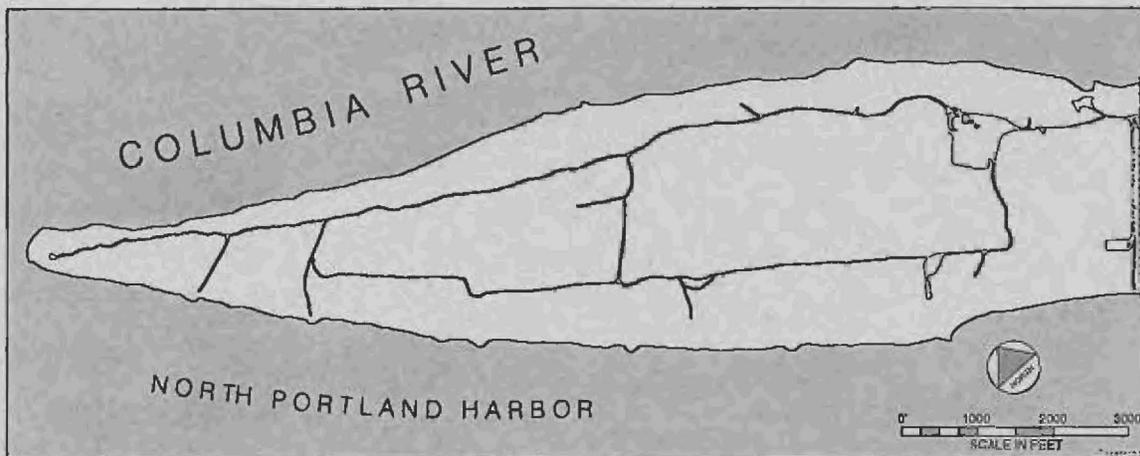


# West Hayden Island

## Goal 5 Analysis

### West Hayden Island Development Program



Prepared by:

The Bureau of Planning  
Portland, Oregon



Prepared for:

The Port of Portland

June 1996

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# **West Hayden Island Goal 5 Analysis**

**West Hayden Island Development Program**

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## CHAPTER 1 INTRODUCTION

### PURPOSE

This document provides an inventory, analysis, and recommendations to protect significant natural resources located on the western portion of Hayden Island. The Bureau of Planning has prepared this report for the Port of Portland as a component of the *West Hayden Island Development Program*. This project is the result of an intergovernmental agreement between the Port of Portland and the Bureau of Planning. The Port of Portland owns the majority of the West Hayden Island site and is interested in developing the site for marine industrial use.

In order to accomplish the proposed development plans, the site must be annexed into the City of Portland and receive industrial zoning. The Planning Bureau is assisting the Port of Portland prepare the application materials necessary for that annexation and zoning process. One element of that process is completing a natural resources inventory and analysis. This document is intended to comply with the Oregon Land Conservation and Development Commission (LCDC) Statewide Planning Goal 5 requirements. State Goal 5 requires all jurisdictions in Oregon to "conserve open space and protect natural and scenic resources."

### BACKGROUND

In 1982 the regional government (Metro) expanded the Urban Growth Boundary (UGB) to include West Hayden Island. At that time, the area was re-designated by Multnomah County from "Multiple Use Forestry" to "Future Urban" within the Multnomah County Framework Plan. The impetus for both actions was to provide a future site for waterfront industrial and marine terminal uses.

An important element in the Multnomah County analysis was the finding that additional waterfront acreage was needed within the UGB to meet the forecasted demand for marine terminal uses. That analysis also found that natural resources located on West Hayden Island are significant enough to warrant some level of protection. Accordingly, the County retained the Significant Environmental Concern (SEC) overlay zone. Multnomah County concluded that marine industrial development on West Hayden Island is appropriate, with some level of environmental review:

"Marine economic activities are a crucial sector in the Oregon and Portland region economics. So too are the contributions made by other basic industrial activities."

“Wildlife, fishery habitat, potential recreational areas and sites of scenic significance will be balanced with West Hayden Island’s unique suitability for water-dependent industrial development through meeting the requirements of the SEC zone, the design review process, and the community planning process.”

(Multnomah County, Planning Commission Decision, July, 1982)

The Multnomah County decision is attached as Appendix C.

Similarly, Metro based its decision primarily on the demonstrated need for additional land available for marine industrial uses. The hearings officer stated that:

“There is no dispute in this record that there will be a year-2000 need for additional marine terminal facilities in the region, and that alternative sites elsewhere on the Willamette or Columbia rivers do not exist.” (Metro, Findings, Conclusions and Recommendation of the Hearings Officer, 1983).

In addition, the findings summarized the environmental concerns expressed by the Portland Audubon Society — that development of West Hayden Island would destroy one of the last parcels of riverine habitat left in the greater Portland area, and threaten fisheries in the area. Although the habitat resource could not be said to be “unique” or “significant” in the traditional land use planning sense, “it is clearly a fast disappearing resource and will likely enjoy a unique status soon.” (Michael Houck of the Portland Audubon Society, in testimony to Metro, 1983). The Metro ordinance amending the UGB to include West Hayden Island is attached as Appendix B.

Since inclusion within the UGB, two proposals have been made to develop the area for waterfront industrial and marine terminal uses. Portland General Electric (PGE) proposed a marine industrial park for the largest land parcel on West Hayden Island. PGE proposed nine marine terminal berths, and 25 industrial warehouse sites. The PGE proposal included major alterations to both the Columbia River and the Oregon Slough (banks, channels, and adjacent land areas) (PGE, 1987). Although some environmental permits were issued, the proposal was never carried out. In July 1994, the Port of Portland purchased PGE’s parcel, and the other remaining parcels on West Hayden Island. After purchasing the site, the Port began preparing the *West Hayden Island Development Program*, with the intention to develop the area along the Columbia River (the north bank) as a deep draft port facility.

## DOCUMENT ORGANIZATION

The Goal 5 Administrative Rule prescribes the following three-step planning process:

- 1) An inventory of the location, quantity, and quality of Goal 5 resources (Chapter 4);
- 2) An analysis of the economic, social, environmental, and energy (ESEE) consequences of allowing, limiting or prohibiting land uses which conflict with identified resources (Chapter 6); and
- 3) A program to protect significant resources (Chapter 7).

This document is organized into seven chapters and seven appendices:

- 1) **Introduction.** Chapter 1 includes a purpose statement, background information, and an organizational outline of the document.
- 2) **Policy Framework.** Chapter 2 describes the policy context of natural resource protection on West Hayden Island.
- 3) **Natural Resources Inventory.** Chapter 3 contains the inventory of natural resources on West Hayden Island. The inventory contains information on the location, quantity, and quality of resources found on the site. The inventory is based on recent field visits, previous baseline inventory work (the 1988 *Columbia Corridor Inventory of Wetlands, Water Bodies, and Wildlife Habitat Areas*), environmental analysis completed by PGE (the 1985 Environmental Impact Statement associated with PGE's West Hayden Island Marine Industrial Park), and environmental analysis provided by the Port of Portland (including the 1995 *West Hayden Island Development Program* and the 1995 *West Hayden Island Wetland Delineation*).
- 4) **Identification of Impact Area.** Chapter 4 identifies the geographic area within which conflicting uses could adversely affect a significant Goal 5 resource.
- 5) **Identification of Conflicting Uses.** Chapter 5 contains an analysis of the existing, proposed and potential uses which could conflict with natural resource preservation. This chapter includes a description of proposed marine terminal development, as well as a listing of City of Portland zoning options.
- 6) **ESEE Analysis.** Chapter 6 contains the economic, social, environmental, and energy analysis of allowing, limiting, or prohibiting conflicting uses on West Hayden Island.
- 7) **Natural Resource Protection Program.** Chapter 7 includes a suggested course of action intended to protect significant natural resources on West Hayden Island, recognizing the *West Hayden Island Development Program*.

The appendices provide supporting material and background information.

Appendix A provides a summary of research and methodologies related to identifying the economic value of protecting natural resources.

The METRO ordinance amending the Urban Growth Boundary to include West Hayden Island is included as Appendix B.

The decision of the Multnomah County Planning Commission to re-designate West Hayden Island from rural to urban is attached as Appendix C.

The text of Statewide Planning Goal 5 and the associated Administrative Rules are found in Appendices D and E.

The full text of Chapter 33.810 (Comprehensive Plan Map Amendments) of the Portland Zoning Code is attached as Appendix F

The full text of Chapter 33.855 (Zoning Map Amendments) of the Portland Zoning Code is attached as Appendix G

Appendix H includes a more detailed description of the Wildlife Habitat Assessment methodology used in the Inventory.

Appendix I contains a consolidated bibliography for the Inventory and ESEE analysis.

## CHAPTER 2

### POLICY FRAMEWORK

#### INTRODUCTION

This chapter presents the policy framework for the *West Hayden Island Goal 5 Analysis*. The section begins with a discussion of the state-mandated land use planning program, followed by a review of most relevant local, regional and federal policies and programs.

#### STATE LAND USE POLICY

##### Statewide Planning Program

Oregon's statewide land use planning program was established by Senate Bill 100 and adopted by the Legislature in 1973. The bill is included in the Oregon Revised Statutes (ORS) as Chapter 197. The legislation created the Land Conservation and Development Commission (LCDC) and gave it the authority to adopt mandatory Statewide Planning Goals. These goals provide the framework for Oregon's cities and counties to prepare and maintain comprehensive plans.

After local governmental adoption, comprehensive plans are submitted to the Department of Land Conservation and Development (DLCD) for review to ensure compliance with and implementation of the Statewide Planning Goals. A comprehensive plan is acknowledged by DLCD when it is found to comply with the goals. The City of Portland's Comprehensive Plan was adopted by City Council in 1980, effective January 1, 1981, and acknowledged by DLCD in May of 1981.

##### Periodic Review

To ensure that local jurisdictions continue to comply with Statewide Planning Goals, the state devised two reporting mechanisms: periodic review and post-acknowledgment review. The City has adopted a number of Goal 5 protection/conservation plans through periodic review. Since West Hayden Island did not appear on the periodic review work program for Multnomah County or the City of Portland, the reporting mechanism that applies to this Goal 5 Analysis is post-acknowledgment review.

Also in 1981, the Oregon Legislature amended ORS Chapter 197 to require periodic review by the state of acknowledged comprehensive plans. The purpose of periodic review is to ensure that each local government's comprehensive plan and land use regulations are in compliance with the Statewide Planning Goals and coordinated with the plan and programs of other state agencies. New Statewide Planning Goals or Statewide Planning Rules adopted since a comprehensive plan was acknowledged must be

addressed using LCDC periodic review procedure. In the fall of 1981, subsequent to acknowledgment of the city's Comprehensive Plan, LCDC adopted an Administrative Rule for State Goal 5.

At the time of initial LCDC periodic review, all of Hayden Island was located in unincorporated Multnomah County. In 1985, the eastern portion of Hayden Island annexed into the City of Portland. In May 1989, City Council applied City Comprehensive Plan map designations, base zones and overlay zones to that portion of the island as part of the Industrial/Environmental Mapping Project for Columbia Corridor. The City of Portland conducted a Goal 5 inventory of West Hayden Island, but had no authority to complete the State Goal 5 process at this time. Through the first periodic review, West Hayden Island was not identified as a Goal 5 periodic review responsibility for Multnomah County or the City of Portland.

This Goal 5 analysis is intended to satisfy post-acknowledgment requirements associated with amending the City's Comprehensive Plan map and applying City base zones and overlay zones. Among the various city and state goals are those which relate to natural or environmental resources, as described below.

#### **Statewide Planning Goal 5**

Goal 5 requires Oregon cities and counties "to conserve open space and protect natural and scenic resources." The Goal 5 Administrative Rule requires local governments to follow a three-step planning process.

An inventory of resources is the first step. This involves determining the location, quantity and quality of the resources present. If a resource is not important, it may be excluded from further consideration for purposes of local land use planning, even though state and federal regulations may apply. If information is not available or is inadequate to determine the importance of the resource, the local government must commit itself to obtaining the necessary data and performing the analysis in the future. At the conclusion of this process, all remaining sites must be included in the inventory and are subject to the remaining steps in the Goal 5 process.

The next step is identification of conflicts with protection of inventoried resources. This is done primarily by examining the uses allowed in broad zoning categories. A conflicting use is one which, if allowed, could negatively impact the resource.

If there are no conflicting uses for an identified resource, a jurisdiction must adopt policies and regulations to ensure that the resource is preserved. Where conflicting uses are identified, the economic, social, environmental and energy (ESEE) consequences of resource protection must be determined. Compatibility with other Goal 5 plans and other applicable statewide planning goals must be considered. The ESEE analysis is adequate if it

provides a jurisdiction with reasons why decisions are made regarding specific resources.

The final step is adoption of a program or plan to protect significant resources. Based on the inventory and analysis, a jurisdiction must decide whether to allow, limit or prohibit conflicting uses and adopt measures to implement its decisions.

In June 1996, LCDC amended State Goal 5 and related administrative rules. These new administrative rules become effective September 1, 1996. Assuming the Port of Portland's land use application is filed after that date, the new administrative rules will apply.

### **Other Applicable Statewide Planning Goals**

There are 19 Statewide Planning Goals. State Goals 1, 2, and 5 through 14 are applicable to placing City land use designations associated with the West Hayden Island Development Program. State Goal 5 is the focus of the present study and is discussed above. Goal 3 (Agricultural Land) and Goal 4 (Forest Lands) generally apply to lands outside of the Urban Growth Boundary. The West Hayden Island study area lies within the Urban Growth Boundary.

Goals 1 and 2 cover citizen involvement and the land use planning process respectively. These goals are discussed below. Goals 6 through 14 cover topics such as air, water and land resources quality; areas subject to natural disasters and hazards; recreational needs; economic development; housing; public facilities and services; transportation; energy conservation; and urbanization. These topics are also discussed below, and in greater detail with the ESEE analysis (Chapter 6).

Goal 1, Citizen Involvement, requires opportunities for citizens to be involved in all phases of the planning process. In preparing the West Hayden Island Development Program, the Port of Portland held open houses, convened a Planning Advisory Committee and met with businesses, Hayden Island residents, and public agency representatives. For the quasi-judicial application, the Bureau of Planning will send public notice of mandatory public hearings before the Land Use Hearings Office and City Council.

Goal 2, Land Use Planning, requires the development of a process and policy framework which acts as a basis for all land use decisions and assures the decisions and actions are based on an understanding of the facts relevant to the decision. The placement of City Comprehensive Plan Map designations, base zones, and overlay zones follows the City's quasi-judicial procedures for such actions. The West Hayden Island Goal 5 Analysis, a report prepared by the Portland Bureau of Planning for the Port of Portland, is consistent in format and content with other adopted City Goal 5 resource plans. The West

Hayden Island Goal 5 Analysis provides the inventory, ESEE analysis and program elements mandated by the Goal 5 Administrative Rule.

Goal 6, Air, Water and Land Resource Quality, provides for the maintenance and improvement of these resources. All municipal and industrial effluent entering the Columbia River is subject to the water quality standards of the state and to standards which apply specifically to the Columbia River. The Department of Environmental Quality grants permits for major discharge sources; applicants are required to ensure that the physical, chemical and biological properties of effluent are within acceptable limits. The ESEE analysis (Chapter 6) includes a more detailed discussion of air and water quality.

Goal 7 - Areas Subject to Natural Disasters and Hazards, provides for the protection of life and property from natural disasters and hazards. West Hayden Island is located within the floodway fringe of the Columbia River. Before urban development can occur it will be necessary to add fill to the island to comply with federal FEMA and City building code requirements.

Goal 8, Recreational Needs, provides for the recreational needs of both citizens and visitors to the state. The ESEE analysis includes a discussion of potential recreational uses on West Hayden Island. The proposed marine terminal development plans include an open space component which may expand opportunities for water-oriented recreation in the Columbia Corridor.

Goal 9, Economy of the State, provides for the diversification and improvement of the Oregon economy. Adequate land for marine terminals is necessary for the health of the regional economy and should be provided for inside the Urban Growth Boundary. There are no alternative locations in the Portland metropolitan region which can provide the combination of rail, highway, and deep-water channel access needed for marine terminal facilities. Providing land needed for marine terminal expansion will facilitate direct employment opportunities and facilitate general growth in the regional economy. A more detailed analysis of the economic benefits of marine terminal development is provided in the ESEE analysis (Chapter 6). The economic benefits of conserving natural areas in an urban setting are also discussed in two parts of this report: the ESEE analysis and Appendix A.

Goal 10, Housing, provides for meeting the housing needs of the state. West Hayden Island was not part of the City's inventory of lands needed for housing. West Hayden Island is currently in a natural state and is surrounded by urban industrial uses. Because it is within the 65 dba noise level (airport overlay), the Department of Environmental Quality opposes residential development of the western portion of the island. In addition, much of the site is within the 100-year floodplain.

Goal 11, Public Facilities and Services, provides for the timely, orderly and efficient planning and development of public service facilities that can serve as a framework for the urban development of the City. Police, fire, sewer, and water service can be provided by a number of possible providers, some of which already serve the eastern portion of the island. A more detailed plan for utility service is provided in the *West Hayden Island Development Program*, pages 87 - 95.

Goal 12, Transportation, provides for the development of a safe, convenient and economical transportation system. The proposed development of West Hayden Island for deep-draft marine industrial purposes is an important multimodal element of the regional transportation system. Marine terminal facilities facilitate the flow of goods and services and strengthens the local and regional economy.

The north shore of the site contains 12,000 linear feet of usable shoreline with access to the authorized 40-foot navigation channel which extends to the Interstate-5 bridge. The site also has access to the Burlington Northern Railroad line which operates a double track line traversing the island and which could provide access for both Union Pacific and Burlington Northern, providing a marketing advantage over comparable sites in the lower Columbia River. Proximity to the interstate highway system and the Portland International Airport are additional advantages. Transportation related issues are also discussed within the ESEE analysis (Chapter 6).

Portions of the State Transportation Planning Rule became directly applicable to land use decisions and limited land use decisions May 6, 1994. Applicable provisions address pedestrian and bicycle facilities, transit improvements, and reduced dependence on the automobile. These provisions will apply directly to land use decisions until such time that the City amends its Planning and Zoning, and Subdivision regulations to comport with state standards.

Several provisions of the Transportation Planning Rule apply to proposed marine industrial development on West Hayden Island. For example, the rule requires:

- Facilities providing safe and convenient pedestrian and bicycle access within and from new subdivisions, planned developments, shopping centers and industrial parks to nearby residential areas, transit stops, and neighborhoods activity centers, such as schools, parks, and shopping.
- Design of transit routes or transit facilities to support transit use through the provision of bus stops, pullouts and shelters, optimum road geometry, on-road parking restrictions and similar facilities, as appropriate. Tri-Met will make determination on whether any transit facilities are required.

- New industrial and commercial developments to provide preferential parking for carpools and vanpools.

The Port of Portland may wish to examine development plans in relation to these (and other) provisions of the Transportation Planning Rule.

Goal 13, Energy Conservation, provides for the distribution of land uses in a pattern that maximizes the conservation of energy. Development of multimodal facilities to efficiently connect marine cargo with rail infrastructure may have positive energy consequences. In general, the movement of freight over water is more energy efficient than moving freight over land. Development of marine facilities within the Urban Growth Boundary (rather than farther downstream) minimizes the land distance that cargo bound for Portland must travel. A more detailed discussion of energy conservation can be found within the ESEE analysis (Chapter 6).

Goal 14, Urbanization, provides for the orderly and efficient transition of rural lands to urban uses. The Urban Growth Boundary (UGB) was amended in 1983 to include the West Hayden Island site. This action was taken based on a demonstrated need for additional marine terminal facilities in the region, and on the lack of alternative sites elsewhere within the UGB. The ordinance amending the Metro UGB is attached as Appendix B. The findings, conclusions, and recommendations associated with the decision to include West Hayden Island within the UGB are included within that appendix.

The requirements of Statewide Planning Goal 15, Willamette River Greenway, were addressed in the *Willamette River Greenway Plan* (1987). The inventory report of the *Willamette River Greenway Plan* identifies potential enhancement sites that the Port of Portland may consider as candidates for off-site mitigation. Statewide Planning Goals 16, 17, 18 and 19 address coastal and ocean resources and therefore do not apply to the City of Portland.

## LOCAL POLICY

### Land Use Planning and Annexation

In March 1983, Multnomah County passed Resolution A, which declared the county's intent to turn over urban service delivery to incorporated jurisdictions. This action stimulated annexation requests of certain unincorporated properties to the cities of Portland and Gresham. In 1987, the eastern portion of Hayden Island (which does not include the West Hayden Island site) annexed to the City of Portland. By that date, West Hayden Island had been brought into the Urban Growth Boundary, but remained in Multnomah County.

In order to implement the *West Hayden Island Development Program*, the study area needs urban land use designations. A first step in that process is to transfer planning and zoning responsibilities of West Hayden Island from Multnomah County to the City of Portland. In July, 1996, the Portland City Planning Commission and the Multnomah County Planning Commission will consider an amendment to the Multnomah County - City of Portland Urban Planning Area Agreement (UPAA) to transfer those responsibilities before the City annexes West Hayden Island. The amendment will allow the Port of Portland to apply for City zoning and the City to implement that zoning without interruption before and after annexation.

### **Portland Comprehensive Plan**

The Portland Comprehensive Plan provides a coordinated set of guidelines for decision-making to guide future growth and development of the city. The Comprehensive Plan is implemented through the use of public facilities and land use policies, the Comprehensive Plan map, and the city's regulations for development, including the Zoning Code. Since the state acknowledged the city's Comprehensive Plan in 1981, land use decisions in conformance with the policies and objectives of the Plan are in compliance with the Statewide Planning Goals.

The *West Hayden Island Goal 5 Analysis* recommendations are consistent with City of Portland Comprehensive Plan Goals and Policies, particularly Goal 8 - Environment. The purpose of City Goal 8 is to "maintain and improve the quality of Portland's air, water and land resources and protect neighborhoods and business centers from detrimental noise pollution."

There are eleven additional Comprehensive Plan Goals. These goals address metropolitan coordination, urban development, neighborhoods, economic development, transportation, energy, citizen involvement, plan review and implementation, and public facilities. As with the Statewide Planning Goals, these procedures are applied in the preparation, review and presentation of this plan. Economic development, energy and related goals are addressed in more detail in Chapter 6 as part of the ESEE analysis of resource sites.

Goal 1, Metropolitan Coordination, provides for planning activities coordinated with federal, state, and regional plans.

In 1982, Metro expanded the Urban Growth Boundary to include West Hayden Island. This action was taken for the purpose of ensuring an adequate supply of land for marine industrial expansion within the Urban Growth Boundary. *The West Hayden Island Goal 5 Analysis* is consistent with that decision.

This analysis is a component of the Port of Portland's *West Hayden Island Development Program*. The Goal 5 analysis relies substantially on materials

and comments provided by the Port of Portland and other interested public agencies. In Chapter 7 of this report, we discuss the option for an integrated resource management program involving the property owner and public agencies with regulatory responsibilities for natural resources. At a minimum, an integrated resource management program should involve the Port of Portland, the Portland Bureau of Planning, the Division of State Lands, and the U.S. Army Corps of Engineers. Other possible participants include the National Marine Fisheries Service and Metro.

Goal 2, Urban Development, provides for maintaining Portland's role as the major regional employment, population and cultural center through expanding opportunities for housing and jobs, while retaining the character of established areas. This analysis facilitates an orderly annexation process for land needed for marine industrial uses. The development of marine terminal facilities on West Hayden Island will help maintain Portland's role as the major regional distribution center.

Goal 3, Neighborhoods, provides for the preservation and reinforcement of the stability and diversity of the City's neighborhoods while allowing for increased density.

Allowing marine industrial uses to locate on a site surrounded primarily by other industrial uses minimizes impacts to residential neighborhoods. Protection of natural resources on West Hayden Island further minimizes the impacts of marine industrial uses on adjacent residential communities (such as houseboats along the Oregon Slough) by protecting vegetative buffers. By locating marine terminal facilities close to rail and highway infrastructure, traffic impacts to residential neighborhoods are reduced.

The Port of Portland has invited neighborhood involvement in the West Hayden Island planning process by holding several community forums. In addition, a representative of the Hayden Island Neighborhood Association served on the Planning Advisory Committee for the *West Hayden Island Development Program*.

Goal 4, Housing, provides for a diversity in the type, density and location of housing in order to provide an adequate supply within the city. As discussed above, the West Hayden Island site is not needed within the Urban Growth Boundary for residential purposes. The site is within the 65 dba noise level (airport overlay), and much of the site is within the 100-year floodplain, and thus was not considered as part of the regional inventory of buildable lands.

Goal 5, Economic Development, promotes actions which foster a strong and diverse economy, and which provide a full range of employment and economic choices for individuals and families in all parts of the city. The

ESEE analysis (Chapter 6) includes a discussion of the economic development issues associated with marine industrial uses on West Hayden Island.

Goal 6, Transportation, provides for and protects the public's interest in the public right-of-way and transportation system by encouraging the development of a balanced, affordable, and efficient transportation system. *The West Hayden Island Development Program*, and this analysis represent a coordinated planning effort which will facilitate the development of an efficient multimodal connection between marine, rail, and highway transportation networks. The proposed development program also identifies future opportunities for pedestrian access with a recreational trail designation on the Comprehensive Plan .

Goal 7, Energy, promotes increasing energy efficiency in all sectors of the city. The ESEE analysis (Chapter 6) includes a discussion of the energy related issues associated with marine industrial uses on West Hayden Island.

Goal 9, Citizen Involvement, provides for improving the method for citizen involvement in the land use decision making process and providing opportunities for citizen participation in the implementation, review and amendment of the adopted Comprehensive Plan.

As discussed above, in preparing plans for marine terminal development of West Hayden Island, the Port of Portland held open houses, convened a Planning Advisory Committee and met with businesses, Hayden Island residents, and public agency representatives. For the quasi-judicial application, the Bureau of Planning will send public notice of mandatory public hearings of the Land Use Hearings Office and City Council.

Goal 10, Plan Review and Administration, states that the Comprehensive Plan will undergo periodic review and describes the different Comprehensive Plan designations within the City of Portland. Using the guidance of Policy 10.3, two Comprehensive Plan Map designations are most suitable for West Hayden Island: Industrial Sanctuary and Open Space. The site was brought into the Urban Growth Boundary in order to allow for adequate land for marine industrial uses. The Industrial Sanctuary designation is intended for areas where City policy is to reserve land for existing and future industrial development. The Open Space designation is appropriate for some portions of West Hayden Island. This designation is intended for lands that serve an open space function, primarily public lands, but also some private areas. Lands intended for open space designation include parks, natural areas, golf courses and cemeteries.

Goal 10 also describes the process by which amendments are made to the Comprehensive Plan. Quasi-judicial amendments to the Comprehensive Plan Map are reviewed by the hearings officer prior to final local action by

City Council. For quasi-judicial amendments, the burden of proof for the amendment is on the applicant. The applicant must show that the requested change is : (1) consistent and supportive of the appropriate Comprehensive Plan Goals and Policies, (2) compatible with the land use pattern established by the Comprehensive Plan Map, (3) consistent with the Statewide Land Use Planning Goals, and (4) consistent with any adopted applicable area plans adopted as part of the Comprehensive Plan.

When the requested amendment is from a residential designation to a commercial, employment, or industrial designation, or from the urban commercial designation to another commercial, employment, or industrial designation, the requested designation must not result in a net loss of potential housing units.

Goal 11, Public Facilities, provides for a timely, orderly and efficient arrangement of public facilities and services that support existing and planned land use patterns and densities. The *West Hayden Island Development Program* includes an analysis of the public infrastructure necessary for marine terminal development on West Hayden Island (including sanitary and stormwater facilities, road access, parks and recreation, water service).

Goal 12, Urban Design, provides for enhancing Portland as a livable city, attractive in its setting and dynamic in its urban character by preserving its history and building a substantial legacy of quality private developments and public improvements for future generations. Urban design is discussed in greater detail within the ESEE analysis (Chapter 6). The proposed City Comprehensive Plan Map designations and zoning do not ensure attractive industrial development on West Hayden Island. Portland's image as a livable city would be enhanced if the proposal results in a state of the art environmentally sensitive marine terminal development.

### **Prosperous Portland**

In September 1994, the City of Portland adopted the *Prosperous Portland* economic development plan (City of Portland, 1994). The plan calls for the city to pursue the development of target industry clusters - industries and related businesses whose growth will critically contribute to the City achieving its economic and workforce goals.

The warehouse and distribution, and the transportation equipment industries were selected to be among the initial target industries. The warehouse and distribution cluster includes those companies involved in the storage and distribution of products of national and international markets. This cluster capitalizes on Portland's traditional strength as a transportation center with supporting infrastructure of highway, rail, marine, and air facilities.

## **Scenic Resources**

In March 1991, City Council adopted the *Scenic Resources Protection Plan*. (cultural plan). The cultural plan's purpose is to protect and enhance significant scenic resources in Portland for future generations. The cultural plan protects scenic views, sites, drives and corridors in compliance with Statewide Planning Goal 5.

West Hayden Island was not within the jurisdiction of the City of Portland when the inventory of scenic resources was completed. The Columbia River, however, was identified in the *Scenic Resources Protection Plan* as a Scenic Corridor.

A scenic corridor is a linear scenic resource. It may include streets, bikeways, trails, or waterways (rivers, creeks, sloughs) through parks, natural areas, or urban areas. The corridor may include the scenic views along it, but may also be valued for its intrinsic scenic qualities, such as a winding road through a wooded area. In some cases (such as along the Columbia River), scenic resources are protected through the use of environmental zoning regulations. In these cases, the impact to scenic resources must be addressed in the environmental review process.

## **PORT OF PORTLAND POLICY**

### **Marine Terminals Master Plan**

The Marine Terminals Master Plan is a long range planning effort to provide a flexible and rational blueprint for future facility development. The Marine Terminals Master Plan is integrated with other planning efforts, principally the strategic and business plans for the Port's Marine Department. The Marine Terminal Master Plan recognized West Hayden Island as the only remaining waterfront area in the Portland District which can be improved to meet the region's future marine cargo needs.

## **REGIONAL POLICY**

Metro was created after a vote of the citizens of the region as a elected regional government responsible for addressing issues of regional significance in the metropolitan area and is enabled by state law, adopted by the Oregon Legislature in 1977. In addition, the voters of the region adopted a Metro Charter in 1992, which describes additional responsibilities for the agency. Metro has an elected Executive Officer and a Metro Council which propose and determine regionwide policies. Regional Policies relevant to West Hayden Island are described below. These policies include the *Regional Urban Growth Goals and Objectives (RUGGOs)*, the *Metropolitan Greenspaces Masterplan*, *The Metro 2040 Plan*, and the *Metropolitan Housing Rule*.

## Metro Regional Urban Growth Goals and Objectives

In September 1991, Metro developed the *Regional Urban Growth Goals and Objectives* (or RUGGOs). The RUGGOs define the goals and objectives for managing growth for jurisdictions within the urban growth boundary. The RUGGOs provide guidance for creating and implementing the *Metro 2040 Plan*. Several of the RUGGOs relate to marine industrial development of West Hayden Island.

RUGGO Goal II.1, Natural Environment, states:

Preservation, use and modification of the natural environment of the region should maintain and enhance environmental quality while striving for the wise use and preservation of a broad range of natural resources.

Objective 9, Natural Areas, Parks and Wildlife Habitat, directs Metro to acquire, protect and manage (1) open spaces to provide passive and active recreational opportunities, and (2) an open space system providing habitat for native wildlife and plant populations.

RUGGO Goal II.2, Built Environment, states that development in the region should occur in a coordinated and balanced fashion. Aspects of that balance include:

- II.2.iii. the integration of land use planning and economic development programs;
- II.2.iv. the coordination of public investment with local comprehensive and regional functional plans;
- II.2.v. the continued evolution of regional economic opportunity; and
- II.2.vi. the creation of a balanced transportation system, less dependent on the private automobile, supported by both the use of emerging technology and the co-location of jobs, housing, commercial activity, parks and open space.

Objective 12, Public Services and Facilities, directs Metro to plan public facilities to: (1) minimize cost; (2) maximize service efficiencies and coordination; (3) result in net improvements in environmental quality and the conservation of natural resources; (4) keep pace with growth while preventing any loss of existing service levels and achieving planned service levels; (5) use energy efficiently; and (6) shape and direct growth to meet local and regional objectives.

Objective 13, Transportation, states that planning for the regional transportation system should seek to reduce energy consumption, maintain air quality, and reduce negative impacts on parks, public open space, wetlands and negative effects on communities and neighborhoods arising from noise,

visual impacts and physical segmentation. Objective 13 directs Metro to include policies for the inter-regional movement of people and goods by rail, ship, barge and air in regional transportation plans, and to assess and address the needs for movement of goods via trucks, rail and barge.

Objective 14, Economic Opportunity, states that public policy should encourage the development of a diverse and sufficient supply of jobs, especially family wage jobs, in appropriate locations throughout the region. Expansions of the urban growth boundary for industrial or commercial purposes shall occur in locations consistent with these regional urban growth goals and objectives. Objective 14 also directs Metro to assess the potential for redevelopment and/or intensification of use of existing commercial and industrial land resources in the region.

### **Metropolitan Greenspaces Plan**

The *Metropolitan Greenspaces Masterplan* was adopted in July 1992. The purpose of that plan is to identify and protect natural areas within the Portland metropolitan area and Clark County, Washington. The program is a cooperative effort between Metro, cities, counties, special districts, nonprofit conservation organizations and citizens. The goal is to establish a regional system of natural areas, parks and open spaces which are connected by trails and greenways.

West Hayden Island is identified by the *Greenspaces Masterplan* as a regionally significant natural area site. That plan also identified the Columbia River, the Willamette River, and the Columbia Slough as regionally significant wildlife corridors.

### **Metro's Region 2040 Growth Concept**

Metro's ongoing Region 2040 program is closely tied to the RUGGOs, the Greenspaces Program and Portland's Livable Cities Project. Region 2040 is aimed at identifying a collectively-shared vision for the future urban form of the region. The *Metro 2040 Growth Concept* was adopted by the Metro Council in 1995. Since then, the Metro Policy Advisory Committee, a committee of local government elected officials and appointed citizens, has recommended early implementation of the regional policies of the 2040 Growth Concept. The legal form of this early implementation is a functional plan. The policies in this functional plan will be coordinated with policies to be re-adopted in official components of the Metro Charter mandated Regional framework Plan, on or before December 30, 1997.

The *Draft Urban Growth Management Functional Plan* (dated April 24, 1996) includes several proposed policies relevant to West Hayden Island, related to water quality and flood management conservation, regional accessibility, and allowed uses within industrial areas.

Title 3 of the *Draft Urban Growth Management Functional Plan* requires Cities and Counties to ensure that their comprehensive plans and implementing regulations protect Water Quality and Flood Management Areas, as defined by adopted maps. The draft document proposes performance standards which city and county ordinances must meet. Among these standards are proposed requirements that development be prohibited in Water Quality and Flood Management Areas unless a hydrological study shows that proposed fill not lead to increased flood elevations, and requirements that vegetative cover be maintained in those areas. The *West Hayden Island Natural Resources Inventory* (Chapter 3 of this report), and the *West Hayden Island ESEE Analysis* (Chapter 6 of this report) include discussions of vegetative cover, and floodway values.

Title 4 of the *Draft Urban Growth Management Functional Plan* states that it is the intent of the Metro 2040 Growth Concept that Industrial Areas contain very little retail development. Such areas would be expected to include some limited retail commercial uses, primarily to serve the needs of people working or living in the immediate employment areas. As described in the *Conflicting Use* discussion of this report (Chapter 5), commercial uses are not anticipated on West Hayden Island.

Title 6 of the *Draft Urban Growth Management Functional Plan* describes the importance of transportation accessibility within the region, and a set of standards and performance measures designed to insure accessibility while enhancing livability. The proposed marine terminal development on West Hayden Island is one element of a regional system of transportation facilities which provide for improved freight access to the region and freight mobility within the region.

The *Urban Growth Management Functional Plan* is expected to be adopted by the Metro Council in the Fall of 1996. Jurisdictions will have two years to comply with the requirements of the plan.

### **Metropolitan Housing Rule**

In addition to regional coordination with Metro, the city is responsible for meeting its share of regional housing needs. The designation of West Hayden Island for marine industrial use will not prevent the city from meeting its housing obligations. Resource areas suggested for protection within this report are constrained lands which by the Metropolitan Housing Rule definition are not needed for housing. Certain areas which are not needed for housing may still provide limited infill opportunities. To the extent housing density can be increased in or adjacent to these areas, urban services can be provided in a more cost effective manner. For this reason, the City encourages compact development forms which accomplish the dual objectives of resource conservation and housing development. In working

with Metro on the 2040 Concept Map, the City allocated housing in centers and in corridors (main streets). No housing was allocated to West Hayden Island.

### **FEDERAL POLICY**

The Federal Clean Water Act applies to water resources on the West Hayden Island site. The Act's primary objective is to maintain and restore physical, chemical and biological integrity of the nation's waters, including wetlands. Another objective of the Act is "to maintain a balanced indigenous population of species." Implementation of the Conservation Plan is consistent with these objectives.

### **Permitting Agencies**

Federal and state governments, as well as special districts, have jurisdiction over wetland modification. Following is a brief synopsis of the agencies involved and their roles as they relate to wetlands and water bodies.

- U. S. Environmental Protection Agency (EPA): Under Section 309 of the Clean Water Act, EPA reviews environmental impact statements required for all federally funded developments having significant environmental impacts.
- U. S. Army Corps of Engineers (COE): The Clean Water Act, primarily through the Section 404 process, requires a permit for the dredge or fill of material into the waters of the United States. Permits under the Section 404 process are subject to review by EPA and the U.S. Fish and Wildlife Service.
- Oregon Division of State Lands (DSL): In accordance with Oregon statutes, a state permit is required for filling, removal or alteration of 50 cubic yards or more of material within the bed or banks of the waters of Oregon.

## CHAPTER 3 NATURAL RESOURCES INVENTORY

### INTRODUCTION

A natural resources inventory is the first step in the Goal 5 process. The first part of this inventory provides an overview of the natural resource functions and values of West Hayden Island. The inventory then provides information on natural resource location, quality and quantity. The inventory concludes with a determination of resource significance.

### DISCUSSION FORMAT

The inventory summarizes material gathered during field visits as well as resource information collected from other sources as noted. The elements of the report and the discussion format are reviewed below.

<b>Resource Site #:</b>	<b>Name</b>	<b>Map: Quarter section maps</b>
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**Resource Site Size:** Approximate acreage of resource site

**Approx. Boundaries:** Approximate north, east, south and west boundaries

**Neighborhood:** Name of the local neighborhood

**Inventory Dates:** Dates of field inventories within the resource site

**Habitat Classification:** Based on the Cowardin classification system

**Types of Resources:** List of resources, described in more detail below

**Functional Values:** List of resource values, discussed in detail below

#### **Resource Location and Description:**

Describes the location and significant resource features of individual sites.

#### **Resource Quantity and Quality:**

Resource quantity and quality is evaluated using information from field inventories, local, and regional planning efforts and other sources.

### Composite Wildlife Habitat Rating:

The habitat rating provides a summary of the relative quality of wildlife habitat within a particular resource site. At the top of the habitat rating box, the range of habitat scores for the site is indicated. The previous section explains the decision and contributing factors used in weighing the significance of habitat resources. The functional value of the three principal habitat components, water, food, and cover, is then generalized (from "low" to "high") based on the following habitat scores:

	Low	Moderately Low	Medium	Moderately High	High
Water	2 - 7	8 - 12	13 - 18	19 - 24	25 - 30
Food	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24
Cover	0 - 5	6 - 11	12 - 16	17 - 22	23 - 28

The three remaining categories, interspersions, uniqueness, and disturbance, are classified in a similar fashion using "low," "medium" and "high."

*Uniqueness* is a combination of the site's special features (habitat type, flora and fauna);

*Disturbance* is a combination of physical and human disturbance (note: a high score corresponds to a "low" disturbance);

*Interspersion* is a score used to rate the extent to which the site is isolated from other habitat areas. For example, a site surrounded by pavement, buildings, and other human activity would receive a low interspersions score.

	Low	Medium	High
Interspersion	0 - 1	2 - 4	5 - 6
Uniqueness	0 - 3	4 - 7	8 - 12
Disturbance	8 - 6	5 - 3	2 - 0

### Significance Findings:

Summarizes the inventory and the significance of individual resources.

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**RESOURCE SITE 146:  
WEST HAYDEN ISLAND**


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Sect. 19, 28, 29, 30, 32, 33, T2N, R1E

<b>Approx. Site Size:</b>	750 acres
<b>Approx. Boundaries:</b>	Columbia River, north and west; Oregon Slough, south; Burlington Northern railroad, east
<b>Neighborhood:</b>	Hayden Island Neighborhood Network
<b>Inventory Dates:</b>	Multiple surveys 1980-1984 (Portland General Electric EIS) and 1994 (Port of Portland), 5/8/86, 2/2/95, 4/2/95, 4/21/95, 5/6/95, 7/21/95, and 7/26/95

**Habitat Classification:**

- Upland Meadow
- Riparian Forest
- Palustrine, Scrub-Shrub and Forested Wetland, Broad-leaf Deciduous, Seasonally and Intermittently Flooded
- Palustrine, Emergent Wetland, Persistent, Seasonally Flooded
- Riverine, Lower Perennial/Tidal, Unconsolidated Shore, Sand, Permanently and Seasonally Flooded

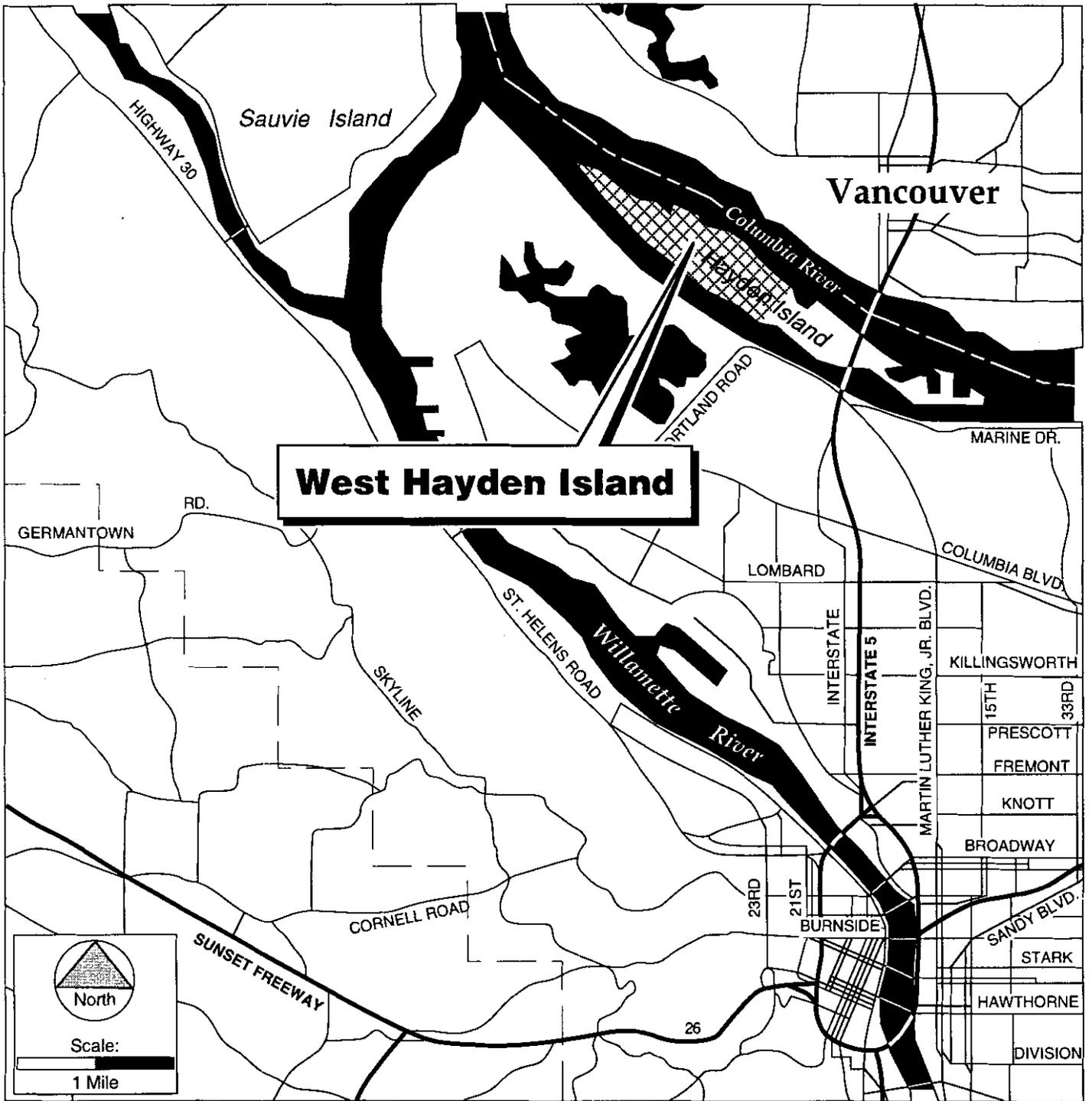
**Types of Resources:**

Upland forest and meadow, fish and wildlife habitat, sensitive fauna, palustrine and riverine wetlands, groundwater, open space.

**Resource Location and Description**

Hayden Island is located on the Columbia River near the confluence of the Columbia and Willamette Rivers in northwestern Multnomah County (Figure 1). The West Hayden Island resource site comprises nearly half of the island, west of the Burlington Northern railway crossing. The island is commercially developed east of the railway and is mostly undeveloped to the west. Development activities on West Hayden Island include an earth-moving training school, an electrical substation, and transmission lines that cross through the site. Most upland meadow, forest, and wetland habitats are open range areas which are actively grazed by domestic cattle. The Oregon Slough and the Columbia River are used for commercial and recreational marine activities, including the tying off of log rafts along the shoreline of West Hayden Island. The site includes much of the original Hayden Island as well as some land area that formed in the 1930's and 40's after rock "groins" were placed in the Oregon Slough, and some land created more recently by the dumping of dredge spoils from the Columbia River.

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**West Hayden Island**

**Figure 1**

**Vicinity Map**

**WEST HAYDEN ISLAND  
DEVELOPMENT PROGRAM  
Goal 5 Natural Resources Inventory**

Key:  
 West Hayden Island

Sources: Adopted environmental zoning areas in Portland.  
 For Vancouver Lake area, METRO greenspaces plan.

**Functional Values:**

The following functional values have been identified on West Hayden Island:

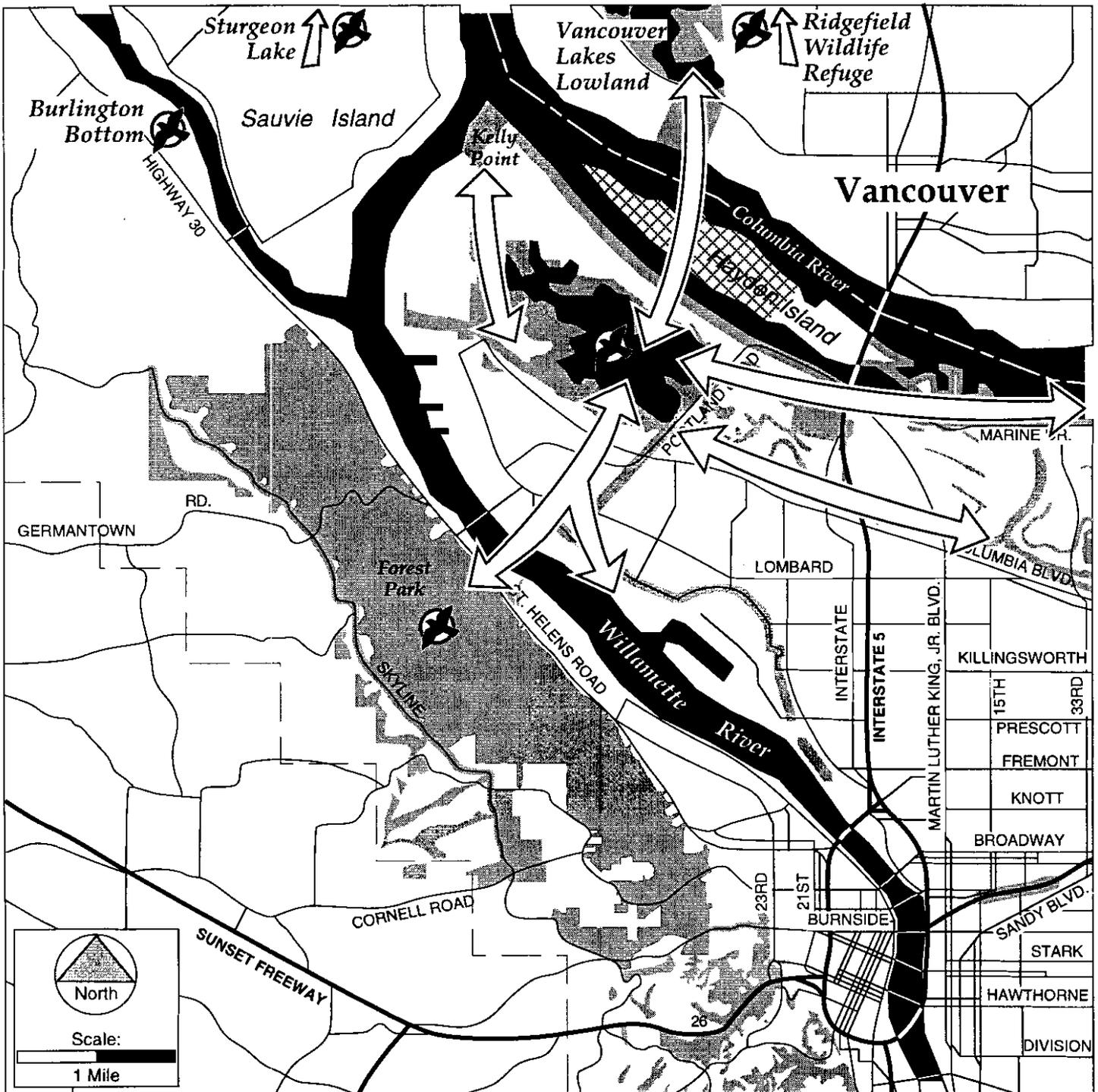
- Food, water, cover and territory for wildlife (including fish)
- Flood storage, conveyance and desynchronization
- Groundwater recharge and discharge
- Drainage
- Pollution, nutrient retention and removal
- Soil stabilization
- Microclimate
- Neighborhood livability and scenic amenities
- Recreational and educational values

These functional values are elaborated below. Additional general information on the functions and values of natural resources can be found in other City Goal 5 Reports, particularly: *Skyline West Conservation Plan* (September, 1994), *Natural Resources Protection Plan for the Columbia South Shore* (October, 1993), and the *East Buttes, Terraces and Wetlands Conservation Plan* (July, 1993).

**Fish and Wildlife Habitat (Food, Water, Cover)**

West Hayden Island's wetlands and riparian forests provide important breeding, feeding and refuge areas for a variety of bird, mammal, amphibian, reptile and invertebrate species, described in more detail later in this inventory. The site's riparian forests, wetlands and shallow water habitat also support a variety of fish and other aquatic wildlife in the Columbia River. The *Baseline Report for West Hayden Island Goal 5 Inventory and Assessment* (Smyth 1995) provides the basis for identifying wildlife habitat values, and provides further references on this topic.

The value of the West Hayden Island site for wildlife is also related to its location within the City — i.e. the site serves, along with other natural areas, as part of a network of natural areas allowing the movement of wildlife in areas that are otherwise highly urbanized (Figure 2). Since West Hayden Island is located near the confluence of the Columbia and Willamette rivers, it affects fish and wildlife passage along river corridors, and among upland and wetland habitats in the vicinity. Along with currently protected natural resources in the Columbia Slough area and Smith and Bybee Lakes, the site helps form an east-west and north-south bird and animal connection between the Columbia Gorge and Columbia River islands to the east, Sauvie Island and Forest Park to the west, and the Vancouver Lake and Ridgefield areas to the north. These natural areas form nearly continuous corridors of water and vegetation close to the Columbia and Willamette rivers. These corridors provide food, water, cover, perching, nesting, and resting for native birds and animals. Occasional large natural areas along these corridors (such as West Hayden Island and Smith and Bybee Lakes) are desirable to provide habitat



**Key:**



Wildlife "islands"



Wildlife corridor connections  
(The Columbia and Willamette Rivers also serve as wildlife corridors)



Major natural areas within the city of Portland.  
(The Vancouver Lake area corresponds to greenspaces identified by METRO)



West Hayden Island

Sources: Adopted environmental zoning areas in Portland. For Vancouver Lake area, METRO greenspaces plan.

# Figure 2 Wildlife Corridors

## WEST HAYDEN ISLAND DEVELOPMENT PROGRAM Goal 5 Natural Resources Inventory

diversity and rest areas necessary for a variety of species. These corridors allow for the introduction, re-charge, and passage of bird and animal species not normally observed in large cities, such as bald eagle and great blue heron. As wildlife move through these corridors, they are sometimes able to disperse into adjacent urban areas. Dispersal of native vegetation through seed distribution can also occur.

In addition to the importance of maintaining "a balanced indigenous population of species" as identified by federal policy, the presence of a variety of wildlife, including those species supported by West Hayden Island, have many beneficial values ranging from vector control and plant pollination to the enjoyment and education they provide for local residents, school children and nature enthusiasts.

Flood Storage, Conveyance and Desynchronization, Groundwater Recharge and Discharge, Soil Stabilization, and Drainage.

Rain falling on a forest bounces off leaves and twigs, drips into the spongy forest floor, and soaks into soils. Rain falling on pavement is drained quickly into culverts and pipes, and into rivers and streams. Forests such as those found on the West Hayden Island site can lower peak flood heights by slowing and absorbing stormwater runoff. Forests also store water in the wet season and release it in the dry season, when the extra water can help aquatic life. Ponds and marshes can also be used to temporarily store and desynchronize runoff that contributes to flooding. In addition, the loss of floodplain lands, due to filling and diking, contributes to flooding.

