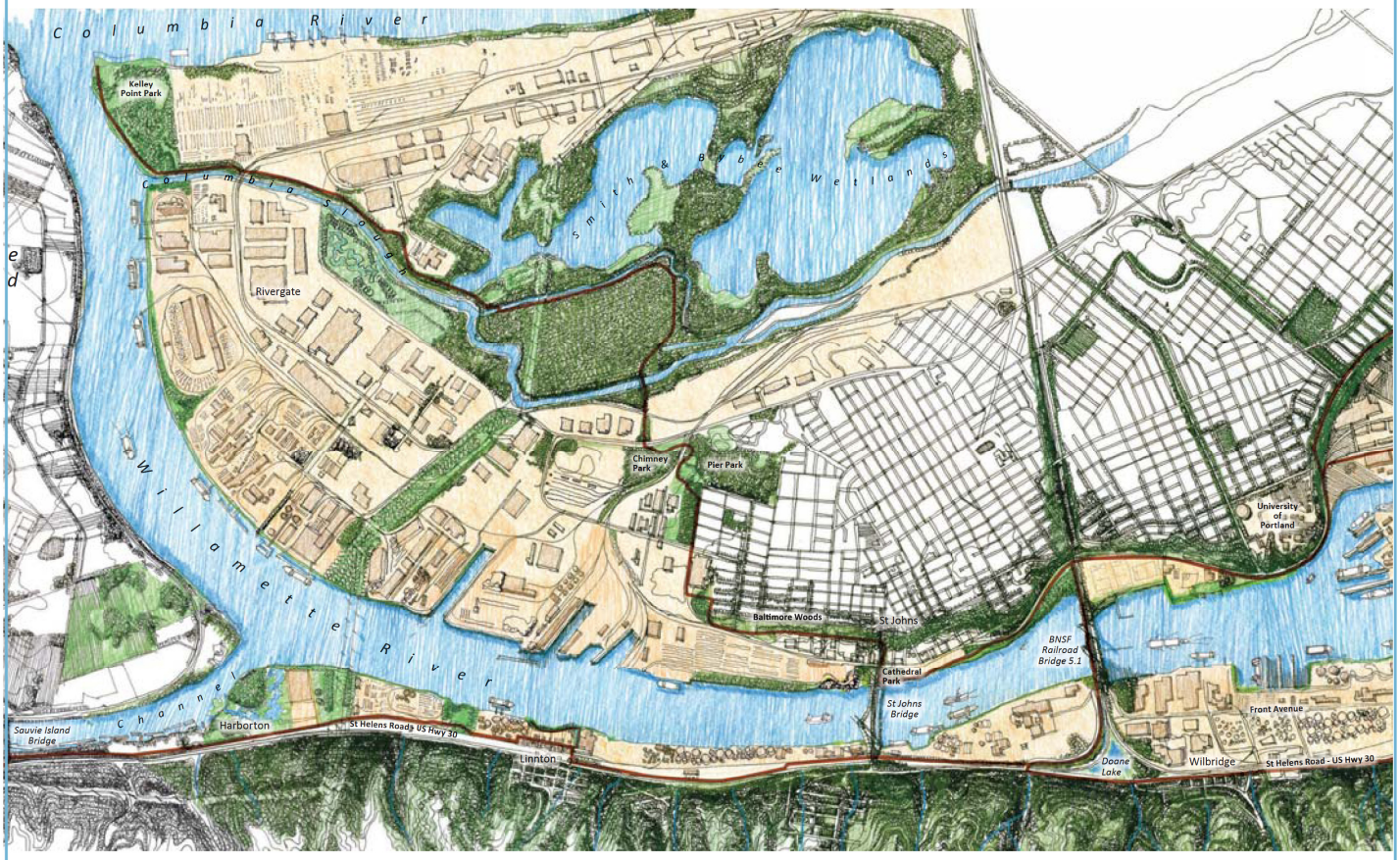
THE RIVER PLAN
NORTH REACH

RECOMMENDED DRAFT

NOVEMBER 2009



VOLUME 3A:
NATURAL RESOURCES INVENTORY:
RIPARIAN CORRIDORS AND WILDLIFE HABITAT

City of Portland Bureau of
Planning and Sustainability
Sam Adams, Mayor I Susan Anderson, Director

RIVER PLAN / NORTH REACH VOLUMES

VOLUME 1A: POLICIES, OBJECTIVES AND RECOMMENDATIONS

*This volume describes the project background, policy context and recommendations to address Economic Prosperity, Watershed Health, Access, Riverfront Communities, and Working with our Partners. (*Available in print)

VOLUME 1B: CODE AMENDMENTS AND ZONING MAPS

This volume contains amendments to the comprehensive plan, zoning code, and other City titles, and zoning maps. (Available in print)

VOLUME 2: ECONOMIC PROSPERITY BACKGROUND INFORMATION

This volume includes background information for some of the economic prosperity recommendations. For additional information please see the River Plan website. (Available on CD)

VOLUME 3A: NATURAL RESOURCES INVENTORY: RIPARIAN CORRIDORS AND WILDLIFE HABITAT

This volume contains natural resource information for 13 resource sites in the North Reach. (Available on CD)

VOLUME 3B: NATURAL RESOURCES INVENTORY: RIPARIAN CORRIDORS AND WILDLIFE HABITAT—APPENDICES

This volume contains five technical appendices to the Willamette River Natural Resource Inventory including a description of the methodology used to develop the inventory. (Available on CD)

VOLUME 3C: ECONOMIC, SOCIAL, ENVIRONMENTAL AND ENERGY ANALYSIS AND RECOMMENDATIONS FOR RIPARIAN CORRIDORS AND WILDLIFE HABITAT

This volume contains a State Land Use Planning Goal 5 required analysis of the tradeoffs associated with different levels of natural resource protection for the upland portions of the River Plan / North Reach planning area. (Available on CD)

VOLUME 4: ACCESS BACKGROUND INFORMATION

This volume includes background information for the access related recommendations. For additional information please see the River Plan website. (Available on CD)

VOLUME 5: ORDINANCE AND RESOLUTION

*This volume includes the draft River Plan/ North Reach Ordinance and Resolution. (*Available in print)

Documents listed as available on CD can be ordered in print form. Please allow seven days for printing.

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City Council
Sam Adams, Mayor and Commissioner in Charge
Nick Fish
Amanda Fritz
Randy Leonard
Dan Saltzman
Erik Sten (until April 2008)

Planning Commission
Don Hanson, President
Amy Cortese Vice President
Michelle Rudd, Vice President
André Baugh
Lai-Lani Ovalles
Howard Shapiro
Jill Sherman
Irma Valdez

Bureau of Planning
Susan Anderson, Director
Gil Kelley, Director (through December 2008)
Eric Engstrom, Principal Planner
Brian Campbell, Interim Principal Planner

Bureau of Planning Project Team
Roberta Jortner, Project Manager
Mindy Brooks
Kevin Martin
Chris Hagerman (through July 2009)
Chris Scarzello (through July 2009)
Elliot Scott (through June 2009)
Shannon Buono (through February 2007)
Katie Hinman (until July 2007)

Document Cartography and Design
Gary Odenthal, GIS Coordinator
Christine Rains, Graphic Designer

Contributors
Adolfson Associates, Inc.

Bureau of Development Services
Kate Green
Kathy Harnden
Kim Miller

Bureau of Environmental Services
Lynn Barlow
Andi Gresch
Paul Ketcham
Katelin Lovell
Chris Prescott
Josh Robben
Ry Thompson
Naomi Tsurumi

Bureau of Planning
Shannon Buono
Sallie Edmunds
Diane Hale
Matt Lustig
Arianne Sperry

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Chapter 1. INTRODUCTION

Report Purpose, Organization and Uses

The purpose of this inventory report is to provide useful, current, and accessible information on the location of existing natural resource features and the current relative condition of riparian corridors and wildlife habitat located in and along the Willamette River in Portland.

The report is organized into chapters that provide a context for inventory work, describe the inventory methodology and present an inventory of natural resources for the Willamette River corridor with a focus on the North Reach. Detailed inventory information for the Central and South Reaches will be developed in the future and documented in separate report volumes.

The following is a brief summary of the material contained in each chapter of this document:

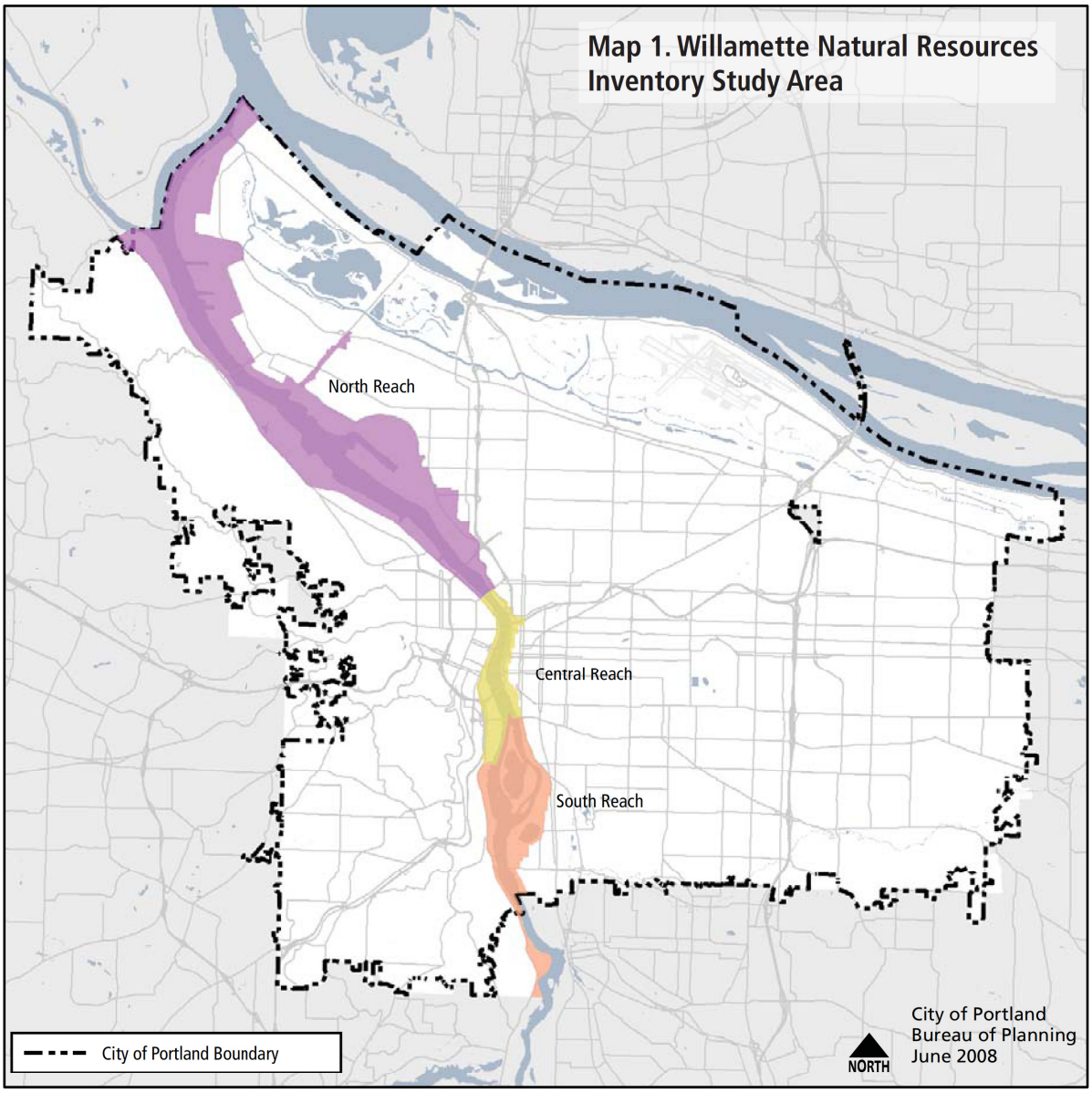
Chapter 2: RELATIONSHIP TO FEDERAL, STATE AND REGIONAL REGULATIONS — This chapter describes the regulatory context for the inventory.

Chapter 3: PROJECT APPROACH AND METHODOLOGY OVERVIEW — This chapter provides an overview of the citywide inventory project approach and the methodology used to evaluate riparian corridor functions and wildlife habitat attributes. Following the citywide information, there is a section describing additional work done specifically for the Willamette River Natural Resources Inventory.

Chapter 4: THE WILLAMETTE RIVER NATURAL RESOURCES INVENTORY — This chapter begins with a general overview of the Willamette River basin. Following the overview, a summary of Willamette River characteristics in Portland are presented; the summary includes general land uses, transportation, and commerce as well as existing natural resources. More specific information is provided for the North Reach of the Willamette River in Portland (the Central and South Reaches will be included in future volumes of the report). Finally, the North Reach is split into subareas called inventory sites. For each inventory site a natural resources description is presented. Descriptions include the presence, type and extent of existing waterways, flood areas, wetlands, vegetation, and fish and wildlife habitats and species. Information about disturbances, such as invasive species and contamination, is also discussed. An evaluation of current riparian corridor functions and wildlife habitat is presented for each site, followed by a series of maps: aerial photographs, water-related features, vegetation features, riparian corridor relative ranks, wildlife habitat relative ranks and combine riparian/wildlife habitat relative ranks.

The inventory is intended to inform and support a broad array of City and community activities relating to the Willamette River corridor in Portland. Such activities include implementing and updating city programs to manage natural resources, identifying priority areas for restoration, enhancement, and public acquisition, designing development and redevelopment projects, and meeting regional, state, and federal regulatory requirements.

Over the long term, this inventory can help the City achieve its River Renaissance Vision for a clean and healthy Willamette River, and meet its watershed health goals. The inventory will inform the development of regulatory and non-regulatory tools through the River Plan, including an update of the Portland's Willamette Greenway Program. The City also intends to submit this inventory to Metro as part of the City's compliance with the Title 13 Nature in Neighborhoods Program.



Study Area

The study area for this inventory includes the Willamette River channel as it flows northward through Portland to its confluence with the Columbia River. The inventory also includes lands adjacent or proximate to this portion of the river. The boundary of the inventory study area is shown on Map 1.The study area encompasses, and is somewhat larger than, the area currently contained within the City's Willamette Greenway Overlay Zones, and is generally coincident with the boundaries of the River Plan project currently underway.

For the purposes of planning, the River Plan and this inventory are divided into three reaches: North, Central and South Reach (see Map 1).

The North Reach includes 12 miles of the river, extending from the Broadway Bridge to the Columbia River. The North Reach is characterized by heavy industry through the Portland Harbor, river-dependent land uses, and significant natural resources set in the regional context of the Lower Columbia River and Tualatin Mountains.

The Central Reach extends from the Ross Island Bridge to the Broadway Bridge and is characterized primarily by commercial/mixed use development on the west side of the Willamette and industrial uses on the east side of the river. The Central Reach also contains downtown Portland, Waterfront Park, the inner eastside industrial area and the East Bank Esplanade.

The South Reach extends from the southern city limits to the Ross Island Bridge and is characterized primarily by commercial and residential uses, moorages and parks and open spaces such as Oaks Bottom, Powers Marine Park and Willamette Park. Ross Island provides both an important industrial site and an important natural resource area.

Background

Starting more than 30 years ago, the City began developing natural resource inventories pertaining to portions of the current study area. The first Willamette River inventory was completed in 1975 for the Lower Willamette River Management Plan. It was the first of 10 inventories the City completed citywide to meet state land use planning goals. The Willamette inventory provided generalized information about relative wildlife habitat values.

The second Willamette River inventory, adopted by the City in 1986, provided more detailed information about specific habitat sites along the river, including information about existing conditions and potential restoration options. A Wildlife Habitat Assessment (WHA) methodology was used to document and rank existing conditions, and identify potential opportunities for habitat improvement. The inventory was divided into 24 segments or zones along the Willamette River in Portland. Each zone included anywhere from 2 to 14 habitat sites depending on the complexity of the zone. Highly ranked habitat sites received a high value (numeric) and were identified as Rank I, with lesser value habitat sites identified as Rank II, III, IV, or V. The 1986 inventory correlated directly to the area referred to as the Willamette Greenway, and has been used since 1987 as part of the Willamette Greenway Plan to provide guidance for protection and restoration opportunities along the river.

Both the 1975 and the 1986 Willamette River inventories were developed as the basis for the City's emerging Willamette Greenway program. The Greenway program was established primarily to meet requirements of State Land Use Planning Goal 15, Willamette Greenway. The program includes policies, design guidelines, overlay zone maps and regulations to meet multiple objectives along the Willamette River.

Between 1991 and 2002, the City adopted natural resource inventories for other areas in the city as part of a program to comply with State Land Use Planning Goal 5. The following documents address small portions of the inventory study area addressed in this report:

- Inventory and Analysis of Wetlands, Water Bodies and Wildlife Habit Areas for the Columbia Corridor–Industrial/Environmental Mapping Project (1989)
- Balch Creek Watershed Protection Plan (1991)
- Northwest Hills Natural Area Protection Plan (1992)
- Southwest Hills Resource Protection Plan (1992)
- East Buttes and Terraces and Wetlands Conservation Plan (1993)
- Inventory of Natural, Scenic and Open Spaces, the sources for Multnomah County Unincorporated Urban Areas (2003)

Resource values were determined based on a number of factors, including quality, quantity, diversity, interspersion, and uniqueness. The inventories informed the completion of an Economic, Social, Environmental and Energy Analysis, and the establishment of environmental overlay zoning maps and regulations to protect important resource areas identified in the inventories.

The information presented in this report incorporates updated information including current natural resource data, recent field assessments, and resource evaluations that build on the approach used to produce new draft natural resource inventory information citywide. The citywide inventory is a refinement of Metro's inventory of regionally significant fish and wildlife habitat, which was adopted in September 2005 as part of the regional Nature in Neighborhoods program. Additional refinements to the citywide inventory approach have been made specifically to reflect current conditions in the Willamette River study area.

The work presented in this report is consistent with and advances the goals outlined in the Portland Watershed Management Plan and the Framework for Integrated Watershed Management, both of which were adopted by the City Council in 2005. These documents establish key ecological principles, restoration priorities, and recommended strategies to protect and restore watershed health. Portland's watershed goals and objectives are provided in Appendix A.

Chapter 2. RELATIONSHIP TO STATE, REGIONAL AND FEDERAL REGULATIONS

The Willamette River Natural Resources Inventory will inform City strategies to achieve and maintain compliance with the state, regional, and federal regulations described below.

Section 2a. STATE AND REGIONAL REGULATIONS

State Land Use Planning Program

Comprehensive land use planning was mandated by the 1973 Oregon Legislature, primarily in response to growth pressures on valuable resource land. Since 1975, cities and counties in Oregon have been required to comply with Statewide Planning Goals. Nineteen goals were developed and cities and counties were directed to comply with the goals by developing or updating their comprehensive plans. Portland adopted its first comprehensive plan in 1981 to satisfy the requirements of the state planning program.

State planning goals that relate most directly to Portland's natural resources are:

- **Goal 5, Natural Resources, Scenic and Historic Areas, and Open Spaces** – Goal 5 addresses many types of resources. It establishes a process in which resources are inventoried and evaluated for significance. If a resource or site is found to be significant, the local government has three policy choices: to preserve the resource, allow proposed uses that conflict with it, or establish a balance between protecting and allowing uses that conflict with the resource.

- **Goal 6, Air, Water, and Land Resources Quality** – This goal requires local comprehensive plans and implementing measures to be consistent with state and federal regulations on matters such as air quality, stream quality, and groundwater pollution.

- **Goal 7, Areas Subject to Natural Hazards** – Goal 7 deals with development in places subject to natural hazards such as floods or landslides. It requires that jurisdictions apply "appropriate safeguards" (floodplain zoning, for example) when planning for development.

- **Goal 15, Willamette River Greenway** – Goal 15 sets forth procedures for protecting the diverse qualities of the 300 miles of land along the Willamette River. Multiple uses and functions are to be conserved, enhanced, and maintained, including significant habitat, and economic and recreational uses.

To address Goals 5, 6, and 7, cities and counties must use inventories to inform development of their local compliance programs. Goals 5 and 15 require local jurisdictions to develop their own resource inventories, while Goal 7 refers to land hazard inventories developed by federal and state agencies to be used for implementing policy. Goal 6 does not require an inventory, but does require local programs to be consistent with adopted state and federal clean water and clean air laws.

Goal 5 requires the following resources to be identified in the city and county Goal 5 inventories

- Riparian corridors, including water and riparian areas and fish habitat;
- Wetlands;
- Wildlife habitat;
- Federal Wild and Scenic Rivers;

- State Scenic Waterways;
- Groundwater resources;
- Approved Oregon recreation trails;
- Natural areas;
- Wilderness areas;
- Mineral and aggregate resources;
- Energy sources;
- Cultural areas;
- Historic resources;
- Open space; and
- Scenic views and sites.

Goal 15 requires some similar types of resources be inventoried:

- Fish and wildlife habitats;
- Hydrological conditions;
- Ecologically fragile areas;
- Significant natural and scenic areas, and vegetative cover;
- Areas of annual flooding and floodplains;
- All current public recreation sites, including public access point to the river and hunting and fishing areas;
- Recreational needs as set forth in Goal 8;
- Historical and archaeological sites;
- All current aggregate excavation and processing sites, and all known extractable aggregate sources.

Additional resources that are unique to Goal 15 also need to be inventoried:

- Land currently committed to industrial, commercial, and residential uses;
- The ownership of property, including riparian rights;
- Other uses of land and water in or near the Greenway; and
- Acquisition areas, which includes identifying areas suitable for protection or preservation through public acquisition of lands or an interest in land.

The Goal 5 Administrative Rule requires local governments to follow a three-step planning process. Completing an inventory is the first step. The inventory includes an analysis of the location, quantity, quality, and significance of the resources identified. If a resource is not important, it may be excluded from further consideration. The remaining resources are then subject to a "conflicting use" analysis, followed by development of a protection program for significant resources.

The Goal 15 Willamette River Greenway inventory is used to determine which lands are suitable or necessary for inclusion within the greenway boundary, and to develop the greenway management plan and acquisition program. There is no determination of significance, and no conflicting use analysis. However, jurisdictions are instructed to consider competing or conflicting uses when determining the best use of a public resource (e.g., the Willamette River).

Cities and counties may choose to meet the requirements of Goal 15 instead of Goal 5 for areas within the Willamette Greenway. The City of Portland addressed these inventory requirements while developing the Willamette Greenway and Environmental Overlay Zoning programs that now apply to some of the natural resources that are addressed by this inventory. The inventory presented in this report focuses on riparian corridors and wildlife habitat areas. It also contains general information pertaining to water quality; natural hazards including landslide and wildlife hazard areas and flood areas; hydrological conditions; ecologically fragile areas; significant natural areas; and vegetative cover. Thus, this inventory may be used to inform and support future updates to the City's programs relating to portions of Goals 5, 6, 7, and 15. However, because the inventory focuses on riparian corridors and wildlife habitat areas, it can be used to update only those parts of the City's Goal 5 program.

Metro Urban Growth Management Functional Plan —Titles 3 and 13

The 1973 Oregon Legislature granted expanded powers for the Columbia Region Association of Governments (now called Metro), to "coordinate regional planning in metropolitan areas" and to "establish a representative regional planning agency to prepare and administer a regional plan." During the 1990s, Metro worked with local jurisdictions to develop Regional Urban Growth Goals and Objectives (RUGGOs) and the *Urban Growth Management Functional Plan.*

The *Urban Growth Management Functional Plan* provides a regional approach to growth management by tailoring several key state planning goals to meet regional population growth expectations. This approach recognizes the interrelationships between housing, employment, clean air and water, natural resources, and transportation networks across jurisdictional boundaries. Metro developed the plan with input from the 24 cities and 3 counties within the Urban Growth Boundary.

Metro's *Urban Growth Management Functional Plan* was acknowledged by the Oregon Department of Land Conservation and Development and became law. Metro area cities and counties achieve compliance by updating comprehensive plans and land use ordinances to meet regional requirements. Cities and counties within the Metro Urban Growth Boundary must have comprehensive plans and ordinances that also comply with remaining state goals not covered by the *Urban Growth Management Functional Plan*.

Nine titles in the Urban Growth Management Functional Plan are derived from or relate to State Planning Goals and the rest are procedural. Title 3 and Title 13 pertain most directly to natural resources and the inventory information contained in this report.

Title 3 is derived from portions of State Goals 6 and 7, and establishes regional requirements relating to water quality, erosion control, and flood hazard management. In September 2002, the City of Portland submitted to Metro a detailed report titled the *Title 3 Water Quality Compliance Report.* The report explains how the City complies with Title 3 requirements through the existing environmental overly zoning program and newer regulations established through adoption of the *Willamette River Title 3 Water Quality Compliance Project* in August 2002. Metro found the City in substantial compliance with Title 3 in December 2002**.**

Title 13, adopted by the Metro Council in September 2005, establishes the Nature in Neighborhoods program. The purpose of the program is to protect, conserve, and restore important riparian corridors and wildlife habitat areas in the region. Title 13 establishes provisions intended to prevent impacts or ensure mitigation of unavoidable impacts on identified "habitat conservation areas" within the region. Habitat conservation areas are comprised of high-value riparian corridors identified in Metro's inventory of regionally significant riparian corridors and wildlife habitat. In January 2007, the Oregon Department of Land Conservation and Development acknowledged the new Title 13 program, finding it in compliance with Goals

5 and 6. This acknowledgement establishes new Goal 5 and 6 requirements for cities and counties within Metro's jurisdiction. Metro area cities and counties have until January 2009 to show that their local programs meet the requirements of the regional program.

Most of the natural resource areas addressed in this inventory are also identified by Metro as providing important water quality, riparian and wildlife habitat functions during development of Titles 3 and 13. This inventory is intended to replace a portion of the regional inventory that Metro produced to inform the Nature in Neighborhoods Program. This inventory is expected to inform any future updates to existing City programs that were, or will be established, in part, to comply with these Metro titles.

Section 2b. FEDERAL REGULATIONS

Clean Water Act

The Water Pollution Control Act Amendments of 1972 and subsequent amendments, now known as the Clean Water Act (CWA), regulate discharges of pollutants to waters of the United States. The CWA calls for restoration and maintenance of the quality of the nation's water, where attainable, to promote a range of beneficial uses.

Section 303 of the CWA establishes water quality standards and Total Maximum Daily Loads (TMDL) that limit the amount of pollutants that a particular body of water is allowed to receive from all sources. States are required to develop lists of water bodies that are "water quality limited" because they do not meet certain water quality standards. In Portland, major rivers and streams are water quality limited with the exception of Balch Creek. Most of Portland's waterways, including the Willamette River, do not meet water quality standards for temperature and bacteria. The Willamette mainstem also does not meet standards for dioxin and mercury. Some of the City's waterways do not meet standards for parameters such as biological oxygen demand, nutrients, pH, and pesticides.

The City has developed a draft Local Implementation Plan to meet TMDL requirements for the Willamette River and its tributaries in Portland. This inventory is being used to help identify priorities for resource protection, restoration, and ecologically-friendly development approaches.

Endangered Species Act

In 1998, National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS), proposed listing a number of Pacific Northwest salmonid species under the Endangered Species Act (ESA). Portland's Willamette and Columbia rivers, Columbia Slough, Johnson, Tryon and Fanno creeks, and several smaller tributary streams are used by several of these species (i.e., Columbia River steelhead trout, Columbia River Chinook salmon, and Pacific lamprey).

After the 1998 listing of steelhead trout in the Lower Columbia ESU (Evolutionary Significant Unit), the City of Portland began developing a comprehensive, coordinated citywide response for City Council adoption (Resolution No. 35715). The City's response is intended to avoid "take" of a listed species (i.e., harming individuals or populations or their habitat), and to assist with recovery of listed salmonids. The City has since taken actions such as identifying and prioritizing City programs that could affect listed species, providing technical support to bureaus, providing oversight for activities involving federal permitting or funding, and developing a watershed plan to help guide city actions.

This inventory can help inform City activities intended to address threatened and endangered species and meet City goals to prevent harm and promote recovery. For example, the information in this report can support efforts to prioritize areas and actions to protect and restore salmonid habitat conditions in the study area.

The inventory may also help inform City activities to conserve at-risk species that are not currently listed under the Endangered Species Act (e.g., Pacific lamprey, coastal cutthroat trout, several bat species and others). Efforts to conserve at-risk species could prevent and minimize further decline and potentially preclude the need to list them in the future.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund)

In 2000, a six-mile stretch of the Lower Willamette River – the Portland Harbor – became a designated federal Superfund site due to the discovery of contaminated sediments. Elevated levels of polychlorinated biphenyls (PCBs), heavy metals, polycyclic aromatic hydrocarbons (PAHs), pesticides such as DDT and other contaminants are present in river sediments from Swan Island to the southern tip of Sauvie Island.

In September 2001 an agreement was established between the Oregon Department of Environmental Quality (DEQ) and a coalition of businesses and public agencies – including the City of Portland – to participate in investigation and cleanup of the site. The DEQ is working on the cleanup of approximately 100 upland sites along the banks of the Willamette River. Federal, state and tribal governments serve as the Natural Resource Trustees. The Trustees are conducting a natural resources damage assessment to determine how the release of hazardous substances have harmed natural resources such as fish and wildlife since CERCLA was established in 1980. The Trustees can recover damages from parties who have caused injury, and can mandate restoration and mitigation actions. The Trustees can use this inventory to inform the identification of restoration opportunities to address past damages.

Contamination is addressed in this report for each inventory site. Information presented includes a summary of hazardous substances, waste types, and environmental and health risks. A map indicating the general location and status of contamination is also included for each inventory site. It is important to note that many areas along the Willamette, particularly in the North Reach, have some level of contamination and also have important natural resources.

Chapter 3. PROJECT APPROACH AND METHODOLOGY OVERVIEW

The inventory presented in this report was produced by integrating information from several sources. Some of the information presented later in this report was taken directly from Portland's new (draft) citywide inventory of riparian corridors and wildlife habitat. Other key information was produced specifically for the Willamette River inventory study area, including the delineation of inventory sites, completion of wildlife habitat assessments for portions of the study area, and observations from additional field visits. The following chapter describes the key information pieces that make up this inventory, and how the information was developed.

Section 3a. BACKGROUND AND RELATIONSHIP TO METRO'S REGIONAL INVENTORY

The Bureau of Planning has recently produced substantial new inventory information for riparian corridors and wildlife habitat in Portland. Products include natural resources descriptions, GIS data, GIS models, maps, and a report documenting the project approach.

The Bureau used Metro's inventory of regionally significant riparian corridors and wildlife habitat as a starting point for citywide inventory development. By basing the new City inventory on Metro's approach, the Bureau was able to incorporate and build on the extensive research, analysis, technical review, and public scrutiny that went into the development of Metro's regional inventory. Metro's inventory was reviewed by the Independent Multidisciplinary Science Team (a group of leading scientists in the Pacific Northwest), and other local experts. Public workshops were held and a public hearing was conducted before the Metro Council. The Metro Council endorsed the regional natural resources inventory in December 2001. The Council directed Metro staff to develop a regional program to protect, conserve, and restore regionally significant riparian corridors and wildlife habitat. The inventory was updated and adopted as part of the Title 13 Nature in Neighborhoods program in September 2005.



The Nature in Neighborhoods Program establishes regional requirements that Metro area cities and counties must meet to remain in compliance with State Planning Goals 5 & 6. The development of Metro's inventory is documented in several reports: the *Technical Report for Fish and Wildlife (Metro 2005); Metro's Riparian Corridor and Wildlife Habitat Inventories (Metro 2005);* and *Addendum and Update to Metro's Riparian Corridor and Wildlife Habitat Inventories (Metro 2005).*

Both the City's and Metro's inventories reflect fundamental information from Metro's extensive review of scientific literature pertaining to riparian corridors and wildlife habitat. The scientific foundation upon which both inventories are based can be summarized as follows:

> **Riparian corridors** are comprised of rivers and streams, riparian vegetation, and off-channel areas, including wetlands, side channels, and floodplains. Riparian corridors usually contain a complex mix of vegetation consisting of trees or woody vegetation, shrubs and herbaceous plants. Riparian corridors also include areas that provide the transition between the stream banks and upland areas. Watershed functions provided by natural resources located in riparian corridors include:

- *Microclimate and shade* – Open water bodies, wetlands, and surrounding trees and woody vegetation are associated with localized air cooling, soil moisture, and increased humidity.
- *Bank function and control of sediments, nutrients and pollutants* – Rivers, streams, trees, vegetation, roots and leaf litter intercept precipitation; hold soils, banks and steep slopes in place; slow surface water runoff; take up nutrients; and filter sediments and pollutants found in surface water. Structures, such as pilings, can also help stabilize banks and contain contaminants but can impair channel dynamics and other functions.
- *Streamflow moderation and flood storage* – Waterways and floodplains provide for conveyance and storage of streamflows and floodwaters; trees and vegetation intercept precipitation and promote infiltration which tempers stream flow fluctuations or "flashiness" that often occurs in urban waterways.
- *Organic inputs, nutrient cycling and food web* – Water bodies, wetlands and nearby vegetation provide food for aquatic and terrestrial species (e.g., plants, leaves, twigs, insects) and are part of an ongoing chemical, physical and biological nutrient cycling system.
- *Large wood and channel dynamics* – Rivers, streams, riparian wetlands, floodplains and large trees and woody vegetation contribute to changes in location and configuration of waterway channels over time.
- *Wildlife movement corridors* – Rivers and streams and vegetated corridors along waterways allow wildlife to migrate and disperse among different habitat areas and provide access to water.

Wildlife habitats provide food, cover, and roosting and nesting sites for a broad array of birds, mammals, reptiles and amphibians. The terrestrial habitat features that provide these functions include forests, woodland, shrubland, grassland and meadows, wetlands, rocky slopes and uplands, buttes, and other topographic features. The following wildlife habitat attributes are indicators of habitat function and habitat fragmentation due to urbanization:

- *Habitat patch size* – Larger habitat patches generally provide more food, cover, breeding and nesting opportunities for multiple wildlife species.
- *Interior habitat area (edge effect)* – Rounder-shaped habitat patches experience less "edge effect" (disturbance from urban land uses, predation and invasive species) than narrow patches. Larger, rounder patches provide interior habitat that is needed by certain species.
- *Connectivity between habitat patches (including distance and edge effect)* – Patches located closer together generally facilitate species dispersal and migration, and provide access to food, cover, nesting sties, and reproduction opportunities.
- *Connectivity/proximity to water* – Access to water is vital to wildlife survival. Habitat that is connected or close to rivers, streams and wetlands is valuable for all types of wildlife.
- *Special habitat areas* – Specific habitat types or features that provides critical functions for wildlife, including habitats and species at risk, rare or declining habitat types such as native oak assemblages, designated critical habitat for threatened or endangered species, and urban structures such as the Willamette River bridges that Peregrine Falcons use for nesting.

Section 3b. INVENTORY METHODOLOGY

Below is a summary of the steps the Bureau took to produce the citywide inventory of riparian corridors and wildlife habitat (also see Figure 1).

1. **Compiled GIS Data and mapped key natural resource features, including rivers, streams, wetlands, flood areas, vegetation and topography.**

   Natural resource feature data are the primary inputs to the GIS inventory models for riparian corridor and wildlife habitat. The Bureau improved Metro's regional natural resource feature GIS data for the City of Portland by:

   - Remapping more than 180 miles of stream centerlines; adding 86 miles of open stream channel to the maps.
   - Mapping smaller vegetation units (1/2 acre minimum), and classifying forest, woodland, shrubland and herbaceous vegetation (based on the National Vegetation Classification System) over a wider area. Land that is either not vegetated or sparsely vegetated is not mapped as part of the inventory.[1]
   - Updating the City's flood area data for use in the inventory, including incorporation of the 2004 FEMA 100-year floodplain.

2. **Developed criteria and GIS models to rank and map the relative functional value of existing natural resources**

   Like Metro, the City produced GIS models to assess the relative functional value of riparian corridors and wildlife habitat. The riparian corridor and wildlife habitat GIS models assign relative ranks of "high," "medium," or "low" to natural resource features that meet certain criteria. The ranks are produced using a consistent and replicable method, and represent a simple ordinal scale depicting the relative number and distribution of functions provided by natural resource features in the city. The ranks are not tied to a reference or baseline condition, but allow comparison of the relative condition of natural resources within the region or city.

