expansion of camping and boating facilities (e.g., marina and boat docks) and bridge work, are cited in the Skamokawa Tourism Facilities Preliminary Feasibility Study. These improvements may impact intertidal wetlands.

Analysis of Compensation: The amount and distribution of development and subsequent dredge and/or fill activities, are undetermined. There-

fore, mitigation area requirements cannot be estimated. Washington State agencies often use a Habitat Evaluation Procedure (HEP) to determine mitigation requirements. This is done on a case by case basis.

9.6.10 Elochoman Slough Marina/Elochoman River Match-up

ELOCHOMAN SLOUGH MARINA	Site # 15 ELOCHOMAN RIVER
Development Site	Mitigation Site
Action: Filling and/or Dredging	Mitigation: Restoration (Dike Breach)
State: Washington	State: Washington
County: Wahkiakum	County: Wahkiakum
Location: T8N, R6W, Sect.2	Location: T9N, R6W, Sect. 26
Landowner: Town of Cathlamet	Landowner: H.B. Schmitt
Zoning:	Zoning: Rural
Habitat	Habitat
Lost: Fresh Intertidal	Gained: Fresh Intertidal
Relative	Relative
Value: N/A	Value: N/A
Area Lost: Undetermined	Area Available: 20 acres
Credits	Credits
Lost: N/A	Avail/Gained: N/A
Net	Conflicts: None known
Credits: N/A	

Need: The Elochoman Slough Marina has 75 boat slips in use at this time. They are essentially evenly divided with regard to commercial and recreational use. Moorage expansion may require additional dredging or filling.

Analysis of Compensation: The amount and distribution of development and subsequent dredge and/or fill activities, are undetermined. Therefore, mitigation area requirements cannot be estimated. Washington State agencies often use a Habitat Evaluation Procedure (HEP) to determine mitigation requirements. This is done on a case by case basis.

9.6.11 South Astoria/Lee-Schwarz Tract Match-up

SOUTH ASTORIA	Site # 31. LEE-SCHWARZ TRACT
Development Site	Mitigation Site
Action: Filling and/or Dredging	Mitigation: Restoration (Dike Breaching)
State: Oregon	State: Oregon
County: Clatsop	County: Clatsop
Location: T8N, R9W, Sect.17	Location: T8N, R9W, Sect. 28
Landowner: Corderman Oregon Inc. Pacific Power & Light Fluhrer Bros.	Landowner: Richard Lee and Ron Schwarz

Zoning: City of Astoria Marine Industrial Aquatic Development	Zoning: Clatsop County AF-20
Habitat Lost: Brackish Intertidal Low and High Marsh	Habitat Gained: Fresh Intertidal High and Low Marsh
Relative Value: 3 and 5 Area Lost: Undetermined Credits Lost: Undetermined Net Credits: Undetermined	Relative Value: 3 and/or 5 Area Available: 35 acres Credits Available: Min. 105 - Max. 175 Conflicts: Agriculture

Need: Most suitable development sites in this area have already been developed. Industrial sites include the former Bumble Bee Boatyard, the abandoned PP&L plant, the Fluhrer Brothers shingle mill and a boat shop. Some dredging has been considered to provide access from the PP&L site to the Youngs Bay channel.

The proximity of the site to the Youngs Bay channel enhances its potential as a moorage facility, i.e., fishing boats. Dredging may be required to provide access to the old Bumble Bee Boatyard and the Youngs Bay channel.

Analysis of Compensation: The amount and distribution of development and subsequent dredge and/or fill activities, are undetermined. Therefore, mitigation area requirements cannot be estimated. The Airport Mitigation Bank offers an additional mitigation option for development in this area.

9.6.12 Oregon and Washington State Highway Projects

All mitigation sites that are matched with highway projects are considered Priority 2 Sites in the Mitigation and Restoration Plan. Potential highway development projects were identified through a review of Washington's Proposed Highway Construction Program (Washington State Department of Transportation 1987) and Oregon's Six Year Highway Improvement Program (Oregon Department of Transportation 1986). Two sites were identified, one in Oregon and one in Washington.

The Oregon project is to replace the John Day Bridge where US Highway 30 crosses the John Day River. Mitigation will be out-of-kind/off-site at Swash Lake.

In Washington, the project is to replace the Deep River bridge where SR 4 crosses the Deep River. On-site mitigation has already been implemented.

An effort has been made to distribute Priority 2 and 3 sites throughout the estuary in order to maximize mitigation opportunities for future road and bridge work.

9.7 MITIGATION AND RESTORATION SITE DESCRIPTIONS (PRIORITY 2 AND 3, LEVEL 4 SITES)

The sites listed in this section are considered low priority inventory sites. They are low priority because they are either not matched with a development or they are in an ownership that cannot allow designation at a higher level. In most cases, future demands for use of these sites are likely to be low. Since anticipated demand for these sites is considered low, no measures are recommended to protect the sites for mitigation. This means there are no restrictions on property owners with ownerships that are listed as Priority 2 or 3, Level 4 sites.

Site selection was based primarily on: site character (sites with no or little wetland vegetation or with no structural improvements were given highest priority), estimated ease of mitigation action (sites that required little or no new dike work were considered preferable) and ownership. Public ownerships were considered higher priority than privately owned sites. The rationale here is: 1. an anticipated higher degree of receptivity to the concept of mitigation uses and 2. an anticipated greater degree of protection for the mitigation site.

An attempt was made to develop a distribution of various sized mitigation options throughout the Estuary with a rough correlation of density and size of sites to anticipated demand in a given area.

These sites are also proposed as potential restoration alternatives outside of the context of mitigation. That is, they are relatively low cost restoration options and they are generally not potentially competing with mitigation sites.

9.7.1 List of Priority 2 and 3, Level 4 Mitigation and Restoration Sites and Relevant Data

COLUMBIA RIVER (Clatsop County)

Site #: **5 Astoria Bridge**
Landowner: Oregon State Highway Commission
Subarea: 42.13
Legal Description: T8N, R9W, Section 7CA
Tax Lot: 300 & 1800
Acres: .44
County: Clatsop
State: Oregon
Zoning: Tourist Aquatic Development
Value/Acre: $2,960 & $30,450
Elevations: Variable
Status: Designated Priority 3, Level 4
Potential Conflicting Uses: Commercial/Recreation

Site #: **8 Aldrich Point**
Landowner: Gary Miller

Subarea: 4.29
Legal Description: T9N, R7W, Section 27
Tax Lot: 101
Acres: 73
County: Clatsop
State: Oregon
Zoning: EFU
Value/Acre: $800 - $1,100
Elevations: Undetermined
Status: Inventory Priority 3, Level 4
Potential Conflicting Uses: Agriculture

COLUMBIA RIVER (Pacific County)

Site #: **11 Jetty "A"**
Landowner: U.S. Army Corps of Engineers
Subarea: 4.47
Legal Description: T9N, R11W, Section 15 & 16, Columbia River Mile 2
Tax Lot:
Acres: 40
County: Pacific
State: Washington
Zoning:
Value/Acre: n/a
Elevations: Variable
Status: Designated Priority 3, Level 4
Potential Conflicting Uses: Dredged Material Disposal/Corps Projects

COLUMBIA RIVER (Clatsop County)

Site #: **12 West Sand Island**
Landowner: U.S. Army Corps of Engineers
Subarea: 4.47
Legal Description: T9N, R11W, Sections 10, 11, 13, 14, 15, 23 & 24
Tax Lot:
Acres: about 6
County: Clatsop
State: Oregon
Zoning:
Value/Acre:
Elevations: Variable
Status: Designated Priority 3, Level 4
Potential Conflicting Uses: Corps Projects

LEWIS AND CLARK RIVER (Clatsop County)

Site #: **18 Jeffers Slough**
Landowner: Roger Olson and Arthur J. Filliger
Subarea: 4.18
Legal Description: T8N, R10W, Section 36
Tax Lot: 1500, 200 & 100

Acres: 35
County: Clatsop
State: Oregon
Zoning: EFU
Value/Acre: $800 - $1,100
Elevations: Undetermined
Status: Inventory Priority 3, Level 4
Potential Conflicting Uses: Agriculture

Site #: **19 Fort Clatsop**
Landowner: National Park Service; James & Shirley Roberts
Subarea: 4.18
Legal Description: T8N, R10W, Section 36
Tax Lot: 2001
Acres: 17
County: Clatsop
State: Oregon
Zoning: EFU
Value/Acre: $800 - $1,100
Elevations: Undetermined
Status: Inventory Priority 3, Level 4
Potential Conflicting Uses: Agriculture

Site #: **20 Miller Tract**
Landowner: Elmer Miller
Subarea: 4.18
Legal Description: T8N, R10W, Section 35
Tax Lot: 1100
Acres: 37
County: Clatsop
State: Oregon
Zoning: EFU
Value/Acre: $800 - $1,100
Elevations: Undetermined
Status: Inventory Priority 3, Level 4
Potential Conflicting Uses: Agriculture

Site #: **21 Cavenham Tract**
Landowner: Cavenham Forest Industries
Subarea: 4.18
Legal Description: T7N, R10W, Section 1
Tax Lot: 1000
Acres: 29
County: Clatsop
State: Oregon
Zoning: EFU
Value/Acre: $800 - $1,100
Elevations: Undetermined
Status: Inventory Priority 3, Level 4
Potential Conflicting Uses: Agriculture