While flood storage, conveyance and desynchronization on West Hayden Island may be insignificant by itself relative to the size of the Columbia River, Goal 5 rules require that cumulative effects be considered. The *Lower Columbia Bank Protection Environmental Impact Statement Supplement* estimated in 1976 that 65 percent of the original Columbia River floodplain had been lost (functionally) due to filling and diking (Corps of Engineers 1976). More recent estimates go as high as 85 percent for cumulative loss of riparian and wetland habitats in this area of the Columbia River system (Smyth, 1995). West Hayden Island is among those few areas within the Columbia floodplain that has not been entirely filled or diked. Because the site has not been filled or diked, the site still functions as a portion of the Columbia River floodplain. Remaining natural floodplain resources are nationally recognized as playing an important role in flood control efforts.

The vegetation on West Hayden Island helps to protect the island from erosion. Vegetation provides a natural armor for shorelines. In some situations, vegetation can serve as a natural alternative to riprap or concrete. Vegetation also slows the velocity of stormwater. In general, to the extent that stormwater is held in check, less erosion and bank failures result.

Surface water is supplied through seasonal recharge and discharge of groundwater. Groundwater recharge occurs in the presence of large quantities of water over large areas for moderately long periods of time, where it has the ability to percolate to the groundwater aquifer. Groundwater resources are recharged by rain and river water percolating into the ground. Discharge is not an important domestic source of water, but does contribute water to wetlands during critical periods of low water. This water is extremely important for fish and wildlife. The groundwater resources of West Hayden Island help support wetland resources when river levels are low. Wetland resources, in turn, support wildlife populations.

#### Pollution, Nutrient Retention and Removal

Portland is one of twelve local governments designated by the United Nations' 1988 Toronto "World Conference on the Changing Atmosphere" to retard global warming by slowing the buildup of carbon dioxide. Urban forests in the United States store approximately 800 million tons of carbon, or about five percent of all forest carbon storage in the entire country. A mature tree absorbs about 13 pounds of atmospheric carbon dioxide every year (Society of American Foresters 1991). The City of Portland's *Carbon Dioxide Reduction Strategy* supports the maintenance of existing trees, and the planting of new trees, in order to cause a reduction in atmospheric carbon dioxide (City of Portland, Energy Office 1993). This is the only "sink increase" element of the strategy; the others are "source reduction" elements. A mature tree can also intercept up to 50 pounds of atmospheric particulates every year (Dwyer et al. 1992). Particulates are removed when plants reduce winds, causing particulates to settle out of the atmosphere onto plants or the ground, where precipitation washes the particulates into the soil below. To the extent that particulates are trapped in forests, water quality benefits as well because those particulates are then prevented from entering stream flows. The 451 acres of riparian forests on West Hayden Island contribute to pollution reduction efforts because they are centrally located within a large urban area.

Natural water features, such as ponds and wetlands, also perform important water quality functions by slowing surface waters, allowing deposition of sediments and associated nutrients, metals, and organic contaminants (at least 35 percent removal according to Hupp and Yanosky). Goal 5 requires that jurisdictions examine the resource in relation to potential conflicting uses. While the current use of the site may not generate substantial pollution that is released into wetlands on the site, Goal 5 requires an analysis that considers the conflicting uses that are possible based on broad land use categories. The value of the resource for pollution reduction cannot be considered based only on the existing use. The fact that a wetland resource is not currently receiving pollution does not mean the resource cannot serve that function. West Hayden Island wetlands could help to slow surface water runoff, and trap

sediments and associated nutrients, metals, and organic contaminants released from future development elsewhere on the site.

### Microclimate

The microclimate of the riparian forest on West Hayden Island, created in part by the shade of the vegetation and the transpiration of water from the leaves, moderates climate extremes. The forest acts as a natural air conditioner for adjacent areas, cooling the air during the day and warming it at night (McHarg 1969). One study, for example, showed that the large parks and natural areas in St. Louis were as much as 5 degrees (Celsius) cooler on a summer evening than more developed portions of that city (Stanford University Aerosol Laboratory and the Ralph M. Parsons Company, 1953 — as described by Clark 1972). In addition, these parks and natural areas influenced the temperature of surrounding areas. The microclimate effects of forest clearing are particularly applicable to forests with large deciduous trees, such as cottonwoods and willows (both common on West Hayden Island), which are well known for the large amount of moisture that they transmit into the atmosphere. A reduction in summer cooling and humidifying can be expected in the Hayden Island vicinity as a result of forest clearing. The *Lower Columbia Bank Protection Environmental Impact Statement Supplement* indicates that the Corps of Engineers (COE) has recognized this functional value when dealing with similar habitat on the Lower Columbia (COE, 1976). Conversely, large amounts of brick, concrete, or asphalt surfaces are considered to be major factors leading to higher temperatures in urban areas.

### Neighborhood Livability and Scenic Amenities

A pleasing environment fosters positive emotional states. Trees and vegetation provide much of the color, variety, textures, shapes and sounds that are important aesthetic elements of the city during all seasons of the year. Trees have a deep significance to people, especially in an urban setting which often strongly contrasts with the natural world. Trees and forests provide beauty and serenity. For example, studies have shown that the presence of natural areas increases the value of residential property.<sup>1</sup> Studies also show that urban forests play a clear role in reducing stress-related impacts on health (Ulrich 1989). Exposure to nature has significant "restorative" benefits. For example, hospital patients with windows that overlook trees have more favorable recovery rates, shorter hospital stays, and a lower intake of pain relieving drugs than those patients without view of trees (Ulrich 1984). Similarly, prison research suggests that views of nature from cell windows leads to lower levels of stress for prisoners (West 1985). The *Prosperous Portland Plan*, adopted in September of 1994, identifies Portland's reputation

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<sup>1</sup> The City of Portland's *Skyline West Conservation Plan* (September, 1994), as well as the *Urban Forestry Management Plan*. (City of Portland, Parks and Recreation 1995) contain extensive references on this topic.

as a livable city as a strength which helps attract and retain business. Successful businesses recognize that a livable environment contributes to a more productive workforce. Accordingly, businesses often make relocation decisions based on quality of life factors, such as proximity to large natural areas (Haug 1991).

### Recreational and Educational Values

Testimony provided on other conservation plans within the City of Portland indicates that greenspaces provide important educational values. These values include hands-on learning about ecology and environmental issues, basic life skills training (communication, problem solving skills, etc.), community benefit projects (such as trash clean up and environmental monitoring), and development of pride, self respect, and sensory awareness. As one student put it, "Greenspaces teach you how to think." The West Hayden Island site has particular value as a resource for environmental education. First, it is one of the few remaining examples of the cottonwood riparian forest vegetation community in the region. Second, the site has examples of several different types of wetland resources. Third, a large variety of wildlife species can be seen there.

Natural resources on West Hayden Island provide, or support several types of recreation, including boating (including non-motorized), picnicking, wildlife viewing, and fishing. The western tip of the island in particular has been used by boaters (the site is not formally open to the public, and no specific facilities are provided). The Oregon Slough adjacent to the southern shore of the island is also used by canoes and kayaks. The natural resources on the site contribute to this recreation by providing a scenic backdrop and supporting wildlife populations.

### **Resource Quantity and Quality**

In 1987, the City of Portland rated 21 natural areas located in the Columbia Corridor planning area. The Columbia Corridor planning area extends from the Willamette River to NE 185th Avenue, between the Columbia River and Columbia Boulevard. West Hayden Island is the second highest rated wildlife habitat site in that corridor. This site is second only to the Smith and Bybee Lakes natural area in terms of habitat quality and quantity. The site contains approximately 451 acres of Columbia River riparian cottonwood forest, 150 acres of upland meadow, 24 acres of beach, and 102 acres of developed (non-resource) areas. Fishman Environmental Services (FES), under contract to the Port of Portland, has identified 20.5 acres of wetlands. Previous surveys identified between 70 and 352 acres of wetlands on the site. The wetland section below explains these differences. Wetland acreage will be finalized when the FES report is accepted by the U. S. Army Corps of Engineers (COE) and the Division of State Lands (DSL). More detailed information on these habitat types is provided below.

### Vegetation

This section provides a description of the vegetation resources on the site. Unless otherwise noted, all vegetation information is based on the *Baseline Report for West Hayden Island Goal 5 Inventory and Assessment*. (Smyth 1995). The vegetation resources can be associated with the following functional values, as described previously in the functional values section: food, water, cover and territory for wildlife; pollution, nutrient retention and removal; soil stabilization; microclimate; neighborhood livability and scenic amenities; and recreational and educational values.

The resource site exists as a mosaic of several habitat types (Figure 3). Approximately one quarter of the West Hayden Island site is used for the various commercial activities noted above. The area that has been used by the earth-moving school has not been considered a habitat area due to continual disturbance. Some of the "non habitat" area is land that was formed relatively recently, from the deposit of Columbia River dredge spoils. The remaining three quarters of the site is comprised of natural vegetation with varying degrees of disturbance. Site vegetation is typical of lower Columbia River island habitats, including riparian forest, and palustrine and riverine wetland habitats. The site's vegetation is dominated by "a classic Columbia River riparian cottonwood forest" (Lev and Jennings 1986). Interspersed with these historical vegetative cover types are pasture areas that have been grazed for many decades. Habitat types on the site (defined by dominant plant species) are shown in Table 1.

**Table 1. Habitats Types on West Hayden Island**

Habitat type	Plant community
riparian forest (RF 1-10)	cottonwood/ash
	cottonwood/stinging nettle
	cottonwood/snowberry
wetlands (W1-15)	
emergent wetland (EW)	rush/reed canary grass/herbs
wetland forest (FW)	cottonwood/willow/red osier dogwood
wet meadow (WM)	reed canary grass and associates
upland meadow (UM)	pasture grasses/weedy species

For the purposes of this Goal 5 analysis, the upland forests on the West Hayden Island site are considered throughout the site as riparian forests (marked RF on Figure 3). The cottonwood forests on West Hayden Island took advantage of flooding and/or groundwater movement, and continue to be functionally dependent on groundwater originating from the Columbia River. While cottonwood seems to be the common denominator in these forest

stands, differences in their development history and hydrology likely account for variations in vegetation found throughout the site.

Along the north access road, the forest is mostly composed of the cottonwood/stinging nettle association and in some of the more upland portions, the forest evolves into the cottonwood/nettle/snowberry association.<sup>2</sup> Canopy closure at full leaf-on ranges from 65 percent to 95 percent.<sup>3</sup> The shrub layer varies in forested areas. In some areas, there is no shrub layer. Other areas are open and may include dominant shrubs of snowberry or young open canopied red osier dogwood (RF 3). In still other areas, shrubs may be thick and include several other species such as wild rose and red elderberry (RF 5).

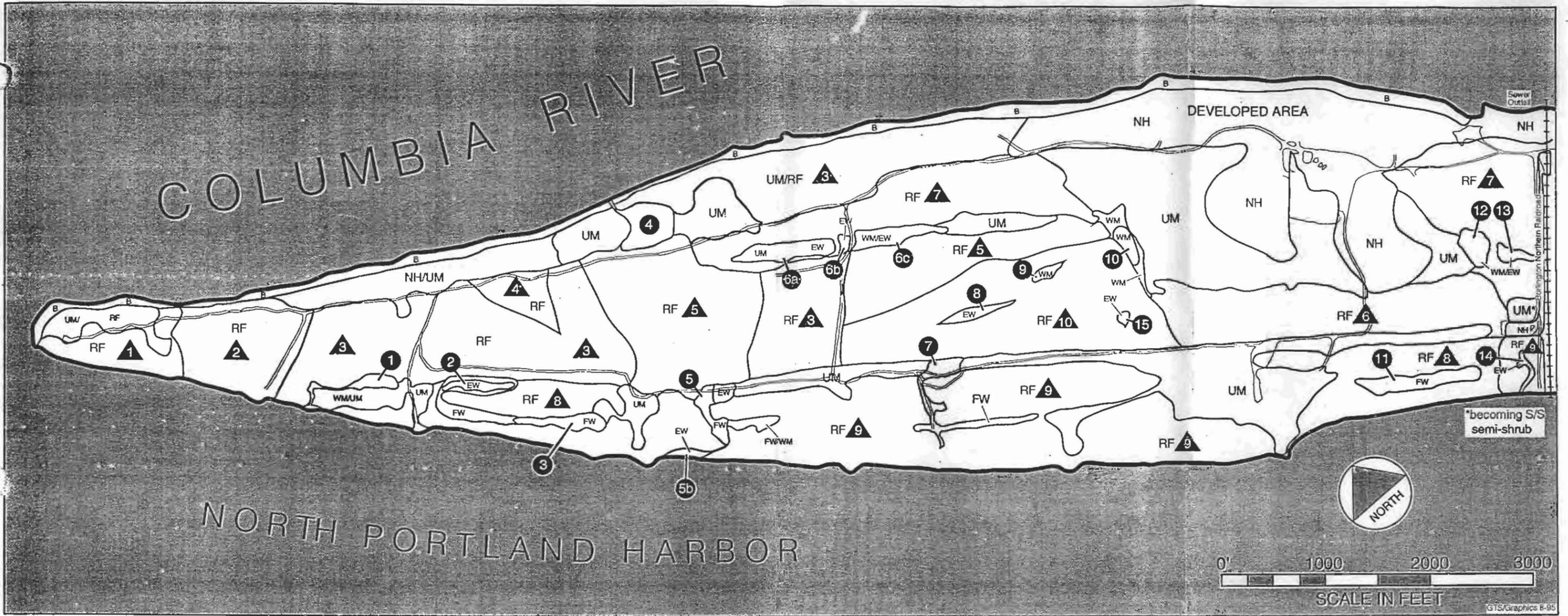
Recruitment of young trees has been hampered by cattle grazing. Numerous cottonwood trees, willow, and ash seedlings are found throughout the resource site which have been eaten down several times by cattle. This continual foraging by cattle may explain why the forest canopy generally appears to be the same age throughout most of the site. There are, however, some very large individual cottonwood trees within the riparian and upland forest types (as a dominant in RF 10 and as scattered individuals in other riparian forest types). Trees exceeding 30 inch diameter at breast height are likely to be older than 60 years of age and may be older than 80 years of age. The large cottonwoods are mostly associated with original island land, that is, not on areas filled with dredged spoils.

A black cottonwood/Oregon ash riparian woodland exists in the eastern forests near the PGE access road and scattered throughout the central portion of the site (RF 7, RF 8, and RF 10). In this forest type, the overstory canopy closure also ranges from 65 to 95 percent. Where nettles and snowberry are both present, nettles dominate. Scattered red elderberry and seedling or sapling ash may be found in the midstories and understories. A few old and dying Pacific willow may be found widely scattered throughout the riparian forest resource units, often in association with wetland habitats (RF 8 and W 2, W 3, W 8, W 11, and W 15).

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<sup>2</sup> "Plant association" refers to groupings of plants that are often found growing together. For example, the term "cottonwood/stinging nettle association" refers to the portions of the site that are dominated by cottonwood trees with stinging nettles on the forest floor. Different associations of plants often support different wildlife species, and may have different levels of sensitivity to development.

<sup>3</sup> "Canopy closure" in this case refers to the density of tree cover when the leaves are fully developed. The percentage can be seen as the percentage of the ground that is shaded by tree cover. A higher percentage indicates a denser forest.



**LEGEND**

**WETLAND AREAS 1-15**

- EW Emergent Wetland
- FW Forested Wetland

**FORESTED AREAS 1-10**

- RF Riparian Forest

**MEADOW AREAS**

- WM Wet Meadow
- UM Upland Meadow

**OTHER AREAS**

- B Beach
- NH Non-Habitat (Bare ground)

This map identifies natural resource units used to assess wildlife habitat. Wetland boundaries are not based on the 1987 COE methodology. For the proposed regulatory wetland boundaries, refer to Fishman, 1995.



**Figure 3**  
**Natural Areas Map**

**WEST HAYDEN ISLAND**  
**DEVELOPMENT PROGRAM**  
Goal 5 Natural Resources Inventory

In the western and west central woodlands, the plant association is primarily black cottonwood/red osier dogwood/willow (RF 1, RF 2, RF 3, and RF 5). Again, stinging nettle may be present but the understory may include several shrub species such as gooseberry, wild rose, snowberry, and alder and cottonwood seedlings. Canopy closure in this association ranges from 40 to 65 percent. The herbaceous layer is diverse and includes sword fern, miner's lettuce, galium, and buttercup among other species. In this general area also the cottonwood/snowberry association is found. Shrubs also include young red osier dogwood and cascara, red elderberry, and pacific ninebark. Herbs include, in addition to those listed for the cottonwood/dogwood/willow association, lady fern, black hawthorne seedlings, and trailing blackberry.

Pacific willow overhang at least five of the wetland units, often with scattered red elderberry and Himalayan blackberry in the shrub layer (W1, W2, W3, W5, W8) (FES wetlands 7, 16, 17, 18, 19, 20, 21). These willow provide food and resting habitat for insects that are prey species for several species of fish. Generally, there is a viable food source for salmonids and other game fish that may use these habitats during high water (for those wetlands connected during high water to the slough or Columbia) or may be able to use these habitats if they were hydrologically re-connected to the slough or Columbia River. The willows also support cavity-nesting birds.

In addition to Pacific willow associated areas, emergent wetlands also occur in more open areas along the north shore sandy hills and within meadow habitats. Reed canary grass is the dominant herbaceous plant in most of the emergent/wet meadow wetland complexes. It is likely that this plant was used to dry out pastures and stabilize the dikes built to hold out the flood flows from the Columbia River. These wetlands often are associated with disturbed vegetation; that is, reduced in quantity and quality by cattle grazing or by clearing activities around powerline rights-of-way. Herbaceous vegetation in these wetlands often includes pasture grasses and weedy species such as thistles.

Himalayan blackberry also occurs throughout the site in the more disturbed areas as a dominant shrub component, especially along the periphery of wooded areas where light is sufficient to support their growth. This plant occurs in association with both upland and wetland habitat types.

Dead wood habitat (snags or dead/downed woody debris) is generally lacking throughout the site. There is a small patch within the RF 4 habitat type that includes eleven snags. This is the greatest single concentration of snag habitat on West Hayden Island. Most of the dead wood habitat is Oregon ash and willow. Where this habitat occurs it provides security and resting areas for amphibians and reptiles and foraging areas for insect gleaning birds. Scattered within the riparian and wetland forests or wetland associated forests (RF 8) are

old "rank" Oregon ash trees. These trees have thin crowns and partially dead trunks which include cavities. The cavities provide suitable habitat for small mammals and birds and foraging opportunities for insect eaters such as the northern flicker. These trees will become future snags.

The north shore includes a narrow strip of sandy beach backed by mounded dredge material from the Columbia River. It is sparsely vegetated with weed species such as dock, plantain and various forbs. Young cottonwood trees with an understory dominated by Himalayan blackberry have colonized what are likely the older spoils. This area does provide wildlife habitat value for foraging birds, such as swallows and white-crowned sparrows as well as potential nesting areas for turtles. Raptors and insect gleaning upper canopy birds, such as warblers and chickadees, also use this area for foraging and resting.

One plant, *Artemisia lindleyana*, previously listed as rare and endangered (1979), was identified along the north shore of the site (Nelson 1919, Thompson 1927, Lev and Jennings 1986, PGE 1987). This plant is endemic to the Columbia River system and, though West Hayden Island was once one of only three known Oregon populations, its distribution is wider than previously believed according to the Nature Conservancy (1984). This plant has since been removed from the Rare and Endangered Species list.

### Wetlands

National environmental policy has identified wetlands as having important natural resource values. The wetlands on the West Hayden Island site can be associated with the following functional values, as described previously in the functional values section:

- food, water, cover and territory for wildlife;
- flood storage, conveyance and desynchronization;
- groundwater recharge and discharge;
- drainage;
- pollution, nutrient retention and removal, and;
- educational values

The island hydrology, which includes historic periodic flooding, has been modified through the construction and use of dikes and Columbia River dams. It is likely that interior island wetlands were saturated with back flow from the Columbia River and groundwater saturation resulting from Columbia waters moving through the alluvial soils. In addition, some wetlands have lost their outlet to the Columbia River and the Oregon Slough because of dredge spoil deposits along the shorelines. Some of these outlets still function in times of high water. Several wetlands are remnants of river areas that were isolated by dredge deposits.

Approximately 20.5 acres of wetland have been identified on the site by Fishman Environmental Services (FES, 1995). This estimate is based on the 1987 *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratories 1987). This manual requires that three parameters — soils, vegetation, and hydrology — be assessed when making wetland determinations. Since 1989, the federal and state agencies responsible for regulating and monitoring wetlands in this area have agreed to use this method to delineate wetlands, eliminating some of the past confusion about what is and what is not a wetland.

Earlier wetland determinations on West Hayden Island were not based on this triple parameter method. The Soil Conservation Survey (1983) identified 352 acres of hydric soils on West Hayden Island. The 1989 U.S. Fish and Wildlife Service Wetland Inventory Map shows 159 acres of wetlands on West Hayden Island. The COE estimate (1986) of 79.5 acres was based on aerial photography and ground surveys. A habitat evaluation prepared by PGE in 1985 identified 70 acres of wetlands on the eastern two-thirds of the site, and was based on pre-1987 methodologies.

In addition to a changing methodology, the hydrological regime which formed the island has been significantly altered by the dams on the Columbia River. Wetland soils and vegetation, upon which many of the pre-1987 surveys were based, may occur on some areas of the island which are no longer regularly flooded. A final determination of wetland acreage will be made based upon review of the FES report by the U. S. Army Corps of Engineers (COE) and the Division of State Lands (DSL). In general, the FES report identifies the same wetlands as identified by the City. In order to facilitate discussion, the text also refers to FES wetland identification numbers.

The wetlands described in the FES report include only interior wetland areas and do not include river banks, which often have similar functional values. River bank areas below the mean high water mark are federally regulated as jurisdictional waters of the United States. This designation applies to the portions of the site adjacent to the river and below a specified mean high water mark (Figure 4).<sup>4</sup>

National environmental policies call for the conservation of wetland resources. However, it should be emphasized that Goal 5 is intended to identify a broader range of natural resources. Consequently, resource protection or conservation under Goal 5 is not specifically limited to wetland areas as determined by the 1987 methodology. A more flexible approach is

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<sup>4</sup> The COE is currently re-evaluating the 17 foot mean high water mark elevation. The COE is also evaluating whether to include interior areas below 17 feet within the jurisdictional waters. As a result, this paragraph, and Figure 4, are subject to changes.

taken under Goal 5 rules. For example, the analysis is based on factors such as whether the natural resource is "ecologically or scientifically significant", or an open space is "needed" or a scenic area is "outstanding". The Wildlife Habitat Assessment (Smyth 1995), when considered along with economic, social, energy, and other environmental factors, plays a key role in determining the extent of areas to be protected or conserved.

The Natural Areas Map (Figure 3) identifies wetland areas discussed in the inventory (Smyth 1995). These boundaries are intended to delineate areas discussed in the wildlife habitat assessment process, and are not intended to establish the regulatory wetland boundaries (i.e., they are not based on 1987 methodology for determining regulatory wetlands). For the proposed state and federal regulatory wetland boundaries, refer to the 1995 FES report. The wetland areas shown in Figure 3 were established as part of the wildlife habitat assessment, and are based on the U. S. Fish and Wildlife Service definition of a wetland. This definition has been used by the city as a basis for wildlife habitat assessment work because it is the most inclusive. The Fish and Wildlife definition requires the presence of two of the three attributes used in the 1987 methodology: vegetation, soil, and hydrology. The use of this more inclusive definition allows greater flexibility in the Goal 5 process. The City can then make a decision, with all the necessary information, if local land use policy should be more, equal to, or less inclusive than state and federal standards. For example, in the rezoning action in the Columbia South Shore in 1987, the City chose to use the Corps of Engineers definition for regulatory purposes, although the Fish and Wildlife definition was used in the inventory.

#### Fish and Wildlife

West Hayden Island has a highly diverse set of habitats, including the palustrine and riverine wetlands, meadows and cottonwood riparian forest described above. A list of 78 breeding, resident, and migratory bird species using the site's habitats is shown in Appendix C-3 of the PGE Environmental Impact Statement (1987). Forty-two species were observed in 1995 (Smyth), including great blue heron, osprey, great horned owl, and bald eagle. Additional birds identified at the site include black-crowned night heron, green heron, hairy woodpecker, bank swallow, cormorant, redhead, teal, European wigeon, goldeneye, bufflehead, ruddy duck, hooded merganser, (Lev and Jennings 1986), and peregrine falcon (Houck, pers. comm. 1995). As of 1993, the bald eagle (*Haliaeetus leucocephalus*), and the peregrine falcon (*Falconiformes peregrinus*) are federally threatened species, and the bank swallow (*Riparia riparia*) is a sensitive species (see Table 2).

The PGE Environmental Impact Statement (1987) suggested that West Hayden Island forests contribute to the viability of the great blue heron rookery at West Delta Park. According to the *West Hayden Island Development Program: Technical Background Paper, Environmental Conditions* (FES 1994), heron rookeries are also present in the Vancouver Lake Lowlands.

Bald eagles are known to use the island to forage and rest. Observation of a bald eagle pair investigating the large cottonwood trees may indicate a potential for the site to provide future nesting habitat for these birds. (Marc Hayes and City of Portland 1995).

Although peregrine falcons are federally listed as a threatened species, they can co-exist with intensive urban development. For example, they have been seen among the office towers of downtown Portland, where they feed on pigeons.

Although there has been no documented use of West Hayden Island by tri-colored blackbirds (*Agelaius tricolor*) to date, the site does provide suitable habitat. The only known tri-colored blackbird colony in the Willamette Valley is located near Hayden Island. The site may provide foraging areas for this rare bird. The tri-colored blackbird is a state-listed sensitive and federal candidate species. The tri-colored blackbird nests in colonies associated with open water marshes. Location of tri-colored colonies is unpredictable as the birds relocate nesting areas at unknown frequencies. The local Portland colony has been located in several areas, including Smith-Bybee Lakes. In the absence of additional life history information, the colony may be attracted to smaller wetlands and possibly the riparian forest (they also use nettle patches for nesting) on West Hayden Island.

Mammals observed on the site include beaver, Townsend's mole, raccoon, eastern cottontail, and brush rabbit (PGE EIS 1987, Smyth 1995). The lush vegetation supports a small herd of black-tailed deer which forage throughout the undeveloped portions of the site. According to Lev and Jennings (1986), and the Environmental Impact Statement prepared for the previous PGE proposal for the site (1987), as many as 38 species of mammals are likely to occur on West Hayden Island.

Several amphibian and reptile species occur on the island, including long-toed salamander, bullfrog, Pacific chorus frog, common garter snake and painted turtle (Smyth 1995, FES 1995). Evidence of breeding was found during the 1995 surveys for long-toed salamander (larva and sub-adults), Pacific chorus frog (egg masses, tadpoles, and sub-adults), and common garter snake (adults and juveniles). Suitable nesting habitat exists for painted turtle, a state sensitive species, in the dredge spoils on the northern and southern shorelines, and perhaps the sandy soils within the interior island. Wetland 8 (FES 7) may also

provide foraging habitat. Generally, painted turtle habitat on the island is limited, though it could be enhanced (Smyth 1995, Hayes, pers comm, 1995).

Previous reports (PGE 1987) mistakenly identified red-legged frog as occurring on the site. Although red-legged frogs (state sensitive) have not been observed on West Hayden Island, marginally suitable breeding and rearing habitat for this species exists in and around one wetland unit (W 14, FES 11). Wetlands 2, 3, and 7 (FES 19, 18, 10), if reconnected to the slough, would also be suitable due to the surrounding forests. It is possible that red-legged frogs could re-colonize (or be re-introduced to) suitable habitat on West Hayden Island if that habitat were enhanced (Smyth 1995, Hayes, pers comm, 1995). In general, the diversity of aquatic and terrestrial insects on the site provide a plentiful prey base for amphibians and reptiles as well as insect gleaning birds such as downy woodpeckers and warblers. The diversity of insect life on West Hayden Island is supported by the presence of wetlands and dense riparian forest on the site.

Several species of Lepidoptera (butterflies and moths) were also observed on West Hayden Island, mostly within the upland meadow habitat. These include cabbage and western whites, satyr anglewing, painted lady, red admiral, mylitta crescent, and spring azure butterflies, plus several unknown species of moth. Several wetland areas showed a high diversity of invertebrate life, including such species as mayflies, odanata (dragon and damsel flies), daphnia, scud, water beetles, water boatman, chironomids, and water striders. As stated above, these invertebrate species provide a prey base for amphibians, reptiles, fish, and birds. Chironomids have been shown to be a preferred and, therefore, important food item for rearing chinook salmon.

The 1987 PGE EIS estimated that 50 to 100 million juvenile migratory fish species, and an equal number of juvenile shad, pass West Hayden Island each year. More than one million adult salmon and steelhead return to the Columbia River annually according to the report. Historically the island likely served as an overwintering and resting area for migrating salmon and as potential rearing areas for local populations of salmonids. About 50 different fish species have been identified adjacent to the site in the Columbia River and Oregon Slough. Bluegill, carp and three-spine stickleback were recently observed in wetlands on the site.

The significance of this resource site for fish is emphasized by Lev and Jennings (1986): "The geographic and hydrologic location of Hayden Island is an area of unparalleled importance to Columbia River salmon and steelhead fish...the entire Columbia River anadromous fishery must pass this site during juvenile and adult migrations." Fishman stated: "The fine-grained sediments around West Hayden Island support populations of amphipods..., clams and aquatic fly larvae.... These animals represent a food resource for fish, including juvenile salmonids, sturgeon and other species." (1995)

Juvenile salmon have been observed in the Oregon Slough (Hafele, pers comm, 1995).

The National Marine Fisheries Service (NMFS) has listed Columbia River sockeye and spring/summer and fall chinook salmon as endangered under the Endangered Species Act, as amended in 1973. Consequently, the entire Columbia River mainstem was designated critical habitat, including the habitat around West Hayden Island. Emphasis is being placed on restoring the freshwater portion of the chinook ecosystem and part of this restoration effort will require protection and restoration of rearing habitats in the Columbia River estuary. Research indicates that a key component of chinook habitat is off-channel rearing areas. Restoration of this habitat is an important factor in rebuilding the productive life-history structure and maintaining the adaptive capacity of the species (Bakke and Smyth, 1995). Thus, habitat provided by West Hayden Island, including the small backwater wetlands, is important, and may be more important as the NMFS develops a recovery plan for these fish (Smyth 1995). The proposed marine facility use for this site can have significant adverse impacts on fisheries (including protected fish stocks). Whereas the resource site generally extends to the island's shoreline, the Goal 5 impact area includes the Columbia River and Oregon Slough.

Table 2 shows the regulatory status of state and federally protected species observed on West Hayden Island. Two other species (the red legged frog and the tricolored blackbird) are also included because they have been observed on similar habitat in the vicinity of West Hayden Island, and the West Hayden Island site provides suitable habitat which could be utilized by those species in the future, particularly if that habitat is enhanced.

Table 2. State and Federally Protected Species Discussed in Inventory Text

Scientific name	Common Name	Federal Status	State Status	Observed on West Hayden Island	Suitable Habitat on West Hayden Island
<i>Haliaeetus leucocephalus</i>	bald eagle	threatened		yes	yes
<i>Falconiformes peregrinus</i>	peregrine falcon	threatened		yes	yes
<i>Riparia riparia</i>	bank swallow		sensitive	yes	yes
<i>Chrysemys picta</i>	painted turtle		sensitive	yes	yes
<i>Agelaius tricolor</i>	tricolored blackbird	candidate	sensitive	no	possibly
<i>Rana aurora</i>	red-legged frog		sensitive	no	marginal
<i>Oncorhynchus nerka</i>	natural sockeye salmon runs	endangered		Columbia River designated as critical habitat	
<i>Oncorhynchus tshawytscha</i>	natural spring, summer, and fall chinook salmon runs	endangered		Columbia River designated as critical habitat	
<i>Oncorhynchus kisutch</i>	natural coho salmon runs	decision in progress			

### Composite Wildlife Habitat Rating

The composite rating box below (Table 3) presents the West Hayden Island habitat scores in a format consistent with other Goal 5 inventories conducted by the City of Portland. A more specific explanation of the scoring system can be found in the Discussion Format section of this inventory. Other Goal 5 inventories have utilized this same numerically-based scoring system, and have included a similar composite score box. The ratings are based on habitat assessment forms that were completed during field observations on the site.

Wildlife Habitat Assessment Forms were completed for each resource unit within the resource site as shown in Figure 3, and for the site as a whole (Smyth 1995). Table 3 summarizes the resulting range of scores. The Wildlife Habitat Assessment (WHA) process analyzes physical environments for characteristics which wildlife have known preferences. The WHA form is used to rate habitat values numerically for comparison purposes based on the presence and availability of three basic elements: food, water, and cover. The presence of specific flora and fauna is noted on the data forms. Each location is

also rated for its uniqueness, level of disturbance, and interspersions with other natural areas. All other Goal 5/natural resource areas in the City of Portland have also received WHA ratings. These data forms are located in the project file at the Portland Planning Bureau. The site as a whole received a score of 95. Earlier preliminary assessments, completed as part of the *Columbia Corridor Inventory of Wetland Bodies and Wildlife Habitat Areas*, gave the site a similar score of 99 (Bureau of Planning, 1986).

**Table 3. Composite Wildlife Habitat Rating  
(Entire West Hayden Island Site):**

<b>Range of Habitat Scores:</b>	<b>9 - 95</b>
Water	: High
Food	: High
Cover	: Moderately High
Interspersion	: High
Uniqueness	: High
Disturbance	: Medium

Riparian forest (RF) resources with the highest values were those that contained well-defined development in all three vegetative layers: tree, shrub, and herb. RF 10 (Figure 3) received the highest habitat ranking (Smyth 1995). RF 6 had the lowest value because the understory was almost completely lacking due to cattle grazing. In most areas small wetland pockets are present providing additional habitat diversity within the forested areas.

The wetlands with the highest scored values are W 8, W 7, and W 4 (FES wetlands 7, 9, 10, 15) (identified on Figure 3) (Smyth 1995). W 4 (FES wetland 15) is an emergent wetland with a sustained open water component. It is hydrologically connected to the Columbia River. W 7 (FES wetlands 9 & 10) is located along the PGE powerline right of way. This wetland is highly disturbed by cattle grazing and tromping, and yet it continues to support a high diversity of aquatic life. W 8 (FES wetland 7) is an isolated emergent wetland/forest wetland complex that appears to be located in an historic natural slough in the center of the island. It is likely that W 8 (FES wetland 7) was once connected to the Oregon Slough. W 8 (FES wetland 7) is an extremely important area for breeding and rearing herpetofauna. Because the site holds water into the summer months, it is used by nesting waterfowl to rear their young. A great blue heron was observed in the area in July 1995.

Table 4 ranks the wetland and riparian forest resource units according to the score they received in the Habitat Assessment.

**Table 4. Relative Habitat Value of West Hayden Island Resource Units**

<b>Wetland Resource Units</b>	<b>Riparian Forest Resource Units</b>
<u>Top Third</u> W 8 (FES 7) W 7 (FES 9, 10) W 4 (FES 15) W 1 (FES 20, 21) W 5 (FES 16, 17)	<u>Top Third</u> RF 10 RF 5 RF 9
<u>Middle Third</u> W 2 (FES 19) W 11 (FES not included) W 14 (FES 11) W 15 (FES 5) W 3 (FES 18)	<u>Middle Third</u> RF 8 RF 1 RF 3 RF 2
<u>Lower Third</u> W 6 (FES 12, 13, 14) W 9 (FES 6) W 12 (FES 2) W 13 (FES 1) W 10 (FES 3, 4)	<u>Lower Third</u> RF 7 RF 4 RF 6

"Resource units" refer to sub units of the site, as shown on Figure 3. The ranking has been divided into three categories, "top third", "middle third", and "lower third" to facilitate later discussion. This ranking is relative only to West Hayden Island resources. A resource unit identified in the "lower third" category on this table is not necessarily a low-valued resource relative to Goal 5 sites elsewhere in the City. Resource units in this table are shown in ranked order. The division of this ranking into thirds is recognized as an arbitrary distinction, and is intended to only to facilitate discussion later in the ESEE process. Levels of protection for each resource unit will not be based on a distinction between "top third" and "middle third" resources. Resource protection decisions will be the result of a more complex process weighing the relative habitat value of a resource with other possible values (economic, social, energy).

In 1985, PGE conducted a habitat evaluation on West Hayden Island. Of the ten evaluation species selected as part of the *West Hayden Island Habitat Evaluation* (PGE), the site was found to provide highly suitable or optimum habitat for eight species. These species were great blue heron, red-tailed hawk, yellow warbler, common yellowthroat, American goldfinch, brush rabbit, Townsend's vole, and Pacific chorus frog.

The West Hayden Island site is an important one for providing breeding, foraging, and migratory habitat for a high diversity of animal species. The

dominant forest, meadow, and wetland habitats also provide a dispersal area for bird, amphibians, and mammals. Although the flood cycle has been highly altered by the use of dikes and dams, this island is significant in its place in the lower Columbia River ecosystem complex. The plant communities are typical of what was found historically in the area. Some species, such as the yellow-billed cuckoo, have been permanently displaced from the region. The remaining habitat on West Hayden Island provides an opportunity to reintroduce this species. The island also provides an important stop-over area for mammals, amphibians, and birds as they move from the mainland habitats in Oregon to those in Washington and vice versa. Little of this habitat remains within Multnomah County compared to pre-European settlement.

In addition to the vegetation, wetland and habitat resources described above, West Hayden Island contains additional natural resources addressed under Goal 5 such as soils, groundwater, and scenic amenities. Soils are a variety of silt loams and sands, occurring either naturally or as a result of dredge spoils deposition. More precisely, the soils are Faloma, Rafton and Sauvie silt loams, Pitchuck sands, with Moag soil inclusions. The silt loams are generally located in the central and southern parts of the site, while the sands are found along the Columbia River, at the west end of the island, and in the vicinity of the original beach along the Oregon Slough. All of these soils have severe limitations for urban uses due to flooding and a seasonal high water table (Mult. Co. Soil Survey 1983). Groundwater seeps through the site's loosely consolidated alluvial material to form a shallow water table under the island. Groundwater resources are of good quality and quantity, and are generally undifferentiated across the site. Scenic resources include an identified scenic corridor (the Columbia River) and a scenic viewpoint on (east) Hayden Island. Since West Hayden Island was not part of the City when the original *Scenic Resources Protection Plan* was developed, a scenic inventory is warranted.

### **Significance Findings**

The location of the West Hayden Island resource site is significant for several reasons. The site is an island located on the Columbia River and (mostly) within the Columbia River floodplain. The metro area contains only four major islands: Hayden Island, Ross Island, Sauvie Island, and Government Island. The riparian forest on West Hayden Island is among the largest fragments of cottonwood riparian forest area found on any of these islands. West Hayden Island's location at the confluence of the Columbia and Willamette rivers places it as an important landmark frequently used as a stop-over site by migratory birds and waterfowl. The island is positioned as an important stepping stone for wildlife moving across and along the Columbia River between Smith and Bybee Lakes, Columbia Slough, Delta Park, Government Island, Vancouver Lake, and Sauvie Island.

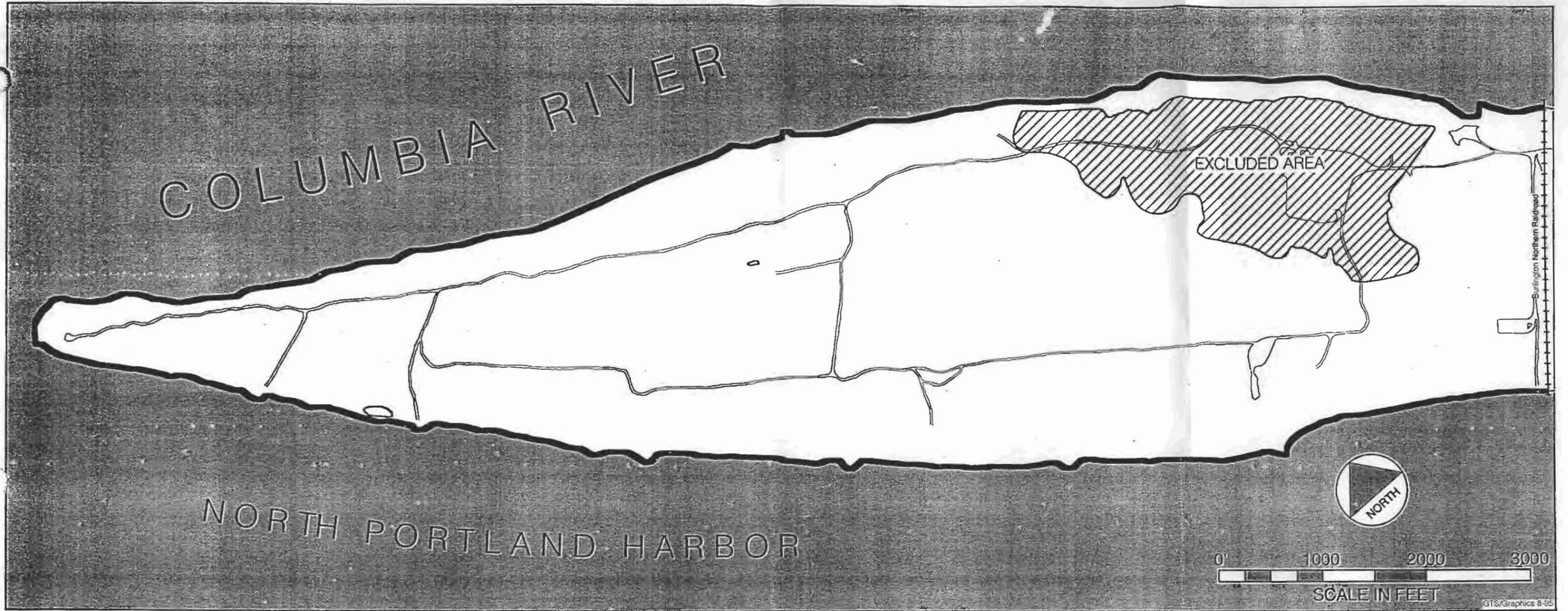
The quantity of West Hayden Island resources is also significant. West Hayden Island is about 750 acres in size. Ross Island is about one-fifth that size at 150 acres (and perhaps one-eighth of Hayden Island's overall size). The site's size dwarfs many other islands on the lower Columbia and Willamette rivers, including Sand Island, Lady Island, McGuire Island, and Lemon Island. Regionally, only Government and Sauvie islands are of larger size. The site also contains significant quantity (roughly 451 acres) of Columbia River cottonwood-ash riparian forest. Few local natural areas, let alone islands, contain such a large contiguous area of this classic riparian forest community. Ross Island, together with adjacent Hard Tack Island and Oaks Bottom comprise approximately 450 acres total, not all of which is forested. About half of Sauvie Island is in agricultural use. It is uncertain how many acres of the cottonwood vegetation community remains on Sauvie Island (a vegetation inventory is in progress). There are approximately 12,000 acres of protected land (all habitat types) on Sauvie Island, primarily on the northern end of the island. Much of this area is dominated by the ash/ willow vegetation community, as well as non-forested wetlands. Willow Bar (about 100 acres) is one of the more significant cottonwood communities on Sauvie Island. According to officials of the Oregon State Department of Fish and Wildlife stationed on Sauvie Island, any opportunity to protect riparian cottonwood forests is significant. In 1976, the COE estimated that there were approximately 11,500 acres of cottonwood habitat between river mile 12 and river mile 145 of the Columbia River (between Astoria and the Bonneville Dam). West Hayden Island represents an estimated 4 percent of that habitat (this figure may be likely to increase with updated acreage estimates).

The quality of West Hayden Island resources is generally significant but varies, in part, with the type of resource. The site overall is the second highest quality habitat area in the Columbia Corridor and one of the highest within the City of Portland. Two state-listed sensitive wildlife species and two federally threatened species have been observed at the site (Table 2). In addition, the site is considered critical habitat for two federally threatened natural salmon runs. A third salmon run may be listed in the near future. There are also several sensitive species that are known to occur in the vicinity of West Hayden Island, but have not been documented on the site.

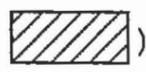
The site contains high habitat diversity, both in terms of habitat structure and habitat type (e.g., palustrine and riverine wetlands, upland meadows and riparian forests). Natural vegetation communities are generally well-developed, in good health, and relatively characteristic of early Lower Columbia floodplain forests. Wetlands are distributed across the site and vary in type, habitat value, and water quality. A portion of the site lies below the high water elevation of the Columbia River; these river bank areas are jurisdictional waters of the U.S. (nationally recognized as providing important values).

One area of the site, totaling about 100 acres in the northeast quadrant, was not found to contain significant resource quality as part of the City's preliminary inventory review. Among other factors, habitat assessment scores are consistently below 30, mitigating (or contributing) factors are generally absent, the area provides limited connection or buffer to adjoining habitats, and no significant plant or animal communities or species are present. This area is shown as "excluded area" on Figure 5.

The balance of the West Hayden Island site contains significant resource location, quantity, and quality warranting inclusion on the City's Goal 5 inventory. The total area of significant Goal 5 resources is approximately 650 acres.



LEGEND

 Area of Goal 5 Inventory (Excludes )



**Figure 5**  
**Site 146**

WEST HAYDEN ISLAND  
DEVELOPMENT PROGRAM  
Goal 5 Natural Resources Inventory

November 1995

Portland Bureau of Planning

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## CHAPTER 4 IDENTIFICATION OF IMPACT AREA

### INTRODUCTION

The administrative rule for State Goal 5 instructs local jurisdictions to identify the resource and the area of impact. In Chapter 3 of this report, the natural resources of West Hayden Island were identified. This chapter identifies the impact area. For purposes of Goal 5, the impact area is defined as the geographic area within which conflicting uses could adversely affect a significant Goal 5 resource.

### IDENTIFICATION OF THE WEST HAYDEN ISLAND IMPACT AREA

The most substantial impacts to natural resources on West Hayden Island will be from conflicting uses located directly within that site. Resources on West Hayden Island could also be impacted by off-site conflicting uses which have large impacts on Columbia River hydrology. For example, the construction of large dams and other flood control devices have substantially altered seasonal flooding within the Columbia River, with an impact on riverine ecosystems such as West Hayden Island. Historically, dredging in the Columbia River has also had a substantial impact on resources on West Hayden Island. Large portions of what is now Hayden Island was formed as dredge material was deposited around the original island. For instance, much of the northern shore of the island is composed primarily of relatively recent dredge material. It is beyond the scope of this report to regulate activities elsewhere along the Columbia River system.

An impact area analysis, however, must recognize that the West Hayden Island site exists within the context of the larger Columbia River system. Accordingly, some portions of the ESEE will discuss the impacts of conflicting uses on the larger Columbia River system. For example, the impact of marine terminal development on salmon migration will be discussed. Analysis of these system-wide impacts will be necessarily generalized as no complete system-wide environmental analysis of the Lower Columbia River system has been completed. Large scale marine terminal development on West Hayden Island (discussed in Chapter 5) will require a more detailed Environmental Impact Study (EIS). This report will present these system-wide impacts in a summary fashion, relying on a more detailed EIS process to determine the specific level of off-site impacts.

For the purposes of this analysis, the impact area encompasses the West Hayden Island site and the surrounding waters of the Columbia River and Oregon Slough, to the midpoint of both channels. The impact area extends downstream from the Burlington Northern Railroad bridge to the western tip of West Hayden Island.

## CHAPTER 5 IDENTIFICATION OF CONFLICTING USES

### INTRODUCTION

Once a resource is found to be significant, existing and potential uses which may conflict with the preservation of that resource must be identified. As a component of Goal 5 natural resource planning, local governments must identify conflicting uses within inventoried Goal 5 resource areas. The Goal 5 administrative rule defines a conflicting use as one that, if allowed, could negatively impact a significant resource site. This discussion identifies existing and potential conflicting land uses on West Hayden Island (West Hayden Island). Because West Hayden Island has not yet been zoned by the City of Portland, this discussion covers both the specific marine terminal proposal for West Hayden Island, as well as other possible conflicting uses based on existing Multnomah County zoning, and the most likely City of Portland zoning designations. Marine terminal development, as described in the *West Hayden Island Development Program*, represents the most likely conflicting land use for this resource site.

The Goal 5 administrative rule directs local governments to examine the uses allowed within broad zoning categories (e.g., agricultural, industrial, residential, commercial, institutional, etc.). For the purposes of this plan, a range of possible zoning designations have been identified.

### EXISTING CONFLICTING USES

#### Agricultural Uses

Agriculture is the existing land use on much of West Hayden Island. Cattle have been grazing on the site for a considerable period of time. The island was used as a dairy for the Hudson Bay Company as early as 1820 (Minor and Chappel, 1994). Agricultural uses are allowed by right in the existing County multiple use forest (MUF-19) zoning, and the following City of Portland zones: Industrial, Residential Farm/Forest, and Open Space.

State Goal 3 insures that adequate agricultural land exists outside the urban growth boundary (UGB). Land within the UGB is intended primarily for urban uses. Given that policy framework, existing agricultural uses within the UGB will eventually be replaced by more urban uses. In addition:

- Soils on West Hayden Island are classified as low yield agricultural class 6, suitable primarily for pasture, range, woodland, or wildlife habitat (Multnomah County, 1982).

- Most of the soils on West Hayden Island are rated unsuitable for commercial forest use, due to low fertility, periodic flooding, and extremely dry soil conditions in the summer. The site is highly suitable for black cottonwood, willow, and Oregon ash. The commercial value of these species is low. Existing forest stands on West Hayden Island are not being managed for forest production because the costs of managing the site for forest products far exceed the potential returns (Multnomah County, 1982).

Based on these factors, and on the findings in the Metro Urban Growth Boundary decision (Appendix B), it is unlikely that new agricultural uses would be approved on West Hayden Island.

### **Rail Lines, Utility Corridors, and Dredge Disposal Site**

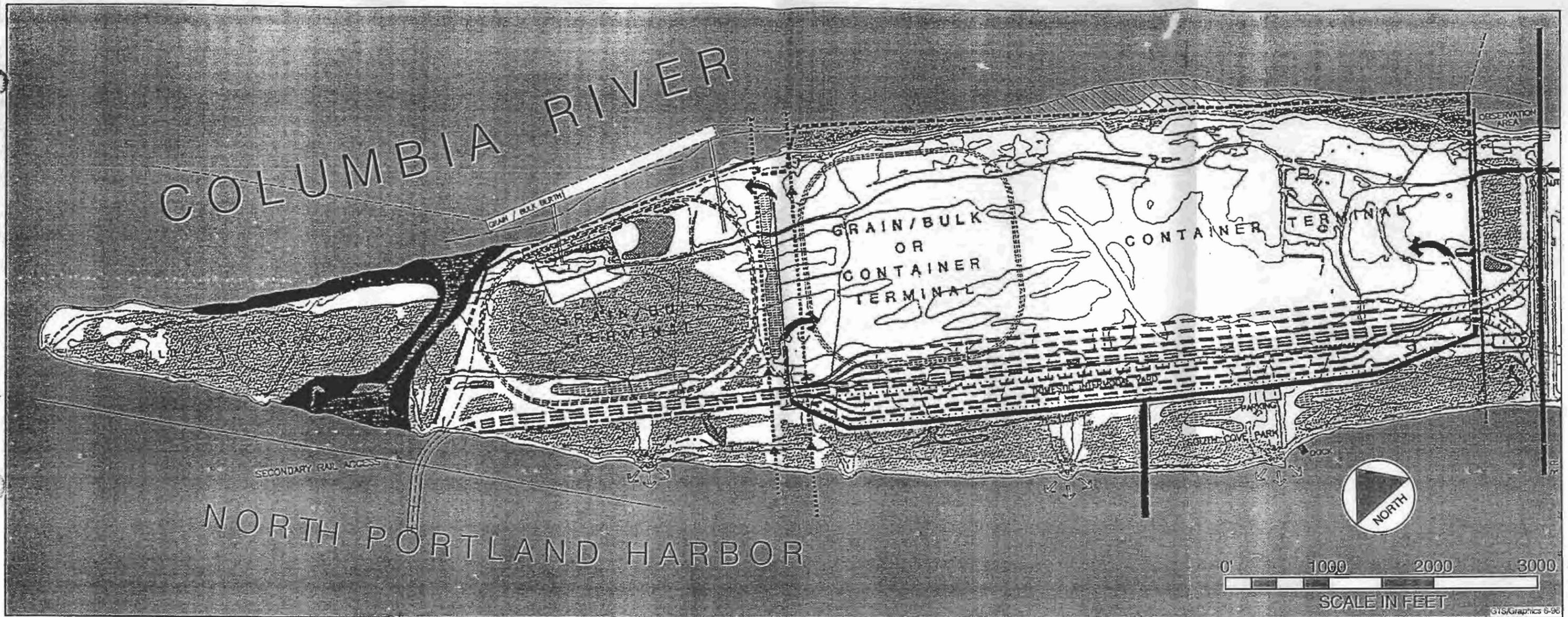
Utility and railroad corridors are an existing conflicting use on West Hayden Island. A City of Portland sewer outfall pipe currently passes through the eastern side of the site. PGE maintains a substation located just west of the Burlington Northern Railroad. Two power transmission lines, one owned by the Bonneville Power Administration (BPA), the other by Pacific Power and Light (PP&L) cross the central portion of the property on a southwest-to-northeast axis. The Burlington Northern mainline railroad forms the eastern boundary of the site. Portions of the site have also been used to deposit dredge materials from the Columbia River as part of ongoing channel maintenance activities. Most basic utilities are allowed by right in Industrial zones and with conditional use approval in Open Space and Residential Farm/Forestry zones.