   Science-based model criteria were developed to score, assign relative ranks, and map the natural resources that provide the riparian and wildlife habitat functions described above. The City's model criteria focus on the presence, type and extent of specific natural resource features. More detailed information on natural resources (e.g. vegetation assemblages) and disturbances (e.g. development, contamination and invasive species) are provided in narrative inventory site descriptions.

   The City's inventory models apply criteria that are similar to criteria Metro developed for the regional inventory. The Bureau has refined some of the regional criteria to reflect additional detail, more recent studies, and local conditions. For example, the City's riparian corridor model assigns a lower value to herbaceous vegetation than Metro's models to reflect the predominance of cultivated landscapes and lawn in Portland's urban watersheds. The riparian corridor model criteria were further refined for the Willamette River inventory to reflect the extent of development and hardened riverbanks in the North Reach (discussed further in the next section — *Development of the Willamette River Inventory*). The City's wildlife habitat model assigns higher relative function scores to somewhat smaller habitat patches. The refined patch size scoring thresholds are based on additional scientific studies including recent wildlife studies conducted in Portland natural areas.

   The Bureau of Planning worked closely with Metro and the Bureau of Environmental Services to ensure that refinements to the regional inventory would be consistent with Metro's work and would support the City's watershed health goals. The Bureau of Planning coordinated a technical review process in 2006 to address potential refinements to the regional methodology. For more detail see Appendix E — *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008.*

[1] Sparse vegetation is defined as areas with a predominance of boulders, gravel, cobble, talus, consolidated rock and/or soil with unconsolidated, low-structure vegetation.

Riparian Corridor Model

The City's riparian corridor GIS model assigns primary and secondary scores to natural resources for six riparian functions. The scores reflect the types of landscape features present and the proximity of those features to a river, stream or wetland. Primary scores are applied to features that provide the most direct and substantial contribution to a particular riparian function. Secondary scores are assigned to features that provide lesser, but still important, riparian functions. The predominance of riparian functions occurs within 30 to 100 meters (approximately 100 to 300 feet) of a water body, but some functions, such as the microclimate effect associated with adjacent, contiguous forest vegetation, can occur up to several hundred feet from a water body.

The primary and secondary scores for each function are combined to produce aggregated relative riparian corridor rankings of "high," "medium," or "low."

Table 1: Riparian Corridor GIS Model Criteria

Microclimate and Shade

Primary Feature:	Footnotes	Secondary Feature:	Footnotes
River, stream/drainageway or wetland	2, 5	----	
Forest or dense trees within the flood area (except within a drainage district)	3, 4	Woodland vegetation within the flood area (except within a drainage district)	3, 4
Forest or dense trees contiguous to and within 100 feet of a river, stream or wetland	1, 2	Forest or dense trees contiguous to primary forest vegetation and within 780 feet of a river, stream or wetland	1, 2
----		Woodland vegetation contiguous to and within 100 feet of a river, stream or wetland	1, 2
----		Shrubland vegetation contiguous to and within 50 feet of a stream or wetland	1, 2

Stream Flow Moderation and Water Storage

Primary Feature:	Footnotes	Secondary Feature:	Footnotes
River, stream/drainageway or wetland	2, 5	----	
Vegetation within the flood area (except within a drainage district)	3, 4	Non-vegetated land within the flood area (except within a drainage district)	3, 4
----		Forest or dense trees, woodland or shrubland vegetation within 300 feet of a river, stream or wetland	1, 2
----		Forest or dense trees contiguous to flood area or starts within 300 feet of a river, stream or wetland, and extends up to 780 feet of a river, stream or wetland	1, 2
----		Herbaceous vegetation within 100 feet of a river, stream or wetland	1, 2
----		Where the slope is at least 25%: Herbaceous vegetation that starts within 100 feet of a river, stream or wetland, and is within 200 feet of a river, stream or wetland	1, 2

Bank Function, and Sediment, Pollution and Nutrient Control

Primary Feature:	Footnotes	Secondary Feature:	Footnotes
River, stream/drainageway or wetland (except Willamette River North and Central Reach)	2, 5	Willamette River North and Central Reach	5
Land within 50 feet of a river, stream or wetland, except where the bank is hardened and non-vegetated (exception applies in the Willamette River North and Central Reach)	1, 2, 7	Land within 50 feet of a river where the bank is hardened and non-vegetation (applies in the Willamette River North and Central Reach)	7
Forest or dense trees, woodland or shrubland vegetation within the flood area (except within a drainage district)	3, 4	Herbaceous vegetation within the flood area (except within a drainage district)	3, 4
Forest or dense trees and natural/semi-natural woodland or shrubland vegetation within 100 feet of a river	1, 6, 8	Cultivated woodland or shrubland vegetation within 100 feet of a river	1, 6, 8
Forest or dense trees, woodland and shrubland vegetation within 100 feet of a stream or wetland	1, 2	Herbaceous vegetation within 100 feet of a river, stream or wetland	1, 2
Where the slope is at least 25%: Forest or dense trees, and natural/semi-natural woodland or shrubland vegetation within 200 feet of a river	1, 6, 8	----	
Where the slope is at least 25%: Forest or dense trees, woodland or shrubland vegetation within 200 feet of a stream or wetland	1, 2	Where the slope is at least 25%: Forest or dense trees, woodland and shrubland vegetation that is contiguous to primary vegetation (limited to the contiguous area of 25 percent slope)	1, 2
----		Where the slope is at least 25%: Herbaceous vegetation contiguous to primary vegetation and within 200' of a river, stream or wetland	1, 2

Large Wood and Channel Dynamics

Primary Feature:	Footnotes	Secondary Feature:	Footnotes
River or stream/drainageway	2, 5	----	
Willamette River beaches		----	
Land within 50 feet of a river or stream (except land within 50 feet of a river in the Willamette River North and Central Reach)	1, 4	----	
Forest or dense trees within 50 feet of a river in the Willamette River North or Central Reach		Woodland, shrubland, herbaceous vegetation or non-vegetated land within 50 feet of the river within the Willamette River North and Central Reach	
Forest or dense trees within the flood area (except within a drainage district)	3, 4	Woodland, shrubland or herbaceous vegetation within a flood area (except within a drainage district)	3, 4
Forest or dense trees contiguous to and within 150 feet of a river or stream (except within a drainage district)	1, 3, 4	Within a drainage district, forest or dense trees contiguous to and within 150 feet of stream	1, 3, 4
----		Where the slope is at least 25%: Forest or dense trees contiguous to primary forest vegetation and is within 260 feet of a river or stream (except within a drainage district)	1, 4
Forest or dense trees contiguous to and within 150 feet of a wetland located completely or partially within the flood area or 150 feet of a river or stream (except within a drainage district)	1, 2, 3, 4	Where the slope is at least 25%: Forest or dense trees contiguous to primary forest vegetation and within 260 feet of a wetland located completely or partially within the flood area or 150 feet of a river or stream (except within a drainage district)	1, 2, 3, 4
Wetland located completely or partially within the flood area or within 150 feet of a river or stream (except within a drainage district)	1, 2, 3, 4	----	

Organic Inputs, Food Web and Nutrient Cycling

Primary Feature:	Footnotes	Secondary Feature:	Footnotes
River, stream/drainageway or wetland	2, 5	----	
Flood area with forest or dense trees and natural/semi-natural woodland or shrubland vegetation (except within a drainage district)	3, 4, 8	Cultivated woodland and shrubland vegetation within a flood area (except within a drainage district)	3, 6, 8
Forest or dense trees and natural/semi-natural woodland or shrubland vegetation within 100 feet of a river	1, 2, 6	Forest or dense trees and natural/semi-natural woodland or shrubland vegetation that is contiguous to primary vegetation and is within 170 feet of a river	1, 2, 6
----		Cultivated woodland or shrubland vegetation within 100 feet of a river	1, 2, 6, 8
Forest or dense trees, woodland or shrubland vegetation within 100 feet of a stream or wetland	1, 2	Forest or dense trees, woodland or shrubland vegetation that is contiguous to primary vegetation and within 170 feet of a stream or wetland	1, 2

Riparian Wildlife Movement Corridor

Primary Feature:	Footnotes	Secondary Feature:	Footnotes
River, stream/drainageway or wetland	2, 5	----	
Vegetation that is contiguous to and within 100 feet of a river, stream or wetland	1, 2	Vegetation that is contiguous to primary vegetation and within 300 feet of a river, stream or wetland	1, 2

Footnotes:

1 All search distances are measured from either a) the edge of the mapped water body, or b) the stream/drainageway centerline.

2 "Wetland" refers to all mapped regional wetlands fully or partially within 1/4 mile of a river or stream/drainageway, unless otherwises specified.

3 "Flood area" is comprised of the combined FEMA 100-year floodplain (2004), the adjusted 1996 flood inundation area, and additional adjustments to reflect more recent permitted activities affecting site elevation.

4 Portland-area drainge districts: Peninsula Drainage District #1, Peninsula Drainage District #2, and Multnomah County Drainage District #1.

5 Rivers, streams/drainageways and wetlands are primary features for riparian functions under evaluation. The model produces functional rankings for such features if open water area has been mapped. Map notations will indicate relative riparian function levels associated with streams or drainageways where only centerline data are available.

6 Data classifications that differentiation between natural/semi-natural and cultivated vegetation has been assigned for the Willamette River Corridor only.

7 Hardened banks are defined as seawalls, pilings and non-vegetated riprap and adjacent land within 50 feet of the North or Central Reach of the Willamette River.

8 Criteria relating to natural, semi-natural and cultivated vegetation are currently applied only to the Willamette River corridor and to flood area. Criteria made be modified, if warranted, in the future during area-specific planning efforts.

Features that receive any score, primary or secondary, provide significant riparian corridor functions. Features that receive at least one secondary score and no primary scores receive a low relative rank. Features that receive one or more primary scores receive a medium or high relative rank; the number of secondary scores does not affect medium and high ranks.Table 2 shows the formula used to establish the aggregate relative ranks. The formula is consistent with the formula Metro used to evaluate and rank riparian corridors in the region.

Table 2: Riparian Corridor Aggregated Relative Ranking Formula

Riparian Corridor Relative Rank	Ranking Formula	
	Primary Functions	Secondary Functions
High	4-6	0-6
Medium	1-3	0-6
Low	0	1-6

Typically, the riparian corridor model assigns aggregated relative ranks to natural resource features as follows:

- **High –** Rivers, streams and wetlands; forest or woodland vegetation within a flood area, in close proximity to a water body, and woody vegetation on steep slopes
- **Medium –** Shrubland and herbaceous vegetation within a flood area or in close proximity to a water body
- **Low —** Vegetation outside the flood area and further from a water body; developed flood areas; and hardened, non-vegetated banks of the North and Central reaches of the Willamette River

Wildlife Habitat Model

The wildlife habitat GIS model assigns scores to mapped habitat patches based on their size, shape, and connectivity to other patches or water bodies as shown in Table 3 below. For purposes of the inventory, habitat patches are defined as areas of forest vegetation and wetland that are at least two acres in size, plus adjacent woodland vegetation.

Table 3: Portland Natural Resource Inventory – Wildlife Habitat GIS Model: Attributes and Summary of Scoring Criteria

Habitat patches receiving a "high" relative score (3 points)	Habitat patches receiving a "medium" relative score (2 points)	Habitat patches receiving a "low" relative score (1 point)
Attribute: Habitat Patch* Size		
Habitat patches* 585 acres or larger.	Habitat patches at least 30 acres and less than 585 acres.	Habitat patches at least 2 acres and less than 30 acres.
Attribute: Interior Habitat Area**		
Interior habitat is 500 acres or larger.	Interior habitat area is at least 15 acres and less than 500 acres.	Interior habitat area is at least 2 acres and less than 15 acres.
Attribute: Connectivity/Proximity to Other Habitat Patches***		
Core forest/wetland portion of the patch is at least 2 acres and receives a patch proximity index value of 100 or more.	Core forest/wetland portion of the patch is at least 2 acres and receives a patch proximity index value of at least 30 and less than 100.	Core forest/wetland portion of the patch is at least 2 acres and receives a patch proximity index value of less than 30.
Attribute: Connectivity/Proximity to Water****		
At least 75% of the habitat patch is within 300 feet of a river, stream or wetland.	At least 25% and less than 75% of the habitat patch is within 300 feet of a river, stream or wetland.	Less than 25% of the habitat patch is within 300 feet of a river, stream or wetland.

Footnotes:

* A habitat patch is defined as an area of contiguous forest and/or wetland greater than 2 acres in size, plus any woodland vegetation adjacent and contiguous to the core forest/wetland area.

** "Interior area" is defined as the area within the forest and/or wetland portion of a habitat patch that is situated at least 200' from the edge of that portion of the patch.

*** Proximity to other patches is calculated using the Fragstats 3.3 proximity index (PROX). The specified search radius is ¼ mile. The proximity index is a dimensionless measure of the relative size and distance of all patches whose edges are within the specified search radius of each vegetation patch. For more information on Fragstats and the proximity index, refer to http://www.umass.edu/landeco/research/fragstats/fragstats.html.

**** Proximity to water relative value thresholds were determined by identifying "natural breaks" in the distribution of the values using the Jenk's Natural Breaks method, which determines the best arrangement of values into a specified number of classes by comparing and minimizing the sum of the squared differences of values from the means of potential classes.

[2]Hardened, non-vegetated river banks include seawalls, pilings and non-vegetated riprap.

[3]Woodland vegetation that is contiguous to a forest/wetland patch that is greater than 2 acres in size is evaluated for wildlife habitat. Woodland vegetation independent of a forest/wetland patch is not evaluated by the model.

A habitat patch can receive up to 12 points if it receives a high rank for each of the four attributes. Features that receive scores for one or more attributes provide significant wildlife habitat functions. Individual scores for each attribute are combined to produce an aggregated relative ranking of "high," "medium," or "low" for each wildlife habitat patch. As with the riparian corridor model, the formula used to generate the aggregate wildlife habitat rank is similar to those Metro used for the regional inventory (see Table 4).

Table 4: Wildlife Habitat Aggregated Relative Ranking Formula

Wildlife Habitat Relative Rank	Ranking Formula
High	9 or more points
Medium	4-8 points
Low	1-3 points

Typically, the wildlife habitat model assigns aggregated relative ranks to natural resource features as follows:

- **High –** Large forest and wetland areas such as Forest Park, Smith and Bybee Wetlands, Tryon State Park, and Riverview Cemetery.
- **Medium –** Moderate sized forest and wetland areas such as those at Oaks Bottom, portions of Powell Butte, and the South Rivergate Corridor.
- **Low –** Numerous smaller forest and wetland areas through out the city.

3. Designated Special Habitat Areas and Updated Regional Species Lists.

The Bureau of Planning worked with Portland's Bureau of Environmental Services and Parks and Recreation to update the documentation and mapping of the regional Habitats of Concern identified in Metro's inventory. Habitats of Concern are areas with sensitive/threatened fish or wildlife species, sensitive/unique plant populations, wetlands, native oak, bottomland hardwood forests, riverine islands, river delta, migratory stopover habitat, connectivity corridors, upland meadow, and other unique natural or built structures or resources (such as bridges that provide habitat for Peregrine Falcons).



Picture 1: Peregrine Falcon on the St. Johns Bridge
Courtesy of Bob Sallinger, Audubon Society of Portland

Habitat of Concern are referred to as Special Habitat Areas (SHAs) in the citywide inventory. Like the Habitats of Concern, SHAs are mapped more generally than the landscape feature data used in the riparian and wildlife GIS models. The SHA boundaries correspond to broader areas, and the boundaries may extend beyond the specific landscape features.

The City has updated the SHA criteria to include areas that National Oceanic and Atmospheric Administration (NOAA) designated as Critical Habitat for anadromous salmonids. The Willamette River and portions of the Columbia Slough, Johnson Creek and Tryon Creek are designated as Critical Habitat. The City has also designated certain urban structures as SHAs, including chimney roosting sites for Vaux's Swifts and several bridges on the Willamette and Columbia rivers that provide nesting sites for Peregrine Falcons. A full list of SHA criteria is available in Appendix E – *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*

Special Habitat Areas include certain resource features that are not addressed by the wildlife habitat model criteria, such as the grasslands at Powell Butte. All Special Habitat Areas receive a high relative rank for wildlife habitat, which would supersede a medium or low rank if assigned by the wildlife habitat model.

The citywide inventory also includes up-to-date plant and wildlife species lists. Metro's regional vertebrate species lists have been culled to include only those species that would be found in Portland. The current species lists are found in Appendix D.

4. Produced combined ranks and maps based on GIS model results and information on Special Habitat Areas.

Once the aggregated riparian corridor and wildlife habitat ranks are generated and Special Habitat Areas are designated, a single combined relative rank for riparian corridor/wildlife habitat areas is produced. Where ranked riparian corridors and wildlife habitat areas overlap, and if the two aggregated relative ranks differ, the higher of the two ranks becomes the overall combined rank for that resource area. For example, a feature that ranks medium for riparian corridor functions and low for wildlife attributes, would receive a medium combined relative rank.

It is important to note that natural resource features can rank high based on the specific inventory criteria, and also be impacted by land management activities, invasive plants or animals, or contamination. This situation is especially prevalent in highly developed areas such as portions of the Willamette River Corridor.

The Bureau produced maps showing the inventory GIS model results for individual riparian and wildlife habitat functions and attributes, the Special Habitat Areas, the aggregated riparian corridor and wildlife habitat relative ranks, and the combined ranks, for each inventory site in the Willamette River North Reach.

5. Addressed Resource Significance

To comply with the Goal 5 rule, local jurisdictions must assess inventoried natural resources to determine if the resources are "significant" based on location, and relative quantity and quality. Resources that have been deemed significant must then be evaluated to determine if and how those resources should be protected by the local jurisdiction.

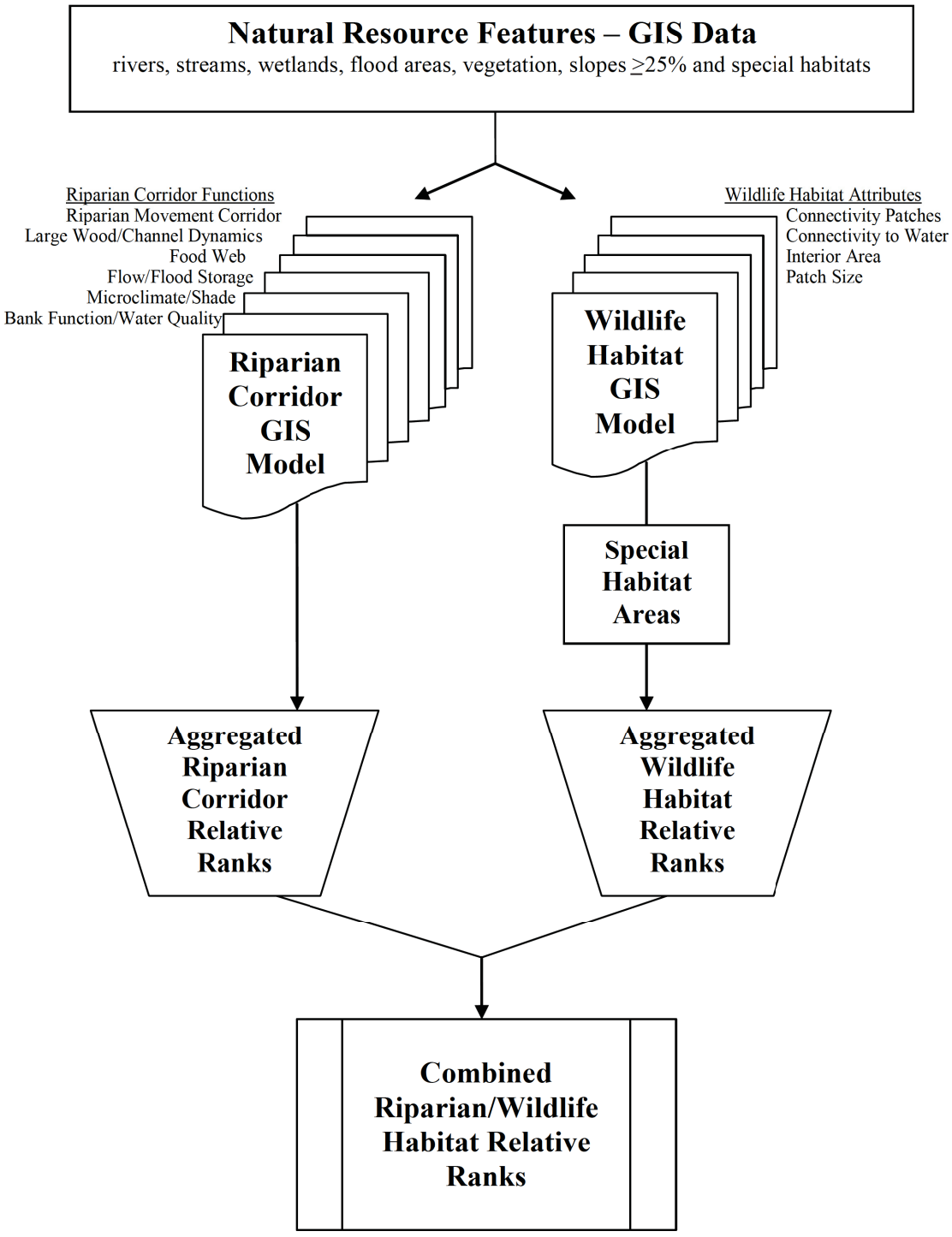
The City's inventory is based on the science and approach Metro used to develop the adopted inventory of regional riparian corridors and wildlife habitat. The City's inventory reflects updates and refinements to the regional inventory, and relates more closely to the current relative quality and functions of Portland's natural resources. These improvements have increased the accuracy and level of detail of the City's inventory information.

Metro determined the ecological significance of inventoried regional riparian corridors and wildlife habitat based on the science literature. For riparian corridors, Metro determined that all natural resources that receive scores for riparian functions are ecologically and regionally significant. For wildlife habitat, Metro determined that all ranked habitats are ecologically significant, and all but the lowest ranked wildlife habitats are regionally significant. Metro noted that these low ranked wildlife habitat areas could provide locally significant habitat and recommended that cities and counties consider these areas when developing local protection programs.

The Oregon Department of Land Conservation and Development acknowledged Metro's regional inventory and associated Title 13: Nature in Neighborhoods program as in compliance with the Goal 5 rule in January 2007.

Following Metro's approach, all natural resources receiving riparian corridor and wildlife habitat scores and ranks in the City's inventory would be deemed significant. Official determination(s) of significance will take place at the time of adoption by the City Council.

Figure 1: Natural Resources Inventory Flow Diagram



Section 3c. DEVELOPMENT OF THE WILLAMETTE RIVER NATURAL RESOURCES INVENTORY

The Willamette River Natural Resources Inventory presented in this report reflects the citywide inventory work discussed in the previous section, and additional work conducted specifically for the Willamette River inventory study area, as described below.

Delineating Inventory Sites

The Bureau of Planning delineated 13 new inventory sites for the Willamette Inventory. Consistent with more recent City inventories, the Willamette inventory sites are contiguous to each other and include significant natural resources and the surrounding land uses.

Specifically, the inventory site boundaries are intended to:

- Capture similar and contiguous landscape features (natural and human-made) in the same inventory site.
- Abut one another – i.e., no gaps between inventory sites in the Willamette River study area, or between Willamette River inventory sites and inventory sites established for other adopted inventories.
- Address areas included in Metro's inventory of regionally significant riparian corridors and wildlife habitat.

To delineate the boundaries between inventory sites, a number of landscape features were considered:

- Streets, bridges, railroad tracks or other transportation facilities – The intent is to set boundaries coincident with facilities that are likely to remain in the same location for many years. When a transportation facility is used, the resource boundary will include the entire right-of-way within the inventory site. If the transportation facility is located between two inventory sites, the entire right-of-way will be included in one of the sites depending on development, property ownership, vegetation or other characteristics.
- Property boundaries and ownership – The intent is to avoid either bisecting a single property or bisecting multiple and adjacent properties that are under a single ownership.
- Contiguous undeveloped areas – The intent is to include contiguous, undeveloped areas in the same inventory site if possible.
- Topography – The intent is to use topography as a boundary where it forms a natural break between inventory sites, such as relatively flat riparian areas and more steeply sloping uplands or bluffs.
- Vegetation – The intent is to include contiguous vegetation in the same inventory site, except when vegetation types differ significantly or other landscape features such as steep slope indicate a distinction in resource character
- Willamette River Centerline – The intent is to include the river, near-shore areas and river bank within the same inventory site as the adjacent riparian corridor.

The term "inventory site" or "site" is used, rather than "resource site" or "habitat site" which are used in other City inventories, including the 1986 inventory produced for the Willamette Greenway. This is because the Willamette River inventory sites contain resource areas and surrounding land uses; much of this area is developed.

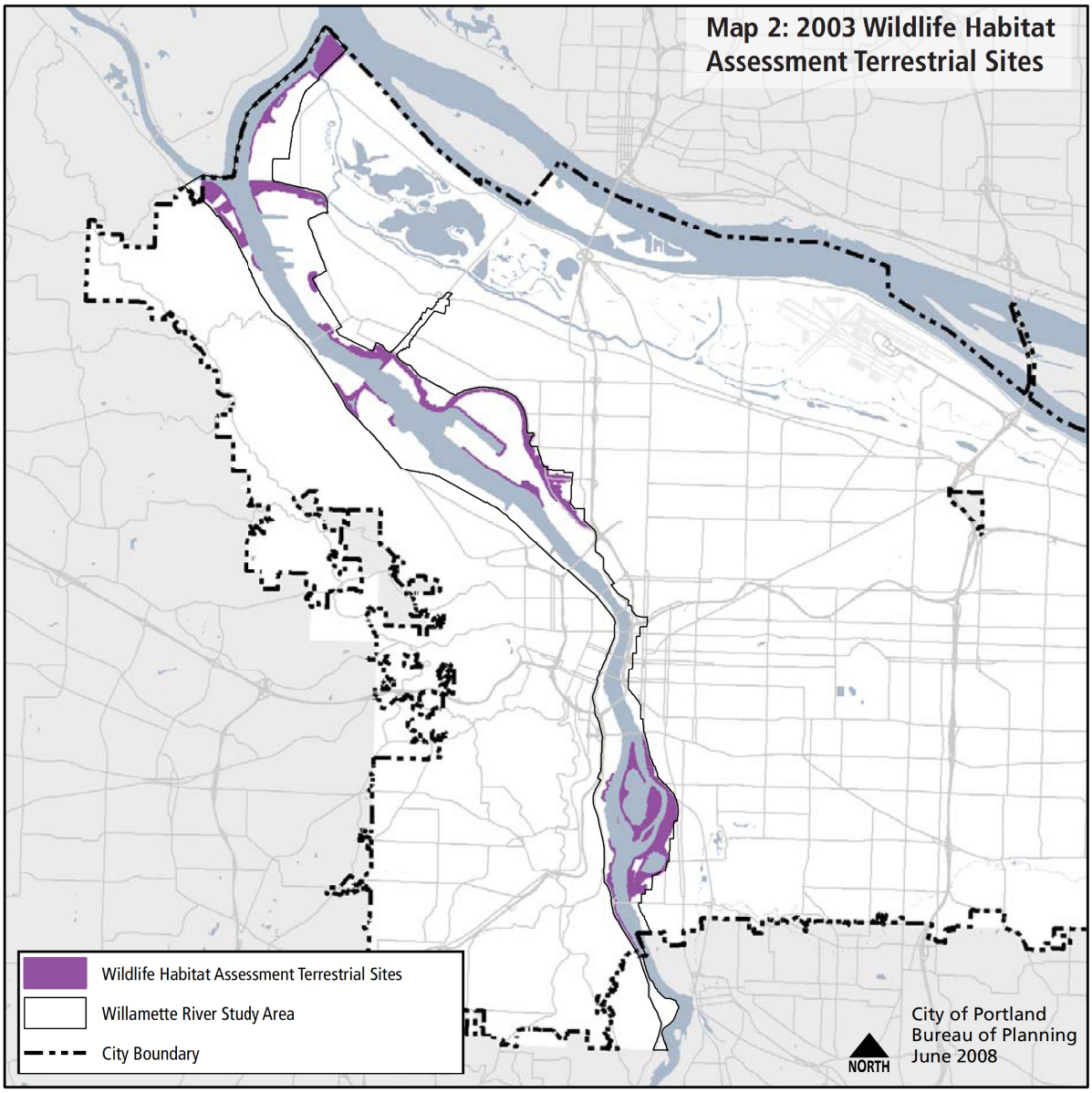
Incorporating information from the draft Lower Willamette Inventory: Natural Resources (Adolfson Associates, Inc. 2000, updated by City staff, 2003)

The Bureau of Planning contracted with Adolfson Associates, Inc. to produce habitat inventory information for the Willamette Corridor. An initial draft Willamette River Inventory: Natural Resources report was produced in 2000. The report identified 24 "habitat sites" throughout the study area – 15 terrestrial and nine aquatic (Willamette River) sites. Site boundaries were generally concurrent with the natural resources themselves and did not encompass surrounding developed areas.

The study involved extensive field visits conducted on land and by boat on the Willamette River itself. Wildlife Habitat Assessments (WHAs) were performed for each site. These assessments involved evaluating the presence and availability of water, food, and cover for wildlife. Observations regarding water quality, riparian vegetation, wildlife use and habitat connectivity were recorded, as well as disturbance impacts, and connection with other natural areas. Unique or rare occurrences of plant and animals were also noted. A Riverine Habitat Assessment methodology, adapted from the WHA, was developed to assess the riverine habitat of the Willamette River. Habitat sites received a numeric score, which provided a relative rank as compared to other sites within the Willamette River Inventory study area.

The *Lower Willamette Inventory: Natural Resources* report contained habitat descriptions, including observational data collected using the WHA, and the numeric score for each site.

In 2003, the *Lower Willamette Inventory: Natural Resources* report was updated by the Bureau of Planning to reflect input from other bureaus and key stakeholders, including information about recent development that altered the presence and condition of natural resources. Site boundaries have been modified slightly, but the habitat descriptions and WHA scores were not updated. Terrestrial sites are shown in Map 2.



The data and information from the updated *Lower Willamette Inventory: Natural Resources* (2003) has been incorporated into the inventory site habitat descriptions presented later in this report. The numeric scores were not used to develop the relative rankings because they do not address the full array of riparian functions evaluated in this inventory, and they were not developed for all identified resources in the inventory. The WHA forms and numeric scores can be found in Appendix D.

Supplemental Site Visits

In the fall of 2005 and the spring of 2006, City staff teams from the Bureaus of Planning and Environmental Services conducted site visits to address areas that were not addressed in the Adolfson study, and to revisit some areas Adolfson had addressed. Site assessment forms, similar to the WHA forms, were produced to record natural resources and functions including water quality, presence, type and diversity of vegetation, wildlife use and limiting factors. Like the information from the Adolfson work, the natural resource information recorded during the supplemental site visits has been included in the natural resource descriptions provided for each inventory site. The completed site visit forms are found in Appendix D. Additional field visits were conducted in the winter and spring of 2008 to verify vegetation data and assess potential Special Habitat Areas.

Criteria Refinements

The August 2007 discussion draft Willamette River Natural Resource Inventory report was made available for public comment through October 2007. Comments included expressions of support for and concerns about the inventory methodology. Comments also included suggestions for inclusion of additional information. A number of comments expressed interest and concerns about how the inventory would be used to update regulations affecting development and natural resources in the North Reach.

Staff convened a group of technical experts on January 10, 2008 to discuss comments pertaining to the inventory methodology, specifically the GIS model criteria. Participants included staff from the Port of Portland and SWCA Environmental Consultants, Ellis Ecological Services, Windward Environmental, Oregon Department of Fish and Wildlife, US Fish and Wildlife Service, Metro, NOAA Fisheries, Audubon Society of Portland, and the Portland Bureau of Environmental Services.

Based on the input from these experts and additional staff analysis, refinements were made to several of the GIS model criteria used to evaluate riparian corridor functions and wildlife habitat attributes in the Willamette Corridor. Most of the refinements are specific to the Willamette River North Reach and Central Reach. Some of the refinements are applicable to natural resources throughout the city. Ultimately, the decisions were to:

- Update the mapped Willamette River channel to include beaches. -Continue to highlight the role of beaches and shallow-water areas as special habitats for fish and wildlife by depicting and describing these areas in the Willamette River Special Habitat Area.
- Provide additional information about the river, such as water quality, in the revised inventory report.
- Recognize the extent of hardened, non-vegetated banks and sediment contamination in the North Reach, by downgrading value assigned to the river for bank function, and control of sediment, nutrients and pollutants (likely applicable to the Central reach as well).
- Downgrade the value assigned to seawalls, pilings and non-vegetated riprap within the North Reach to recognize the associated impairment of bank function and channel dynamics (likely applicable to the Central reach as well).
- Continue to recognize localized effects of large wood on riverbank structure, sediment retention, etc. Recognize that riparian vegetation further from the river is more likely to contribute large wood when trees are located on steep slopes.
- Differentiate between the quality of functions provided by natural or semi-natural vegetation and highly manicured landscapes. Downgrade the value assigned to cultivated vegetation for bank function, sediment, pollution and nutrient control, and organic inputs/food web.
- Modify criteria related to microclimate and shade functions to require that forest vegetation be contiguous to the river itself. Recognize that shrubland and cultivated woodland vegetation do not contribute significantly to microclimate and shade functions in the North Reach.

Details regarding the criteria refinements can be found in Appendix B - City of Portland Inventory GIS Model Criteria and Appendix E -*City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

Chapter 4. THE WILLAMETTE RIVER NATURAL RESOURCES INVENTORY

The Willamette River Natural Resources Inventory chapter provides information, data and maps regarding the presence, extent and condition of natural resources along the Willamette River in Portland. This chapter is organized into the following sections:

Section 4.a: THE WILLAMETTE RIVER BASIN – Provides a general description of the Willamette River Basin and a context for the inventory

Section 4.b: THE WILLAMETTE RIVER IN PORTLAND – Contains summary information, including water quality, hydrology, fish and wildlife, regarding the Lower Willamette River in Portland

Section 4.c: THE NORTH REACH

Section 4.c1: OVERVIEW– Includes information, data and maps about natural resources in the Willamette River North Reach.