Site #: **23 Schneider Tract**
Landowner: Mamie Schneider
Subarea: 4.18
Legal Description: T7N, R9W, Section 18
Tax Lot: 100
Acres: 20
County: Clatsop
State: Oregon
Zoning: EFU
Value/Acre: $800 - $1,100
Elevations: Undetermined
Status: Inventory Priority 3, Level 4
Potential Conflicting Uses: Agriculture

YOUNGS RIVER (Clatsop County)

Site #: **24 Daggett Point**
Landowner: David Hess
Subarea: 4.20
Legal Description: T8N, R9W, Section 20
Tax Lot:
Acres: 35
County: Clatsop
State: Oregon
Zoning: EFU
Value/Acre: $800 -$1,100
Elevations: Undetermined
Status: Priority 3, Level 4
Potential Conflicting Uses: Agriculture

Site #: **25 Binder Slough**
Landowner: Benjamin Riekkola
Subarea: 4.20
Legal Description: T7N, R9W, Section 4
Tax Lot: 500
Acres: 38
County: Clatsop
State: Oregon
Zoning: EFU
Value/Acre: $800 - $1,100
Elevations: Undetermined
Status: Priority 3, Level 4
Potential Conflicting Uses: Agriculture

Site #: **26 Haven Island**
Landowner: Cavenham Forest Industries
Subarea: 4.20
Legal Description: T7N, R 9 W, Section 4
Tax Lot: 1000
Acres: 63
County: Clatsop
State: Oregon

Zoning: F-38, Forestry
Value/Acre: Assessed at $ 566.00
Elevations: + 5.8' - + 6.2' MLLW
Status: Priority 3, Level 4
Potential Conflicting Uses: Existing Wetlands (Potential Enhancement Project)

Site #: **27 Bjork/Cathcart** Tract
Landowner: Laila Bjork and Virgil Cathcart
Subarea: 4.20
Legal Description: T7N, R9W, Section 4
Tax Lot: 201
Acres: 57
County: Clatsop
State: Oregon
Zoning: EFU
Value/Acre: $ 800.00 - 1100.00
Elevations: Undetermined
Status: Priority 3, Level 4
Potential Conflicting Uses: Agriculture

Site #: **28 Tolonen** Tract
Landowner: Waino Tolonen
Subarea: 4.20
Legal Description: T7N, R9W, Section 15
Tax Lot: 700
Acres: 14
County: Clatsop
State: Oregon
Zoning: EFU
Value/Acre: $800 - $1,100
Elevations: Undetermined
Status: Inventory Priority 3, Level 4
Potential Conflicting Uses: Agriculture

Site #: **29 Warila** Tract
Landowner: John Warila
Subarea: 4.20
Legal Description: T7N, R9W, Section 15
Tax Lot: 600
Acres: 11
County: Clatsop
State: Oregon
Zoning: AF-20 Forestry
Value/Acre: $800 - $1,100
Elevations: Undetermined
Status: Priority 3, Level 4
Potential Conflicting Uses: Agriculture/Forestry

Site #: **30 Tri-River** Tract
Landowner: Tri-River Investment Co.

Subarea: 4.20
Legal Description: T8N, R9W, Section 28
Tax Lot: 300
Acres: 55
County: Clatsop
State: Oregon
Zoning: EFU
Value/Acre: $800 - $1,100
Elevations: + 6' - + 6.7' MLLW
Status: Inventory Priority 3, Level 4
Potential Conflicting Uses: Agriculture

WALLUSKI RIVER (Clatsop County)

Site #: **32 Parhaniemi** Tract 1
Landowner: John Parhaniemi
Subarea: 4.20
Legal Description: T8N, R9W, Sections 27 & 34
Tax Lot: 1000 & 300
Acres: 31
County: Clatsop
State: Oregon
Zoning: EFU
Value/Acre:
Elevations: + 3.6' to 8.1' MLLW
Status: Inventory Priority 3, Level 4
Potential Conflicting Uses: Agriculture

Site #: **33 Elliot Tract**
Landowner: Frank Elliot
Subarea: 4.20
Legal Description: T8N, R9W, Section 34
Tax Lot: 200
Acres: 50
County: Clatsop
State: Oregon
Zoning: EFU
Value/Acre: $800 - $1,100
Elevations: + 3.8' - 4.9' MLLW
Status: Inventory Priority 3, Level 4
Potential Conflicting Uses: Agriculture

Site #: **34 Parhaniemi Tract 2**
Landowner: Waino Parhaniemi
Subarea: 4.20
Legal Description: T8N, R9W, Section 34
Tax Lot: 500
Acres: 60
County: Clatsop

State: Oregon
Zoning: EFU
Value/Acre: $800 - $1,100
Elevations: 5.1' - 8.2' MLLW
Status: Inventory Priority 3, Level 4
Potential Conflicting Uses: Agriculture

KLASKANINE RIVER (Clatsop County)

Site #: **35 Colvin Tract**
Landowner: Alva Colvin
Subarea: 4.20
Legal Description: T7N, R9W, Section 14
Tax Lot: 401
Acres: 22
County: Clatsop
State: Oregon
Zoning: EFU
Value/Acre: $800 - $1,100
Elevations: Undetermined
Status: Inventory
Potential Conflicting Uses: Agriculture

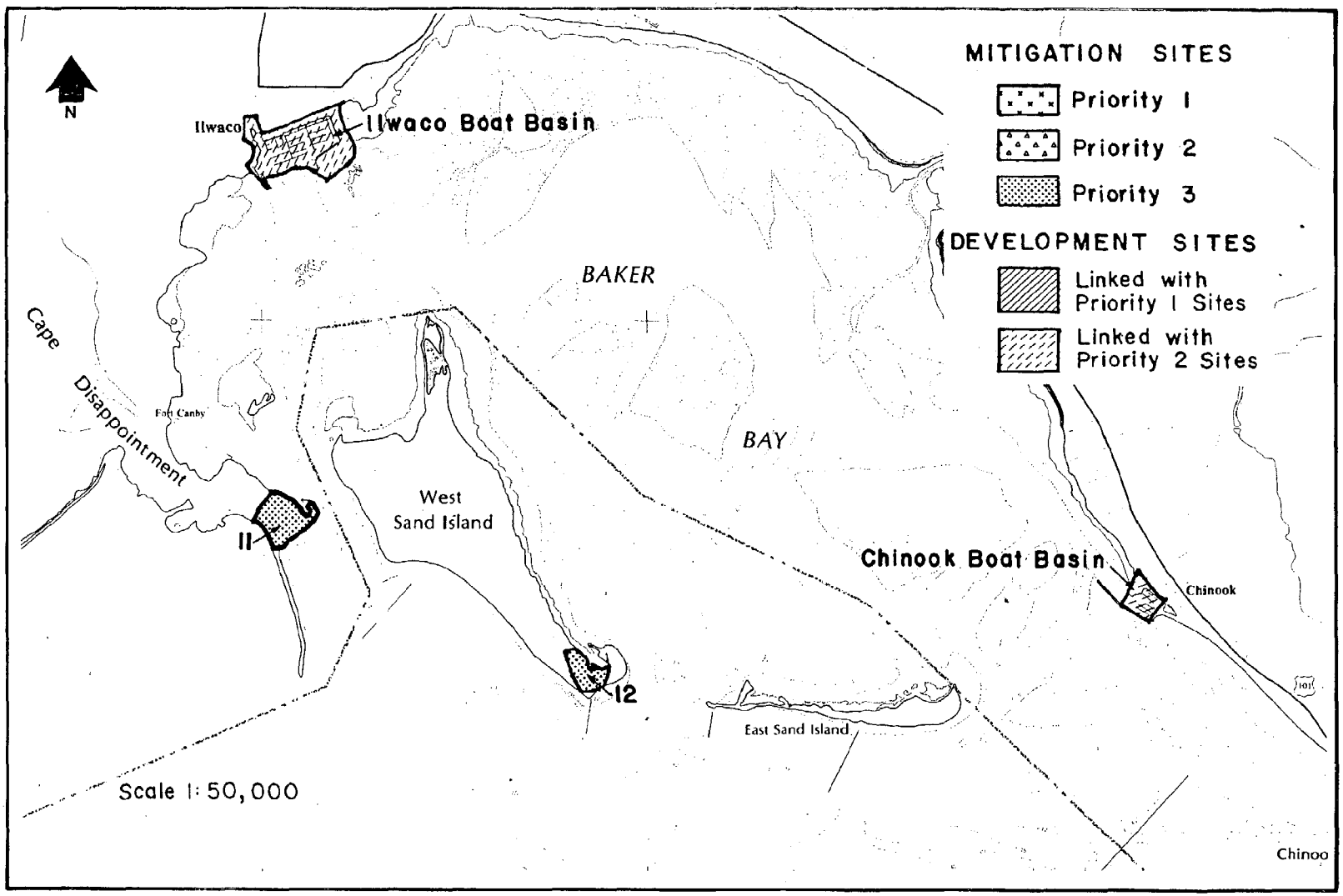


Figure 19. Mitigation and development sites in the Baker Bay area.