### **PROPOSED MARINE TERMINAL USES**

The Port of Portland's marine terminal development criteria require that the proposed facility have the capacity to accommodate a general container terminal, an auto terminal, a dry bulk terminal, a grain terminal, and an inter-modal yard for transferring loads to trucks and rail. Storm water retention and cleanup facilities, and other on-site environmental mitigation will also be required by federal and state environmental regulations. The proposed alternatives also include open space/recreation areas and wildlife habitat areas (Port of Portland, 1995). The Port will use the *West Hayden Island Development Program* as a guide to future development. The Port intends to prepare more detailed design and construction plans as specific users are identified. Figure 6 shows the recommended development plan (as of 10/12/95).

### **Container Terminal**

The proposed general container terminal serves to connect large cargo ships with rail and trucks. The container facility must include docking berths in the form of fixed wharves, a paved yard for container storage, truck access, rail



**LEGEND**

- |   |                                     |
|---|-------------------------------------|
| — — — — — Development Boundary                    | ≡ ≡ ≡ International Intermodal Yard |
| - - - - - Marginal Wharfline                      | — — — — — Road                      |
| ==== Rail Storage Yard                            | ▨ Retained Forest Areas             |
| ..... Existing Power Lines                        | ▧ Shoreline Excavation              |
| ..... Relocated Power Lines                       | ▩ Retained Wetlands                 |
| — — — — — Rail Tracks                             | ▩ New Wetland/Channel               |
| — — — — — Shallow Water Habitat Limit (-20' NGVD) | ↩ Terminal Access                   |
| — — — — — Ordinary High Water (+17' NGVD)         | — — — — — Unpaved Trail             |
| ▲ Transmission Towers                             |                                     |
| ▭ Stormwater Polishing Pond                       |                                     |
| ⊙ Viewpoint                                       |                                     |



**Figure 6**  
**Port of Portland**  
**Recommended Plan**

WEST HAYDEN ISLAND  
 DEVELOPMENT PROGRAM  
 Goal 5 Natural Resources Inventory

mainline track, and as a result must be 8,800 feet long. To operate efficiently, the rail spur should have as few curves as possible. According to Port staff, the ability of West Hayden Island to accommodate a rail spur is among the primary reasons for choosing the site. Rail access is a critical component of the marine terminal proposal, as regional freight transportation is becoming more reliant on rail. There is also a growing demand to utilize the mainline track for passenger rail services. The ability to pull entire trains off the mainline track minimizes disruption to mainline rail traffic.

### **Environmental Mitigation**

The current development proposal includes new wetlands and storm water retention/cleanup basins.

### **Recreational Uses Associated with Marine Terminal Development**

Current proposals provide for recreational uses on some undeveloped portions of the site. To limit impacts on natural resources and discourage conflicts with marine terminal operations the most likely form of recreation would be passive or informal recreation, such as a hiking trail. Current proposals also include a small facility for recreational boaters.

### **Phasing**

The Port of Portland has proposed that development occur on West Hayden Island in three phases (Figure 7). The first phase includes development of the rail spur, a grain/bulk facility, the first stage of recreational improvements, and a new wetland channel for mitigation purposes. The second phase includes expanded road access, a new bridge across the Oregon Slough, a container terminal on the eastern portion of the site, and expanded recreational facilities. The third phase could be either an enlargement of the container terminal, or a second grain/bulk facility, and possibly a new rail bridge across the Oregon Slough.

### **SPECIFIC RESOURCE CONFLICTS ASSOCIATED WITH PROPOSED MARINE TERMINAL DEVELOPMENT**

To facilitate this discussion it is useful to consider the extent to which identified natural resources conflict with proposed marine terminal development. Tables 5 and 6 show the elements of the proposed marine terminal development which conflict with each forest and wetland resource within the study area. Table 5 and 6 refer to "resource units," which correspond to individual natural resources within the West Hayden Island site, as identified in the Natural Resources Inventory (see Figure 3). Resource units correspond to the 10 riparian forest units (RF) and 15 wetland units (W) as identified in the inventory (Wetlands identified by Fishman Environmental Services are labeled FES). Identified conflicts are based on the *West Hayden Island Development Program*.

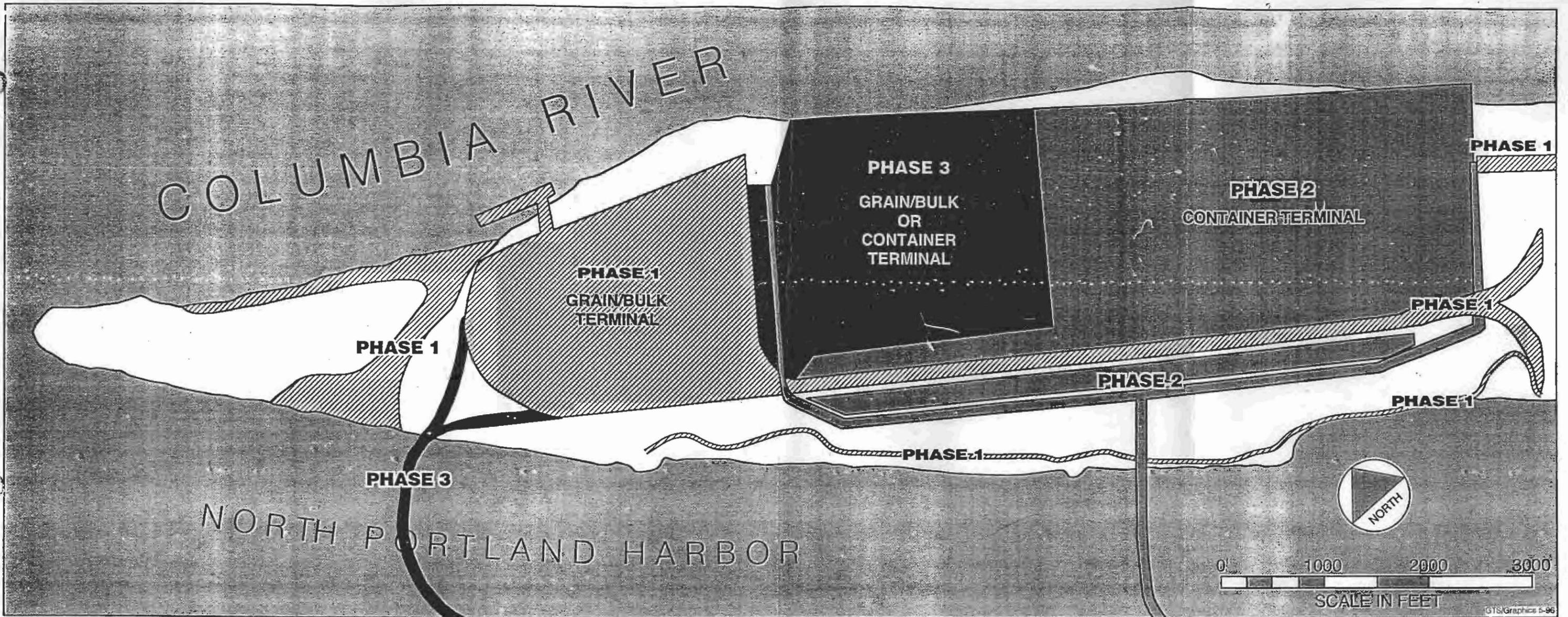
access and support facilities. The facility must accommodate a variety of large equipment used to carry and load cargo. A gatehouse complex must allow for truck cues and processing, and include a building for administrative personnel. The design must also include a maintenance and repair building, and other warehouse facilities, as well as additional space for container storage, equipment washing, refrigeration facilities, and space for employee facilities. All of the alternatives must also accommodate auto import facilities (unloading, storage, and potential processing). An auto processing center, if built, must include space to add final accessories to automobiles, car wash facilities, and administrative/employee facilities. The Port has used a design depth of approximately 1,500 feet (from the wharf line to the back of the terminal area). The width of the terminal is a function of the number of berths (i.e. the number of ships to be accommodated), with 1000 feet being the minimum berth for planning purposes.

### **Grain/Bulk Terminal**

Grain/bulk facilities must include storage space for bulk goods, grain, and other non-containerized commodities. Rail access is also an important component, provided by a loop track. Grain/Bulk storage areas and handling equipment must be washed between uses, requiring that extensive drainage and water treatment be accommodated. To assure proper environmental control of storm water and wash water, mineral bulk facilities typically have limited pervious surfaces. Large loading cranes and conveyor belts will be used to load and unload bulk goods. Grain elevators have typically not required the full development of the interior of the rail loop, although this may be changing. Mineral bulk facilities require more extensive on-site storage and handling. Development on West Hayden Island may include a mineral bulk terminal, a grain terminal, or both. The rail footprint of both the grain terminal and mineral bulk facilities can be firmly established. The current *West Hayden Island Development Program* indicates that existing forest resources within the proposed grain terminal will remain. The location of grain and/or mineral bulk terminals is constrained by adjacent power transmission lines. Some storage, rail and cargo movement, and storm water management may be possible beneath the transmission lines, but more active terminal activities (i.e. structures, loading, dock development, conveyor belts) cannot be accommodated.

### **Rail Infrastructure and Inter-modal Yards**

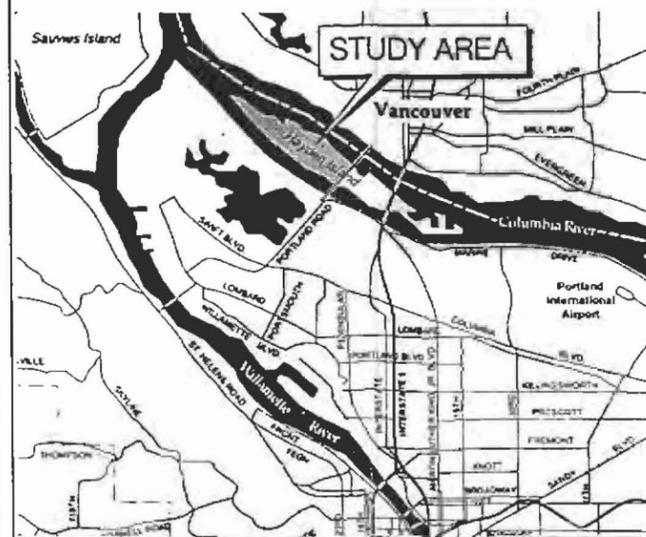
A critical component of development on West Hayden Island is a rail spur from the mainline Burlington Northern track, serving an inter-modal loading yard. This facility must allow for equipment to load and unload trains and trucks. Two new bridges across the Oregon Slough have also been proposed to facilitate truck and train movements. One bridge would serve trucks and allow auto access, while a second (optional) bridge would facilitate rail movement. A rail spur must allow for a full train to pull off the



**LEGEND**

-  PHASE 1
-  PHASE 2
-  PHASE 3

**VICINITY MAP**



**Figure 7  
Phasing Plan**

**WEST HAYDEN ISLAND  
DEVELOPMENT PROGRAM**  
Goal 5 Natural Resources Inventory

Table 5. West Hayden Island Development Program: Wetland Resource Conflicts (1 of 3 pages)

Resource Unit (see Fig. 3)	Wetland #1 (FES 20)	Wetland #2 (FES 19)	Wetland #3 (FES 18)	Wetland #4 (FES 15) Benson Pond	Wetland #5a (FES 16)	Wetland #5b (FES 17)	Wetland #6a (FES 14)	Wetland #6b (FES 13)	Wetland #6c (FES 12)
Resource Type	emergent forested	open water/ forested	emergent forested	open water	emergent forested	forested	emergent	emergent	emergent
Direct Conflicts with Proposed Marine Terminal Facilities	no direct conflict, resource retained	secondary rail bridge grain/bulk terminal rail loop	secondary rail bridge rail access	grain/bulk terminal rail loop	rail access	no direct conflict, resource retained	grain/bulk terminal container terminal existing utilities stormwater pond	container terminal or second grain/bulk terminal	container terminal or second grain/bulk terminal
Indirect Conflicts with Proposed Marine Terminal Facilities	new wetland channel construction, maintenance boaters drawn to remaining natural areas (increased human presence, litter, dogs, noise) adjacent wet meadow eliminated (new channel)	increased exposure to elements (wind and light) due to opening up adjacent forest canopy	increased exposure to elements (wind and light) due to opening up adjacent forest canopy	light & noise from adjacent rail and port facilities	increased exposure to elements (wind and light) due to opening up adjacent forest canopy recreational trail users and boaters (increased human presence, litter, dogs, noise)	recreational trail users and boaters (increased human presence, litter, dogs, noise)	resource isolated by surrounding development (decreased habitat value) increased litter microclimate changes	resource lost with current development program	resource lost with current development program
Acres	0.95	0.68	0.40	3.64	1.12	0.32	3.13	0.29	1.71
Acres Retained	0.95	1.06	0.30	3.00	0.80	0.32	0.70*	0*	0*

\* These resources may be partially retained if phase three of the proposed marine terminal development occurs as a grain terminal rather than an extension of the proposed container terminal.

Table 5. West Hayden Island Development Program: Wetland Resource Conflicts (2 of 3 pages)

Resource Unit (see Fig. 3)	Wetland #7 (FES 9)	Wetland #7 (FES 10)	Wetland #8 (FES 7)	Wetland #9 (FES 6)	Wetland #10 (FES 3)	Wetland #10 (FES 4)	Wetland #11	Wetland #12 (FES 2)	Wetland #13 (FES 1)
Resource Type	open water/emergent	emergent forested	emergent	forested	open water	emergent	forested	emergent	emergent
Direct Conflicts with Proposed Marine Terminal Facilities	intermodal yard	intermodal yard access road	container terminal or second grain/bulk terminal	container terminal	container terminal	container terminal	no direct conflict, resource retained	Access road	no direct conflict, resource retained
Indirect Conflicts with Proposed Marine Terminal Facilities	resource lost with current development program	increased exposure to elements (wind and light) due to opening up adjacent forest canopy  recreational trail users (increased human presence, litter, dogs, noise)	resource lost with current development program	resource lost with current development program	resource lost with current development program	resource lost with current development program	recreational trail users (increased human presence, litter, dogs, noise)	resource lost with current development program	increased human presence, litter, dogs, noise  potential microclimate changes
Acres	0.98	1.46	1.09	0.20	0.07	1.89	3.50	0.48	0.47
Acres Retained	0	0.50	0	0	0	0	3.50	0	0.47

Table 5. West Hayden Island Development Program: Wetland Resource Conflicts (3 of 3 pages)

Resource Unit (see Fig. 3)	Wetland #14 (FES 11)	Wetland #15 (FES 5)	Wetland FES 8
Resource Type	forested	forested	emergent
Direct Conflicts with Proposed Marine Terminal Facilities	no direct conflict, resource retained	intermodal yard container terminal	container terminal or second grain/bulk terminal
Indirect Conflicts with Proposed Marine Terminal Facilities	recreational trail users and boaters (increased human presence, litter, dogs, noise)	resource lost with current development program	resource lost with current development program
Acres	0.46	0.02	0.07
Acres Retained	0.46	0	0

Table 6. West Hayden Island Development Program: Riparian Forest Resource Conflicts (1 of 2 pages)

Resource Unit (see Fig. 3)	Riparian Forest #1	Riparian Forest #2	Riparian Forest #3 (west unit)	Riparian Forest #3 and meadow (north shore)	Riparian Forest #3 (central unit, under utility lines)	Riparian Forest #4	Riparian Forest #5 (unit south of Wetland #4)	Riparian Forest #5 (central unit)	Riparian Forest #6
<b>Direct Conflicts with Proposed Marine Terminal Facilities</b>	no direct conflict, resource retained	no direct conflict, resource retained	grain/bulk terminal and rail loop  new wetland channel	grain/bulk terminal rail loop(s)  container terminal  storm water pond  access road	container terminal or second grain/bulk terminal  storm water pond  access road	grain/bulk terminal and rail loop	grain/bulk terminal and rail loop	container terminal or second grain/bulk terminal	container terminal intermodal yard  rail access
<b>Indirect Conflicts with Proposed Marine Terminal Facilities</b>	recreational boaters drawn to remaining natural areas (increased human presence, litter, dogs, noise)	recreational boaters drawn to remaining natural areas (increased human presence, litter, dogs, noise)	potential maintenance activities associated with new wetland channel  recreational boaters drawn to remaining natural areas (increased human presence, litter, dogs, noise)	resource lost with current development program	resource lost with current development program	resource isolated by surrounding development (decreased habitat value)  increased human presence, litter, noise	resource isolated by surrounding development (decreased habitat value)  increased human presence, litter, noise	resource lost with current development program	resource lost with current development program
<b>Acres</b>	9	21	50	19	16	5	37	10	29
<b>Acres Retained</b>	9	21	26	0	0	3	20	0	0

Table 6. West Hayden Island Development Program: Riparian Forest Resource Conflicts (2 of 2 pages)

Resource Unit (see Fig. 3)	Riparian Forest #7 (unit near wetland #6)	Riparian Forest #7 (east unit)	Riparian Forest #8 (west unit)	Riparian Forest #8 (east unit)	Riparian Forest #9 (small unit south of wetland #1)	Riparian Forest #9 (central south unit)	Riparian Forest #9 (unit around wetland #14)	Riparian Forest #10	Impacts common to all remaining forest areas
Direct Conflicts with Proposed Marine Terminal Facilities	container terminal	container terminal access road	grain/bulk terminal and rail loop  rail access  secondary rail bridge	access road  stormwater pond	new wetland channel	access road  intermodal yard	rail access	container terminal or second grain/bulk terminal  intermodal yard	introduction of non-native species (birds, animals, plants) due to human activity and forest clearing  forest fragments subject to increased exposure to elements (wind and light) due to opening up forest canopy
Indirect Conflicts with Proposed Marine Terminal Facilities	resource lost with current development program	resource isolated by surrounding development (decreased habitat value)  increased human presence, litter, noise  microclimate changes	potential maintenance activities associated with new wetland channel  increased human presence, litter, dogs, noise	increased human presence, litter, dogs, noise	resource lost with current development program (replaced by new wetland channel)	increased human presence, litter, noise	increased human presence, litter, noise	resource lost with current development program	increased "edge" habitat and decreased interior forest habitat due to smaller size and fragmentation of remaining forest stands (impacts on species composition)
Acres	26	20	13	23	2	85	4	82	
Acres Retained	0	7	8	13	0	61	3	0	

## **CONFLICTING USES ALLOWED BY EXISTING MULTNOMAH COUNTY ZONING**

Currently, West Hayden Island is designated on the Multnomah County Framework Plan as "urban". The County Framework Plan states that areas designated "urban" are further described through specific community plans. In 1976, Multnomah County adopted a Hayden Island Community Plan, which contains a set of policies for the eastern portion of Hayden Island and no implementing maps. The Hayden Island Community Plan does not address the study area. The existing (Multnomah County) zoning is Multiple Use Forest (MUF-19), with the Significant Environmental Concern (SEC) overlay.

The City zoning code (33.855.080) provides for areas annexed into the City from Multnomah County to automatically receive comparable City zoning upon officially being incorporated into the City. MUF-19 is automatically converted to RF (Residential Farm/Forest), unless it is superseded by a special study or a plan district. The SEC overlay is automatically converted to either an environmental conservation ("c") overlay or an environmental protection ("p") overlay based on any approved city plans. To date, the City has not considered or approved a rezoning plan for West Hayden Island. The purpose of this report is, in part, to determine the appropriate pattern of City of Portland environmental zones for West Hayden Island.

The purpose of the existing Multiple Use Forest (MUF-19) zone is to conserve and encourage the use of suitable lands for the growing and harvesting of timber and small wood lot management; to provide for agricultural uses; to conserve and protect watersheds, wildlife habitats and other forest associated uses and scenic values; to provide standards for residential and other uses, including local tourist commercial services which are compatible with forest and agricultural uses; to assure public and private recreation opportunities and to minimize potential hazards from fire, pollution, erosion and urban development. The primary allowed uses in the MUF-19 zone are forestry, agricultural, and single family dwellings on lots of 38 acres or more. A variety of other uses are allowed by conditional use approval. The proposed marine terminal development is not well suited to the MUF-19 zone. Before marine terminal development on West Hayden Island can occur, conversion to a City industrial designation is required.

## **CONFLICTING USES PERMITTED BY MOST LIKELY CITY OF PORTLAND ZONING DESIGNATIONS**

The *West Hayden Island Development Program* specifically outlines the type of facilities that are expected on West Hayden Island. The process of annexation into the City of Portland may include (or be followed by) a change to a zoning designation more appropriate for the proposed marine terminal use. The IH or IG2 zones are the most likely zoning designations. In addition

to the uses associated with the marine terminal proposal described above, there are several other uses that could be allowed by right on land with industrial (City of Portland) zoning (IH or IG2). Some portions of the site could also be zoned as Open Space (OS), or Residential Farm/Forest (RF). Environmental overlays ("p" or "c") may also be applied. Table 7 indicates which uses are allowed by right and by condition in Industrial, Residential Farm/Forest, and Open Space zones. West Hayden Island has not yet been zoned by the City of Portland. The zoning that is applied will determine what the range of potential conflicting uses upon rezoning.

### **Industrial Uses**

Warehouse and freight movement uses, and rail yards are allowed by right in both the IH and IG2 zones, but not allowed in Residential Farm/Forest zones or Open Space zones. Manufacturing and production uses, warehouse uses, quick vehicle servicing, wholesale sales, and industrial service are allowed by right in an industrial zone. Waste related uses are allowed in the industrial zone with special limitations after conditional use approval.

Industrial needs for the City of Portland and Portland metropolitan area have been described in detail in the *Inventory and Analysis of Wetlands, Water Bodies, and Wildlife Habitat Areas for the Columbia Corridor*, adopted by the City of Portland in April 1989 (pages 127-134). The report concludes that the need for industrial land in the metropolitan area by the year 2005 is about 5,192 acres. About 19,070 acres of vacant, suitable land exist within the metropolitan urban growth boundary, 10,483 of these are vacant and uncommitted and have no development constraints. This provides a market ratio of over 2:1 for the estimated need for presently-unconstrained land, and a ratio of almost 4:1 for all vacant industrial land. In addition, there are about 9,700 acres of vacant industrial land within Multnomah County and, according to the 1989 publication by the Bureau of Planning *1987 Vacant Land Report*, 5,731 acres of vacant industrial land within the City of Portland.

However, industries which are highly location-dependent, such as deep-draft shipping or air freight facilities may face shortages. As described above, the Port of Portland faces capacity constraints unless the land base available for marine terminal uses is expanded. West Hayden Island is the only undeveloped parcel within the urban growth boundary that meets marine terminal development requirements. Based on the existing supply of industrial land, and on the shortage of vacant river-front land, industrial uses not dependent on river access are not likely on West Hayden Island.

### **Residential Uses**

Household living uses could be allowed by right in the Residential Farm/Forest zone (RF), and with conditional use approval in an industrial zone. Group living is also allowed in the Residential Farm/Forest Zone with

**Table 7. Conflicting Uses Permitted by Likely City of Portland Zoning for West Hayden Island Development Plan Area (by base zone)**

Use Categories	IH	IG2	RF	OS
<b>Residential Categories</b>				
Household Living	CU	CU	Y	N
Group Living	N	N	CU	N
<b>Commercial Categories</b>				
Retail Sales And Service	L/CU	L/CU	N	CU
Office	L/CU	L/CU	N	N
Quick Vehicle Servicing	Y	Y	N	N
Vehicle Repair	Y	Y	N	N
Commercial Parking	CU	CU	N	N
Self-Service Storage	Y	Y	N	N
Commercial Outdoor Recreation	CU	CU	N	CU
Major Event Entertainment	CU	CU	N	N
<b>Industrial Categories</b>				
Manufacturing And Production	Y	Y	N	N
* Warehouse And Freight Movement	Y	Y	N	N
Wholesale Sales	Y	Y	N	N
Industrial Service	Y	Y	N	N
* Railroad Yards	Y	Y	N	N
Waste-Related	L/CU	L/CU	N	N
<b>Institutional Categories</b>				
Basic Utilities	Y/CU	Y/CU	CU	CU
Community Service	L/CU	L/CU	CU	CU
* Parks And Open Areas	Y	Y	L/CU	L/CU
Schools	N	N	CU	CU
Colleges	N	N	CU	N
Medical Centers	N	N	CU	N
Religious Institutions	N	N	CU	N
Daycare	L/CU	L/CU	L/CU	CU
<b>Other Categories</b>				
Agriculture	Y	Y	Y	Y
Aviation And Surface Passenger Terminals	CU	CU	CU	N
Detention Facilities	CU	CU	N	N
Mining	CU	CU	CU	CU
Radio And TV Broadcast Facilities	L/CU	L/CU	L/CU	L/CU
* Rail Lines And Utility Corridors	Y	Y	CU	CU

Y= Yes, allowed

CU = Conditional Use Review Required

L= Allowed, but special limitations apply

\*Primary uses associated with Port Proposal

N= No, Prohibited

conditional use approval. In the IG2 and IH zones, the approval criteria for residential uses require that the residential use occur through the conversion of existing buildings no longer suitable for industrial use, or occur as houseboat development which does not interfere with the industrial use of the waterway. Residential uses may also occur as accessory to the primary use (for example, on West Hayden Island the most likely residential use is a watchman's residence).

The *West Hayden Island Development Program* does not propose any stand alone residential uses on the site. Houseboat development along the southern shore of the site is possible, but has not been proposed. It is unlikely that residential zoning would be approved for West Hayden Island, given reasoning behind the Metro Urban Growth Boundary decision (Appendix B), given that most of the site is within the 100-year floodplain (thus was not considered in meeting LCDC Goal 10 for needed housing), and given that much of the site will be within the City's airport noise overlay zone, which discourages residential development.

### **Commercial Uses**

Self-storage is allowed by right in industrial zones. Commercial outdoor recreation, major event entertainment, and commercial parking are allowed with conditional use approval in an industrial zone. Retail sales and service, and office uses are allowed without conditional use approval in IH and IG2 zones provided the use is less than 3,000 square feet or less in floor area, and there are fewer than five such uses per project. Retail sales and service, and office uses with more than 3,000 square feet of floor area are allowed in industrial areas with a conditional use approval. Projects with more than four such uses also require conditional use approval.

The approval criteria for these conditional commercial uses require that the proposed use be located in an industrial area because industrial firms, or their employees constitute the primary market of the proposed use, and that the proposed use will not significantly alter the overall industrial character of the area. Retail sales and service and commercial outdoor recreation are also allowed in the open space zone with conditional use approval.

The *West Hayden Island Development Program* does not propose any stand-alone commercial uses on the site. It is unlikely that commercial zoning would be approved for West Hayden Island, given the reasoning behind the Metro Urban Growth Boundary decision (Appendix B), given that adequate commercial areas are already provided elsewhere on Hayden Island, and given limited infrastructure capacity (particularly transportation). In addition, the City found in 1989 that existing commercial and employment zoning in the Columbia Corridor will meet the City's overall need for commercial uses through at least the year 2010.

### **Institutional Uses**

All parks and open space uses are allowed by right in the Industrial zones. Passive park facilities (such as trails) are allowed by right in the Residential Farm/Forest zone, and the Open Space zones. Some parks and open space uses, including cemeteries, golf courses, boat ramps, and facilities that draw spectators to events in parks are allowed in the Residential Farm/Forest and Open Space zones with a conditional use approval and with special limitations. Community service and daycare are allowed with special limitations and a conditional use approval in an Industrial zone and with a conditional use approval in an Open Space zone.

The approval criteria for community service and daycare uses in industrial zones require that the proposed use be located in an industrial area because industrial firms, or their employees constitute the primary market of the proposed use, and that the proposed use will not significantly alter the overall industrial character of the area. Daycare uses are allowed within the Residential Farm/Forest zone with special limitations and a conditional use approval. Community service, schools, colleges, medical centers and religious institutions are allowed with a conditional use approval in a Residential Farm/Forest zone.

The *West Hayden Island Development Program* does not propose any stand alone institutional uses on the site. It is unlikely that large scale institutional uses (schools, colleges, medical centers, or religious institutions) would be approved for West Hayden Island, given reasoning behind the Metro Urban Growth Boundary decision (Appendix B).

### **Other Uses**

Agricultural uses are allowed by right in IH, IG2, OS, and RF zones. Aviation and surface passenger terminals, detention facilities, and mining could occur in industrial zones if approved by a conditional use review. Radio and TV broadcast facilities could also be allowed in an industrial zone by a conditional use review, but only with special limitations. Mining is allowed in Open Space zones with a conditional use approval. Radio and TV broadcast facilities are also allowed in the Open Space zone with conditional use approval and with special limitations. Aviation and surface passenger terminals and mining are allowed in Residential Farm/Forestry zones with conditional use approval. Radio and TV broadcast facilities are allowed with conditional use approval and with special limitations in the Residential Farm/Forestry zone. Rail lines and utility corridors are allowed by right in both IH and IG2 zones and are allowed in RF and OS zones with conditional use approval.

The *West Hayden Island Development Program* does not propose aviation or surface passenger terminal development, mining, or radio and TV broadcast facilities. It is unlikely that such uses would be approved for West Hayden Island, given reasoning behind the Metro Urban Growth Boundary decision (Appendix B).

## CONCLUSION

Marine terminal development as described in the *West Hayden Island Development Program* represents the most likely conflicting use on West Hayden Island. If allowed, the proposed development would have significant impacts on natural resources identified in the inventory (Chapter 3). The proposed marine terminal facilities, in general, would require complete removal of vegetation and the placement of fill material to raise the elevation of the site above the one-hundred year flood plain. These impacts will be examined in greater detail in the ESEE analysis (Chapter 6). In addition to marine terminal development, recreational facilities are proposed for some portions of the site. Recreational uses can have significant impacts to natural resources. These impacts will be discussed in greater detail within the ESEE analysis.

Zoning on West Hayden Island is currently administered by Multnomah County. Annexation of West Hayden Island by the City of Portland, and the application of an industrial zoning designation is a pre-requisite to marine terminal development. City of Portland industrial zoning designations allow a variety of other uses, in addition to the proposed marine terminal, by right, or by conditional use. Some uses, such as residential, commercial, and institutional, are allowed on a limited or conditional basis if they provide accessory support to the primary industrial use (refer to the specific conditions of approval for details). The impacts of these uses are also discussed in greater detail in the ESEE analysis.

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## CHAPTER 6

### ECONOMIC, SOCIAL, ENVIRONMENTAL, AND ENERGY CONSEQUENCES OF PERMITTING, LIMITING, OR PROHIBITING CONFLICTING USES

#### INTRODUCTION TO ESEE PROCESS

After resources have been inventoried and conflicting uses identified, a jurisdiction is required through Statewide Planning Goal 5 and its administrative rule to analyze economic, social, environmental, and energy consequences of resource protection. If there are no conflicting uses for an identified resource, the Oregon Administrative Rule (OAR) for Goal 5 requires the jurisdiction to adopt policies and regulations ensuring protection of the resource. Where conflicting uses are identified, the economic, social, environmental, and energy consequences must be determined. Impacts on both the resource by conflicting uses, and conflicting uses by the resource, must be considered. Other applicable Statewide Planning Goals are also considered in the discussion of impacts. The ESEE analysis is adequate for purposes of meeting OAR standards if it provides a jurisdiction with reasons why decisions are made regarding the protection of specific resources. The following analysis reviews the economic, social, environmental, and energy consequences of allowing, limiting, or prohibiting conflicting uses.

For the purposes of this analysis:

- **“Allowing the conflicting use”** means placing no additional natural resource protection measures on the site. This means not applying a conservation or protection overlay zone on the site, nor applying any additional resource protection measures (other than those required by the base zone). Assuming an industrial base zone (IH or IG2) is applied to the West Hayden Island site, marine terminal development would be allowed without further Goal 5 natural resource related restrictions.
- **“Limiting the conflicting use”** means constraining development (which would otherwise be allowed by the base zone) in order to protect significant natural resources. Limited protection would allow substantial industrial or marine terminal development of the site, provided functional values and high valued resources are preserved. Limited protection might fully allow development of less significant portions of the site, while conserving or protecting those resources with higher value. “Conservation” and “protection” refers to applying the environmental conservation or protection overlay zones.
- **“Prohibiting conflicting uses”** means fully protecting the identified resources on the site. Full protection would likely involve use of the

environmental protection overlay zone on all or most of the site. Full protection would likely preclude large scale marine terminal or industrial development.

OARs define the steps to be followed in complying with Goal 5, but provide flexibility in determining what factors should be considered as having potential economic, social, environmental or energy consequences. This flexibility is important because relevant ESEE factors vary greatly, depending on the type of resource that is being evaluated and potential conflicting uses that are allowed.

Each section of the ESEE analysis will include a general discussion of factors to be considered. This background information will be followed by an analysis of the consequences of the three protection options described above. For each protection option (allowing, limiting, or prohibiting), the consequences on the resource will be presented first, followed by the consequences on the conflicting use. In the case of marine terminal uses, the analysis will be based on the specific development plans as described in the *West Hayden Island Development Program* (Port of Portland, 1995). The consequences on other potential conflicting uses will be considered based on broad land use categories:

- industrial
- commercial
- institutional (such as daycare, community service, schools, etc.)
- residential
- recreational
- agricultural
- utility uses (including existing power transmission corridors, sewer outfall lines, and the use of the site for disposal of dredge material from the Columbia River).

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## ECONOMIC ANALYSIS

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### GENERAL BACKGROUND/Framework

Protection of natural resources can have significant economic consequences, both positive and negative. The economic analysis is organized according to the following topics: the concept of *basic industries* and associated regional economic consequences; consequences related to marine terminal capacity and growth; consequences on the development potential of the site; the direct economic consequences of regulation; the economic consequences related to the cumulative loss of environmental infrastructure; the amenity value of natural areas and related economic consequences; and mitigation issues and associated economic consequences. This analysis is based on several principles and methods that warrant further explanation. Appendix A outlines the principles which can be used to identify the economic value of natural areas. The economic value of marine terminal facilities is discussed below in a regional economic context. The consequences of allowing, limiting, or prohibiting conflicting uses are presented below.

### Basic Industries and the Regional Economy

#### Target Industries

In September 1994, the City of Portland adopted the *Prosperous Portland* economic development plan (City of Portland, 1994). The plan calls for the city to pursue the development of target industry clusters — industries and related businesses whose growth will critically contribute to the City achieving its economic and workforce goals.

One basis for determining these target industry groups is the concept economists call *basic industries*. Basic industries are those that manufacture goods or provide services that are sold outside the immediate geographic area, and thereby bring new wealth into a community. These industries are considered basic because they create the fundamental wealth that is redistributed throughout a city or region. Wages and salaries, purchases of supplies and services, and tax revenue generated by these basic industries contribute to a vital community.

In identifying target industries, the City's strengths were considered. The strengths of Portland include an excellent geographic location for west coast and international trade, and good transportation facilities for moving both goods and people. The warehouse and distribution, and the transportation equipment industries were selected to be among the initial target industries. The warehouse and distribution cluster includes those companies involved in the storage and distribution of products of national and international markets. This cluster capitalizes on Portland's traditional strength as a transportation center with supporting infrastructure of highway, rail, marine,

and air facilities. The transportation equipment cluster includes the manufacturing of motor vehicles, railroad equipment, search and navigation equipment, ship repair, and the manufacturing of aircraft parts.

Both of these target industries rely on the continued access to efficient Port facilities. As part of the city's basic transportation infrastructure, the Port contributes to the economy of the city and the region as it supports basic industries that bring wealth into the region. An analysis of the economic impact of expanded Port facilities must consider the impacts to the basic industries supported by marine infrastructure. The impact of marine terminal development is not constrained to the direct employment provided by the facility. Marine terminals should be seen in a larger context, as an element of the regional economic infrastructure.

#### Trade and Portland's Economic Base

Oregon's economy has historically been linked to the Columbia River system. More than 18 percent of Oregon's gross domestic product moves across Portland's docks. Some 26 percent of Portland's economy is attributed to trade. The Columbia/Snake River System stretches inland 465 miles accessing a large cargo market. Excellent rail service gives good market access to and from the eastern U.S. This focus on freight movement has a significant job impact on the Portland area. The wholesale trade sector of the economy is one of the largest.

In addition to generating direct jobs, marine terminal facilities improve the competitive position of Oregon businesses by reducing the cost of shipping goods in and out of the Portland region. Without adequate marine terminal facilities, Oregon businesses would have to pay to move goods to other ports. The Port of Portland estimates that its container operations save Oregon businesses about \$75 million a year in rail and trucking costs (*The Oregonian*, 1/13/96).

Metro's 2040 *Commodity Flow and Requirements Study* stated:

"For Portland to continue its strong economic growth, there needs to be a continued emphasis on maintaining and enhancing the transportation system. Portland has prospered as a distribution center and should continue to view transportation, distribution and the related services as an engine for prosperity. The quick transfer of goods between ship, rail, truck and air services is increasingly a competitive strength of an economy that is evaluated for relocation, plant expansion, or citing transportation service hubs. Commodity flows through Portland are vital to both the Portland and broader Oregon economies" (DRI/McGraw-Hill, 1994, p. 8).

The Oregon Joint Legislative Committee on Trade and Economic Development stated:

“Oregon’s deep draft Ports are a critical link in the regional transportation system that provides access for Oregon producers to world markets, most importantly the Pacific Rim. Pacific region trade accounted for 40 percent of worldwide trading in 1988 and continues to grow. With respect to high technology, the region [the Pacific rim] accounted for 2/3 of world trade” (Oregon Joint Legislative Committee on Trade, Economic development, 1991, p. i).

Following this lead, one recommendation in the *Prosperous Portland* Plan was to further develop Portland’s capacity to participate in the international economy. Working more specifically toward that goal, in 1995 the City of Portland Mayors Business Roundtable released the *Internationalizing Greater Portland* plan. This plan contains several strategies involving or related to West Hayden Island:

- Strategy A8a recommends developing Hayden Island as the next major site for marine terminal development.
- Strategy A3a recommends preserving competitive modal choices for freight movement (truck, rail and barge).
- Strategy A1 recommends deepening the Columbia River navigation channel.

#### The Economic Impact of the Port of Portland

The following specific information regarding the regional impact of Port operations was furnished by the Port of Portland. In 1994 Martin O’Connell & Associates was retained by the Port to estimate the economic impacts of the Port’s four lines of business: the Seaport, the Portland International Airport, Portland Ship Yard, and real estate holdings. The estimates presented here refer only to the Port’s Seaport operations. These estimates are not the result of long term input-output models which incorporate multiple rounds of re-spending. These estimates estimate only the first round of spending. The impacts were estimated and measured in terms of:

- Jobs (direct, induced, and influenced)
- Employee earnings and income
- Business revenue
- State and local taxes

*Direct jobs* are those that would not exist if Portland marine activity were to cease.

*Induced jobs* are jobs supported in the region by the purchases of goods and services by the people holding the direct jobs.

*Influenced jobs* are with exporters and importers using the marine facilities at the Port of Portland. While the facilities and services provided at the Portland seaport are a crucial part of the infrastructure allowing these jobs to exist, they would not necessarily be displaced if marine activity were to cease.

*Employee earnings* consist of wages and salaries produced by the direct jobs. *Total income* adds the first round of responding in the local economy generated by the spending of those direct employee earnings.

*Business revenue* consists of total business receipts of firms providing services in support of the marine activities.

*State and local taxes* include taxes paid by individuals as well as firms dependent upon the Port of Portland seaport.

Included in the seaport impact estimates are direct and induced impacts of cargo and vessel activity at the Port of Portland, as well as the direct and influenced impacts of the dredging activity performed by the Port.

The result of the Martin O'Connell & Associates study indicate:

- A total of 7,652 direct and induced jobs were produced for Portland area residents and residents of the State of Oregon.
- Of the 7,652 direct and induced jobs, public facilities owned and operated by the Port of Portland were responsible for 4,303 direct and induced jobs.
- A total of 42,644 regional jobs are with firms that use the Port of Portland seaport. These jobs are considered influenced by the activities at the seaport, but the degree of dependence is difficult to measure. If the Port were not available for their use, they would no doubt suffer an economic penalty, but other Pacific Northwest ports could be used.
- Every 1,000 containers moved through the Port of Portland's marine facilities generate about 11 direct jobs for area residents. Every 1,000 automobiles generate about two direct jobs.
- Cargo moving in containers creates the greatest total revenue impact for cargo moving through the Port of Portland's marine facilities, followed by automobiles and grain exports.
- Marine activity produced \$1.3 billion of business revenue including revenue to ocean carriers calling the Port. Activity at Port owned facilities comprises \$1.1 billion of the total business revenue impact. However, most of the ocean carrier revenue does not stay in the Portland area,

because these ocean carriers are typically foreign flag carriers. A more relevant measure excludes the more than \$678 million of revenue to ocean carriers.

- Bulk cargos give rise to relatively small job and revenue impacts per ton. A small number of people use a lot of equipment to move bulk commodities, compared to other categories.
- The \$204 million distributed as personal income to residents of the area from seaport activities brings about \$360 million worth of income when re-spending effects are included. Marine activity at the Port of Portland's facilities accounted for \$182 million of the total personal income and consumption impact.
- Port activity generated \$29 million in state and local taxes, of which Port owned assets generated \$16 million.

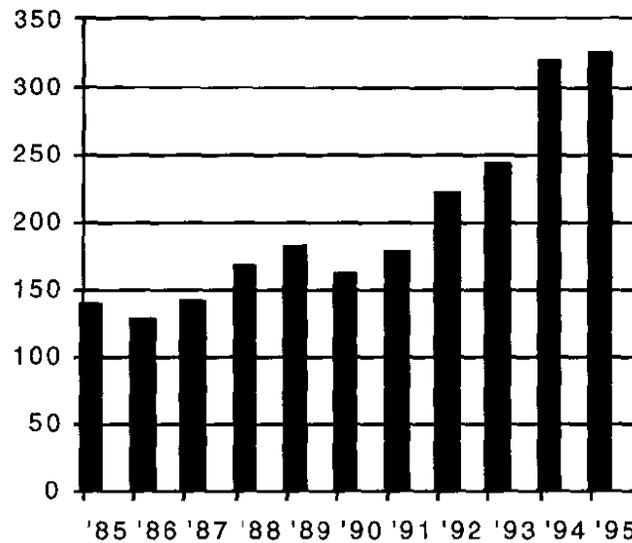
### **Port Capacity and Growth**

The Port of Portland operates five terminals within the City of Portland (Terminals 1, 2, 4, 5, and 6). The Port handles cargo in four major business lines: containers, bulk, autos, and general cargo. In 1990, the Port handled slightly more than 8.6 million metric tons of cargo.

With the exception of mineral bulks, existing terminal facilities are operating at levels that are below their practical capacity. This excess capacity is due, in large measure, to changes in operations and transportation technology which have allowed more efficient utilization of existing terminals. Nonetheless, based on the forecast growth in all business lines, additional facilities and facility improvements will be required. The total cargo moving over Port docks is projected to grow from 8.6 million metric tons in 1990 to within the range of 13 to 21 million metric tons annually by 2010. These forecasts are presented in the 1991 Update of the Port of Portland's *Marine Terminals Master Plan* (MTMP). The forecasts are intended to aid in the planning for long term facility growth and land needs.

- Container cargo volume at Terminal 6 has doubled in three years, outpacing the high forecast in the Port's 1991 Master Plan. Over the period 1991-1994, Terminal 6 was the fastest growing terminal on the West Coast (see Figure 8). The Port is actively pursuing full terminal buildout and, with modest growth, will reach the projected terminal capacity at existing facilities within 10 years. After that date, additional container facilities will be needed under moderate (5 percent a year) or high growth scenarios.

**Figure 8. Port of Portland Container Volumes**  
Number of 20-foot containers (thousands)



Source: Port of Portland

- The 1991 MTMP concludes that automobile capacity in Portland is not constrained as long as new growth is realized through new small volume accounts which can be handled at existing facilities. New large volume accounts may require a separate dedicated facility. However, industry growth is projected to be flat.
- Existing grain facilities in the Portland harbor can accommodate significant growth, particularly if the rail infrastructure is improved to enhance the efficiency of operations. However, the need for new grain export facilities over the long term is also driven by the expected retirement of one or more facilities in the Portland harbor, the changing foreign agricultural outlook, and ongoing deregulation of the North American transportation industry.
- The exportation of mineral bulks has been an area of high growth for the Portland harbor, particularly through the Port's Terminal 4. The 1991 MTMP forecast the need for additional capacity improvements to handle soda ash at Terminal 4. These improvements are in place, and additional demand has triggered the need for a new facility. The required terminal capacity is being added at the Port's Terminal 5 and is currently under construction.

The Port of Portland identified three mutually supporting strategies to overcome future land supply constraints identified in the 1991 MTMP: re-development, cooperation with other ports, and acquisition of undeveloped property.

### Redevelopment Options

The Port may purchase, fill, or redevelop property within the Portland Harbor on an incremental basis over time. At the present time, the estimated cost of redeveloping land in the Portland Harbor is at least twice the cost of extending services and preparing vacant land for marine terminal development. The cost differences are largely due to differences in acquisition cost and environmental remediation costs. Besides cost, a significant drawback to gaining usable waterfront through re-development is that it will be increasingly difficult to assemble the sites needed for future Port facilities. The acreage requirements of new facilities have increased dramatically, such that to remain competitive, rail loop potential (100 acre sites) or adequate yard area (50 acres per berth) must be planned for. Many waterfront sites are not physically large enough to accommodate marine terminal facilities (see Figure 9). For example, much of the land on the west side of the Willamette River is located in a narrow area between the river and US 30 and the Northwest Hills (Forest Park). Many waterfront sites also have existing improvements with significant value, making re-development less attractive. In addition, as land close to Downtown gentrifies (such as in the River District), there will be increasing conflicts between Port operations and other land uses. Truck traffic in some neighborhoods adjacent to existing Port of Portland facilities is also an ongoing issue of concern.

### Joint Ventures with Other Ports

The Port may pursue long-term relationships with other ports on the lower Columbia River to jointly utilize land resources. Several deep draft marine terminal development sites were identified along the lower Columbia River in the 1986 *Lower Columbia River Deep Draft Sites* report: East Astoria, Tongue Point, Lower Westpoint, Port Westward, and Rainier. Several constraints must be considered regarding the development of large marine terminal facilities down-river from Portland.

- Marine terminal development along the lower Columbia would require major transportation infrastructure improvements (rail and highway) on the Oregon side of the Columbia River. A minimum investment would be upgrading the rail line between Portland and Astoria, at a cost of \$9.6 million to \$12.2 million (1991 estimate, Northwest Economic Associates).
- Development outside the Urban Growth Boundary (UGB) would be a greater distance from the Portland labor pool, leading to higher transportation costs for employees, and reduced job opportunities within the City.
- There are many jurisdictional issues to overcome before joint facility development could be successful.

- According to the *Lower Columbia River Deep Draft Sites* report, development elsewhere on the lower Columbia would have environmental impacts comparable to development on West Hayden Island. All of these sites have environmental issues comparable to the West Hayden Island site. Only one site (Rainier) does not have wetland areas. All sites face issues surrounding salmon migration and feeding. All of the sites contain or are adjacent to important waterfowl and other bird habitat areas. Several sites are utilized by endangered species (such as the Bald Eagle, and the Columbian White-Tailed Deer).

#### Acquire Undeveloped Property

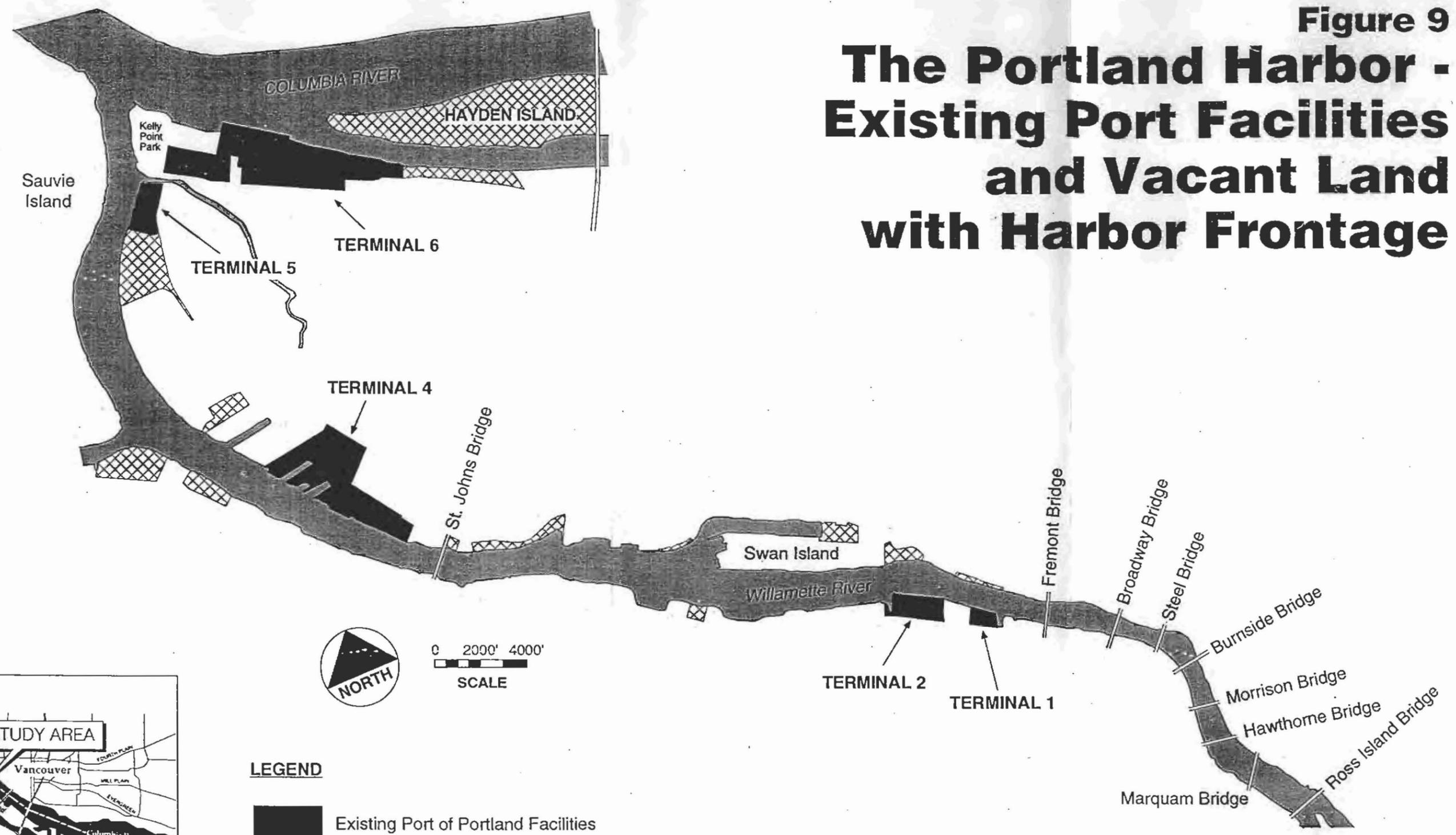
The Port can purchase undeveloped property and prepare it for future facility developments. The only remaining undeveloped waterfront property suitable for marine terminal activity within the Portland UGB is West Hayden Island (Figure 9 shows vacant waterfront property).

The key advantages of the West Hayden Island site are: good transportation access, good parcel size, proximity to labor and services in the metropolitan area and buffered from residential and other conflicting uses. Larger ships and larger rail handling equipment have had a significant impact on land requirements in the last 20 years (see Figure 10). Deep water access is important in this respect, limiting new marine terminal development to sites adjacent to the 40 foot deep draft channel. The larger Columbia River channel will facilitate the movement of larger ships. Typical grain facility size has increased from 40 acres to 100 acres during this period. Also, central city land patterns around the country have pushed more marine activity to the edge of cities.

#### Port Capacity and Growth Conclusion

The Port believes it is prudent to pursue all three of these strategies. New development and cooperation with other ports require large lead times, and redevelopment of existing facilities will occur in any case as modernization becomes necessary.

**Figure 9**  
**The Portland Harbor - Existing Port Facilities and Vacant Land with Harbor Frontage**

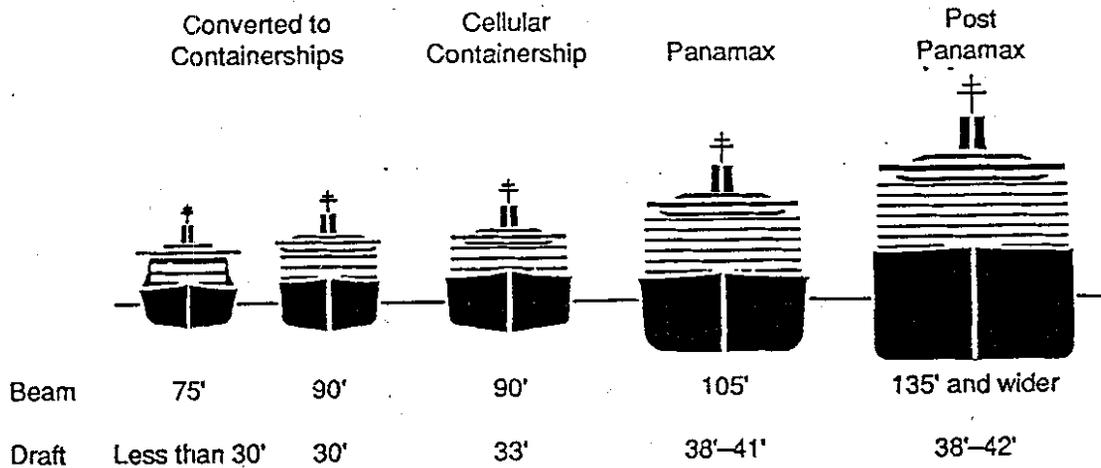


- LEGEND**
- Existing Port of Portland Facilities
  - Vacant Land with Harbor Frontage

Source: Port of Portland, Marine Terminals Master Plan, Harbor Land Inventory 1991 Update

**WEST HAYDEN ISLAND DEVELOPMENT PROGRAM**  
 Goal 5 Natural Resources Inventory

Figure 10. Container Ship Evolution: Beam Size and Draft.