Section 4.c2: NORTH REACH INVENTORY SITES – Detailed information, data and maps are provided for the following inventory sites:

WR1: Kelley Point Park

WR2: Terminal 5 Riparian Forest

WR3: Harborton Wetlands

WR4: South Rivergate Corridor

WR5: Time Oil/Terminal 4

WR6: Linnton

WR7: North Oak Palisades/Cathedral Park

WR8: Doane Lake

WR9: Willamette Cove

WR10: McCormick/Baxter and Triangle Park

WR11: Northwest Industrial Area

WR12: Swan Island

WR13: Willamette Bluff

Section 4.d: THE CENTRAL REACH – To be completed at a later date

Section 4.e: THE SOUTH REACH – To be completed at a later date

Section 4a.
THE WILLAMETTE RIVER BASIN

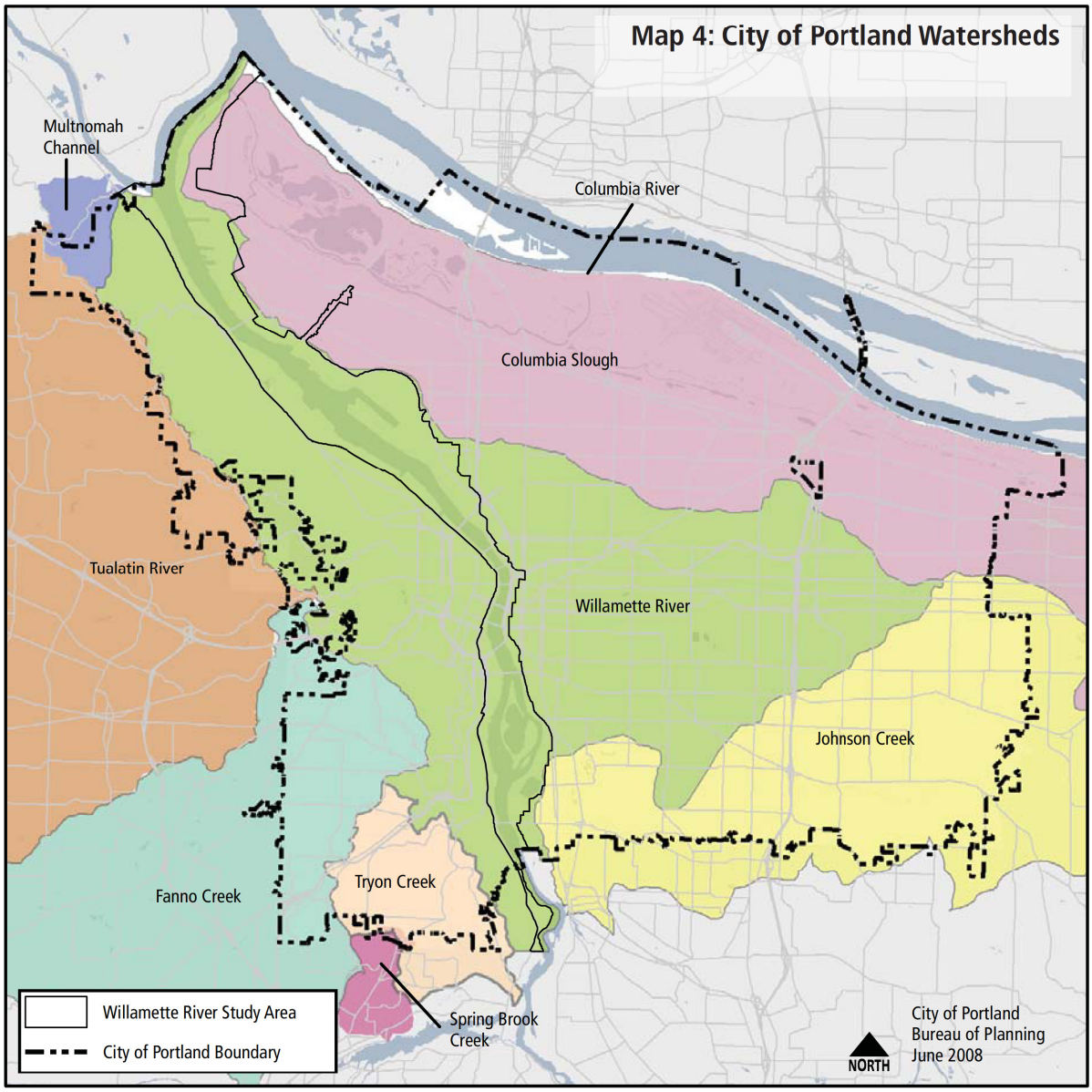
Regionally situated in the Lower Columbia River Basin, the Willamette River Basin is an 11,500 square mile watershed located between the Cascade Mountains to the east, and the Coast Range to the west. The 187-mile long Willamette River flows north through 128 jurisdictions including Eugene, Corvallis, Salem and Portland as well as eight counties: Lane, Linn, Benton, Marion, Polk, Yamhill, Clackamas and Multnomah. Nearly 70% of Oregon's population lives in the Willamette River Basin. The mix of land use ranges greatly from forestry and agriculture to urban residential, commercial and industrial.



Map 3: Willamette River Basin

The basin occupies roughly 12% of Oregon's land and plays an important role in the ecology of the region. The basin extends from mountains approximately 10,000 feet in elevation to the Columbia River just 10 feet above sea level. The Willamette Basin is also made up of 12 tributary sub-basins that are diverse in terms of elevation, hydrology, and landscape character. The Willamette basin helps to disperse aquatic and avian species among rivers and streams, upland forests, valleys, floodplains, and to and from the Columbia River and the Pacific Ocean. It is part of the Pacific Flyway for migratory birds, and is a key component of the extensive network of spawning streams for anadromous salmon and steelhead.

The hydrology of the Willamette River Basin has been altered substantially by the development and operation of 13 dams in tributary sub-basins. The dams provide flood control and hydroelectric power. However, the dams and associated changes in the river flow regime have affected water temperature, reduced the ecological values provided by seasonal flooding, and pose challenges to fish passage and migration. Dam construction, river and stream channelization, bank hardening, non-native species introductions, supplementation of fisheries through aquaculture, timber harvesting, agricultural activities, and urbanization have contributed to changes in historic aquatic habitats and biota.



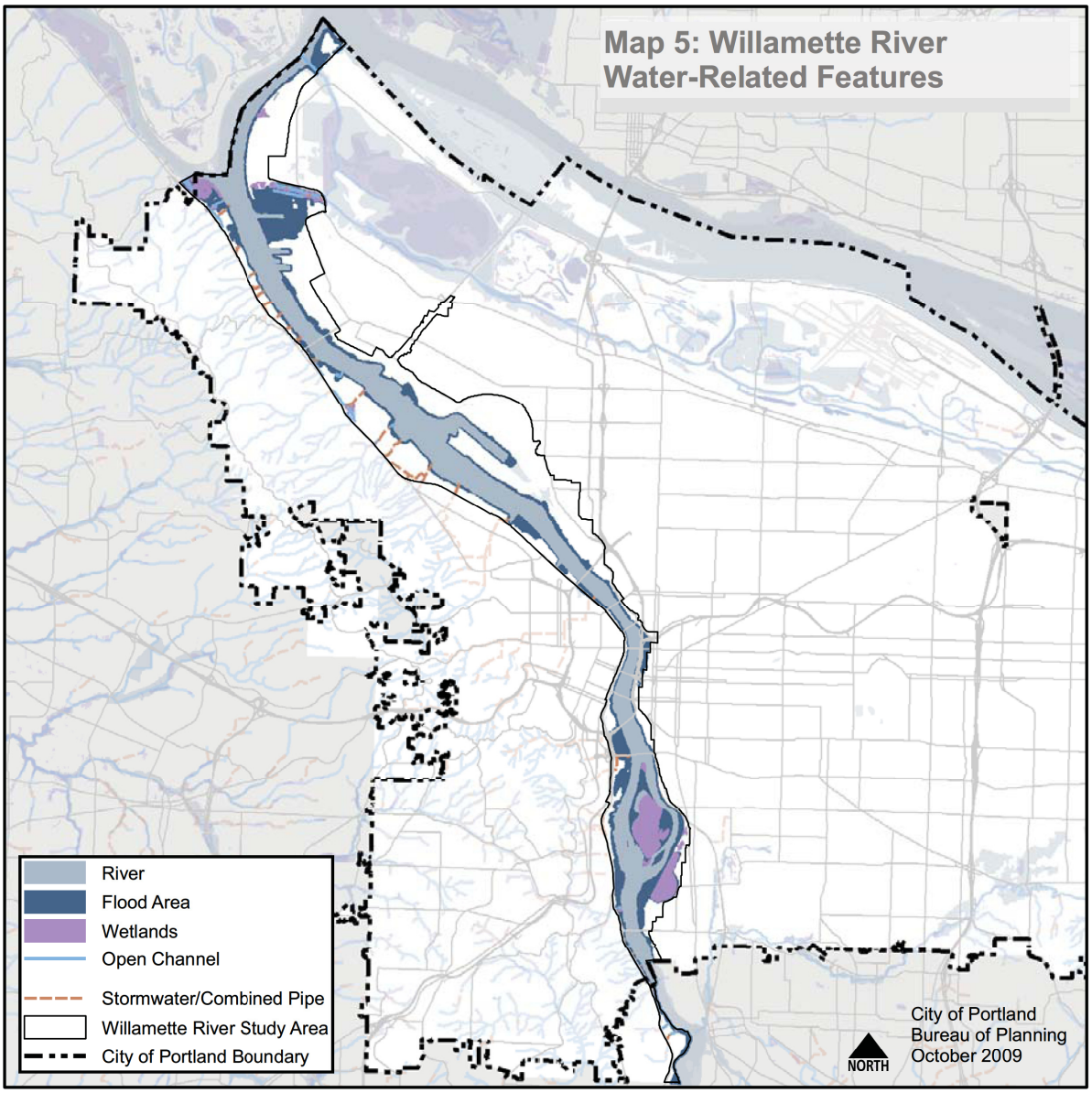
Section 4b.

THE WILLAMETTE RIVER IN PORTLAND

The 27 mile stretch of river between Willamette Falls in Oregon City and the Columbia River is often referred to as the Lower Willamette River. This portion of the basin connects directly with the regional ecosystem that includes Sauvie Island, Ridgefield and Shilapoo Wildlife Areas, Vancouver Lake, Tualatin Mountains (Forest Park), Burlington and Oak Bottom, the Smith and Bybee Lakes preserve, Sandy River, and floodplain islands in the Columbia River.

This inventory study area includes 17 miles of the Lower Willamette River as it flows northward through Portland to its confluence with the Columbia River. The confluence of the Willamette and the Columbia Rivers, the 9th and 2nd largest rivers in US respectively, occurs partially within the city limits. The inventory also includes lands adjacent to this portion of the river. The boundary of the inventory study area is shown on Map 4.

The study area is 8,900 acres in size. The Willamette River channel comprises approximately 3,290 acres (37%) of the study area. The study area contains 5 miles of tributary stream channels including segments of the Columbia Slough, Johnson Creek, Tryon Creek, Saltzman Creek, Doane Creek, Balch Creek and Stephens Creek. Many of the smaller tributary streams originate in Forest Park and the West Hills, and are piped through the study area. Wetlands comprise approximately 340 acres of the study area. The largest are Harborton Wetlands and Oaks Bottom. The study area contains roughly 4,570 acres of flood area, including 3,265 acres of open water flood area, 615 acres of vegetated flood area and 690 acres that are not vegetated, much of which is developed with industrial or other land uses. (See Map 5)



Also within the study area are approximately 1,570 acres of vegetated patches greater than one-half acre in size. These include 530 acres of forest or tree canopy, 295 acres of woodland, 235 acres of shrubland and 510 acres of herbaceous cover. This vegetation covers roughly 17% of the Willamette River inventory study area. The vegetated areas include sporadic patches of native oak trees, primarily located along approximately 7 miles of the east-side escarpment referred to in the inventory as the Willamette Bluff. (See Map 6)

Table 5 provides a summary of natural resource features within the inventory study area for the Willamette River.

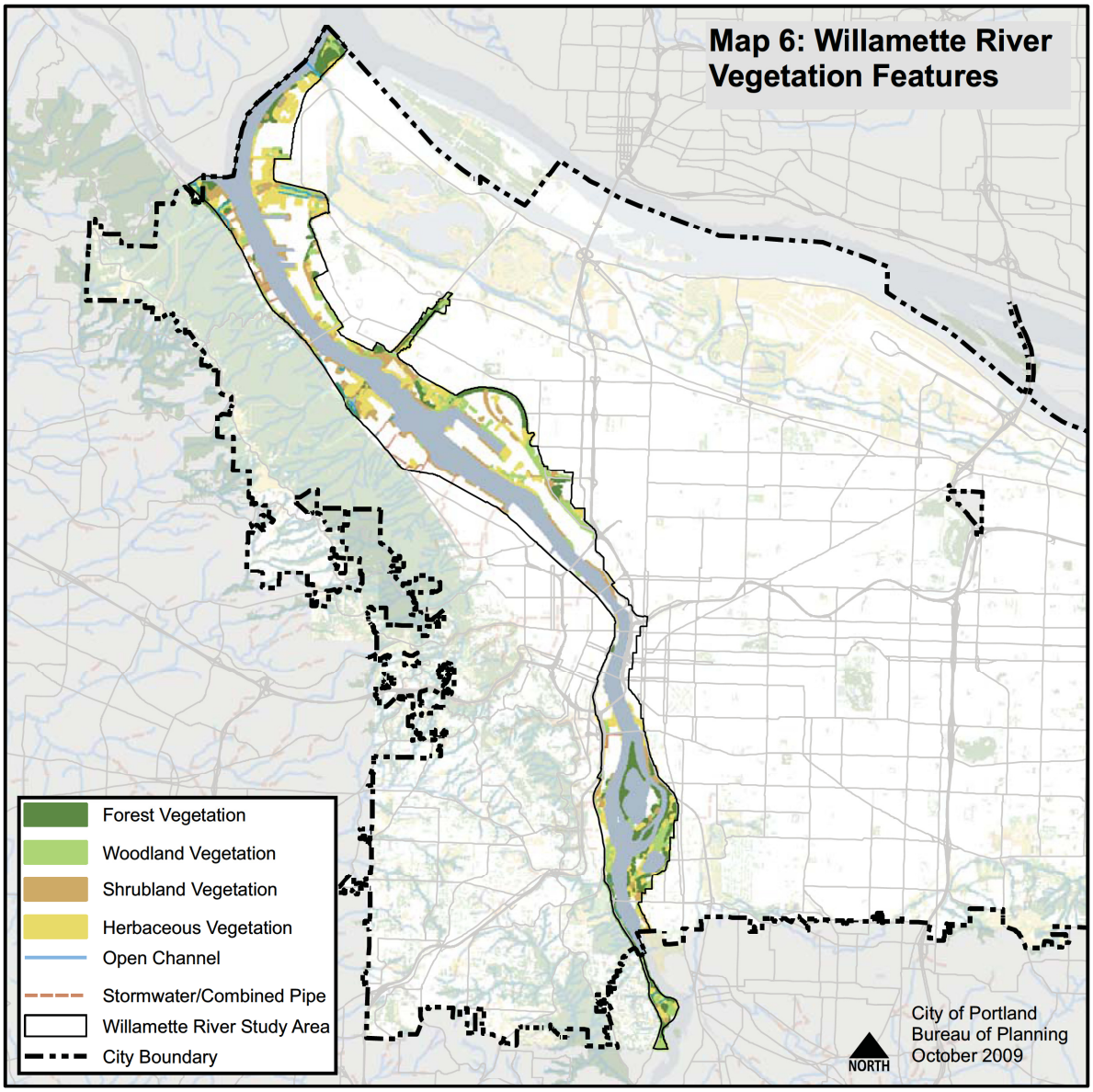


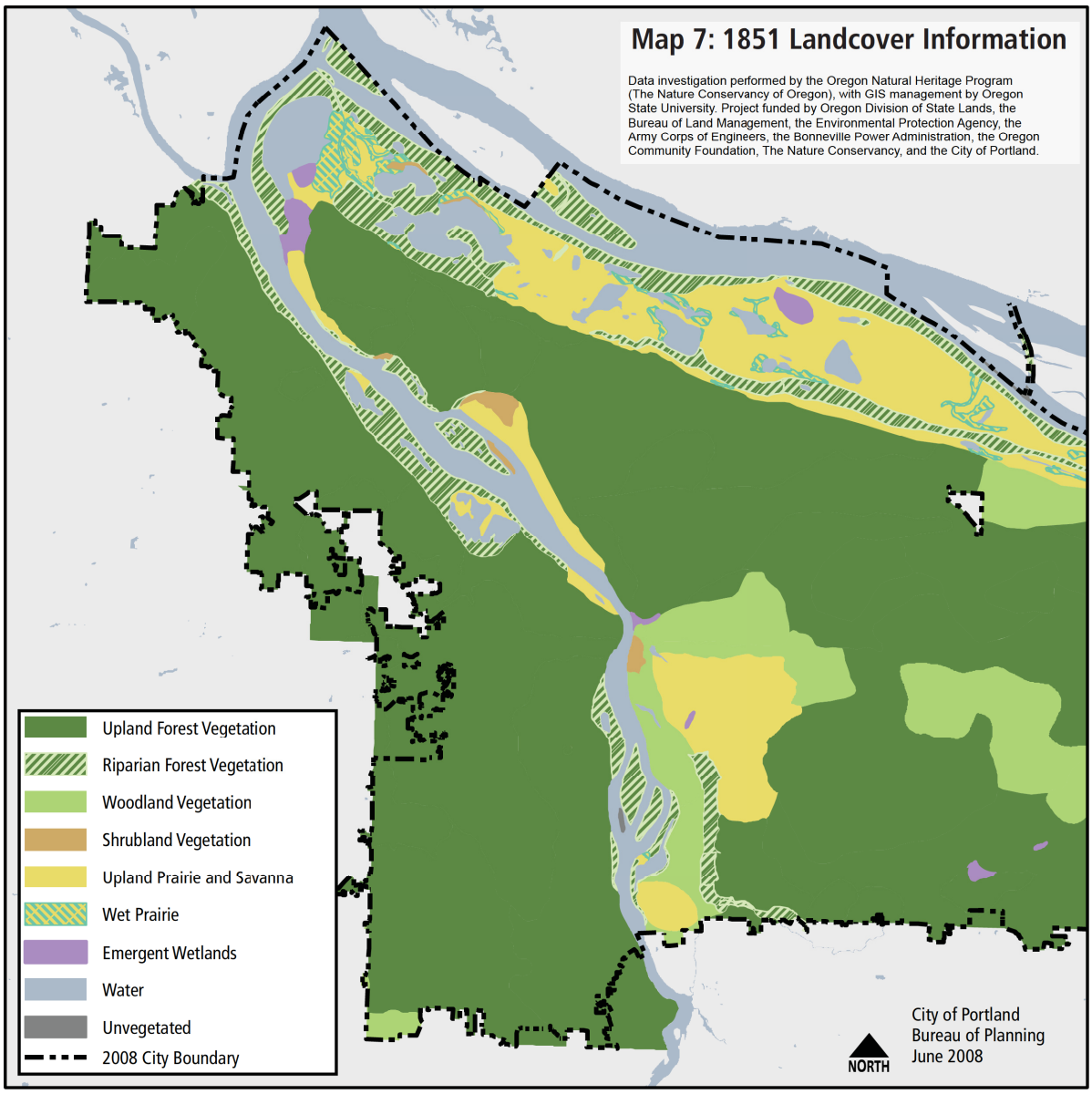
Table 5: Summary of Natural Resource Features in the Willamette River Study Area

	Study Area (acres)
Stream (miles)	
Willamette River (miles/acres)	17 / 3,220
Open Stream Channel (miles)	5
Piped Stream Segments (miles)	11
Wetlands (acres)	**340**
Flood Area (acres)*	4,645
Vegetated (acres)	625
Non-vegetated (acres)	750
Open Water (acres)	3,270
Vegetated Areas >= ½ acre (acres)+^	**1,570**
Forest (acres)	530
Woodland (acres)	295
Shrubland (acres)	235
Herbaceous (acres)	510
Impervious Surfaces (acres)	**3,070**

* The flood area includes the 100-year floodplain, determined by FEMA, combined with the adjusted 1996 flood inundation area.

\+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and has been updated based on 2006 aerial photography.

The Willamette River channel within Portland is a generally wide, although in the southern portions of the city the river is constrained by historic basalt flows. As noted above, flow levels are managed through the operation of 13 dams in the upper basin. River levels are also subject to tidal influences. Historically the Willamette River in the Portland area was comprised of an extensive interconnected system of active channels, open slack waters, emergent wetlands, riparian forests, and adjacent upland forests. Vegetation in bottomland and wetland forests consisted of black cottonwood, Oregon ash and willow with associated understory assemblages. Denser mixed conifer forests of Douglas fir, Bigleaf maple, western red cedar, western hemlock, grand fir and red alder dominated the west hills and some parts of the east terrace. Foothills savannas of Oregon white oak, Pacific madrone, red alder and Bigleaf maple were found on the east side of the river.



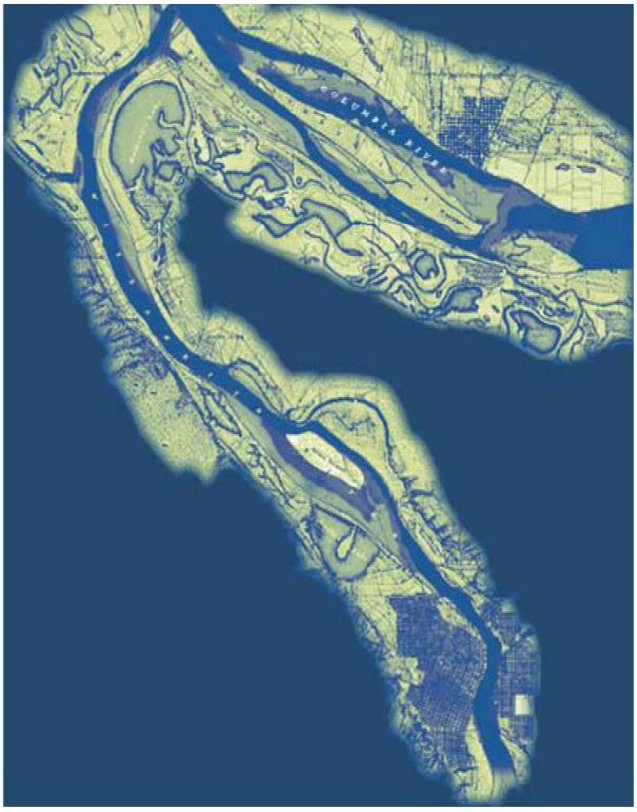
Today, the Willamette River has many uses, including shipping, industry and commercial enterprises, floating homes, recreation, and fish and wildlife migratory corridor. The river itself has been substantially altered in Portland. The river bottom is dredged to improve navigation and allow large barges and ships to access Portland terminals. The Willamette River federal navigation channel extends from the mouth of the Willamette River upstream 11.6 miles to the Broadway Bridge in Portland. The width of the channel varies between 600 and 1,900 feet and the maintained depth is 40 feet. The Portland District U.S. Army Corps of Engineers maintains this federal navigation channel. The channel was last dredged in 1997. Maintenance dredging has been suspended until legal and technical issues are resolved regarding dredging within the boundaries of the Portland Harbor Superfund site. Portions of the channel are now less than 40 feet deep, which can pose a hazard to large cargo ships.

Substantial portions of the river banks have been hardened with riprap, seawalls and docks. Pilings, piers and other human-made structures extend out into the river. Where the river flows through downtown Portland the banks are largely hardened, including nearly 97,390 linear feet of riprap and 32,570 linear feet of pilings and seawalls, roughly 25% and 8% respectively of the total length of river bank in Portland. The remainder of the Willamette riverbank in Portland is comprised of beaches (32%), rocks/rock outcrops (20%) and unclassified fill (13%).

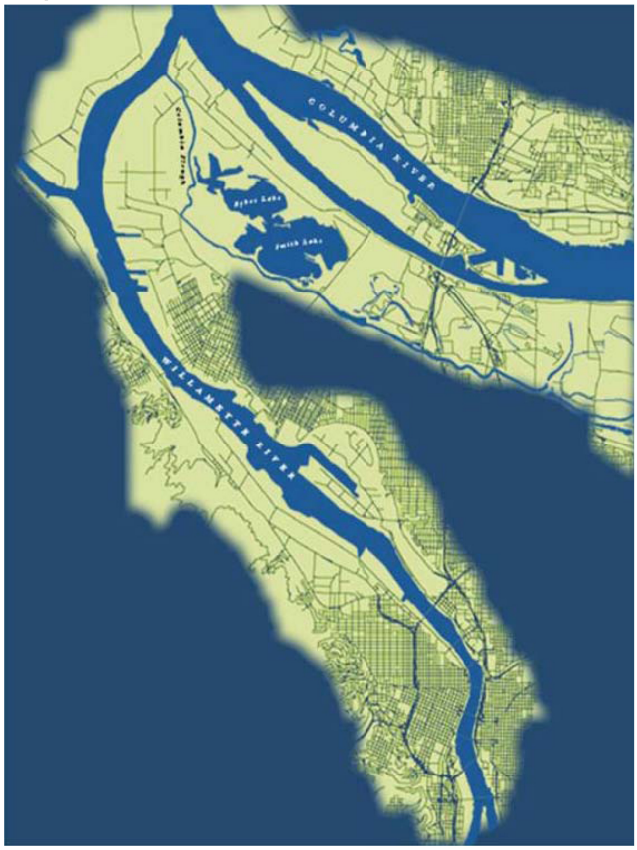
Marine cargo activities are common in this reach, with large vessels docking at berths. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships, but reduces channel complexity.

The historic floodplain and lowlands of the Willamette River in Portland was located between Forest Park and the Southwest Hills on the west and the remnant oak bluffs on the east. Over the years, many floodplain areas, bottomland forests and wetlands have been filled and developed, leaving

Map 8: 1888 Portland Wetlands and Water Bodies



Map 9: 2007 Portland Wetlands and Water Bodies



some larger natural resource areas, but primarily small strips and isolated pockets or narrow corridors of riparian forest, wetlands, and upland vegetation. The remaining floodplain is generally narrow and contains both undeveloped and developed areas.

Even with the physical changes and development, the Willamette River and nearby resources continue to provide important watershed functions. The floodplain provides flood storage during large storm events. Remnant wetlands, trees and vegetation provide water storage, filter pollutants from stormwater, cycle nutrients, and create localized microclimate and shading of riverbanks and tributary streams. These areas also provide wildlife habitat and connectivity corridors along the river and tributary streams. The river, nearshore mudflats and islands, and adjacent lands also provide habitat for numerous aquatic species and birds and terrestrial wildlife, including species that have been listed as 'at-risk' by one or more agencies or wildlife organizations, including bald eagle, American Peregrine falcon, little willow flycatcher and olive-sided flycatcher, pileated woodpecker, painted turtle, northern red-legged frog and several other bird and bat species.



Picture 2: Tributary stream in North Reach industrial area – Forest Park in background

The main channel of the river is used by anadromous salmonids as a migration corridor. The confluences of the Willamette River and its tributaries provide important fish and wildlife habitat. Beach, near-shore shallow water areas, sandy substrates, and large woody debris provide refugia habitat for salmonids that are listed as threatened species under the Endangered Species Act and feeding areas for shorebirds and other wildlife (ODFW, 2005). These areas also provide connectivity corridors between the river and tributaries.

Ward et al. (1994) investigated the effect of shoreline development within the Portland Harbor on migrating juvenile salmonids and concluded that shoreline development associated with offshore wharves, piers, floating platforms, and pilings had no adverse effect on the migration patterns of juvenile salmonids that were actively moving through the area. The study did not assess the effect of development on resident, rearing, or over wintering juvenile salmonids. The study did look at predation related to pikeminnow and determined that predation rates at developed sites were the same as at undeveloped sites within the study area. Warm-water fish may benefit from the type of habitats associated with developed banks.

The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, and temperature (see Table 6). Oregon Water Quality Index values from 1986 to 1995 for the Lower Willamette Basin in Portland range from fair to very poor. The Lower Willamette River in Portland is also deemed unsafe for swimming.

Cool water is one of the necessities of anadromous salmonids and aquatic macroinvertabrates. Tributary streams can influence water temperature in portions of the Willamette by providing cool water. However, many tributaries to the river, including the Columbia Slough, do not meet standards for temperature and other pollutants, such as sediment and heavy metals.

Table 6: Water Quality (303(d) Listings) in the Lower Willamette River and Tributaries

POLLUTANT	SEASON	YEAR RIVER WAS LISTED FOR THIS POLLUTANT	RISK FACTORS
Pesticides and Toxics (DDT/DDE, Dieldrin, Aldrin, Pentachlorophenol, PCB, PAH)	Year Around	1998, 2002	Fishing, drinking water, resident fish and aquatic life, anadromous fish passage
Heavy Metals (iron, manganese, mercury)	Year Around	1998, 2002	Fishing, drinking water, resident fish and aquatic life, anadromous fish passage
Bacteria (Fecal Coliform)	Fall/Winter/Spring	1998	Water contact recreation
Temperature	Summer	1998	Salmonid fish rearing, anadromous fish passage
Biological Criteria	N/A	1998	Resident fish and aquatic life

The Portland Harbor, which includes the Willamette River from roughly the Fremont Bridge downstream to river mile 2 near the tip of Sauvie Island, has been listed on the National Priorities List of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), or "Superfund" (Figure 2). Sediments in the river are contaminated with various toxic compounds, including metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), chlorinated pesticides and dioxin. Levels of these pollutants in the river appear to be highest near contaminated upland sites adjacent to the river. One of the main ways in which people come in contact with these toxic compounds is by consuming fish caught in the Willamette. In June 2004, the Oregon Department of Human Services issued a fish advisory related to high PCB levels found in fish caught from the Willamette River in Portland Harbor. The advisory recommends that children and pregnant or nursing women should not consume fish from the Willamette. For more information about the Portland Harbor Superfund, see the Department of Environmental Quality's website http://www.deq.state.or.us/lq/cu/nwr/PortlandHarbor/index.htm.

Significant riparian and wildlife habitat resources still exist at Kelley Point Park, Harborton Wetlands, South Rivergate Corridor, Ross Island, the Oaks Bottom Wildlife Refuge, and in numerous smaller tributaries, wetlands, and vegetated habitat areas along the Willamette corridor in Portland. These areas provide flood storage, water cooling and sediment filtering, and fish and wildlife habitat. These areas also provide important wildlife connectivity corridors along the river and to other significant resources within Portland and the region.

Eleven bridges cross the Willamette River in Portland. The Sellwood, Marquam, Ross Island, Hawthorne, Morrison, Steel, Broadway, Fremont, Railroad, and St. Johns bridges are designed to accommodate automobile and truck traffic. Just south of the St. Johns Bridge a railroad bridge cross the Willamette. Several of the bridges provide habitat. For example, the St. Johns, Railroad, Fremont, and Marquam bridges provide nesting opportunities for Peregrine falcons.

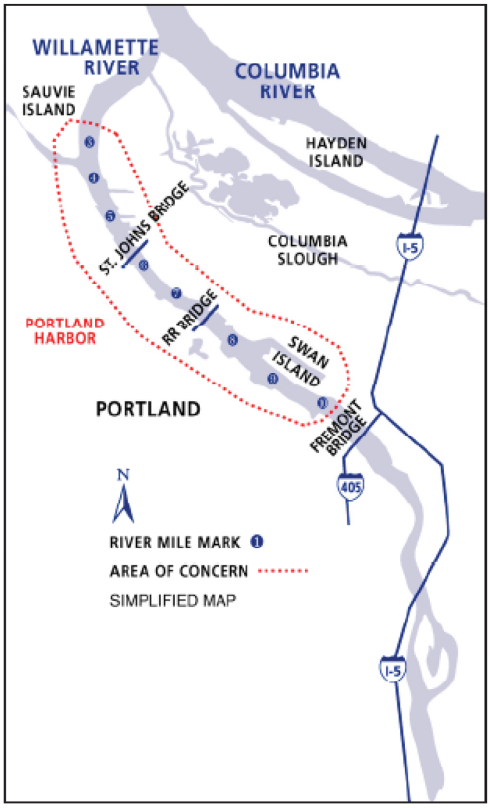


Figure 2: Portland Harbor Superfund (Department of Environmental Quality)

The Lower Willamette River also contains and connects to important upland resource areas. The Willamette River corridor provides connectivity for north/south and east/west wildlife movement. For example, the river connects to Forest Park and further west to the Tualatin Mountains and Coast Range. These large forested areas provide a major wildlife migration corridor for deer and elk and are a source of species recruitment. The Lower Willamette River corridor provides important wintering habitat for waterfowl and raptors, and breeding habitat for Neotropical migratory songbirds. To the east, the Willamette River corridor connects to the East Buttes in the Johnson Creek watershed and the Sandy River delta via the Columbia Slough and the Columbia Gorge. A seven-mile escarpment runs along the east side of the river within the city, providing important native oak habitat and wildlife habitat connectivity. Local neighborhoods contain tree canopy and vegetation that help manage stormwater by intercepting rain and filtering pollutants from overland flow. Neighborhood vegetation can also provide important wildlife habitat areas and corridors.

Picture 3: Oaks Bottom Wildlife Refuge/Ross Island



Picture 4: Waud Bluff/Mocks Crest



Section 4c. THE NORTH REACH

Section 4c1. OVERVIEW

Picture 5: Railyard



Picture 6: Port of Portland Terminal 5



The North Reach of the Willamette River Natural Resources Inventory study area is 6,470 acres in size and extends approximately 12 miles from the Broadway Bridge to the confluence of the Willamette and Columbia rivers. The North Reach is the longest reach of the Willamette River within the City of Portland. The landscape of the North Reach is comprised of industrial lands, river-dependent uses, a few residential areas, and several parks and natural areas.

The North Reach is located within a dynamic junction of ecosystems linking the northernmost portions of the Willamette River Basin with the Columbia River Gorge and Sandy River Basin, the forests and emergent wetlands of the Ridgefield Wildlife Refuge and Vancouver Lake Lowlands, Sauvie Island, Tualatin Mountains, and the Columbia River Estuary and Pacific Ocean. Because of these connections, the North Reach serves as a migration corridor for salmonids moving between the ocean and spawning areas upstream, as well as a connectivity corridor for mammals and birds.

Given its location along two major river systems, the North Reach also plays a critical role in the region's economy. Portland originated as a seaport for timber and grain exports. Railroads and major highways were constructed connecting Portland to Seattle, San Francisco, Los Angeles and eastward.

To facilitate industrial development and use of the river for shipping, the landscape has been altered significantly. Large portions of flood plain wetlands, such as Doane and Guilds lakes, have been filled. Swan Island and portions of the river channel were altered. Numerous small streams originating in Forest Park have been piped. The banks of the Willamette have also been filled, steepened and armored; wharves and piers are built out into the river and the channel is dredged to improve navigation for large ships and barges. Today, the Portland Harbor is a major distribution point for many goods. Three industrial districts are located in the North Reach: Rivergate, Swan Island

and Northwest Industrial. Of the jobs provided by Portland's industrial districts, 36% are located within these three districts. Between one-half and three-quarters of the developed, occupied land in the North Reach is in heavy industrial use, primarily freight distribution – rail yards, marine terminals and truck terminals (Industrial Lands Atlas, Bureau of Planning 2004).

Within the industrial districts are large areas of vacant, non-vegetated or sparsely vegetated land. Much of this non-vegetated, vacant land contains fill, and has been cleared, graded, and compacted. With the exception of the floodplain, these areas are not currently providing significant riparian corridor or wildlife habitat functions as assessed in the inventory. However, some of these vacant areas in the North Reach represent restoration opportunities, particularly if located adjacent to or between areas with existing functions.



Picture 7: Cathedral Park

Portions of two residential communities, Linnton and St. Johns, are located partially within the North Reach study area. Both neighborhoods represent a transition between river-dependent industrial uses and residential/commercial uses. Also located in the North Reach are four parks, including Kelley Point Park and Cathedral Park, four Port of Portland Terminals, and numerous industrial developments.