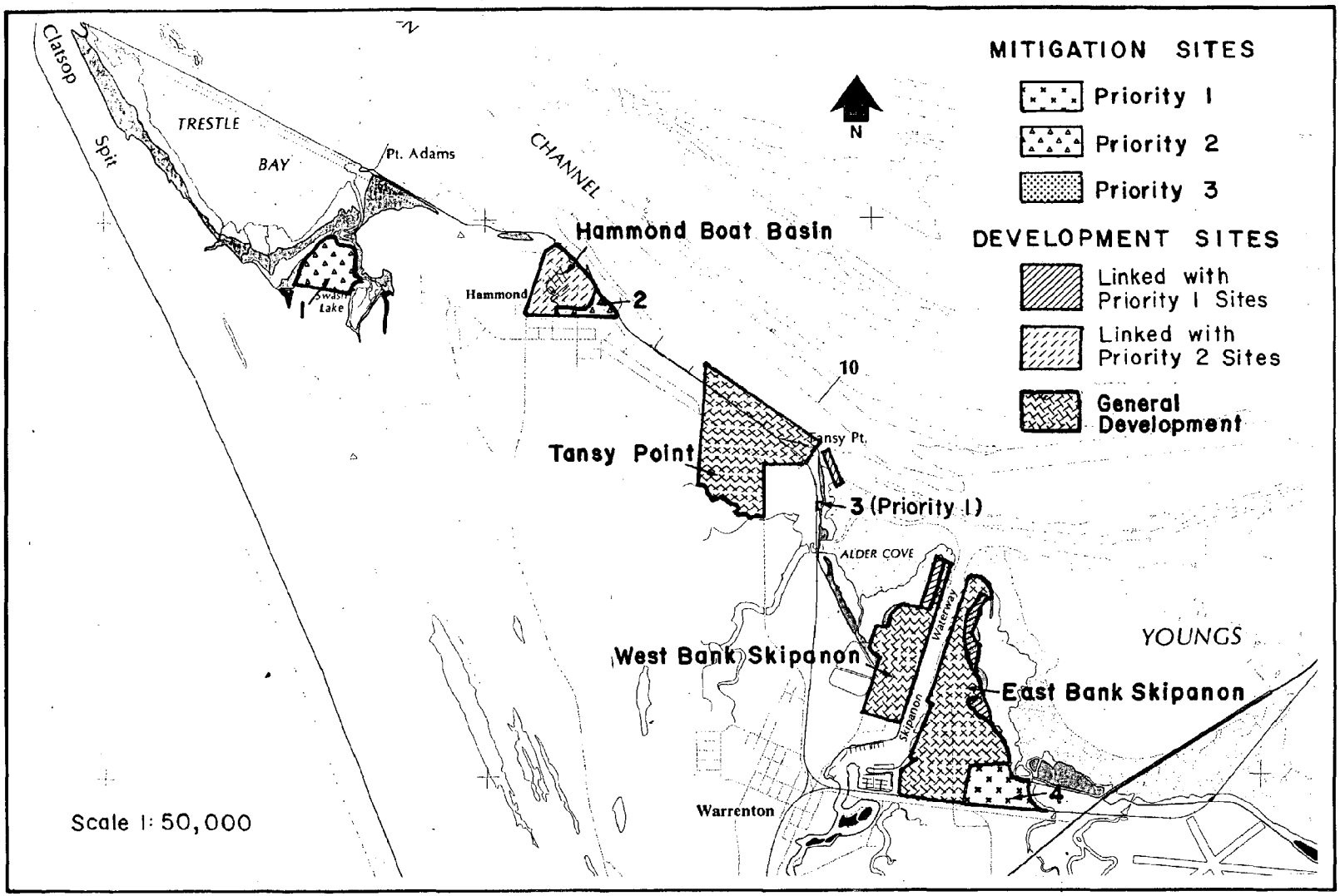


Figure 20. Mitigation and development sites in the Warrenton/Hammond area.

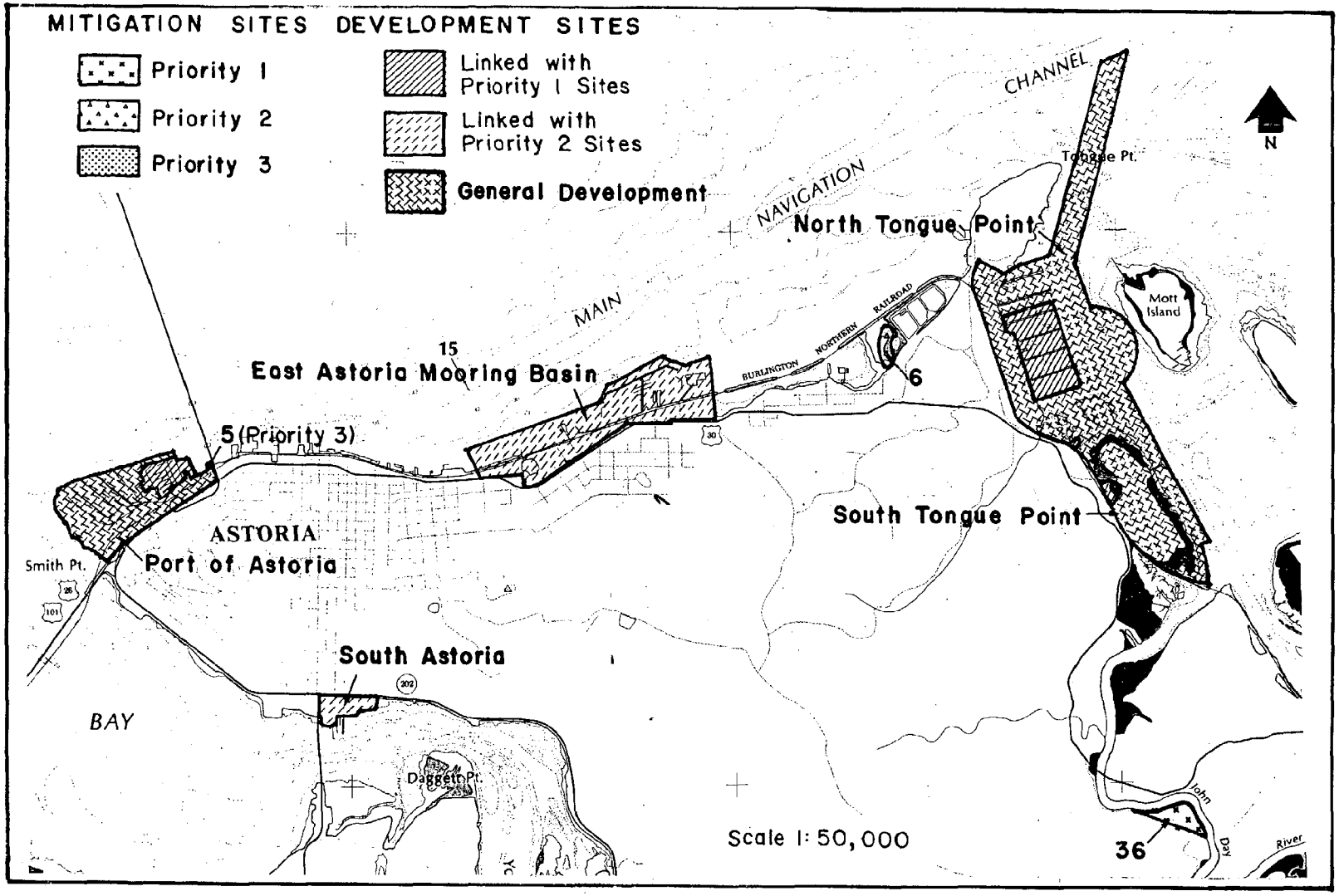


Figure 21. Mitigation and development sites in the Astoria area.