### The Economics of Development Constraints

In simplistic terms, development potential means how much development can be placed on a property. On industrial land, protecting natural resources may reduce development potential if the development cannot be redistributed elsewhere on the site.

There are several development criteria specific to the Port proposal that will affect land requirements, and thus also affect the economic impact of resource protection. The development criteria cover the topics of rail access, grain/bulk terminal size, general cargo terminal size, power transmission lines, and the City of Portland sewer outfall. Each criterion is discussed below. The Port of Portland has used these development criteria to prepare alternative development schemes for West Hayden Island (Port of Portland, 1995).

#### Rail Access

A marine industrial facility depends on efficient rail access. One of the most important aspects of the West Hayden Island site is the potential for rail development. The Metro 2040 Commodity Flow and Requirements Study (DRI/McGraw-Hill, 1994) states that on-dock or near-dock rail facility requirements are expected to grow by 400 percent by the year 2040 relative to current needs. A high percentage of intercity freight moving through Portland is rail freight. Trends indicate that this percentage will grow in the future (DRI/McGraw-Hill, 1994).

"Portland's recent success in maintaining and increasing its share of West Coast containerized cargo traffic is largely attributable to the rail connections provided at its Terminal 6 facility ... High quality rail

service and intermodal transfer facilities are now essential attributes for a container terminal, and were a contributory factor, for instance, in Tacoma's attraction of a significant amount of trade formerly passing through the Port of Seattle (Northwest Economic Associates, 1991)."

The mainline track adjacent to the site currently receives a high degree of traffic, and this traffic is projected to increase substantially as regional freight transportation relies more on rail and as passenger rail use increases. In addition to existing passenger and freight service, the mainline is seen as the future corridor for high speed passenger service connecting Portland with other Pacific Northwest population centers. To allow trains to exit the mainline quickly, the proposed rail spur on West Hayden Island must have minimal curves. This is a major constraint on the ability to avoid some natural resources on the site. The Development Plan must accommodate trains up to 8,800 feet long, allowing them to pull completely off the mainline track as quickly as possible. The Port of Portland has estimated that an intermodal loading yard on West Hayden Island will employ 100 people.

If West Hayden Island cannot accommodate unit trains in their entirety, then railroad operating efficiency and flexibility, terminal operating efficiency, and sustainable mainline capacity are significantly affected. As a result, one of the most attractive features of West Hayden Island for marine terminal development is compromised. If unit trains could not be handled, they would have to be "busted up" at other regional rail yards, and brought to West Hayden Island in sections, typically 4,000 feet long. As a result, the railroads will not be able to move unit trains directly to the site using road power, but will need to stop, transfer, and add switch engines and a crew to accomplish the work. Currently, the base cost of a switching asset is approximately \$32,000 per month. The actual cost of a switching asset to handle West Hayden Island would be greater as development there would generate a larger train volume than is generated by existing Port facilities. In addition to the cost of switching, trains would spend more time using the mainline track. The Port estimates that use of the mainline would be about 40 minutes to 1 hour with optimal marine terminal facilities on West Hayden Island or 3 hours if rail access is constrained.

#### Grain/Bulk Terminal

The grain/bulk terminal must be a minimum of 2,150 feet wide and 2,500 feet long, with three concentric tracks to accommodate on-terminal unit train processing. The ideal rounded square shape has been modified to better fit the given space in the current recommended development alternative. The size of this facility is driven by the need to accommodate unit train lengths around the circumference, and by internal storage and water treatment space requirements. Trains must have sufficient room to load and switch tracks on straight rail sections. Straight sections must be a minimum of 450 feet long to

accommodate this. Again, this is a constraint on the ability to avoid some natural resources identified in the inventory. The Port of Portland has estimated that 100 people will be employed at the grain/bulk terminal at full build-out. For comparison, the Columbia Grain facility (grain bulk only) employs an average of 50 people.

#### General Cargo Terminal

The general cargo terminal modules must have a depth of at least 1,500 feet from the wharf line to on-dock rail facilities. This distance is already smaller than is recommended by the *Marine Planning Guidebook* developed for the American Association of Port Authorities, which recommends a total terminal depth of about 2,100 feet. Compromising this distance would compromise operating efficiency, reducing the value of the facility. The Port estimates that each acre of terminal area translates into added capacity of approximately 2,000 containers per year. Terminal 6 currently captures approximately \$200 of revenue (to the Port of Portland) per container. It can then be estimated that for each acre that the terminal size is reduced, annual gross revenue to the Port of Portland is reduced by \$400,000 (1995 dollars). The Port estimates that each box brings about \$1014 in revenue to the community. These figures will vary by terminal and operating practice. Similarly, employment is reduced in proportion to the decreasing size of the terminal. The Port of Portland has estimated that at full build-out, the proposed West Hayden Island general cargo terminal will employ 1,000 people. With a terminal size of approximately 300 acres, this translates to an employment density of roughly 3.33 employees per acre. For comparison, peak employment at Terminal 6 is roughly 400 people on a 24 hour basis, who handle a volume of 180,000 to 200,000 containers per year.

#### Power Transmission Lines

The BPA and PP&L Transmission lines pose a significant constraint on development. The BPA right-of-way is 200 feet wide and crosses West Hayden Island from north to south. The entire 13-acre right-of-way is federally owned. Separated from the BPA lines at a distance of roughly 250 feet is a 150-foot easement and right-of-way for PP&L. Elevated structures, buildings, conveyors, lighting, and vessel activity would be restricted beneath these structures. Some rail movement, storage, or wetland mitigation may be allowed. Full dock and terminal development is impractical in these corridors. This spatial constraint makes it more difficult to avoid some identified natural resources on the site.

#### City of Portland Sewer Outfall

A sewer outfall line crosses the eastern edge of the site. The Port of Portland choose this line as the eastern boundary of the development for several reasons: 1) to avoid the need to move the outfall pipe, 2) to provide a buffer area between marine terminal development and the eastern portion of

Hayden Island, and 3) to provide vessel maneuvering room downstream from the BNRR bridge.

Based on the above criteria, the Port states that the optimum development footprint with maximum flexibility would be a rectangle development about 2,200 feet deep and as long as possible. Because West Hayden Island is not this shape, maximizing marine facility development becomes an exercise in shifting a roughly rectangular area of different sizes either west, north, or south. To the extent that the development can be shifted in order to avoid identified natural resources, resource protection can occur without impact on the economic value of the proposed facility. Where resources conflict with the minimal criteria outlined above, resource protection will reduce the economic value of marine terminal development. In that situation, the lost value must be weighed against the value of the natural resource.

### Direct Regulatory Costs

Direct regulatory costs of environmental protection or conservation include fees charged by the City for land use reviews, and the time required for such reviews. Additional expenditures may occur in order to prepare materials for land use review. These costs should be considered as consequences of limited or full protection of resources on the West Hayden Island site. Table 8 lists the fees charged for the environmental conservation and environmental protection land use review cases. The Type II procedure is the shorter and simpler of the quasi-judicial reviews. It is intended for reviews which involve lesser amounts of discretion, lower impacts, or both. The Type III procedure is the longer and more in-depth review. It is intended for reviews which involve the most discretion and the greatest potential impacts.

**Table 8. Fees for Environmental Land Use Reviews**

Land Use Review	Procedure Type	Bureau of Planning Fee	Hearings Officer Fee	Combined Fee
Environmental Conservation (Residential Use only)	II	\$617	\$117	\$734
(Non-residential or mixed use)	II	\$1,029	\$117	\$1,146
Violation	III	\$2,572	\$655	\$3,227
Environmental Protection	II	\$335	\$117	\$452
	III	\$2,825	\$655	\$3,480

Source: City of Portland, Effective July , 1995

In addition to fees, the cost of regulation may be related to the processing time of the review. State law includes the requirement that all quasi-judicial reviews be completed within 120 days of filing a complete application. In the case of Type II procedures, the decision must be made within 14 days of finding that the application is complete. Type II decisions may be appealed up to 14 days after the decision is mailed. In the case of Type III reviews, a public hearing must be scheduled within 51 days of finding the application complete. For Type III reviews, a decision must be mailed within 17 days of the hearing. Type III decisions may be appealed up to 14 days after the decision is mailed.

### **Cumulative Loss of Environmental Infrastructure**

Impacts to environmental infrastructure will have economic consequences, as discussed in Appendix A. Many of the environmental consequences of development on West Hayden Island can be described as cumulative. Development on West Hayden Island, for example, will not by itself cause significant impacts on the flood storage capacity of the Lower Columbia. Over time, however, flood storage capacity can be affected by many small impacts adding up to a larger cumulative impact. Goal 5 requires that cumulative impacts be discussed. The cumulative consequences discussed here cannot be attributed only to development of the West Hayden Island site. Prohibiting development on West Hayden Island would not necessarily eliminate these consequences.

In addition many of these economic consequences are external to the marketplace, meaning that although a economic impact (positive or negative) may occur, in many cases no specific market transaction occurs. This makes quantification of these consequences difficult. Appendix A discusses economic "externalities" in greater detail.

Development on West Hayden Island may result in the loss of wetland and flood storage resources, contributing in the long run to a cumulative loss of flood storage capacity, and flood plain habitat, within the lower Columbia River system. Increased flooding can lead to higher public disaster relief expenditures.

Development on West Hayden Island will result in a loss of wildlife habitat. As described in Appendix A, the existence of wildlife has utility (economic benefit) to many people. The wildlife habitat value of West Hayden Island as a whole contributes to the viability of regional wildlife populations, which supports the value of other public greenspace investments.

Development on West Hayden Island will impact the shallow water habitat surrounding the site. The elimination of such habitat at West Hayden Island contributes to an ongoing regional loss of such habitat, with a negative impact on some Columbia River fish populations. The existence of natural salmon

stocks is critical for the continued existence of commercial salmon fisheries. The recovery of endangered salmon stocks may enable greater utilization of other non-endangered stocks. The current ten year average gross sales of commercial salmon are about \$11 million for the troll fishery and \$7.3 million for the non-treaty gill net fishery. The treaty gill net fishery has averaged \$2.1 million in ex-vessel value between 1982 and 1991. This ten year period was one of relatively low salmon runs, suggesting that a recovered salmon economy would be of much greater value (Huppert, et al., 1995). The Columbia River also contributes to some commercial fisheries in Canada and Southeast Alaska. These illustrative figures are presented to show that the cumulative loss of environmental infrastructure (in this case fish habitat) is an economic issue.

Development on West Hayden Island will result in a loss of forest resources on the site. Elimination of identified forest resources on West Hayden Island will contribute to the cumulative loss of urban forest resources, with a negative impact on efforts to improve air quality (details are presented in the environmental analysis). Air pollution has economic impacts by contributing to increased health care costs, and reduced productivity. In addition, poor air quality can lead to public pressure to regulate (limit) the operation and expansion of industry, and a need for other expensive air quality programs.

### **The Amenity Value of Natural Areas**

Impacts on natural amenities can have economic consequences (see Appendix A). The economic consequences on amenity values are general in nature. These consequences may be both positive and negative. While development on West Hayden Island will cause the loss of significant natural amenities, development plans may also improve the accessibility of remaining natural amenities.

The City of Portland has a reputation for livability, and is known as a city which values and takes advantage of its natural resources to make it an attractive place to work and live. Development on West Hayden Island will destroy some natural amenity resources on the site. The loss of such amenity resources could harm Portland's reputation of livability. This reputation is a competitive advantage in attracting new business development and high quality jobs. This effect would be strongest in industries for which amenity values play an important role in location decisions (see Appendix A). Allowing industrial or marine terminal development of West Hayden Island would remove a major natural area from the Columbia Corridor and North Portland that could potentially identify and provide uniqueness to the area in the future. Another perspective is that the construction of a large marine terminal facility, done in an environmentally sensitive manner, could increase the uniqueness and livability of the area, and attract jobs.

Natural amenities can also provide a reason for locating a conference or convention, or provide a local destination for tourists. This can bring significant money into the local economy. Elimination of natural amenities on West Hayden Island would eliminate the possibility of capitalizing on this value in the future.

A large accessible natural area can benefit the local recreational equipment industry. Currently West Hayden Island is not easily accessible to recreational use. Full development of West Hayden Island for industrial uses could eliminate or reduce the potential for this benefit in the future. The demand for river related recreational facilities is strong (see Table A-2 in Appendix A).

As described in Appendix A, natural amenities can have an impact on property values, particularly for residential land. The closest residential land is a houseboat development opposite the Oregon Slough, to the south.

### **State and Federal Mitigation**

According to federal and state regulations, the loss of some identified natural resources on West Hayden Island will require mitigation. Mitigation costs associated with state and federal regulations will be a consequence of allowing large scale development on West Hayden Island.

### **ECONOMIC CONSEQUENCES OF ALLOWING CONFLICTING USES**

The following is a discussion of the likely economic consequences of fully allowing conflicting uses on West Hayden Island. This analysis is based on the topics discussed above and information presented in Appendix A. Much of the analysis is focused on the consequences of allowing marine terminal or industrial development on West Hayden Island, however, other potential uses are also discussed, including: commercial, residential, utilities, open space, and agricultural uses.

The consequences on the resource are discussed based on functional categories. The consequences on the conflicting uses are discussed based on general land use categories.

### **Consequences on the Resource**

#### **Cumulative Loss of Environmental Infrastructure**

Marine terminal or industrial development on West Hayden Island will result in the loss of wetland and flood storage resources, wildlife habitat (including shallow water habitat important to fisheries), and forest resources. These impacts can be described as cumulative. As discussed above, and in Appendix A, these cumulative impacts can have important economic consequences.

Commercial and institutional development on West Hayden Island would require significant alteration of vegetation and topography on a scale similar to that of industrial development, with similarly negative impacts on environmental infrastructure and the economic value of that infrastructure.

Residential development within industrial zones must relate to the primary industrial use (for example a watchman's residence). The impacts of such residential development on the resource would therefore be related to the impacts of the primary industrial use. Residential development may have a greater flexibility in avoiding small areas with significant resource value — such as wetland areas. Houseboat development may have a smaller impact because vegetative cover need not be removed from a large area, and fill is not required.

Recreational facilities can require the removal of vegetation or the modification or destruction of natural resources in much the same way as other conflicting urban development. Large open areas such as golf courses and ball fields, although providing resting or feeding areas for some birds and animals, also can contribute to water pollution through runoff. Pedestrian trails remove vegetation and introduce human activity into natural areas, adversely impacting wildlife values. Water access for fishing and boating can create similar impacts. A portion of the economic value of a natural area can be attributed to the existence of wildlife, and other environmental infrastructure values discussed above, independent of public recreational use. Intensive recreational use could degrade natural resource values, and therefore reduce the economic values associated with the existence of those resources.

Potential agricultural uses on West Hayden Island include the food crops, livestock, and forestry. All of these activities can have negative cumulative consequences on environmental infrastructure, and thus have negative consequences on the economic value of those resources. The specific effects are discussed in the environmental consequences section of this report.

### **The Amenity Value of Natural Areas**

Marine terminal or industrial development on West Hayden Island would involve the loss of a natural amenity resource. Such amenity resources may have regional economic value, as discussed in Appendix A.

Marine terminal or industrial development on West Hayden Island would result in the loss of forest resources. The loss of forest resources on some portions of West Hayden Island would likely reduce the value of houseboat moorages in the Oregon Slough, since the existence of a large undeveloped greenspace on West Hayden Island probably adds amenity value to those properties (see Appendix A).

Commercial and institutional development on West Hayden Island would require significant alteration of vegetation and typography on a scale similar to that of industrial development, with similarly negative impacts on environmental amenity values.

Residential development within industrial zones must relate to the primary industrial use (for example a watchman's residence). The impacts of such residential development on the resource would therefore be related to the impacts of the primary industrial use. Residential development may have a greater flexibility in avoiding small areas with significant amenity value - such as wetland areas. Houseboat development may have a smaller impact because vegetative cover need not be removed from a large area, and fill is not required.

Public enjoyment of a natural area adds economic value to that area. However, allowing high impact recreational uses on West Hayden Island could degrade natural resources, and thus reduce the amenity value of the site.

Utilities, particularly overhead lines, can have adverse visual impacts which can negatively effect the amenity value of a natural area.

Agricultural uses on West Hayden Island can have negative consequences on amenity values, and thus have negative consequences on the economic value of those amenities. Not all agricultural uses have negative consequences on amenity values. The strongest negative impacts are associated with forest removal, or removal of other highly valued natural resources. Existing agricultural uses may have scenic amenity values.

### **State and Federal Mitigation**

Mitigation costs associated with state and federal regulations will be a consequence of allowing any type of large scale development on West Hayden Island.

### **Consequences on the Conflicting Use**

#### **Basic Industries and Regional Economy**

Industrial or marine terminal development of West Hayden Island would have positive consequences associated with expanded and efficient Port facilities, supporting the basic industries of the region, and the larger regional economy, as discussed above.

#### **Port Capacity and Growth**

Allowing industrial or marine terminal development of West Hayden Island will allow adequate expansion space for the Port of Portland, and other

marine dependent uses. Expanded Port facilities would have positive economic benefits to the region as discussed above.

### **Industrial and Marine Terminal Development Potential**

Allowing full industrial or marine terminal development of West Hayden Island would allow the greatest amount of flexibility as the Port of Portland develops more specific marine terminal design options.

### **Commercial Uses**

Allowing commercial uses on West Hayden Island would have negative economic consequences to the extent that such uses conflict with marine terminal development. As discussed in the conflicting use analysis, commercial uses are unlikely on West Hayden Island.

### **Institutional Uses**

Allowing daycare and community service uses on West Hayden Island would have positive economic consequences to the extent that such uses support marine terminal operations (for example, by providing services needed by marine terminal employees). As discussed in the conflicting use analysis, large scale institutional uses (schools, colleges, medical centers, or religious institutions) are unlikely on West Hayden Island.

### **Residential Uses**

No plans exist for large scale residential development of West Hayden Island. Allowing residential development, due to the significant environmental constraints of the site, would likely have minimal economic benefits. The most likely residential development on West Hayden Island are residences associated with another primary use, such as agricultural uses, or industrial uses (such as a watchman's residence). In that context, the consequences of allowing residential uses are related to the consequences of allowing these other primary uses. Houseboat moorages could also be allowed on West Hayden Island (assuming industrial zoning) provided that such development does not interfere with the industrial use of the waterway. In the case of houseboat development, it is likely that the retention of adjacent natural resource areas would have economic benefits (amenity value).

### **Recreational Uses**

Allowing passive recreational uses on West Hayden Island, such as limited boating facilities, wildlife viewing areas, pedestrian trails, and interpretive facilities, would support the region's recreation, tourist, and convention industries, and would support the amenity values of the regional greenspaces system. Open space recreational uses provide amenities which can help attract some industries to the region.

### Utilities and Dredge Disposal

Allowing utility uses on West Hayden Island would facilitate the ongoing operation and maintenance of existing utility corridors on the site (Overhead transmission lines and a sewer outfall line). Allowing continued disposal of dredge material on the site would reduce the regulatory (permitting) cost of obtaining another disposal site to replace the West Hayden Island site.

Allowing disposal of dredge material on West Hayden Island would also facilitate (provide fill material for) marine terminal development.

### Agricultural Uses

Based on the information presented in the conflicting use analysis, allowing agricultural uses on West Hayden Island would have few positive economic consequences, except to the extent such an action would allow the continuation of employment and revenue resulting from livestock grazing on West Hayden Island.

### Summary

The economic consequences of allowing conflicting uses are summarized in Table 9.

**Table 9. Economic Consequences of Allowing Conflicting Uses**

Possible Action	Consequences
Allow conflicting uses fully.	+ <ul style="list-style-type: none"> <li>• Supports basic industries and regional economic development, future Port capacity and growth, and development flexibility.</li> <li>• Maximizes flexibility when placing new utilities.</li> </ul>
	- <ul style="list-style-type: none"> <li>• Harms the economic value of environmental infrastructure.</li> <li>• Harms greenspace/amenity values.</li> <li>• More extensive mitigation measures may increase project costs.</li> </ul>

### ECONOMIC CONSEQUENCES OF LIMITING CONFLICTING USES

The following is a discussion of the likely economic consequences of limited industrial or marine terminal development on West Hayden Island. This discussion is based on methods and background information presented above and in Appendix A. The consequences of allowing commercial and residential uses, basic utilities, utility corridors, agriculture, and open space uses are also discussed in the context of limited protection of resources.

Limited protection would allow development on the less significant portions of the site, while conserving or protecting those resources with the highest resource values. Under limited protection, industrial or marine terminal development could be scaled back, shifted, or phased-in so as to reduce conflicts with resource values.

To facilitate this discussion it is useful to consider the relative value of the identified natural resources on West Hayden Island, and the extent to which each identified natural resource conflicts with proposed development plans. This information is included within the West Hayden Island Goal 5 Inventory, and in the Conflicting Use section of this report, and provides the basis for this analysis. The discussion refers to resource units, which correspond to individual natural resources within the West Hayden Island site, as identified in the West Hayden Island Goal 5 Inventory (Natural Areas Map — Figure 3). Wetlands identification numbers used by Fishman Environmental Services are indicated in parenthesis ().

The consequences on the resource are discussed based on functional categories. The consequences on the conflicting uses are discussed based on general land use categories.

### **Consequences on the Resource**

#### **Cumulative Loss of Environmental Infrastructure**

Marine terminal or industrial development on West Hayden Island will require the elimination of wetland and flood storage resources, wildlife habitat (including shallow water habitat important to fisheries), and forest resources. These impacts can be described as cumulative. As discussed above, and in Appendix A, these cumulative impacts can have important economic consequences.

Protection or conservation of floodplain resources on the site would help reduce flood relief expenses in the future. Protection or conservation of the highest rated wildlife resources on the site would help protect the economic benefits gained from wildlife. Protection or conservation of the forest resources on the site would help protect the economic benefits associated with large urban forests (such as air pollution reduction and the moderating impact on microclimate).

Protection or conservation of individual resources on West Hayden Island could have negative consequences if such an action forces destruction of other more valuable natural resources. In addition, protection or conservation of certain resources could have negative consequences if that protection precludes resource enhancement projects. For example, some wetland resources on the site could be enhanced to provide improved fish habitat on the site.

Commercial or institutional development on West Hayden Island would require significant alteration of vegetation and topography on a scale similar to that of industrial development, with similarly negative impacts on environmental infrastructure and the economic value of that infrastructure. The limited protection options discussed immediately above apply to commercial as well as industrial development.

As discussed above, housing within industrial zones must relate to the industrial use (for example, a watchman's residence). The impacts of such residential uses on the resource would therefore relate to the impact of the primary industrial use. Houseboat moorages may also be allowed in industrial zones provided that this use does not interfere with the industrial use of the waterway. Limited protection or conservation of natural resources on West Hayden Island would protect the functional natural resource values of the site, while allowing residential development on portions of the site with lower resource values (provided the residential development is allowed by the base zone).

Recreational facilities can require the removal of vegetation or the modification or destruction of natural resources in much the same way as other conflicting urban development. Large open areas such as golf courses and ball fields, although providing resting or feeding areas for some birds and animals, also can contribute to water pollution through runoff. Pedestrian trails remove vegetation and introduce human activity into natural areas, adversely impacting wildlife values. Water access for fishing and boating can create similar impacts. Intensive recreational use could degrade natural resource values, and therefore reduce the economic values associated with the existence of those resources. Limited protection or conservation of natural resources on West Hayden Island would protect the functional natural resource values of the site, while allowing low impact recreational facilities such as pedestrian trails.

Utilities, such as overhead lines and underground facilities can adversely impact natural resources, and thus have negative consequences on the economic value of those resources. Limited protection or conservation of natural resources on West Hayden Island would protect the functional natural resource values of the site, while allowing ongoing operation and maintenance of existing utilities.

Potential agricultural uses on West Hayden Island include the planting of crops, raising livestock, and forestry. All of these activities can have negative consequences on environmental infrastructure, and thus have negative consequences on the economic value of those resources. Limited protection or conservation of natural resources on West Hayden Island would protect the functional natural resource values of the site by precluding large scale

alteration or removal of natural resources for agricultural purposes, and by precluding livestock grazing within the highest valued resource units on the site.

### **The Amenity Value of Natural Areas**

Marine terminal or industrial development on West Hayden Island would lead to the loss of natural amenity resources. As discussed above, natural amenities are a regional asset. The loss of those resources has potential economic consequences (see Appendix A).

The above statement must be qualified by several factors. First, West Hayden Island is not currently accessible to the public, although some public use does occur informally. Second, all of the proposed marine terminal development alternatives have included open space components in the southernmost portion of the study area. Some of these open space areas would be open to the public. Thus, the amount of publicly accessible greenspace may increase with some development scenarios. The open space components proposed as part of the *West Hayden Island Development Program* could have some recreational and greenspace related economic benefits, although perhaps not as great as the benefits of a larger regional park. Protection or conservation of these open space components helps retain and attract businesses to North Portland and supports the recreation equipment economy. It must be recognized, however, that a portion of the value of regional greenspaces can be attributed to the mere existence those spaces, regardless of whether the public has access. In addition, the wildlife habitat value of West Hayden Island as a whole supports regional wildlife populations, which supports the value of other public greenspace investments.

At a more localized level, the loss of forest resources along the southern shore of West Hayden Island would likely reduce the value of houseboat moorages in the Oregon Slough, since the existence of a large undeveloped greenspace on West Hayden Island probably adds amenity value to those properties (see Appendix A). The current marine terminal development alternatives all retain areas along the southern shore of the island, which is the portion of the site closest to houseboats. Protection of these resources helps support the value of those houseboats.

Commercial or institutional development on West Hayden Island would require significant alteration of vegetation and topography on a scale similar to that of industrial development, with similarly negative impacts on amenity values. The discussion of the consequences related to industrial uses above applies to commercial as well.

As discussed above, housing within industrial zones must relate to the industrial use (for example, a watchman's residence). The impacts of such

residential uses on the resource would therefore relate to the impact of the primary industrial use. Houseboat moorages may also be allowed in industrial zones provided that this use does not interfere with the industrial use of the waterway. Limited protection or conservation of natural resources on West Hayden Island would protect the most valuable amenities of the site, while allowing residential development on portions of the site with lower resource values (provided the residential development is allowed by the base zone).

Public enjoyment of a natural area adds economic value to that area. However, allowing heavy recreational uses on West Hayden Island could degrade natural resources, and thus reduce the amenity value of the site. Limited protection or conservation of natural resources on the site would help protect the quality of remaining greenspaces on the site, and therefore would protect the amenity value of the site.

Utilities, particularly overhead lines, can also have adverse visual impacts which can negatively affect the amenity value of a natural area. Limited protection or conservation of natural resources on the site would help protect the quality of remaining greenspaces on the site (and therefore the amenity value) by directing the development of new utilities to lower valued portions of the site. Limited protection or conservation of natural resources on the site would not eliminate the impacts of existing utility corridors on the site.

Agricultural uses on West Hayden Island can have negative consequences on natural resource amenities. However, not all agricultural uses have negative consequences on amenity values. The strongest negative impacts are associated with forest removal, or removal of other highly valued natural resources. Existing agricultural uses may have scenic amenity values. Limited protection or conservation of natural resources on the site would help protect the quality of remaining greenspaces on the site (and therefore the amenity value) by directing agricultural uses to lower valued portions of the site.

### **State and Federal Mitigation**

According to federal and state regulations, elimination of some natural resources on West Hayden Island will require mitigation. Mitigation costs can be reduced by avoiding conflicts with such resources. Limited protection of resources on West Hayden Island would encourage development to avoid certain resources, thus reducing mitigation costs associated with state and federal regulations.

One mitigation option is to enhance the value of remaining resource units. For example, some wetland areas could be enhanced by being hydrologically re-connected to the Oregon Slough (Smyth & Bakke, 1995). The Port of

Portland has also proposed creating a new wetland channel on the western portion of the site.

Environmental conservation and protection zoning regulations permit enhancement activities in some cases, provided the enhancement has no negative impacts to existing resources, and provided that at least one functional value is substantially enhanced. These enhancement regulations are intended to re-enforce a policy that mitigation projects should not lead to further elimination or degradation of existing resources. In particular, mitigation that involves the disturbance of existing wetlands, or water bodies, removal of native vegetation, excavation, filling, or alteration of topography would be discouraged within resource areas.

Wetland #1 (FES 20 and 21) is located where the Port of Portland proposes to create a new wetland channel. While such mitigation may have environmental benefits, care should be taken to avoid destroying (or interrupting) existing natural resources. Protection of Wetland #1 may preclude the development of a new wetland channel, in the proposed location, if that channel negatively impacted this resource. This may effect the cost of mitigation.

### Consequences on the Conflicting Use

#### **Basic Industries and Regional Economy**

Among Portland's primary economic strengths are an excellent geographic location for west coast and international trade, and good transportation facilities for moving both goods and people. Many industries rely on the continued access to efficient Port facilities. As part of the city's basic transportation infrastructure, the Port contributes to the economy of the city and the region as it supports basic industries that bring wealth into the region.

By reducing the size of the proposed general cargo terminal in order to protect certain resource units, future Port expansion and efficiency improvements could eventually be limited. Such action could possibly place the City at a competitive disadvantage. The result may be increased vacancy rates, less new construction, and less employment for the city as a whole. This effect would be strongest in industries which rely on efficient movement of goods and access to Port facilities, or industries which could benefit from Port expansion. The Martin O'Connell & Associates estimate described in the background material above provide some quantification of the economic impacts of the Port of Portland in the region.

### **Port capacity and Growth**

By reducing the size of the proposed general cargo terminal in order to protect certain resource units, future Port expansion and efficiency improvements could eventually be limited.

### **Industrial and Marine Terminal Development Potential**

In simple terms, development potential is a measure of how much development can be placed on a property. Limited protection of natural resources may reduce development potential if the development could not be accomplished in an environmentally sensitive manner, or redistributed elsewhere.

Development potential on General and Heavy Manufacturing properties is related to land area, so reduction in area directly available for development can represent a loss in development potential. For industrial development, the consequences of protecting significant natural resources is related to the land area that is protected. In the case of West Hayden Island, it is possible to specifically identify the economic consequences of protecting particular resources on marine terminal development because general development plans are being prepared by the Port of Portland. The following analysis identifies the consequences of conserving or protecting specific individual resources on West Hayden Island.

Federal and state regulations require that the Port mitigate for the loss of some resources, even in the absence of City zoning protection. For this reason, and because some portions of the site are poorly suited for development, a portion of the site is retained on all of the current marine development alternatives. For example, the western tip of West Hayden Island is relatively narrow, and may not be a suitable marine terminal development site. Land along the southern bank of the site (The Oregon Slough) is also less valuable for marine terminal development due to the smaller size of the channel, and because the West Hayden Island site does not have adequate width to support development of both shores.

The several alternative development plans presented by the Port of Portland show development areas ranging from 507 to 611 acres. There are several resource units which do not conflict with the proposed recommended development plan. These resource units are: riparian forest unit #1 (hereafter referred to as RF 1), RF 2, Wetland #5b (hereafter referred to as W 5b), W 11, W 14 (FES 11), and W 13 (FES 1). Full protection of these resources would have no negative economic consequences for marine terminal uses.

Portions of several resource units are located in other areas generally unavailable for port development. Portions of the RF 7 and RF 9 units are located between the City of Portland sewer outfall line and the Burlington

Northern Railroad mainline track. As discussed above in the section entitled "economics of development constraints," marine terminal development in this area is not being considered by the Port of Portland. Full protection of these resources would have no negative economic consequences for marine terminal uses.

Because the proposed marine terminal facilities are concentrated along the northern shore of the island, resources on the southern shore are retained in all of the development alternatives. Thus, most of resource units RF 8, RF 9 have no conflict with marine terminal development. Full protection of the non-conflicting portions of these resources would have no economic consequences on marine terminal development.

Resource units W 3 (FES 18) and W 5a (FES 16) are in the path of the approach leading to a proposed second rail bridge. The economic value of the secondary bridge can be expressed in terms of better connectivity within the local rail network, which will lead to more efficient movement of goods. However, if the rail alignment in this area could be altered slightly, or an environmentally sensitive design is applied, this conflict could be avoided. Applying a conservation zone would conserve the important resources and functional values within these resource units while still allowing for a rail alignment with an environmentally sensitive design.

Resource unit W 2 (FES 19) sits in the path of a proposed grain/bulk terminal (as described in the Port of Portland's recommended alternative). Unit W 2 overlaps with only a small portion of the proposed grain/bulk facility. If the shape of the grain/bulk rail loop could be altered, or an environmentally sensitive design is applied, this conflict could be avoided. Applying a conservation zone would conserve the important resources and functional values within this resource unit while still allowing for a grain/bulk facility which incorporates environmentally sensitive design in the vicinity of this resource.

Resource unit W 12 (FES 2) is located in the areas proposed for general cargo terminal development, where one of the access roads enters the terminal area. Because this resource is located at the edge of the cargo terminal, there may be greater flexibility in development options here. It is possible that development in this area could avoid this resource without significant impact to the efficiency or capacity of the proposed development. Applying a conservation zone would conserve the important resources and functional values within this resource unit while still allowing for environmentally sensitive development within this resource unit.

Portions of units RF 3, RF 7, RF 9, and W 6a are located within the power transmission corridor on the central portion of the site. The Port of Portland has indicated that only limited development would be practical within this

corridor. The most likely marine terminal related development within this corridor could be access roads, and stormwater ponds. Protection or conservation of this corridor would preclude the large scale alteration of resources that would be necessary for the development of access roads and stormwater ponds.

Resource unit W 7 (FES 9 and 10) received one of the highest habitat value scores on the site. This resource unit sits in the path of an inter-modal yard and rail spur proposed by the Port of Portland as part of marine terminal development. Prohibiting the development of the proposed inter-modal yard would directly eliminate the potential for as many as 100 inter-modal yard employees (Port of Portland Estimates). The intermodal yard is critical to the operation of the proposed container terminal. Prohibiting the development of the proposed inter-modal yard would seriously undermine the viability of development on the site as a whole, with consequences to the regional economy, as discussed in the background material above.

Resource unit W 8 (FES 7) and RF 10 are the highest ranked wetland and riparian forest units respectively. Resource unit RF 10 surrounds unit W 8. Resource units W 9 (FES 6), W 10 (FES 3 and 4), W 15 (FES 5), W 6b (FES 13), W 6c (FES 12), and a portion of RF 5 are also located in this same general area. Each of these units contributes to the relatively high value of this cluster, with each unit re-enforcing the value of adjacent units. This cluster of resources conflicts with the third phase of development described in the Port of Portland's Recommended Development Plan (10/12/95). The Third phase of development could be either an enlargement of the container terminal, or the development of a second grain/bulk terminal. This phase of development would be the final phase of development on West Hayden Island, and would not occur for 10 to 20 years.

A reduction in land area available for container terminal development will effect the employment potential of the proposed marine terminal development. Port estimates indicate that employment at the general cargo terminal would be approximately 3.33 employees per acre. Full protection of this resource cluster would remove approximately 100 acres from the proposed container terminal (about 1/3 of the total area, or most of phase three). This leads to a loss of up to 333 potential employees if these resource units are fully protected. Using the Port's estimate of 2000 containers per acre per year, and an average revenue of \$200 per container, this loss of area translates into a capacity potential of 200,000 fewer containers annually, and approximately \$40 million per year in lost gross revenue potential (Assuming this portion of the development could not be located elsewhere).

The consequences of protecting this cluster changes if a second grain bulk terminal is developed during phase three rather than an enlarged container terminal. If these resource units are protected, and the proposed second

grain/bulk facility is unable to locate elsewhere, the potential for as many as 100 jobs is lost.

Unit RF 5 received one of the highest habitat value scores among the 10 riparian forest units on the site. Unit W 4 (FES 15), known as the Benson Pond, also received a relatively high habitat value score. These units are adjacent to each other, which contributes to their value. The primary conflict with protecting these resources is the proposed grain/bulk terminal and associated rail loop. The current Recommended Development Plan (10/12/95) indicates that a grain/bulk facility can be placed in this area in a manner which minimizes impact to natural resources. Specifically, current development plans propose to retain much of the Benson Pond (W 4, FES 15), and much of the forest area within the proposed rail loop. Conservation of the Benson Pond, and forest resources within the grain/bulk rail loop would allow the development of the grain/bulk terminal as proposed, while conserving much of the functional value of these resource units.

### **Commercial Uses**

As discussed in the conflicting use analysis, stand-alone commercial uses are unlikely on West Hayden Island. Commercial development in industrial zones is often directly related to the primary industrial uses of the site (for example a lunch counter serving employees of an industrial facility). To the extent that such commercial uses are impacted by resource protection, the primary industrial uses they are associated with may also be impacted.

Limited protection may have a positive impact on some commercial uses. In some commercial/industrial areas, such as the Koll Business center in Washington County, natural resource amenities have been integrated into the development in such a way as to increase its desirability, and therefore its value.

### **Institutional Uses**

Limiting daycare and community service uses on West Hayden Island may have negative economic consequences to the extent that such uses support marine terminal operations (for example, by providing services needed by marine terminal employees). To the extent that such institutional uses are impacted by resource protection, the primary industrial uses they are associated with may also be impacted. As discussed in the conflicting use analysis, large scale institutional uses (schools, colleges, medical centers, or religious institutions) are unlikely on West Hayden Island.

### **Residential Uses**

Limited protection of West Hayden Island resources would not preclude residential development of the site, assuming such development is allowed by the base zone. Existing Multnomah County zoning allows residential

development on lots of 28 acres or more. If City of Portland industrial zoning is placed on the site, residential development would be limited to residences specifically supporting the primary industrial use of the site (such as a watchman's residence), or to houseboat moorages provided such uses do not interfere with the industrial use of the waterway. Limited protection would conserve of the functional value of resources on the site while allowing development to occur. In many cases the conservation of resources enhances the economic value of residential development (as amenities are capitalized into property values). The consequences of limited protection on residential uses are positive.

### **Recreational Uses**

Allowing passive recreational uses on West Hayden Island, such as limited boating facilities, wildlife viewing areas, pedestrian trails, and interpretive facilities, would support the region's recreation, tourist, and convention industries, and would support the amenity values of the regional greenspaces system. Open space recreational uses provide amenities which can help attract some industries to the region. Limited protection or conservation of natural resources on West Hayden Island would protect natural resources from intensive recreational development, while allowing passive recreational uses.

### **Utilities and Dredge Disposal**

Allowing utility uses on West Hayden Island would facilitate the ongoing operation and maintenance of existing utility corridors on the site (Overhead transmission lines and a sewer outfall line). Allowing continued disposal of dredge material on the site would reduce the regulatory (permitting) cost of obtaining another disposal site to replace the West Hayden Island site. Allowing disposal of dredge material on West Hayden Island would also facilitate (provide fill material for) marine terminal development. Limited protection or conservation of natural resources on West Hayden Island does not restrict ongoing operation and maintenance of existing overhead transmission and sewer outfall lines. Limited protection or conservation allows utility upgrades and new connections, subject to standards designed to protect natural resource values. Limited protection or conservation of natural resources on West Hayden Island would limit dredge disposal to portions of the site with lower resource values.

### **Agricultural Uses**

Based on the information presented in the conflicting use analysis, limiting agricultural uses on West Hayden Island would have few economic consequences, except to the extent such an action effects cattle currently grazing on West Hayden Island. Limited protection or conservation of resources on West Hayden Island could involve removing cattle from the highest valued natural resources on West Hayden Island.

## Summary

Possible actions associated with limiting conflicting uses are presented in Table 10. For each action, the economic consequences are summarized.

Table 10. Economic Consequences of Limiting Conflicting Uses

Possible Action	Consequences
Protect resource units along the Oregon Slough.	<ul style="list-style-type: none"> <li>+               <ul style="list-style-type: none"> <li>• Protects houseboat property values.</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>-               <ul style="list-style-type: none"> <li>• Some resources in this area conflict with rail and access road needs of marine terminal development.</li> </ul> </li> </ul>
Protect resources on the western tip of the site.	<ul style="list-style-type: none"> <li>+               <ul style="list-style-type: none"> <li>• Protects some wildlife habitat value.</li> <li>• Protects amenity values associated with this portion of the site.</li> <li>• Protects functional value of some forest resources.</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>-               <ul style="list-style-type: none"> <li>• May impact cost of mitigation projects in this area.</li> </ul> </li> </ul>
Protect resources between the City of Portland sewer outfall pipe and the Burlington Northern Railroad	<ul style="list-style-type: none"> <li>+               <ul style="list-style-type: none"> <li>• Protects some wildlife habitat value.</li> <li>• Protects functional value of forest resources on this portion of the site (air quality and microclimate).</li> <li>• Protects amenity values associated with this portion of the site.</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>-               <ul style="list-style-type: none"> <li>• Some resources in this area conflict with rail and access road needs of marine terminal development.</li> <li>• May impact the cost of maintaining and upgrading sewer outfall pipe.</li> </ul> </li> </ul>
Protect areas within the power transmission corridors.	<ul style="list-style-type: none"> <li>+               <ul style="list-style-type: none"> <li>• Protects functional value of forest resources on this portion of the site (air quality and microclimate).</li> <li>• Protects amenity values associated with this portion of the site.</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>-               <ul style="list-style-type: none"> <li>• May preclude placement of access roads and stormwater pond in this area.</li> <li>• May impact placement of new utilities in this corridor.</li> </ul> </li> </ul>

Table 10. Economic Consequences of Limiting Conflicting Uses (cont.)

Possible Action	Consequences
Limit conflicting uses in those wetland areas in the path of the proposed grain/bulk terminal rail loop, west of the power transmission corridor.	<p>+</p> <ul style="list-style-type: none"> <li>Protects wildlife habitat values on this portion of the site.</li> <li>Protects functional value of forest resources on this portion of the site (air quality and microclimate).</li> <li>Protects amenity values associated with this portion of the site.</li> <li>Protects some flood storage resources.</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>Possible increases in design and construction costs of rail loop.</li> </ul>
Limit conflicting uses within wetlands adjacent to and east of sewer outfall pipe.	<p>+</p> <ul style="list-style-type: none"> <li>Protects the functional values of wetland resources.</li> <li>Enhances amenity and wildlife values of adjacent forested areas.</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>Some resources in this area conflict with rail and access road needs of marine terminal development.</li> <li>May impact the cost of maintaining and upgrading sewer outfall pipe.</li> </ul>
Limit conflicting uses within Benson Pond and resources inside the proposed grain/bulk rail loop.	<p>+</p> <ul style="list-style-type: none"> <li>Protects wildlife habitat values on this portion of the site.</li> <li>Protects functional value of forest resources on this portion of the site (air quality and microclimate).</li> <li>Protects amenity values associated with this portion of the site.</li> <li>Protects some flood storage resources.</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>Possible increases in design and construction costs of the grain/bulk terminal.</li> </ul>
Protect resources which conflict with intermodal yard and rail access.	<p>+</p> <ul style="list-style-type: none"> <li>Protects wildlife habitat values.</li> <li>Protects amenity values of the site.</li> <li>Protects functional values of wetlands and forest resources.</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>Seriously undermines economic viability of marine terminal development on the site.</li> </ul>

Table 10. Economic Consequences of Limiting Conflicting Uses (cont.)

Possible Action	Consequences
Protect resources which conflict with phase 3 of proposed marine terminal development.	<p>+</p> <ul style="list-style-type: none"> <li>Protects significant wildlife habitat values.</li> <li>Protects functional values of forests and wetlands.</li> <li>Protects amenity values of the site.</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>Eliminates economic benefits associated with phase three: either a second grain/bulk terminal, or expanded container terminal capacity.</li> </ul>
Limit conflicting uses in wetlands which could be hydrologically re-connected to the Columbia River or Oregon Slough.	<p>+</p> <ul style="list-style-type: none"> <li>Some level of conservation will protect existing functional values of these resources.</li> <li>Protects resources from development which could preclude salmon habitat enhancement projects.</li> <li>Protects amenity values of the site.</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>Conservation of some wetland resources may harm the viability of marine terminal development.</li> <li>Applying a conservation or protection zone to these areas might inhibit future salmonid habitat enhancement projects.</li> </ul>
Protect the highest rated resources on the site, as determined by the wildlife habitat assessment.	<p>+</p> <ul style="list-style-type: none"> <li>Protects the value of wildlife habitat from intensive marine terminal, recreation, and agricultural uses.</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>May harm viability of marine terminal development.</li> </ul>
Limit conflicting uses on portions of the site below the Columbia River High water Mark.	<p>+</p> <ul style="list-style-type: none"> <li>Protects the value of flood storage resources.</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>Constrains marine terminal development, particularly wharf design options.</li> </ul>
Limit conflicting uses within all forest resources on the site.	<p>+</p> <ul style="list-style-type: none"> <li>Protects the functional values of the forest associated with microclimate and air quality.</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>Conservation of some forest resources may harm the viability of marine terminal development.</li> </ul>

## **ECONOMIC CONSEQUENCES OF PROHIBITING CONFLICTING USES**

The following is a summary of the likely economic consequences of prohibiting conflicting uses, i.e. full protection of resources on West Hayden Island. This analysis is based on the economic concepts and background information presented above and in Appendix A. Full protection of all resources on West Hayden Island would preclude any industrial or marine terminal development from occurring on the portion of West Hayden Island included within the Goal 5 Inventory. The consequences of full protection on commercial, residential, agricultural, recreational, and utility uses are also discussed.

The consequences on the resource are discussed based on functional categories. The consequences on the conflicting uses are discussed based on regional economic consequences and consequences on general land use categories.

### **Consequences on the Resource**

#### **Cumulative Loss of Environmental Infrastructure**

Prohibiting industrial and marine terminal uses on the site would protect the cumulative economic values associated with fish and wildlife, forest, floodplain, and wetland resources, as described in Appendix A. Prohibiting commercial, institutional, residential, and agricultural development would have similar consequences. Certain existing and new utility uses are allowed within environmental overlay zones. Full protection would not necessarily fully protect resource values from existing utility uses.

#### **Amenity Value of Natural Areas**

Prohibiting industrial and marine terminal uses on the site would support the economic amenity values associated with the regional system of natural areas, as described in Appendix A. Prohibiting commercial, institutional, residential, and agricultural uses would have similar consequences. Certain existing and new utility uses are allowed within environmental overlay zones. Full protection would not necessarily fully protect amenity values from existing utility uses.

At a more localized level, elimination of forest resources on West Hayden Island would likely reduce the value of houseboat moorages in the Oregon Slough, since the existence of a large undeveloped greenspace on West Hayden Island probably adds amenity value to those properties. Prohibiting marine terminal or industrial development on West Hayden Island would protect this specific amenity value.

## **Mitigation**

According to federal and state regulations, the elimination of some identified natural resources on West Hayden Island (wetlands particularly) will require mitigation. Prohibiting industrial or marine terminal development would likely reduce or eliminate future mitigation costs related to West Hayden Island.

## **Consequences on the Conflicting Use**

### **Basic Industries and Regional Economy**

Among Portland's primary economic strengths are an excellent geographic location for west coast and international trade, and good transportation facilities for moving both goods and people. Many industries rely on the continued access to efficient Port facilities. As part of the City's basic transportation infrastructure, the Port contributes to the economy of the city and the region as it supports basic industries that bring wealth into the region.

By prohibiting conflicting uses on West Hayden Island, future Port expansion and efficiency improvements would be limited. Such action would place the City at a competitive disadvantage. The result may be increased vacancy rates, less new construction, and less employment for the city as a whole. This effect would be strongest in industries which rely on efficient movement of goods and access to Port facilities, or industries which could benefit from Port expansion. The Martin O'Connell & Associates estimates described in above provide some quantification of the economic impacts of the Port of Portland in the Portland region.

### **Port Capacity and Growth**

By prohibiting industrial or marine terminal development on West Hayden Island future Port expansion and efficiency improvements could eventually be limited. Prohibiting industrial or marine terminal development on the site would require the extensive redevelopment of existing port facilities or the pursuit of joint development with other Ports in the Lower Columbia Region. One outcome of limited Port capacity is to push marine business toward other ports, with negative impacts on the Portland regional economy.

### **Industrial and Marine Terminal Development Potential**

Industrial needs for the City of Portland and Portland metropolitan area have been described in detail in the *Inventory and Analysis of Wetlands, Water Bodies, and Wildlife Habitat Areas for the Columbia Corridor*, adopted by the City of Portland in April 1989 (pages 127-134). The report concludes that the need for industrial land in the metropolitan area by the year 2005 is about 5,192 acres. About 19,070 acres of vacant, suitable land exist within the metropolitan urban growth boundary, 10,483 of these are vacant and

uncommitted and have no development constraints. This provides a market ratio of over 2:1 for the estimated need for presently unconstrained land, and a ratio of almost 4:1 for all vacant industrial land. In addition, there are about 9,700 acres of vacant industrial land within Multnomah County and, according to the 1989 publication by the Bureau of Planning *1987 Vacant Land Inventory* 5,731 acres of vacant industrial land within the City of Portland.

However, industries which are highly location-dependent, such as deep-draft shipping or air freight facilities may face shortages. As described above, the Port of Portland faces capacity constraints unless the land base available for marine terminal uses is expanded. West Hayden Island is the only undeveloped parcel within the urban growth boundary that meets marine terminal development requirements.

As discussed previously, a reduction in area available for development on a parcel can affect overall employment potential on industrial zoned land. For transportation planning purposes, the City estimates employment densities for new industrial development at 15 employees per acre. Assuming that all of the 650 acres within the inventory site were excluded from industrial use, the potential for up to 9,750 employees could be eliminated. This figure, however, is misleading because much of the resource area is wetland, water, or river bank, with major development limitations. The cost of developing some of these lands will exceed the returns for many private ventures. In addition, federal and state regulations place additional costs on development plans, making those resources less available for development even if development is allowed by City zoning.

For example, the Columbia River Economic Development Council's *Industrial Land Policy*, for example, states that for the purposes of industrial land inventory, the presence of wetland's, hydric soils, floodways, or critical habitat will cause a property to be classified as marginally or poorly suited for industrial development. The employment potential for industrial uses on West Hayden Island is likely to be considerably less than the number implied by a simple ratio of employees per acre.

As discussed above, Port of Portland estimates the following employment for elements of the proposed development plan: 3.33 employees per acre at the general cargo terminal; as many as 100 employees for the entire grain/bulk terminal; and up to 100 employees at the intermodal yard.

Federal and state regulations require that the Port of Portland mitigate for the loss of some resources, even in the absence of City zoning protection. For this reason, and because some portions of West Hayden Island are not suitable for marine terminal development, a portion of the site is retained on all of the Port's proposed development plans. For example, the western tip of West Hayden Island is too narrow to be a cost effective development site. Land

along the southern bank of the site (The Oregon Slough) is also less valuable for Port development due to the smaller size of the channel, and because the West Hayden Island site does not have adequate width to support development of both shores.

The several alternative development plans presented by the Port have development areas ranging from 507 to 611 acres. Assuming an approximately 300 acre general cargo terminal, and a single grain/bulk terminal, full protection leads to a loss of up to 1,200 potential new jobs. This figure represents full build-out potential, which will occur only if specific facilities are economically justified by future growth in Port business. Initial employment will be lower. For comparison, Terminal 6 currently employs roughly 400 people.

### **Commercial Uses**

As discussed in the conflicting use analysis, it is unlikely that commercial zoning would be approved for West Hayden Island.

Commercial development in industrial zones is often directly related to the primary industrial uses of the site (for example a lunch counter serving employees of an industrial facility). To the extent that such commercial uses are impacted by resource protection, the primary industrial uses they are associated with may also be impacted.

### **Institutional Uses**

Prohibiting daycare and community service uses on West Hayden Island would have negative economic consequences to the extent that such uses support marine terminal operations (for example, by providing services needed by marine terminal employees). To the extent that such institutional uses are impacted by resource protection, the industrial uses they are associated with may also be impacted.

### **Residential Uses**

As discussed in the conflicting use analysis, it is unlikely that West Hayden Island will be zoned for residential development. In addition, housing within industrial zones must relate to the industrial use (such as a watchman's residence). The economic consequences of the resource on this conflicting use are therefore directly tied to industrial or marine terminal development, as discussed previously.

### **Recreational Uses**

Passive recreational uses on West Hayden Island, such as limited boating facilities, wildlife viewing areas, pedestrian trails, and low impact interpretive facilities, would support the region's recreation, tourist, and convention industries, and would support the amenity values of the regional greenspaces

system. Open space recreational uses provide amenities which can help attract some industries to the region. Full protection of natural resources on West Hayden Island would preclude intensive recreational development, while allowing some passive recreational uses. Full protection of resources greatly enhances attractiveness of passive recreational uses.

**Utilities and Dredge Disposal**

Full protection of natural resources on West Hayden Island does not restrict ongoing operation and maintenance of existing overhead transmission and sewer outfall lines. Full protection allows utility upgrades and new connections, subject to standards designed to protect natural resource values. Full protection would preclude the disposal of dredge material on protected portions of the site.

**Agricultural Uses**

Based on the information presented in the conflicting use analysis, prohibiting agricultural uses on West Hayden Island would have few economic consequences, except to the extent such an action would eliminate employment and revenue from cattle currently on West Hayden Island. The economic consequences of removing cattle from West Hayden Island would depend on whether those cattle could be located elsewhere.

**Summary**

The economic consequences of prohibiting conflicting uses are summarized in Table 9.

**Table 11. Economic Consequences of Prohibiting Conflicting Uses**

Possible Action	Consequences
Fully protect the entire resource site.	<p style="text-align: center;">+</p> <ul style="list-style-type: none"> <li>• Supports the economic value of environmental infrastructure.</li> <li>• Supports greenspace/amenity values.</li> <li>• Eliminates federal and state mitigation costs.</li> </ul>
	<p style="text-align: center;">-</p> <ul style="list-style-type: none"> <li>• Effects efficiency of basic industries, future Port capacity and growth, and development flexibility.</li> <li>• Reduces flexibility when placing new utilities.</li> </ul>

**ECONOMIC ANALYSIS CONCLUSIONS AND RECOMMENDATIONS**

There are large economic benefits associated with allowing efficient Port facilities. These benefits include direct employment at new marine terminal facilities, as well as new jobs within industries which would utilize expanded

Port facilities. Existing marine terminal facilities make a significant contribution to the regional economy. The benefits of marine terminal development accrue on a regional scale.