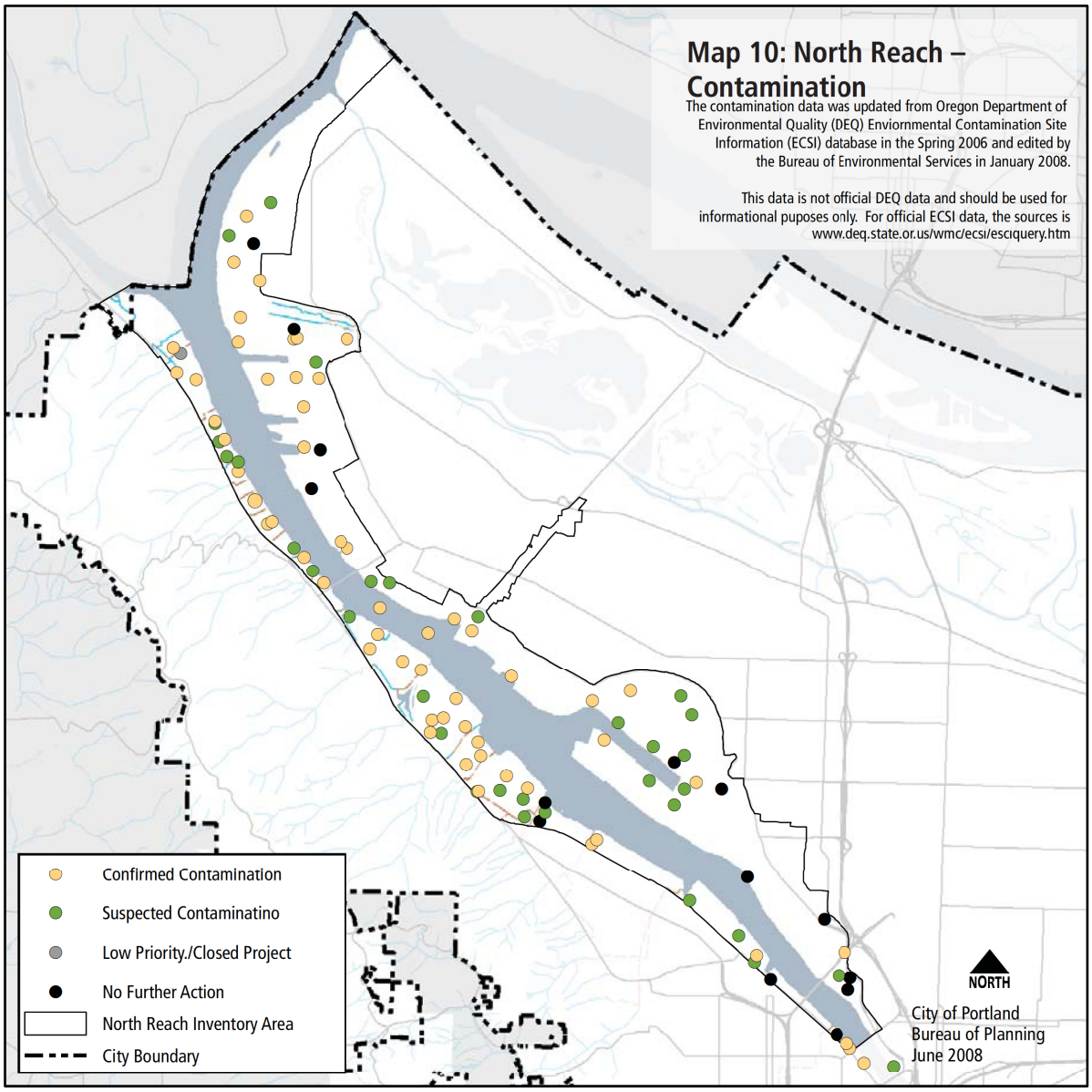
The Willamette River and considerable portions of the land in the North Reach is contaminated with toxic compounds. The Portland Harbor is a listed Superfund site, and more than 100 Environmental Cleanup Sites have been identified by the Department of Environmental Quality (Map 10). The types of contamination include polychlorinated biphenyls (PCBs), DDT, polycyclic aromatic hydrocarbons (PAHs), and heavy metals such as mercury. Some contaminants are bound to soil particles, while others can dissolve in water. The level of risk to humans and wildlife varies depending on the type of contaminant as well as exposure. The inventory site descriptions provide an overview of contaminated areas, types of contaminants, risk, and status of clean up activities. For more information, see the Department of Environmental Quality's website (http://www.deq.state.or.us/lq/ECSI/ecsi.htm).

Although contamination is prevalent in the North Reach, the area also contains important natural resources including remnant bottomland hardwood forests, upland forests and oak escarpments, wetlands, streams, riparian corridors, and the river itself.



Picture 8: Turtle

Larger natural resource areas remain at Kelley Point Park, the Harborton Wetlands, South Rivergate corridor, Willamette Cove, Doane Lake and the Willamette Bluff. These areas provide



important connections with natural resources to the east including Smith and Bybee Wetlands and the Columbia Slough as well as to the north and west including the Multnomah Channel, Sauvie Island and Tualatin Mountains (Forest Park).

Remnant bottomland hardwood forests, associated wetlands, and intermittent river bank vegetation occur along the river. These resources provide bank functions, sediment and pollution control, localized microclimate and shading, organic inputs, wintering and breeding habitat for waterfowl, shorebirds and neotropical migrating birds. The river, river banks and vegetated riparian areas contribute to channel dynamics and provide important opportunities for wildlife to move and access water, food, and shelter. Travel corridors along the Columbia Slough are important for dispersion of mammals such as deer, coyote, fox and beaver, as well as reptilian (turtles and snakes) species. Upland tree canopy and vegetated cliffs offer additional hydrologic, water quality and habitat benefits, including stopover areas for neotropical migratory birds.

The forests provide year-round seeds, berries, nuts and insects for a variety of resident songbirds. Bald eagle, blue heron, osprey and other raptors depend on the bottomland forests, emergent wetlands and upland forests for food and nesting sites. These habitats are also important for terrestrial species such as deer, river otter, coyote, and fox, which make use of the proximity of shelter in the uplands and forage along the river. Reptiles, such as native Western Painted and Pond Turtles and garter snakes, and amphibians, such as northern red-legged frogs, also move between the upland and riparian habitats. Moving from the upland areas to the lowland forests and river is relatively easy for avian species and bats, but is difficult for mammals, reptiles and amphibians that must cross roads, such as Highway 30. railroads, parking lots, and maintained landscaped areas.



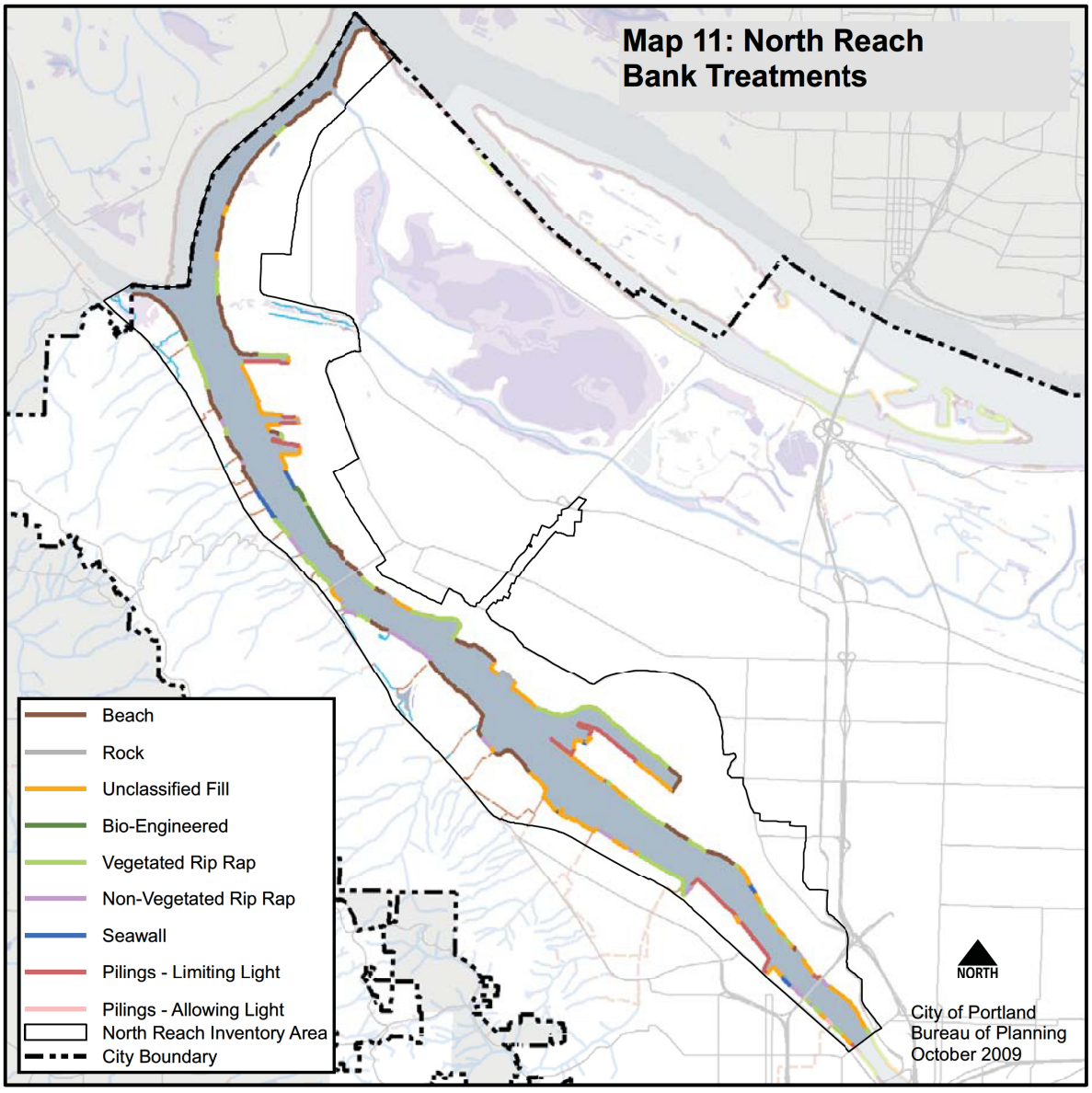
Picture 9: Beach along Willamette at Harborton Wetlands

Historically, the North Reach was one of the most unconstrained of the river reaches below Willamette Falls. The low-lying delta islands and dynamic floodplains likely resulted in significant channel movement and change. The river was historically a half mile wide with a large shoal along the east river bank. Surveys from the 1800s indicate that banks in this reach were dominated by beaches and wetlands. Islands and floodplains provided extensive off-channel refuges for large historic salmon runs. Fish passage between the river channel and tributaries included access to the Columbia Slough, Miller Creek, Rock Creek, and Multnomah Channel.

Table 7: River Bank Treatments in the Willamette River North Reach

Bank Type	Length (ft)	% of Total
Beach	37,633	23%
Bio-Engineered	4,927	3%
Vegetated Rip Rap	39,311	25%
Non-Vegetated Rip Rap	21,911	12%
Unclassified Fill	33,765	21%
Pilings - Limiting Light	21,427	13%
Pilings - Allowing Light	433	0%
Rock	2,339	1%
Seawall	2,803	2%
Total	**164,549**	**100%**

Today, the Willamette River channel in the North Reach is a deep, simplified channel that is dredged to support navigation. Water less than 20 feet deep used to comprise more than two thirds of the channel area. Now shallow water areas comprise about 10 percent of the channel area. The channel generally has steep banks which have been largely filled and armored with pilings and riprap. Numerous docks are used by river-dependent industries. In some places, vegetation has been mixed with riprap to stabilize the bank. This vegetation provides many functions, including sediment control and wildlife habitat.



Anadromous salmonids use the Willamette River North Reach primarily for passage (upstream and downstream). Rearing does occur at the confluence with the Columbia Slough and Multnomah Channel as well as at other embayments. Shallow-water areas such as Willamette Cove, and remnant beaches that accumulate large wood, are also used by anadromous salmonids, shad and sturgeon for migration and rearing (ODFW, 2005). Other fish that use the Lower Willamette include yellow perch, largemouth bass, smallmouth bass, northern pikeminnow and sunfish. Warm water fish find refuge among the wharves and docks, as evidenced by the large numbers of piscivorous birds. Pacific lamprey are also found in the Willamette River. Few studies have been done on lamprey, which are an anadromous eel-like fish. Recent research conducted by Portland General Electric suggests that the Willamette River is one of the most important production areas for Pacific lamprey in the Columbia River Basin (PGE 2008).

Macroinvertebrates (aquatic insects), zooplankton and phytoplankton are a significant food sources for fish and other aquatic species. The invertebrate community in the Lower Willamette is relatively homogenous, consisting primarily of oligochaetes, cladocerans, amphipods and chironomids (Friesen et. al., 2005). The highest species diversity and taxa richness tends to be found at beaches. High densities of invertebrates usually exist at riprapped banks, but the species diversity and richness varies from high to relatively low. Seawalls tend to have the lowest species densities, diversity and richness likely caused by the lack of interstitial spaces or other complex microhabitats. Figure 3 is representative of taxa found in the Lower Willamette River: (A) copepods (Calanoida), (B) chironomids (Diptera), (C) *Daphnia* spp. (Cladocera), (D) *Eogammarus* spp. (Amphipoda), (E) *Corophium* spp. (Amphipoda), (F) *Bosmina* spp. (Cladocera), (G) caddisfly (Trichoptera), (H) mayfly (Ephemoptera), and (I) stonefly (Plecoptera).



Picture 10: Coho found in Millers Creek

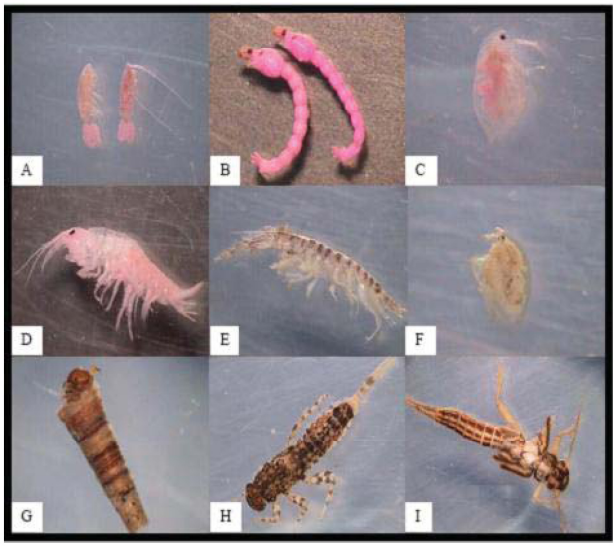
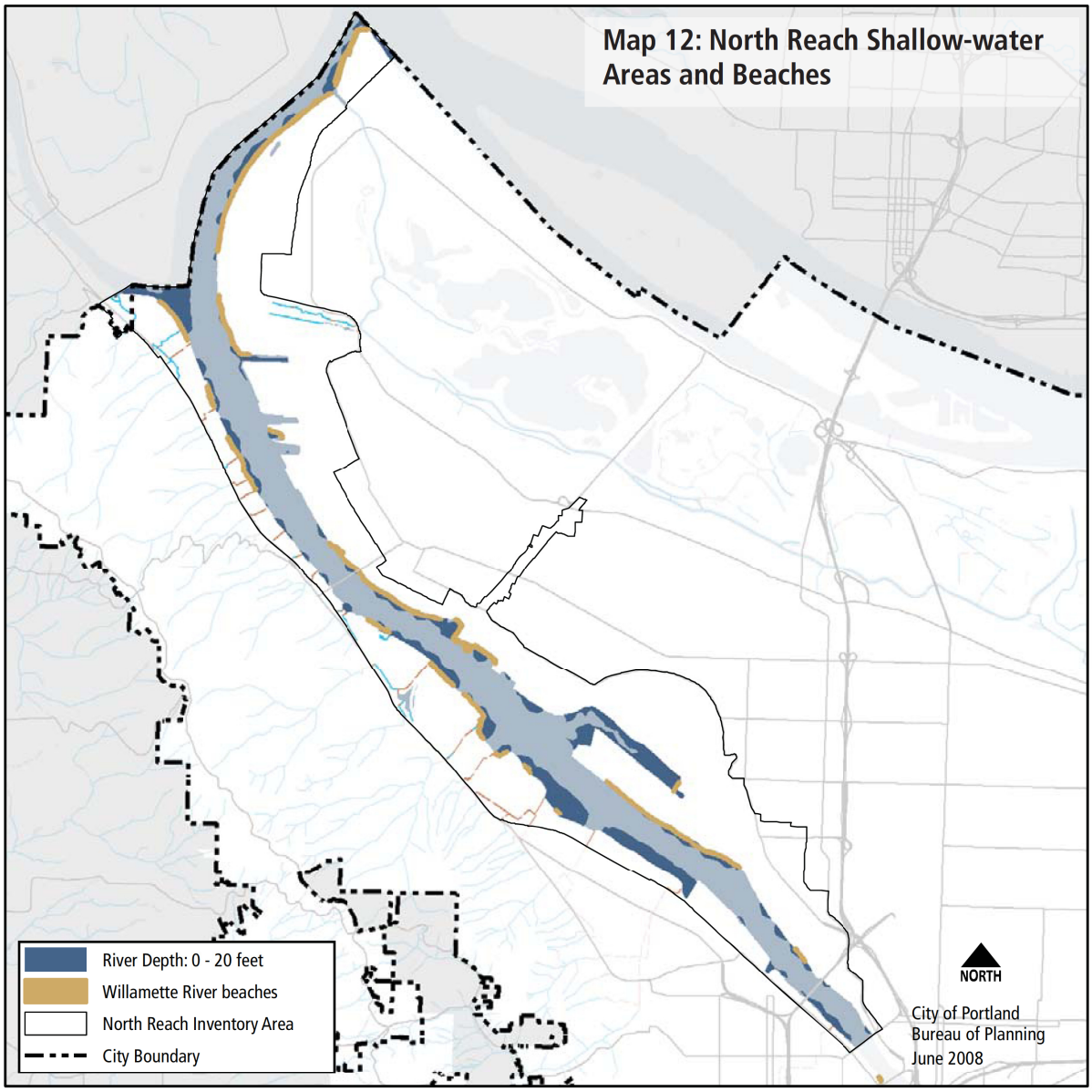
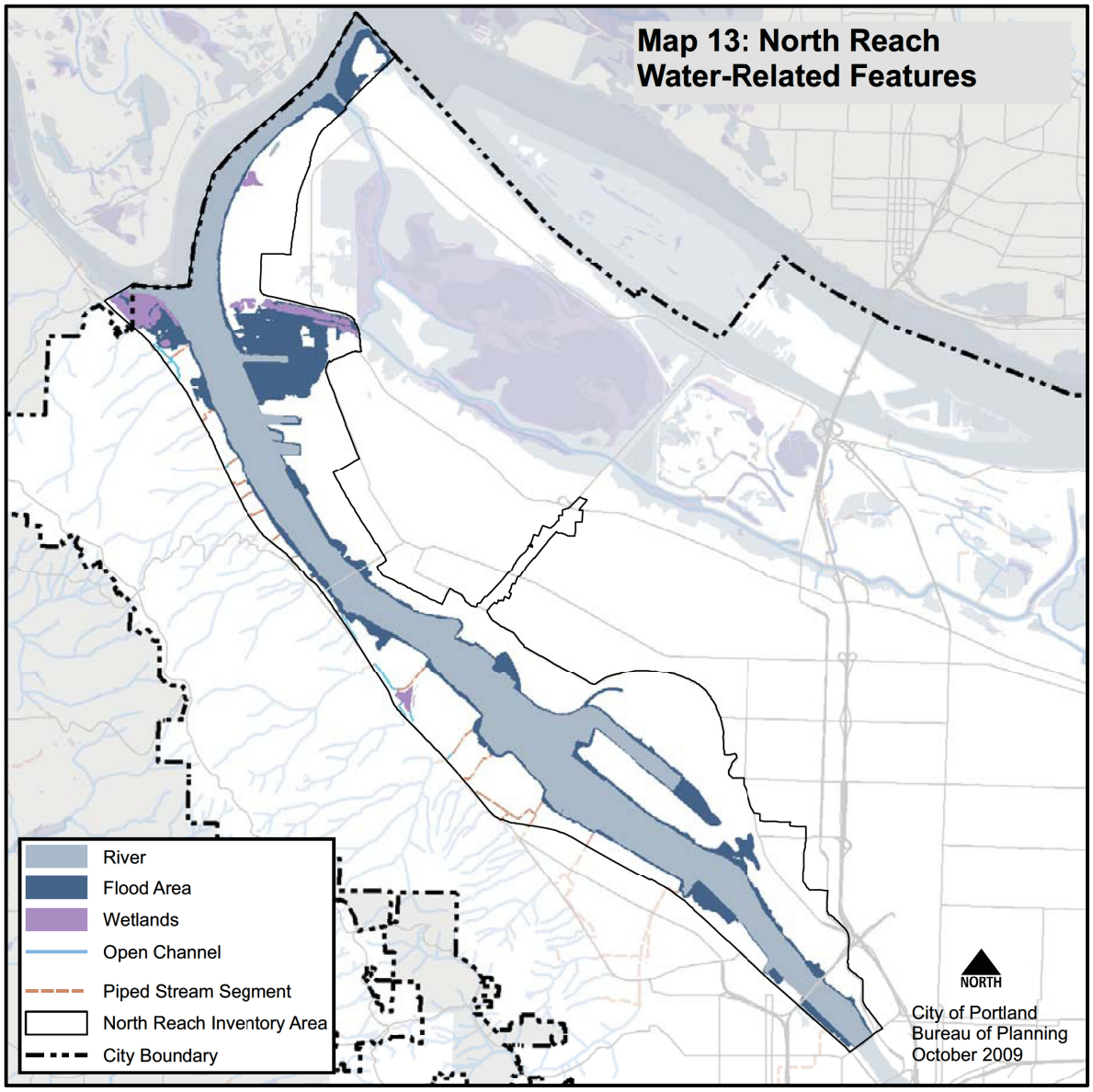


Figure 3: Macroinvertebrates



The Willamette River North Reach is roughly 6,470 acres in size. The North Reach contains 12 miles of the river, which is about 2,171 acres or 34% of the North Reach study area.There are also 4 miles stream channels in the North Reach, including the confluences of the Columbia Slough and Multnomah Channel. There are 3,005 acres of flood area within the North Reach, 2,155 acres of which are the open water area of the river. Roughly 320 acres of the land portion of the flood area are vegetated while the remaining 530 acres are developed with industrial or other land uses. Wetlands, such as Harborton Wetlands and North Doane Lake, comprise an additional 88 acres in the North Reach.



The North Reach contains approximately 1,015 acres of vegetated patches greater than one-half acre in size, including 245 acres of forest or dense tree canopy, 210 acres of woodland, 170 acres of shrubland and 390 acres of herbaceous cover. These vegetated areas cover approximately 17% of the North Reach study area. There are also 20 designated Special Habitat Areas, totaling 2,695 acres, within the North Reach. These include native oak assemblages, bottomland hardwood forests and wetlands. Impervious surfaces, such as buildings, parking lots and 96 miles of roads, cover 2,620 acres (40%) of the North Reach study area.

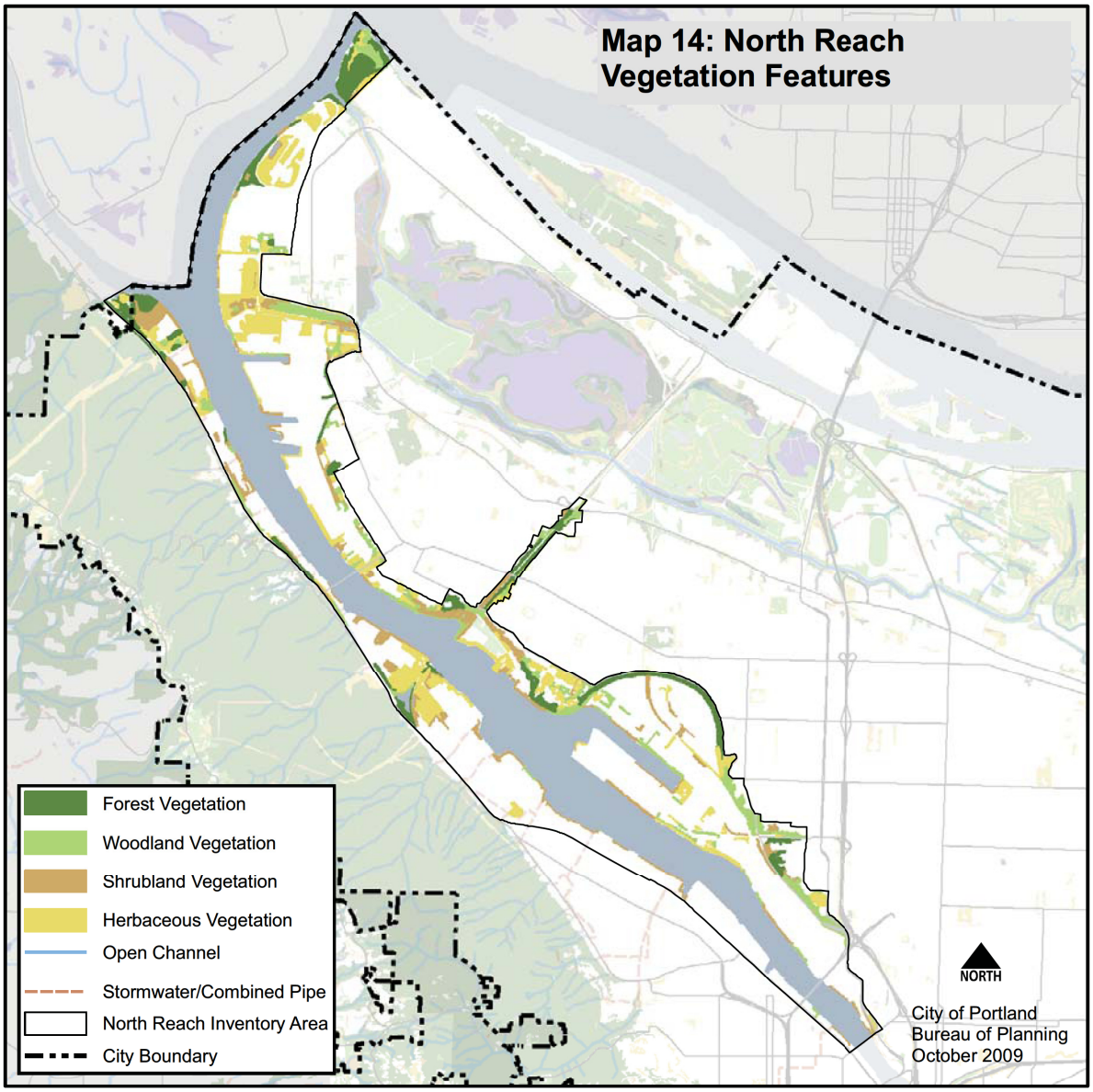


Table 8: Summary of Natural Resource Features in the Willamette River North Reach

	North Reach (6492 Acres)
Stream (miles)	
Willamette River (miles/acres)	12 / 2,170
Open Stream Channel (linear feet)	4
Piped Stream Segments (miles)	7
Wetlands (acres)	**88**
Flood Area (acres)*	**3,007**
Vegetated (acres)	323
Non-vegetated (acres)	528
Open Water (acres)	2,156
Vegetated Areas >= ½ acre (acres)+	**1,015**
Forest (acres)	247
Woodland (acres)	208
Shrubland (acres)	170
Herbaceous (acres)	390
Impervious Surfaces (acres)	**2,623**

* The flood area includes the 100-year floodplain, determined by FEMA, combined with the adjusted 1996 flood inundation area.

+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and is currently being updated based on 2006 aerial photography.

Resource Evaluation

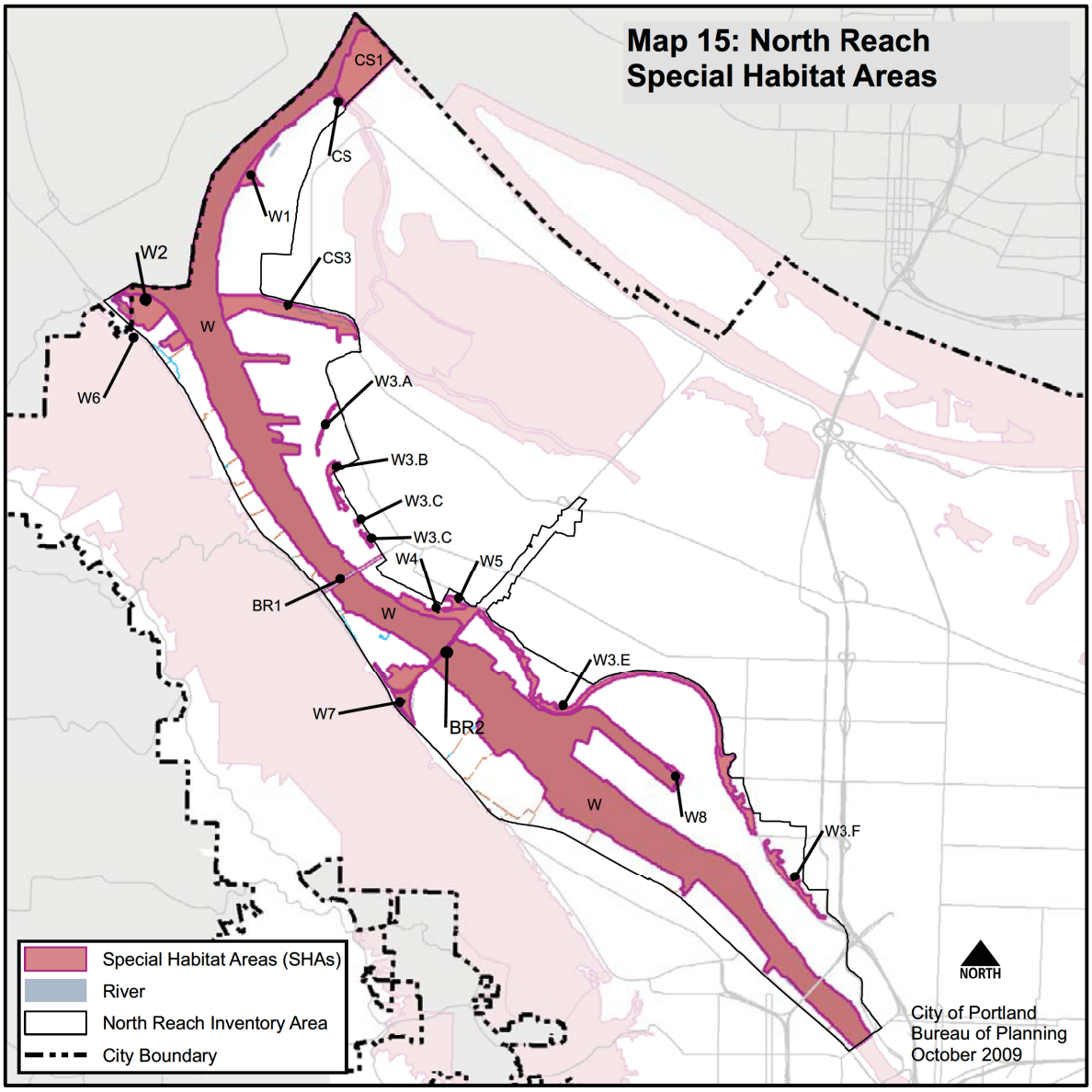
The methodology for evaluating relative resource function is outlined in the previous chapter and details are available in Appendix E – City of Portland Natural Resource Inventory Update: Project Report – Discussion Draft June 2008.

Designated Special Habitat areas in the North Reach are shown in Table 7 and Map 15. Special Habitat Areas rank high for wildlife habitat and combined riparian corridor and wildlife habitat.

Table 9: Special Habitat Areas in the Willamette River North Reach

Watershed/ Site ID	Site Name	P	W	O	B	I	D	M	C	S	E	G	U
Columbia Slough													
CS	Lower Columbia Slough	--	X	--	X	--	--	X	X	X	--	--	X
CS1	Kelley Point Park	--	--	--	X	--	--	X	X	--	--	--	--
CS3	West Wye/ I-5 Powerline Mitigation Site	--	X	--	X	--	--	X	X	X	--	--	--
Willamette River													
BR1	St. Johns Bridge	--	--	--	--	--	--	--	--	X	--	--	X
BR2	Railroad Bridge	--	--	--	--	--	--	--	--	X	--	--	X
BR3	Fremont Bridge	--	--	--	--	--	--	--	--	X	--	--	X
W	Willamette Mainstem ESA Critical Habitat	--	--	--	--	--	--	--	X	X	--	--	--
W1	NW Willamette River Forested Wetland	--	X	--	X	--	--	--	X	--	--	--	--
W2	Harborton Forest & Wetlands Complex	--	X	--	X	--	--	X	X	X	--	--	--
W3.A	Willamette Bluff Complex - Roberts/ Railroad Bluff	--	--	X	--	--	--	--	X	--	--	--	--
W3.B	Willamette Bluff Complex - Weyerhauser Ave Woodlands	--	--	X	--	--	--	--	X	--	--	--	--
W3.C	Willamette Bluff Complex - Edison Street Woodlands	--	--	X	--	--	--	--	X	--	--	--	--
W3.D	Willamette Bluff Complex - Decatur Bluff	--	--	X	--	--	--	--	X	--	--	--	--
W3.E	Willamette Bluff Complex - Willamette Bluff	--	--	X	--	--	--	--	X	--	--	--	--
W3.F	Willamette Bluff Complex - Riverwood Woodland	--	--	X	--	--	--	--	X	--	--	--	--
W4	Willamette Cove Bottomland	--	--	X	X	--	--	--	X	--	--	X	--
W5	Edgewater Street Forest and Ravine	--	--	X	--	--	--	--	X	--	--	--	--
W6	Forest Park	--	--	X	X	--	--	X	X	X	X	--	--
W7	Doane Lake and Wetlands	--	X	--	X	--	--	X	X	X	--	X	--
W8	Swan Island Lagoon Beach and Wapato Wetland	--	X	--	--	--	--	X	--	X	--	--	X

P - Area contains sensitive or rare plant populations
W - Wetlands and associated seeps, springs and streams that are part of the wetland complex
O - Native oak
B - Bottomland hardwood forest
I - Riverine island
D - River delta
M - Migratory stopover habitat
C - Corridor between patches or habitats
S - Area critical to sensitive species life history, on more than an incidental basis; critical habitats as designated by NOAA
E - Elk migratory corridor
G - Upland meadow, prairie or grassy area important to migrants and grassland-associated species
U - Resource or structure that provides critical or unique habitat function in natural or built environments


Map 15: North Reach
Special Habitat Areas
CS1
CS
W1
W2
CS3
W
W6
W3.A
W3.B
W3.C
W3.C
W4
W5
BR1
W
W3.E
W7
BR2
W
W8
W3.F
Special Habitat Areas (SHAs)
River
North Reach Inventory Area
City Boundary
NORTH
City of Portland
Bureau of Planning
October 2009

All of the ranked resource areas provide significant riparian and habitat value, although current condition and function levels vary considerably. The relative ranks can help inform planning programs, design of development or redevelopment projects, and mitigation and restoration activities.

Table 10: Summary of Ranked Natural Resources in the Willamette River Inventory Study Area

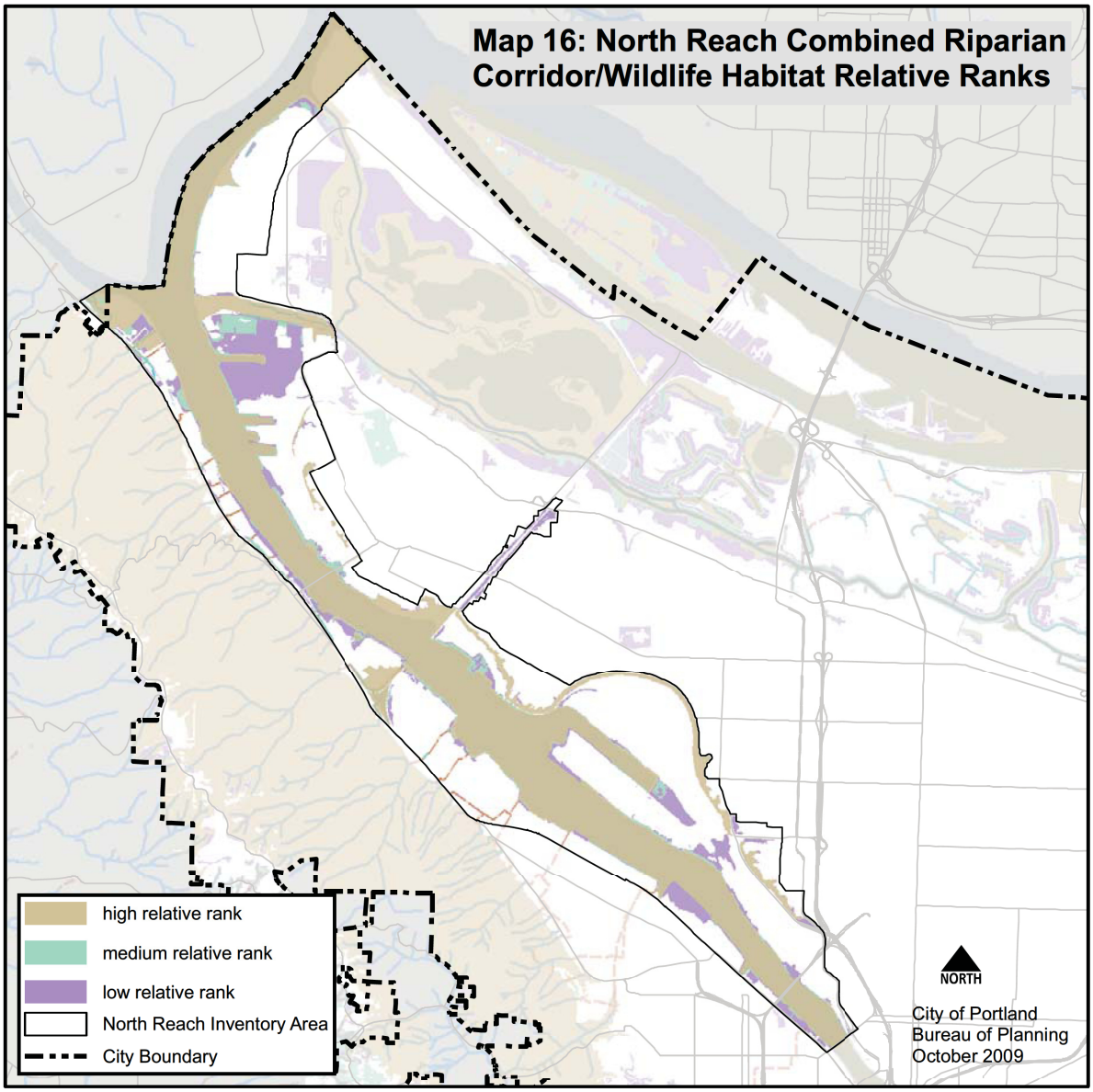
	High	Medium	Low	Total
Total Inventory Study Area = 6,492 acres				
Terrestrial* = 4,320 acres				
Willamette River = 2,172 acres				
Riparian Corridor**				
acres	2,437	240	572	3,249
percent total inventory study area	38	4	9	51
Wildlife Habitat**				
acres	0	191	149	340
percent total inventory study area	0	3	2	5
Special Habitat Areas **				
acres	2,697			
percent total inventory study area	42			
Wildlife Habitat- adjusted for Special Habitat Areas ***				
acres	2,697	21	51	2,769
percent total inventory study area	42	<1	1	43
Combined Riparian Corridor/Wildlife Habitat+				
acres	2,776	190	539	3,505
percent total inventory study area	43	3	8	54
Combined Riparian Corridor/Wildlife Habitat (excludes Willamette River)				
acres	621	190	539	1,350
percent total inventory study area	10	3	8	21

* Terrestrial includes the land, tributary streams, drainageways and wetlands; excludes the Willamette River.