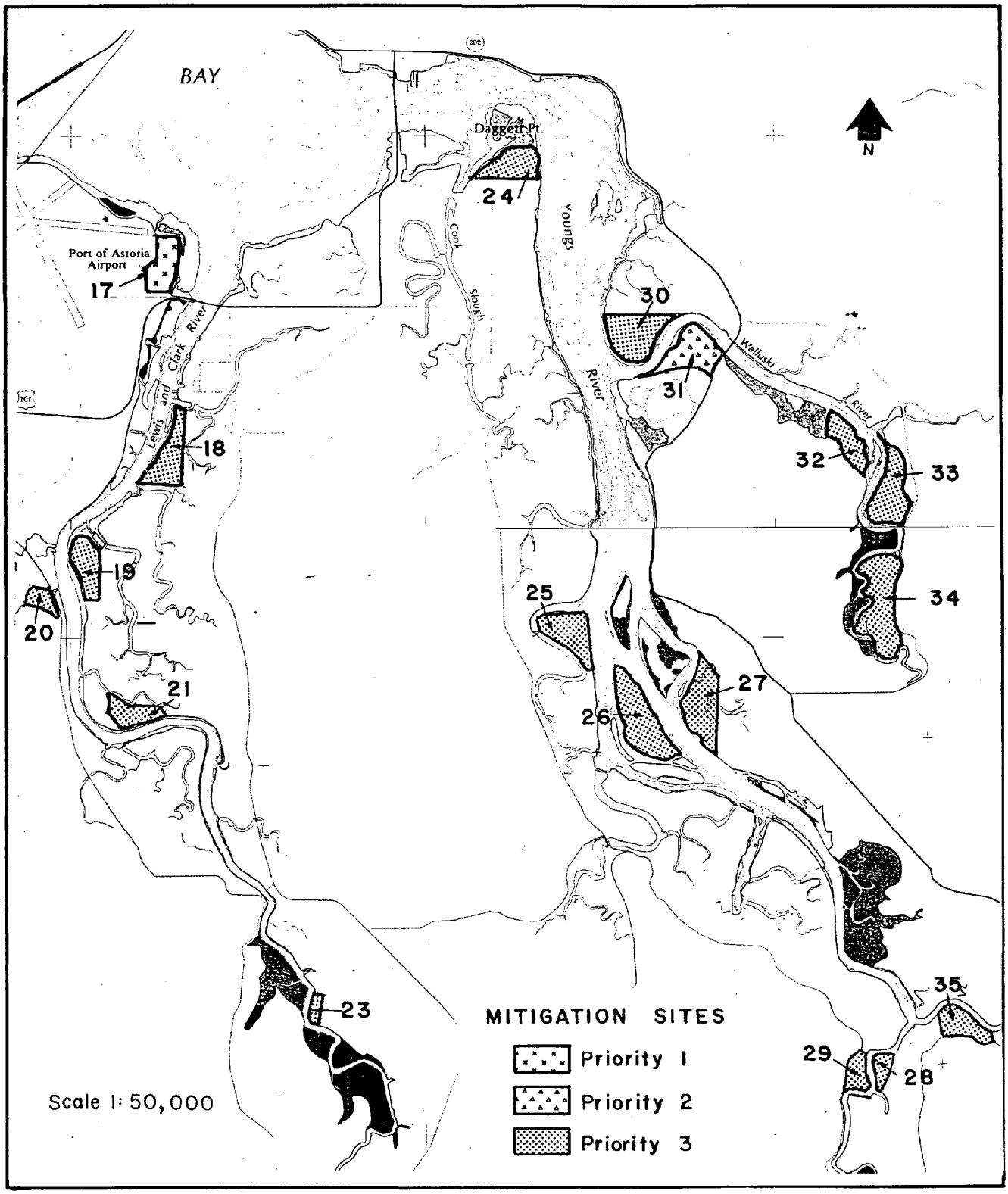


Figure 22. Mitigation sites in the Lewis and Clark and Youngs River area.

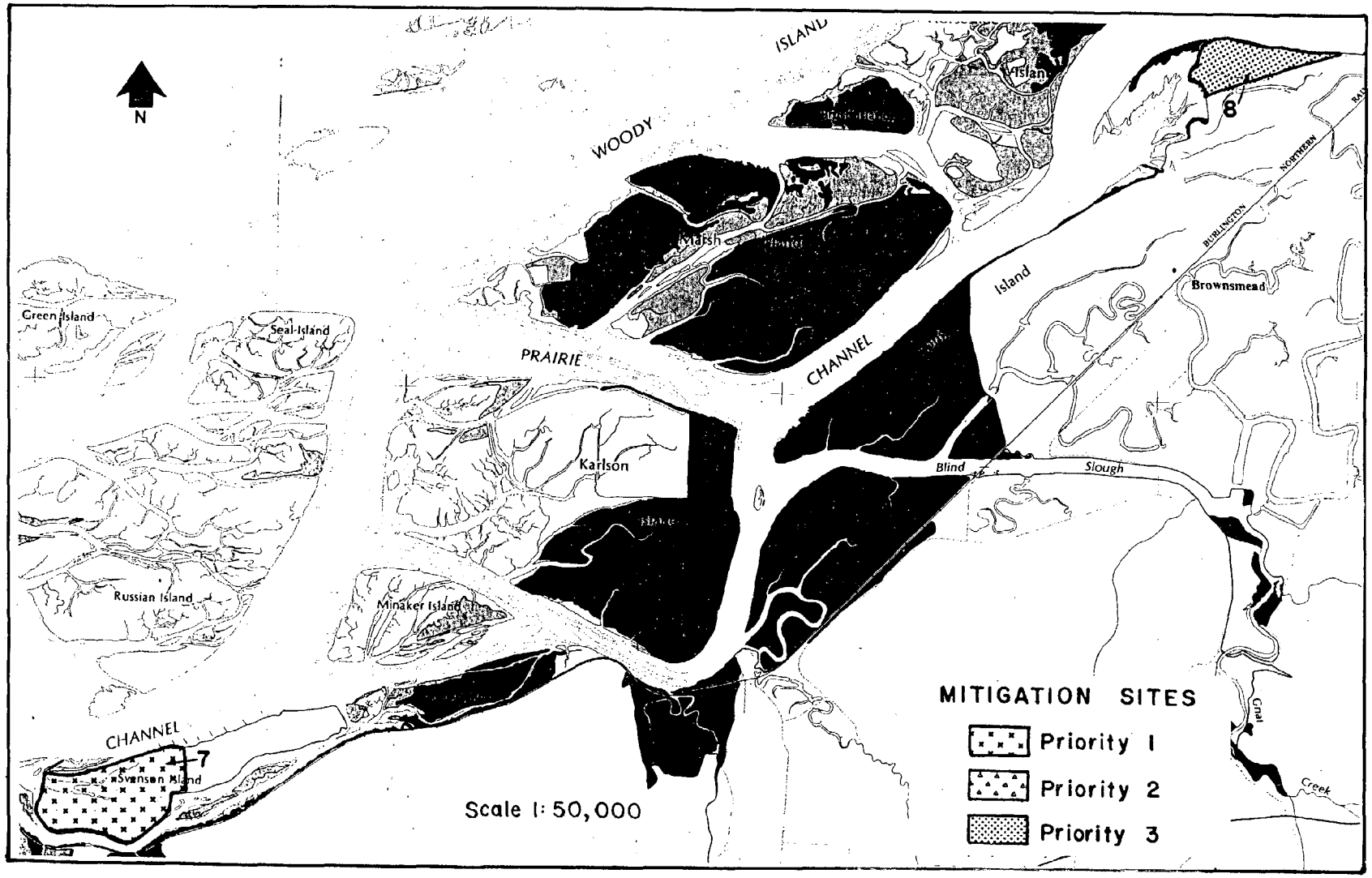


Figure 23. Mitigation sites in the Svensen Island and Brownsmead area.

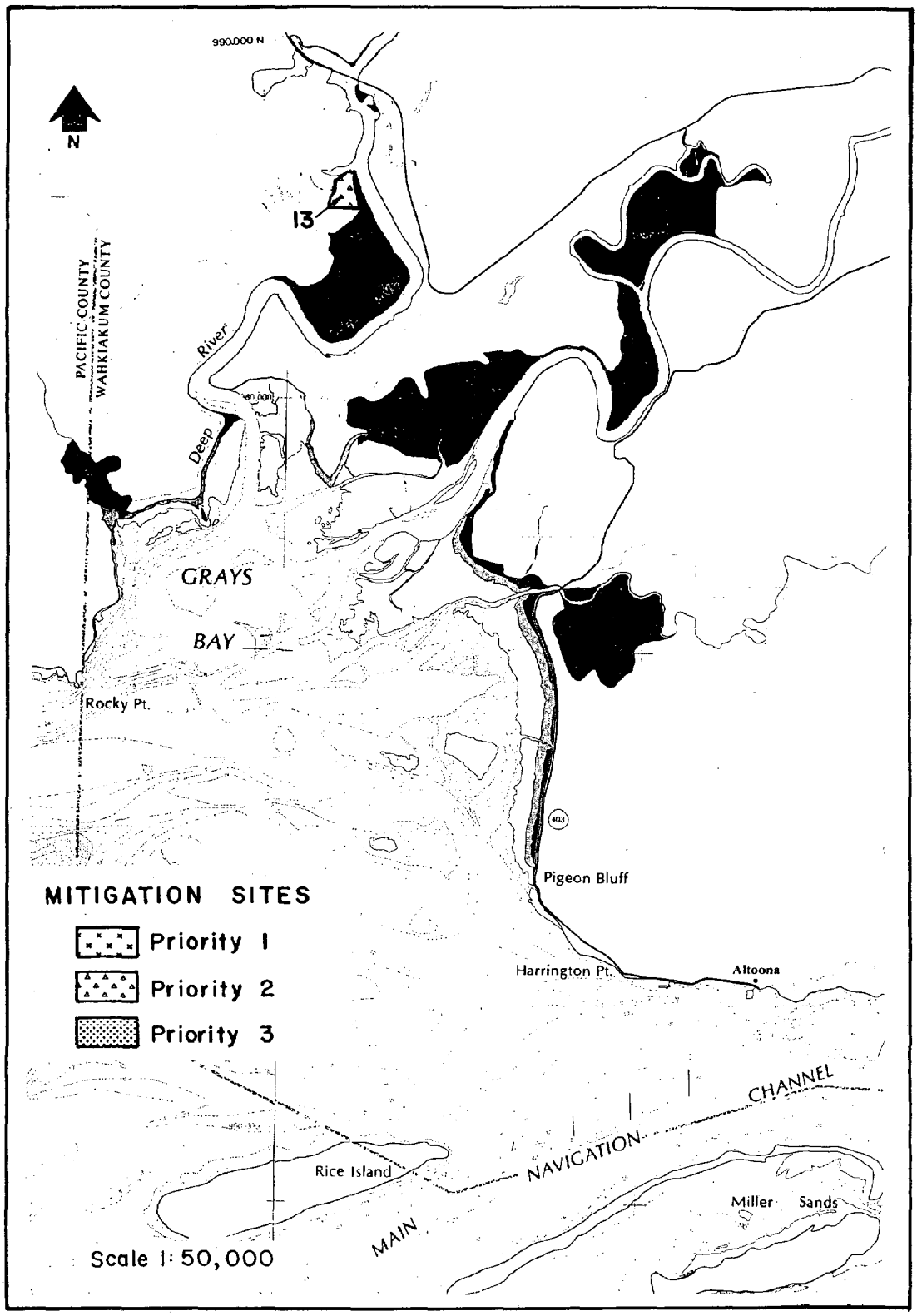


Figure 24. Mitigation sites in the Grays Bay area.