There are also significant economic values associated with natural resources found on West Hayden Island. These values are derived from floodplain resources, fish and wildlife habitat (including critical habitat for endangered salmon runs), and the air quality and microclimate benefits of urban forests. Natural amenities (such as large natural areas) also play an important role in the regional economy by attracting and helping to retain high quality jobs, contributing to tourism, supporting recreation, and contributing to property values.

An economic analysis of potential development on West Hayden Island must consider two views of the Portland economy. One view is that Portland has an economy rooted in the movement of goods. As such, development and maintenance of transportation infrastructure (such as adequate marine terminal capacity) is critical. A second view of the regional economy is one based on the quality of environmental amenities available. For many people, a high quality environment is a key regional asset, in economic development terms. Increasingly, Portland's economy is based on the trade of information (professional and technical services, technology, entertainment, etc.). A quality environment can be seen as an element of the supporting infrastructure for this portion of the economy.

The basis of this analysis is that these two views are not mutually exclusive, that both views have a place in the larger development strategy of the Portland region. Marine terminal development on West Hayden Island has positive economic consequences. Such development, however, should not take place without the full consideration of the consequences on environmental quality and natural amenities. From an economic point of view, limited protection of natural resources on West Hayden Island represents the best approach. It is not economically wise to prohibit all marine terminal development, or to allow the complete loss of natural resources on the site.

Limited protection would involve protecting or conserving some specific resources on the site in order to protect specific functional values (refer to the conclusions of the limited protection analysis). Limited protection would also allow significant portions of the site to be developed for marine terminal uses.

The Port of Portland may ask voters to support a bond measure to finance marine terminal facilities on West Hayden Island. Portland area voters have demonstrated that they value maintaining open space and large natural areas within the otherwise highly urbanized region (refer to Appendix A). Limited

protection options provide voters with a level of certainty that some natural resources on West Hayden Island will be protected for the long term. This level of certainty will enhance the prospects (and the value) of a marine terminal bond measure. A Port proposal that includes long term protection of resources will be more valuable from the public's point of view.

*Economic Recommendation: The economic analysis supports limited protection of resources on West Hayden Island. This recommendation is the result of the economic analysis only. Conflicts between the actions associated with this recommendation and the social, environmental, and energy recommendations will be resolved in the conflict resolution section of this chapter.*

## SOCIAL ANALYSIS

### GENERAL BACKGROUND/Framework

This analysis outlines the social consequences of allowing, limiting, or prohibiting conflicting uses. The discussion will focus on the following topics: recreational and educational opportunities; historic, heritage, and cultural values; visual variety and impact; urban design and image of the city; screening and buffering of incompatible uses; and health, safety, and welfare. A general discussion of these topics is presented first, followed by an analysis applying these topics in the context of allowing, limiting, or prohibiting conflicting uses.

### Recreational and Educational Opportunities

There are very few undeveloped sites of the size, type, and quality of West Hayden Island (West Hayden Island) within the Portland urban growth boundary (UGB). The site is unique as it is one of the only large islands with cottonwood riparian forest habitat remaining within the UGB. It is a unique educational opportunity for schools in east Portland, providing convenient access to a wide variety of native vegetation and wildlife that was once common along the Lower Columbia and Willamette Rivers.

Recreational opportunities afforded by large waterfront natural areas, such as fishing, limited boating, wildlife viewing, and hiking are important. Such waterfront resources are scarce within the City of Portland, particularly along the Columbia River. The 1991 Parks Futures Plan identified an extreme shortage of public land as a major constraint to the current and future recreational use of the Columbia riverfront (City of Portland, Bureau of Parks and Recreation, 1991, p.5.59).

The West Hayden Island site also has potential recreational benefits for the residents of the eastern portion of Hayden Island, who currently must drive off the island to enjoy this type of resource.

### Historic, Heritage, and Cultural Values

West Hayden Island is near the confluence of the Willamette and Columbia Rivers. Before the arrival of Euroamerican settlers in the Portland area, both rivers functioned, as they do today, as the major routes of commerce. It is very likely that West Hayden Island had many visitors prior to the first record of the island by European-American explorers. The island was a prominent landmark in the Columbia River, and was noted in the journals of several early explorers (William Robert Broughton, 1792, and Lewis and Clark, 1805). Explorers noted extensive Native American villages both upstream and downstream of the Island. Evidence of Native American activities, particularly transitory activities such as food gathering, hunting and fishing,

is likely to exist in some form on Hayden Island. Evidence of much of the pre-historic use on the site has very likely been disturbed or destroyed, both by river erosion and by being covered by dredge material. It is the margins of the historic (pre-dredge) island that have been most affected. Industrial and marine terminal development would require re-grading of the land, possibly exposing or destroying any remaining artifacts. Use of the island by EuroAmericans was associated with Fort Vancouver (approximately two miles to the northeast, on the opposite side of the Columbia River). By 1825 the land surrounding Fort Vancouver was being used as horse and cattle pasture and was under cultivation of grains, vegetables and fruits. A dairy was set up on Hayden Island directly across from the Fort. Hayden Island was later settled by members of the Hayden emigrant party, the island eventually being purchased by Guy Hayden and his wife Mary Jane in 1851 (Minor, et. al, 1994).

### **Visual Variety and Impact**

Much of the surrounding land is flat, and covered with hard paved surfaces. The eastern portion of Hayden Island is dominated by the extensive parking lots of the Jantzen Beach Mall. To the north is the Port of Vancouver's marine terminal, and other heavy industrial uses. To the south is the Rivergate industrial area and the Port of Portland's Terminal 6, which includes extensive paved areas used to store imported automobiles and other marine cargo. The forested area of West Hayden Island provides some relief from these large paved areas.

### **Urban Design and Image of the City**

Significant riverine natural areas, and waterfront recreational opportunities help to provide a sense of definition, location, and uniqueness the City of Portland. As the largest remaining cottonwood riparian forest within the urban growth boundary, West Hayden Island could play a significant role in re-enforcing the City's river-oriented image. The site's significance is further re-enforced because it is an island. Other islands within the City, such as Swan Island and Ross Island have been greatly impacted by industrial and marine uses.

In contrast, large grain elevators, conveyors, and loading cranes can have a strong visual impact on the surrounding area. Proposed marine terminal facilities would be visible to those crossing the Interstate bridge, and to those arriving in Portland by rail. This would contribute to the image of Portland as a vibrant port city. Large industrial and marine terminal facilities can be used as an element in urban design. For example, the downtown waterfront in Olympia, Washington incorporates a viewing tower overlooking Port facilities there.

### **Screening and Buffering of Incompatible Uses**

Natural resources, such as those on West Hayden Island can act as an edge to different land uses, separating and buffering them from each other by both distance and visually.

### **Health, Safety, and Welfare**

The health, safety, and welfare consequences can be considered from a physical or socio-economic perspective.

Any marine terminal or industrial development on West Hayden Island would require extensive filling of land within the flood plain. This filling would reduce the capacity of the site to store floodwaters. Flood storage areas help protect the public from flood danger.

Studies show that urban forests have a clear role to play in reducing stress-related impacts on health. Exposure to nature has significant "restorative" benefits. For example, hospital patients with windows that overlook trees have more favorable recovery rates, shorter hospital stays, and a lower intake of pain relieving drugs than those patients without view of trees (Ulrich, 1984). In addition, urban forests help reduce air pollution problems and the resulting health impacts (City of Portland, Energy Office, 1993).

The Port of Portland represents an important element in the regional infrastructure, supporting the basic industries of the region. Constraining marine terminal development could constrain the growth of the regional economy. A weaker regional economy can result in increased vacancy rates, less new construction, and less employment for the city as a whole. Unemployment and vacant buildings contribute to crime, social distress, and neighborhood decay. As stated in the economic analysis, the regional system of natural areas, and an environmentally friendly image also contributes to Portland's economy.

### **SOCIAL CONSEQUENCES OF ALLOWING CONFLICTING USES**

The following is a discussion of the consequences of allowing marine terminal and industrial development to occur on West Hayden Island. This analysis is based on information presented above. The consequences of allowing commercial, residential, recreational, utility, and agricultural uses are also discussed.

The consequences on the resource are discussed based on functional categories. The consequences on the conflicting uses are discussed based on general land use categories.

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## Consequences on the Resource

### **Recreational and Educational Opportunities**

Fully allowing industrial, marine terminal, commercial, institutional, or residential uses would preclude future acquisition of this site for recreation, eliminating the largest opportunity to expand public riverfront access to the Columbia River.

A portion of the recreational and educational value of a natural area can be attributed to the existence of wildlife, and other environmental infrastructure values discussed above. Intensive recreational use could degrade natural resource values, and therefore reduce the social values associated with the existence of those resources.

Allowing new utilities, or the disposal of dredge material on West Hayden Island would not conflict with recreational values except to the extent that some recreational uses rely on an environment free from the visual and natural habitat impacts of those uses.

Many agricultural activities would involve removal or alteration of natural vegetation and habitat, reducing the value of the site for recreation and education.

### **Historic, Heritage, and Cultural Values**

Marine terminal, industrial, commercial, institutional, or residential development on West Hayden Island would eliminate the largely natural character of the site, which represents a significant reminder of the historic and pre-historic conditions along the Lower Columbia River. Intensive recreational uses (such as playing fields) would have a similar effect. Passive recreational uses (such as hiking trails and wildlife viewing) would not conflict with the natural character of the site. Utility uses have an impact on the natural character as they often require the creation of cleared corridors, and may have additional visual impacts (described below). Agricultural uses have an impact on the natural character if extensive changes to the landscape are required (such as forest clearing).

### **Visual Variety and Impact**

Marine terminal development on West Hayden Island would add to the already substantial amount of large paved areas in the immediate vicinity. Commercial and institutional development may have similar consequences. Residential development (with the exception of houseboats) would also likely involve substantial removal of vegetation in order to allow the fill necessary to bring the site above the 100 year flood elevation. Intensive recreational uses (such as playing fields), and agricultural uses would have visual impacts if large areas of forest are removed. Passive recreational uses (such as hiking

trails and wildlife viewing) would not have substantial visual consequences. Continued use of the site for cattle grazing would not have substantial visual impacts. As stated earlier, utility uses may require changes to the visual landscape, particularly if they require large cleared corridors, or the construction of large towers (power transmission lines, for example).

### **Urban Design and Image of the City**

Marine terminal, industrial, commercial, institutional or residential development on West Hayden Island would lead to the loss of a substantial portion of the natural resources of the site. These resources can help to provide a sense of definition, location, and uniqueness the City of Portland. Intensive recreational uses (such as playing fields), the disposal of dredge material, or intensive agricultural uses would have a similar effect. Passive recreational uses (such as hiking trails and wildlife viewing) would not conflict with the natural resources of the site. Utility uses have an impact on natural resources as they often require the creation of cleared corridors, and may have additional visual impacts (described below).

### **Screening and Buffering of Incompatible Uses**

Natural resources act as an edge to different land uses, separating and buffering them from each other by both distance and visually. The removal of natural resources can require major changes in land uses to resolve issues of incompatibility, or the creation of artificial buffers, many of which simply duplicate elements found in natural resource buffers. Marine terminal, industrial, commercial, institutional, or residential development on West Hayden Island would require extensive removal of natural resources. Intensive recreational uses (such as playing fields), and intensive agricultural uses would have a similar effect. Passive recreational uses (such as hiking trails and wildlife viewing) would not conflict with the natural resources of the site. Utility uses have an impact on natural resources as they often require the creation of cleared corridors, and may have additional visual impacts (described below).

### **Health, Safety, and Welfare**

Fully allowing marine terminal, industrial, commercial, or institutional uses could reduce or eliminate the health, safety, and welfare benefits of natural resources on West Hayden Island (described above in the social background information).

### **Consequences on the Conflicting Use**

#### **Industrial or Marine Terminal Uses**

Large grain elevators, conveyors, and loading cranes have a strong visual impact on the surrounding area. These facilities help to define a city as a port.

Allowing industrial of marine terminal uses on West Hayden Island would create this kind of visual identifier on West Hayden Island.

West Hayden Island is surrounded, with few exceptions, by heavy industrial land, including the Port of Portland's Terminal 6, and Port of Vancouver facilities. By allowing heavy industry or additional marine terminal facilities here, conflicts with incompatible uses elsewhere in the City can be reduced.

As stated in the economic analysis above, the Port of Portland represents an important element in the infrastructure that supports the basic economy of the region. Allowing marine terminal expansion can result in decreased vacancy rates, more new construction, and more employment for the city as a whole. Employment and occupied buildings reduce crime, social distress, and neighborhood decay.

### **Commercial Uses**

As discussed in the conflicting use analysis, stand-alone commercial uses are unlikely on West Hayden Island. Accessory commercial development on West Hayden Island which provides supporting goods and services to marine terminal or marine-industrial uses will have consequences related to the primary use (industrial or marine terminal uses discussed above).

### **Institutional Uses**

In general, allowing daycare or community service uses on West Hayden Island which provide supporting services to employees of marine terminal or marine-industrial uses will have positive social consequences. As discussed in the conflicting use analysis, large scale institutional uses (schools, colleges, medical centers, or religious institutions) are unlikely on West Hayden Island.

### **Residential Uses**

The most likely residential development on West Hayden Island are residences associated with another primary use, such as agricultural uses, or industrial uses (such as a watchman's residence). In that context, the consequences of allowing residential uses are related to the consequences of allowing these other primary uses.

As discussed in the conflicting use analysis, most of the site is within the 100-year flood plain and was not considered in meeting LCDC goal 10 for needed housing. Allowing such uses in the flood plain can lead to greater damage, injury, and displacement when flooding occurs. Allowing flood storage resources to be filled for purposes of residential development may in the long run increase flooding problems elsewhere, with consequences on existing residential uses. Houseboat moorages could also be allowed on West Hayden Island (assuming industrial zoning) provided that such development does

not interfere with the industrial use of the waterway. Houseboat development would not have an impact on floodplain resources.

### **Recreational Uses**

Allowing passive recreational uses on the site would support the values discussed above in the introduction to the social analysis. To the extent that the natural character of the site is retained, a unique educational opportunity for schools in east Portland is also retained. Allowing recreational uses would increase recreational opportunities along the Columbia River. Such waterfront resources are scarce within the City of Portland. Allowing recreational uses would benefit the residents of the eastern portion of Hayden Island, who currently must drive off the island to enjoy this type of recreational resource.

### **Utilities and Dredge Disposal**

Allowing utility uses on West Hayden Island would facilitate the ongoing operation and maintenance of existing utility corridors on the site (Overhead transmission lines and a sewer outfall line). Allowing continued disposal of dredge material on the site would reduce the regulatory (permitting) cost of obtaining another disposal site to replace the West Hayden Island site. Allowing disposal of dredge material on West Hayden Island would also provide fill material for marine terminal development.

### **Agricultural Uses**

Agricultural activities located in close proximity to urban populations can have recreational and educational value distinct from natural resource values. As stated above, West Hayden Island represents one of the earliest agricultural sites (a dairy) in the region. Continued agricultural use on West Hayden Island may have some historic and heritage value distinct from those values associated with natural resources on the site. In addition, agricultural views can provide visual relief in many urban contexts. Such views, in close proximity to urban uses, can give a city a distinct image. Such views may have health, safety, and welfare benefits similar to the benefits of large natural areas.

## Summary

The social consequences of allowing conflicting uses are summarized in Table 12.

**Table 12. Social Consequences of Allowing Conflicting Uses**

Possible Action	Consequences
Fully allow conflicting uses.	+ <ul style="list-style-type: none"> <li>• Supports positive health, safety and welfare consequences associated with a strong regional economy.</li> </ul>
	- <ul style="list-style-type: none"> <li>• Reduces some recreational and educational opportunities.</li> <li>• Negative effect on historic heritage and cultural values.</li> <li>• Reduces visual variety.</li> <li>• Harms environmentally friendly image of the City.</li> <li>• Reduces health, safety and welfare benefits of a large natural area (for example, benefits of retaining flood storage areas).</li> </ul>

## **SOCIAL CONSEQUENCES OF LIMITING CONFLICTING USES**

The following is a discussion of the consequences of allowing limited marine terminal and industrial development to occur on West Hayden Island. This analysis is based on the introductory information presented above. The consequences of limited protection on commercial, residential, recreational, utility, and agricultural uses are also discussed.

The consequences on the resource are discussed based on functional categories. The consequences on the conflicting uses are discussed based on general land use categories.

### Consequences on the Resource

#### **Recreational and Educational Opportunities**

Limited protection would conserve some recreational and educational resources on the site, while allowing for resource-sensitive development to occur. All of the proposed marine terminal development alternatives include significant public open space components. In those areas, much of the existing resources would be retained. In addition, the Port of Portland proposes to construct a new bridge to the site. Thus, current marine terminal development plans could facilitate recreational and educational use of the site in the future. Protection or conservation of those resources designated as

open space in the *West Hayden Island Development Program* would facilitate future recreational and educational use of a portion of the site.

Commercial, institutional, or residential development on West Hayden Island would have resource impacts similar to marine terminal or industrial development. Limited protection of resources within commercial or residential development areas would to some extent protect recreational and educational resources. The positive consequences of limited protection in this context, however, may be minimal since commercial and residential uses would not involve expanded public access to these resources.

Recreational facilities can require the removal of vegetation or the modification or destruction of natural resources in much the same way as other conflicting urban development. Intensive recreational use could degrade natural resource values, and therefore reduce the social values associated with the existence of those resources.

Allowing new utilities or the depositing of dredge material on West Hayden Island would not conflict with recreational values except to the extent that recreational uses rely on an environment free from the visual and natural habitat impacts of those uses. Limited protection or conservation of resources on West Hayden Island would direct future utility development and dredge disposal away from the highest valued resources on the site, but would not require removal of existing utility corridors or dredge material.

Many agricultural activities would involve removal or alteration of natural vegetation and habitat, reducing the value of the site for recreation and education. Limited protection or conservation of natural resources on West Hayden Island would protect the functional natural resource values of the site by precluding large scale alteration or removal of natural resources for agricultural purposes, and by precluding livestock grazing within the highest valued resource units on the site.

### **Historic, Heritage, and Cultural Values**

Limiting marine terminal, industrial, commercial, institutional, or residential development protects specific resources, but would significantly change the natural character of the site. Limited protection of the site does not preserve the largely natural character of West Hayden Island. Alteration of the natural character of West Hayden Island eliminates a significant reminder of the historic and pre-historic conditions along the lower Columbia River.

Intensive recreational uses (such as playing fields) would have a similar effect. Passive recreational uses (such as hiking trails and wildlife viewing) would not conflict with the natural character of the site. Agricultural uses have an impact on the natural character if extensive changes to the landscape

are required (such as forest clearing). Limited protection or conservation would preclude large scale alteration or elimination of natural resources for recreational and agricultural uses, while allowing activities with less impact on existing natural resources. Utility uses have an impact on the natural character as they often require the creation of cleared corridors, and may have additional visual impacts (described below). Limited protection or conservation would direct future utility development away from the highest valued resources, but would not require removal of existing utility corridors.

### **Visual Variety and Impact**

Limited protection would promote the integration of natural resources into the proposed marine terminal development, and preserve some variety in landscape form. Limited protection would have similar consequences in the context of industrial, commercial, institutional, and residential uses.

Intensive recreational uses (such as playing fields), and agricultural uses would also have visual impacts if large areas of forest are removed. Passive recreational uses (such as hiking trails and wildlife viewing) would not have substantial visual consequences. Limited protection or conservation would preclude large scale alteration or elimination of natural resources for recreational and agricultural uses, while allowing activities with less impact on existing natural resources. As stated above, utility uses may require changes to the visual landscape, particularly if they require large cleared corridors, or the construction of large towers (power transmission lines, for example). Limited protection or conservation would direct future utility development away from the highest valued resources, but would not require removal of existing utility corridors.

### **Urban Design and Image of the City**

Allowing some development on the site would lead to improved public access to the remaining portions of the site. Improved river access associated with the proposed marine terminal proposal would support the river-oriented identity and, therefore, the uniqueness and character of the City as a whole. Protection or conservation of resources on the site which do not conflict with the recommended marine terminal development plan would protect valuable river-oriented resources.

Limited protection or conservation would preclude large scale alteration or elimination of natural resources for industrial, commercial, institutional, residential, recreational and agricultural uses, while allowing activities with less impact on existing natural resources. Utility uses have an impact on natural resources as they often require the creation of cleared corridors, and may have additional visual impacts (described below). Limited protection or conservation would direct future utility development away from the highest valued resources, but would not require removal of existing utility corridors.

### **Screening and Buffering of Incompatible Uses**

Limited protection or conservation of natural resources which serve as buffers or edges between land uses allows for incompatible land uses to locate more closely, with less potential for conflicts.

### **Health, Safety, and Welfare**

Limited protection would conserve many of the health, safety, and welfare benefits of natural areas described above, while still allowing for sensitive development to occur. Some natural areas could be retained on West Hayden Island while allowing for proposed marine terminal development, or other potential uses to occur.

### **Consequences on the Conflicting Use**

#### **Industrial or Marine Terminal Uses**

Large grain elevators, conveyors, and loading cranes have a strong visual impact on the surrounding area. These facilities help to define a city as a port. Allowing limited industrial or marine terminal uses on West Hayden Island would create this kind of visual identifier on West Hayden Island, while conserving many of the natural resource values of the site.

West Hayden Island is surrounded, with few exceptions, by heavy industrial land, including the Port of Portland's Terminal 6, and Port of Vancouver facilities. By allowing limited heavy industry or additional marine terminal facilities here, conflicts with incompatible uses elsewhere in the City can be reduced.

As stated in the economic analysis above, the Port of Portland represents an important element in the infrastructure that supports the basic industries of the region. These basic industries support other sectors of the economy, and bring wealth into the City. Thus, allowing limited marine terminal uses will facilitate marine terminal expansion, and can result in decreased vacancy rates, more new construction, and more employment for the city as a whole. Employment and occupied buildings reduce crime, social distress, and neighborhood decay.

#### **Commercial Uses**

As discussed in the conflicting use analysis, stand-alone commercial uses are unlikely on West Hayden Island. Limiting accessory commercial development on West Hayden Island which provide supporting goods and services to marine terminal or marine-industrial uses will have consequences related to the primary use (industrial or marine terminal uses discussed above).

**Institutional Uses**

Limiting daycare and community service uses on West Hayden Island may have negative social consequences to the extent that such uses provide services needed by marine terminal employees. As discussed in the conflicting use analysis, large scale institutional uses (schools, colleges, medical centers, or religious institutions) are unlikely on West Hayden Island.

**Residential Uses**

Limited protection of West Hayden Island resources would not preclude residential development of the site, assuming such development is allowed by the base zone. Existing Multnomah County zoning allows residential development on lots of 28 acres or more. If City of Portland industrial zoning is placed on the site, residential development would be limited to residences specifically supporting the primary industrial use of the site (such as a watchman's residence), or to houseboat moorages provided such uses do not interfere with the industrial use of the waterway. Limited protection would conserve of the functional value of resources on the site while allowing development to occur.

Most of the site is within the 100-year flood plain and was not considered in meeting LCDC Goal 10 for needed housing. Limiting residential uses in the flood plain can lead to reduced damage, injury, and displacement when flooding occurs. Protecting flood storage resources may in the long run decrease flooding problems elsewhere, with positive consequences on existing residential uses.

**Recreational Uses**

Allowing limited recreational uses on the site would support the social values discussed above. To the extent that the natural character of the site is retained, a unique educational opportunity for schools in east Portland is also retained. Allowing limited recreational uses would increase the recreational opportunities along the Columbia River, while conserving the natural resource values that support many of those recreational uses. Allowing limited recreational uses would benefit the residents of the eastern portion of Hayden Island, who currently must drive off the island to enjoy this type of recreational resource.

**Utilities and Dredge Disposal**

Allowing utility uses on West Hayden Island would facilitate the ongoing operation and maintenance of existing utility corridors on the site (Overhead transmission lines and a sewer outfall line). Allowing continued disposal of dredge material on the site would reduce the regulatory (permitting) cost of obtaining another disposal site to replace the West Hayden Island site. Allowing disposal of dredge material on West Hayden Island would also

facilitate (provide fill material for) marine terminal development. Limited protection or conservation of natural resources on West Hayden Island does not restrict ongoing operation and maintenance of existing overhead transmission and sewer outfall lines. Limited protection or conservation allows utility upgrades and new connections, subject to standards designed to protect natural resource values. Limited protection or conservation of natural resources on West Hayden Island would limit dredge disposal to portions of the site with lower resource values.

### **Agricultural Uses**

Agricultural activities located in close proximity to urban populations can have recreational and educational value distinct from natural resource values. As stated above, West Hayden Island represents one of the earliest agricultural sites (a dairy) in the region. Continued agricultural use on West Hayden Island may have some historic and heritage value distinct from those values associated with natural resources on the site. In addition, agricultural views can provide visual relief in many urban contexts. Such views, in close proximity to urban uses, can give a city a distinct image. Such views may have health, safety and welfare benefits similar to the benefits of large natural areas. Limited protection or conservation of natural resources on West Hayden Island would protect the functional natural resource values of the site by precluding large scale alteration or removal of natural resources for agricultural purposes, and by precluding livestock grazing within the highest valued resource units on the site. Agricultural uses could continue on portions of the site with lower natural resource values.

## Summary

The social consequences of limiting conflicting uses are summarized in Table 13.

**Table 13. Social Consequences of Limiting Conflicting Uses**

Possible Action	Consequences
Limit conflicting uses on portions of the site designated as open space in the Port's Development Plan (November 1995).	<p style="text-align: center;">+</p> <ul style="list-style-type: none"> <li>• Supports educational and passive recreational opportunities.</li> <li>• Supports visual variety.</li> <li>• Supports screening and buffering between Port facilities and adjacent non-industrial land uses.</li> <li>• Supports some health safety and welfare benefits of natural areas while allowing health safety and welfare benefits of Port development.</li> </ul>
	<p style="text-align: center;">-</p> <ul style="list-style-type: none"> <li>• Limits existing agricultural uses on the site.</li> <li>• Does not protect cultural and historic values of the site as a whole.</li> <li>• Does not protect environmentally friendly image of the City.</li> </ul>

## **SOCIAL CONSEQUENCES OF PROHIBITING CONFLICTING USES**

The following is a discussion of the consequences of prohibiting marine terminal and industrial development on West Hayden Island. This analysis is based on the introductory information presented above. The consequences of full protection on commercial, residential, recreational, utility, and agricultural uses are also discussed.

The consequences on the resource are discussed based on functional categories. The consequences on the conflicting uses are discussed based on general land use categories.

### Consequences on the Resource

#### **Recreational and Educational Opportunities**

Full protection of resources enhances the recreational and educational values of the site (discussed above in the introduction to the social analysis).

#### **Historic, Heritage, and Cultural Values**

Full protection supports the historic, heritage and cultural values of the site (discussed above in the introduction to the social analysis).

### **Visual Variety and Impact**

Full protection protects the forest resources of the site, which provide visual relief in an area otherwise dominated by flat paved surfaces.

### **Urban Design and Image of the City**

Full protection of waterfront natural areas, such as West Hayden Island, supports the river oriented and environmentally friendly image of the City.

### **Screening and Buffering of Incompatible Uses**

Full protection of the West Hayden Island site may cause marine terminal and industrial uses to locate elsewhere, possibly to sites with greater conflicts with adjacent uses.

### **Health, Safety, and Welfare**

Full protection of West Hayden Island resources protects the health, safety and welfare values of the site (discussed above in the introduction to the social analysis).

### **Consequences on the Conflicting Use**

#### **Industrial and Marine Terminal Uses**

The large grain elevators, conveyors, and loading cranes will have a strong visual impact on the surrounding area. This facility helps to define that city as a port. Prohibiting industrial of marine terminal uses on West Hayden Island would eliminate the potential for this kind of design element on West Hayden Island.

West Hayden Island is surrounded, with few exceptions, by heavy industrial land, including the Port of Portland's Terminal 6, and Port of Vancouver facilities. By locating heavy industry or additional marine terminal facilities here, conflicts with incompatible uses elsewhere in the City can be reduced. Prohibiting marine terminal and industrial uses on the site would require these facilities to be located elsewhere, perhaps resulting in greater conflicts with neighboring uses.

The Port of Portland represents an important element in the transportation infrastructure that supports the basic economy of the region. Thus, limiting future marine terminal expansion can result in increased vacancy rates, less new construction, and less employment for the city as a whole. Unemployment and vacant buildings contribute to crime, social distress, and neighborhood decay. Prohibiting industrial and marine terminal development on West Hayden Island could contribute to these social problems.

**Commercial Uses**

As discussed in the conflicting use analysis, stand-alone commercial uses are unlikely on West Hayden Island. Prohibiting accessory commercial development on West Hayden Island which provide supporting goods and services to marine terminal or marine-industrial uses will have consequences related to the primary use (industrial or marine terminal uses discussed above).

**Institutional Uses**

Prohibiting daycare and community service uses on West Hayden Island may have negative social consequences to the extent that such uses provide services needed by marine terminal employees. As discussed in the conflicting use analysis, large scale institutional uses (schools, colleges, medical centers, or religious institutions) are unlikely on West Hayden Island.

**Residential Uses**

Most of the site is within the 100-year flood plain and was not considered in meeting LCDC goal 10 for needed housing. Prohibiting such uses in the flood plain can lead to reduced damage, injury, and displacement when flooding occurs. Fully protecting flood storage resources may in the long run decrease flooding problems elsewhere, with positive consequences on existing residential uses.

**Recreational Development**

Passive recreational uses on West Hayden Island, such as limited boating facilities, wildlife viewing areas, pedestrian trails, and low impact interpretive facilities, would support the recreational and educational values discussed above. Full protection of natural resources on West Hayden Island would preclude intensive recreational development, while allowing some passive recreational uses. Full protection of resources greatly enhances the value of the site for educational and passive recreational uses.

**Utilities and Dredge Disposal**

Full protection of natural resources on West Hayden Island does not restrict ongoing operation and maintenance of existing overhead transmission and sewer outfall lines. Full protection allows utility upgrades and new connections, subject to standards designed to protect natural resource values. Full protection would preclude the disposal of dredge material on protected portions of the site.

**Agricultural Uses**

Agricultural activities located in close proximity to urban populations can have recreational and educational value distinct from natural resource

values. As stated above, West Hayden Island represents one of the earliest agricultural sites (a dairy) in the region. Continued agricultural use on West Hayden Island may have some historic and heritage value distinct from those values associated with natural resources on the site. In addition, agricultural views can provide visual relief in many urban contexts. Such views, in close proximity to urban uses, can give a city a distinct image. Such views may have health, safety and welfare benefits similar to the benefits of large natural areas. Full protection of natural resources on West Hayden Island would preclude agricultural uses.

### Summary

The social consequences of prohibiting conflicting uses are summarized in Table 14.

**Table 14. Social Consequences of Prohibiting Conflicting Uses**

Possible Action	Consequences
Fully protect the entire resource site.	<p>+</p> <ul style="list-style-type: none"> <li>• Supports the cultural and historic values of the site as a whole.</li> <li>• Fully protects the environmentally friendly image of the City.</li> <li>• Supports health, safety and welfare benefits of a large natural area (for example, benefits of retaining flood storage areas).</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>• Precludes the health, safety and welfare benefits associated with marine terminal development.</li> <li>• Precludes existing agricultural uses on the site.</li> </ul>

### **SOCIAL ANALYSIS CONCLUSIONS & RECOMMENDATIONS**

There are significant social values associated with the natural character of the West Hayden Island site, including: recreational and educational opportunities; historic, heritage, and cultural values; values related to visual variety and urban image; screening and buffering values; and health, safety, and welfare values. These values support limiting, and in some cases, prohibiting conflicting uses.

The proposed marine terminal development, however, has significant social benefits. These benefits are primarily related to the health, safety, and welfare benefits of the potential economic growth resulting from Port expansion. This value supports allowing marine terminal development.



**Figure 11**  
**Historic Wetlands in**  
**the Columbia Corridor**

WEST HAYDEN ISLAND  
 DEVELOPMENT PROGRAM  
 Goal 5 Natural Resources Inventory

Source: 1905 USGS map from Oregon Historical Society map collection.  
 Negative No. ORHI 77060

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Portland Bureau of Planning

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## ENVIRONMENTAL ANALYSIS

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### GENERAL BACKGROUND/Framework

This analysis outlines the environmental consequences of allowing, limiting, or prohibiting conflicting uses. The discussion will focus on the following topics: wildlife habitat; flood storage, conveyance and desynchronization, groundwater recharge and discharge, soil stabilization, and drainage; air and water pollution; and microclimate. These topics correspond to functional categories discussed in the West Hayden Island Goal 5 Inventory. Additional detail may be found in that report. This analysis applies these topics in the context of allowing, limiting, or prohibiting conflicting uses.

The off-site impacts of conflicting uses on West Hayden Island are an important consideration in this analysis — such as the consequences on endangered salmon runs in the Columbia River, and the consequences on regional wildlife movement.

Many of the consequences discussed in this analysis are cumulative in nature. Development on West Hayden Island, for example, will not by itself cause significant impacts on the flood storage capacity of the Lower Columbia system. Over time, however, flood storage capacity has been affected by many small impacts adding up to a larger cumulative impact. The *Lower Columbia Bank Protection Environmental Impact Statement Supplement* estimated in 1976 that 65 percent of the original Columbia River floodplain had been lost (functionally) due to filling and diking (Corps of Engineers 1976). More recent estimates go as high as 85 percent for cumulative loss of riparian and wetland habitats in this area of the Columbia River system (Smyth, 1995). The cumulative consequences discussed here cannot be attributed only to development of the West Hayden Island site. Prohibiting development on West Hayden Island would not necessarily eliminate these consequences. No comprehensive cumulative environmental analysis of the lower Columbia River system has been completed. This report does not attempt such an analysis. The discussion of cumulative consequences below is intended as a listing of issues rather than a comprehensive cumulative effects analysis.

The West Hayden Island site includes an estimated 451 acres of riparian cottonwood forest. Very few other sites, particularly island sites, in the Portland region contain such a large contiguous area of this habitat type. In 1976 the COE estimated that there were approximately 11,500 acres of the riparian cottonwood habitat type remaining along the lower Columbia River (between Astoria and Bonneville Dam). West Hayden Island represents about 4 percent of that area. Over time, many riparian areas along the Columbia have been converted to agricultural or industrial uses.

The social benefits of economic growth are such that marine terminal development should be allowed on the West Hayden Island site. The significant values associated with natural resources on the site support conserving as much of the site as possible without damaging the viability of marine terminal development. The social values associated with the natural character of the site as a whole supports prohibiting non-marine terminal related uses.

*Social Recommendation: The social analysis supports limited protection of resources on West Hayden Island. This recommendation is the result of the social analysis only. Conflicts between the different elements of this recommendation and the economic, environmental, and energy recommendations will be resolved in the conflict resolution section of this chapter*

Neotropical migrant birds	Intensive development on West Hayden Island would likely discourage use of the site by area-sensitive neotropical migrant birds, particularly if remaining forests are fragmented (Smyth, 1995).
Herpetofauna	Wetland losses would have a negative impact on herpetofauna because dispersal and colonizing habitat for them is already substantially reduced from the historically available habitat at the confluence of the Columbia and Willamette Rivers and the surrounding region (see Figure 11).

### **Flood Storage, Conveyance and Desynchronization, Groundwater Recharge and Discharge, Soil Stabilization, and Drainage**

The long term cumulative loss of floodplain — land available to store floodwaters — is an ongoing concern. Figure 11 shows historic wetlands of the Columbia Corridor as they were in 1905. Many of these wetlands have since been filled. Over the long term, the hydrology of West Hayden Island and vicinity has changed substantially. These changes have consequences and on resource functions and values:

- Changes in hydrology can affect the recharge and discharge of groundwater.
- The replacement of forest and wetland resources with impervious surfaces affects the timing and magnitude of surface run-off.
- Extensive modification of the river channel can cause problems downstream. For example, past dredging activities in the Columbia River have been associated with extensive changes to Sturgeon Lake on Sauvie Island. In 1988 the West Multnomah Soil and Water Conservation District stated that upstream dredging was "Changing the lake from an open water resource into a mud flat," and that this change was causing the loss of "irreplaceable overwintering areas for migratory waterfowl and valuable recreation areas for local communities, as well as causing severe water quality problems." (West Multnomah Co. Soil and Water Conservation District, 1988).
- Extensive riprapping of natural river banks has consequences for wildlife which relies on that habitat. The removal of riparian vegetation can contribute to erosion problems.

### **Air and Water Pollution**

As discussed in the West Hayden Island Natural Resources Inventory, natural resources on West Hayden Island help to reduce air and water pollution. Urban forests help by absorbing atmospheric pollution. Portland is one of twelve local governments designated by the United Nations' 1988 Toronto "World Conference on the Changing Atmosphere" to retard global

## Fish and Wildlife Habitat

Loss of upland riparian forests and meadows would result in the direct and long-term reduction of available habitat for resident birds and mammals. Temporary or short-term impacts due to project construction may include disturbance to nesting and foraging birds, mammals, and herpetofauna.

Because West Hayden Island is located between several regionally significant natural areas (Smith/Bybee Lakes, Vancouver Lake lowlands, and Ridgefield Wildlife refuge), the site may serve to facilitate wildlife movement between those areas.

Specific fish and wildlife concerns include:

Endangered Salmon populations	Intensive development of West Hayden Island could potentially have a negative impact on endangered natural salmon populations. Direct impacts from north shore development could occur from construction activities and from potential oil or other hazardous materials spills or leaks from ships and dockside facilities. Loss of the small wetland areas, especially those that are hydrologically connected to the Columbia River and the Oregon Slough, would reduce the available backwater holding areas for migrating salmonids. These areas are most likely connected during April and May during peak migration times. Research indicates that a key component of chinook habitat is off-channel rearing areas. As stated in the West Hayden Island Goal 5 Inventory, restoration of this habitat is an important factor in rebuilding the productive life history structure and maintaining the adaptive capacity of the species (Smyth and Bakke, 1995). Allowing the destruction of these resources would have significant adverse consequences for fisheries, including protected fish stocks.
Great Blue Herons	Intensive development of West Hayden Island may affect the success of near-by great blue heron rookeries, and preclude their expansion onto West Hayden Island (PGE, 1986).
Bald Eagles	Although no bald eagle nests have yet been observed on West Hayden Island, the site may provide future nesting habitat. Intensive development of West Hayden Island will reduce the likelihood of future bald eagle nesting on the site.
Tricolored Blackbirds	The only known tricolored blackbird ( <i>Agelaius tricolor</i> ) colony in the Willamette Valley is located near Hayden Island, and the site may provide foraging areas for this rare bird. Although there has been no documented use of West Hayden Island by the tricolored colony to date, the site does provide suitable habitat. Intensive development of West Hayden Island may limit future use of the site by the tricolored colony.

warming by slowing the buildup of carbon dioxide. The City of Portland's *Carbon Dioxide Reduction Strategy* states that maintenance of existing trees, and the planting of new trees, will cause a measurable reduction in atmospheric carbon dioxide (City of Portland, Energy Office, 1993). Natural water features, such as ponds and wetlands, can perform important water quality functions by slowing surface waters, allowing deposition of sediments and associated nutrients, metals, and organic contaminants. Air and water pollution consequences vary with the type of conflicting use. For example a conflicting use may be a new source of pollution, or may have impacts on natural resources (such as forests or wetlands, which absorb pollutants).

### **Microclimate**

Varying degrees of forest clearing will be required for marine terminal, industrial, utility, and some types of recreational and agricultural development. A reduction in summer cooling and humidifying may occur in the Hayden Island vicinity as a result of large scale forest clearing. This consequence could be tempered by the presence of a large water body (the Columbia River), as well as Columbia Gorge winds. This potential consequence is discussed further in the functional values section of the West Hayden Island Goal 5 Inventory.

### **CONSEQUENCES OF ALLOWING CONFLICTING USE**

The following is a discussion of the likely environmental consequences associated with the loss of natural resources on West Hayden Island. This analysis is based on information discussed in the West Hayden Island Goal 5 Inventory. The consequences of allowing marine terminal, industrial, commercial, and residential, utility, residential, and agricultural uses are discussed.

The consequences on the resource are discussed based on functional categories. The consequences on the conflicting uses are discussed based on general land use categories.

### **Consequences on the Resource**

The impacts to the immediate environment from marine terminal development are significant as operating requirements necessitate almost complete removal of vegetation, alteration of topography and the placement of extensive impervious surfaces (buildings, storage areas, loading areas, parking lots) within the development footprint. The impacts of other types of industrial, commercial, and institutional development would be similar. Because the site is located within the 100-year floodplain, many types of development would require substantial alteration of the site (to accommodate fill material). The placement of fill material, either as part of the land

preparation process, or in order to dispose of dredge material, has a substantial impact on many natural resource values.

Implementation of the current *West Hayden Island Development Program* would result in the direct loss of the following approximate acreages: 15 acres of wetlands (emergent, open water, and forested), 300 acres of riparian forest, 130 acres of meadow habitats, 30 to 60 acres of shallow water habitat, and 18 acres of sandy beach habitat. Direct habitat loss would thus total approximately 500 to 525 acres. Impacts would occur over time as the different project components are built. Impacts at this stage of the proposal are general in nature because final site plans have not been approved, permits not obtained, and the National Environmental Protection Act (NEPA) process not completed.

### **Fish and Wildlife Habitat**

Loss of upland riparian forests and meadows would result in the direct and long-term reduction of available habitat for resident birds and mammals. Temporary or short-term impacts due to marine terminal project construction may include disturbance to nesting and foraging birds, mammals, and herpetofauna. The fragmentation of habitat on the site is a concern. Specific wildlife concerns are discussed above in the introduction to the environmental analysis. The most significant fish and wildlife concern associated with marine terminal uses is the potential consequences on endangered salmon migration past the island, and the value of some wetland resources on the site for future salmon recovery efforts.

In addition, because West Hayden Island is located between several regionally significant natural areas (Smith/Bybee Lakes, Vancouver Lake lowlands, and Ridgefield Wildlife refuge), it may serve to facilitate wildlife movement between those areas. Extensive marine terminal, industrial, commercial or residential development on West Hayden Island would negatively affect this function.

The operation of existing utilities (underground and overhead) has few adverse effects on fish and wildlife habitat. Construction and maintenance practices, however, may have adverse impacts. These activities often create cleared corridors which can fragment wildlife habitat and increase light and wind penetration into forested areas, providing opportunities to establish invasive, non-native species.

Certain types of surface utilities such as stormwater detention areas, retention areas, sediment traps and constructed wetland pollution treatment facilities have beneficial environmental effects if located without disruption to existing resources. However, replacement of existing natural resources with these facilities normally has detrimental effects, including: blocking fish and wildlife passage; eliminating vegetation; modifying or destroying habitat; and

increasing in human intrusion for construction, operations, and maintenance.

Recreational uses can remove vegetation and modify or destroy natural resources in much the same way as other conflicting urban development. Large open areas such as golf courses and ball fields, although providing resting or feeding areas for some birds and animals, also can contribute to water pollution through runoff containing sediment, pesticide, herbicides, and fertilizers. Pedestrian trails can remove vegetation and introduce human activity along natural resources, adversely impacting wildlife values. Water access for fishing or boating can create similar impacts. Both pedestrian trails and water access are likely recreational uses on West Hayden Island, as shown in the Port of Portland's current Development Program for West Hayden Island.

The removal of forest cover for forestry or agricultural purposes has the same effects as those for other urban uses, as described above. The conversion of forest to farmland replaces diverse forest plant communities with few, cultivated species. Livestock can disturb sensitive plant species, and often inhibits vegetative development.

#### **Flood Storage, Conveyance and Desynchronization, Groundwater Recharge and Discharge, Soil Stabilization, and Drainage**

Development of West Hayden Island for marine terminal, industrial, commercial, institutional, or residential uses would require extensive filling of land within the flood plain, and removal of forest cover, which in general would contribute to a cumulative decrease in flood storage capacity and cause more rapid runoff from the site.

Marine terminal development would require that dredging take place in order to enlarge the Columbia River channel in the vicinity of the site. Dredging can have a negative effect on natural ecosystems located downstream. In addition, the disposal of dredge material has a direct impact on the site which it is deposited.

Marine terminal development would require extensive riprapping of banks, and wharf construction along water body channels. Such development eliminates river bank habitat, and can cause increased erosion and deterioration of remaining natural river banks.

Construction of utilities can degrade wetlands and drainages, increase stormwater runoff and erosion, and reduce forest cover. Underground hydrology can be modified by underground utilities, by either blocking subsurface flows or guiding it along a utility corridor by the use of gravel or similar fill.

Agriculture often draws irrigation water from wells. Extensive use of ground water can result in draw down of the water table, which in turn can reduce surface drainage flows and eliminate a water source for wildlife.

### **Air and Water Pollution**

The movement of large amounts of cargo through marine terminal facilities, and the use of large machinery, increases the chances of hazardous material spills. Regardless of whether or not any large hazardous spills occur, frequent minor oil spillage can add up, leading to degraded water quality. The frequent cleaning of proposed grain/bulk facilities, and resulting run-off could also be a source of water pollution. To address this problem, facility designs are likely to include water retention ponds, and other water pollution mitigation measures. The final impacts of the marine terminal facility will depend largely on the type of facility that is developed, and what the actual design will be. Industrial, commercial, institutional, or residential development would have similar consequences related to the storage of commercial and household materials, and the use of machinery, and/or automobiles. The scale of the impacts would vary with the use.

Marine terminal or industrial development on West Hayden Island would require extensive forest clearing. Such clearing would reduce the ability of West Hayden Island to contribute to pollution reduction strategies (this strategy is discussed above, and in the West Hayden Island Natural Resources Inventory).

Allowing full development of marine terminal or industrial uses on the site which will require the filling of wetland areas would eliminate the ability of these areas to perform pollution removal functions in the future.

As stated above, recreational uses can remove vegetation and modify or destroy natural resources in much the same way as other conflicting urban development. Large open areas such as golf courses and ball fields can contribute to water pollution through runoff that contains sediment, pesticide, herbicides, and fertilizers.

Vegetation acts as a filter, cleansing runoff before it reaches streams or wetlands. Removal of vegetation for agricultural purposes eliminates these benefits. Agriculture also commonly involves the use of pesticides, herbicides and fertilizers. These chemicals contaminate surface-water and ground-water areas and harm wildlife. Animal fecal contamination occurs as a result of pasture use and can have similar environmental effects.

### **Microclimate**

Conflicting uses which require the large scale removal of forest resources on the site may, as a result, impact the microclimate of the site. A reduction in

summer cooling and humidifying might be expected in the immediate vicinity of the site as a result of large scale forest clearing.

### **Consequences on the Conflicting Use**

#### **Marine Terminal and Industrial Uses**

One of the major benefits of a West Island marine terminal development is the proximity of the site to major transportation corridors, particularly rail corridors. Freight movement by rail generally results in less fuel consumption, and less air pollution than movement of goods by truck. Encouraging the expansion of efficient rail facilities onto the site could result in some decrease in localized air pollution. Allowing the development of efficient rail facilities on West Island would decrease demands on the BNRR mainline track. This facilitates efficient movement of trains, including passenger trains. High speed passenger rail service is being considered for the Pacific Northwest corridor. Decreasing demands on the mainline track could facilitate the development of high speed passenger rail, and thus could also decrease the amount of pollution generated by travelers in the corridor.

#### **Commercial Uses**

Accessory commercial development on West Hayden Island which provides supporting goods and services to marine terminal or marine-industrial uses will have consequences related to the primary use (industrial or marine terminal uses discussed above). By allowing supporting services to locate close to industrial or marine terminal uses, the demand for transportation may be reduced, with positive environmental consequences. Adequate commercial land exists on the eastern portion of Hayden Island to support marine terminal facilities on West Hayden Island.

#### **Institutional Uses**

By allowing uses which provide services to marine terminal employees (such as daycare and community services) to locate close to industrial or marine terminal uses, the demand for transportation can be reduced, with positive environmental consequences. As discussed in the conflicting use analysis, large scale institutional uses (schools, colleges, medical centers, or religious institutions) are unlikely on West Hayden Island.

#### **Residential Uses**

The most likely residential development on West Hayden Island are residences associated with another primary use, such as agricultural uses, or industrial uses (such as a watchman's residence). In that context, the consequences of allowing residential uses are related to the consequences of allowing these other primary uses. Houseboat moorages could also be allowed on West Hayden Island (assuming industrial zoning) provided that such development does not interfere with the industrial use of the waterway.

There are extensive infrastructure development and land preparation costs associated with residential development on West Hayden Island. The expenditure of energy and resources for this purpose may have negative environmental consequences if an adequate supply of residential land exists elsewhere in the City which would not require such costs. The development of houseboat moorages on West Hayden Island would require a lower level of land preparation.

### **Recreational Uses**

Some forms of recreational use, such as wildlife viewing, pedestrian trails, and natural resource interpretive facilities can have positive environmental consequences as educational resources, allowing urban residents to become familiar with ecological processes. If such uses are conducted in a manner that minimizes disturbance of sensitive resources, allowing these kind of recreational uses can have positive long term environmental consequences.

### **Utilities and Dredge Disposal**

Allowing conflicting utility uses will allow new utilities to be placed on the site in a manner that efficiently serves the site. Allowing disposal of dredge material on West Hayden Island will facilitate (provide fill material for) marine terminal development.

### **Agricultural Uses**

West Hayden Island is a mosaic of vegetative communities and human uses integrated with a riparian ecosystem which provides food, shelter, breeding and rearing areas for aquatic and terrestrial animals and birds. Fish and wildlife need food, water, cover, and places to perch, rest, breed and nest. Any changes in an ecosystem, whether man-induced or natural, will affect fish and wildlife habitats. Agricultural impacts may help some wildlife species, but harm other species.

## Summary

The environmental consequences of allowing conflicting uses are summarized in Table 15.

**Table 15. Environmental Consequences of Allowing Conflicting Uses**

Possible Action	Consequences
Allow conflicting uses fully.	<p>+</p> <ul style="list-style-type: none"> <li>• Encourages efficient rail access to Port facilities, with positive environmental consequences.</li> <li>• Allows marine terminal facilities to locate within the UGB, reducing impacts outside the UGB.</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>• Negative impact on fish and wildlife.</li> <li>• Negative Impact on floodplain resources.</li> <li>• Negative impact on wetland resources.</li> <li>• Negative impact on forest resources.</li> <li>• Negative impact on microclimate in the vicinity.</li> </ul>

## CONSEQUENCES OF LIMITING CONFLICTING USES

The following is a discussion of the likely environmental consequences of the limited protection or conservation of natural resources on West Hayden Island. This analysis is based on information presented in the West Hayden Island Goal 5 Inventory. The consequences of allowing marine terminal, industrial, commercial, and residential, utility, recreational, and agricultural uses are discussed.

The consequences on the resource are discussed based on functional categories. The consequences on the conflicting uses are discussed based on general land use categories.

As stated above, marine terminal development can cause significant impacts to the immediate environment. Marine terminal operating requirements necessitate almost complete removal of vegetation, alteration of topography, and the placement of extensive impervious surfaces within the development footprint.

The impacts of industrial, commercial, and residential development would in many cases be similar. Limited protection of resources on West Hayden Island would allow some development, while protecting the highest quality resources. However, even limited development would involve significant alteration of some portions of the site. The amount of direct habitat loss

would depend on the extent of resource protection. Impacts would occur over time as the different project components are built.

If resource units are protected from development, that same development has to occur elsewhere. In many cases, protected natural resources can be avoided through clustering of development on less significant portions of the site. The environmental consequences of clustering are also generally positive as the functional values of the resource areas are conserved, and development is directed to portions of the property with fewer natural resource values.

### **Consequences on the Resource**

#### **Wildlife Habitat**

Loss of upland and riparian forests and meadows would result in the direct and long-term reduction of available habitat for resident birds and mammals. Temporary or short-term impacts due to project construction may include disturbance to nesting and foraging birds, mammals, and herpetofauna. Specific wildlife concerns are discussed above in the introduction to the environmental analysis.

The fragmentation of habitat on the site is a concern. According to Lev and Jennings (1986), and the Environmental Impact Statement prepared for the previous PGE proposal for the site (1987), as many as 38 species of mammals are likely to occur on West Hayden Island. Limiting all types of development in such a way as to reduce forest fragmentation will support the continued existence of a variety of mammals on the site.

In addition, protecting the highest valued wetlands on the site would reduce the negative impacts on species that rely on that habitat, such as herpetofauna. The addition of dead and downed wood into these wetlands and their adjacent riparian forested areas would enhance the value for some species.

The most significant fish and wildlife concern associated with marine terminal uses is the potential consequences on endangered salmon migration past the site, and the value of some wetland resources on the site for future salmon recovery efforts.

Some loss of shallow water habitat will result from construction of wharves along the northern shore of the site. Several wharf types are possible with marine terminal development. The Port's *Refined Alternatives Working Paper* states that "The most direct mitigation for impacts to shallow water habitat on the north shore of the island will be from wharf design options that minimize impacts." (Port of Portland, 1994, p. 38)

Loss of the small wetland areas, especially those that are hydrologically connected to the Columbia River and the Oregon Slough, would reduce the available backwater holding areas for migrating salmonids. Backwater holding areas are most likely connected during peak migration times (April and May). Research indicates that a key component of chinook habitat is off-channel rearing areas. As stated in the West Hayden Island Goal 5 Inventory, restoration of this habitat is an important factor in rebuilding the productive life history structure and in maintaining the adaptive capacity of the species (Smyth and Bakke, 1995). Limited protection of these resources would have positive consequences for fisheries, including protected fish stocks. Limited protection could have negative consequences if such conservation or protection precluded restoration activities.