** High-ranked riparian resources, wildlife habitat, and Special Habitat Areas include the Willamette River.

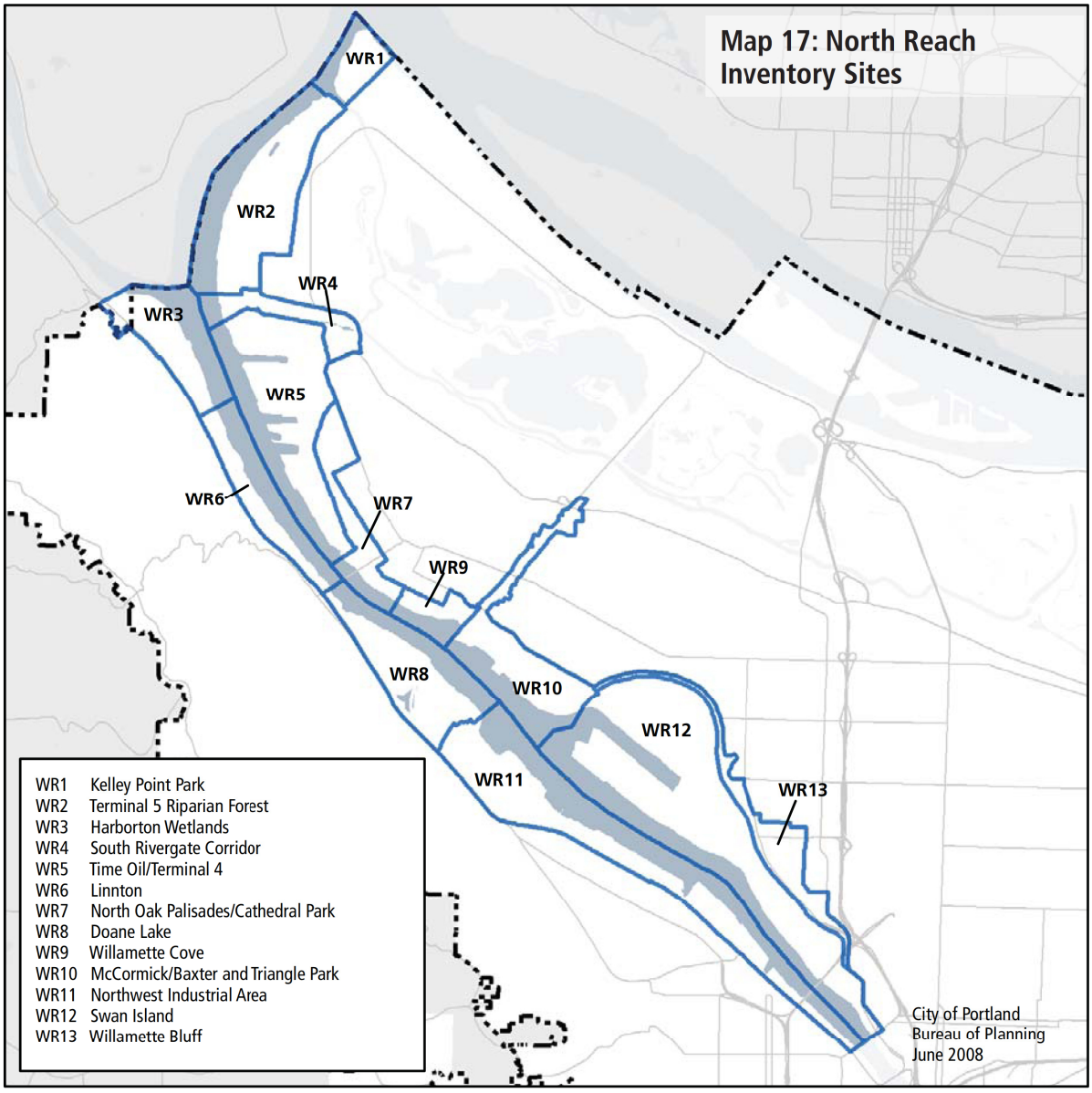
*** Special Habitat Areas rank high for wildlife habitat.

+ Because ranked riparian corridors, wildlife habitat, and Special Habitat Areas overlap, the areas cannot be added together to determine the combined area.


Map 16: North Reach Combined Riparian Corridor/Wildlife Habitat Relative Ranks
high relative rank
medium relative rank
low relative rank
North Reach Inventory Area
City Boundary
NORTH
City of Portland
Bureau of Planning
October 2009

Section 4c2. NORTH REACH INVENTORY SITES

There are thirteen inventory sites in the North Reach of the Willamette River Inventory study area. They range in size from approximately 119 acres to 1,450 acres, including land and portions of the Willamette River. The inventory sites support a variety of uses, primarily industrial, parks and natural area, and river recreation and commerce.



The following report sections provide information for each inventory site. Each site section starts with a summary of site characteristics (Table 11) and is followed by a description and evaluation of natural resources.

Table 11: Explanation of Inventory Site Summary Information

Characteristic	Explanation
Watershed	The name of the watershed(s) within which the inventory site is located.
Neighborhood:	The name of the neighborhood(s) within which the resource site is located.
Legal Description:	USGS quadrangle maps, and quarter section maps.
River Mile:	Beginning at the mouth of the Willamette River, mile 0 is where the centerline of the Willamette meets the centerline of the Columbia River. This is also coincident with the northwest corner of the City of Portland boundary.
Site Size:	Size estimates include land features, streams and drainageways, wetlands and portions of the Willamette River to the centerline of the channel (for sites on the river) .
Previous Inventory:	City-adopted natural resource inventories in which the site or portions of the site were addressed.
Zoning:	Zone designations within the site, including overlays (e.g. airport, design, open space, scenic, greenway and environmental).
Existing Land Use:	Primary land uses currently on the site.
General Resource Description:	Brief description of the site, its geographic location, natural resources and other key features.
Resource Features:	Specific natural resource features found on the site (e.g., stream, wetland, flood area, vegetation, beach, steep slopes, open water). Features may be in relatively good or poor/ degraded condition.
Resource Functions :	Riparian and wildlife habitat resource functions are provided by the existing resource features located within an inventory.
Special Habitat Area:	Special Habitat Areas (SHAs) are designated where there are documented critical or rare or declining habitat types, or critical habitats for special status species.
Special Status Species:	Special status species are wildlife (including fish) or plant species known or reasonably expected to occur within or use the site, and that have been identified by Oregon Department of Fish and Wildlife, Oregon Natural Heritage Information Center, the US Fish and Wildlife Service, or NOAA National Marine Fisheries Service. Special status species lists for Portland can be found in Appendix E.*
Hazards	Indicates whether any portion of the site is within City-designated Wildfire Hazard Zone, Landslide Hazard Zone, or the Flood Area (FEMA 100-year floodplain and/or adjusted 1996 flood inundation area).
Contamination	Indicates whether any portion of the site is contaminated per the Department of Environmental Quality, Environmental Cleanup Site Information (ECSI) database.

* Additional information regarding special status species is available in the draft Terrestrial Ecology Enhancement Strategy Summary and Update, Bureau of Environmental Services (August 2007).

Following the inventory site summary, the following information is provided:

Site Description

The site description is a brief, general description of site boundaries, current and historic land uses, development characteristics, natural resource features, and other issues such as known contamination, mitigation sites, revegetation projects and natural hazards, if applicable. This section is intended to provide important context for the following descriptions and evaluations of the natural resources on the site.

Natural Resource Description

The general site description is followed by an account of the types and condition of natural resources present on the site. The description provides information on water bodies, wetland, plant assemblages, habitat types, and wildlife species found at the site. Natural resource functions are addressed, as are factors that may affect the overall function of these resources. Such factors include invasive species, development-related disturbances, extensive impervious surfaces, and contamination.

The natural resource descriptions, in conjunction with the natural resource evaluations, are intended to provide a general understanding of the presence, functions and relative value or quality of the natural resources. The descriptions are based in part on research and field assessments completed by City staff and Adolfson Associates

between 2000 and 2003. City staff conducted additional field visits to many of the sites in 2005 and 2006. Field observations and Wildlife Habitat Assessment forms are provided in Appendix D. Additional site visits were conducted after the Discussion Draft of this report was released in 2007. Other information sources used to develop these descriptions include: the Bureau of Environmental Services Willamette River Characterization; a four-year Oregon Department of Fish and Wildlife study on the life cycles and behaviors of listed salmonids in the lower Willamette River; Department of Environmental Quality information on contaminated sites; City data on natural resources and landslide and wildfire hazard areas; and various other documents.

Natural Resource Evaluation

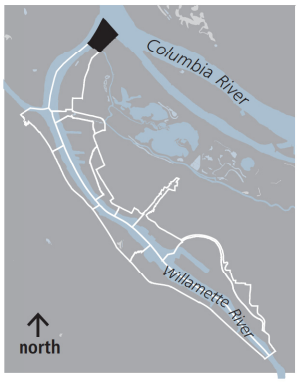
This section presents and describes key natural resource functions and values that currently exist in each inventory site. The resource evaluations are presented in three sub-sections – riparian areas, wildlife habitat, and combined riparian and wildlife habitat areas. The methodology used to produce the relative rankings, including the process listed below, is summarized in the previous chapter and a more detailed description is found in Appendix E - *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

The natural resource evaluation process includes:

1. Mapping key resource features associated with riparian corridors and wildlife habitat
2. Applying science-based criteria using GIS models to assess functions and attributes and generate initial relative ranks for natural resource features in the site
3. Incorporating Special Habitat Areas
4. Combining Relative Rankings

It is important to emphasize that the relative rankings denote the current conditions and the relative functional quality of natural resources in a given site. The relative quality of existing natural resources in the Willamette corridor ranges from relatively functional to highly degraded. This information is intended to inform, but not dictate, how these areas could be managed. For example, understanding the relative quality of existing resources can inform planning efforts, design of development projects, and priority-setting for natural resource protection or restoration. It should also be noted that all ranked resources provide important watershed values and functions that should be taken into consideration when making management decisions to protect, restore, or disturb these areas.

Inventory Site WR1:
KELLEY POINT PARK



Summary Information

Watershed: Columbia Slough, Willamette River and Columbia River watersheds

Neighborhood: St. Johns

USGS quadrangle and quarter section maps: 2N1W13, 2N1W14, 2N1W23, 2N1W24 and 1220, 1320-21, 1420

River Mile: 0-0.6 (from the mouth of the Willamette River, at the junction of the Willamette River and Columbia River centerlines)

Site Size: 161 acres (land and water)

Previous Inventory: Lower Willamette River Wildlife Habitat Inventory, March 1986; Columbia Corridor Industrial and Environmental Mapping Project, January 1989

Zoning:
Open Space (OS)
Aircraft Landing overlay (h)
River Water Quality overlay (q)
River Recreational overlay (r)

Existing Land Use: Natural Area

General Description: The site includes Kelley Point Park, the confluence of the Willamette and Columbia rivers, the south bank of the Columbia River near Kelley Point Park, the east bank of the Willamette River between the northwest and southwest corners of Kelley Point Park, and the confluence of the Columbia Slough with the Willamette River. The site extends to the City of Portland boundary to the west and north of Kelley Point Park. The landscape features within the site connect the habitat provided by the rivers, the Lower Columbia Slough, and Smith and Bybee Wetlands.

Resource Features: Bottomland forest, vegetated flood area, beach, grassland, open water

Functional Values: Microclimate and shade; stream flow moderation and water storage; bank function, and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; wildlife habitat; habitat connectivity/ movement corridor

Special Habitat Area: **Willamette River** – Area critical to sensitive species including NOAA designated Critical Habitat (S) and connectivity corridor (C). **Kelley Point Park** – Bottomland hardwood forest (B), migratory stopover habitat (M) and connectivity corridor (C). **Columbia Slough** - Area critical to sensitive species including NOAA designated Critical Habitat (S), Bottomland hardwood forest (B), migratory stopover habitat (M), connectivity corridor (C) and resource or structure that provides unique habitat function in natural or built environment (U).

Special Status Species: **Wildlife:** Bald eagle, downy woodpecker, winter wren, great blue heron, American beaver, river otter. **Fish**: Lower Columbia River Chinook salmon; Lower Columbia Coho salmon; Lower Columbia River Steelhead trout, Pacific lamprey

Natural Hazards: Wildfire, flood area

Contamination: No

Site Description

The Kelley Point Park inventory site is 161 acres in size. The terrestrial portion of this site is approximately 102 acres and includes Kelley Point Park, a multi-use park located in North Portland at the confluence of the Willamette and Columbia Rivers, and the mouth of the Columbia Slough. Kelley Point Park was originally created by the Port of Portland, which filled the flood-prone peninsula with dredge material from the river. WR1 Map 1 shows an aerial view of the Kelley Point Park inventory site.

Roughly 62 acres of the site is comprised of Willamette River and Columbia Rivers, to the river centerlines, and the Columbia Slough channel and banks. The site has approximately 3,100 linear feet of frontage on the Willamette River, 1,790 linear feet of Columbia River frontage, and 900 linear feet of Columbia Slough frontage.

The City of Portland's Bureau of Environmental Services has three revegetation projects on the site, including one along the southwest bank of the Columbia Slough. (There are also two proposed revegetation projects at the site.) The entire site is within the City of Portland Wildfire Hazard Zone (City of Portland, 1998).

Active dredging in the Willamette River has produced a uniform channel with little complexity. Marine cargo activities are common in river, with large vessels passing through to upstream berths in the Portland Harbor. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships. Beaches and associated nearshore shallow-water areas and the Willamette River/Columbia Slough confluence provide habitat for migrating salmonids, shorebirds and other wildlife species.



Picture 12: Columbia Slough Confluence with the Willamette River.

Table 12: Summary of Natural Resource Features in WR1: Kelley Point Park

	Study Area (161 acres)
Stream (miles)	
Willamette River (miles/acres)	<1/62
Open Stream Channel (linear feet)	1,585
Piped Stream Segments (linear feet)	0
Wetlands (acres)	**0**
Flood Area (acres)*	**115**
Vegetated (acres)	45
Non-vegetated (acres)	8
Open Water (acres)	62
Vegetated Areas >= ½ acre (acres)+	**91**
Forest (acres)	61
Woodland (acres)	17
Shrubland (acres)	1
Herbaceous (acres)	12
Impervious Surfaces (acres)	**7**

* The flood area includes the FEMA 100-year floodplain combined with the adjusted 1996 flood inundation area.

\+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and is currently being updated based on 2006 aerial photography.

Natural Resource Description

The Kelley Point site contains both aquatic and terrestrial resources (key resource features are shown in WR1 Maps 2 and 3). The site includes Kelley Point Park and a portion of the adjacent Columbia Slough. The site is located at the junction of the Willamette and Columbia rivers, and is partially within the floodplains of both rivers. The natural resource features in the site provide important watershed functions and connections between major habitat areas in the region (e.g., forests and wetlands in and around Smith and Bybee Wetlands, Sauvie Island, Columbia River Gorge islands and the Vancouver Lake (WA) lowlands).

The dominant vegetation is bottomland forest, which is comprised of two primary vegetation associations: black cottonwood/pacific willow and the drier black cottonwood/snowberry. The black cottonwood/pacific willow assemblage (approximately 25 acres of site) is common within the flood areas along the shores of the Willamette River and Columbia Slough. Most of the forest has a complex structure with trees of varying ages, snags, and large wood. Near the mouth of the Slough, the forested area has a noticeably even-aged structure. This could indicate a past flood or human-induced disturbance. The black cottonwood/snowberry assemblage (approximately 50 acres of the site) occurs with greater frequency on the upland and northern portions of the site. Tree canopy cover within the bottomland forest ranges from 40 to 80 percent. Shrubs and herbaceous vegetation cover the ground beneath most of the tree canopy.

The shrub and groundcover layers are comprised primarily of red elderberry and red osier dogwood, and sword fern and stinging nettle in the ground layer. Invasive species, including St. John's Wort, also exist within the site. The site contains three open meadow habitats. These areas are primarily grass-dominated fields that are mowed and managed for recreational uses. The edges between the forest and grassland habitats are dominated by exotic Himalayan blackberry and Scot's broom. Removal of invasive species and replanting with native species (snowberry, red osier dogwood and blue wild rye) has occurred along the Columbia Slough and along the eastern boundary of the park.

Other vegetation assemblages include two small stands of Pacific madrone, a common component of more xeric communities (e.g., foothill savanna/oak woodland), occurring along the forest edge in the northern part of Kelley Point Park. Apple and cherry trees, vestiges of an abandoned orchard, occur in the southern part of the park.

The Willamette River and Lower Columbia Slough are affected by daily and seasonal tidal fluctuations. This tidal influence creates unique hydrologic conditions in the area. The twice daily tidal influence causes the Columbia Slough and the Willamette River to reverse flow (depending on tide and river flow levels). The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, and temperature. Oregon Water Quality Index values from 1986 to 1995 for the Lower Willamette Basin in Portland range from fair to very poor. The Lower Willamette River in Portland is also deemed unsafe for swimming. The water quality conditions of the Willamette can be detected upstream in the Columbia Slough through the site, as evidenced by slightly differing salinity concentrations.

Beaches exist along all three waterways. The near shore environment consists of shallow, shelving areas with primarily sand and silt substrate. Large wood is transported and deposited along the shoreline during high flow periods. The riparian gallery and beaches along Kelley Point Park provide one of the largest uninterrupted stretches of vegetated shallow water in the Willamette north of the Ross Island Bridge. The combination of beaches, large wood, and shallow water provide refugia and rearing habitat for migrating juvenile salmonids including Lower Columbia River Chinook, Lower Columbia Coho salmon and Lower Columbia River Steelhead trout (ODFW, 2005). Other indigenous fish such as Pacific lamprey and sturgeon are expected to be present although their use of the reach may be limited by dredging. Fish such as sucker and carp may also be abundant in these uniform habitats (ODFW, 2005). Open water also provide feeding areas for birds such as ducks, cormorants, gulls, herons; and

mammals such as river otter and mink. A wildlife migration corridor crosses the river in this reach providing a connection between Sauvie Island, Forest Park and Smith and Bybee Wetlands.

The mosaic of bottomland forest, grassland, river and slough systems creates a diverse mix of forage, nesting, and resting or stopover opportunities for wildlife. The size of the site provides ample space for resident and migratory species that use the site. The combination of forest, open water, and grassland habitats provides conditions necessary for raptors (e.g., bald eagle, osprey), kingfishers, double crested cormorants, and great blue herons that feed on fish and aquatic invertebrates in the open water. The forest provides a variety of year-round seeds, berries, nuts, vegetation, and insects for resident robin, chickadee, wren, thrush, tanager, sparrow, towhee, kinglet, and other passerines. It also provides spring and summer food sources for breeding warblers, flycatchers, and swallows. Beaver, river otter, and mink occasionally forage within the site.

Downed logs, common in the bottomland forest, provide long-term cover, resting, and feeding areas for reptiles, birds, and small mammals. Deer swim from Sauvie Island across the Willamette River, and take refuge or forage within the forest.

The grassland areas are more limited in terms of food supply and cover for wildlife. However, Red-tailed hawks and owls use perch sites within the forest to located and feed on small mammals and ground feeding birds in the grassland. During the summer much of the grassland area is mowed and maintained to accommodate active park uses.

Birds observed or heard during winter 1999/2000 field surveys include bald eagle, red-breasted nuthatch, downy woodpecker, golden crowned kinglet, Oregon junco, spotted towhee, winter wren, black-capped chickadee, American goldfinch, cliff swallow, gulls, double crested cormorants, grebes, and Canada geese. Also noted were black tailed deer tracks and evidence of browsing.

Kelley Point Park, the Willamette River and the Columbia Slough within the site are designated Special Habitat Areas (SHA). The large vegetated areas at Kelley Point Park provides critical habitat connectivity between the Willamette River, Columbia River, Lower Columbia Slough and Smith and Bybee Lakes. The forest and woody vegetation also provides important stopover habitat for migratory birds, as well as nesting habitat for a number of resident songbirds. The Willamette River and Lower Columbia Slough are designated Special Habitat Areas, reflecting their value as a wildlife corridor and as federally designated "Critical Habitat" for salmonids species listed as threatened under the Endangered Species Act. The beach and near-shore shallow water areas along the Willamette River also provide important habitat for ESA-listed salmonids and macroinvertebrates (ODFW, 2005). Beaches and sandy areas provide nesting habitat for shorebirds such as Caspian terns.

Habitat disturbance factors include invasive species, lack of forest structural diversity, wake damage along the banks and shoreline, and use of the park, trails and beach use and vegetation management. Noise, vibration and light from marine traffic can also disturb fish and wildlife.

Natural Resource Evaluation

The natural resources located within this site have been evaluated for relative riparian and wildlife habitat quality. Relative quality is presented in the form of relative functional value ranks for riparian corridors, wildlife habitat, and riparian/wildlife habitat value combined (Table 13). The relative ranks are produced using GIS models and information on Special Habitat Areas. The model criteria are not sensitive to the species of vegetation present or whether vegetation is native or non-native. However, the model criteria do assign different values to cultivated, heavily manicured and managed landscapes and semi-natural and natural vegetation. The approach used to generate the relative ranks is summarized in the introduction to the North Reach sites. Additional detail is provided

in the Methodology Overview section of this report and Appendix E - *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

All of the ranked resource areas provide significant riparian and/or wildlife habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can help inform planning programs, design of development or redevelopment projects, mitigation and restoration activities.

Riparian Corridors – Relative Ranks

The site contains portions of the Willamette River, Columbia River and Columbia Slough, vegetated and non-vegetated flood area, riparian forest with associated shrub and groundcover, as well as other types of vegetation that contribute to the riparian corridor functions as detailed in the natural resource description. These landscape features provide the following riparian functions:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank function, and sediment, pollution and nutrient control
- Large wood and channel dynamics
- Organic inputs, food web and nutrient cycling
- Riparian wildlife movement corridor

High relative functional ranks are assigned to the Willamette and Columbia Rivers and the Columbia Slough, land within 50 feet the Willamette River and Columbia Slough, and to portions of the flood area covered in forest and woodland vegetation. Medium relative ranks are assigned to portions of the flood areas covered with shrubland and herbaceous vegetation and land within 50 feet of the Columbia River. Low relative ranks are assigned to portions of flood area that are not vegetated. Other areas are assigned a high, medium or low relative rank depending on the proximity and extent of vegetation relative to the Willamette or Columbia River, or to the Columbia Slough (WR1 Map 4).

Wildlife Habitat – Relative Ranks

The site contains vegetated patches and corridors that provide wildlife habitat and connectivity between habitat patches. The large forested areas in Kelley Point Park are remnant of the bottomland forest that used to be common along the lower Willamette River. Bottomland forest provides nesting, breeding and foraging habitats for a diverse range of bird and mammal species, as well as amphibians, reptiles, and invertebrate species.

Based on the wildlife habitat model criteria, a medium relative ranking is assigned to the forest/woodland patch because of its size, interior area and proximity to water and other patches. There are no high or low-ranked habitat areas within this site.

Kelley Point Park, the Willamette River and the Columbia Slough within the site are designated Special Habitat Areas (SHA). The SHAs contain unique features and provide critical wildlife habitat as described in the Natural Resources Description section above. SHAs receive a high relative rank for wildlife habitat. The SHA ranking supersedes lower rankings generated by the GIS model. Therefore, all SHAs within the site rank high for wildlife habitat (WR1 Map 5).

Combined Riparian/Wildlife Habitat - Relative Ranks

Where areas mapped as riparian corridors and wildlife habitat overlap, and their relative ranks differ, the combined relative rank will be the higher of the two ranks. For example, an area that ranks medium for riparian function and low for wildlife habitat will receive a medium combined relative rank. Because all of Kelley Point Park, as well as most of the bank, rank high for wildlife habitat, the combined relative rank for the entire site is high (Map 6).

Table 13: Summary of Ranked Resources in WR1: Kelley Point Park

Total Inventory Study Area = 161 acres
Terrestrial* = 99 acres
Willamette River = 62 acres

	High	Medium	Low	Total
Riparian Corridor **				
acres	104	9	18	131
percent total inventory study area	64	6	11	81
Wildlife Habitat**				
acres	0	78	0	78
percent total inventory study area	0	49	0	49
Special Habitat Areas **				
acres	160			
percent total inventory study area	99			
Wildlife Habitat — adjusted for Special Habitat Areas ***				
acres	160	1	0	161
percent total inventory study area	99	<1	0	100
Combined Riparian Corridor/Wildlife Habitat +				
acres	161	0	0	161
percent total inventory study area	100	0	0	100
Combined Riparian Corridor/Wildlife Habitat (excludes Willamette River and Columbia Slough)				
acres	103	0	0	103
percent total inventory study area	64	0	0	64

* Terrestrial includes the land, tributary streams, drainageways and wetlands

** High-ranked riparian resources, wildlife habitat, and Special Habitat Areas includes the Willamette River

*** Special Habitat Areas rank high for wildlife habitat

\+ Because riparian resources, wildlife habitat, and Special Habitat Areas overlap, the results cannot be added together to determine the combined area.

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Site WR1 - Map 1: Kelley Point Park

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 800'

0' 400' 800' 1200'

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Site WR1 - Map 2: Kelley Point Park

Water-Related Features

Water Bodies

River Depths

- 0 to -20′
- -20 to -30′
- -30 to -40′
- deeper than 40′
- Stream/Drainage
- Culvert or Piped

Other Features

- Flood Area
- Wetlands
- Beach
- Bio-engineered
- Vegetative Rip Rap
- Non-vegetative Rip Rap
- Site Boundary
- City Boundary

Outfalls

- Stormwater
- Combined stormwater /sanitary
- Abandoned/Unclassified
- Fill Bank
- Rock Bank
- Seawall
- Pilings
- Urban Services

INFORMATION SOURCES:

Water Bodies:
Rivers, lakes and other water features. Originally digitized by Metro (1994). Data collection scale: 1:100′ - 1:400′. City of Portland and Multnomah County pockets updated by City of Portland, Bureau of Planning, to refine waterbody geometry, remove erroneously mapped waterbodies, and add missing waterbodies. Aerial photos were the primary data source used as reference for re-mapping waterbodies. This is an interim dataset reflecting all work completed to date.
Outfalls: Maintained by BES (June 2008) Location is approximate and data may be incomplete.

All data compiled from source materials at different scales.
For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1″ = 800′

0′ 400′ 800′ 1200′

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Site WR1 - Map 3: Kelley Point Park

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

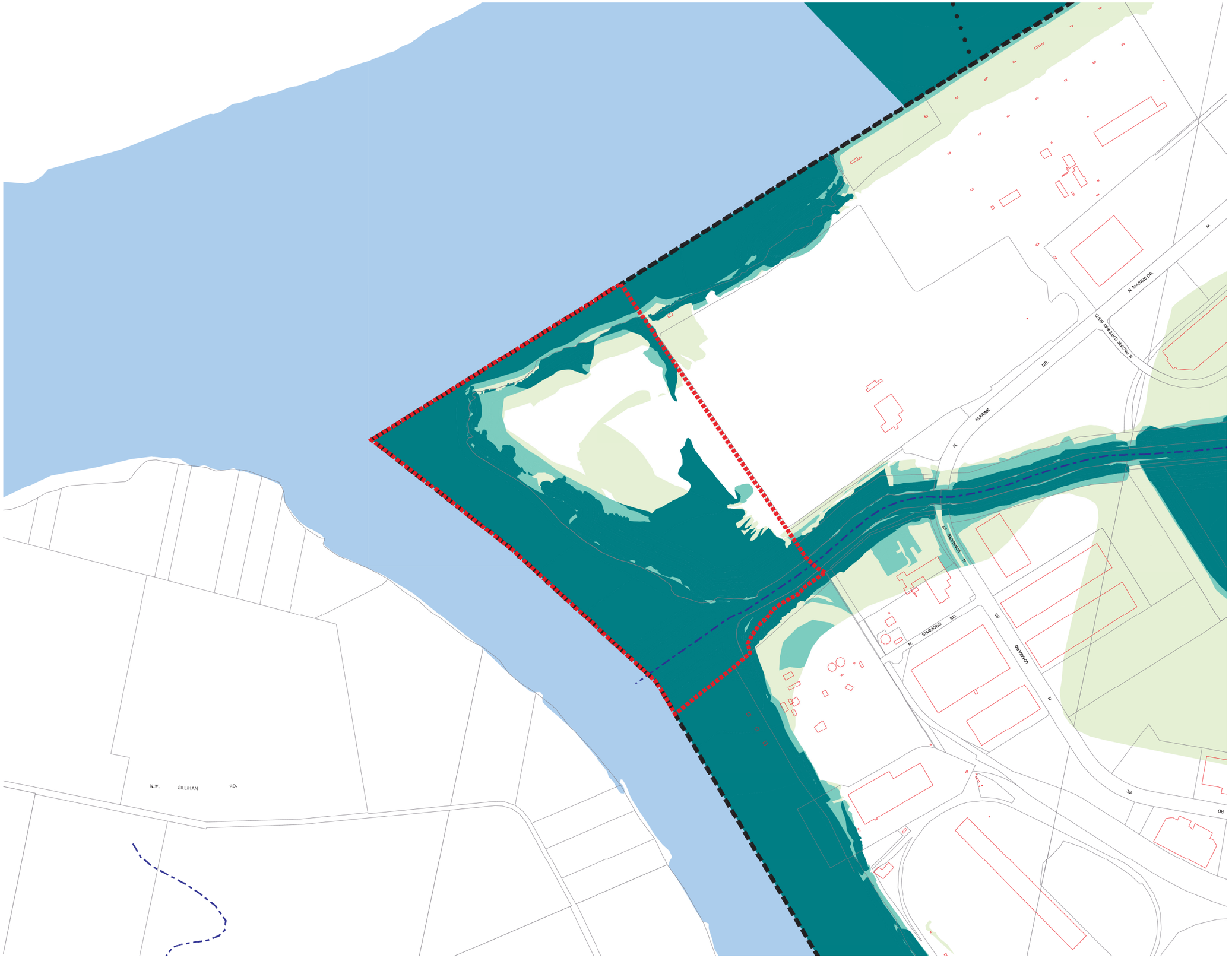
All data compiled from source materials at different scales.
For more detail, please refer to the source materials or
City of Portland, Bureau of Planning & Sustainability.

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Site WR1 - Map 4: Kelley Point Park

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

For more information, please visit our website:
http://www.portlandonline.com/planning/index.cfm?c=40437

NOTE: Portland's resource inventory is still being evaluated for accuracy and consistency and should be considered preliminary. The inventory has not yet been adopted by the City of Portland.

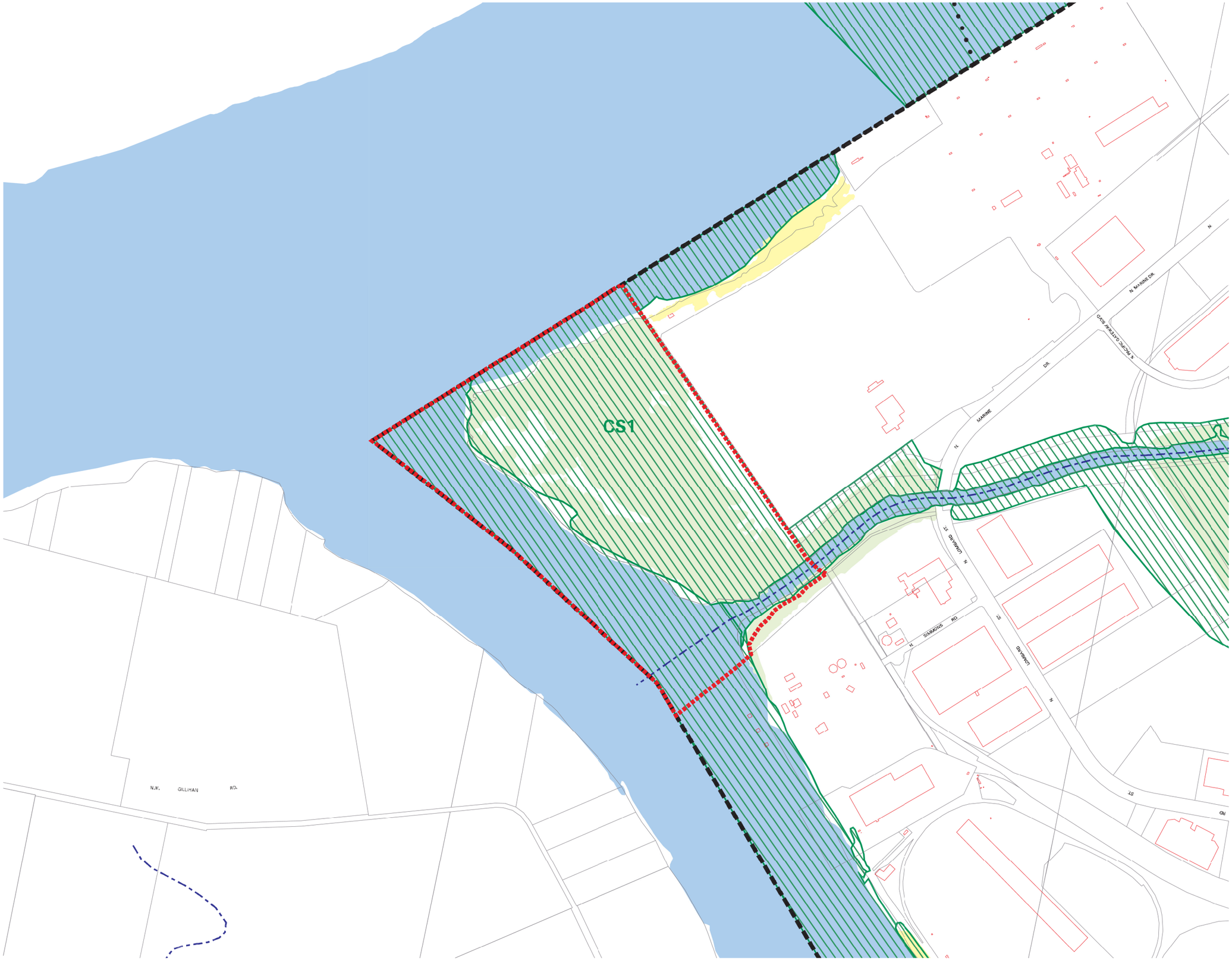
All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 800'

0' 400' 800' 1200'

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Site WR1 - Map 5: Kelley Point Park

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

For more information, please visit our website:
http://www.portlandonline.com/planning/index.cfm?c=40437

NOTE: Portland's resource inventory is still being evaluated for accuracy and consistency and should be considered preliminary. The inventory has not yet been adopted by the City of Portland.