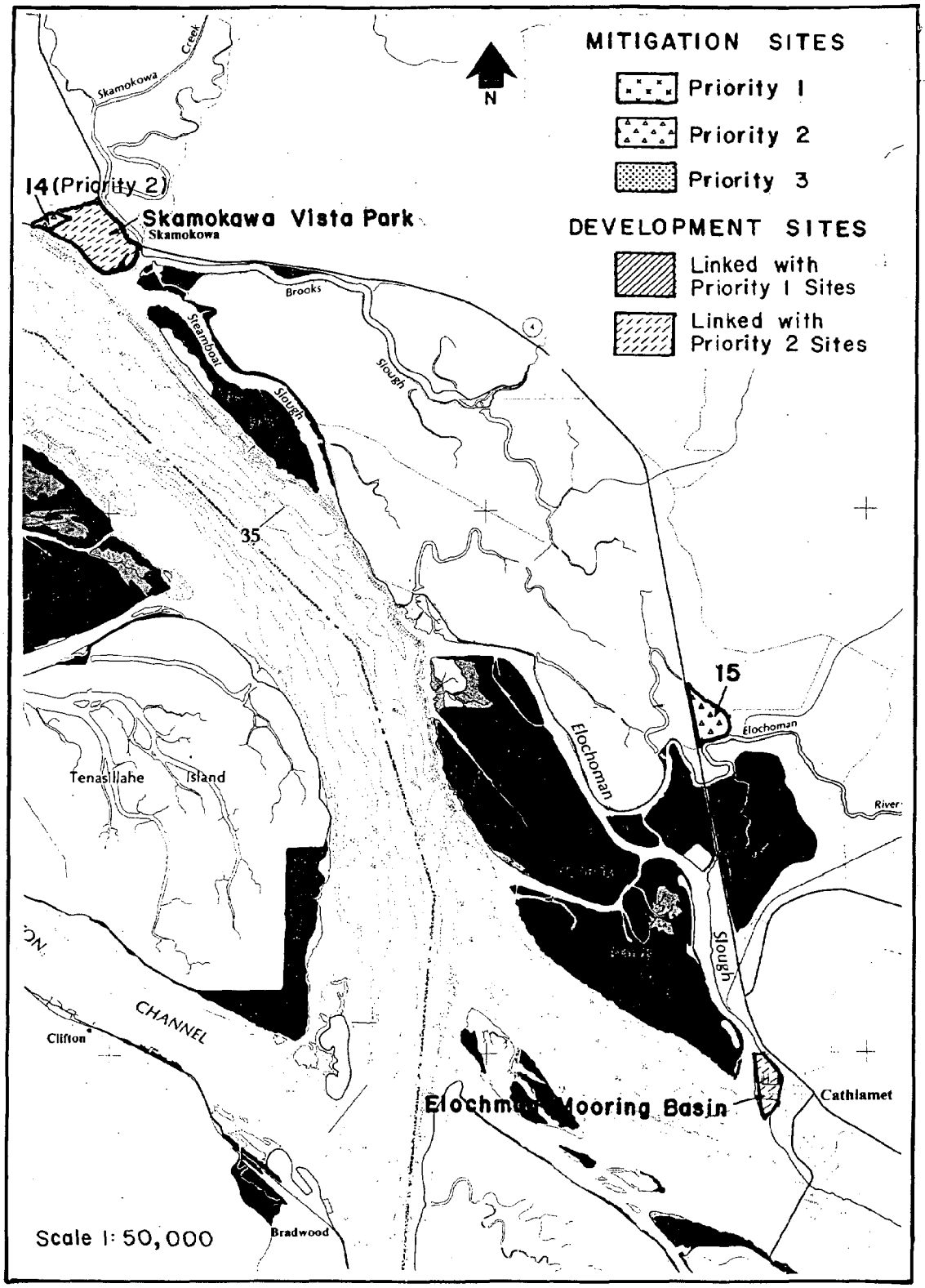


Figure 25. Mitigation and development sites in the Skamokawa area.

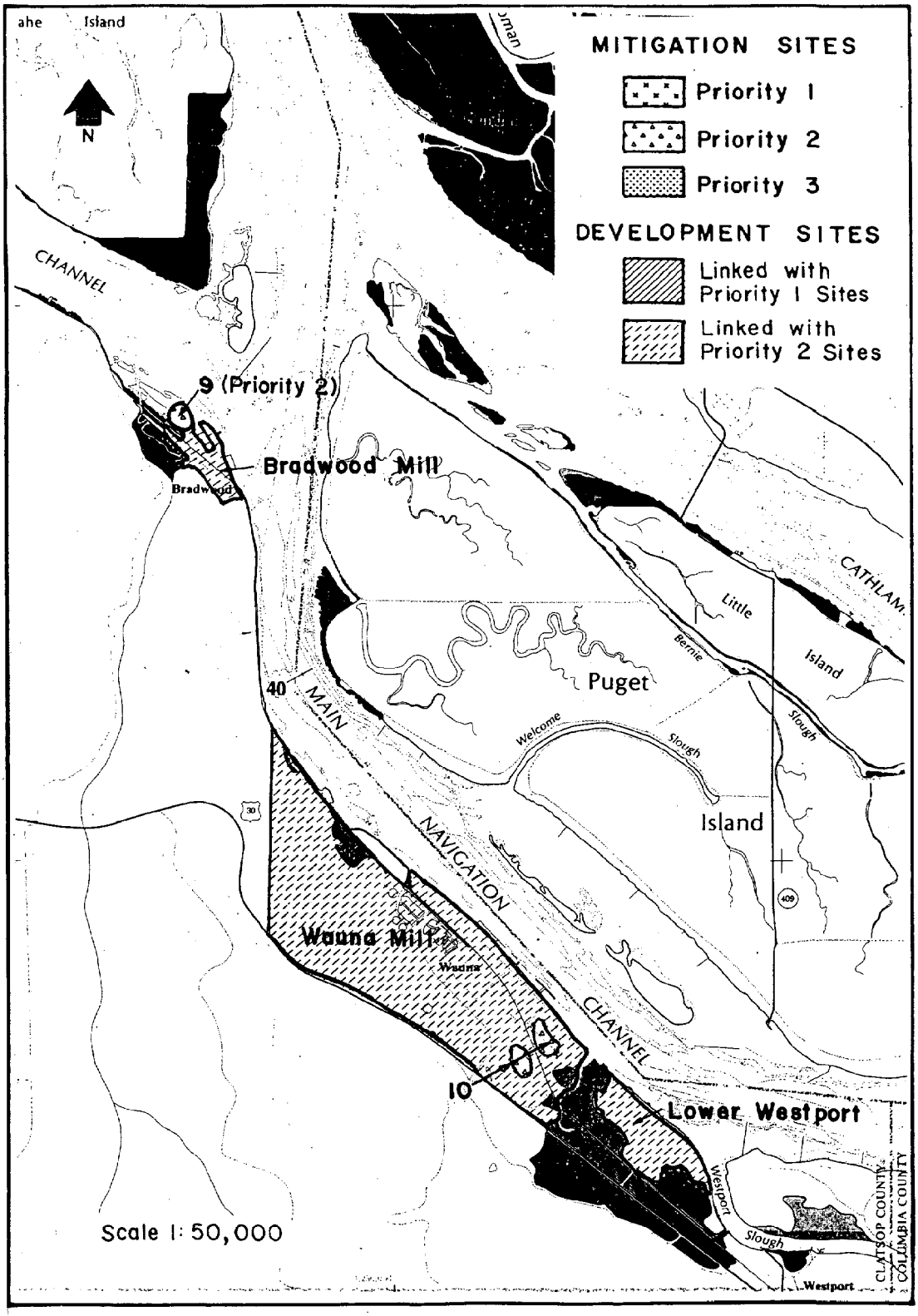


Figure 26. Mitigation and development sites in the Bradwood and Wauna Mill area.

REFERENCES CITED

Adamus, P.; Stockwell, L. 1983. A method for wetland functional assessment: Volume I, Critical review and evaluation concepts. US Dept. of Transportation, Federal Hwy. Administration. pp. 176.