In addition, because West Hayden Island is located between several regionally significant natural areas (Smith/Bybee Lakes, Vancouver Lake lowlands, and Ridgefield Wildlife refuge), it may serve to facilitate wildlife movement between those areas. Protection of resources in such a manner as to retain at least one large un-fragmented area, as well as continuous corridors providing a north — south and east — west connection could help preserve this ecological function.

The operation of existing underground and overhead utilities has few adverse effects. Construction and maintenance practices, however, do have adverse impacts on natural resources. These activities often create cleared corridors which can fragment wildlife habitat and increase light and wind penetration into forested areas, providing opportunities to establish invasive, non-native species. Limited protection or conservation of resources on West Hayden Island would minimize these consequences.

Certain types of surface utilities such as stormwater detention areas, retention areas, sediment traps and constructed wetland pollution treatment facilities have beneficial environmental effects if located without disruption to existing resources. Replacement of existing natural resources with these facilities normally has detrimental effects, including blocking fish and wildlife passage, reduction of vegetation, modification or destruction of habitat, increase in human intrusion for construction, operations, and maintenance. Limited protection or conservation of resources on West Hayden Island could preclude the construction of such facilities within the designated resource areas.

As discussed above, recreational uses can remove vegetation and modify or destroy natural resources in much the same way as other conflicting urban development. Both pedestrian trails and water access are likely recreational uses on West Hayden Island, as shown in the *West Hayden Island Development Program*. Limited protection or conservation of resources on

West Hayden Island would preclude the most active recreational uses (such as ball fields and golf courses), but would allow more passive recreational uses, subject to restrictions intended to minimize their impact on resources.

The removal of forest cover for forestry or agricultural purposes has the same effects as those for other urban uses, as described above. Limited protection or conservation of natural resources on West Hayden Island would protect the functional natural resource values of the site by precluding large scale alteration or removal of natural resources for agricultural purposes, and by precluding livestock grazing within the highest valued resource units on the site.

#### **Flood Storage, Conveyance and Desynchronization, Groundwater Recharge and Discharge, Soil Stabilization, and Drainage**

Development of West Hayden Island for marine terminal, industrial, commercial, institutional, or residential uses would (to varying degrees) require extensive filling of land within the flood plain, and removal of forest cover. The loss of these resources would contribute to a cumulative decrease in flood storage capacity and cause more rapid runoff from the site.

Conservation of wetland resources, and the most developed riparian forest resources on West Hayden Island, would help conserve flood storage capacity and help desynchronize runoff.

Marine terminal development would require extensive riprapping of banks and wharf construction along water body channels. Such development eliminates river bank habitat, and can cause increased erosion and deterioration of remaining natural river banks. Limited protection or conservation of these resources could reduce the negative consequences associated with the elimination of river bank habitat.

Construction of utilities can degrade wetlands and drainages, increase stormwater runoff and erosion, and reduce forest cover. Underground hydrology can be modified by underground utilities, by either blocking subsurface flows or guiding it along a utility corridor by the use of gravel or similar fill. Limited protection or conservation of West Hayden Island natural resources would impact the future placement of new utilities, reducing these negative consequences.

#### **Air and Water Pollution**

Marine terminal, industrial, commercial, or institutional development on West Hayden Island would require extensive forest clearing. Such clearing would reduce the ability of West Hayden Island to contribute to pollution reduction strategies (this strategy is discussed above, and in the West Hayden Island Natural Resources Inventory). Limited protection of forest resources would help conserve this resource value.

Marine terminal, industrial, or commercial uses on the site would in many cases require the filling of wetland areas, eliminating the ability of these areas to perform pollution removal functions in the future. Limited protection of wetland areas on the site would help conserve this resource value.

As stated above, recreational uses can remove vegetation and modify or destroy natural resources in much the same way as other conflicting urban development. Limited protection or conservation of resources on West Hayden Island would preclude development of these more active recreational uses.

Vegetation acts as a filter, cleansing runoff before it reaches streams or wetlands. Removal of vegetation for agricultural purposes eliminates these benefits. Agriculture also commonly involves the use of pesticides, herbicides and fertilizers. Animal fecal contamination occurs as a result of pasture use and can have similar environmental effects. Limited protection or conservation of natural resources on West Hayden Island would protect the functional natural resource values of the site by precluding large scale alteration or removal of natural resources for agricultural purposes, and by precluding livestock grazing within the highest valued resource units on the site. Limited protection or conservation would not preclude all water and air pollution related consequences resulting from agricultural uses.

### **Microclimate**

Conservation of forest resources on the site would help minimize the localized warming and drying that would occur due to the extensive paved surfaces associated with marine terminal, industrial, and some types of commercial development.

### **Consequences on the Conflicting Use**

#### **Marine Terminal and Industrial Uses**

One of the major benefits of a West Hayden Island marine terminal development is the proximity of the site to major transportation corridors, particularly rail corridors. Limiting the development of efficient rail facilities on West Island would increase demands on the Burlington Northern mainline track. This inhibits efficient movement of trains, including passenger trains. High speed passenger rail service is being considered for the Pacific Northwest corridor. By increasing the use of the mainline track by freight trains, prohibiting rail infrastructure on West Hayden Island could hinder the development of high speed passenger rail, and thus could increase the amount of pollution generated by travelers in the corridor. Limited protection of the site could allow efficient rail facilities, while still protecting some of the most significant resources.

### **Commercial Uses**

Accessory commercial development on West Hayden Island provides supporting goods and services to marine terminal or marine-industrial uses. By allowing supporting services to locate close to industrial or marine

terminal uses, the demand for transportation can be reduced, with positive environmental consequences. Adequate commercial land exists on the eastern portion of Hayden Island to support marine terminal development on West Hayden Island. As discussed in the conflicting use analysis, stand-alone commercial uses are unlikely on West Hayden Island.

### **Institutional Uses**

By allowing uses which provide services to marine terminal employees (such as daycare and community services) to locate close to industrial or marine terminal uses, the demand for transportation can be reduced, with positive environmental consequences.

### **Residential Uses**

There are extensive infrastructure development and land preparation costs associated with residential development on West Hayden Island. The expenditure of energy and resources for this purpose may have negative environmental consequences if an adequate supply of residential land exists which would not require such costs. Limited protection of resources on West Hayden Island will encourage residential development to locate outside of resource areas, which may reduce the costs of infrastructure and land preparation.

### **Recreational Uses**

Some forms of recreational use, such as wildlife viewing, pedestrian trails, and natural resource interpretive facilities can have positive environmental consequences as educational resources, allowing urban residents to become familiar with ecological processes. If such uses are conducted in a manner that minimizes disturbance of sensitive resources, allowing these kind of recreational uses can have positive environmental consequences. Limited protection or conservation of resources would allow passive recreational uses on the site, subject to regulations intended to reduce the negative consequences of those uses.

### **Utilities and Dredge Disposal**

To the extent that resources found on the site are preserved or conserved, there may be difficulty in placing utilities and facilities in a manner which can efficiently serve surrounding development. However, protection or conservation of resources on the site would not preclude the placement of utilities. If utilities can be placed in such a manner as to not have long lasting detrimental impacts on the resource, the resource would have no impact on

utilities. Limited protection or conservation of natural resources on West Hayden Island would limit dredge disposal to portions of the site with lower resource values.

### Agricultural Uses

West Hayden Island is a mosaic of vegetative communities and human uses integrated with a riparian ecosystem which provides food, shelter, breeding and rearing areas for aquatic and terrestrial animals and birds. Any changes in an ecosystem, whether human-induced or natural, will effect fish and wildlife habitats. Limited protection or conservation of natural resources on West Hayden Island would protect the functional natural resource values of the site by precluding large scale alteration or removal of natural resources for agricultural purposes, and by precluding livestock grazing within the highest valued resource units on the site. The impact of cattle removal may be beneficial to many wildlife species, while harmful to some.

### Summary

Possible actions associated with limiting conflicting uses are presented in Table 16. For each action, the environmental consequences are summarized.

**Table 16. Environmental Consequences of Limiting Conflicting Uses**

Possible Action	Consequences	
Fully protect at least one contiguous un-fragmented area of the site.	+	<ul style="list-style-type: none"> <li>Minimizes habitat fragmentation.</li> </ul>
	-	<ul style="list-style-type: none"> <li>Negative environmental consequences may occur if such protection impacts efficiency of rail infrastructure or forces development elsewhere (such as outside the UGB).</li> </ul>
Fully protect the highest valued natural resource units on the site (as determined by the Wildlife Habitat Assessment)	+	<ul style="list-style-type: none"> <li>Protects most important wildlife habitat values.</li> </ul>
	-	<ul style="list-style-type: none"> <li>Negative environmental consequences may occur if such protection impacts efficiency of rail infrastructure or forces development elsewhere (such as outside the UGB).</li> </ul>

Table 16. Environmental Consequences of Limiting Conflicting Uses (cont.)

Possible Action	Consequences
Limit conflicting uses within the forested portions of the site.	<p>+</p> <ul style="list-style-type: none"> <li>Protects pollution reduction values associated with urban forests.</li> <li>Reduces microclimate impacts of development.</li> <li>Protects stormwater desynchronization values.</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>Negative environmental consequences may occur if such protection impacts efficiency of rail infrastructure or forces development elsewhere (such as outside the UGB).</li> </ul>
Limit conflicting uses within the wetlands on the site	<p>+</p> <ul style="list-style-type: none"> <li>Protects wildlife habitat.</li> <li>Protects flood storage capacity.</li> <li>Protects Stormwater desynchronization values.</li> <li>Protects water quality functions of wetlands.</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>Negative environmental consequences may occur if such protection impacts efficiency of rail infrastructure or forces development elsewhere (such as outside the UGB).</li> <li>May constrain some habitat enhancement activities.</li> </ul>
Limit conflicting uses within the river bank and beach areas of the site.	<p>+</p> <ul style="list-style-type: none"> <li>Protects shallow water habitat.</li> <li>Encourages sensitive wharf design.</li> <li>Reduces bank erosion.</li> <li>Protects river bank habitat.</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>Negative environmental consequences may occur if such protection impacts efficiency of rail infrastructure or forces development elsewhere (such as outside the UGB).</li> <li>May constrain some habitat enhancement activities.</li> </ul>

### CONSEQUENCES OF PROHIBITING CONFLICTING USES

The following is a summary of the likely environmental consequences of prohibiting conflicting uses, i.e. full protection of resources on West Hayden Island. This discussion is based on information presented in the West Hayden Island Goal 5 Inventory.

Full protection of all resources on West Hayden Island would preclude marine terminal development from occurring on the portion of West Hayden Island included within the Goal 5 Inventory. The consequences of prohibiting industrial, commercial, residential, utility, recreational, and agricultural uses are also discussed. In the Goal 5 inventory process, the West Hayden Island resource site as a whole received a higher habitat value score than any of the individual resource sub-units within the site. Put simply, the whole is more valuable than the sum of its individual parts. This reflects the value of West Island site being associated with its relatively unique position (in size, location, and habitat type) within the metropolitan region. While limited protection (described above) may protect the environmental functions of specific units within the site, prohibiting conflicting uses is the only way to protect some of the functions associated with the site as a whole.

The consequences on the resource are discussed based on functional categories. The consequences on the conflicting uses are discussed based on general land use categories.

### **Consequences on the Resource**

#### **Fish and Wildlife Habitat**

Full protection of resources on West Hayden Island would protect the fish and wildlife values identified in the West Hayden Island Goal 5 Inventory, and discussed above in the introduction to the environmental analysis.

#### **Flood Storage, Conveyance and Desynchronization, Groundwater Recharge and Discharge, Soil Stabilization, and Drainage**

Full protection would protect these functional values (described in the West Hayden Island Goal 5 Inventory, and discussed above).

#### **Air and Water Pollution**

Full protection of resources on West Hayden Island would protect the air and water quality values identified in the West Hayden Island Goal 5 Inventory, and discussed above in the introduction to the environmental analysis.

#### **Microclimate**

Full protection of resources on West Hayden Island would protect the microclimate values identified in the West Hayden Island Goal 5 Inventory, and discussed above in the introduction to the environmental analysis.

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## Consequences on the Conflicting Use

### **Marine Terminal and Industrial Uses**

One of the major benefits of a West Hayden Island marine terminal development is the proximity of the site to major transportation corridors, particularly rail corridors. Prohibiting marine terminal or industrial development on the site would hinder efficient movement between ships and rail. Freight movement by rail generally results in less fuel consumption, and thus less air pollution than movement by truck. Discouraging the expansion of efficient rail facilities could increase some local air pollution.

If resource protection precluded future needed industrial or marine terminal development, and it were not able to locate nearby, people may have to travel greater distances between home and employment. In the case of marine terminal development, one option would be to locate new Port of Portland facilities at other locations on the Lower Columbia River, outside the Portland UGB. Prohibiting marine terminal development on West Island potentially increases the distance between a major labor market and marine terminal facilities, possibly increasing pollution caused by commuters.

Another consequence of locating marine terminal development elsewhere would be to increase the land distance that freight bound for Portland must travel — that is, the distance between Port facilities and industries within the City. This may also lead to greater localized pollution, depending on the mode of transportation used.

If resource sites are protected from development, that same development has to occur elsewhere. If, as a result of resource protection the proposed development locates elsewhere, on a site with less significant natural resources, the environmental consequences are generally positive. In a case where the environmental functions and values of a site are preserved, and development is directed to a site with fewer environmental resources, the consequences are positive. The environmental consequences of resource protection are especially positive if as a result of resource protection, development is directed toward sites that have already lost much of their ecological value. This is the case when new industrial and marine terminal uses can be accommodated through the redevelopment of older facilities.

The benefits of full protection of the West Hayden Island site would be limited if as a result of protection, conflicting uses are forced to locate on sites with comparable natural resource conflicts. In the case of marine terminal development, similar conflicts exist at most of the alternative locations the region. Of the alternate marine terminal sites located along the lower Columbia River, only one site (Rainier) does not have wetland conflicts. All of the alternative sites face issues surrounding salmon migration and feeding.

All of the sites contain or are adjacent to important waterfowl and other bird habitat areas. Several sites are utilized by endangered species, such as the Bald Eagle, or the Columbian White-Tailed Deer.

### **Commercial Uses**

Accessory commercial development on West Hayden Island provides supporting goods and services to marine terminal or marine-industrial uses. Prohibiting such uses will have consequences related to the primary use (industrial or marine terminal uses discussed above). Full protection of natural resources on West Hayden Island would not likely impact development potential of commercial uses in the City and region. As described in the conflicting use analysis, it is unlikely that commercial zoning would be approved for West Hayden Island, given reasoning behind the Metro Urban Growth Boundary decision (Appendix B), given that adequate commercial areas are already provided elsewhere on Hayden Island, and given limited infrastructure capacity (particularly transportation). In addition, the City found in 1989 that existing commercial and employment zoning in the Columbia Corridor will meet the City's overall need for commercial uses through at least the year 2010.

### **Institutional Uses**

By prohibiting uses which provide services to marine terminal employees (such as daycare and community services) from locating close to industrial or marine terminal uses, the demand for transportation can be increased, with negative environmental consequences. As discussed in the conflicting use analysis, large scale institutional uses (schools, colleges, medical centers, or religious institutions) are unlikely on West Hayden Island.

### **Residential Uses**

There are extensive infrastructure development and land preparation costs associated with residential development on West Hayden Island. The expenditure of energy and resources for this purpose may have negative environmental consequences if an adequate supply of residential land exists which would not require such costs. Full protection of resources on West Hayden Island will encourage residential development to locate elsewhere, which may reduce the costs of infrastructure and land preparation for that development.

### **Recreational Uses**

Some forms of recreational use, such as wildlife viewing, pedestrian trails, and natural resource interpretive facilities can have positive environmental consequences as educational resources, allowing urban residents to become familiar with ecological processes. If such uses are conducted in a manner that minimizes disturbance of sensitive resources, allowing these kind of recreational uses can have positive long term environmental consequences.

Full protection of resources on West Hayden Island would allow passive recreational uses on the site, subject to regulations intended to reduce the negative consequences of those uses.

### **Utilities and Dredge Disposal**

If resources on the site are fully protected there may be difficulty in placing utilities and facilities in a manner which can efficiently serve surrounding development. However, protection of resources on the site would not preclude the placement of utilities. If utilities can be placed in such a manner as to not have long lasting detrimental impacts on the resource, full protection of the resource would have few impacts on utilities. Full protection would preclude the disposal of dredge material on protected portions of the site.

### **Agricultural Uses**

West Hayden Island is a mosaic of vegetative communities and human uses integrated with a riparian ecosystem which provides food, shelter, breeding and rearing areas for aquatic and terrestrial animals and birds. Fish and wildlife need food, water, cover, and places to perch, rest, breed and nest. Any changes in an ecosystem, whether man-induced or natural, will effect fish and wildlife habitats. Full protection of natural resources on West Hayden Island would protect the functional natural resource values of the site by precluding large scale alteration or removal of natural resources for agricultural purposes, and by precluding livestock grazing within the site. The impact of cattle removal may be beneficial to many wildlife species, while harmful to some.

## Summary

The environmental consequences of prohibiting conflicting uses are summarized in Table 17.

**Table 17. Environmental Consequences of Prohibiting Conflicting Uses**

Possible Action	Consequences
Fully protect the resource site.	<p>+</p> <ul style="list-style-type: none"> <li>• Protects fish and wildlife habitat functions.</li> <li>• Protects floodplain resources.</li> <li>• Protects wetland resources and associated functions.</li> <li>• Protects forest resources and associated air pollution reduction values.</li> <li>• Protects microclimate functions of West Hayden Island.</li> </ul>
	<p>—</p> <ul style="list-style-type: none"> <li>• Negative environmental consequences may occur if such protection impacts efficiency of rail infrastructure or forces development elsewhere (such as outside the UGB).</li> <li>• May constrain some habitat enhancement activities.</li> </ul>

## ENVIRONMENTAL ANALYSIS CONCLUSIONS AND RECOMMENDATIONS

The loss of natural resources on West Hayden Island would have negative environmental consequences. These consequences include: loss of critical wildlife habitat; loss of floodplain resources; further reduction of wetland and riparian forest habitat; and the loss of a large forested area within an otherwise urban landscape.

Many of the environmental benefits of natural resources on West Hayden Island are associated with the existence of the site as a whole. Much of the site's environmental value is associated with the size of the site, and the site's position within the lower Columbia River ecosystem. An important factor is the designation of the entire Columbia River mainstem as critical habitat for endangered sockeye and spring/summer and fall chinook. The site is one of the few remaining examples of riparian cottonwood forest within the metropolitan region. Many similar undeveloped riverine sites have disappeared — the cumulative result of many small changes to properties all along the river.

The environmental benefits of marine terminal development are primarily related to the development of more rail oriented marine terminal facilities. There are environmental benefits associated with moving freight with rail

rather than trucks. In addition, efficient rail facilities within the Columbia River corridor may facilitate Salmon recovery efforts, since those efforts may disrupt barge traffic on the river.

An important additional consideration is the location of alternate sites. If all of the alternate sites for a conflicting use have similar environmental conflicts, the benefits of resource protection must be weighed against the economic benefits of the proposed use. This may be the case with proposed marine terminal uses.

*Environmental Recommendation: The environmental analysis supports full protection of resources on West Hayden Island. This recommendation is the result of the environmental analysis only. Conflicts between the different elements of this recommendation and the economic, social, and energy recommendations will be resolved in the conflict resolution section of this chapter.*

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## ENERGY ANALYSIS

### GENERAL BACKGROUND/Framework

This analysis outlines the energy consequences of allowing, limiting, or prohibiting conflicting uses. The discussion will focus on the following topics: transportation; infrastructure; and the heating and cooling of structures. A general discussion of these topics is presented first, followed by an analysis applying these topics in the context of allowing, limiting, or prohibiting conflicting uses.

Decisions regarding resource protection will have impacts on city form. Development densities may have to be altered to take resource protection into account. Development form and location will, in turn, impact energy consumption in both construction and ongoing maintenance of human uses and activities.

### Transportation

Energy expenditures for transportation relate primarily to travel distance from origin to destination, and mode of transportation used. Both variables can be affected by natural resource protection.

As discussed in the environmental analysis, one of the major benefits of marine terminal development on West Hayden Island is the proximity of the site to major transportation corridors, particularly rail corridors. Freight movement by rail is generally more energy efficient than freight movement by truck. Discouraging the expansion of efficient rail facilities onto the site could result in some lost energy efficiency. Compromising the development of efficient rail facilities on West Hayden Island may also increase demands on the BNRR mainline track. This inhibits efficient movement of trains, including passenger trains. High speed passenger rail service is being considered for this corridor. Increasing demands on the mainline track could hinder the development of high speed passenger rail, and thus could also impact travel behavior (and therefore energy consumption) in the corridor.

If resource protection precludes industrial or marine terminal development on West Hayden Island, such facilities may be located elsewhere. One option is to locate new deep draft marine terminal facilities elsewhere along the lower Columbia River. Developing new facilities down-river from Portland would increase the land distance that freight bound for Portland must travel - that is, the distance between marine facilities and industries in Portland which utilize those transportation facilities. In general, moving freight over water is more energy efficient than moving freight on land (by rail or truck). As a result, marine facilities have historically been located as far up-river as possible. In addition, new port development along the lower Columbia

would require major investments in transportation infrastructure on the Oregon side of the river. A major component of infrastructure development is energy.

Another consequence of locating marine facilities elsewhere would be to increase the distance between a major labor market (Portland) and marine terminal facilities, possibly encouraging long distance commuting.

The availability of natural resources on West Hayden Island provides opportunities for wildlife observation, recreation, and education purposes to residents of Hayden Island. Because resources are closer to users, less transportation energy is used in reaching them. The presence of some natural resources on the site could reduce energy consumption in this respect.

When the 40-Mile Loop, Columbia Slough Trail, and bicycle path along Airport Way and north-south connections are completed, a greater range of transportation modes, including bicycling and walking, will be possible within the Columbia corridor. Separation of pedestrian and bicycle routes from roadways may increase safety, and therefore make alternative forms of transportation more attractive. Proximity to natural resources along the slough may also make travel more pleasant. There is the potential, as part of marine terminal development, to provide a spur trail, connecting West Hayden Island to the 40 mile loop. Such trails can contribute to efforts to reduce transportation related energy consumption.

### **Infrastructure**

Clustering development outside of natural resource areas in an efficient manner will result in less infrastructure needed to serve sewer, water, transportation, and other needs. If development occurs away from flood hazard areas, the need for additional construction considerations or hazard control structures would be unnecessary. A major component of infrastructure development is energy.

### **Heating and Cooling of Structures**

Energy consumption for the purpose of heating and cooling structures is impacted by resource protection in two ways: building form and presence of vegetation.

In many cases, resource protection is accomplished through clustering of buildings away from the highest values resources, resulting in more common wall construction and reduced surface area for a given volume. Heat transfer between indoors and outdoors is therefore reduced, resulting in an energy savings.

Trees provide shade on nearby buildings in the summer, reducing energy demands for cooling. Plants also absorb sunlight and transpire during growing seasons, reducing ambient air temperatures. This moderating effect can reduce energy needs for cooling of nearby development. Trees and shrubbery can also act as a wind break during winter. By slowing or diverting winter winds, heat loss in structures from infiltration and convection is reduced, resulting in lower energy needs.

On a regional scale, large greenspaces can have a cooling effect on surrounding areas. The forest acts as a natural air conditioner for adjacent areas, cooling the air during the day and warming it at night (McHarg, 1969). One study, for example, showed that the large parks and natural areas in St. Louis were as much as 5 degrees (Celsius) cooler than more developed portions of the city. In addition, these parks and natural areas influenced the temperature of surrounding areas (Clarke, 1972). Large amounts of brick, concrete, or asphalt surfaces are considered to be major factors leading to higher temperatures in urban areas. The microclimate effects of forest clearing are particularly applicable to forests with large deciduous trees, such as cottonwoods and willows, which are well known for the large amount of moisture that they transmit into the atmosphere. A reduction in summer cooling and humidifying might be expected in the West Hayden Island vicinity as a result of forest clearing. These changes can have an impact on energy use.

## **CONSEQUENCES OF ALLOWING CONFLICTING USES**

The following is a discussion of the energy consequences of allowing marine terminal and industrial development to occur on West Hayden Island. This analysis is based on information presented above. The energy consequences of allowing commercial, residential, recreational, utility, and agricultural uses are also discussed.

The consequences on the resource are discussed based on functional categories. The consequences on the conflicting uses are discussed based on general land use categories.

### **Consequences on the Resource**

#### **Heating and Cooling of Structures**

Allowing marine terminal, industrial, commercial, or institutional development to replace a large natural area may increase the need for summer air conditioning (and thus increase energy use) for development that occurs on the site and for development in the immediate vicinity. The relative importance of this consequence depends on the nature of development. For example, the heating and cooling of buildings may be a minor concern for marine terminal facilities. Other uses (such as residential,

recreational, utility, or agricultural development) would have a smaller impact as long as those uses do not necessarily involve removal of forest resources, or the creation of large paved areas.

### **Infrastructure**

Allowing marine terminal, industrial, commercial, institutional or residential uses to occur on West Hayden Island would require extensive infrastructure development and land preparation. The result would require more infrastructure materials and maintenance, of which a major component is energy. Allowing recreational or agricultural development on West Hayden Island would require less extensive infrastructure.

### **Consequences on the Conflicting Use**

#### **Marine Terminal and Industrial Uses**

Allowing marine terminal development to occur on the site would encourage efficient movement of cargo between ships and rail. By encouraging the expansion of efficient ship-to-rail facilities, marine terminal or related industrial development of the site could reduce future transportation related energy use. Allowing marine terminal development on West Hayden Island would minimize the land distance that cargo moving to and from Portland must travel, with possible energy savings.

#### **Commercial Uses**

Accessory commercial development on West Hayden Island which provides supporting goods and services to marine terminal or marine-industrial uses will have consequences related to the primary use (industrial or marine terminal uses discussed above). By allowing supporting services to locate close to industrial or marine terminal uses, the demand for transportation may be reduced, with positive energy consequences. Adequate commercial land exists on the eastern portion of Hayden Island to support marine terminal facilities on West Hayden Island.

#### **Institutional Uses**

By allowing uses which provide services to marine terminal employees (such as daycare and community services) to locate close to industrial or marine terminal uses, the demand for transportation can be reduced, with positive energy consequences. As discussed in the conflicting use analysis, large scale institutional uses (schools, colleges, medical centers, or religious institutions) are unlikely on West Hayden Island.

#### **Residential Uses**

The most likely residential development on West Hayden Island are residences associated with another primary use, such as agricultural uses, or

industrial uses (such as a watchman's residence). In that context, the consequences of allowing residential uses are related to the consequences of allowing these other primary uses. Houseboat moorages could also be allowed on West Hayden Island (assuming industrial zoning) provided that such development does not interfere with the industrial use of the waterway.

Residential development on West Hayden Island would involve substantial land preparation and infrastructure development, a major component of which is energy. In addition, allowing substantial residential development on West Hayden Island may not represent the best use of scarce river-front land. Allowing residential development on the site would have negative energy consequences. Houseboat moorages would involve a lower level of land preparation and would thus may have fewer negative energy consequences.

#### **Recreational Uses**

Allowing recreational uses on West Hayden Island supports the development of recreational trails, and supports local recreational opportunities. As discussed above, the development of recreational trails and localized recreational opportunities can reduce transportation related energy consumption.

#### **Utilities and Dredge Disposal**

Allowing conflicting utility uses will allow new utilities to be placed on the site in a manner that efficiently serves the site. Allowing disposal of dredge material on West Hayden Island would also facilitate (provide fill material for) marine terminal development.

#### **Agricultural Uses**

Consequences on agricultural uses from resource protection relate primarily to travel distance from origin to destination. Allowing agricultural uses on West Hayden Island will allow such uses to take advantage of a short travel distance to population centers and markets, and therefore may reduce energy expenditures required to transport agricultural products.

## Summary

The energy consequences of allowing conflicting uses are summarized in Table 18.

**Table 18. Energy Consequences of Allowing Conflicting Uses**

Possible Action	Consequences
Allow conflicting uses fully.	<p style="text-align: center;">+</p> <ul style="list-style-type: none"> <li>• By allowing conflicting uses to occur within the Portland region, rather than on alternative sites along the lower Columbia River, future transportation energy expenditures are reduced.</li> <li>• Encouraging the development of efficient ship-to-rail infrastructure could reduce future transportation related energy expenditures.</li> </ul>
	<p style="text-align: center;">-</p> <ul style="list-style-type: none"> <li>• The loss of large natural areas can increase energy expenditures for heating and cooling.</li> <li>• Development of Marine terminal uses on West Hayden Island would involve extensive energy expenditures associated with installation of infrastructure.</li> </ul>

## **CONSEQUENCES OF LIMITING CONFLICTING USES**

The following is a discussion of the energy consequences of allowing limited marine terminal or industrial development to occur on West Hayden Island. This analysis is based on information presented above. The energy consequences of limited protection on commercial, residential, recreational, utility, and agricultural uses are also discussed.

The consequences on the resource are discussed based on functional categories. The consequences on the conflicting uses are discussed based on general land use categories.

### Consequences on the Resource

#### **Heating and Cooling of Structures**

Limited protection generally allows necessary conflicting uses to occur provided they occur in a resource-sensitive manner. In many cases, this can be accomplished through clustering of buildings away from the highest valued resources, resulting in more common wall construction and reduced surface area for a given volume. Heat transfer between indoors and outdoors would be reduced, resulting in an energy savings.

Energy needs for heating or cooling would generally be positively impacted as a result of limited resource protection. A positive impact would result from clustering buildings, and from retaining adjacent vegetation. A positive impact would result from wind protection and summer shading. The extent of energy saving is dependent on many factors beyond the scope of this report, including type of resource protected, proximity of resource to development, structure type, heating source, construction materials, design, activities, etc.

Limited protection of resources on West Hayden Island would encourage the clustering of marine terminal buildings and paved areas, and would encourage the retention of natural vegetation, possibly reducing energy use. Limited protection could similarly encourage energy savings in buildings associated with commercial, institutional, residential, recreational, and agricultural uses.

### **Transportation**

The impact of limited resource protection on transportation energy costs depend upon where needed potential land uses displaced by protected resources will relocate. If increased land use densities can occur to offset protected areas, or if uses are located closer to employee homes, other employment centers, and existing transportation infrastructure, a net positive benefit from protection should result. If development is allowed to occur, some protection of natural resources will also encourage the use of energy-efficient travel, such as bicycling and walking, by enhancing routes for these modes.

### **Infrastructure**

Clustering development outside of natural resource areas in an efficient manner will result in less infrastructure needed to serve sewer, water, transportation, and other needs. If development occurs away from flood hazard areas, the need for additional construction considerations or hazard control structures would be unnecessary. Limited protection would require the clustering of development outside resource areas, reducing the need for extensive infrastructure development and land preparation. The result would require fewer infrastructure materials and less maintenance, of which a major component is energy. Allowing recreational or agricultural development on West Hayden Island would require less extensive new infrastructure. However, clustering recreational or agricultural uses away from natural resources could also reduce energy use.

## **Consequences on the Conflicting Use**

### **Marine Terminal and Industrial Development**

There are energy benefits to allowing marine terminal and industrial development to occur in such a way as to encourage efficient ship-to-rail

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movement of goods. Limited protection or conservation which does not inhibit marine terminal development, particularly ship-to-rail infrastructure development, and allows for the protection of some natural resources, will have positive energy consequences.

### **Commercial Uses**

Accessory commercial development on West Hayden Island provides supporting goods and services to marine terminal or marine-industrial uses. By allowing supporting services to locate close to industrial or marine terminal uses, transportation related energy use can be reduced. Adequate commercial land exists on the eastern portion of Hayden Island to support marine terminal development on West Hayden Island. As discussed in the conflicting use analysis, stand-alone commercial uses are unlikely on West Hayden Island.

### **Institutional Uses**

By allowing uses which provide services to marine terminal employees (such as daycare and community services) to locate close to industrial or marine terminal uses, the demand for transportation can be reduced, with positive energy consequences. It is unlikely that large scale institutional uses (schools, colleges, medical centers, or religious institutions) would be approved for West Hayden Island, given reasoning behind the Metro Urban Growth Boundary decision (Appendix B).

### **Residential Uses**

Residential development on West Hayden Island would involve substantial land preparation and infrastructure development, a major component of which is energy. In addition, substantial residential development on West Hayden Island may not represent the best use of scarce river-front land. Limiting residential uses to portions of the site with lower resource values reduces the energy expenditures associated with that development.

### **Recreational Uses**

Limited protection of resources on West Hayden Island would allow passive recreational uses (such as wildlife observation), subject to regulations intended to protect resource values. Allowing passive recreational uses on West Hayden Island supports the development of recreational trails. Limited protection enhances the value of passive recreational uses on West Hayden Island, and increases local recreational opportunities. As discussed above, the development of recreational trails and localized recreational opportunities can reduce transportation related energy consumption.

### Utilities and Dredge Disposal

To the extent that resources found on the site are preserved or conserved, there will be greater difficulty in placing utilities and facilities in a manner which can efficiently serve surrounding development. However, protection or conservation of resources on the site would not preclude the placement of utilities. If utilities can be placed in such a manner as to not have long lasting detrimental impacts on the resource, the resource would have few negative energy consequences on utilities. Limited protection or conservation of natural resources on West Hayden Island would limit dredge disposal to portions of the site with lower resource values.

### Agricultural Uses

Consequences on agricultural uses from limited resource protection relates to travel distance from origin to destination. Limited protection of West Hayden Island may require some existing and potential future agricultural operations on West Hayden Island to relocate outside of the City, increasing travel distance to population centers and markets, and therefore increasing transportation related energy expenditures.

### Summary

The energy consequences of limiting conflicting uses are summarized in Table 19.

**Table 19. Energy Consequences of Limiting Conflicting Uses**

Possible Action	Consequences
Limit conflicting uses within the resource site.	<p>+</p> <ul style="list-style-type: none"> <li>• Supports the retention of vegetation within a large natural area, possibly reducing future energy use of future buildings located on the site, and in surrounding areas.</li> <li>• Supports non-automobile travel by protecting natural amenities along pedestrian /bike trails.</li> <li>• Encourages clustering of development away from natural areas, reducing infrastructure needs.</li> <li>• By supporting local passive recreational opportunities, reduces distance (energy use) local residents must travel for recreational opportunities.</li> </ul>
	<p>-</p> <ul style="list-style-type: none"> <li>• If resource conservation forces needed marine terminal facilities to locate elsewhere, or significantly impacts the efficiency of ship-to rail cargo movement, negative transportation related energy consequences may occur.</li> </ul>

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## CONSEQUENCES OF PROHIBITING CONFLICTING USES

The following is a discussion of the energy consequences of prohibiting marine terminal or industrial uses on West Hayden Island. This analysis is based on the introductory information presented above. The energy consequences of full protection on commercial, residential, recreational, utility, and agricultural uses are also discussed.

The consequences on the resource are discussed based on functional categories. The consequences on the conflicting uses are discussed based on general land use categories.

### Consequences on the Resource

#### Heating and Cooling of Structures

If resource sites are protected from development, that same development has to occur elsewhere. Needed development could be provided for through expanding urban boundaries and using the same building form, which would result in no change in energy consumption for heating or cooling. Retaining large regional natural areas can help reduce the need for summer air conditioning, and thus reduce energy expenditures for surrounding development. Energy needs for heating or cooling would generally be positively impacted as a result of resource protection. The extent of energy saving is dependent on many factors beyond the scope of this report, including type of resource protected, proximity of resource to development, structure type, heating source, construction materials, design, activities, etc.

#### Transportation

The availability of natural resources on West Hayden Island provides opportunities for wildlife observation, recreation, and education purposes to residents of the Hayden Island. Because resources are closer to users, less transportation energy is used in reaching them. Protection of natural resources could reduce energy consumption in this respect.

The impact of resource protection on transportation energy costs depend upon where needed potential land uses displaced by protected resources will relocate. If increased land use densities can occur to offset protected areas, or if uses are located closer to employee homes, other employment centers, and existing transportation infrastructure, a net positive benefit from protection should result. If, to compensate for lost development opportunities on the site, urban boundaries are expanded to allow development far from employee homes, other employment centers, and existing transportation infrastructure, more energy would be required.

### **Infrastructure**

Clustering development outside of natural resource areas in an efficient manner will result in less infrastructure needed to serve sewer, water, transportation, and other needs. If development occurs away from flood hazard areas, the need for additional construction considerations or hazard control structures would be unnecessary. The result would be less infrastructure materials and maintenance, of which a major component is energy. Prohibiting marine terminal, industrial, commercial, institutional, and residential uses on West Hayden Island would avoid extensive infrastructure development and land preparation costs, provided such development could be accommodated in an area with existing infrastructure.

### **Consequences on the Conflicting Use**

#### **Marine Terminal and Industrial Uses**

If resource protection precludes needed marine terminal development on West Hayden Island, such facilities may be located elsewhere. One option would be to locate new deep draft marine terminal facilities elsewhere along the lower Columbia River. Developing new facilities down-river from Portland would increase the land distance that freight bound for Portland must travel - that is, the distance between marine facilities and industries in Portland which utilize those facilities. In general, moving freight over water is more energy efficient than moving freight on land (by rail or truck). As a result, marine facilities have historically been located as far up-river as possible. In addition, new port development along the lower Columbia would require major investments in land preparation and transportation infrastructure. A major component of infrastructure development is energy.

Another consequence of locating marine facilities elsewhere would be to increase the distance between a major labor market (Portland) and marine terminal facilities, possibly encouraging long distance commuting.

#### **Commercial Uses**

Accessory commercial development on West Hayden Island provides supporting goods and services to marine terminal or marine-industrial uses. Prohibiting such uses will have consequences related to the primary use (industrial or marine terminal uses discussed above). Full protection of natural resources on West Hayden Island would not likely impact development potential of commercial uses in the City and region. As described in the conflicting use analysis, it is unlikely that commercial zoning would be approved for West Hayden Island, given reasoning behind the Metro Urban Growth Boundary decision (Appendix B), given that adequate commercial areas are already provided elsewhere on Hayden Island, and given limited infrastructure capacity (particularly transportation). In addition, the City found in 1989 that existing commercial and employment

zoning in the Columbia Corridor will meet the City's overall need for commercial uses through at least the year 2010.

### **Institutional Uses**

By prohibiting uses which provide services to marine terminal employees (such as daycare and community services) from locating close to industrial or marine terminal uses, the demand for transportation can be increased, with negative energy consequences. As discussed in the conflicting use analysis, large scale institutional uses (schools, colleges, medical centers, or religious institutions) are unlikely on West Hayden Island.

### **Residential Uses**

Residential development on West Hayden Island would involve substantial land preparation and infrastructure development, a major component of which is energy. Prohibiting residential development on West Hayden Island reduces land preparation and infrastructure related energy expenditures. Energy expenditures are reduced when new residential development occurs in areas with existing infrastructure.

### **Recreational Uses**

Full protection of resources on West Hayden Island would allow passive recreational development, subject to regulations intended to protect resource values. Allowing passive recreational uses on West Hayden Island supports the development of recreational trails. Full protection of West Hayden Island resources would enhance the value of passive recreational uses on West Hayden Island. As discussed above, the development of recreational trails, and localized recreational opportunities can reduce transportation related energy consumption.

### **Utilities & Dredge Disposal**

To the extent that resources found on the site are preserved or conserved, there may be greater difficulty in placing utilities and facilities in a manner which can efficiently serve surrounding development. However, protection or conservation of resources on the site would not preclude the placement of utilities. If utilities can be placed in such a manner as to not have long lasting detrimental impacts on the resource, full protection of resources would have few negative energy consequences on utilities. Full protection would preclude the disposal of dredge material on protected portions of the site.

### **Agricultural Uses**

Consequences on agricultural uses from full resource protection relate primarily to travel distance from origin to destination. Protection of West Hayden Island will require existing and potential future agricultural operations on West Hayden Island to re-locate outside of the City, increasing

travel distance to population centers and markets, and therefore increasing transportation related energy expenditures.

### Summary

The energy consequences of prohibiting conflicting uses are summarized in Table 20.

**Table 20. Energy Consequences of Prohibiting Conflicting Uses**

Possible Action	Consequences
Fully protect the resource site.	<p style="text-align: center;">+</p> <ul style="list-style-type: none"> <li>• Supports the retention of large natural areas, possibly decreasing energy expenditures for heating and cooling.</li> <li>• Could reduce extensive energy expenditures associated with installation of infrastructure.</li> <li>• By supporting local passive recreational opportunities, reduces the distance that local residents must travel to reach recreational opportunities, with positive energy consequences.</li> </ul>
	<p style="text-align: center;">-</p> <ul style="list-style-type: none"> <li>• Discourages conflicting uses from locating on the site, which could push those uses to alternative sites outside the Portland region, increasing future transportation related energy expenditures.</li> <li>• Discourages development of efficient ship-to-rail infrastructure, which could increase future transportation related energy expenditures.</li> </ul>

### **ENERGY ANALYSIS CONCLUSIONS AND RECOMMENDATIONS**

The retention of natural vegetation on West Hayden Island may reduce heating and cooling related energy needs both within the site and in the surrounding community. Conservation or protection of resources can also reduce infrastructure related energy use to the extent that future land uses can cluster on portions of the site away from resource areas. Resource conservation or protection can enhance the attractiveness of walking and bicycle routes, decreasing automobile use, and decreasing transportation related energy use. Resource protection can also reduce the distance local residents must travel to reach recreational opportunities, thus decreasing energy use.

The effect of resource protection on energy use related to both infrastructure and transportation depends primarily on whether a proposed use will be required to locate elsewhere due to resource protection. The energy

consequences could be either positive or negative depending on the specifics of the possible alternative locations.

If there are no alternative locations for marine terminal development within the urban growth boundary (UGB), resource protection may require marine terminal uses to locate in alternative locations which lead to greater transportation related energy use. For example, if marine terminal facilities are located farther down-river from Portland, more energy may be required to move cargo to and from Portland. This would occur because the movement of cargo on large ships and barges is more energy efficient than moving cargo on land (by rail and truck). Additionally, if marine terminal facilities are forced to locate farther from employee homes, and farther from existing infrastructure, greater energy expenditures (related to commuting and the provision of new infrastructure) could be anticipated.

*Energy Recommendation: The energy analysis supports limited protection of resources on West Hayden Island. This recommendation is the result of the energy analysis only. Conflicts between this recommendation and the economic, social, and environmental recommendations will be resolved in the Conflict Resolution section of this report.*

## CONFLICT RESOLUTION AND RECOMMENDATIONS

### GENERAL BACKGROUND AND FRAMEWORK

This conflict resolution section is based on the conclusions and recommendations from each section of the ESEE analysis. This section will resolve conflicts between the various recommendations and conclusions reached in different sections of the ESEE analysis. Conflict resolution will occur in two stages. First, conceptual protection strategies will be presented. Second, those conceptual strategies will then be used to make initial location-specific recommendations (Table 21). The "resource unit" is used in this stage to identify specific resources on the site (see Figure 3).

The ESEE analysis discussed the significant natural resources and associated resource values of West Hayden Island. Some of those natural resource values are common to all portions of the site, while others are more place-specific (limited to individual locations on the site). Examples of whole-site values are floodplain values, microclimate values, amenity values, cultural/historic values, and some wildlife values. Place-specific values are more localized in nature. Examples of place-specific values include the values associated with wetlands, forest resources, shallow water habitat, and the values associated with the different wildlife habitats found within the site. An assessment of relative wildlife habitat values was conducted as part of the Inventory (Chapter 3).

Protection of natural resources can apply to a single site or a portion of the site, depending on the type of values present, and the balance of conflicts between a resource and conflicting uses (the ESEE analysis). The preceding analyses provides the rationale for decisions made regarding natural resource protection for different portions of West Hayden Island. Any of the following three decisions can be made for resources identified on the site:

- 1. Protect the resource fully.** This action occurs in areas where the resource, relative to conflicting uses, is sufficiently important that the resource should be protected. Conflicting uses may be allowed elsewhere on the development site.
- 2. Limit the conflicting uses in a manner which protects the resource.** This action occurs in areas where both the resource and conflicting uses are important relative to each other, and restrictions are placed on conflicting uses which would protect the functional value of identified resources, while at the same time allowing some or all conflicting uses on the development site.

3. **Allow the conflicting use fully.** This action occurs in areas where conflicting uses, notwithstanding the impact on the resource, are sufficiently important to warrant being allowed fully and without resource-related restrictions.

## CONCEPTUAL RESOURCE PROTECTION STRATEGIES

The first part of this chapter evaluated economic, social, environmental, and energy (ESEE) consequences of full, limited, or no protection of natural resources on West Hayden Island. The following pages identify ten possible strategies to protect natural resource values, using conclusions and recommendations of the ESEE analysis. This section serves to compare the conclusions of one section of the ESEE with the conclusions of the other sections, and to resolve conflicts between those recommendations.

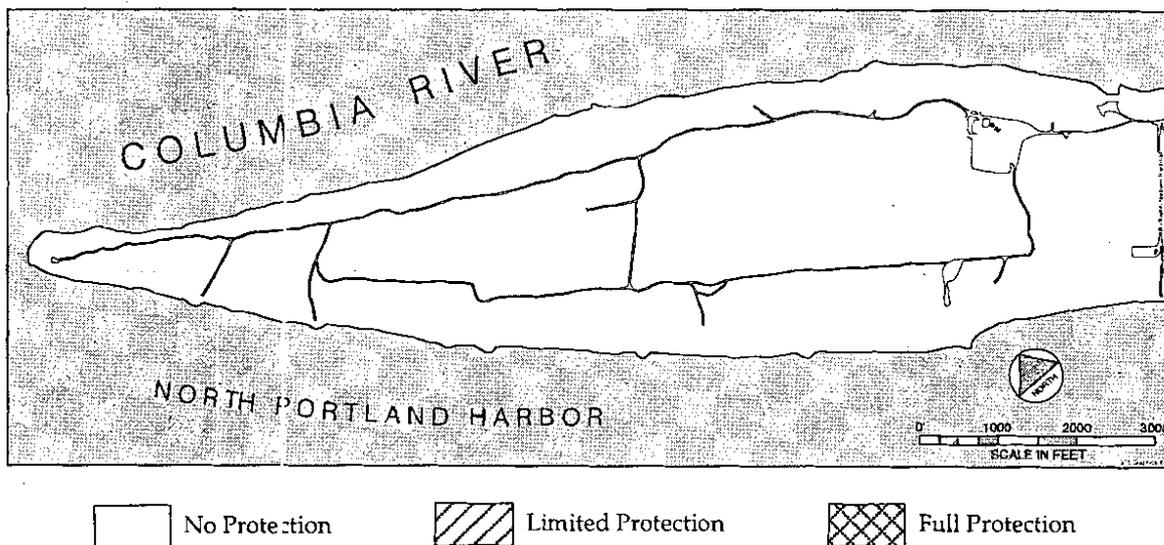
Each of the possible strategies presented below will either be accepted, rejected, or modified, based on an analysis of the consequences of that recommendation. The generalized recommendations that result from this analysis will be applied to specific resources of the site in Table 21 and Figures 30 and 31. The final recommendations will then be presented.

**Strategy A:**

*Allow conflicting uses fully on the site as a whole  
(Do not protect resources on the site).*

This strategy recognizes the potentially large economic benefits associated with marine terminal development. The energy analysis suggests that under some circumstances (depending on possible alternative locations for marine terminal development), development of a marine terminal on West Hayden Island could reduce future transportation-related energy expenditures. The environmental analysis similarly concludes that there are some transportation-related environmental benefits to fully allowing marine terminal development on West Hayden Island (rather than elsewhere along the lower Columbia River).

**Figure 12. Effect of Strategy A on the West Hayden Island Site**



**Recommendation:** *The "no protection" strategy fails to protect natural resource values on West Hayden Island. Negative impacts occur to fish and wildlife, and natural amenity values. Reject the "no protection" strategy. The analysis of environmental, social, and energy consequences supports the protection or conservation of some resources on the site. The economic analysis concludes that some resources do not conflict with marine terminal development, and that protecting some resources will have economic benefits, as discussed in Appendix A.*

Figure 13. ESEE Consequences of Strategy A

Positive Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"> <li>• Supports basic industries, future Port capacity and growth, and development flexibility.</li> <li>• Allows intensive recreational use.</li> <li>• Maximizes flexibility when placing new utilities.</li> <li>• Reduces regulatory costs.</li> </ul>
<u>Social</u>	<ul style="list-style-type: none"> <li>• Supports positive health, safety and welfare consequences of Port development.</li> </ul>
<u>Environmental</u>	<ul style="list-style-type: none"> <li>• Encourages efficient rail access to Port facilities, with positive environmental consequences.</li> <li>• Allows new marine terminal facilities to locate within the UGB.</li> </ul>
<u>Energy</u>	<ul style="list-style-type: none"> <li>• By allowing conflicting uses to occur within the UGB, rather than on alternative sites outside the UGB, future transportation energy expenditures are reduced.</li> <li>• By encouraging development of efficient rail infrastructure could reduce future transportation related energy expenditures.</li> </ul>
Negative Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"> <li>• Harms the economic value of environmental infrastructure.</li> <li>• Harms greenspace/amenity values.</li> <li>• Increases federal and state mitigation costs.</li> </ul>
<u>Social</u>	<ul style="list-style-type: none"> <li>• Reduces some recreational and educational opportunities.</li> <li>• Negative effect on historic heritage and cultural values.</li> <li>• Reduces visual variety.</li> <li>• Reduces health, safety and welfare benefits of a large natural area.</li> </ul>
<u>Environmental</u>	<ul style="list-style-type: none"> <li>• Negative impact on fish and wildlife.</li> <li>• Negative Impact on floodplain resources.</li> <li>• Negative impact on wetland resources.</li> <li>• Negative impact on forest resources and associated air pollution reduction values.</li> <li>• Negative impact on microclimate in the vicinity of West Hayden Island.</li> <li>• Loss of shallow water habitat associated with wharf development.</li> </ul>
<u>Energy</u>	<ul style="list-style-type: none"> <li>• Elimination of large regional natural areas can increase energy expenditures for heating and cooling.</li> <li>• Development of Marine terminal uses on West Hayden Island would involve extensive energy expenditures associated with installation of infrastructure.</li> </ul>

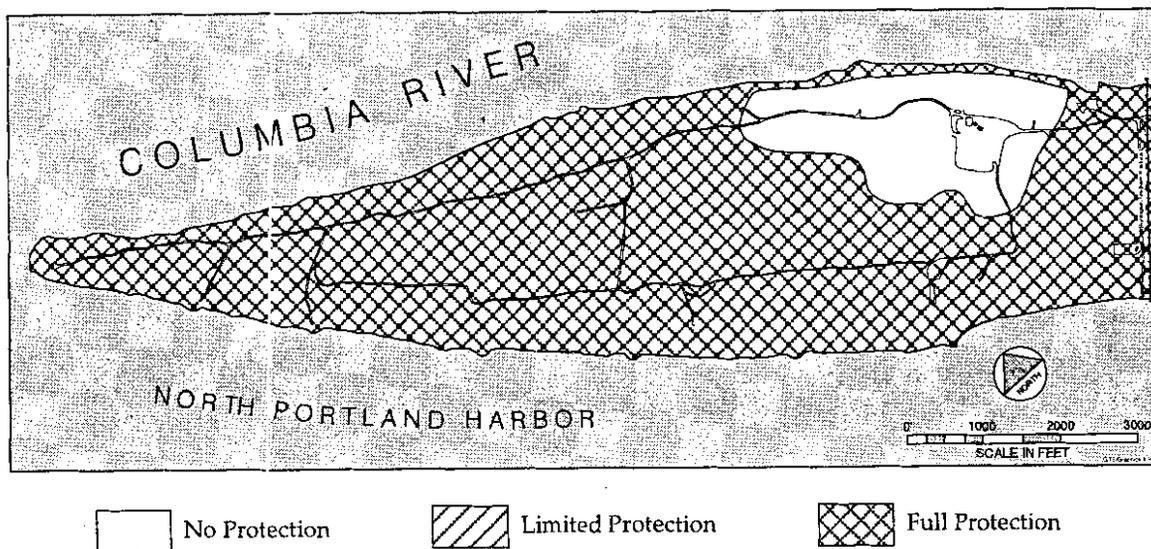
Note: The consequences listed above are discussed in greater detail earlier in the ESEE analysis.

**Strategy B:**

**Fully protect the entire site  
(Prohibit all conflicting uses on the site).**

This strategy is based on the recommendations resulting from the environmental analysis. Many of the environmental benefits of natural resources on West Hayden Island are associated with the existence of the site as a whole. Much of the site's environmental value is associated with the size of the site, and the site's position within the lower Columbia River ecosystem. An important factor is the National Marine Fisheries Service designation of the entire Columbia River mainstem as critical habitat for endangered sockeye and spring/summer and fall chinook. The site is one of the few remaining examples of riparian cottonwood forest within the metropolitan region.