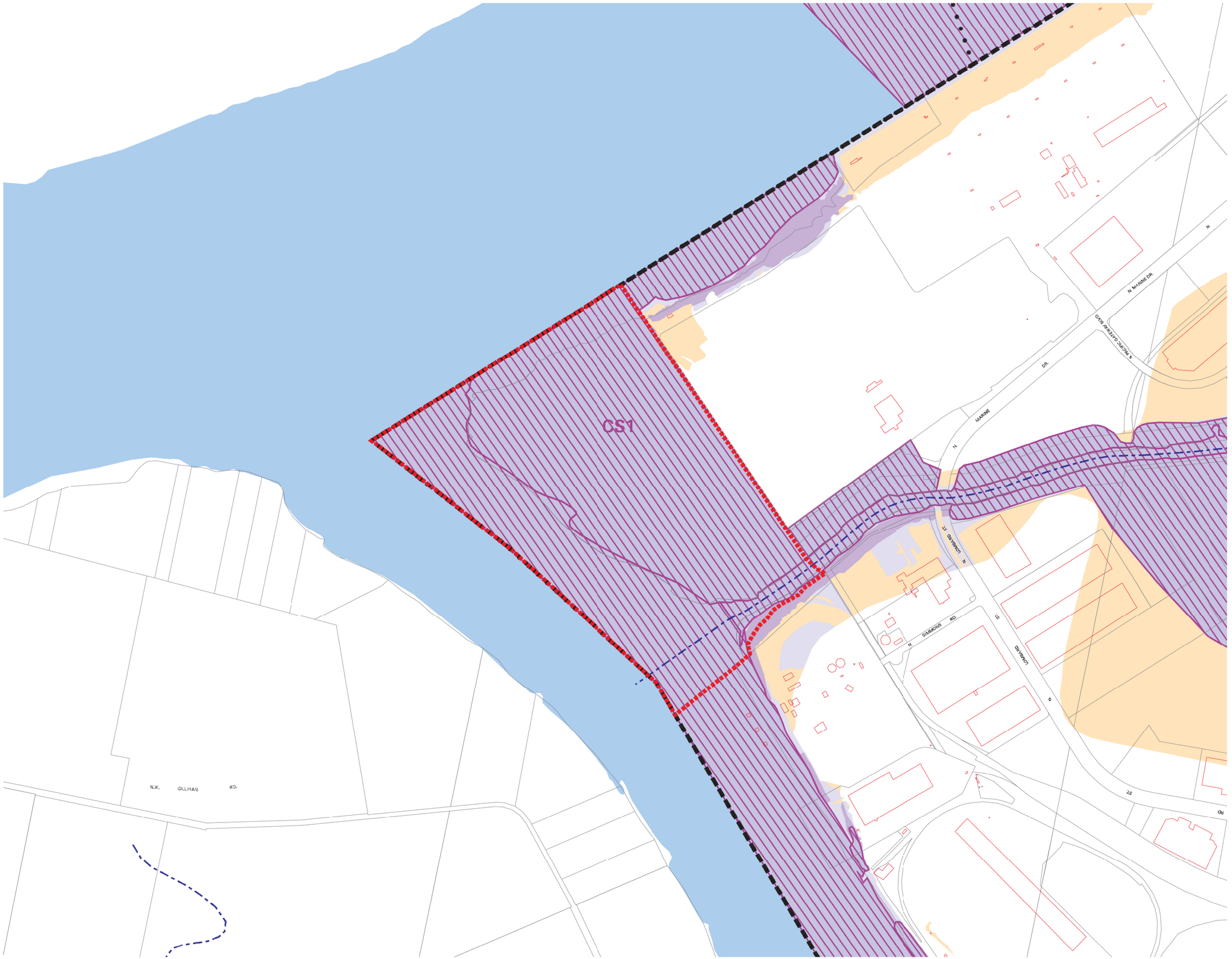
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Site WR1 - Map 6: Kelley Point Park

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

For more information, please visit our website: http://www.portlandonline.com/planning/index.cfm?c=40437

NOTE: Portland's resource inventory is still being evaluated for accuracy and consistency and should be considered preliminary. The inventory has not yet been adopted by the City of Portland.

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Inventory Site WR2: TERMINAL 5 RIPARIAN FOREST



Summary Information

Watershed: Willamette River

Neighborhood: St. Johns

USGS quadrangle, quarter section maps: 2N1W23, 2N1W26 and 2N1W35 and 1319-20, 1418-20, 1518-20, 1618-20, 1718-19

River Mile: 0.6 – 2.8

Site Size: 703 acres (land and water)

Previous Inventory: Lower Willamette River Wildlife Habitat Inventory, March 1986

Zoning: Heavy Industrial (IH)
Aircraft Landing overlay (h)
River Industrial overlay (i)

Existing Land Use: Industrial, Port of Portland Terminal 5

General Description: The site consists of remnant, fragmented riparian forest patches along the bank of the Willamette River and surrounding industrial uses. The south bank of the Columbia Slough is located along the north boundary of the site.

Resource Features: Bottomland forest, woodland, shrubland and herbaceous riparian vegetation; a wetland; flood area; open water; beach habitat

Functional Values: Microclimate and shade; stream flow moderation and water storage; bank function, and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; riparian wildlife movement corridor

Special Habitat Area: **Willamette River** – Area critical to sensitive species including NOAA designated Critical Habitat (S) and connectivity corridor (C). **NW Willamette River Forested Wetland** – Wetland (W), bottomland hardwood forest (B) and connectivity corridor (C).

Special Status Species: **Wildlife:** great blue heron, American beaver, river otter. **Fish:** Lower Columbia River Chinook salmon; Lower Columbia River steelhead trout; Pacific Lamprey

Natural Hazards: Flood area

Contamination: Yes

Site Description

This 703-acre inventory site is located along the east bank of the Willamette River between the confluence of the Columbia Slough to the north and the South Rivergate Corridor (WR3), containing the Portland General Electric power line, to the south. The eastern site boundary runs to the east of the Union Pacific railroad tracks. WR2 Map 1 shows an aerial view of the Terminal 5 Riparian Forest inventory site.

This site consists primarily of industrial uses. The Port of Portland Terminal 5 is located within this site. The site has approximately 2 miles (10,400 linear feet) of Willamette River frontage and 910 linear feet of frontage along the south bank of the Columbia Slough. The Willamette River makes up 236 acres of the entire site. The flood area of the Willamette includes 31 acres, of which 17 acres are vegetated and the other 14 are non-vegetated bank and impervious surfaces. The site contains 282 acres (40%) impervious surface coverage, including 7 miles of roads.

Vegetated areas at least ½ acre in size include approximately 23 acres of forest or dense tree canopy, 10 acres of woodland and 4 acres of shrubland vegetation, as well as a 6-acre wetland located about midway within the site. Large areas of herbaceous vegetation, equaling roughly 69 acres, are found inland around railroad tracks and industrial uses. At the northeast end of this site the City's Bureau of Environmental Services has conducted a revegetation project, along the banks of the Columbia Slough.



Port of Portland Terminal 5 Riparian Forest

Table 14: Summary of Natural Resource Features in WR2: Terminal 5 Riparian Forest

	Study Area (703 acres)
Stream (miles)	
Willamette River (miles/acres)	2 / 236
Open Stream Channel (linear feet)	0
Piped Stream Segments (linear feet)	0
Wetlands (acres)	**6**
Flood Area (acres)*	**264**
Vegetated (acres)	17
Non-vegetated (acres)	14
Open Water (acres)	233
Vegetated Areas >= ½ acre (acres)+	**106**
Forest (acres)	23
Woodland (acres)	10
Shrubland (acres)	4
Herbaceous (acres)	69
Impervious Surfaces (acres)	**282**

* The flood area includes the FEMA 100-year floodplain combined with the adjusted 1996 flood inundation area.

\+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and is currently being updated based on 2006 aerial photography.

Active dredging in the Willamette River has produced a uniform channel with little complexity. The inventory site is bordered by heavy industrial uses, which have substantially modified bank conditions and nearshore areas. Marine cargo activities are common in river, with large vessels docking or passing through to upstream berths. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships. Beaches and associated nearshore shallow-water areas, and the Willamette River/Columbia Slough confluence provide habitat for migrating salmonids, shorebirds and other wildlife species.

Several contaminated areas within this site have been documented by the Oregon Department of Environmental Quality (DEQ). The most significant is on the Oregon Steel Mills property where soil, sediment and groundwater contamination exist.

Natural Resource Description

Site WR2: Terminal 5 Riparian Forest contains both aquatic and terrestrial resources (key resource features are shown in WR2 Maps 2 and 3). Most of the bank is comprised of beaches, with some sections of vegetated and unvegetated riprap, unclassified fill, and rock. The river banks are all within the flood area. The nearshore conditions are fairly shallow. Sand and silt substrate provides habitat for juvenile salmonids (ODFW, 2005). Three freestanding pile dock structures serve as shipping berths and extend 150 to 200 feet into the river.

The site contains small patches of remnant bottomland forest interspersed with industrial development and nearshore docks. The dominant tree species is black cottonwood indicating remnants of the black cottonwood/ Pacific willow community common along the Columbia Slough and at Kelley Point Park. Also, isolated stands of cottonwood are scattered along the banks between shrub dominated areas containing Himalayan blackberry, Scot's broom, and red osier dogwood.

Native trees and shrubs planted by the Port of Portland are present on the riverbank in the vicinity of Berths 502 and 503. Upstream of the Terminal 5 berths, the vegetated corridor widens from about 100 to 200 feet, and reaches a width of 700 feet at the middle of the site. Forest tree species include cottonwood, Pacific willow, and Oregon ash. Both snowberry and elderberry are dominant components of the shrub layer in this part of the site, with elderberry more common east of the fence that traverses the site north to south. Other shrub species include red osier dogwood, Nootka rose, and Himalayan blackberry. Tree canopy cover within the forested area ranges from 45 to 70 percent. Shrub and herbaceous vegetation cover the majority of the area underneath the tree canopy. The age of the forest vegetation ranges from less than 10 years to approximately 50 years.

A forested wetland, approximately six acres in size, is located within the cottonwood forest. The wetland contains several willow species, including Sitka, Piper's, and Pacific willow, which are increasingly common towards the eastern end of the wetland. Reed canarygrass and stinging nettle are common throughout the wetland. The wetland is located outside the flood area, separated from the river by a berm. Forested wetlands such as this are rare within the study area, particularly those located on industrial lands.

The remnant forested areas and wetland provide forage, perch, and limited nesting opportunities for wildlife. Raptors, including osprey, nest and forage at the site. Kingfishers, great blue herons, and numerous passerine species also forage at this site. Snags and large wood provide forage opportunities for reptiles, amphibians, birds, and small mammals. Mink, river otter, and beaver occasionally forage at the site. Other wildlife present at the site include crow, robin, kinglet, song sparrow, orange crowned warbler, violet green swallow, red breasted nuthatch, starling, northern flicker, great blue heron, northern shoveller, American widgeon, and American coot. Recent beaver activity was evident at the site. Woodpecker borings in snags occur at the site.

However, the forested wetland and the Willamette River within this site are also designated Special Habitat Areas (SHAs). The forested wetland provides connectivity along the bank between Kelley Point Park and the South Rivergate Corridor. The Willamette River is designated a Special Habitat Area, reflecting its roles as an important wildlife corridor and its federal designation by NOAA as "Critical Habitat" for salmonids species listed as threatened under the Endangered Species Act. The beach and near-shore shallow water areas along the Willamette River also provide important habitat for ESA-listed salmonids and macroinvertebrates (ODFW, 2005).

A stormwater treatment pond built in the late 1980s is located inside the rail tracks of the Terminal 5 bulk facility. The pond consists of an open stormwater settlement basin approximately 2.5 acres in size and approximately 70 feet deep. The banks of the pond are characteristic of a willow scrub/shrub wetland.

Within the site is the confluence of the Willamette River and the Columbia Slough. From the confluence upstream to Oregon Steel Mills at River Mile 2, development includes diking and piers that extend out into the river channel, leaving a relatively undisturbed nearshore environment and bank. Most of the shoreline in this section is a gently sloping beach and bank comprised of sand fill, clay, and revetment (Ward et al., 1994). Along sections of the beach, downed trees provide additional ecological function and habitat complexity. The beach and near-shore shallow water areas provide important habitat for salmonids that are listed as threatened species under the Endangered Species Act, including Lower Columbia River Chinook salmon and Lower Columbia River steelhead trout (ODFW, 2005). The confluence with the Columbia Slough also provides important backwater, off-channel, and shallow-water refugia habitats for salmonids. Other indigenous fish such as Pacific lamprey and sturgeon are expected to be present although their use of the reach may be limited by dredging. Fish such as sucker and carp may also be abundant in these uniform habitats (ODFW, 2005).

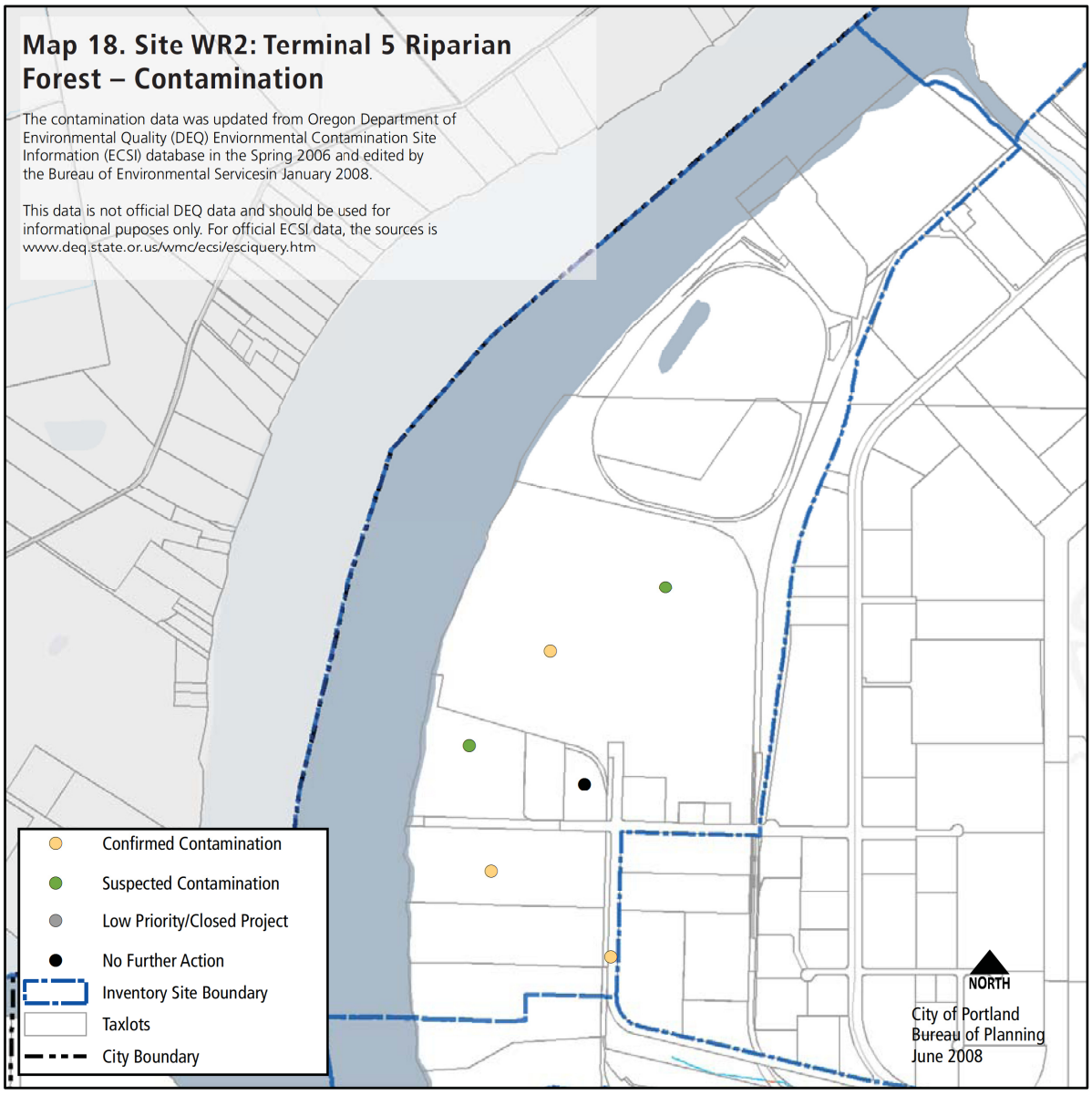
The open water also provides feeding areas for birds such as ducks, cormorants, gulls, herons; and mammals such as river otter and mink. Insectivores such as swallows and bats also forage over the water. The proximity of this site to Kelley Point Park and the Harborton wetlands enhances its role as a migration corridor for terrestrial species migrating from wildlife refuges in Southern Washington and Sauvie Island.

The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, and temperature. Oregon Water Quality Index values from 1986 to 1995 for the Lower Willamette Basin in Portland range from fair to very poor. The Lower Willamette River in Portland is deemed unsafe for swimming.

Marine cargo activities are common in this reach, with large vessels docking or passing through to upstream berths. Several structures related to the marine cargo facilities are located on the bank. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships, but decreases the structural diversity of the channel bed. Marine activities create noise and vibration that can disturb fish and wildlife. Although the nearshore environment is only slightly altered, most connections to the historic floodplain have been eliminated.

The development also contributes to fragmentation of the riparian corridor, particularly in the southern half of the site. Disturbed banks are dominated by invasive species, including Himalayan blackberry and Scot's broom, that limit growth of riparian forest species. The Terminal 5 security fence running north-south through the forest limits access for large and midsized mammals. The vegetation community lacks diversity in terms of species composition and forest structure. No significant upland habitat exists within the site.

Soil, groundwater and river sediments with in the site contain contamination resulting from industrial activities such as steel slag disposal, petroleum releases, and chemical spills (see Map 18). Types of pollutants found here include metals (lead, cadmium, chromium, copper, nickel, zinc) petroleum, ammonia, arsenic, polycyclic aromatic hydrocarbons (PAHs), paint wastes, and others. Potential environmental and health risks include direct contact or ingestion of contaminated sediments or groundwater by humans, aquatic organisms, birds or mammals and consumption of fish or crayfish by recreational anglers. For more information regarding contamination, visit the DEQ website at http://www.deq.state.or.us/lq/ecsi/ecsi.htm.



Natural Resource Evaluation

The natural resources located within this site have been evaluated for relative riparian and wildlife habitat quality. Relative quality is presented in the form of relative functional value ranks for riparian corridors, wildlife habitat, and riparian/wildlife habitat value combined (Table 15). The relative ranks are produced using GIS models and information on Special Habitat Areas. The model criteria are not sensitive to the species of vegetation present or whether vegetation is native or non-native. However, the model criteria do assign different values to cultivated, heavily manicured and managed landscapes and semi-natural and natural vegetation. The approach used to generate the relative ranks is summarized in the introduction to the North Reach sites. Additional detail is provided in the Methodology Overview section of this report and in Appendix E - *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

All of the ranked resource areas provide significant riparian and/or wildlife habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can help inform planning programs, design of development or redevelopment projects, mitigation and restoration activities.

Riparian Corridors - Relative Ranks

The site contains riparian vegetation, vegetated and non-vegetated flood area, a forested wetland, and portions of the Willamette River, that contribute to the riparian functions mentioned in the previous section. These landscape features provide the following riparian functions:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank function, and sediment, pollution and nutrient control
- Large wood and channel dynamics
- Organic inputs, food web and nutrient cycling
- Riparian wildlife movement corridor

High relative ranks are assigned to the Willamette River, the forested wetland, and forest, woodland, and shrubland within the flood area. High and medium relative ranks are assigned to the banks of the Willamette and land within 50 feet of the river. Herbaceous portions of the flood areas also receive a medium relative rank. Low relative ranks are assigned to the non-vegetated flood area. Other vegetated areas are assigned a high, medium, or low relative rank depending on the proximity and extent of the vegetation relative to the Willamette River or the wetland (WR2 Map 4).

Wildlife Habitat – Relative Ranks

The site contains a forested wetland patch that provides nesting, breeding, and foraging habitats for a diverse range of bird, mammal, amphibian, reptile, and invertebrate species. Further, the patch is located in close proximity to the river providing connectivity between the two habitats (WR2 Map 5.) Based on the wildlife habitat model criteria, a low relative rank is assigned to the forested/woodland/wetland patch because of its size and proximity to the river. Along the Columbia Slough, there is an area that receives a medium relative rank due to its proximity to the Slough.

The forested wetland and the Willamette River within this site are also designated Special Habitat Areas (SHAs). The SHAs contain unique features and provide critical wildlife habitat as described in the Natural Resources Description section above. SHAs receive a high relative rank for wildlife habitat. The SHA ranking supersedes lower rankings generated by the GIS model. Therefore, all SHAs within the site rank high for wildlife habitat (WR2 Map 5).

Combined Riparian/Wildlife Habitat – Relative Ranks

Where areas mapped as riparian corridors and wildlife habitat overlap, and their relative ranks differ, the combined relative rank will be the higher of the two ranks. For example, an area that ranks medium for riparian function and low for wildlife habitat will receive a medium combined relative rank. Areas that are assigned a high combined relative rank are those that rank high for riparian functions or wildlife habitat, including Special Habitat Areas (WR2 Map 6.)

Table 15: Summary of Ranked Resources in WR2: Terminal 5 Riparian Forest

Total Inventory Study Area = 703 acres
Terrestrial* = 467 acres
Willamette River = 236 acres

	High	Medium	Low	Total
Riparian Corridor **				
acres	259	15	9	283
percent total inventory study area	36	2	1	39
Wildlife Habitat**				
acres	0	3	19	22
percent total inventory study area	0	<1	3	3
Special Habitat Areas **				
acres	255			
percent total inventory study area	36			
Wildlife Habitat- adjusted for Special Habitat Areas ***				
acres	255	3	3	261
percent total inventory study area	36	<1	<1	37
Combined Riparian Corridor/Wildlife Habitat +				
acres	262	14	9	285
percent total inventory study area	37	2	1	**40**
Combined Riparian Corridor/Wildlife Habitat (excludes Willamette River)				
acres	28	14	9	**51**
percent total inventory study area	4	2	1	**7**

* Terrestrial includes the land, tributary streams, drainageways and wetlands

** High-ranked riparian resources, wildlife habitat, and Special Habitat Areas includes the Willamette River

*** Special Habitat Areas rank high for wildlife habitat

\+ Because riparian resources, wildlife habitat, and Special Habitat Areas overlap, the results cannot be added together to determine the combined area.

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Site WR2 - Map 1: Terminal 5 Riparian Forest

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 800'

0' 400' 800' 1200'

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Site WR2 - Map 2: Terminal 5 Riparian Forest

Water-Related Features

Water Bodies

River Depths

- 0 to -20′
- -20 to -30′
- -30 to -40′
- deeper than 40′
- Stream/Drainage
- Culvert or Piped

Other Features

- Flood Area
- Wetlands
- Beach
- Bio-engineered
- Vegetative Rip Rap
- Non-vegetative Rip Rap
- Site Boundary
- City Boundary

Outfalls

- Stormwater
- Combined stormwater /sanitary
- Abandoned
- Unclassified Fill Bank
- Rock Bank
- Seawall
- Pilings
- Urban Services

INFORMATION SOURCES:

Water Bodies:
Rivers, lakes and other water features. Originally digitized by Metro (1994). Data collection scale: 1:100′ - 1:400′. City of Portland and Multnomah County pockets updated by City of Portland, Bureau of Planning, to refine waterbody geometry, remove erroneously mapped waterbodies, and add missing waterbodies. Aerial photos were the primary data source used as reference for re-mapping waterbodies. This is an interim dataset reflecting all work completed to date.
Outfalls: Maintained by BES (June 2008) Location is approximate and data may be incomplete.

All data compiled from source materials at different scales.
For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1″ = 800′

0′ 400′ 800′ 1200′

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Site WR2 - Map 3: Terminal 5 Riparian Forest

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

All data compiled from source materials at different scales.
For more detail, please refer to the source materials or
City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 800'

0' 400' 800' 1200'

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Site WR2 - Map 4: Terminal 5 Riparian Forest

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

For more information, please visit our website:
http://www.portlandonline.com/planning/index.cfm?c=40437

NOTE: Portland's resource inventory is still being evaluated for accuracy and consistency and should be considered preliminary. The inventory has not yet been adopted by the City of Portland.

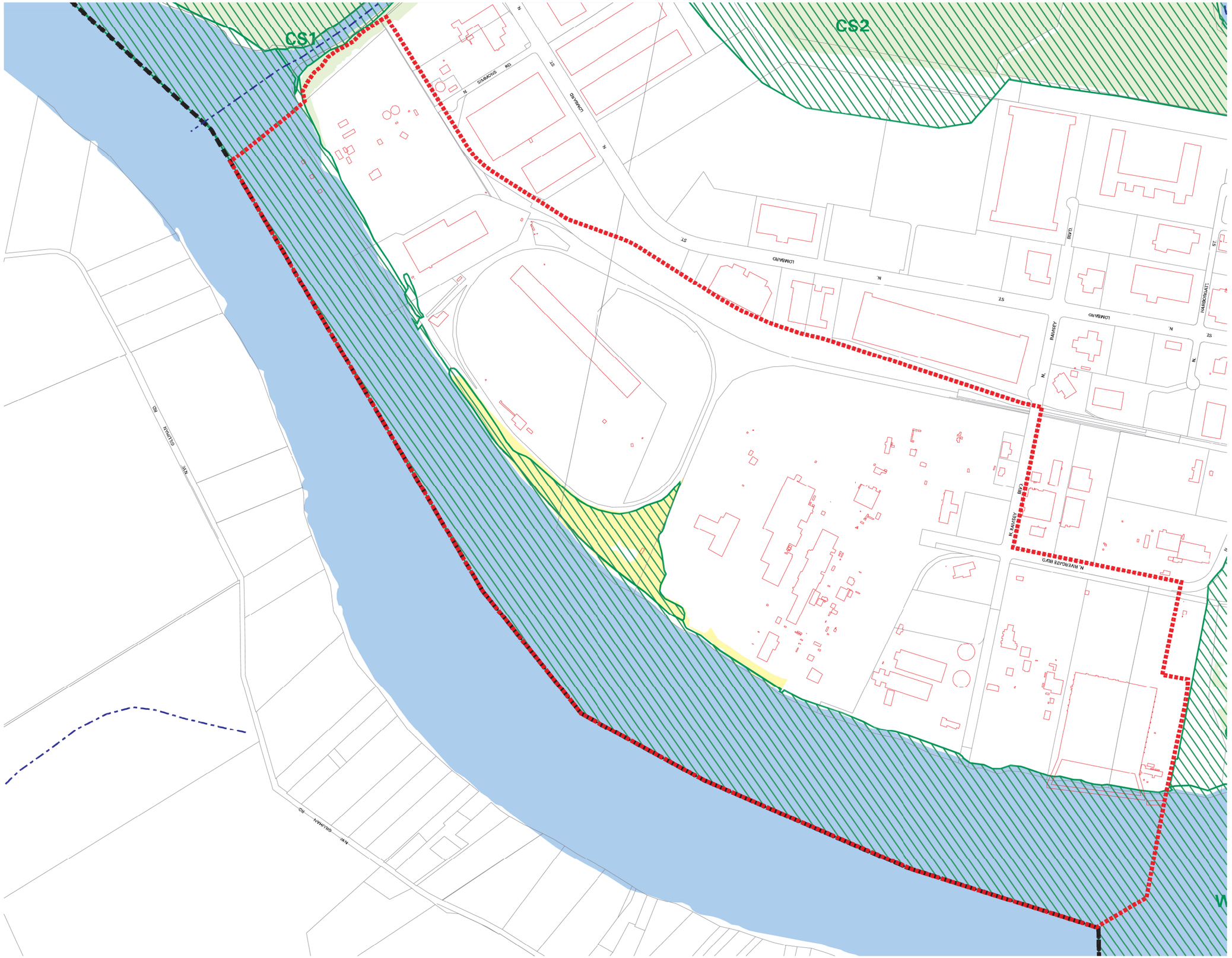
All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 800'

0' 400' 800' 1200'

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Site WR2 - Map 5: Terminal 5 Riparian Forest

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

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NOTE: Portland's resource inventory is still being evaluated for accuracy and consistency and should be considered preliminary. The inventory has not yet been adopted by the City of Portland.

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Site WR2 - Map 6: Terminal 5 Riparian Forest

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

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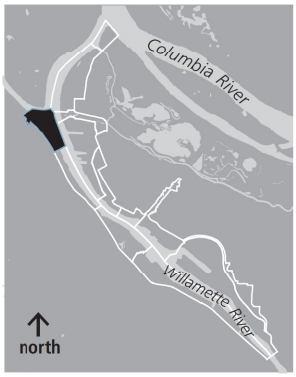
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Inventory Site WR3: HARBORTON WETLANDS



Summary Information

Watershed: Willamette River Watershed and Multnomah Channel

Neighborhood: Linnton

USGS quadrangle, quarter section maps: 2N1W33, 2N1W34, 2N1W35, 1N1W03, and 1716-18, 1817-19, 1918

River Mile: 2.7 – 3.7

Site Size: 339 acres (land and water)

Previous Inventory: Lower Willamette River Wildlife Habitat Inventory, March 1986; Northwest Hills Natural Areas Protection Plan, July 1991. Inventory of Natural, Scenic and Open Space Resources for Multnomah County Unincorporated Urban Areas, 2002

Zoning:

Heavy Industrial (IH)	Conservation overlay (c)
General Employment (EG)	Protection overlay (p)
Residential 10,000 (R10)	River Water Quality overlay (q)
Residential 5,000 (R5)	River Natural overlay (n)
Residential Farm/Forest (RF)	River General overlay (g)
Open Space (OS)	River Industrial overlay (i)

Existing Land Use: Residential; marine; industrial; open space; railroad highway

General Description: Set at the base of the West Hills, the northern portion of the site consists of deciduous forests on flat Willamette River bottomlands and upland coniferous forests on steep, east-facing slopes. The slopes flatten out to form the Willamette River flood area where deciduous riparian forests and forested wetlands make up the majority of the bottomland. The southern portion is developed with industrial uses. There is beach and vegetated riparian area along the entire site.

Resource Features: Upland forest, bottomland forest, upland scrub/shrub, herbaceous vegetation; wetland; streams; floodplain; beach; open water

Functional Values: Microclimate and shade; stream flow moderation and water storage; bank function, and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; wildlife habitat; habitat connectivity/ movement corridor

Special Habitat Area: **Willamette River** – Area critical to sensitive species including NOAA designated Critical Habitat (S) and connectivity corridor (C). **Harborton Forest & Wetlands Complex** – Wetland (W), bottomland hardwood forest (B), migratory stopover habitat (M), connectivity corridor (C) and area critical to sensitive species (S).

Special Status Species: **Wildlife:** Red-legged frogs, river otter. **Fish:** Lower Columbia River Chinook salmon; Lower Columbia River steelhead trout, Pacific lamprey

Natural Hazards: Wildfire; flood area

Contamination: Yes

Site Description

This 339-acre site is located on the west bank of the Willamette River at the confluence of Multnomah Channel. The western boundary is generally formed by St. Helens Road between the southern property line of Owens Corning Roofing and Asphalt and the Portland City boundary. The site includes areas within the City limits and the Multnomah County urban service area boundary. The majority of the site is zoned for heavy industrial use. WR3 Map 1 shows the aerial view of the Harborton Wetlands inventory site.

The site has approximately 5,100 linear feet of frontage along the Willamette River and 2,500 linear feet on the Multnomah Channel. The site includes roughly 148 acres of open water within the Willamette River and Multnomah Channel. Roughly 1.0 miles of small tributaries flow through the site including Miller Creek, a tributary of Multnomah Channel.

Two forested wetlands, total approximately 47 acres, and a small drainageway are located in the northern half of the site. The bank of these wetlands is primarily beach with vegetation on the edges. Both forested wetlands are with the flood area, as is a significant portion of the industrial development, including the PGE Powerline Corridor, found between and south of the wetlands.



Harborton Wetlands

The southern half of the site is almost completely developed, except along the railroad corridor to the west, and at the southern end of the site where a pocket of woodland and herbaceous vegetation exists. The site contains 71 acres (20%) impervious surface coverage, including 1.4 miles of road.

Of the vegetated areas at least ½ acre in size, there are roughly 36 acres of forest or dense tree canopy, 12 acres of woodland, 31 acres of shrubland and 27 acres of herbaceous vegetation. Approximately 79 acres of the flood area are vegetated. Roughly 27 acres of flood area are developed with industrial uses.

Active dredging in the Willamette River has produced a uniform channel with little complexity. Marine cargo activities are common in river, with large vessels passing through to upstream berths in the Portland Harbor. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships. Beaches and associated nearshore shallow-water areas, and the Willamette River/Multnomah Channel confluence provide habitat for migrating salmonids, shorebirds and other wildlife species.

Areas of soil, sediment, and groundwater contamination are linked to historic industrial uses and use of parts of the site as a City of Portland fire training ground. Large portions of the site are within the City of Portland Wildfire Hazard Zone (City of Portland, 1998).

Natural Resources Description

Located at the junction of the Willamette River and Multnomah Channel, this site contains both aquatic and terrestrial resources (key resource features are shown in WR3 Maps 2 and 3) and provides important habitat linkages along the Willamette River, to Forest Park and Sauvie Island, and across the Willamette to the South Rivergate Corridor. The site contains forested wetland complexes near the junction of the Willamette River and Multnomah Channel. A tributary stream, Miller Creek, flows through the site to the Multnomah Channel. Another unnamed open channel flows through the southern portion of the complex. The mosaic of bottomland forest, shrub, wetland, river, and streams, combined with proximity to the large tracts of nearby forest and wetland make this site one of the highest quality wildlife areas in the North Reach. The Harborton Wetlands is also a functioning floodplain, which serves as a potential off-channel rearing site for juvenile salmon.

Table 16: Summary of Natural Resource Features in WR3: Harborton Wetlands

	Study Area (358 acres)
Stream (miles)	
Willamette River (miles/acres)	1 / 148
Open Stream Channel (linear feet)	6,338
Piped Stream Segments (linear feet)	2,509
Wetlands (acres)	**47**
Flood Area (acres)*	**254**
Vegetated (acres)	79
Non-vegetated (acres)	27
Open Water (acres)	148
Vegetated Areas >= ½ acre (acres)+	**106**
Forest (acres)	36
Woodland (acres)	12
Shrubland (acres)	31
Herbaceous (acres)	27
Impervious Surfaces (acres)	**71**

* The flood area includes the FEMA 100-year floodplain combined with the adjusted 1996 flood inundation area.

\+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and is currently being updated based on 2006 aerial photography.

Most of this site contains natural riverbanks with beach that accumulated large wood; one section of riprap bank occurs immediately south of the power lines. The northernmost beach segment is approximately 2,100 feet long while the southernmost segment is approximately 1,000 feet long. Reed canarygrass and willows occur along the high water fringe of the beach areas. The Multnomah Channel, beach and near-shore shallow water areas provide important habitat for salmonids that are listed as threatened species under the Endangered Species Act, including Lower Columbia River Chinook salmon and Lower Columbia River steelhead trout (ODFW, 2005). The river channel provides a migration corridor for fish, birds, and mammals. Adult salmon and steelhead utilize the Willamette River during migration. Other indigenous fish such as Pacific lamprey and sturgeon are expected to be present although their use of the reach may be limited by dredging. Fish such as sucker and carp may also be abundant in these uniform habitats (ODFW, 2005).

The open water provides feeding areas for birds such as ducks, cormorants, gulls, herons; and mammals such as river otter and mink. Insectivores such as swallows and bats also forage over the water. In addition, a wildlife migration corridor crosses the river in this reach connecting Forest Park and Smith and Bybee Wetlands.