Adamus, P. 1983. A method for wetland functional assessment: Volume II, FHWA assessment method. US Dept. of Transportation, Federal Hwy. Administration. pp. 139.

Barnes, M. 1987. Tansy Point Staff Report. Astoria, OR: Columbia River Estuary Study Taskforce.

Bierly, K. 1987. Oregon Division of State Lands. Personal communication.

Blomberg, G. 1987. Development and mitigation in the Pacific Northwest. The Northwest Environmental Journal, Volume 3, No. 1. pp. 63-92.

Columbia River Estuary Study Taskforce. 1981. Final CREST Mediation panel agreements. Astoria, Oregon.

Cowardin, L. M., V. Carter, F. Golet, and E. La Roe. 1979. Classification of wetlands and deepwater habitats of the United States, Biological Services Program, U.S. Fish and Wildlife Service, Washington D.C. 103 p.

Eiler, K. 1987. Letter addressed to Clatsop County Planning Director, Astoria, Oregon.

Fishman, P. et al. 1987. Estuarine mitigation evaluation project: A report by Fishman Environmental Services for the Department of Land Conservation and Development and Division of State Lands, Salem, Oregon.

Fox, D.; Bell, S.; Nehlsen, W.; Damron, J. 1984. The Columbia River Estuary: Atlas of physical and biological characteristics. Astoria, Oregon: CREDDP.

Fox, D., M. Barnes and H. West. In press. Revised Columbia River estuary Regional Management Plan. Astoria, Oregon: Columbia River Estuary Study Taskforce.

Frenkel, R. 1987. Oregon State University, Dept. of Geography. Personal Communication.

Gamble, D. 1987. U.S. Army Corps of Engineers, Advanced Planning, Personal communication, Portland, Oregon.

Garbisch, E.W. 1986. Highways and wetlands: Compensating wetland losses. McLean, Virginia: Office of Implementation, Federal Highway Administration. pp. 60.

Gonor, J.J. 1979. The scientific and technical basis for mitigation provisions in statewide estuarine resources (Goal 16). Report to LCDC, Salem, Oregon.

Good, J.W. 1987. Mitigating estuarine development impacts in the Pacific Northwest: From concept to practice. The Northwest Environmental Journal, Volume 3, No. 1. pp. 93-109

Ingles, K. 1987. U.S. Fish and Wildlife Service. Personal Communication.

Jackson, P.; Hamilton, J.; Smith, P.; Spear, T. 1986. Premitigation site analysis of vegetation and microfluvial features at the Astoria airport mitigation bank, Clatsop County, Oregon. Corvallis, Oregon: Dept. of Geography, Oregon State University. pp. 53.

Jacobe, A. 1987. U.S. Fish and Wildlife Service, Real Estate Division. Personal communication.

Jefferson, C.A. 1974. Plant communities and succession in Oregon coastal salt marshes. Corvallis, Oregon: Oregon State University. P.h.D. dissertation.

Josselyn, M.N., J. Buchholz, and P. Romberg 1984. Marsh guide restoration in San Francisco Bay, Technical Report No. 3. Tiburon Center for Environmental Studies, San Francisco State University.

Kentula, E. 1986. Wetland rehabilitation and creation in the Pacific Northwest. Corvallis, Oregon: Northrup Services, Inc., Environmental Research Laboratory. pp. 21.

Karnosh, K. 1987. Oregon State Department of Transportation, Highway Division. Personal communication, Salem, Oregon.

Larson, J.S. 1976. Models for assessment of freshwater wetlands. Publication No. 32. Massachusetts: Water Resource Research Center, University of Massachusetts. pp. 89.

McColgin, I. ed. 1979. A Columbia River Estuary regional management plan. Astoria: CREST.

Mitchell, D.L. 1981. Salt marsh reestablishment following dike breaching in the Salmon River Estuary, Oregon. Corvallis, Oregon: Oregon State University. pp. 171. P.h.D. dissertation, in: Kentula, E. 1986. Wetland rehabilitation and creation in the Pacific Northwest. Corvallis, Oregon: Northrup Services, Inc., Environmental Research Laboratory.

Office of Technology Assessment. 1984. Wetlands: Their use and regulation. Washington D.C.: U.S. Congress, OTA-0-206. pp. 141-183.

Odgen, Beeman and Associates, Inc.; Benkendorf Associates; Enviro Science Inc. 1986. Lower Columbia River assessment of Oregon deep draft sites. Portland, Oregon. Department of Economic Development, Ports Division.

Oregon Dept. of Land Conservation and Development. 1985. Statewide planning goals and guidelines. Salem, Oregon.

Oregon Department of Transportation, Highway Division. 1987. Preliminary six year highway improvement program. Salem, Oregon.

Oregon Division of State Lands. 1984a. ORS 541.626 and associated Administrative Rule OAR 141-85-240 to 141-85-266. Estuarine mitigation: The Oregon process. Salem, Oregon.

Oregon Division of State Lands. 1984b. Appraisal report: Svensen Island, Astoria, Oregon. Seaside, Oregon: Weed and Associates.

Oregon Division of State Lands. 1985. Appraisal report: Clatsop County airport property, Astoria, Oregon. Seaside, Oregon: Weed and Associates.

Oregon Division of State Lands. 1986. Astoria Airport Mitigation Bank resource credit evaluation. Salem, Oregon.

Oregon Divison of State Lands. 1987. Memorandum of agreement concerning Astoria Airport Mitigation Bank. Salem, Oregon.

Oregon State University Extention. 1982. Obtaining permits for waterway development, SG 72.

Port of Astoria Commissioners. 1986. Port of Astoria marine terminals development plan (1985-2020). Astoria, Oregon: Port of Astoria.

Seaman, M.H. ed. 1979. Columbia River Estuary Inventory of physical, biological, and cultural characteristics. CREST: Astoria.

Shipley. 1974. The Fish and Wildlife Coordination Act's application to wetlands. In E. Zajonc, Section 404 assumption: The Oregon experience, in: Reitz, Environmental planning: Law of land and natural resources.

Sill, D. 1987. Libby Levee marsh restoration project, Siskyou Journal, No. 29.

Smith, S. ed. 1983. A mitigation plan for the Columbia River Estuary. Astoria: CREST.

Thomas, D.W. 1983. Changes in Columbia River Estuary habitat types over the past century. Astoria, Oregon: Columbia River Estuary Study Taskforce.

U.S. Army Corps of Engineers. 1985. Implementation of fish and wildlife mitigation in the Corps of Engineers regulatory program, Regulatory guidance letter. Portland, Oregon: U.S. Army Corps of Engineers, Portland District.

U.S. Army Corps of Engineers. 1986. Regulatory programs of the Corps of Engineers; Final rule. Federal Register, Volume 51, No. 219, Rules and regulations. Washington D.C.: U.S. Army Corps of Engineers.

U.S. Army Corps of Engineers. 1987. Libby dike draft definite project report and environmental assessment: Flood damage reduction study, Englewood Diking District, Coalbank Slough, Coos County, Oregon, Portland District.

U.S. Environmental Protection Agency. 1985. U.S. Environmental Protection Agency - Region 10, 404 mitigation policy, Seattle District Office, Seattle, Washington.

U.S. Fish and Wildlife Service. 1979. Concept plan for wintering waterfowl habitat preservation: Washington and Oregon coasts, Region 1, Portland, Oregon.

U.S. Fish and Wildlife Service. 1980. ESM 102 Ecological services manual: Habitat evaluation procedures (HEP). Washington D.C.: U.S. fish and Wildlife Service.

U.S. Fish and Wildlife Service. 1981. U.S. Fish and Wildlife Service mitigation policy. Federal Register, Volume 46, No. 15. Washington D.C.: U.S. Fish and Wildlife Service.

U.S. National Marine Fisheries Service. 1976. A marine fisheries program for the nation. Washington D.C.: Department of Commerce.

Washington State Department of Wildlife. 1986. Memorandum: Draft mitigation policies, habitat evaluation study guidelines, mitigation banking guidelines. Olympia, Washington.

Washington State Department of Ecology. 1976. Washington state coastal zone management program. Olympia, Washington. pp. 153.

Washington State Department of Fisheries. 1983. Hydraulic Code Rules, Chapter 220-110, Washington Administrative Code. Olympia, Washington.

Washington State Department of Ecology. 1984. State Environmental Policy Act rules, Chapter 197-11, Washington Administrative Code. Olympia, Washington.

Washington State Department of Ecology. 1986. Shoreline Management Act rules. Chapter 173-14, Washington Administered Code. Olympia, Washington.

Washington State Department of Transportation. 1987. Proposed highway construction program. Olympia, Washington: Washington State Department of Transportation.

Zedler, J.B. and M.E. Kentula. 1985. Wetlands research plan. Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Corvallis, Oregon.

APPENDIX 1

PERMIT GUIDELINES FOR ADDRESSING MITIGATION CONCERNS

This Section provides planners and permit applicant writers, with a check list of issues that may be considered (depending on the scope of the project) with respect to mitigation requirements. An initial application that thoroughly addresses local, state, and federal concerns is less likely to be delayed and more likely to be approved. Many items on the list may not be relevant to a particular project.