**Figure 14. Effect of Strategy B on the West Hayden Island Site**



**Recommendation: Reject the "full protection" strategy. The economic analysis, and to a lesser extent the social and energy analysis, support allowing marine terminal development.**

Figure 15. ESEE Consequences of Strategy B

Positive Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"> <li>• Supports the economic value of environmental infrastructure.</li> <li>• Supports greenspace/amenity values.</li> <li>• Eliminates federal and state mitigation costs.</li> </ul>
<u>Social</u>	<ul style="list-style-type: none"> <li>• Supports the cultural and historic values of the site as a whole.</li> </ul>
<u>Environmental</u>	<ul style="list-style-type: none"> <li>• Protects fish and wildlife habitat functions.</li> <li>• Protects floodplain resources.</li> <li>• Protects wetland resources and associated functions.</li> <li>• Protects forest resources and associated air pollution reduction values.</li> <li>• Protects microclimate functions of West Hayden Island.</li> </ul>
<u>Energy</u>	<ul style="list-style-type: none"> <li>• Supports the retention of large regional natural areas, possibly decreasing energy expenditures for heating and cooling.</li> <li>• Eliminates extensive energy expenditures associated with installation of infrastructure.</li> <li>• By supporting local passive recreational opportunities, reduces the distance that local residents must travel to reach recreational opportunities, with positive energy consequences.</li> </ul>
Negative Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"> <li>• Effects efficiency of basic industries, future marine terminal capacity and growth, and development flexibility, with regional economic consequences.</li> <li>• Reduces flexibility when placing new utilities.</li> </ul>
<u>Social</u>	<ul style="list-style-type: none"> <li>• Precludes the health, safety and welfare benefits of Port development.</li> <li>• Precludes existing agricultural uses on the site.</li> </ul>
<u>Environmental</u>	<ul style="list-style-type: none"> <li>• Discourages efficient rail access to Port facilities, with some negative environmental consequences.</li> <li>• Could cause new marine terminal facilities to locate outside the UGB.</li> </ul>
<u>Energy</u>	<ul style="list-style-type: none"> <li>• Discourages conflicting uses from locating on the site, which could push those uses to alternative sites outside the UGB, increasing future transportation energy expenditures.</li> <li>• Discourages development of efficient rail infrastructure, which could increase future transportation related energy expenditures.</li> </ul>

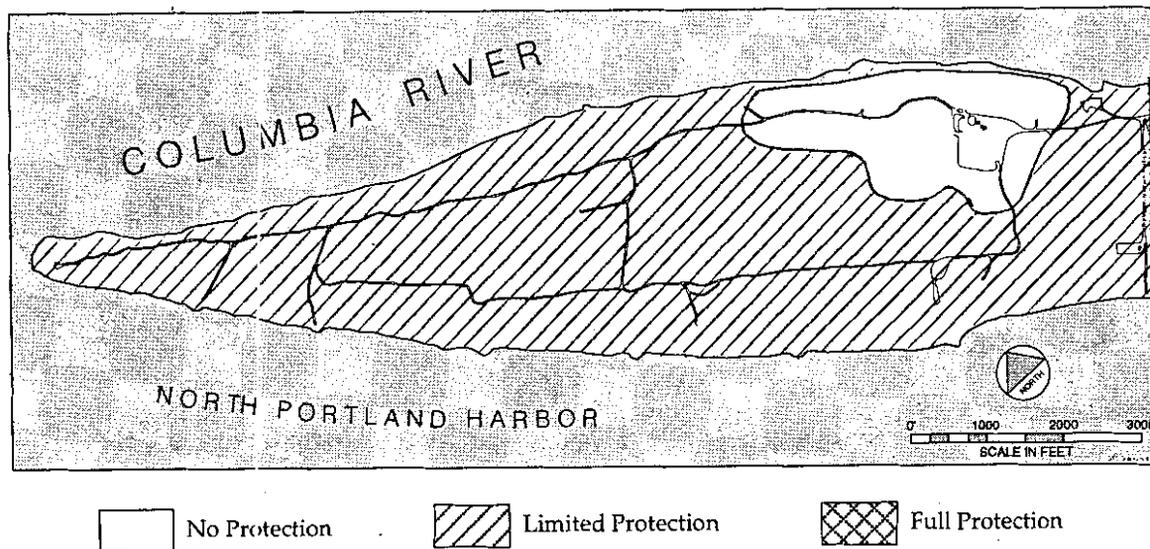
Note: The consequences listed above are discussed in greater detail earlier in the ESEE analysis.

### Strategy C

*Partially protect the entire site  
(Limit all conflicting uses on the site).*

A limited protection strategy would allow conflicting uses throughout the site, provided resource values are conserved. For example, marine terminal development could be allowed to occur on any portion of the site, subject to environmental performance standards, or subject to replacement of existing resources. This strategy recognizes the potential economic value of expanded marine terminal facilities, while conserving generalized resource values. Many of the positive energy consequences associated with resource protection or conservation, for example, are general in nature, and are not associated with one portion of the site more than another. The energy benefits of natural resources on West Hayden Island are associated with the types of resources on West Hayden Island, not necessarily the specific resources. In other words, resources may be replaceable, at least as they relate to energy consequences. This strategy is based on the notion that resources on West Hayden Island are replaceable.

**Figure 16. Effect of Strategy C on the West Hayden Island Site**



**Recommendation: Reject the "partial protection of the whole site" strategy. The ESEE analysis supports more specific protection or conservation of particular natural resources on West Hayden Island.**

Figure 17. ESEE Consequences of Strategy C

Positive Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"> <li>• Allows limited marine terminal development, with the associated economic benefits.</li> </ul>
<u>Social</u>	<ul style="list-style-type: none"> <li>• Supports positive health, safety and welfare consequences of Port development.</li> </ul>
<u>Environmental</u>	<ul style="list-style-type: none"> <li>• Encourages efficient rail access to Port facilities, with positive environmental consequences.</li> <li>• Allows new marine terminal facilities to locate within the UGB, reducing the impact to resources outside the urbanized area.</li> </ul>
<u>Energy</u>	<ul style="list-style-type: none"> <li>• Supports the retention of vegetation within a large natural area, possibly reducing future energy use of future buildings located on the site, and in surrounding areas.</li> <li>• Supports non-automobile modes of travel by protecting natural amenities along pedestrian /bike trails.</li> <li>• Encourages clustering of buildings away from natural areas, reducing infrastructure needs.</li> <li>• By supporting local passive recreational opportunities, reduces distance (energy use) that local residents must travel to reach recreational opportunities.</li> </ul>
Negative Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"> <li>• Effects efficiency of basic industries, future Port capacity and growth, and development flexibility.</li> <li>• Does not fully protect the economic value of environmental infrastructure.</li> <li>• Does not fully protect greenspace/amenity values.</li> </ul>
<u>Social</u>	<ul style="list-style-type: none"> <li>• Does not fully protect recreational and educational opportunities.</li> <li>• Does not protect historic heritage and cultural values.</li> <li>• Does not fully protect environmentally friendly image of the city.</li> <li>• Does not fully protect health, safety and welfare benefits of a large natural area.</li> </ul>
<u>Environmental</u>	<ul style="list-style-type: none"> <li>• Does not specifically protect most valuable fish and wildlife habitat.</li> <li>• Does not specifically protect floodplain resources.</li> <li>• Does not specifically protect most valuable wetland resources.</li> </ul>
<u>Energy</u>	<ul style="list-style-type: none"> <li>• None.</li> </ul>

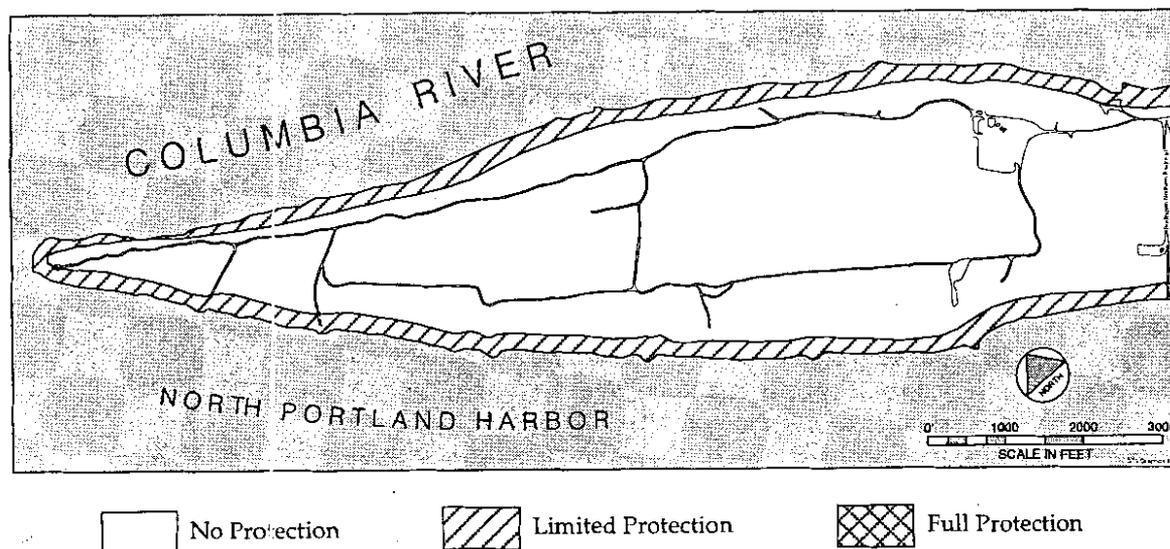
Note: The consequences listed above are discussed in greater detail earlier in the ESEE analysis.

### Strategy D

*Limit conflicting uses (partial protection) within river bank areas and beach areas of the site.*

Much of the environmental and economic value of West Hayden Island (in its undeveloped state) is associated with the site's position within the lower Columbia River ecosystem. Limiting a conflicting use does not prohibit a use unless that use cannot be carried out in an environmentally sensitive manner. Limiting marine terminal uses within river banks and beach areas, for example, would not prohibit that use as long as marine terminal facilities are designed to minimize their impact to the resource values associated with the river's edge. Specific resources of concern are shallow water habitat adjacent to the island (and the relationship of that resource to endangered salmon runs), and the important habitat values associated with riparian areas.

**Figure 18. Effect of Strategy D on the West Hayden Island**



**Recommendation:** *Provide at least partial protection for river bank areas and beach areas along the shore of West Hayden Island. This strategy protects specific functional values and does not substantially reduce the viability of marine terminal or other development on the site. To be effective, this strategy needs to work in combination with other strategies to protect interior forested areas and wetlands.*

**Figure 19. ESEE Consequences of Strategy D**

Positive Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"><li>• Protects the value of floodplain resources.</li></ul>
<u>Social</u>	<ul style="list-style-type: none"><li>• Supports some health safety and welfare benefits of natural areas.</li></ul>
<u>Environmental</u>	<ul style="list-style-type: none"><li>• Protects shallow water habitat.</li><li>• Encourages sensitive wharf design.</li><li>• Reduces bank erosion.</li><li>• Protects river bank habitat.</li></ul>
<u>Energy</u>	<ul style="list-style-type: none"><li>• None</li></ul>
Negative Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"><li>• May constrain marine terminal development, particularly wharf design options.</li></ul>
<u>Social</u>	<ul style="list-style-type: none"><li>• None</li></ul>
<u>Environmental</u>	<ul style="list-style-type: none"><li>• May constrain some habitat enhancement activities.</li></ul>
<u>Energy</u>	<ul style="list-style-type: none"><li>• None.</li></ul>

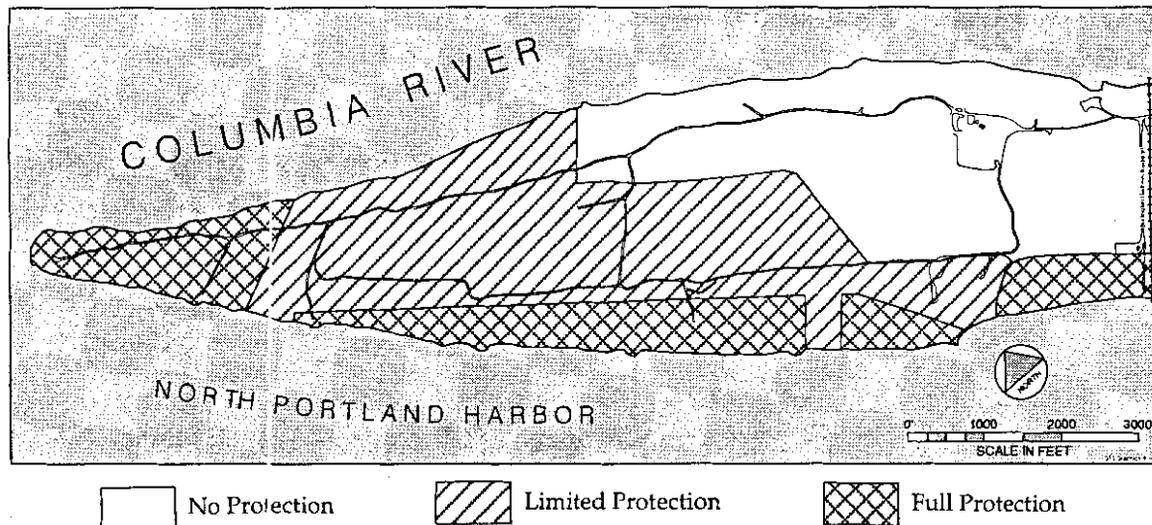
Note: The consequences listed above are discussed in greater detail earlier in the ESEE analysis.

### Strategy E

*Maximize the extent to which protected portions of the site occur as one contiguous block (minimize habitat fragmentation). Consider habitat values when choosing how to create a contiguous block of resources. Protect portions of the site in such a manner as to maximize the retention of existing habitat values.*

Although the whole site is significant relative to other resources in the region, the environmental analysis reveals that some portions of the site have a particularly high value. The quality of resources on the site varies. Several wetland areas, and several forested areas were found to have particularly high habitat values. If conflicting uses are allowed on West Hayden Island, conservation and protection measures should lead to the retention of as many of these high valued resources as possible. In addition, habitat values associated with the site can be maximized to the extent that remaining habitat is not fragmented. Conservation and protection measures should emphasize connectivity between remaining habitat fragments, and minimize fragmentation where possible. This strategy assumes that significant development of West Hayden Island will occur, and emphasizes targeting specific resources for protection.

**Figure 20. Effect of Strategy E on the West Hayden Island Site**



**Recommendation:** Fully protect some portion of the resource units shown on the map above, and partially protect several other key locations in order to insure connectivity between habitat fragments. Some wildlife habitat connectivity can be retained while allowing substantial marine terminal development.

Figure 21. ESEE Consequences of Strategy E

Positive Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"> <li>• Protects the value of wildlife habitat from intensive marine terminal, recreation, and agricultural uses.</li> <li>• Protects houseboat property values.</li> <li>• Supports greenspace/amenity values.</li> <li>• Reduces federal and state mitigation costs.</li> </ul>
<u>Social</u>	<ul style="list-style-type: none"> <li>• Supports educational and passive recreational opportunities.</li> <li>• Supports visual variety.</li> <li>• Supports screening and buffering between Port facilities and adjacent non-industrial uses.</li> <li>• Supports some health safety and welfare benefits of natural areas.</li> </ul>
<u>Environmental</u>	<ul style="list-style-type: none"> <li>• Protects most important wildlife habitat values.</li> <li>• Minimizes habitat fragmentation.</li> </ul>
<u>Energy</u>	<ul style="list-style-type: none"> <li>• Supports the retention of vegetation within a large natural area, possibly reducing future energy use of future buildings located on the site, and in surrounding areas.</li> <li>• Encourages clustering of buildings away from natural areas, reducing infrastructure needs.</li> <li>• By supporting local passive recreational opportunities, reduces distance (energy use) that local residents must travel to reach recreational opportunities.</li> </ul>
Negative Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"> <li>• May increase development costs on the site.</li> <li>• Reduces flexibility when placing new utilities.</li> </ul>
<u>Social</u>	<ul style="list-style-type: none"> <li>• Precludes existing agricultural uses on portions of the site.</li> </ul>
<u>Environmental</u>	<ul style="list-style-type: none"> <li>• Loss of shallow water habitat associated with wharf development.</li> </ul>
<u>Energy</u>	<ul style="list-style-type: none"> <li>• Discourages conflicting uses from locating on the site, which could push those uses to alternative sites outside the UGB, increasing future transportation related energy expenditures.</li> <li>• Discourages development of efficient rail infrastructure, which could increase future transportation related energy expenditures.</li> </ul>

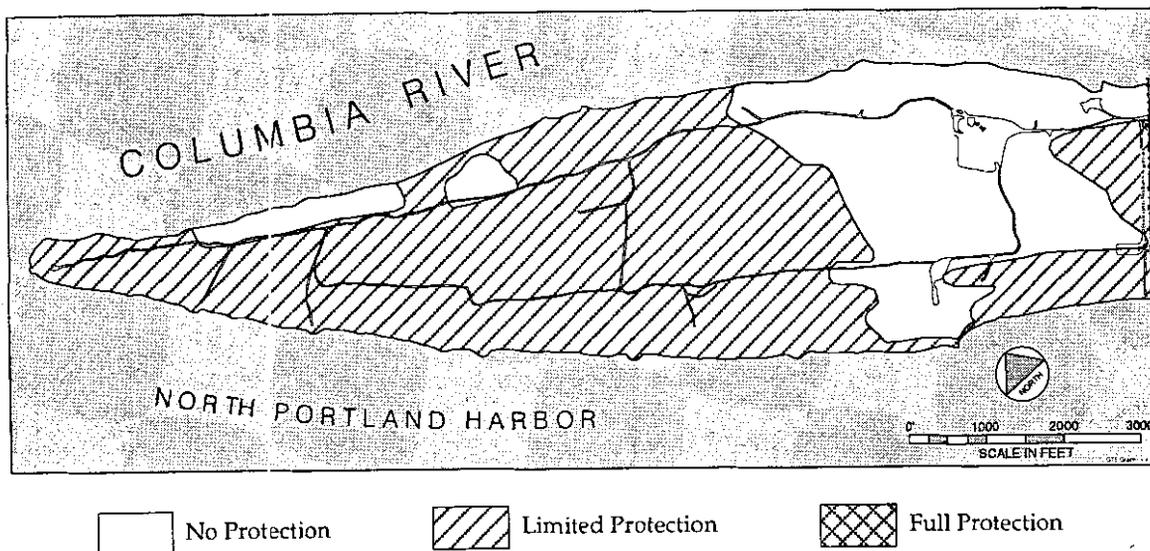
Note: The consequences listed above are discussed in greater detail earlier in the ESEE analysis.

### Strategy F

*Limit conflicting uses (limited protection) within forested areas on the site.*

Many of the energy and environmental values of resources on West Hayden Island are associated with forest resources in particular. This strategy seeks to conserve the forest-related values of the site. This strategy assumes that some of the forest-related resource values are functional in nature and thus are replaceable through mitigation. Conservation of forest resources would not preclude some conflicting uses, such as marine terminal development, provided functional values are conserved (probably through mitigation efforts aimed at developing new riparian forest resources).

**Figure 22. Effect of Strategy F on the West Hayden Island Site**



**Recommendation:** *Limit conflicting uses (provide at least partial protection) within most forested areas on the site. This strategy promotes the conservation of the functional values associated with the cottonwood riparian forests on the site. This limited protection strategy allows important marine terminal development to replace these resources, provided that the functional values are replaced through mitigation.*

Figure 23. ESEE Consequences of Strategy F

Positive Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"><li>• Protects the functional economic values associated with microclimate and air quality.</li></ul>
<u>Social</u>	<ul style="list-style-type: none"><li>• Supports educational and passive recreational opportunities.</li><li>• Supports visual variety.</li><li>• Supports screening and buffering between Port facilities and adjacent non-industrial land uses.</li><li>• Supports some health safety and welfare benefits of urban forests.</li></ul>
<u>Environmental</u>	<ul style="list-style-type: none"><li>• Protects pollution reduction values associated with urban forests.</li><li>• Reduces microclimate impacts of development.</li><li>• Protects stormwater desynchronization values.</li></ul>
<u>Energy</u>	<ul style="list-style-type: none"><li>• Supports the retention of vegetation within a large natural area, possibly reducing future energy use of future buildings located on the site, and in surrounding areas.</li><li>• Encourages clustering of buildings away from natural areas, reducing infrastructure needs.</li></ul>
Negative Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"><li>• Conservation of some forest resources may impact development costs on the site.</li></ul>
<u>Social</u>	<ul style="list-style-type: none"><li>• Precludes existing agricultural uses on portions of the site.</li></ul>
<u>Environmental</u>	<ul style="list-style-type: none"><li>• Loss of shallow water habitat associated with wharf development.</li></ul>
<u>Energy</u>	<ul style="list-style-type: none"><li>• Discourages conflicting uses from locating on the site, which could push those uses to alternative sites outside the UGB, increasing future transportation related energy expenditures.</li></ul>

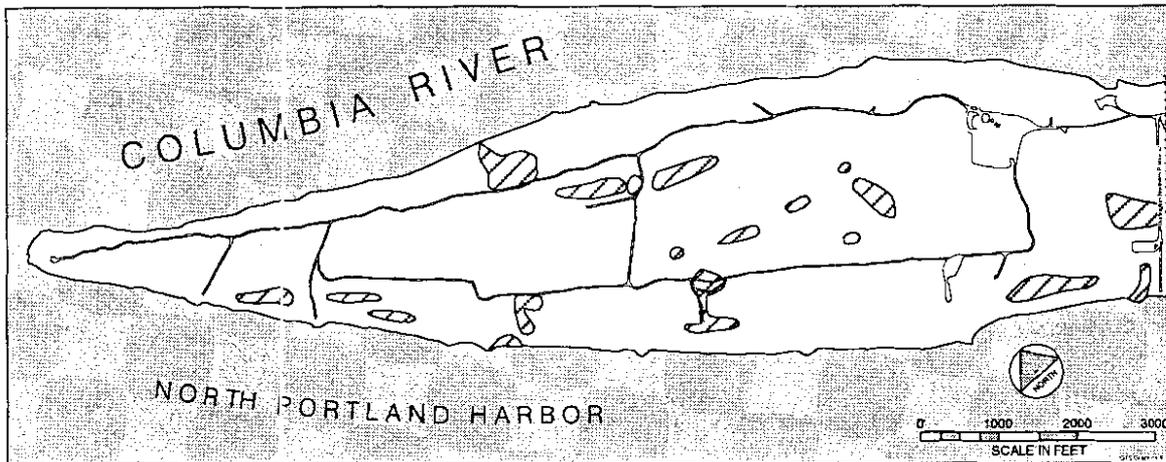
Note: The consequences listed above are discussed in greater detail earlier in the ESEE analysis.

**Strategy G**

***Limit conflicting uses (limited protection) within all wetland resources on the site.***

Many of the energy and environmental values of resources on West Hayden Island are associated with wetland resources in particular. This strategy is similar to Strategy F, but aims at conserving the wetland related values of the site. This strategy assumes that some of the wetland related resource values are functional in nature and thus may be replaceable through mitigation. Conservation of wetland resources would not preclude some conflicting uses, such as marine terminal development, provided functional values are conserved (probably through mitigation efforts aimed at developing new wetland resources).

**Figure 24. Effect of Strategy G on the West Hayden Island Site**



No Protection
  Limited Protection
  Full Protection

***Recommendation: Limit conflicting uses (provide at least partial protection) within wetland resources on the site. This strategy promotes the conservation of functional values associated with wetlands on the site. A limited protection strategy for these resources would allow important marine terminal development to replace these resources provided functional values are replaced through mitigation.***

Figure 25. ESEE Consequences of Strategy G

Positive Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"><li>• Protects existing functional economic value of wetland resources.</li></ul>
<u>Social</u>	<ul style="list-style-type: none"><li>• Supports educational and passive recreational opportunities.</li><li>• Supports visual variety.</li><li>• Supports screening and buffering between Port facilities and adjacent non-industrial land uses.</li><li>• Supports some health safety and welfare benefits of natural areas.</li></ul>
<u>Environmental</u>	<ul style="list-style-type: none"><li>• Protects wildlife habitat.</li><li>• Protects flood storage capacity.</li><li>• Protects Stormwater desynchronization values.</li><li>• Protects water quality functions of wetlands.</li></ul>
<u>Energy</u>	<ul style="list-style-type: none"><li>• Supports the retention of vegetation within a large natural area, possibly reducing future energy use of future buildings located on the site, and in surrounding areas.</li><li>• Encourages clustering of buildings away from natural areas, reducing infrastructure needs.</li></ul>
Negative Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"><li>• Conservation of some wetland resources may impact development costs on the site.</li><li>• Loss of shallow water habitat associated with wharf development.</li></ul>
<u>Social</u>	<ul style="list-style-type: none"><li>• Precludes existing agricultural uses on portions of the site.</li></ul>
<u>Environmental</u>	<ul style="list-style-type: none"><li>• Applying a conservation or protection zone to some wetland areas might impact future salmonid habitat enhancement projects.</li></ul>
<u>Energy</u>	<ul style="list-style-type: none"><li>• Discourages some conflicting uses from locating on the site, which could push those uses to alternative sites outside the UGB, increasing future transportation related energy expenditures.</li></ul>

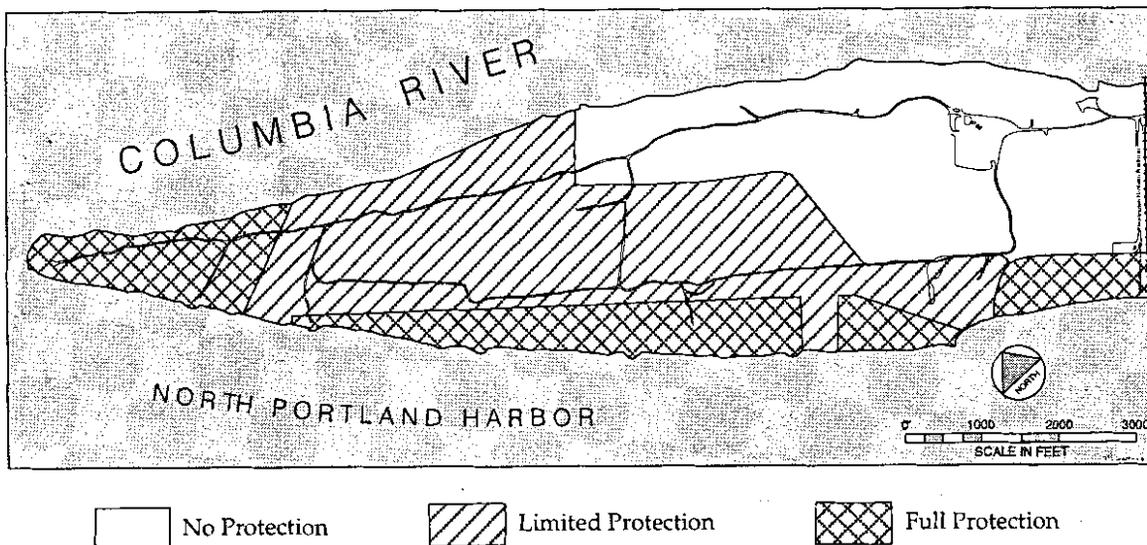
Note: The consequences listed above are discussed in greater detail earlier in the ESEE analysis.

### Strategy H

*Do not protect resources which conflict with the proposed intermodal yard and rail facilities.*

This strategy recognizes the potential economic benefit of proposed marine terminal development on West Hayden Island. This strategy also recognizes that efficient rail access to the West Hayden Island site is a key advantage of this site for marine terminal development. Without efficient rail access, marine terminal development on West Hayden Island is significantly less viable. In addition, expanded intermodal facilities serving ships and rail may have positive economic, energy and environmental consequences. This strategy attempts to create a balance between the positive economic values associated with marine terminal development, and the significant environmental and economic values associated with existing natural resources on West Hayden Island.

**Figure 26. Effect of Strategy H on the West Hayden Island Site**



**Recommendation:** *Allow some conflicting marine terminal uses fully. Do not protect lower valued resources which conflict with the proposed intermodal yard and associated rail and truck access facilities, as described in the West Hayden Island Development Program, (November 1995). Provide Limited protection for higher valued resources which conflict with these facilities.*

Figure 27. ESEE Consequences of Strategy H

Positive Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"> <li>• Supports basic industries, future Port capacity and growth, and development flexibility.</li> <li>• Allows intensive recreational use.</li> <li>• Maximizes flexibility when placing new utilities.</li> </ul>
<u>Social</u>	<ul style="list-style-type: none"> <li>• Supports positive health, safety and welfare consequences of Port development.</li> </ul>
<u>Environmental</u>	<ul style="list-style-type: none"> <li>• Encourages efficient rail access to Port facilities, with positive environmental consequences.</li> <li>• Allows new marine terminal facilities to locate within the UGB, reducing the impact to resources outside the UGB.</li> </ul>
<u>Energy</u>	<ul style="list-style-type: none"> <li>• By allowing conflicting uses to occur within the UGB, rather than on alternative sites outside the UGB, future transportation energy expenditures are reduced.</li> <li>• By encouraging development of efficient rail infrastructure could reduce future transportation related energy expenditures.</li> </ul>
Negative Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"> <li>• Harms the economic value of environmental infrastructure.</li> <li>• Harms greenspace/amenity values.</li> <li>• Increases federal and state mitigation costs.</li> </ul>
<u>Social</u>	<ul style="list-style-type: none"> <li>• Reduces some recreational and educational opportunities.</li> <li>• Negative effect on historic heritage and cultural values.</li> <li>• Reduces visual variety.</li> <li>• Reduces health, safety and welfare benefits of a large natural area.</li> </ul>
<u>Environmental</u>	<ul style="list-style-type: none"> <li>• Negative impact on fish and wildlife (highest valued habitat areas of site are destroyed).</li> <li>• Negative Impact on floodplain resources.</li> <li>• Negative impact on wetland resources.</li> <li>• Negative impact on forest resources and associated air pollution reduction values.</li> <li>• Negative impact on microclimate in the vicinity of West Hayden Island.</li> <li>• Loss of shallow water habitat associated with wharf development.</li> </ul>
<u>Energy</u>	<ul style="list-style-type: none"> <li>• Elimination of large regional natural areas can increase energy expenditures for heating and cooling.</li> <li>• Development of Marine terminal uses on West Hayden Island would involve extensive energy expenditures associated with installation of infrastructure.</li> </ul>

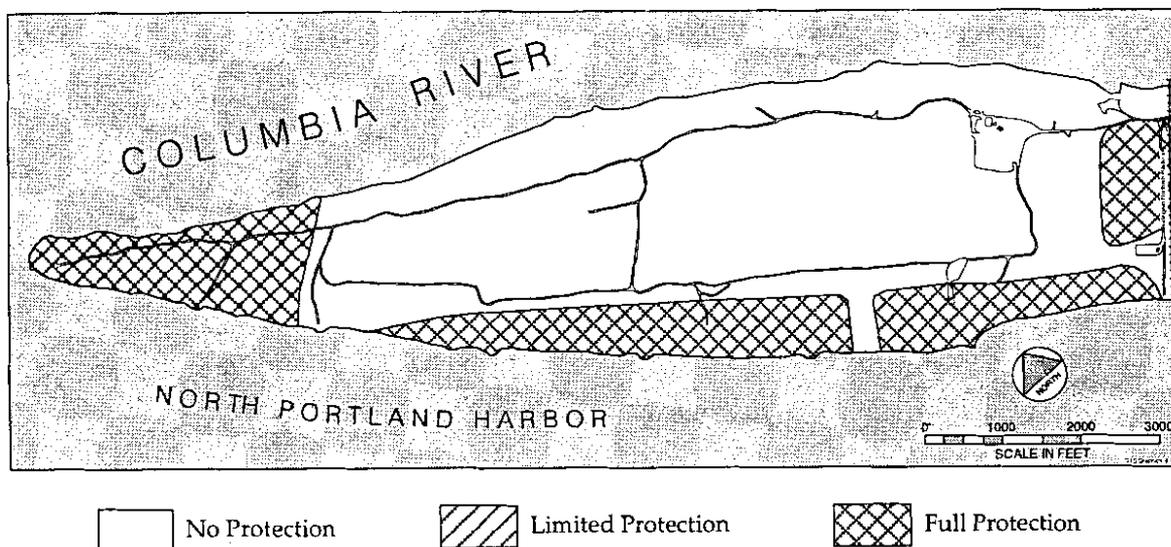
Note: The consequences listed above are discussed in greater detail earlier in the ESEE analysis.

### Strategy I

*Prohibit conflicting uses on portions of the site which are designated as open space in the Port of Portland's West Hayden Island Development Plan (November 1995).*

Goal 5 requires the protection of significant resources if no conflicting uses are identified. Based on the Conflicting Use and ESEE analysis, recreational and utility uses are the only conflicting uses within some portions of the site. Full protection of natural resources does not conflict with proposed passive recreational activities within the area to be designated as open space. Full protection of resources does not conflict with the continued operation and maintenance of the existing utility corridors on the site. This strategy is consistent with the West Hayden Island Development Program's proposed open space component.

**Figure 28. Effect of Strategy I on the West Hayden Island Site**



**Recommendation:** *Prohibit conflicting uses on portions of the site which are designated as open space in the Port of Portland's West Hayden Island Development Plan (November 1995). Assuming development on West Hayden Island occurs according to current development plans, there are few consequences from protecting some resources on the site.*

Figure 29. ESEE Consequences of Strategy I

Positive Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"> <li>• Allows marine terminal development, with the associated economic benefits.</li> <li>• Supports the economic value of remaining environmental infrastructure.</li> <li>• Supports greenspace/amenity values.</li> </ul>
<u>Social</u>	<ul style="list-style-type: none"> <li>• Supports educational and passive recreational opportunities.</li> <li>• Supports visual variety.</li> <li>• Supports screening and buffering between Port facilities and adjacent land uses.</li> <li>• Supports some health safety and welfare benefits of natural areas, while allowing the health, safety, and welfare benefits of Port development.</li> </ul>
<u>Environmental</u>	<ul style="list-style-type: none"> <li>• Encourages efficient rail access to Port facilities, with positive environmental consequences.</li> <li>• Allows new marine terminal facilities to locate within the UGB.</li> <li>• Protects some fish and wildlife habitat functions.</li> <li>• Protects some floodplain resources.</li> <li>• Protects some wetland resources and associated functions.</li> <li>• Protects some forest resources and associated air pollution reduction values.</li> </ul>
<u>Energy</u>	<ul style="list-style-type: none"> <li>• Supports the retention of vegetation within a large natural area, possibly reducing future energy use of future buildings located on the site, and in surrounding areas.</li> <li>• Supports non-auto modes of travel by protecting amenities along pedestrian /bike trails.</li> <li>• Encourages clustering of buildings away from natural areas, reducing infrastructure needs.</li> <li>• By supporting local passive recreational opportunities, reduces distance (energy use) that local residents must travel to reach recreational opportunities.</li> </ul>
Negative Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"> <li>• Does not fully protect the economic value of environmental infrastructure.</li> <li>• Does not fully protect greenspace/amenity values.</li> <li>• Reduces flexibility when placing new utilities.</li> </ul>
<u>Social</u>	<ul style="list-style-type: none"> <li>• Does not fully protect recreational and educational opportunities.</li> <li>• Does not protect historic heritage and cultural values.</li> <li>• Does not fully protect health, safety and welfare benefits of a large natural area.</li> </ul>
<u>Environmental</u>	<ul style="list-style-type: none"> <li>• Does not protect most valuable fish and wildlife habitat.</li> <li>• Does not protect all floodplain resources.</li> <li>• Does not protect most valuable wetland resources.</li> <li>• Loss of shallow water habitat associated with wharf development.</li> </ul>
<u>Energy</u>	<ul style="list-style-type: none"> <li>• None.</li> </ul>

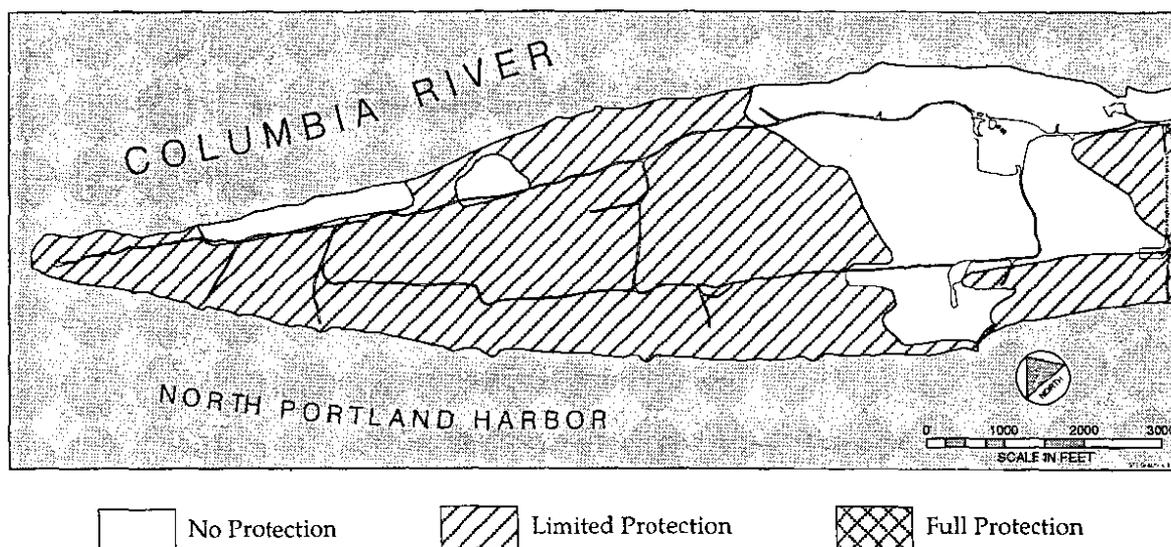
Note: The consequences listed above are discussed in greater detail earlier in the ESEE analysis.

### Strategy J

*Do not protect non-habitat areas (as identified in the inventory - Chapter 3), or low valued meadow and forest habitat.*

This strategy recognizes that the habitat value of a several portions of the site has been substantially reduced by past activities (such as the depositing of dredge material, the activities of the bulldozing training school, and use of the site by cattle). Given the important economic values associated with marine terminal development, protection of these lower valued resources may not be appropriate.

**Figure 26. Effect of Strategy J on the West Hayden Island Site**



**Recommendation:** *Do not protect non-habitat areas (as identified in the inventory - Chapter 3), or low valued meadow and forest habitat (such as riparian forest #6).*

Figure 27. ESEE Consequences of Strategy J

Positive Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"> <li>• Supports basic industries, future Port capacity and growth, and development flexibility.</li> <li>• Increases flexibility when placing new utilities.</li> </ul>
<u>Social</u>	<ul style="list-style-type: none"> <li>• Supports positive health, safety and welfare consequences of Port development.</li> </ul>
<u>Environmental</u>	<ul style="list-style-type: none"> <li>• Encourages efficient rail access to Port facilities, with positive environmental consequences.</li> <li>• Allows new marine terminal facilities to locate within the UGB, reducing the impact to resources outside the UGB.</li> </ul>
<u>Energy</u>	<ul style="list-style-type: none"> <li>• By allowing conflicting uses to occur within the UGB, rather than on alternative sites outside the UGB, future transportation energy expenditures are reduced.</li> <li>• By encouraging development of efficient rail infrastructure could reduce future transportation related energy expenditures.</li> </ul>
Negative Consequences:	
<u>Economic</u>	<ul style="list-style-type: none"> <li>• May harm greenspace/amenity values.</li> </ul>
<u>Social</u>	<ul style="list-style-type: none"> <li>• Reduces some recreational and educational opportunities.</li> <li>• Negative effect on historic heritage and cultural values.</li> <li>• Reduces visual variety.</li> </ul>
<u>Environmental</u>	<ul style="list-style-type: none"> <li>• Negative Impact on floodplain resources.</li> <li>• Negative impact on species utilizing meadow habitat.</li> </ul>
<u>Energy</u>	<ul style="list-style-type: none"> <li>• Development of Marine terminal uses on West Hayden Island would involve extensive energy expenditures associated with installation of infrastructure.</li> </ul>

Note: The consequences listed above are discussed in greater detail earlier in the ESEE analysis.

## CONFLICT RESOLUTION SUMMARY AND LOCATION-SPECIFIC RECOMMENDATIONS

This section presents the tentative results of the conflict resolution portion of the ESEE. The results are presented in two formats.

Table 21 lists different groups of resources on the West Hayden Island site, provides a summary of the conclusions reached in the ESEE analysis, and shows the resource protection recommendation for each resource group. For each grouping of resources, "resource unit" identification numbers are also listed. Resource units correspond to identification numbers used in the inventory (Chapter 3, Figure 3). For each group of resources, the recommendations for each of the four ESEE factors considered are listed. In Table 21, "Full" indicates full protection, "limited" indicates limited protection and "none" indicates no protection. The third column lists the general protection strategy(s) (as discussed in the preceding pages) which contributed to the protection decision for each group of resources. The final column lists the recommended decision for each resource grouping.

Figure 30 places the recommendations listed on Table 21 on the Port of Portland's Recommended Development Plan map (Figure 6).

### How to Use the Conflict Resolution Summary Table (Table 21)

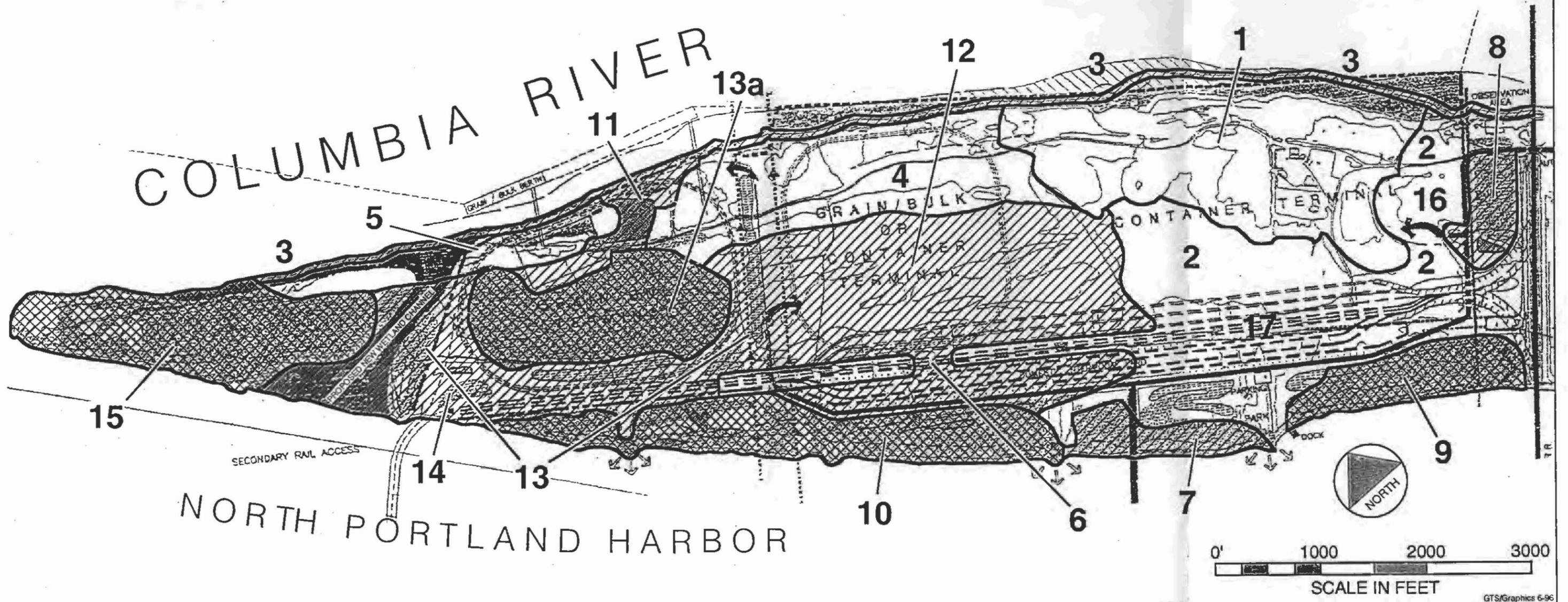
For any given portion of the site, the recommended level of protection is shown in the "Recommended Protection" column of Table 21, and on Figure 30. Numbers shown on Figure 30 refer to rows in Table 21, and each row in Table 21 refers to a number on Figure 30. The "contributing strategy" column of Table 21 identifies the generalized strategies that contributed to the recommendation for that group of resources. Additional columns are labeled for each part of the ESEE analysis (economic, social, environmental, and energy). The "Economic" column, for example, shows what the recommended decision would be if only the economic analysis was considered. The recommendations shown on Table 21 are based on groups of "resource units". Resource units were identified in the Natural Resources Inventory (Chapter 3).

**Table 21. Conflict Resolution Summary Table for West Hayden Island:  
Recommended Level of Protection Based on ESEE Factors and Protection  
Strategies**

Resource Group (Resource Units Impacted)	No. on Fig. 30	Contributing Strategy	Econ	Soc	Env	Energy	Recommended Level of Protection
Area excluded in Inventory	1	See Ch. 3	none	none	none	none	none
Non-habitat areas surrounding excluded area	2	H, J	none	none	none	none	none
Beach area north of excluded area	3	D	none	none	full	none	limited
North-central forest and meadow areas. RF 3, RF 7	4	J	none	none	limited	none	none
Non-habitat and meadows west of W 4	5	J	none	none	none	none	none
Portions of RF 10, RF 9, W 7 conflicting with intermodal yard	6	E, F, G, H	none	limited	full	limited	limited
Bridge approach portion of RF 9	7	D, F, H	none	limited	limited	limited	limited
Portion of RF 7 east of sewer outfall, W 12, W 13	8	F, I	limited	limited	full	limited	limited
Southern shore W 11, W 14, portions of RF 8, RF 9	9	D, F, G, I	full	full	full	full	full

Table 21 (Continued).

Resource Group (Resource Units Impacted)	No. on Fig. 30	Contributing Strategy	Econ	Soc	Env	Energy	Recommended Level of Protection
Southern shore W 5b, portions of W 5a, W 7, RF 9	10	D, E, F, G, I	full	full	full	full	full
Benson Pond W4, portions of RF 3, RF 5	11	D, F, G, H	limited	limited	full	limited	limited
Historic island core W 8, W9, W10, W 6b, W 6c, FES 8, portions of RF 10, RF 5, RF 3, W 6a	12	E, F, G, H	limited	limited	full	limited	limited
Forests west of transmission corridor portions of RF 3, RF 5, RF 4	13	E, F, H	limited	limited	full	limited	limited
Forests within grain/bulk loop portions of RF 5, RF 3, RF 4	13a	E, F, H	full	full	full	full	full
W 1, W 2, W 3, surrounding wet meadows, portion of RF 8	14	D, E, F, G, H	limited	limited	full	limited	limited
Western tip of site RF 1, RF 2, portion of RF 3	15	D, E, F	full	full	full	full	full
Portion of RF 7, west of sewer outfall	16	H, J	none	none	limited	none	none
Existing cleared corridor and RF 6	17	H, J	none	none	limited	none	none



**LEGEND**

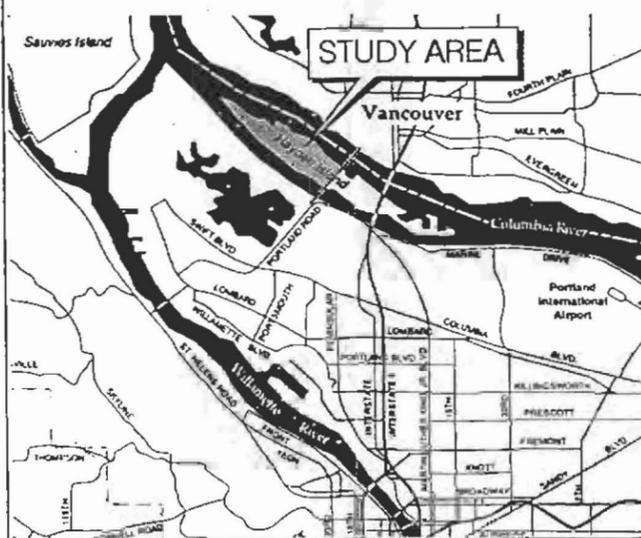
Full Protection

Limited Protection

No Protection

**Note:** Numbers refer to Conflict Resolution Summary Table (Table 21), which provides a summary of the ESEE analysis contributing to the proposed levels of protection shown on this map

**VICINITY MAP**



**Figure 30**  
**Proposed Level of Protection**  
**Overlay on Recommended Plan**

**WEST HAYDEN ISLAND**  
**DEVELOPMENT PROGRAM**  
 Goal 5 Natural Resources Inventory

## SUMMARY OF ESEE CONCLUSIONS

There are large economic benefits associated with allowing efficient Port facilities. These benefits include direct employment at new marine terminal facilities, as well as new jobs within industries which would utilize expanded Port facilities. Existing marine terminal facilities make a significant contribution to the regional economy. The benefits of marine terminal development accrue on a regional scale. These benefits support allowing marine terminal development on West Hayden Island.

There are also significant economic values associated with natural resources found on West Hayden Island. These values are derived from floodplain resources, fish and wildlife habitat (including critical habitat for endangered salmon runs), and the air quality and microclimate benefits of urban forests. Natural amenities (such as large natural areas) also play an important role in the regional economy by attracting and helping to retain high quality jobs, contributing to tourism, supporting recreation, and contributing to property values. The economic value of protecting significant natural resources supports limited protection of natural resources on West Hayden Island.

There are significant social values associated with the natural character of the West Hayden Island site, including recreational and educational opportunities, heritage and cultural values, values related to visual variety and urban image, screening and buffering values, and health, safety, and welfare values. These values support limiting, and in some cases, prohibiting conflicting uses.

However, there are health, safety, and welfare benefits due to the potential economic growth resulting from Port expansion. This value supports allowing marine terminal development.

The loss of natural resources on West Hayden Island would have negative environmental consequences. These consequences include the loss of critical wildlife habitat, loss of floodplain resources, further reduction of wetland and riparian forest habitat, and the loss of a large forested area within an otherwise urban landscape. Much of the site's environmental value is associated with the size of the site, and the site's position within the lower Columbia River ecosystem. An important factor is the designation of the entire Columbia River mainstem as critical habitat for endangered sockeye and spring/summer and fall chinook. The site is one of the few remaining examples of riparian cottonwood forest within the metropolitan region. These significant environmental values support full protection of the West Hayden Island site.

The environmental benefits of marine terminal development are primarily related to the development of more rail oriented marine terminal facilities.

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There are environmental benefits associated with moving freight with rail rather than trucks.

The retention of natural vegetation on West Hayden Island may reduce heating and cooling related energy needs both within the site and in the surrounding community. Conservation or protection of resources can also reduce infrastructure related energy use to the extent that future land uses can cluster on portions of the site away from resource areas. Resource conservation or protection can enhance the attractiveness of walking and bicycle routes, decreasing automobile use, and decreasing transportation related energy use. Resource protection can also reduce the distance local residents must travel to reach recreational opportunities, thus decreasing energy use.

If there are no alternative locations for marine terminal development within the urban growth boundary (UGB), resource protection may require marine terminal uses to locate in alternative locations which lead to greater transportation related energy use. For example, if marine terminal facilities are located farther down-river from Portland, more energy may be required to move cargo to and from Portland. This would occur because the movement of cargo on large ships and barges is more energy efficient than moving cargo on land (by rail and truck). Additionally, if marine terminal facilities are forced to locate farther from employee homes, and farther from existing infrastructure, greater energy expenditures (related to commuting and the provision of new infrastructure) could be anticipated.

In conclusion, the Limited protection option provides the best method of reconciling the conflicting values present on West Hayden Island. Limited protection provides the means to allow marine terminal development to occur on the site, while insuring that significant but conflicting natural resource values continue to be addressed throughout the development process. The limited protection option would require that impacts to natural resources be avoided where possible. Where unavoidable conflicts occur, the limited protection options provides the mechanism to insure that resource values are conserved through mitigation.

The preceding conflict resolution section presents a variety of strategies for achieving the most effective form of limited protection. Figure 30 presents a map of West Hayden Island, with suggested levels of protection shown for different portions (resource units) of the West Hayden Island site. This location specific analysis is presented in recognition that full protection of some resources on the site is possible within the overall framework of limited protection. Figure 30 suggests fully protecting portions of the site which do not conflict with marine terminal development, partially protecting significant resources which conflict with the proposed marine terminal development, and suggests no protection for some lower valued areas. The final chapter of this report, a natural resources protection program, will translate these general recommendations into suggested zoning designations.

## CHAPTER 7 NATURAL RESOURCE PROTECTION PROGRAM

### INTRODUCTION

The Port of Portland has prepared the *West Hayden Island Development Program* as a guide to the long range development of marine terminal facilities on West Hayden Island. In this chapter, the Bureau of Planning provides suggestions for a program to protect the natural resource values of West Hayden Island.

This program suggests City of Portland protection of important natural resources, while providing opportunities for regionally important marine industrial development in the study area. This natural resource protection program includes suggested City Comprehensive Plan map designations, City base zones, City environmental overlay zones, and suggested mitigation opportunities.

The Bureau of Planning has four tasks with respect to West Hayden Island:

1. Assist the Port of Portland to identify, evaluate and suggest the appropriate protection levels for natural resources in the study area;
2. Assist with the orderly transfer of jurisdiction from Multnomah County to City of Portland;
3. Process a land use application from the Port of Portland to apply City land use designations to the study area, including City environmental zones; and
4. Upon adoption, implement City zoning in the study area.

This chapter addresses Tasks 1 and 4 above. Task 2 will be addressed by an amendment to the Urban Planning Area Agreement (UPAA) between the City of Portland and Multnomah County. The UPAA amendment will authorize the transfer of planning responsibilities from the county to the city. The amendment will allow the Port of Portland to apply for City zoning and the City to implement that zoning without interruption before and after annexation of West Hayden Island.

Task 3 will occur when the Port of Portland submits an application to apply City zoning to West Hayden Island. The Port is expected to apply for City zoning in advance of annexation by the City. This chapter includes suggested findings regarding the approval criteria for Comprehensive Plan Map amendments and Zoning Map amendments. The Port of Portland may

consider these suggested findings, suggested mapping rules, and other information included in this report, for use in its quasi-judicial application to the Land Use Hearings Officer.

The Bureau of Planning is not an applicant to those proceedings. As discussed in the introductory chapter, the Bureau of Planning has prepared this report for the Port of Portland as a component of the *West Hayden Island Development Program*. This report is a product of an intergovernmental agreement between the Port of Portland and the Bureau of Planning.