The Harborton Wetlands site provides the largest example of remnant black cottonwood-ash bottomland forest within the North Reach. This is one of the last ash bottomland forest remnants along the Willamette River within Portland. Pacific willow is common along the riverbanks, and other trees found in this association are red alder, big-leaf maple, black hawthorn, and western red cedar (rare). The shrub layer is relatively sparse, containing red osier dogwood, Sitka and Scouler's willow in wetter areas, and red elderberry, Indian plum, snowberry, and Himalayan blackberry on the drier uplands. The herbaceous layer contains reed canarygrass, water-starwort, bittercress, sword

and licorice ferns and some bracken fern, and stinging nettle. Tree canopy cover within the bottomland forest ranges from patchy cover (20 percent canopy closure) to relatively dense cover (80 percent closure). The structural diversity of the forest is relatively high. Trees vary in age from approximately 40 to 60 years. Snags and large wood are common, particularly along the riverbank and beach. Certain segments of the riverbank show signs of scour and erosion.

Miller Creek, a free-flowing, year-round stream with documented use by salmon and steelhead, is also located in the northernmost portion of the site. Recent replacement of the culvert under Highway 30 has improved fish passage.[1] The Miller Creek basin is approximately 770 acres and supports a diverse mix of wildlife including a substantial red-legged frog population. Other streams originating in Forest Park pass through or are adjacent to this site, and provide cool, clean water that feeds the wetlands within the site.

Immediately south of the PGE power line corridor is another small forested wetland and drainageway. This remnant forest is interspersed with a blackberry and Scot's broom shrub association. This association is similar to that found across the river at the South Rivergate Corridor site, and includes some native red osier dogwood and willows. The Bureau of Environmental Services (BES) has conducted floodplain revegetation at Harborton Wetlands and the wetland/drainageway on the PGE property.

Extending south from Harborton Wetlands along the bank in front of the PGE Powerline easement, a narrow strip of vegetation comprised predominantly of a cottonwood/ Himalayan blackberry association connects the two wetland areas. Along the upland side of the PGE Powerline corridor is a railroad spur parallel to the western boundary of the site. Although heavily impacted, this strip of undeveloped land provides wildlife habitat connectivity. In the spring of 2006 deer tracks were observed along the railroad right-of-way and the driveway to the industrial site to access both wetland habitat locations.

Harborton Forested Wetland and the Willamette River are designated Special Habitat Areas (SHA.) The Harborton Forested Wetland SHA is a significant bottomland forest and wetland complex at the confluence of the Multnomah Channel and Willamette River. The combination of native vegetation, including large trees, wetland and open drainageways, provides important habitat for birds and terrestrial species. Miller Creek and a tributary to Miller Creek both run through the SHA and discharge to the Multnomah Channel. The Harborton Forest Wetland SHA provides important connectivity between the upland habitat for Forest Park and the Willamette River, and across to the South Rivergate Corridor.

The Willamette River is designated a Special Habitat Area, reflecting its roles as an important wildlife corridor and its federal designation by NOAA as "Critical Habitat" for salmonids species listed as threatened under the Endangered Species Act. The beach and near-shore shallow water areas along the Willamette River also provide important habitat for ESA-listed salmonids and macroinvertebrates (ODFW, 2005).

Adjacent large tracts of forest (Forest Park) and wetlands along Multnomah Channel and on Sauvie Island strongly influence wildlife use of this site. Bald eagles travel from their nests on Sauvie Island and forage at this site. Eagles, osprey, kingfishers, cormorants, and great blue herons perch in the large trees and snags near the river, feeding on fish and aquatic invertebrates in the Multnomah Channel and Willamette River. More than 110 different species of birds and 50 species of mammals have been documented in Forest Park, located directly west of the Harborton site. Many Forest Park species venture into the Willamette lowlands. Wrens, sparrows, towhees, kinglets, and other passerines can be found foraging at this site. The site provides spring and summer food sources for breeding warblers, flycatchers, and swallows. Snags and tree cavities serve as foraging, roosting, and nesting sites for a wide range of species, including bats, voles, weasels, raccoons, and cavity-nesting birds such as black-capped

[1]Sea-run cutthroat trout, Lower Columbia River Coho salmon, and Lower Columbia River steelhead were documented in the creek below the culvert prior to its replacement (City of Portland, 1991).

chickadees and downy woodpeckers. Amphibians and reptiles, including western red-backed salamanders, Pacific giant salamanders, red-legged frogs, and garter snakes inhabit the site. Deer, coyote, bobcat, beaver, river otter, and mink occasionally forage at the site. Birds observed or heard during 2000 winter/spring field surveys at this site include double-crested cormorant, Canadian goose, bank swallow, killdeer, golden-crowned kinglet, white-crowned sparrow, and song sparrow.

Most of the southern half of the site is developed with industrial uses. A north-south corridor of woodland, shrubland and herbaceous vegetation exists along the highway and near the railroad. This portion of the site has been highly disturbed by development. At the southern end of the site is another vegetated corridor that provides connectivity between Forest Park and the Willamette River. Although there is little structural diversity, the vegetation does include some large black cottonwood and Oregon Ash trees, as well as turf grass.

The level of human disturbance and continued dredging impacts fish and wildlife habitat. Dredging has produced a deep, uniform channel throughout this site lowering channel complexity, removing in-stream habitat features, and reducing the quantity and quality of shallow-water environments. Diking and upland development limit the ability of the river to maintain an active meander critical to the habitat forming process.

Riverbanks in the southern half of the site are dominated by invasive species, particularly Himalayan blackberry that limit growth of riparian forest species. Fill, vegetation clearing, and debris dumping have degraded certain sections of the riverbank.

St. Helens Road and a rail line pose a major obstacle to wildlife traveling between this site and Forest Park. Wildlife road kills in this part of Linnton are relatively common. Road and rail activity create noise which can also disturb wildlife. Streams flowing through this site originate in Forest Park; however, they flow through culverts under St. Helens Road and in some instances remain piped until they discharge into the Willamette River. As a result, with the exception of Miller Creek to the north, these stream corridors are generally not accessible to wildlife. That said, bobcat have been observed foraging on the beach at the far south end of this site, near the central part of the Linnton community. The bobcat is believed to have traveled from Forest Park, crossing several roads including St. Helens Road along its path. River otter burrows in the riverbank have also been noted at this site.

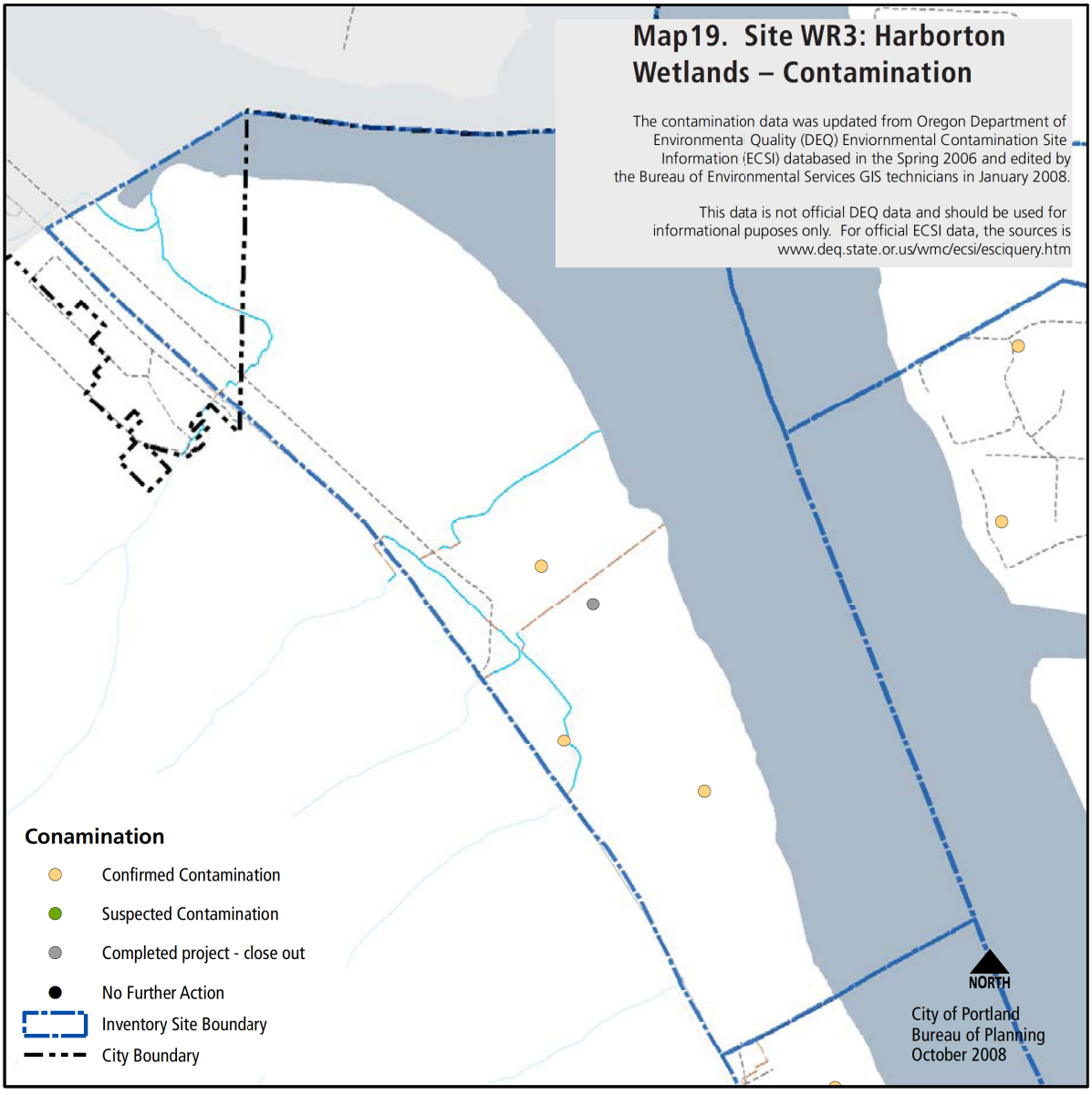
The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, and temperature. Oregon Water Quality Index values from 1986 to 1995 for the Lower Willamette Basin in Portland range from fair to very poor. The Lower Willamette River in Portland is also deemed unsafe for swimming.

Soil, groundwater and river sediments with in the site contain contamination resulting from industrial activities (see Map 19). Types of pollutants include polycyclic aromatic hydrocarbons (PAHs), petroleum products, chlorinated solvents, arsenic, polychlorinated biphenyls (PCBs), metals, and others. Direct contact with contaminated soil or groundwater may pose a risk. In addition, although water quality is generally improving within the basin, this area is downstream of a large and heavily affected watershed and part of the Portland Harbor Superfund site. As a result, water quality and contaminated river sediments are expected to have some adverse affect on fish and wildlife. For more information regarding contamination, visit the DEQ website at http://www.deq.state.or.us/lq/ecsi/ecsi.htm.

Natural Resource Evaluation

The natural resources located within this site have been evaluated for relative riparian and wildlife habitat quality. Relative quality is presented in the form of relative functional value ranks for riparian corridors, wildlife habitat, and riparian/wildlife habitat value combined (Table 17).The relative ranks are produced using GIS models and information on Special Habitat Areas. The model criteria are not sensitive to the species of vegetation present or whether vegetation is native or non-native. However, the model criteria do assign different values to cultivated, heavily manicured and managed landscapes and semi-natural and natural vegetation. The approach used to generate the relative ranks is summarized in the introduction to the North Reach sites. Additional detail is provided in the Methodology Overview section of this report and in Appendix E - *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

All of the ranked resource areas provide significant riparian and/or wildlife habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can help inform planning programs, design of development or redevelopment projects, mitigation and restoration activities.



Riparian Corridors – Relative Ranks

The site contains portions of the Willamette River, Multnomah Channel, vegetated and non-vegetated flood area, and forested wetlands that contribute to the riparian functions detailed in the Natural Resource Description section above. These landscape features provide the following riparian functions:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank function, and sediment, pollution and nutrient control
- Large wood and channel dynamics
- Organic inputs, food web and nutrient cycling
- Riparian wildlife movement corridor

High relative functional are assigned to Willamette River, wetlands, and forest, woodland, and shrubland within the flood area. High and medium relative ranks are assigned to the banks of the Willamette River and Multnomah Channel and land within 50 feet of the water bodies. Medium relative ranks are assigned to portions of the flood areas with herbaceous vegetation. Low relative ranks are assigned to non-vegetated flood area. Other vegetated areas are assigned a high, medium, or low relative rank depending on the proximity and extent of the vegetation relative to the Willamette River and the wetlands (WR3 Map 4).

Wildlife Habitat – Relative Ranks

The site contains vegetated patches and wetlands that provide wildlife habitat. The wildlife habitat model assigns a medium relative rank to the two forested wetlands. The medium rank reflects the size, interior area and proximity to water and other patches. Another narrow forest/woodland patch, located between Highway 30 and the railroad corridor, is assigned a medium relative rank due to its proximity to water and other patches. No high- or low-ranking habitat areas occur within the site.

Harborton Forested Wetland and the Willamette River are designated Special Habitat Areas (SHA.) The Harborton Forested Wetland SHA is a significant bottomland forest and wetland complex at the confluence of the Multnomah Channel and Willamette River. The SHAs contain unique features and provide critical wildlife habitat as described in the Natural Resources Description section above. SHAs receive a high relative rank for wildlife habitat. The SHA ranking supersedes lower rankings generated by the GIS model. Therefore, all SHAs within the site rank high for wildlife habitat (WR1 Map 5).

Combined Riparian/Wildlife Habitat Relative Ranks

Where areas mapped as riparian corridors and wildlife habitat overlap, and their relative ranks differ, the combined relative rank will be the higher of the two ranks. For example, an area that ranks medium for riparian function and low for wildlife habitat will receive a medium combined relative rank. Areas that are assigned a high combined relative rank include those that rank high for riparian functions or wildlife habitat, including Special Habitat Areas (WR3 Map 6).

Table 17: Summary of Ranked Resources in WR3: Harborton Wetlands

Total Inventory Site	**= 358 acres**			
Terrestrial*	**= 210 acres**			
Willamette River	**= 148 acres**			
	High	Medium	Low	Total
Riparian Corridor **				
acres	219	26	31	276
percent total inventory site area	65	8	9	80
Wildlife Habitat **				
acres	0	58	0	58
percent total inventory site area	0	17	0	17
Special Habitat Areas **				
acres	212			
percent total inventory site area	62			
Wildlife Habitat — adjusted for Special Habitat Areas ***				
acres	212	9	0	220
percent total inventory site area	62	3	0	65
Combined Riparian Corridor/Wildlife Habitat +				
acres	226	22	29	277
percent total inventory site area	66	6	9	81
Combined Riparian Corridor/Wildlife Habitat (excludes Willamette River)				
acres	78	21	29	128
percent total inventory site area	23	6	8	38

* Terrestrial includes the land, tributary streams, drainageways and wetlands

** High-ranked riparian resources, wildlife habitat, and Special Habitat Areas includes the Willamette River

*** Special Habitat Areas rank high for wildlife habitat

\+ Because riparian resources, wildlife habitat, and Special Habitat Areas overlap, the results cannot be added together to determine the combined area.



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Site WR3 - Map 1: Harborton Wetlands

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

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Site WR3 - Map 2: Harborton Wetlands

Water-Related Features

Water Bodies

River Depths

- 0 to -20′
- -20 to -30′
- -30 to -40′
- deeper than 40′
- Stream/Drainage
- Culvert or Piped

Other Features

- Flood Area
- Wetlands
- Beach
- Bio-engineered
- Vegetative Rip Rap
- Non-vegetative Rip Rap
- Site Boundary
- City Boundary
- Urban Services

Outfalls

- Stormwater
- Combined stormwater /sanitary

- Abandoned
- Unclassified Fill Bank
- Rock Bank
- Seawall
- Pilings

INFORMATION SOURCES:

Water Bodies:
Rivers, lakes and other water features. Originally digitized by Metro (1994). Data collection scale: 1:100′ - 1:400′. City of Portland and Multnomah County pockets updated by City of Portland, Bureau of Planning, to refine waterbody geometry, remove erroneously mapped waterbodies, and add missing waterbodies. Aerial photos were the primary data source used as reference for re-mapping waterbodies. This is an interim dataset reflecting all work completed to date.
Outfalls: Maintained by BES (June 2008) Location is approximate and data may be incomplete.

All data compiled from source materials at different scales.
For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1″ = 800′

0′ 400′ 800′ 1200′

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Site WR3 - Map 3: Harborton Wetlands

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

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Site WR3 - Map 4: Harborton Wetlands

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

For more information, please visit our website:
http://www.portlandonline.com/planning/index.cfm?c=40437

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Site WR3 - Map 5: Harborton Wetlands

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

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Site WR3 - Map 6: Harborton Wetlands

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

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Inventory Site WR4:
SOUTH RIVERGATE CORRIDOR



Summary Information

Watershed: Willamette River; Columbia Slough

Neighborhood: St. Johns

USGS quadrangle maps, quarter section maps: 2N1W34, 2N1W35, 2N1W36, and 1718-21,1820 -21

River Mile: 2.8 – 3.1

Site Size: 176 acres (land and water)

Previous Inventory: Lower Willamette River Wildlife Habitat Inventory, March 1986.

Zoning: Heavy Industrial (IH)
River Industrial overlay (i)
Environmental Conservation overlay (c)

Existing Land Use: Industrial

General Description: The site contains a vegetation corridor and several ponds, and includes the Portland General Electric (PGE) power line corridor. This site provides a natural resource and wildlife habitat connectivity between the Willamette River, the Multnomah Channel, Forest Park, the Lower Columbia Slough, and Smith and Bybee Lakes.

Resource Features: Bottomland forest, upland scrub/shrub, emergent forested wetland, perennial and ephemeral ponds, scrub/shrub wetland, vegetated flood plain, beach, open water

Functional Values: Microclimate and shade; stream flow moderation and water storage; bank function, and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; wildlife habitat; habitat connectivity/ movement corridor

Special Habitat Area: **Willamette River** – Area critical to sensitive species including NOAA designated Critical Habitat (S) and connectivity corridor (C). **West Wye/ I-5 Powerline Mitigation Site** – Wetland (W), bottomland hardwood forest (B), migratory stopover habitat (M), connectivity corridor (C) and area critical to sensitive species (S).

Special Status Species: **Wildlife:** Western painted turtle, bald eagle, American Peregrine falcon, river otter. **Fish:** Lower Columbia River Chinook salmon; Lower Columbia River steelhead trout; Pacific lamprey

Natural Hazards: Flood area

Contamination: Yes



Beach and Large Wood

Site Description

The South Rivergate inventory site is 176 acres in size. The site consists of an east-west corridor. It is more than one mile long, averages 1,000 feet wide, and follows a Portland General Electric (PGE) power line easement. The site is located between the Willamette River and N. Lombard Avenue. Rivergate Boulevard borders the site to the north. Approximately half of the site, to the west of N. Time Oil Road, is within the Willamette River Watershed. The eastern half of the site is within the Columbia Slough Watershed.

Time Oil Road travels parallel to the site to the south, then crosses through the site towards the west end. At the southeast the site is bordered by N. Burgard Road. This site is traversed by Union Pacific Railroad tracks in several locations. WR4 Map 1 shows the aerial view of the South Rivergate Corridor inventory site.

The east/southeast section of the site is developed with power station facilities. Several ponds and emergent wetlands, totaling about 28 acres, provide habitat for a variety of wildlife. Within and surrounding the wetlands and drainage ways, vegetated areas at least ½ acre in size include approximately 30 acres of forest and woodland, 17 acres of shrubland and 50 acres of herbaceous vegetation.

Roughly 30 acres of the Willamette River are included in this site, from the shore to the river centerline. The bank is almost entirely beach and accumulated large wood. Of the 89 acres of flood area on the site, 30 acres are composed of open water areas and 43 acres are wetlands and vegetated areas. The remaining portion of the flood area, roughly 15 acres, is developed with roads, railroad tracks and rights-of-way. The site contains 45 acres (26%) impervious surface coverage, including 2.6 miles of road.

The City of Portland's Bureau of Environmental Services (BES) has two active revegetation projects on this site, one at the Rivergate Pump Station in the western section of the site, and the other at Bonneville Pond, at the eastern end of the site.

Table 18: Summary of Natural Resource Features in WR4: South Rivergate Corridor

	Study Area (176 acres)
Stream (miles)	
Willamette River (linear feet/acres)	1,585/30
Open Stream Channel (linear feet)	7,395
Piped Stream Segments (linear feet)	728
Wetlands (acres)	**28**
Flood Area (acres)*	**89**
Vegetated (acres)	43
Non-vegetated (acres)	16
Open Water (acres)	30
Vegetated Areas >= ½ acre (acres)+	**96**
Forest (acres)	<1
Woodland (acres)	29
Shrubland (acres)	17
Herbaceous (acres)	50
Impervious Surfaces (acres)	**45**

* The flood area includes the FEMA 100-year floodplain combined with the adjusted 1996 flood inundation area.

\+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and is currently being updated based on 2006 aerial photography.

Active dredging in the Willamette River has produced a uniform channel with little complexity. Marine cargo activities are common in river, with large vessels passing through to upstream berths in the Portland Harbor. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships. Beaches and associated nearshore shallow-water areas, and the Willamette River/Columbia Slough confluence provide habitat for migrating salmonids, shorebirds and other wildlife species.

The Oregon Department of Environmental Quality (DEQ) has identified one contaminated area within the site. In addition, one of the ponds in the southeast section of this site is contaminated with household and industrial waste.

Natural Resources Description

The site contains both aquatic and terrestrial resources (key resource features are shown in WR4 Maps 2 and 3), including a segment of the Willamette River. The river bank within this site is comprised of beach with herbaceous and woodland vegetation on the slopes. The beach area is located along the entire site and extends south into Site WR5 Time Oil/Terminal 4. Large wood accumulates along the beach and contributes towards ecological functions and habitat complexity. There is evidence of mass failure, scour, and erosion along the riverbank, which may in part be exacerbated by the transmission tower footings located directly on the beach and banks. The beach and near-shore shallow water areas provide important habitat for salmonids that are listed as threatened species under the Endangered Species Act, including Lower Columbia River Chinook salmon and Lower Columbia River steelhead trout (ODFW, 2005). The confluence with the Columbia Slough also provides important backwater, off-channel, and shallow-water refugia habitats for salmonids. Other indigenous fish such as Pacific lamprey and sturgeon are expected to be present although their use of the reach may be limited by dredging. Fish such as sucker and carp may also be abundant in these uniform habitats (ODFW, 2005).

The open water habitat also provides feeding areas for birds such as ducks, cormorants, gulls, herons; and mammals such as river otter and mink. Insectivores such as swallows and bats also forage over the water. The proximity of this site to Kelley Point Park, Smith and Bybee Lakes and the Harborton wetlands increases its importance as a migration corridor for terrestrial species migrating from wildlife refuges in Southern Washington and Sauvie Island.

The site includes emergent and open water wetlands and drainageways with surrounding vegetation. Upland there are seven wetlands and ponds with associated vegetation. Four of the ponds are located west of N Time Oil Road and range in size from 0.2 acre to 1.3 acres. These ponds were created by the Port of Portland in the mid-1990s as mitigation for development on other sites. There are three other wetlands and associated drainageways east of N Time Oil Road. The drainageways provide a hydrologic connection between the wetlands and the Columbia Slough. The drainageways are piped under N Lombard Avenue to the Slough. Active flood area associated with the Willamette River and the Lower Columbia Slough extends into the site.

During the summer an aquatic vegetation mat forms on most of the wetlands, so that the ratio of open water to submergent/emergent wetland vegetation varies through the course of the year. This mat is typically comprised of South American waterweed, curly-leaved pondweed, leafy pondweed, Canadian waterweed, and lesser duckweed. Emergent vegetation along the margins of the ponds includes broad-leaved cattail, reed canarygrass, common rush, jointed rush, bulrush, nut sedge, water-plantain, wapato, and sedge species.

Bordering the wetlands are grassland and meadow areas typically comprised of invasive herbaceous growth including teasel, Canadian thistle, bird's-foot trefoil, purple loosestrife, and reed canarygrass. Upland shrub communities consist of Himalayan blackberry, willows (Hooker's, Pacific, Scouler's, and Sitka), red osier dogwood, and Douglas spirea.

The area between the wetlands is dominated by Pacific willow, but includes other willow species such as Hooker's, Scouler's, and Sitka. Young black cottonwood, red elderberry, Douglas spirea, red osier dogwood, Himalayan



South Rivergate Wetlands under power lines

blackberry, and reed canarygrass are also fairly common species in this community. PGE manages this area, and portions of the western section, so that trees do not interfere with the overhead powerlines.

The presence of multiple seasonal and year-round wetlands is unique within the Willamette River study area. The mosaic of aquatic and terrestrial habitat types and the connection between the Willamette River, Lower Columbia Slough, St. Johns Landfill and Smith and Bybee wetlands complex creates important forage, nesting, and resting or stopover opportunities for birds, reptiles, amphibians, and mammals. While such linkages occur at the Kelley Point site, the South Rivergate Corridor is positioned directly across the river from the Multnomah Channel, Harborton wetlands, Forest Park, and Tualatin Mountain wildlife habitats.

Wildlife observed or heard at the site during the 1999/2000 field surveys include birds, reptiles, amphibians and mammals. Water birds observed at the site include double-crested cormorant, great blue heron, herring gull, mallard, hooded and common mergansers, and gadwall. Raptors detected include northern harrier, merlin, red tailed hawk, bald eagle, and American peregrine falcon. A wide variety of songbirds use the site, including black capped chickadee, bushtit, Bewick's and winter wrens, American robin, starling, Hutton's vireo, song sparrow, dark-eyed junco, purple finch, golden-crowned kinglet, and various other sparrows (i.e., house, white-crowned, golden-crowned, and fox sparrows). Other birds identified include downy woodpecker, northern flicker, mourning dove and rock dove (domestic pigeon), western scrub-jay, and American crow. Mammal species noted include mink, river otter, and raccoon.

The site contains one of the largest Western painted turtle populations in the Willamette Valley. The estimated size of the adult population is 70 turtles. Also identified during field surveys were northwestern garter snake, common garter snake, long toed salamander, Pacific chorus (tree) frog, and bull frog. Turtles migrate between the ponds east and west of Time Oil Road, particularly during two seasonal intervals, before nesting and before over wintering.

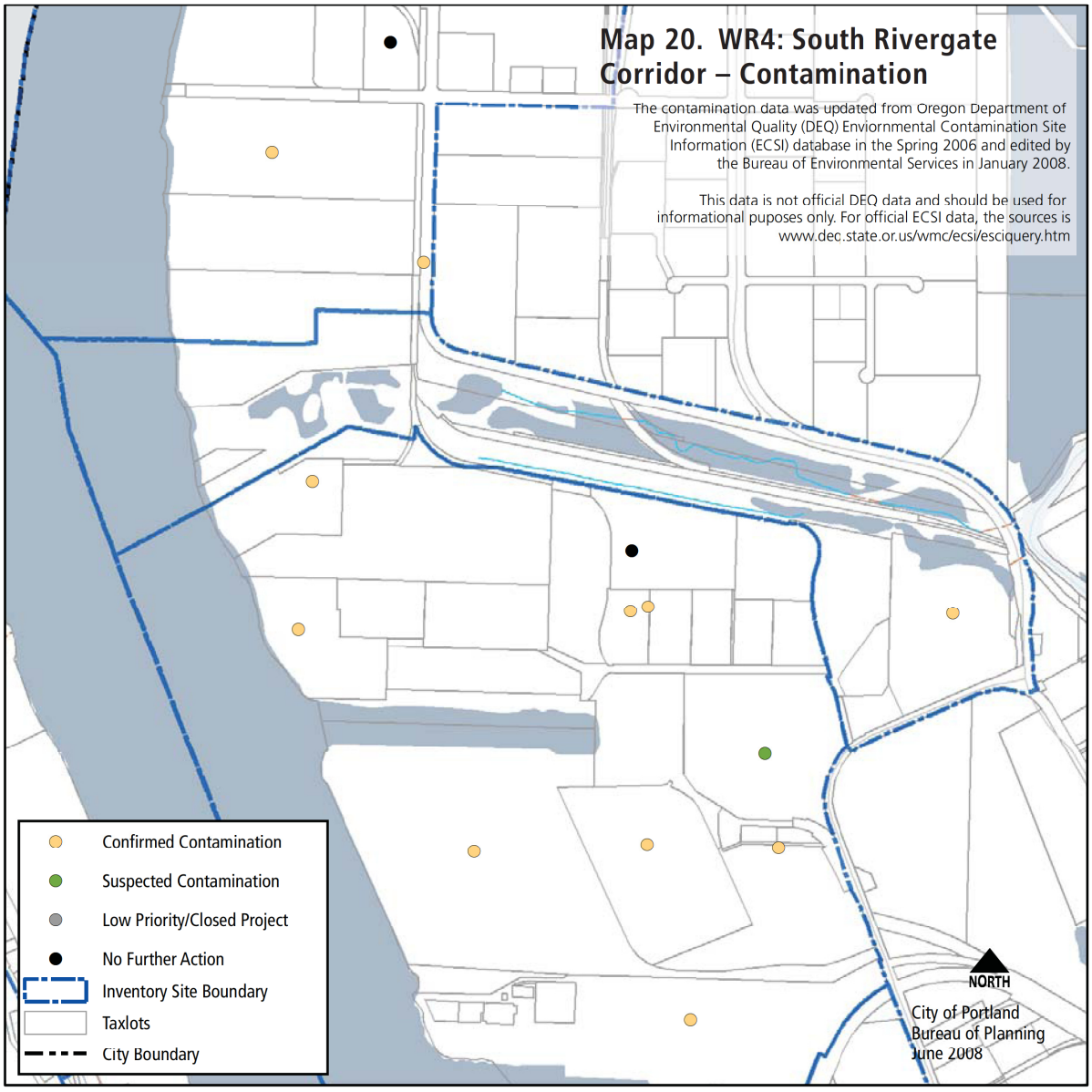
However, the West Wye/T-5 Powerline Mitigation Site (West Wye) and Willamette River are also designated Special Habitat Areas (SHA.) The West Wye SHA is within the PGE power line corridor easement. This area provides a critical wildlife habitat connector between the Willamette River, Lower Columbia Slough and the Smith and Bybee Lakes wetland complex. It contains wetlands, drainageways, and vegetation that are important for sensitive species such as the painted turtle, which uses the area extensively. The Willamette River is a designated Special Habitat Area, reflecting its value as a wildlife corridor and as federally designated "Critical Habitat" for salmonids species listed as threatened under the Endangered Species Act. The beach and near-shore shallow water areas along the Willamette River also provide important habitat for ESA-listed salmonids and macroinvertebrates (ODFW, 2005).

The railroad lines and roads that fragment the site pose a considerable threat to turtles and other wildlife that move between the various habitats. Several turtle road kills have been documented on Time Oil Road. Lombard Avenue may pose a similar risk for turtles crossing between the site's eastern pond and the Columbia Slough. In 2005, the Port of Portland constructed an under-crossing for wildlife including turtles. Noise from nearby road and rail activity can also disturb wildlife. Habitat disturbance caused by Himalayan blackberry and other invasive species is a limiting factor at this site. The nature and extent of vegetation management along the PGE power line easement and at the transmission towers may also be a limiting factor for wildlife.

The largest pond, located at the east end of the site, is highly degraded by household garbage and industrial waste that has been dumped there over the course of many years. An outfall pipe discharges unidentified (visible and odorous) contaminants into the pond. Though turtles and fish are present in the pond, contamination and degraded water quality threaten their continued survival.

The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, and temperature. Oregon Water Quality Index values from 1986 to 1995 for the Lower Willamette Basin in Portland range from fair to very poor. The Lower Willamette River in Portland is also deemed unsafe for swimming.

In addition to the pond discussed above, DEQ has designated one area of contamination within this site. (See Map 20) Soils and groundwater contaminated with PCBs are documented at the Bonneville Power Administration property. The contamination is from past use of chlorinated solvents for equipment cleaning. Potential environmental and health risks are low due to remedial actions and a perimeter fence that limits access. For more information regarding contamination, visit the DEQ website at http://www.deq.state.or.us/lq/ecsi/ecsi.htm.



Natural Resource Evaluation

The natural resources located within this site have been evaluated for relative riparian and wildlife habitat quality. Relative quality is presented in the form of relative functional value ranks for riparian corridors, wildlife habitat, and riparian/wildlife habitat value combined (Table 19). The relative ranks are produced using GIS models and information on Special Habitat Areas. The model criteria are not sensitive to the species of vegetation present or whether vegetation is native or non-native. However, the model criteria do assign different values to cultivated, heavily manicured and managed landscapes and semi-natural and natural vegetation. The approach used to generate the relative ranks is summarized in the introduction to the North Reach sites. Additional detail is provided in the Methodology Overview section of this report and Appendix E - *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

All of the ranked resource areas provide significant riparian and/or wildlife habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can help inform planning programs, design of development or redevelopment projects, mitigation and restoration activities.

Riparian Corridors – Relative Ranks

The site contains a portion of the Willamette River, vegetated and non-vegetated flood area, and wetlands that contribute to the riparian functions detailed in the natural resource description for the site. These landscape features provide the following riparian functions::

- Microclimate and shade
- Stream flow moderation and water storage
- Bank function, and sediment, pollution and nutrient control
- Large wood and channel dynamics
- Organic inputs, food web and nutrient cycling
- Riparian wildlife movement corridor

High relative functional ranks are assigned to the Willamette River, vegetated wetlands, and flood areas with woodland, and shrub land vegetation. Banks of the Willamette and land within 50 feet of the river receives a high relative rank. Medium relative ranks are assigned to portions of the flood areas with herbaceous vegetation. Low relative ranks are assigned to remaining portions of flood area that are not vegetated (WR4 Map 4). Other vegetated areas are assigned a high, medium, or low relative rank depending on the proximity and extent of the vegetation relative to the Willamette River or the wetlands (WR4 Map 4).

Wildlife Habitat – Relative Ranks

The site contains wetlands with woodland and shrubland vegetation that contribute to wildlife habitat function. The GIS model assigns the wetlands a medium relative rank for wildlife habitat based on their size, shape and connectivity.

The West Wye/T-5 Powerline Mitigation Site (West Wye) and Willamette River are also designated Special Habitat Areas (SHA.) The SHAs contain unique features and provide critical wildlife habitat as described in the Natural Resources Description section above. SHAs receive a high relative rank for wildlife habitat. The SHA ranking supersedes lower rankings generated by the GIS model. Therefore, all SHAs within the site rank high for wildlife habitat (WR1 Map 5)

Combined Riparian/Wildlife Habitat Relative Ranks

Where areas mapped as riparian corridors and wildlife habitat overlap, and their relative ranks differ, the combined relative rank will be the higher of the two ranks. For example, an area that ranks medium for riparian function and low for wildlife habitat will receive a medium combined relative rank. Areas that are assigned a high combined relative rank include those that rank high for riparian functions or wildlife habitat, including Special Habitat Areas.

Table 19: Summary of Ranked Resources in WR4: South Rivergate Corridor

Total Inventory Site = 176 acres
Terrestrial* = 146 acres
Willamette River = 30 acres

	High	Medium	Low	Total
Riparian Corridor **				
acres	75	29	22	127
percent total inventory site area	43	17	12	72
Wildlife Habitat **				
acres	0	26	0	26
percent total inventory site area	0	15	0	15
Special Habitat Areas **				
acres	121			
percent total inventory site area	69			
Wildlife Habitat- adjusted for Special Habitat Areas ***				
acres	121	<1	0	122
percent total inventory site area	69	<1	0	69
Combined Riparian Corridor/Wildlife Habitat +				
acres	121	4	5	130
percent total inventory site area	69	2	3	74
Combined Riparian Corridor/Wildlife Habitat (excludes Willamette River)				
acres	94	4	5	103
percent total inventory site area	53	2	3	58

* Terrestrial includes the land, tributary streams, drainageways and wetlands

** High-ranked riparian resources, wildlife habitat, and Special Habitat Areas includes the Willamette River

*** Special Habitat Areas rank high for wildlife habitat

\+ Because riparian resources, wildlife habitat, and Special Habitat Areas overlap, the results cannot be added together to determine the combined area.