Mitigation Goals

The overall goals of aquatic area and wetland mitigation are to:

1. Provide a system that allows no net loss of existing wetland value.

2. Helps to restore traditionally severely diminished habitat types in the Columbia River Estuary.

3. Address the full array of wetland values when designing replacement strategies (e.g., food chain support, flood mitigation, etc.).

Mitigation Objectives

Mitigation objectives will address three primary concerns:

1. Project Impact Mitigation Conditions:

   a. Turbidity - Percent increase above background allowed as measured 100 feet below project.

   b. In-Water Work Period - Time frame within which project cannot be implemented.

   c. Containment Structures - Materials and engineering specifications.

   d. Source, transportation, and deposition of all bulk materials (e.g., sand, rock, etc.).

   e. Restoration of any on site vegetation damaged or destroyed during the development.

2. Permit Procedural Conditions:

   a. Permit application must include maps and drawings displaying construction and mitigation site location and engineering specifications.

   b. All mitigation actions shall be completed before final completion of construction activities.

   c. The permittee shall notify the permit authority (e.g., local jurisdictions, Division of State Lands in Oregon, Department of Ecology in Washington, and Corps of Engineers for both

States) at least ten working days prior to initiation of construction activities and at least five working days before completion of each mitigation action.

d. A construction monitoring program will be designed to meet local, state and federal policies. The program is negotiable on a project by project basis.

3. Compensatory Mitigation Conditions:

a. Specifications of mitigation action starting date and completion date.

b. Site design specifications.

c. For Oregon, ORS 541.626 Administrative Rule habitat value replacement formula and any other numeric or qualitative decision criteria may be used (e.g., HEP and Adamas) to help discern mitigation requirements.

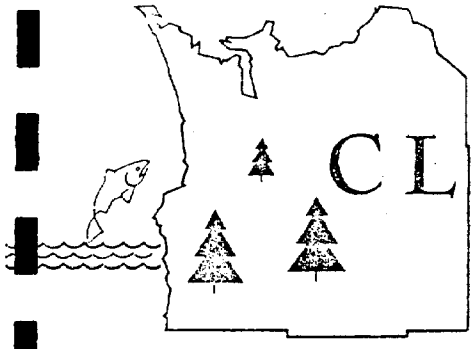
For Washington, any habitat or estuarine wetland and aquatic resource decision making tool may be used (e.g., HEP and Adamus) to help discern mitigation requirements.

d. Adequate notification of mitigation site completion will be required to allow agencies adequate time to schedule site inspection.

e. An adequate monitoring and contingency program shall be designated to address any potential remedial action requirements. The monitoring program shall include compliance monitoring (e.g., annual revegetation report, pre- and post-construction survey documenting area of impact and area of mitigation, and photo documentation of construction and compensatory mitigation sites. The contingency plan shall include: identification of the total area potentially impacted, development of a worst case scenario and subsequent contingency requirements, and identification of criteria to judge appropriate remedial action.

APPENDIX 2

LETTER FROM CLATSOP COUNTY LEGAL COUNSEL REGARDING POTENTIAL REGULATORY TAKING LIABILITY ISSUES



CLATSOP COUNTY

Courthouse . . . . Astoria, Oregon 97103

September 25, 1987

Mr. Curtis J. Schneider, Director
Clatsop County Planning and Development
P.O. Box 179
Astoria, Oregon 97103

Re: CREST Proposed 1987 Mitigation and Restoration Plan

Dear Curt:

John Marshall of CREST has asked me to review their proposed 1987 Mitigation and Restoration Plan in light of the recent U.S. Supreme Court decision in the case entitled First English Evangelical Lutheran Church of Glendale -vs. County of Los Angeles, Cal., 96 LEd 2d 250. The relevant portions of that decision may be summarized as follows:

1. Where a municipal regulation takes all use of a property, the property owner is entitled to just compensation under the just compensation clause of the Fifth Amendment to the U.S. Constitution.

2. Temporary takings which deny a property owner all use of the property are entitled to just compensation during the period of temporary taking.

The 1987 Mitigation and Restoration Plan provides four levels of restrictions to certain categories of land. Level 1 provides that "no incompatible uses can be made . . ." Level 2 provides that structural or capital improvements or topographical changes, normally denied by Level 1, can be allowed as conditional uses. The conditions are that no development violate existing zoning regulations and that the development not endanger the existing dike area. Level 3 provides a 30 day freeze on all permits until specific conditions can be developed. Level 4 provides no restrictions above current zoning.

A review of these levels suggests that Level 1 could deny "all use of property" if "no incompatible uses" in reality means no uses. Level 3 clearly provides no use for a period of 30 days although it appears that after this 30 day period some use will be allowed. For the sake of review I will assume that Level 1 provides that no use can be made of the property and that Level 3 provides that no use can be made for 30 days.

As to Level 1, this restriction would appear to fall within the concerns expressed by the Supreme Court and so require just compensation. I understand that all land with Level 1 restrictions are public except for one and that property owner does not object to the restrictions. Although the public and private landowners are in support of these regulations it is always possible that their attitudes could later change subjecting the County to liability. I would recommend that releases be obtained from all property owners with Level 1 restrictions waiving their rights to seek just compensation for any "taking" caused by imposition of Level 1 restrictions.

As to the Level 3 restriction of no permits for 30 days, that appears to parallel the facts of the Supreme Court case. In that situation a flood destroyed the Lutheran Church and all accessory buildings. Before the Church could rebuild the County passed an interim ordinance barring construction or reconstruction of buildings in the flood area. The Court ruled that a temporary taking also required compensation. Consequently the County could be liable for compensation for 30 days. I have no information to advise me what that figure might be although I would suspect that it would be negligible.

In conclusion, if Level 1 represents a regulation that denies all use of one's property, then I believe such a regulation constitutes a taking for which the County would be liable to pay just compensation. Level 3, at its worst, constitutes a 30 day taking within negligible liability for damages.

If I can provide any further information, please give me a call.

Very truly yours,

Kenneth S. Eiler
Clatsop County Counsel
P. O. Box 179
Astoria, Oregon 97103
(503) 325-8615

KSE:dr
cc: John Marshall

APPENDIX 3

MEMORANDUM REGARDING EXPERIENCE IN SALMON RIVER DIKE BREACHING

Department of Geography
Oregon State University
Corvallis, Oregon 97331-5505
(503) 754-3141

September 24, 1987

TO: Kenneth Bierly
Division of State Lands

FROM: Bob Frenkel Bob Frenkel

RE: Experience in Salmon River Dike Breaching

It occurred to me that there is need to document on-site experience of operators in restoration projects. If this is not presently being done it can be instituted by requiring a simple after-project report prepared by the DSL or ACE staff who have supervised the project. In response to this need, I have compiled the following material and asked Jerry Sherrid, the Forest Service person who supervised the project, to review the information for accuracy and completeness.

Project

According to Permit 3924, the project involved breaching about 8,600 linear feet of dike by removing approximately 31,000 cubic yards of dike material (originally locally dredged and excavated) and filling adjacent ditches in the Salmon River Estuary. About 3,000 cubic yards of material was hauled within the project area. Project and purpose is described in Exhibit "B" of Permit 3924. Two sites are involved: YWCA Dike (south of river) and Basin Lands Dike (north of river).

Both dikes were built in the early 1960's. The Basin Lands Dike was partially breached in 1978 to reestablish salt marsh. The YWCA Dike has remained intact since construction but recently the tide gate has been inoperative.

Cost. Total cost, including add-ons, was $20,400.

Contractor. P.& H. Construction, Lincoln City, OR

Equipment Deployment. For the YWCA dike: (1) one, D-6 bulldozer for 11 days to level dike; (2) three, ten-yard dump trucks for 3 days to transport removed material for deposition in ditches elsewhere on site; (3) one John Deere 790 excavator for 13 days to level dike and reexcavate tidal channels.

For the Basin Lands Dike: (1) one John Deere 790 excavator for four days to level dike and reexcavate tidal channels.

Experience

YWCA Dike. Equipment access was along flattened dikes (available at all times) and, before it became too soft, across pasture (east of Rowdy Creek) for dump trucks and bulldozer (both mired at various times). A 48 inch culvert was placed temporarily across Rowdy Creek to permit creek flow and equipment access. There were six tasks for breaching this dike.

1. The westernmost (east-west trending) dike was levelled by excavator, dike material pushed into ditches. There was sufficient dike material to fill ditches. Three tidal channels formerly crossing dike were reconnected.

2. Western segment of outer dike (lining Salmon River) levelled, material deposited in ditches on both sides of dike. There was sufficient dike material to fill ditches.

3. The old "connection" of Rowdy Creek with river was excavated to 3 feet below tide gate (below MLLW). Tide gate culvert pulled. Width of connection (Rowdy Creek mouth) is about 40 feet. Dike material was also removed from this section to lower the remaining creek "connection" to below MHW. Excess material trucked to north-south ditch.

4. Eastern segment of outer dike levelled and material disposed of as in 2 (above). Mouth of short creek reconnected to river.

5. Long north-south dike levelled, material being pushed into ditches on both sides of dike. The east ditch served to connect Rowdy Creek to the river and, over 25 years, had been deepened through natural erosion processes by a combination of Rowdy Creek and tidal flow. Filling this ditch, required more fill material than available from the adjacent north-south dike and other dike material transported from the section described in section (3) above. Consequently, the final level of filled ditch is 6 to 12 inches below marsh level. It is possible that this filled ditch might be partially eroded in the future. In the second day of the project the tide washed out a temporary plug at the south end of this ditch.