### **SUGGESTED LEVEL OF PROTECTION FOR WEST HAYDEN ISLAND**

The focus of this report is to suggest appropriate protection levels for natural resources in the West Hayden Island study area (Task 1, above). These recommendations are made based on State Goal 5 and the associated Administrative Rule (Appendices D and E). The Goal 5 Administrative Rule requires that a three-step planning process occur in order to reach conclusions regarding the protection of natural resources:

- 1) An inventory must be completed showing the location, quantity, and quality of resources proposed for Goal 5 protection;
- 2) An analysis must be completed describing the economic, social, environmental and energy (ESEE) consequences of allowing, limiting or prohibiting land uses which conflict with identified natural resources; and
- 3) Based on the ESEE analysis, and the inventory, a program must be developed to protect significant resources.

Chapter 4 of this report is a natural resources inventory of West Hayden Island. Chapter 6 of this report provides an ESEE analysis. A natural resources protection program for West Hayden Island is the subject of this chapter.

### **Program Options**

The City's primary land use tools to protect natural areas include the Open Space Plan map designation, the open space (base) zone, and the environmental overlay zones ("c" and "p"). The recreational trail designation may also be applied. An additional tool to implement the environmental zones is to adopt a natural resources management plan (NRMP) for some or all of West Hayden Island. Elsewhere in the Columbia Corridor, there are two adopted NRMPs (Smith-Bybee Lakes and East Columbia Neighborhood) and one proposed NRMP (Peninsula Drainage District No. 1).

This section suggests appropriate plan map designations, base zones, and overlay zones for the West Hayden Island study area. Each of these suggestions is also discussed in relation to the approval criteria for Comprehensive Plan Map amendments and Zoning Map amendments. For each approval criteria, suggested findings are presented.

### **Open Space and Industrial Sanctuary Comprehensive Plan Map Designations**

The placement of map designations for the Comprehensive Plan (hereafter, plan map designations) is guided by Comprehensive Plan Policy 10.2, entitled "Comprehensive Plan Map." The designations state the type of area each is intended for, general uses and development types desired, and the corresponding zone or zones which implement the designation. Plan map designations are shown on the Official Zoning Maps.

Policy 10.3 states that the Open Space plan map designation is "intended for lands that serve an open space function, primarily public lands, but also some private areas. Lands intended for Open Space designation include parks, natural areas, golf courses, and cemeteries. The corresponding base zone is OS.

Residential, commercial, and employment plan designations are not intended for natural areas. Even the lowest density residential designation (Farm and Forest) does not, by itself, protect forests, wetlands, and other habitat areas. Tree harvesting is allowed by right in the corresponding Farm and Forest (RF) zone. The employment plan designation allows commercial uses by right, and offers similar conflicts to those posed by the commercial plan designations. Other reasons not to consider residential, commercial or employment plan designations are discussed in the conflicting uses discussion (Chapter 5).

The Industrial Sanctuary plan designation is intended for areas where City policy is to reserve land for existing and future industrial development. A full range of industrial uses are permitted and encouraged. Non-industrial uses are limited to prevent land use conflicts and to preserve land for industry. The corresponding zones are General Industrial (IG1), General Industrial (IG2), and Heavy Industrial (IH). The Industrial Sanctuary plan designation should be considered for areas of West Hayden Island where industrial development is proposed.

In order to provide for marine industrial development identified in the *West Hayden Island Development Program* and to protect natural resource values, the Bureau of Planning suggests a pattern of Open Space and Industrial Sanctuary plan map designations, as shown on Figure 31.

### Comprehensive Plan Map Amendment Approval Criteria and Suggested Findings

The Port of Portland is expected to apply for a quasi-judicial Comprehensive Plan Map amendment. The relevant approval criteria to amend the Comprehensive Plan Map is found in the City of Portland Zoning Code (Section 33.810.05C). The full zoning chapter regarding Comprehensive Plan Map amendments (Chapter 33.810) is appended to this document (Appendix F). Amendments to the Comprehensive Plan Map which are quasi-judicial will be approved if the review body finds that the applicant has shown that two criteria are met. These criteria are presented below (in bold), with suggested findings:

- 1. The requested designation for the site has been evaluated against relevant Comprehensive Plan policies and on balance has been found to be equally or more supportive of the Comprehensive Plan as a whole than the old designation;**

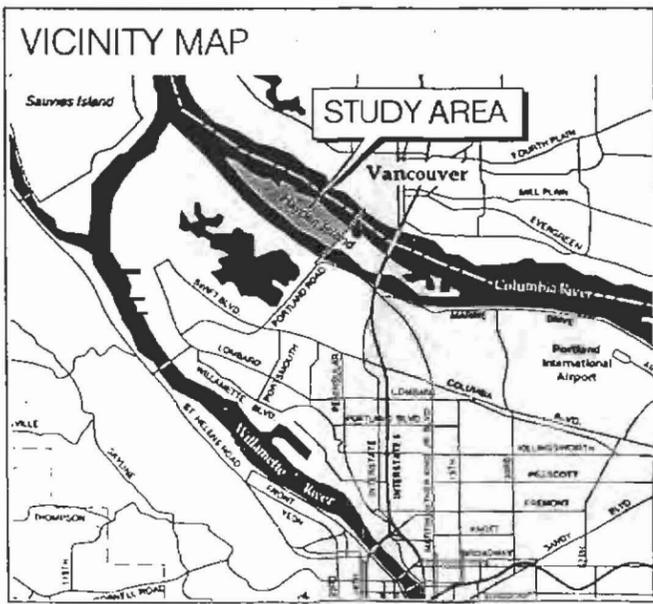
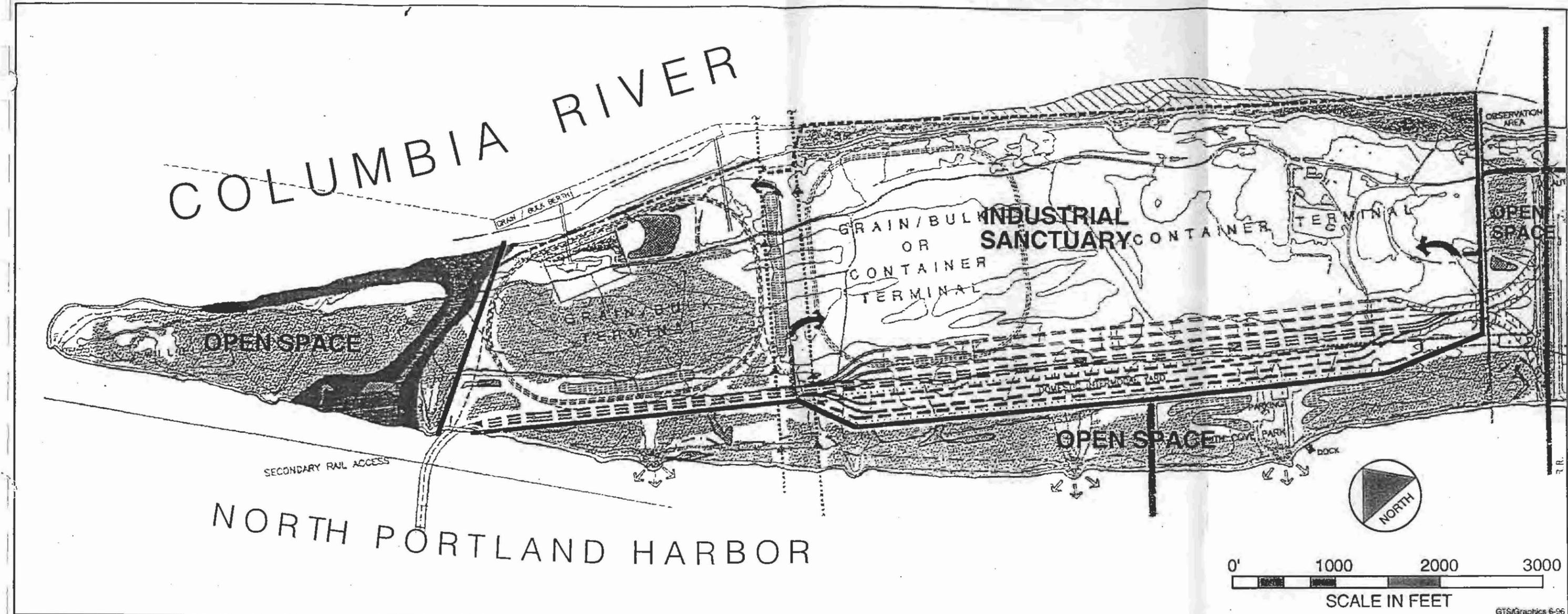
#### Suggested Findings:

The Policy Framework component of this report (Chapter 2) includes a discussion of specific City of Portland Comprehensive Plan Goals. That discussion may supplement these suggested findings.

The existing Multnomah County plan map designation for the West Hayden Island site is "Urban." In 1983, the Multnomah County Board of Commissioners approved "Resolution A," establishing the County policy of encouraging cities to annex lands designated as Urban. The intent of this resolution is to promote the efficient delivery of services by giving planning responsibility for urban lands to cities, and focusing County responsibilities in rural areas.

Based on this policy, it is expected that lands with the County's Urban plan map designation will eventually receive more appropriate comprehensive plan map designations from the city into which they are annexed. The decision to apply the Urban plan map designation to West Hayden Island was made in conjunction with the inclusion of the site within the Urban Growth Boundary (UGB). In amending the UGB to include West Hayden Island, Metro found there was a regional need to add land to accommodate future marine terminal development.

A City of Portland Industrial Sanctuary plan map designation is more appropriate than the current County Urban plan map designation, based on the previous UGB decision, and the intent of that decision to accommodate marine industrial uses on West Hayden Island.



**Figure 31**  
**Suggested Comprehensive**  
**Plan Designations**

WEST HAYDEN ISLAND  
 DEVELOPMENT PROGRAM  
 Goal 5 Natural Resources Inventory

The City of Portland Open Space Plan Map designation is applied to certain high valued natural resources on West Hayden Island. This plan map designation is appropriate for portions of the site which are intended to remain in a natural undeveloped state. This designation supports the long term protection of these natural areas, consistent with Goal 3 of the Comprehensive Plan.

2. **When the requested amendment is from a residential designation to a commercial, employment or industrial designation, or from the urban commercial designation to another commercial, employment, or industrial designation, or to IR Institutional Residential from another residential or the mixed commercial zone, the requested designation will not result in a net loss of potential housing units.**

#### Suggested Findings:

The second criterion does not apply to West Hayden Island because: 1) the existing Urban plan map designation on the site was applied with the specific intention of accommodating marine terminal development, not residential development; 2) the site is within the 100 year floodplain and thus was not included within the regional inventory of buildable lands; and 3) the site is within the Ldn 65 airport noise contour, within which the Department of Environmental Quality discourages residential development.

The Multnomah County findings and the Metro UGB decision are included in this report as Appendices B and C. These decisions provide the policy direction to apply a City Industrial Sanctuary plan map designation to portions of West Hayden Island. Findings related to State Planning Goals and the Multnomah County Framework Plan (as they stood at the time of those decisions) are included within those documents.

#### **IH and OS Base Zones**

For most parcels in the City, the underlying base zone corresponds directly to the parcel's Comprehensive Plan Map designation. Exceptions include residentially-designated parcels with deficient public services and mixed employment-designated parcels with an industrial zone.

Table 10.4-1 of the *Comprehensive Goals and Policies*, shows that the OS and IH base zones are at opposite ends of the intensity scale. The OS zone is not intended as a holding zone for unserviced parcels that are eventually intended to develop as industrial. Therefore, this report does not propose the OS zone for areas of West Hayden Island proposed for marine industrial development. For those portions of the site intended for marine terminal development, the Heavy Industrial (IH) base zone is suggested.

### Approval Criteria for Zoning Map Amendments and Suggested Findings

The Port of Portland is expected to apply for a quasi-judicial Zoning Map amendment. The relevant approval criteria to amend a base zone designation on the Official Zoning Map is found in the City of Portland Zoning Code (33.855.050). The full zoning chapter regarding Zoning Map amendments (33.855) is appended to this document (Appendix G). Amendments to the base zone designation on the Official Zoning Maps will be approved if the review body finds that the applicant has shown that three criteria are met. These criteria are presented below (in bold), with suggested findings:

- A. Compliance with the Comprehensive Plan Map. The zone change is to a corresponding zone of the Comprehensive Plan Map.**
- 1. When the Comprehensive Plan Map designation has more than one corresponding zone, it must be shown that the proposed zone is the most appropriate, taking into consideration the purposes of each zone and the zoning pattern of surrounding land.**
  - 2. Where R zoned lands have a C, E, or I designation with a Buffer overlay, the zone change will only be approved if it is for the expansion of a use from abutting nonresidential land. Zone changes for new uses that are not expansions are prohibited.**
  - 3. When the zone change request is from a higher-density residential zone to a lower-density residential zone, or from the CM zone to the CS zone, then the approval criterion in 33.810.050 A.2 must be met.**

#### Suggested Findings:

For portions of the site where the Open Space plan map designation is proposed, the corresponding OS Zoning Map designation is also proposed.

For portions of the site where the Industrial Sanctuary plan map designation is proposed, there are several corresponding Zoning Map designations: Heavy Industrial (IH), General Industrial 1 (IG1) and General Industrial 2 (IG2).

The IG1 and IG2 base zones provide areas where most industries may locate, while other uses are restricted to prevent other uses and to preserve land for industry. The development standards for each of these zones are intended to allow new development which is similar in character to existing development. IG1 areas generally have smaller lots and a grid block pattern. IG1 areas are mostly developed, with sites with high building coverages and buildings which are usually close to the street. IG1 areas tend to be the City's older industrial areas. Given

the operating requirements of the proposed marine terminal facilities, the IG1 base zone is not appropriate on West Hayden Island.

The IG2 areas generally have larger lots and an irregular or large block pattern. These areas are less developed, with sites having minimum or low building coverages and buildings which are usually set back from the street. The IG2 zone includes more stringent requirements than the IH zone for building setbacks, and landscaping. Given the operating requirements of the proposed marine terminal facilities, these setbacks and landscaping requirements are not appropriate.

The IH base zone provides areas where all kinds of industries may locate including those not desirable in other zones due to their objectionable impacts or appearance. The development standards in the IH zone are the minimum necessary to assure safe, functional, efficient, and environmentally sound development. The IH zone has been applied to existing marine industrial facilities in the vicinity of West Hayden Island (Terminals 5 and 6 in the Rivergate Industrial District). The IH zone is the most suitable Zoning Map designation for West Hayden Island, based on the minimum development requirements of that designation, and because that designation has been applied to adjacent marine industrial land in the Rivergate District.

The IH zone carries less stringent standards regarding allowed hazardous substances than other industrial Zoning Map designations. In general, this is appropriate given the nature of marine industrial operations, and the relatively isolated location of the site. However, there is some residential development on the eastern portion of Hayden Island. The Port may wish to suggest conditions describing a minimum distance from nearby residential uses, within which hazardous substances would be subject to more stringent requirements. Alternatively, the IG2 designation could be applied to a portion of the site.

The second and third portion of this criterion do not apply. West Hayden Island is not currently residentially zoned.

**B. Adequate public services. Public services for water supply, transportation system structure and capacity, and police and fire protection are capable of supporting the uses allowed by the zone or will be capable by the time development is complete, and proposed sanitary waste disposal and stormwater disposal systems are or will be made acceptable to the Bureau of Environmental Services.**

**1. Adequacy of services applies only to the specific zone change site.**

2. **Adequacy of services is based on the projected service demands of the site and the ability of the public services to accommodate those demands. Service demands may be determined based on a specific use or development proposal, if submitted. If a specific proposal is not submitted, determination is based on City service bureau demand projections for that zone or area which are then applied to the size of the site. Adequacy of services is determined by the service bureaus, who apply the demand numbers to the actual and proposed services to the site and surrounding area.**
3. **Services to a site that is requesting rezoning to IR Institutional Residential, will be considered adequate if the development proposed is mitigated through an approved impact mitigation plan for the institution.**

Suggested Findings:

The *West Hayden Island Development Program* includes preliminary plans for stormwater, sanitary sewer, electrical power, natural gas, and communication systems, and includes a circulation plan describing on-island circulation, highway access, and railroad access.

The third portion of this criterion does not apply. The Port of Portland is not requesting a zone change to the IR zone.

- C. **When the requested zone is IR, Institutional Residential. In addition to the criteria listed in subsections A. and B. of this Section, a site being rezoned to IR, Institutional Residential must be under the control of an institution that is a participant in an approved impact mitigation plan that includes the site. A site will be considered under an institution's control when it is owned by the institution or when the institution holds a lease for use of the site that covers the next 20 years or more.**

Suggested Findings:

This criterion does not apply. The Port of Portland is not requesting a zone change to the IR zone.

### Overlay Zones

The environmental overlay zone (Chapter 33.430) outlines the intended use of the environmental protection ("p") zone and the environmental conservation ("c") zone. Section 33.430.017 states that the environmental protection zone provides the highest level of protection to the most important resources and functional values. These resources and functional values are identified and assigned value in the inventory and economic, social, environmental, and energy (ESEE) analysis for each specific study area.

Development will be approved in the environmental protection zone only in rare and unusual circumstances. Section 33.430.017 states that the environmental conservation zone conserves important resources and functional values in areas where the resources and functional values can be protected while allowing environmentally sensitive urban development.

Based on the ESEE analysis (Chapter 6), certain areas of West Hayden Island are proposed for no protection, limited protection, or full protection. Figure 30 of this report shows suggested protection levels throughout the study area.

For purposes of this report, the Bureau of Planning suggests that the Port of Portland use the following mapping rules:

1. Apply the more restrictive environmental protection ("p") zone to high-valued natural resource areas which do not conflict with the proposed marine industrial development (as described in the *West Hayden Island Development Program*, dated November 1995).
2. Apply the environmental conservation zone ("c") zone to high-valued natural resource areas which conflict with proposed development, particularly in areas where careful design could reduce the impact on natural resource values, and in areas where resource values are important enough to warrant mitigation when development occurs.
3. Do not apply an environmental overlay zone to areas of the site with lower natural resource values (such as recent dredge deposits which lack vegetation, and some open meadow areas heavily impacted by cattle).

#### Approval Criteria and Suggested Findings

The Port of Portland is expected to apply for a quasi-judicial Zoning Map amendment. The relevant approval criteria to amend an overlay zone designation on the Official Zoning Map is found in the City of Portland Zoning Code (Section 33.855.060). The full zoning chapter regarding Zoning Map amendments (Chapter 33.855) is appended to this document (Appendix G). Amendments to an overlay zone designation on the Official Zoning Maps will be approved if the review body finds that the applicant has shown that two criteria are met. These criteria are presented below (in bold), with suggested findings:

- A. Where a designation is proposed to be added, the designation must be shown to be needed to address a specific situation. When a designation is proposed to be removed, it must be shown that the reason for applying the designation no longer exists or has been addressed through other means;**

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### Suggested Findings:

The addition of the "c" and "p" overlays to portions of the West Hayden Island Site addresses two specific situations. First, the *West Hayden Island Goal 5 Analysis* includes a natural resources inventory and ESEE analysis which conclude that there are significant natural resources on West Hayden Island. This analysis suggests appropriate levels of protection, based on an analysis of the economic, social, environmental, and energy consequences. Second, the site is currently zoned with the Multnomah County Significant Environmental Concern (SEC) overlay. As the City of Portland assumes planning responsibility for West Hayden Island, this overlay must be replaced by the appropriate City overlay designation(s). The *West Hayden Island Goal 5 Analysis* suggests appropriate "c" and "p" designations using the State Goal 5 process of completing a natural resources inventory and ESEE analysis.

In 1982, when West Hayden Island was re-designated to the County's Urban plan map designation, the SEC overlay was retained. The findings in that decision stated:

"The retention of the SEC overlay zone will allow some retention of Goal 5 resources as identified in the inventory ... adverse impacts of development will be studied and addressed to insure the provision of open space where possible, as well as wildlife habitat and limited recreation areas."

*The West Hayden Island Goal 5 Analysis* suggests a more specific pattern of City of Portland environmental overlay zones designed to accomplish the intention of the SEC overlay, and to respond to more specific inventory information (Chapter 3).

**B. The addition or removal is consistent with the purpose and adoption criteria of the regulation and any applicable goals and policies of the Comprehensive Plan and any area plans.**

### Suggested Findings:

The purpose of the City of Portland's environmental zones is to protect those resources and functional values that have been identified by the City as providing benefits to the public. The environmental regulations encourage flexibility and innovation in site planning and provide for development that is carefully designed to be sensitive to the site's protected resources. The environmental overlay zones proposed for West Hayden Island will ensure that proposed marine terminal development is sensitive to the significant natural resources

identified on that site. These proposed overlay zones have been designed in coordination with the *West Hayden Island Development Program*.

The State Goal 5 Administrative Rules describe the process of identifying significant natural resources, identifying potential conflicting uses, and completing an economic, social, environmental, and energy analysis of the consequences of protecting natural resources. The proposed pattern of overlay zones is based on the *West Hayden Island Goal 5 Analysis*, which is intended to comply with the requirements of the State Goal 5 Administrative Rule.

The proposed overlay zones are consistent with other state, regional, and City of Portland Comprehensive Plan Goals. Chapter 2 of the *West Hayden Island Goal 5 Analysis* provides a discussion of the relevant state, regional and local policies and goals.

#### Environmental Overlay Options Within Grain Terminal Loop(s)

The ESEE analysis (Chapter 6) supports full protection of resources within the rail loop of the proposed grain terminal facility (phase one) (see Figures 6 and 30). If market conditions continue to support developing this facility as a grain terminal, retention of these resources is possible. However, as discussed in the economic analysis, market conditions may change, supporting the development of a bulk terminal in this area. Similarly, phase three of the proposed marine terminal development may occur as either a grain terminal or a mineral bulk terminal. In general, a bulk terminal requires more land area for storage, and may be incompatible with retaining forest resources within the rail loops serving these facilities.

The primary benefits of retaining resources within the rail loop(s) are:

- 1) Retention of these resources would significantly reduce the amount of riparian forest lost due to marine terminal development. Mitigation for lost forest resources will be an important component of the overall mitigation required as a result of marine terminal development. Avoiding impacts to these forests would retain significant natural resource values and reduce the costs of mitigation. Resource agencies, when reviewing mitigation plans, look for instances where proposed development has reduced its impact by avoiding a resource. The forest resources within the rail loops serving the proposed grain terminals represent such an opportunity.
- 2) The ESEE analysis supports protecting resources in such a way as to maximize the extent that remaining resources occur as one contiguous area, rather than smaller isolated fragments. Retention of these resource areas helps to maintain the western portion of the site in a

largely forested state, reducing forest fragmentation. If the forested area within the phase one rail loop is not retained, the remaining forests on the southern shore of the site and at the western tip of the site will be isolated. A higher level of protection for this resource is based on the importance of maintaining connectivity between other remaining resource areas.

The exact placement of the grain/bulk facility may change as more specific designs are developed. Full protection of resources within the grain/bulk rail loop may preclude future modifications of the development plan if zoning patterns are based too closely on current plans. For example, the possibility of shifting the grain/bulk terminal eastward, under the transmission corridors, has been discussed. A design change of this type could reduce impacts to natural resources on the western portion of the site, and reduce the extent of forest fragmentation. If zoning patterns are designed to facilitate current development plans, those patterns could have the unintended effect of discouraging positive changes to those plans.

In general, "full protection" is implemented with a "p" overlay zone. In order to gain approval for development within a "p" zone, the applicant must show: 1) that all other sites within the city of Portland where the proposed use is possible are also within the environmental protection zone; 2) that development on the proposed site would have fewer detrimental impacts than development on alternate sites; 3) that there is a public need for such development; and 4) that the benefits of the development outweigh the detrimental impacts. Development within the "c" overlay does not require this level of analysis.

Maintaining habitat continuity, and reducing riparian forest losses should be a central element of a resource protection program for West Hayden Island. It is therefore appropriate to require substantial consideration of alternative sites before allowing the loss of resources within the proposed grain/bulk rail loop (phase one). A "p" overlay zone requires this level of analysis as part of the development review process. However, as discussed above, some flexibility of design is desirable. The "c" overlay may be a reasonable option within the rail loop areas, provided that: 1) conditions are established to ensure that alternative sites (for that specific element of the development) are considered; and 2) conditions are established to ensure that habitat fragmentation and connections for wildlife movement are addressed in the environmental review process.

#### Airport Noise Overlay

A portion of the West Hayden Island site is within the Ldn 65 noise contour as described by the 1990 *Portland International Airport Noise Abatement Plan Update*. The portion of the site within this contour will likely receive the Airport Noise Impact overlay zone ("x"). The use of this overlay will not

impact natural resource protection, except that residential development is limited within the Noise Impact zone.

#### Recreational Trail Designation

During discussions with the Port of Portland, residents of the eastern portion of Hayden Island have expressed interest in a recreational trail which connects the eastern portion of the island with the West Hayden Island site. A recreational trail designation on West Hayden Island would require the construction of a trail in conjunction with marine terminal development of the site. Construction of a recreational trail would be subject to environmental review where the designation coincides with an environmental zone designation.

Recreational trail requirements could contribute to a program of natural resources protection by:

- Increasing local recreational opportunities (the energy benefits of which are discussed in the ESEE). Providing some level of recreational access to West Hayden Island creates an urban amenity which may help compensate for the loss of amenity values due to marine terminal development.
- Providing a trail which could serve as a spur from the 40 Mile Loop Recreational Trail.
- Providing public access to a significant riverfront natural area. The social analysis of the ESEE states that there is a shortage of public access points to the Columbia River.
- Supporting alternative modes of transportation. As discussed in the energy section of the ESEE, recreational trails can help encourage bicycling and walking as a means of transportation.

The ESEE analysis supports limited recreational uses on West Hayden Island, such as a recreational trail. The Port of Portland may wish to specify a generalized recreational trail alignment as a component of an application to receive City zoning. A trail alignment should be carefully considered to minimize impacts to natural resource functions and values. In particular, a recreational trail should be well removed from the western portion of the site, which, as described in the *West Hayden Island Development Program*, is intended to serve primarily as a refuge for wildlife. The most appropriate recreational trail designation would be from the proposed South Cove Park eastward to one of two railroad crossing options. There are two points where such a trail could cross the Burlington Northern mainline track:

- 1) The trail could be constructed along the Oregon Slough, under the south side of the railroad embankment. This option would require a connecting trail to be designated on properties east of the railroad embankment.
- 2) The trail could connect with the end of Hayden Island Drive, passing under the railroad embankment near the northern shore of the island.

### **Summary of Suggested Protection Program**

This program suggests a mix of Industrial Sanctuary and Open Space plan map designations. The industrial sanctuary plan map designation, and the corresponding Heavy Industrial (IH) base zone, is appropriate where significant marine terminal development is planned. On portions of the site not impacted by marine terminal development the Open Space designation and corresponding OS base zone is most appropriate.

Based on the preceding inventory and ESEE analysis, marine terminal development on West Hayden Island should be allowed, provided impacts to natural resource values are minimized to the extent possible. The use of both the environmental conservation ("c") and environmental protection ("p") overlays is therefore warranted. The more restrictive "p" overlay is appropriate in high valued portions of the site where no marine terminal development is proposed. The "p" overlay, in combination with the OS base zone provides a mechanism to ensure remaining resources on the site are not considered as future development sites. The "c" overlay zone is proposed where natural resources conflict with proposed marine terminal development. The "c" overlay ensures that specific facility designs address natural resource values, and ensures that mitigation occur for unavoidable impacts. No environmental overlay zone is proposed for portions of the site with low habitat value — most notably several areas composed primarily of recent sand dredge deposits, and several open meadow areas. This section has presented a set of mapping rules from which a specific overlay zone map could be drawn. The Port of Portland may consider these rules as they draft an application to receive City zoning. The conclusion of the ESEE analysis also provides a map (Figure 30), which presents generalized resource protection suggestions.

This section also suggests that, as a component of an application to receive City zoning, the Port of Portland propose a recreational trail designation. Such a designation will establish a general alignment. A trail designation is most appropriate in the southeastern portion of the site. A trail designation leading to the western end of the site conflicts with wildlife habitat values.

In summary, this section has outlined the major elements of a suggested program to protect natural resources on West Hayden Island. The primary elements of this protection plan include establishing an Open Space plan map

designation and OS base zone, the use of environmental conservation ("c") and protection ("p") overlay zones, and the placement of a recreational trail designation.

### **MITIGATION OPPORTUNITIES FOR WEST HAYDEN ISLAND**

The City's fourth task identified above is to implement city environmental zoning on West Hayden Island. Once Tasks 1 through 3 are completed, implementation of environmental zoning will occur when a development proposal is submitted to the Bureau of Planning for environmental review. Mitigation will likely be an important component of that review.

This section discusses mitigation for the loss of natural resources on West Hayden Island. Adoption of City of Portland zoning on West Hayden Island (the primary focus of this report) will not by itself require mitigation. The adoption of a detailed mitigation plan is, therefore, beyond the scope of this report. Such a plan, however, is required as part of the City's environmental review process, and will be required in order to obtain state and federal permits. Because it will take time to establish effective mitigation for wetlands, cottonwood riparian forest, and shallow water habitat, mitigation should begin as early as possible in the development process. This section is provided to facilitate early discussion of mitigation options, and serves as a suggested starting point for future discussions. Topics covered below include: interagency coordination; the timing of development and mitigation; goals of mitigation; and an outline of potential mitigation strategies. We discuss two methods available to package a mitigation plan: mitigation banking and a City natural resources management plan (NRMP).

#### **Interagency Coordination**

A number of government agencies (federal, state, city, and possibly regional) will review mitigation for development on West Hayden Island:

- Assuming City environmental overlay zones are applied on West Hayden Island, the Portland Bureau of Planning will process environmental reviews for development proposals within those zones (Portland Zoning Code Chapter 33.430).
- The Division of State Lands (DSL) and the U.S. Army Corps of Engineers (COE) will be involved based on their authority to regulate the filling of wetlands and alterations to Waters of the U.S.
- The National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service (USFWS), and the Oregon Department of Fish and Wildlife (ODFW) will be involved to ensure compliance with the federal endangered species act, and related state legislation. In addition, the COE

is required to consider the comments of these agencies before approving a wetland fill permit.

- The U.S. Environmental Protection Agency (EPA) could also be involved, given its authority to veto approval of a COE permit.

Opportunities for interagency coordination will occur as a mitigation plan is developed. The Port may wish to identify where these opportunities exist.

### **Natural Resource Management Plan Approach**

The City of Portland environmental zoning regulations allow for the development of a natural resources management plan (NRMP), which provides an alternative to the case-by-case land use review process which would otherwise be required for development within environmental zones. This section provides a summary of the NRMP process. For a complete description, see the Portland Zoning Code (Section 33.430.310).

The City's NRMP provides the means to evaluate the cumulative effect of development and mitigation proposed at different times and in different places within the same large ecosystem. An NRMP provides opportunities for coordination with, or joint adoption by, other local governments; special districts; and regional, state and federal agencies. West Hayden Island is a large site (750 acres), and is in quasi-public (Port of Portland) ownership. The development of West Hayden Island will likely take place in several phases over time, and as discussed above, will involve the coordination of multiple agencies. In this context, an NRMP approach could facilitate agency coordination, and simplify the regulatory process without reducing the effectiveness of that process.

NRMPs are intended to cover large ecosystems such as forests, creeks, sloughs, or watersheds. These plans are required to address all resources and functional values conserved and protected by environmental zones within the plan boundaries. An NRMP must also address all significant detrimental impacts of uses allowed by the plan.

A City NRMP is adopted and amended by a legislative process. Whenever the provisions of an NRMP conflict with other portions of the City's environmental zoning regulations, the provisions of the NRMP supersede. Non-conflicting provisions supplement the provisions of the environmental zoning regulations. A natural resource management plan includes:

- management objectives to maintain or enhance resources and functional values;
- lists of allowed and prohibited uses;
- maps of areas where these uses are allowed or prohibited;
- types of mitigation or enhancement required;

- maps of areas reserved for these mitigation or enhancement actions;
- timetables for development, mitigation, and enhancement; and
- procedures and criteria for approving uses.

The Port may find the NRMP process to be appropriate in this case. The NRMP approach allows greater flexibility in determining the best way to conserve natural resource values, may be adopted jointly by several agencies. In addition, the NRMP approach allows the discussion of marine terminal development and mitigation proposals to occur in a more comprehensive (whole site) framework.

### An Early Timeline For Mitigation

The *West Hayden Island Development Program* describes a market driven phasing plan. Specific marine terminal facilities would be developed over time as market conditions allow (Table 22).

**Table 22. Impacts of West Hayden Island Development Program by Phase**

Phase	Timeline	Major Elements	Resources Impacted	Notes
1	3-5 years	basic rail infrastructure grain/bulk terminal new wetland channel recreational trail	wetlands (1.6 acres) riparian forest (~80 acres) shallow water habitat	impact to riparian forest may vary with design of grain/bulk facility
2	10-20 years	container terminal access bridge recreational trail	wetlands (3.2 acres) riparian forest (~72 acres) shallow water habitat	
3	20+ years	expansion of container terminal, or second grain/bulk terminal	wetlands (7.0 acres) riparian forest (~110 acres) shallow water habitat	impacts to riparian forest and wetlands could be reduced if phase three occurs as a grain facility

Most natural resource impacts occur during phases two and three. The impacts during phase three may vary considerably depending on the type of facility built, and the specific design. If phase three occurs as an expansion of the phase two container terminal, there would likely be substantial mitigation for lost riparian forest values. If phase three occurs as a grain bulk terminal, some forest losses may be avoided, with a corresponding reduction in mitigation requirements.

It is important that mitigation take place before development occurs. If mitigation is not complete before development occurs, there will be an intervening loss of habitat. Early mitigation will be particularly important as compensation for the loss of cottonwood riparian forest values. A relatively long period of time is required for a tree to mature and establish an effective habitat. A portion of the value associated with the forest resources on West Hayden Island is related to the age of the existing trees. For example, some trees on West Hayden Island are now large enough to provide resting or perching spots for large raptors (including bald eagles). The Port of Portland should consider initiating mitigation for forest losses as early as possible to minimize short-term habitat losses.

### **Mitigation Banking Approach**

Typically, a developer will mitigate for lost resource values in a piecemeal manner. In that context, all parties to the mitigation plan focus on the immediate project, and consider a limited number of mitigation options.

For a large scale phased project affecting multiple natural resources, a mitigation banking approach makes sense. Mitigation banking refers to implementing resource mitigation actions before they are actually needed. This allows mitigation to proceed immediately, establishing credit toward future resource losses. This credit can then be used as it is needed. Mitigation banking allows one large scale project to be used as mitigation for a variety of future (smaller scale) development projects. For example, in some cases the cost of mitigating for the loss of one small wetland is high relative to the benefits. A banking approach allows economies of scale during mitigation, such as developing one larger mitigation site to replace several smaller resources. Mitigation banking, however, is not an alternative to avoiding or minimizing the impact.

Cooperation between the City, the Port of Portland, the COE, and DSL to establish a mitigation banking agreement may facilitate early mitigation, and simplify the regulatory process. A mitigation banking agreement might be an important component of a natural resources management plan (NRMP). In addition, ORS 196.600-196.655 establishes a framework by which DSL may coordinate mitigation banking activities under certain circumstances.

### **Goals of Mitigation**

The primary goal of mitigation is to reduce impacts on, or if necessary replace, the functional values of natural resources on West Hayden Island. Functional values are discussed in more detail in the State Goal 5 inventory (Chapter 3).

As discussed above, mitigation for marine industrial development on West Hayden Island will involve both federal and state agencies. The agencies involved each have different mandates to protect different aspects of the natural environment of the site. For example, state and federal agencies will, due to their specific regulatory mandates, be particularly concerned with wetland resources and habitats used by threatened and endangered species.

The City of Portland has a broader authority (under State Goal 5) to protect a wide range of natural resource values. The City may also regulate riparian forest resources and habitats important to non-endangered species. Given that state and federal mitigation requirements will likely focus on wetland mitigation, and impacts to endangered salmon populations, City efforts may be most efficiently spent addressing the loss of forest resources and the loss of habitat values in general.

As stated in the Goal 5 inventory (Chapter 3), the riparian forest on West Hayden Island is among the largest fragments of cottonwood riparian forest in the Portland region. West Hayden Island's location at the confluence of the Columbia and Willamette Rivers places it as an important landmark frequently used as a stop-over site by migratory birds and waterfowl. The island is positioned as an important stepping stone for wildlife moving across and along the Columbia River between Smith and Bybee Lakes, Columbia Slough, Delta Park, Government Island, Vancouver Lake, and Sauvie Island. A mitigation plan should seek to conserve this unique combination of riparian forest and small wetland areas.

### **Suggested Mitigation Opportunities**

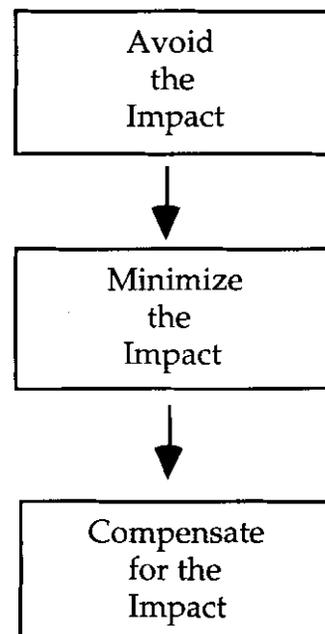
This section presents a list of mitigation opportunities for West Hayden Island. This list is based on a review of mitigation guidelines presented by the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, and the Oregon Division of State Lands. This list is not mutually exclusive or comprehensive. This discussion does not represent an official statement of City policy regarding mitigation, nor does it represent the policy of any agency listed above. This list of strategies is presented as a starting point for mitigation discussions.

Figures 32 and 33 show the location of the potential on-site and off-site mitigation opportunities discussed below. These suggestions are presented in order to illustrate the general steps of a mitigation plan. Mitigation for

marine industrial development on West Hayden Island would likely involve more than one mitigation activity. New ideas for specific mitigation projects may arise as mitigation is discussed in greater detail. In addition, the Port may wish to develop a more formal set of criteria by which to judge potential opportunities.

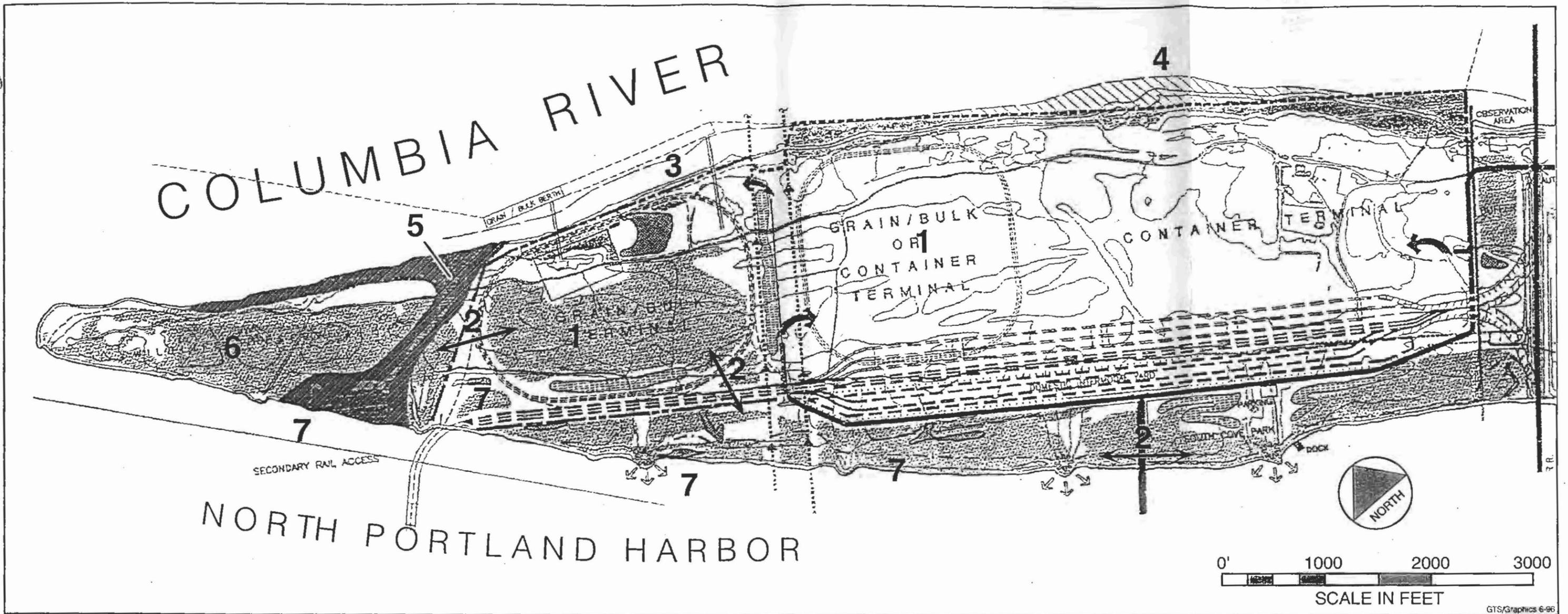
Federal and state agencies responsible for reviewing mitigation proposals have reached general agreement on the preferred steps of the mitigation process. This preferred process is called the "CEQ" process (named for the Council on Environmental Quality, a federal body created under the National Environmental Policy Act). The CEQ process includes five steps, listed in order of preference: 1) avoid the impact altogether by not taking a certain action; 2) minimize the impacts by limiting the degree of the action; 3) rectify the impact by repairing, rehabilitating or restoring the affected environment; 4) reduce or eliminate the impact over time by preservation and maintenance activities, and; 5) compensate for the impact by replacing or providing substitute resources (Salvesen, 1990). This process can be condensed into three steps: avoidance, minimization, and compensation (Environmental Law Institute, 1993).

**Figure 34. Council on Environmental Quality Mitigation Process  
(Condensed Version as of 1990 COE - EPA Agreement)**



#### Avoid the Impact

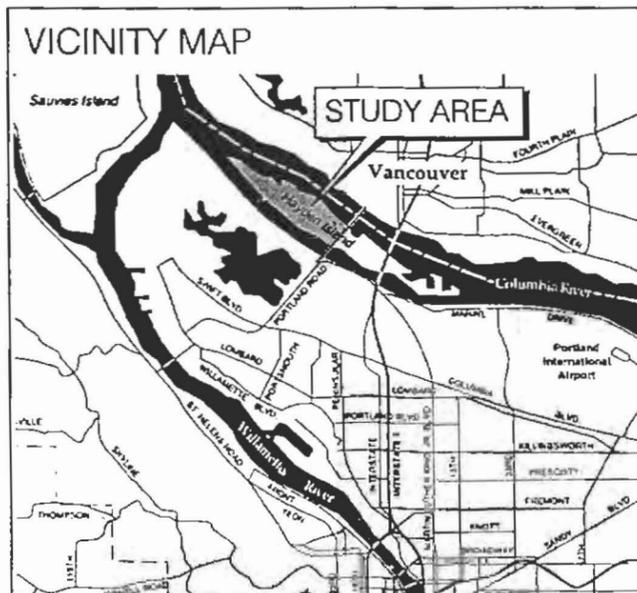
The first step in the mitigation process is to avoid impacts to the resource. As discussed within the ESEE analysis (Chapter 6), avoiding some resources on West Hayden Island may make marine terminal development infeasible.



**LEGEND**

On-Site Mitigation Opportunities for West Hayden Island:

1. Retain forests within proposed grain terminal rail loops.
2. Design rail and road corridors to allow for wildlife passage in key areas.
3. Design grain/bulk terminal to minimize impacts to Benson Pnd and shallow water habitat.
4. Use a container terminal wharf design which minimizes impacts to shallow water habitat.
5. Proposed wetland channel (See West Hayden Island Development Program).
6. Enhancement of existing riparian forests.
7. Re-establish hydrological connections from the Oregon Slough to existing small wetland areas. Enhancement and reconnection of these wetlands could provide improved salmon habitat.



**Figure 32**  
**On-Site Mitigation Opportunities**

**WEST HAYDEN ISLAND DEVELOPMENT PROGRAM**  
Goal 5 Natural Resources Inventory

# Figure 33 Off-Site Mitigation Opportunities by Jurisdiction for West Hayden Island

WEST HAYDEN ISLAND  
DEVELOPMENT PROGRAM  
Goal 5 Natural Resources Inventory

June 1996

Portland Bureau of Planning



**LEGEND**

Off-site mitigation opportunities by jurisdiction for West Hayden Island:

**In The City of Portland**

- ① Enhance connections between the Smith and Bybee Lakes area and surrounding natural areas.
- ② Purchase and enhancement of the North Wetland area and heron rookery within the Peninsula One Natural Resources Management Plan area.
- ③ Restoration of riparian zone along lower Willamette River. Several opportunities exist, including the Harborton site, Willamette Cove, and a proposed waterfront park in Linnton.
- ④ Enhance habitat values along Columbia Slough.

**Outside The City of Portland**

- ⑤ Restoration of riparian forest or wetlands on Sauvies Island.
- ⑥ Habitat enhancement and planting new riparian forest on Government Island.
- ⑦ Habitat enhancement and planting new riparian forest on Sandy River Delta.

**Note:**  
This list serves as a starting point for possible off-site mitigation activities to compensate for lost resource values in developing West Hayden Island. Other off-site opportunities may exist. Other management options, such as avoiding or reducing impacts, and on-site mitigation, should be pursued before off-site mitigation.

Resource agencies will be concerned with whether there are any "practicable alternatives" which would have fewer impacts on the resource. The EPA defines "practicable" as "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall project purposes." The avoidance step in a mitigation process will likely examine the feasibility of alternative sites. This report recognizes that substantial work in this area has already been completed. Such work has been referenced where possible within the ESEE Analysis. The Port should anticipate presenting analysis of this type to resource agencies during the permitting process.

#### Minimize the Impact

The second step of mitigation recognizes that actions can often be taken to minimize and reduce the impact on resources within the design phase of development. Assuming complete avoidance is not possible, this is the preferred mitigation strategy. The *West Hayden Island Development Program* has recognized the resource values present on West Hayden Island, and has incorporated designs which attempt to avoid some resource impacts. As more detailed facility designs are developed, avoidance should continue to be an important consideration. In many cases, one specific design may have fewer resource impacts than another, for example:

- Developing phases one and three as grain facilities, rather than bulk facilities, may allow greater retention of forest resources within those developments. If market conditions require a mineral bulk facility, an analysis should show why such a facility could not locate elsewhere.
- Rail facilities can create barriers to the movement of wildlife. One design solution is to build wildlife underpasses.
- Specific wharf designs may have different impacts to shallow water habitat.
- Road and bridge alignments and designs can be tailored to reduce impacts to specific resources.

#### Compensate for the Impact

Compensatory mitigation may only occur when the first two steps are not feasible or adequate. The impact of marine terminal development could be mitigated, in part, by repairing, rehabilitating, restoring, or enhancing degraded resources elsewhere on the site.

- Existing wetland areas along the southern shore of the site could be enhanced by re-establishing direct hydrological connections to the Oregon Slough. Reconnecting these seasonal wetlands may provide additional habitat for endangered Salmon populations (see Bakke, B.M., *West*

*Hayden Island Wetlands and Potential for Salmon Rearing with Emphasis on Chinook Salmon Listed as Endangered Under the Federal Endangered Species Act).*

- Forested areas on the site could be enhanced by the introduction of downed and woody debris, and the re-establishment of understory species in areas impacted by cattle.
- Both wetland and forested areas could be enhanced by removing cattle from the site.

As a last resort, substitute resources may be created to replace those lost due to development.

On-Site Mitigation

There may be opportunities to provide substitute resources or environments elsewhere on the site. Where new resources are proposed, existing values must be considered. For example, if a new wetland area is proposed where a forest exists now, the lost resource values associated with the riparian forest must be considered.

- The Port of Portland has proposed the construction of a new 22-acre wetland channel on the western portion of the site (*West Hayden Island Development Program*, p. 106).
- There are some open meadow areas of the site not impacted by marine terminal development which could be planted with cottonwood as partial mitigation for lost forest values.
- PGE, in conjunction with a previous proposal for marine industrial development on West Hayden Island, had proposed constructing a wetland lagoon on the southeast portion of the site (1987 *West Hayden Island Marine Industrial Park Final Environmental Impact Statement*).

Off-Site Mitigation

There may also be opportunities to compensate for the loss of resource values by replacing or providing substitute resources or environments on other sites close to West Hayden Island. Off-site mitigation may be necessary because on-site mitigation may not fully compensate for lost riparian forest resources. Mitigation sites outside the City of Portland may be problematic, from a regulatory point of view. The City of Portland has no legal authority to monitor and enforce mitigation measures located outside the City.

- There may be small sites near West Hayden Island where cottonwood trees may be planted — particularly in the vicinity of Smith and Bybee Lakes. It may be possible to restore or enhance sites at the margins of the

Smith and Bybee lakes complex in order to strengthen connective wildlife corridors. One parcel, owned by the Port of Portland, and located between West Hayden Island and Smith and Bybee Lakes along the Oregon Slough is one such opportunity.

- The *Lower Willamette River Wildlife Habitat Inventory* (Bureau of Planning, March, 1986) assessed the wildlife habitat value of land along the lower Willamette River between Sellwood and the Columbia River. That inventory also included recommendations for habitat enhancement activities. There may be industrial parcels along the lower Willamette, no longer used by industry, which could be enhanced for mitigation credit.
- The proposed *NRMP for the Peninsula Drainage District No. 1* (Peninsula One) includes recommendations for resource enhancement activities within that plan area, immediately to the southeast of Hayden Island. In particular, the plan suggests further study of future enhancement of the north wetland area within the Peninsula One study area. The North Wetland is adjacent to an important heron rookery.
- The Port of Portland owns a large portion of Government Island, located several miles upstream from Hayden Island. There is also one private parcel on that island, with a willing seller. A substantial portion of the island consists of open meadow areas, with grazing cattle. The restoration of cottonwood riparian habitat in these areas is one mitigation option.
- Metro, as part of the regional greenspaces program, has an interest in acquiring several properties along the lower Willamette River for recreational use, and wildlife habitat protection. A former industrial site known as Willamette Cove was recently purchased by Metro. Restoration of riparian habitat on this site may be possible. Another parcel, known as the Harborton site, is currently owned by PGE. The Harborton site is immediately south of where the Multnomah Channel separates from the Willamette River. This site is one of the highest valued natural areas remaining along the lower Willamette. Portions of the site have been disturbed, and could be enhanced. The Port of Portland may wish to work with Metro to identify other opportunities for resource enhancement in conjunction with the Greenspaces acquisition program.
- There are opportunities along the Columbia Slough to provide enhanced habitat values by restoring slough embankments, planting trees, or creating new wetland areas. Some habitat enhancement activities could occur on land already owned by the Port of Portland.

### **Summary of Mitigation Opportunities**

In summary, the preceding list of mitigation opportunities illustrates the preferred mitigation process, starting with resource avoidance, and ending

with off-site replacement of resources if necessary. A mitigation plan for development of West Hayden Island will likely involve several natural resource agencies. Mitigation banking, and the City's NRMP procedures, may provide an opportunity for interagency cooperation. Due to the size of the site, and the nature of natural resources present there, mitigation should begin early in the development process.

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## WEST HAYDEN ISLAND GOAL 5 ANALYSIS CONCLUSIONS

This document provides a natural resources inventory of West Hayden Island, an economic, social, environmental and energy (ESEE) analysis of various natural resource protection options, and proposes a program to protect significant natural resources located on West Hayden Island.

The natural resources inventory (Chapter 4) concludes that the bulk of the West Hayden Island site contains significant natural resource values. No further consideration (for the purposes of Goal 5 natural resources protection) is suggested for one portion of the site which has been heavily impacted by the operations of a heavy equipment training school, and by the depositing of dredge material from the Columbia River. This excluded area is shown on Figure 5 (Chapter 4, page 49).

For the remainder of the site, an analysis of three different protection options was completed: full protection; limited protection, and no protection. For each of these options, the economic, social, environmental, and energy (ESEE) consequences were considered (Chapter 6). The ESEE analysis concludes that marine terminal development on West Hayden Island should be allowed, provided impacts to natural resource values are minimized to the extent possible. Limited protection is suggested as the best method of balancing the significant economic, social, environmental and energy considerations discussed in the ESEE analysis.

The suggested protection program (Chapter 7) proposes a mix of Industrial Sanctuary and Open Space comprehensive plan map designations. The industrial sanctuary plan map designation, and the corresponding IH base zone, is appropriate where significant marine terminal development is planned. The Open Space plan map designation and corresponding OS base zone is suggested for other portions of the site.

The use of both the environmental conservation ("c") and environmental protection ("p") overlays is suggested. The more restrictive "p" overlay is appropriate in high valued portions of the site where no marine terminal development is proposed. The "p" overlay, in combination with the OS base zone provides a mechanism to insure remaining resources on the site are not considered as future development sites. The "c" overlay zone is suggested where natural resources conflict with proposed marine terminal development. The "c" overlay insures that specific facility designs address natural resource values, and insures that mitigation occur for unavoidable impacts. No environmental overlay zone is proposed for portions of the site with low habitat value — most notably several areas composed primarily of relatively recent sandy dredge deposits, and several open meadow areas. The suggested protection program includes a set of mapping rules from which a

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specific overlay zone map can be drawn (page 195). The Port of Portland may consider these rules as they draft an application to receive City zoning. The conclusion of the ESEE analysis (Chapter 6) also provides a map with a generalized resource protection proposal (Figure 30). The protection program also suggests that the Port of Portland propose a recreational trail designation as a component of their application to receive City zoning.

In addition, the protection program includes a preliminary discussion of mitigation. Because it will take time to establish effective mitigation for wetlands, cottonwood riparian forest, and shallow water habitat, mitigation should begin as early as possible in the development process. This section is provided in order to facilitate early consideration of mitigation options, and serves as a suggested starting point for future discussions. This section discusses the potential for interagency coordination, the timing of development and mitigation, suggested mitigation goals, and an outline of potential mitigation opportunities. Two potential methods of packaging a mitigation plan are discussed: mitigation banking, and the City's natural resources management plan (NRMP).