6. Temporary culvert across Rowdy Creek pulled and former creek channel excavated to normal creek depth. This was the last task and was accomplished at high tide. Under high tide, tidal water had backed up from the mouth of the now reconnected Rowdy Creek such that, with the pulling of the culvert, flood tide water rushed upstream.

The relative elevational level of the pasture which had been enclosed by the dike was about 10 to 15 inches below the undiked marsh to east. This elevational loss is possibly due to oxidation of organic peat together with and build-up of marsh.

Basin Lands Dike. This diked area had already been returned to estuarine connection in 1978 and had been studied in detail by Dr. Diane Mitchell. However, in 1978, dikes were not completely removed and connection of tidal creeks was poor.

The excavator accessed the wetland from the public information sign (about diking) along Three Rox Road. Access to diked area across marsh was between transects 5104 and 5105. Main creek connection to west (area 51) was reexcavated about 2 feet below present level. Similar excavation was done on all other creek connections. Main dike along Salmon River (area 51) removed in two steps: (a) first, levelled to within 2 feet of grade; (b) second, levelled to grade. The removed material was mostly placed in ditch on Salmon River side. Level of grade could be determined by operator from the presence of bases of former grass tussocks now 25 years after dike emplacement.

Excavator travelled east, along outer dike area (slightly higher and firmer), to dike between area 50 and 51. This dike was levelled by depositing material in ditch, mostly on east side. Creek connections across dike made in five places. Return of excavator was by route across northern margin of wetland.

Map enclosed

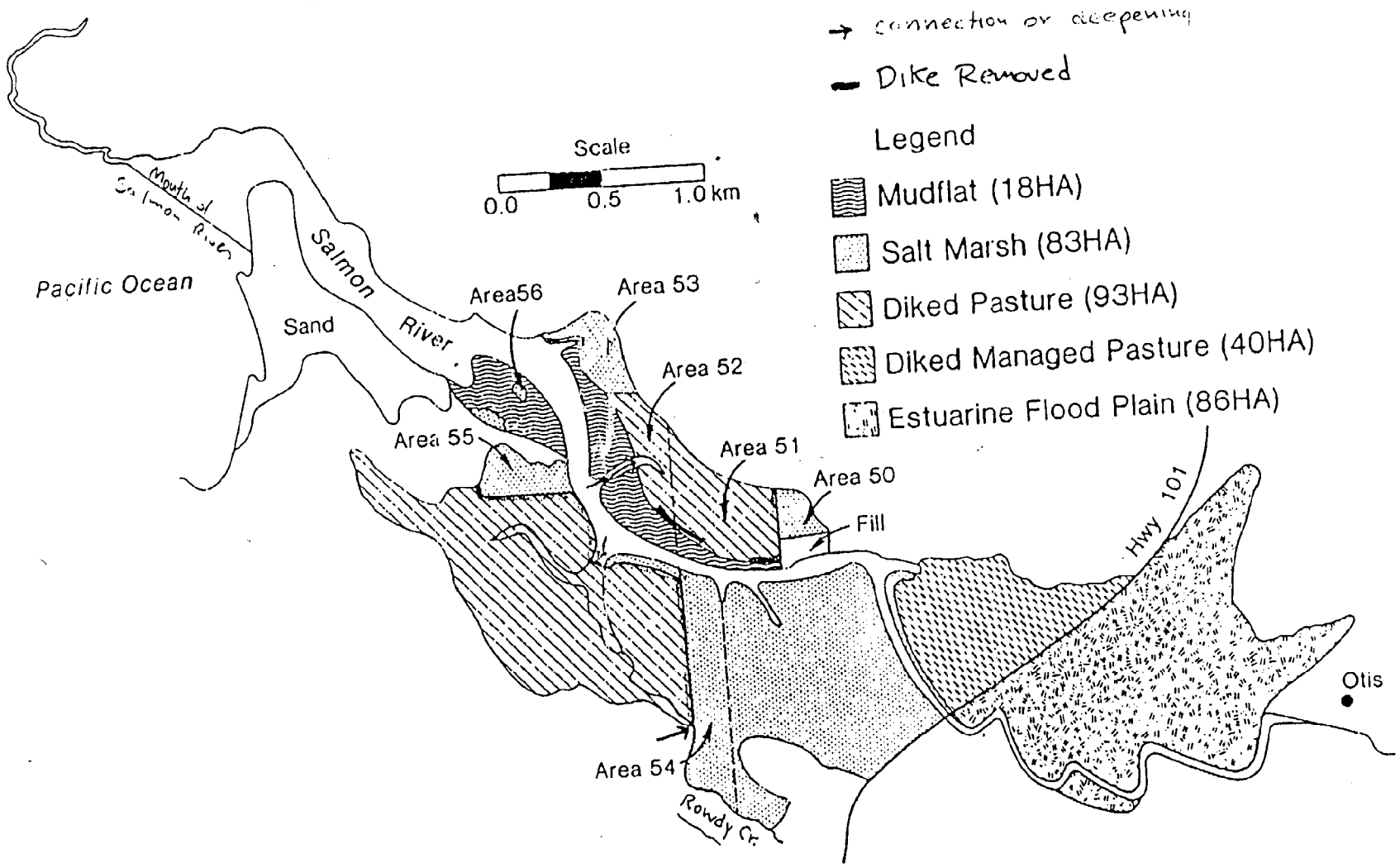


Figure 5. Salmon River wetland types and study locations.

APPENDIX 4

PLAN REVISION PARTICIPATION

MITIGATION PLAN REVIEWERS

Advisory Committee		General Mitigation Plan Reviewers
Steve Felkins Port of Astoria	Sheryl Carrubba Corps of Engineers Natural Resources Br.	Ken Bierly Oregon Division of State Lands
Frank Heer Port of Ilwaco	Nancy Ellifrit US Fish & Wildlife Service	Don Mathison Cowlitz-Wahkiakum Governmental Conference
Kent & Irene Martin Interested Citizens	Karen Ingles US Fish & Wildlife Service	Jim Hidy US Fish and Wildlife Service
Hal Beecher Washington Deptartment of Widllife	Ed Murrell National Marine Fisheries	Gail McEwen Department of Land Conser- vation and Development
Stephanie Hampton Town of Hammond	Patty Snow Department of Land Conser- vation & Development	Jack Zimmerman Hammond Boat Basin
Don Leach Soil & Conservation Service	John Carlton Department of Game	Al Cook Oregon State Parks
Kent & Irene Martin Interested Citizens	Nora Jewett/Bill Alkive Department of Ecology	
Brian Gregor State Highway Dept.	Ken Franklin Division of State Lands	
Curt Schneider Clatsop County Planning	Bob McConnell National Marine Fisheries	
Paul Benoit City of Astoria	Mary Lou Mills WA Department of Fisheries	
Robert Torppa Wahkiakum County	Brent Forsberg Department of Fish & Wildlife	
Chuck Haglund Interested Citizen and Landowner	Jim Rankin City of Warrenton	
Ralph Rogers Environmental Protec- tion Agency	Everett Groves Wahkiakum Port District #2	

MITIGATION PLAN REVIEWERS
cont.

Advisory Committee

Jim Good
School of Oceanography
Oregon State University

Bob Petersen
Port of Ilwaco

Gerald Newgard
Corps of Engineers
Portland District

Mitigation Advisory Committee Meeting Attendants

Meeting 1:

Roger Powers - OR Department of Transportation; Environmental Section
Phil Quarterman - OR Department of Transportation; Environmental Section
Patty Snow - Department of Land Conservation and Development
Ralph Rogers - Environmental Protection Agency
Jack Zimmerman - Town of Hammond
Charles Haglund - Svensen Island Diking Improvement Company
Gerry Black - US Army Corps of Engineers
Nancy Ellifrit - US Fish and Wildlife Service
Sheryl Carrubba - US Army Corps of Engineers
Jim Good - Oregon State University
Ken Franklin - OR Division of State Lands

Meeting 2:

Frank Heer - Port of Ilwaco
Jim Good - Oregon State University Oceanography
Karen Ingels - US Fish and Wildlife Service
Ralph Rogers - Environmental Protection Agency
Gerry Black - US Army Corps of Engineers
Patty Snow - Department of Land Conservation and Development
Ken Franklin - OR Division of State Lands
Marie Haglund - Svensen Island Diking Improvement Company
Chuck Haglund - Svensen Island Diking Improvement Company
Don Leach - Soil Conservation Service
Gilbert Kamara - Interested Citizen
Annette Kamara - Interested Citizen
Nora Jewett - WA Department of Ecology
Carol Whitaker - James River Corporation, Wauna Mill
Gerry Duvall - Cavenham Forest Industries
Richard Lee - Interested Citizen
David Miller - National Marine Fisheries
Jim Rankin - City of Warrenton
Byron Blankenship - US Army Corps of Engineers
Ben Riekkola - Interested Citizen
Phil Quarterman - State Highway Division, Environmental Section
Daniel Hess - Interested Citizen
John Warila - Interested Citizen