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Site WR4 - Map 1: South Rivergate Corridor

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

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N. RAMSEY BLVD.
N. RAMSEY BLVD.
N. RIVERGATE BLVD.
N. RIVERGATE BLVD.
N. RIVERGATE BLVD.
N. LOMBARD ST.
N. LOMBARD ST.
N. HARBORGATE WAY
N. BURGARD WAY
N. BURGARD RD.
N. BURGARD RD.
N. SEVER RD.
TERMINAL RD.
N. COLUMBIA
N. LOMBARD ST.
N. WOODRUSH WAY
N. LOMBARD ST.
N. LOMBARD RD.
N. LOMBARD
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Site WR4 - Map 3: South Rivergate Corridor

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

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Site WR4 - Map 4: South Rivergate Corridor

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

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Site WR4 - Map 5: South Rivergate Corridor

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
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Site WR4 - Map 6: South Rivergate Corridor

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
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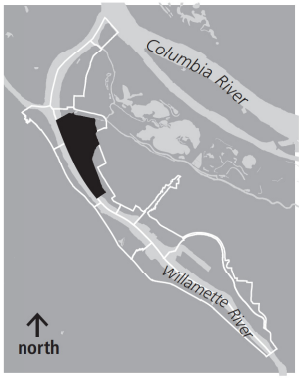
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Sam Adams, Mayor | Susan Anderson, Director

Inventory Site WR5:
TIME OIL RD/TERMINAL 4



Summary Information

Watershed: Willamette River and Columbia Slough

Neighborhood: The northern two-thirds of the site are in the neighborhood and the southern one-third is Cathedral Park neighborhood.

USGS quadrangle and quarter section maps: 2N1W35, 1N1W02, 1N1W11, 1N1W12 and 1718-20, 1818-20, 1919-20, 2019-20, 2120-21

River Mile: 3.1 – 5.4

Site Size: 766 acres (land and water)

Previous Inventory: Lower Willamette River Wildlife Habitat Inventory, March 1986

Zoning: Heavy Industrial (IH)
River Industrial overlay (i)

Existing Land Use: Industrial

General Description: Industrial uses cover most of the site, including the Port of Portland Terminal 4. There is undeveloped land along the northern portion of the site. The eastern boundary is made up of remnant oak bluffs that separate the site from the St. John's neighborhood.

Resource Features: Bottomland forest, foothill savannah, upland shrub/scrub, herbaceous vegetation; developed flood area; beach, open water

Functional Values: Microclimate and shade; stream flow moderation and water storage; bank function, and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; wildlife habitat; habitat connectivity/ movement corridor

Special Habitat Area: **Willamette River** – Area critical to sensitive species including NOAA designated Critical Habitat (S) and connectivity corridor (C).

Special Status Species: **Wildlife:** river otter. **Fish:** Lower Columbia River Chinook salmon; Lower Columbia Coho salmon; Lower Columbia River steelhead trout, Pacific lamprey

Natural Hazards: Landslide; flood area

Contamination: Yes

Site Description

This 766-acre site is located between Time Oil Rd to the north and Cathedral Park to the south. The eastern site boundary follows Bradford Street. The terrestrial portion of this site is approximately 525 acres in size and contains more than 21,000 linear feet of bank along the Willamette. WR5 Map 1 shows the aerial view of the Time Oil Developed Flood Area inventory site.

This site is characterized by shoreline development associated with intensive marine and industrial use. The site contains 413 acres (54%) impervious surface coverage, including 13.2 miles of road. Marine cargo activities are common in this reach, with large vessels docking or passing through to upstream berths. The banks of the Willamette River in this site are highly disturbed. Vegetation is associated primarily with the river bank, although a small strip of forest vegetation exists in the upland portion of the site.

Vegetated areas at least ½ acre in size include 3 acres of forest or dense tree canopy, 3 acres of woodland, 7 acres of shrubland and 56 acres of herbaceous vegetation within the site. Although the vegetated banks reflect disturbance associated with development, they provide a connectivity corridor between Site WR4: South Rivergate Corridor to the north and Cathedral Park to the south.

Of the 514 acres of flood area, 239 are in open water and approximately 225 acres are developed with industrial uses. The remaining 50 acres are vegetated and generally include the banks of the Willamette.



Industrial area

Table 20: Summary of Natural Resource Features in WR5: Time Oil Road/Terminal 4

	Study Area (176 acres)
Stream (miles)	
Willamette River (miles/acres)	2.3/241
Open Stream Channel (linear feet)	0
Piped Stream Segments (linear feet)	0
Wetlands (acres)	**0**
Flood Area (acres)*	**514**
Vegetated (acres)	50
Non-vegetated (acres)	225
Open Water (acres)	239
Vegetated Areas >= ½ acre (acres)+	**69**
Forest (acres)	3
Woodland (acres)	3
Shrubland (acres)	7
Herbaceous (acres)	56
Impervious Surfaces (acres)	**413**

* The flood area includes the FEMA 100-year floodplain combined with the adjusted 1996 flood inundation area.

\+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and is currently being updated based on 2006 aerial photography.

Active dredging in the Willamette River has produced a uniform channel with little complexity. Marine cargo activities are common in river, with large vessels passing through to upstream berths in the Portland Harbor. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships. Beaches and associated nearshore shallow-water areas, and the Willamette River/Columbia Slough confluence provide habitat for migrating salmonids, shorebirds and other wildlife species.

There are several areas of soil, sediment and groundwater contamination on this site, resulting from historic and present industrial uses. The steep slopes below Bradford St. are in the Potential Landslide Hazard area (City of Portland, 2002), and most of the site is within the flood area (City of Portland 2007).

Natural Resources Description

Although this site contains a highly developed portion of the Willamette River bank, it also contains both aquatic and terrestrial resources (key resource features are shown in WR5 Maps 2 and 3). The vegetation on the site consists of remnant bottomland forest, foothill savannah, upland shrubland, herbaceous vegetation; developed flood area; beach and open water. The beaches and vegetated banks of the Willamette River provide connectivity along the river between the wetlands in the South Rivergate Corridor to the north and Cathedral Park and Willamette Cove in the south.

There is a small area of bottomland forest, dominated by black cottonwood trees, located along NE Lombard Road between N Burgard Rd and N Bradford St. The forested area is located on a steep slope extending south from the South Rivergate Corridor.

A significant portion of the northern half of the site is flood area, much of which is developed. During 1996 floods, much of this area was inundated by the waters of the Willamette River and Columbia Slough.

There are three beach areas within this site. The beach in the northern portion of the site extends north into the South Rivergate Corridor inventory site, and is approximately 3,000 feet long. A segment of beach in the north/central portion of the site is approximately 800 feet long. The beach located in the southern portion of the site is approximately 1,200 feet long. The beach and near-shore shallow water areas provide important habitat for salmonids that are listed as threatened species under the Endangered Species Act, including Lower Columbia River Chinook salmon and Lower Columbia River steelhead trout (ODFW, 2005). The river channel provides a migration corridor for fish, birds, and mammals. Adult salmon and steelhead utilize the Willamette River during migration. Other indigenous fish such as Pacific lamprey are expected to be present, although their use of the reach may be limited by dredging. Fish such as sucker and carp may also be abundant in these uniform habitats (ODFW, 2005).

The open water at the shore provides feeding areas for wildlife such as ducks, cormorants, gulls, kingfishers, herons, river otter, mink, and other species that feed on small fish and aquatic insects. Insectivores such as swallows and bats also forage over the water. In addition, a wildlife migration corridor crosses the river in this reach providing a connection for birds between Forest Park to the west and Smith and Bybee Lakes to the east.

The Willamette River is a designated Special Habitat Area (SHA), reflecting its value as a wildlife corridor and as federally designated "Critical Habitat" for salmonids species listed as threatened under the Endangered Species Act. The beach and near-shore shallow water areas along the Willamette River also provide important habitat for ESA-listed salmonids and macroinvertebrates (ODFW, 2005).

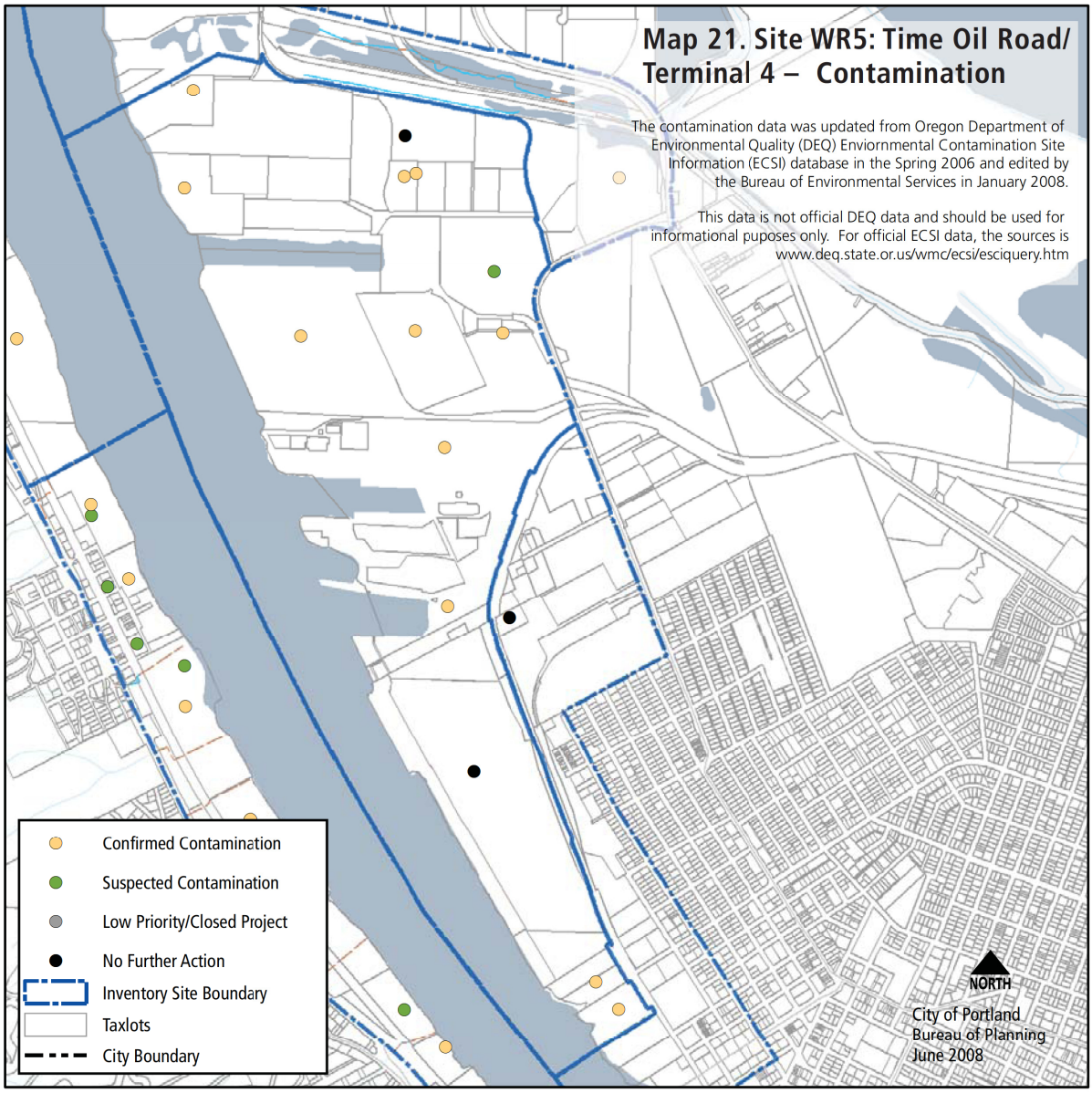
The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, and temperature. Oregon Water Quality Index values from 1986 to 1995 for the Lower Willamette Basin in Portland range from fair to very poor. The Lower Willamette River in Portland is also deemed unsafe for swimming.

Between the beaches are varying bank treatments, including bioengineering, riprap (vegetated and non-vegetated), pilings, seawalls and unclassified fill. The vegetated portions of the bank are characterized by steep slopes and Himalayan Blackberry. In 2001 the Port of Portland planted native vegetation along 1700 feet of riverbank at Terminal 4, to improve stability and wildlife habitat. The Port also installed bioswales to help manage and clean stormwater before it enters the river.

Embayments associated with Terminal 4 reduce the velocity of flows in the river. These areas may provide refugia for aquatic species; however, the habitat value of these terminal embayments is likely limited by the presence of wharves and headwalls. These areas may be more conducive to non-indigenous warmwater species than indigenous salmonid species.

The level of human disturbance and continued dredging in and around the site impacts the function of existing fish and wildlife habitat resources. Several structures related to the marine cargo facilities are located on the east bank of the reach. The west bank is also industrial and has several active docks. Marine cargo activities are common in this reach, with large vessels docking or passing through to upstream berths. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships, but reduces channel complexity.

Soil, groundwater and river sediments with in the site contain contamination resulting from past and current industrial activities such as petroleum storage and handling, trucking, scrap metal and wood storage, and coal tar pitch spills (see Map 21). Types of pollutants found here include petroleum hydrocarbons, metals (lead, mercury, copper, etc.), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), xylenes, antimony, VOCs and others. Potential environmental and health risks include direct contact or ingestion of contaminated sediments or groundwater by humans, aquatic organisms, birds or mammals and consumption of fish or crayfish by recreational anglers. For more information regarding contamination, visit the DEQ website at http://www.deq.state.or.us/lq/ecsi/ecsi.htm.



Natural Resource Evaluation

The natural resources located within this site have been evaluated for relative riparian and wildlife habitat quality. Relative quality is presented in the form of relative functional value ranks for riparian corridors, wildlife habitat, and riparian/wildlife habitat value combined (Table 21). The relative ranks are produced using GIS models and information on Special Habitat Areas. The model criteria are not sensitive to the species of vegetation present or whether vegetation is native or non-native. However, the model criteria do assign different values to cultivated, heavily manicured and managed landscapes and semi-natural and natural vegetation. The approach used to generate the relative ranks is summarized in the introduction to the North Reach sites. Additional detail is provided in the Methodology Overview section of this report and in Appendix E - *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

All of the ranked resource areas provide significant riparian and/or wildlife habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can help inform planning programs, design of development or redevelopment projects, mitigation and restoration activities.

Riparian Corridors – Relative Ranks

The site contains the Willamette River and vegetated and developed flood areas that contribute to the riparian functions detailed in the natural resource description. These landscape features provide the following riparian functions:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank function, and sediment, pollution and nutrient control
- Large wood and channel dynamics
- Organic inputs, food web and nutrient cycling
- Riparian wildlife movement corridor

High relative ranks are assigned to the Willamette River and portions of the flood area with woodland or shrub land vegetation. High and medium relative ranks are assigned to vegetated banks and land within 50 feet of the river. Medium relative ranks are assigned to portions of the flood area with herbaceous vegetation. Low relative ranks are assigned to hardened, non-vegetated banks and land within 50 of the river and to non-vegetated, developed flood area. Other vegetated areas are assigned a high, medium, or low relative rank depending on the proximity and extent of the vegetation relative to the Willamette River (WR5 Map 4).

Wildlife Habitat – Relative Ranks

The site contains a forested patch, located along N Lombard Street, that contributes to wildlife habitat function. The wildlife habitat model assigns a low relative rank to the forested patch due to its size, shape and proximity to other habitat patches.

The Willamette River is a designated Special Habitat Area (SHA), reflecting its value as a wildlife corridor and as federally designated "Critical Habitat" for salmonids species listed as threatened under the Endangered Species Act. The SHAs contain unique features and provide critical wildlife habitat as described in the Natural Resources Description section above. SHAs receive a high relative rank for wildlife habitat. The SHA ranking supersedes lower rankings generated by the GIS model. Therefore, all SHAs within the site rank high for wildlife habitat (WR1 Map 5).

Combined Riparian/Wildlife Habitat Relative Ranks

Where areas mapped as riparian corridors and wildlife habitat overlap, and their relative ranks differ, the combined relative rank will be the higher of the two ranks. For example, an area that ranks low for riparian function and high for wildlife habitat, such as the Willamette River SHAs, will receive a high combined relative rank (WR5 Map 6).

Table 21: Summary of Ranked Resources in WR5: Time Oil Rd/Terminal 4

Total Inventory Site = 766 acres
Terrestrial* = 525 acres
Willamette River = 241 acres

	High	Medium	Low	Total
Riparian Corridor**				
acres	249	55	221	525
percent total inventory site area	33	7	29	69
Wildlife Habitat**				
acres	0	0	2	2
percent total inventory site area	0	0	<1	<1
Special Habitat Areas **				
acres	243			
percent total inventory site area	32			
Wildlife Habitat- adjusted for Special Habitat Areas ***				
acres	243	0	2	246
percent total inventory site area	32	0	<1	32
Riparian Corridor/Wildlife Habitat+				
acres	250	55	223	527
percent total inventory site area	33	7	29	69
Combined Riparian Corridor/Wildlife Habitat (excludes Willamette River)				
acres	8	55	223	286
percent total inventory site area	1	7	29	37

* Terrestrial includes the land, tributary streams, drainageways and wetlands

** High-ranked riparian resources, wildlife habitat, and Special Habitat Areas includes the Willamette River

*** Special Habitat Areas rank high for wildlife habitat

\+ Because riparian resources, wildlife habitat, and Special Habitat Areas overlap, the results cannot be added together to determine the combined area.

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Site WR5 - Map 1: Time Oil/Terminal 4

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 900'

0' 450' 900' 1350'

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Site WR5 - Map 2: Time Oil/Terminal 4

Water-Related Features

Water Bodies

River Depths

- 0 to -20′
- -20 to -30′
- -30 to -40′
- deeper than 40′
- Stream/Drainage
- Culvert or Piped

Other Features

- Flood Area
- Wetlands
- Beach
- Bio-engineered
- Vegetative Rip Rap
- Non-vegetative Rip Rap
- Site Boundary
- City Boundary

Outfalls

- Stormwater
- Combined stormwater /sanitary
- Abandoned
- Unclassified Fill Bank
- Rock Bank
- Seawall
- Pilings
- Urban Services

INFORMATION SOURCES:

Water Bodies:
Rivers, lakes and other water features. Originally digitized by Metro (1994). Data collection scale: 1:100′ - 1:400′. City of Portland and Multnomah County pookets updated by City of Portland, Bureau of Planning, to refine waterbody geometry, remove erroneously mapped waterbodies, and add missing waterbodies. Aerial photos were the primary data source used as reference for re-mapping waterbodies. This is an interim dataset reflecting all work completed to date.
Outfalls: Maintained by BES (June 2008) Location is approximate and data may be incomplete.

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Site WR5 - Map 3: Time Oil/Terminal 4

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

All data compiled from source materials at different scales.
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Site WR5 - Map 4: Time Oil/Terminal 4

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

For more information, please visit our website:
http://www.portlandonline.com/planning/index.cfm?c=40437

NOTE: Portland's resource inventory is still being evaluated for accuracy and consistency and should be considered preliminary. The inventory has not yet been adopted by the City of Portland.

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Site WR5 - Map 5: Time Oil/Terminal 4

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

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Site WR5 - Map 6: Time Oil/Terminal 4

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

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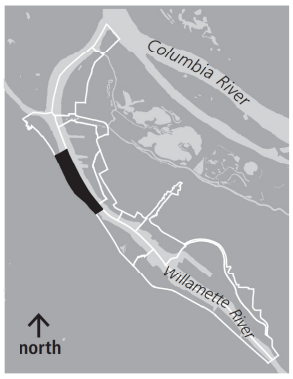
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Inventory Site WR6: LINNTON



Summary Information

Watershed: Willamette River

Neighborhood: Linnton

USGS quadrangle, quarter section maps: 1N1W02, 1N1W03, 1N1W11, 2N1W35, and 1818-19, 1918-19, 2018-20, 2119-20, 2220

River Mile: 3.7 – 5.5

Site Size: 323 acres (land and water)

Zoning: Heavy Industrial (IH)
General Employment (EG1)
General Commercial (CG)
River Industrial overlay (i)
River General overlay (g)
River Water Quality overlay (q)
Scenic overlay (s)

Existing Land Use: Industrial; commercial; Highway 30; railroad

General Description: The site is a thin area of industrial development located between Highway 30 and the Willamette River, north of the St. Johns Bridge.

Resource Features: Forest, woodland, shrubland and herbaceous vegetation; flood area; beach

Functional Values: Microclimate and shade; stream flow moderation and water storage; bank function, and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; wildlife habitat; habitat connectivity/ movement

Special Habitat Area: **Willamette River** – Area critical to sensitive species including NOAA designated Critical Habitat (S) and connectivity corridor (C). **St. Johns Bridge Nests** – Area critical to sensitive species (S) and resource or structure that provides unique habitat function in natural or built environment (U).

Special Status Species: **Wildlife:** river otter **Fish:** Lower Columbia River Chinook salmon; Lower Columbia Coho salmon; Lower Columbia River Steelhead trout, Pacific lamprey

Natural Hazards: Landslide, flood area, wildfire

Contamination: Yes

Site Description

This 323-acre inventory site is located between Highway 30 and the Willamette River, south of site WR3 Harborton Wetlands, and north of the St. Johns Bridge. The site consists primarily of industrial and commercial development. Map 1 shows an aerial view of the Linnton inventory site

Of the 323 acres within the site, the Willamette River accounts for 170 acres. The site contains approximately 9,200 linear feet of river frontage. Bank types include vegetated and non-vegetated riprap, rock and seawall, and 2,700 feet of beach. The flood area is 199 acres, including 170 acres of open water. Of the remaining 29 acres, 4 acres are vegetated and the other 25 are non-vegetated bank and impervious surfaces.

The site contains 102 acres (31%) impervious surface coverage, including 4.1 miles of road. Vegetated areas at least ½ acre in size include approximately 8 acres of forest or dense tree canopy, 4 acres of woodland, 9 acres of shrubland and 2 acres of herbaceous vegetation.

Active dredging in the Willamette River has produced a uniform channel with little complexity. Marine cargo activities are common in river, with large vessels passing through to upstream berths in the Portland Harbor. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships.

Beaches and associated nearshore shallow-water areas, and the Willamette River/ Columbia Slough confluence provide habitat for migrating salmonids, shorebirds and other wildlife species.



Linnton Beach

Table 22: Summary of Natural Resource Features in WR6: Linnton

	Study Area (325acres)
Stream (miles)	
Willamette River (miles/acres)	2/170
Open Stream Channel (linear feet)	528
Piped Stream Segments (linear feet)	1.5
Wetlands (acres)	**0**
Flood Area (acres)*	**199**
Vegetated (acres)	4
Non-vegetated (acres)	25
Open Water (acres)	170
Vegetated Areas >= ½ acre (acres)+	**23**
Forest (acres)	8
Woodland (acres)	4
Shrubland (acres)	9
Herbaceous (acres)	2
Impervious Surfaces (acres)	**102**

* The flood area includes the FEMA 100-year floodplain combined with the adjusted 1996 flood inundation area.

\+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and is currently being updated based on 2006 aerial photography.

There are several areas of contamination within this site, resulting from former and possibly current (in the case of Arco) industrial uses. The Marine Finance Company property is a brownfield. This site also has flood area along the eastern edge. Both landslide and wildfire hazard areas exist along the western edge of the site (City of Portland GIS data).

Natural Resources Description

This site has aquatic and terrestrial resources (key resource features are shown in (WR6 Maps 2 and 3).

The banks of the Willamette along this site are within the flood area and are largely unvegetated, except for a portion to the north that contains remnant riparian forest, woodland, shrubland and herbaceous vegetation. The northern bank is treated with rip rap. A beach, approximately 2,900 feet long, is located near the middle of the site. Just off-shore there is a shallow shelf. The beach and near-shore shallow water areas provide important habitat for salmonids that are listed as threatened species under the Endangered Species Act, including Lower Columbia River Chinook salmon and Lower Columbia River steelhead trout (ODFW, 2005).

The remainder of the river banks are highly modified with vegetated and non-vegetated rip rap, fill, seawall or other revetments. Several structures related to the marine cargo activities are located on the bank. Large vessels dock or pass through to upstream berths. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships, but reduces channel complexity.

The river channel provides a migration corridor for fish, birds, and mammals. Adult salmon and steelhead utilize the Willamette River during migration. Other indigenous fish such as Pacific lamprey and sturgeon may be present although their use of the reach may be limited by dredging. Fish such as sucker and carp may also be abundant in these uniform habitats (ODFW, 2005). The open water habitat also provides feeding areas for birds such as ducks, cormorants, gulls, herons; and mammals such as river otter and mink. Insectivores such as swallows and bats also forage over the water. In addition, a wildlife migration corridor crosses the river in this reach providing a connection between Forest Park and Smith and Bybee Wetlands.

The Willamette River is a designated Special Habitat Area, reflecting its value as a wildlife corridor and as federally designated "Critical Habitat" for salmonids species listed as threatened under the Endangered Species Act. The beach and near-shore shallow water areas along the Willamette River also provide important habitat for ESA-listed salmonids and macroinvertebrates (ODFW, 2005).

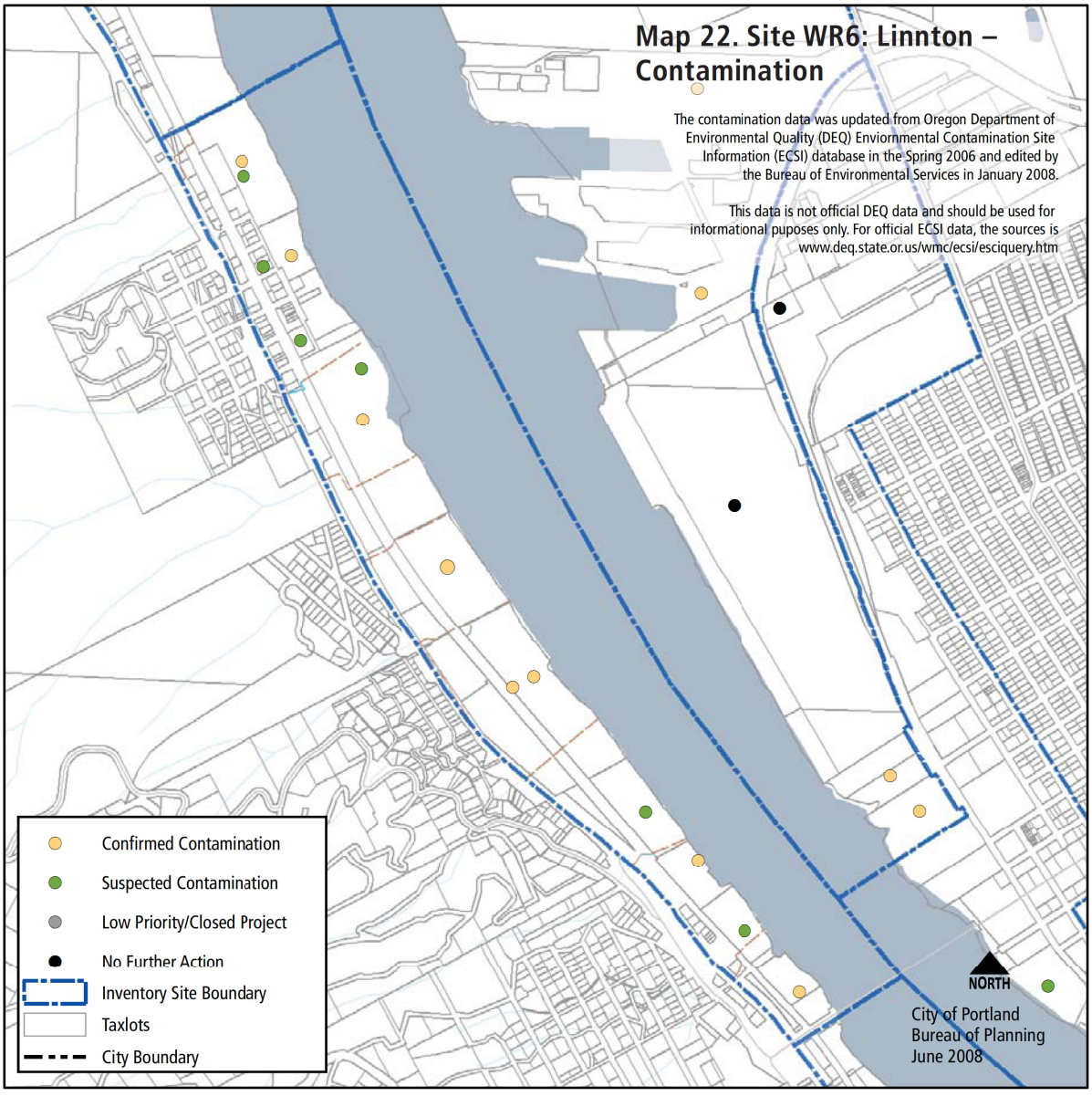
The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, and temperature. Oregon Water Quality Index values from 1986 to 1995 for the Lower Willamette Basin in Portland range from fair to very poor. The Lower Willamette River in Portland is also deemed unsafe for swimming.

Two vegetated patches extend upland (west) from the bank. The first is located approximately in the middle of the site and contains woodland and shrub land vegetation. The woodland area is dominated by black cottonwood, alder and maple trees. The dominant ground cover is sword fern and English ivy. The shrubland area is dominated by Himalayan blackberry and a few maples. The second vegetated area is located at the southwestern end of the site and contains forest vegetation dominated by cottonwood and alder trees, Himalayan blackberry and Scot's broom, and sword fern ground cover. The second vegetated area contains steep slopes.

Five streams are piped through the inventory site. Two stream channel segments remain in the upland vegetated areas. The northern channel is approximately 200 feet long. The southern channel is roughly 30 feet long. The channels are constructed of concrete and metal grates cover the streams. Both flow from upstream under Highway 30 via pipes and culverts, then return to pipes prior to discharging to the Willamette.

The St. Johns Bridge is designated a Special Habitat Area (SHA) because is provides nesting sites for American Peregrine falcon, which is listed as endangered in Oregon.

Soil, groundwater and river sediments within the site contain contamination resulting from past and current industrial activities such as bulk-oil storage, gasoline storage, plywood manufacturing, and auto maintenance (see Map 22). Types of pollutants found here include benzene, petroleum, diesel, methyl tertiary butyl ethel (MTBE), polycyclic aromatic hydrocarbons (PAHs), formaldehyde, phenol, metals, xylenes, and others. Potential environmental and health risks include direct contact or ingestion of contaminated sediments or groundwater by humans, aquatic organisms, birds or mammals and consumption of fish or crayfish by recreational anglers. For more information regarding contamination, visit the DEQ website at http://www.deq.state.or.us/lq/ecsi/ecsi.htm.



Natural Resource Evaluation

The natural resources located within this site have been evaluated for relative riparian and wildlife habitat quality. Relative quality is presented in the form of relative functional value ranks for riparian corridors, wildlife habitat, and riparian/wildlife habitat value combined (Table 23). The relative ranks are produced using GIS models and information on Special Habitat Areas. The model criteria are not sensitive to the species of vegetation present or whether vegetation is native or non-native. However, the model criteria do assign different values to cultivated, heavily manicured and managed landscapes and semi-natural and natural vegetation. The approach used to generate the relative ranks is summarized in the introduction to the North Reach sites. Additional detail is provided in the Methodology Overview section of this report and in Appendix E – *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

All of the ranked resource areas provide significant riparian and/or wildlife habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can help inform planning programs, design of development or redevelopment projects, mitigation and restoration activities.

Riparian Corridors – Relative Ranks

The site contains portions of the Willamette River and vegetated and non-vegetated flood area that contribute to the riparian functions mentioned in the previous section. These landscape features provide the following riparian functions:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank function, and sediment, pollution and nutrient control
- Large wood and channel dynamics
- Organic inputs, food web and nutrient cycling
- Riparian wildlife movement corridor

The Willamette River, and forest, woodland, and shrubland within the flood area or adjacent to streams rank high for overall riparian corridor function. High and medium relative ranks are assigned to beach, vegetated banks and associated land within 50 feet of the river. Medium relative functional ranks are assigned to herbaceous vegetation within the flood area. Low relative ranks are assigned to portions of flood area with no vegetation and to hardened, non-vegetated river banks. Other vegetated areas are assigned a high, medium, or low relative functional rank depending on the proximity and extent of the vegetation relative to the Willamette River (WR6 Map 4).

Wildlife Habitat – Relative Ranks

The site contains a forested patch of bottomland hardwood vegetation in the southwest section of the site. This area is close to the river, and provides connectivity between the Willamette River and Forest Park. Based on the wildlife habitat model criteria (patch size, interior area, and proximity to other patches and water), a medium relative rank is assigned to the forest patch.

The Willamette River is a designated Special Habitat Area, reflecting its value as a wildlife corridor and as federally designated "Critical Habitat" for salmonids species listed as threatened under the Endangered Species Act. The SHAs contain unique features and provide critical wildlife habitat as described in the Natural Resources Description section above. SHAs receive a high relative rank for wildlife habitat. The SHA ranking supersedes lower rankings generated by the GIS model. Therefore, all SHAs within the site rank high for wildlife habitat (WR1 Map 5).

Combined Riparian/Wildlife Habitat Relative Ranks

Where areas mapped as riparian corridors and wildlife habitat overlap, and their relative ranks differ, the combined relative rank will be the higher of the two ranks. For example, an area that ranks medium for riparian function and low for wildlife habitat will receive a medium combined relative rank. Areas that are assigned a high combined relative rank include those that rank high for riparian functions or wildlife habitat, including Special Habitat areas (WR6 Map 6).

Table 23: Summary of Ranked Resources in WR6: Linnton

Total Inventory Site = 325 acres
Terrestrial* = 155 acres
Willamette River = 170 acres

	High	Medium	Low	Total
Riparian Corridor **				
acres	176	8	31	215
percent total inventory site area	54	2	10	66
Wildlife Habitat **				
acres	0	8	0	8
percent total inventory site area	0	2	0	2
Special Habitat Areas **				
acres	171			
percent total inventory site area	53			
Wildlife Habitat- adjusted for Special Habitat Areas ***				
acres	171	8	0	179
percent total inventory site area	53	2	0	55
Combined Riparian Corridor/Wildlife Habitat +				
acres	176	14	24	215
percent total inventory site area	55	4	7	66
Combined Riparian Corridor/Wildlife Habitat (excludes Willamette River)				
acres	7	13	24	44
percent total inventory site area	2	4	7	13

* Terrestrial includes the land, tributary streams, drainageways and wetlands

** High-ranked riparian resources, wildlife habitat, and Special Habitat Areas includes the Willamette River

*** Special Habitat Areas rank high for wildlife habitat

\+ Because riparian resources, wildlife habitat, and Special Habitat Areas overlap, the results cannot be added together to determine the combined area.



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Site WR6 - Map 1: Linnton

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 800'

0' 400' 800' 1200'

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Site WR6 - Map 2: Linnton

Water-Related Features

Water Bodies

River Depths

- 0 to -20′
- -20 to -30′
- -30 to -40′
- deeper than 40′
- Stream/Drainage
- Culvert or Piped

Other Features

- Flood Area
- Wetlands
- Beach
- Bio-engineered
- Vegetative Rip Rap
- Non-vegetative Rip Rap
- Site Boundary
- City Boundary

Outfalls

- Stormwater
- Combined stormwater /sanitary
- Abandoned
- Unclassified Fill Bank
- Rock Bank
- Seawall
- Pilings
- Urban Services

INFORMATION SOURCES:

Water Bodies:
Rivers, lakes and other water features. Originally digitized by Metro (1994). Data collection scale: 1:100′ - 1:400′. City of Portland and Multnomah County pockets updated by City of Portland, Bureau of Planning, to refine waterbody geometry, remove erroneously mapped waterbodies, and add missing waterbodies. Aerial photos were the primary data source used as reference for re-mapping waterbodies. This is an interim dataset reflecting all work completed to date.
Outfalls: Maintained by BES (June 2008) Location is approximate and data may be incomplete.

All data compiled from source materials at different scales.
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Scale: 1″ = 800′

0′ 400′ 800′ 1200′

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Site WR6 - Map 3: Linnton

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

All data compiled from source materials at different scales.
For more detail, please refer to the source materials or
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Site WR6 - Map 4: Linnton

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

For more information, please visit our website:
http://www.portlandonline.com/planning/index.cfm?c=40437

NOTE: Portland's resource inventory is still being evaluated for accuracy and consistency and should be considered preliminary. The inventory has not yet been adopted by the City of Portland.

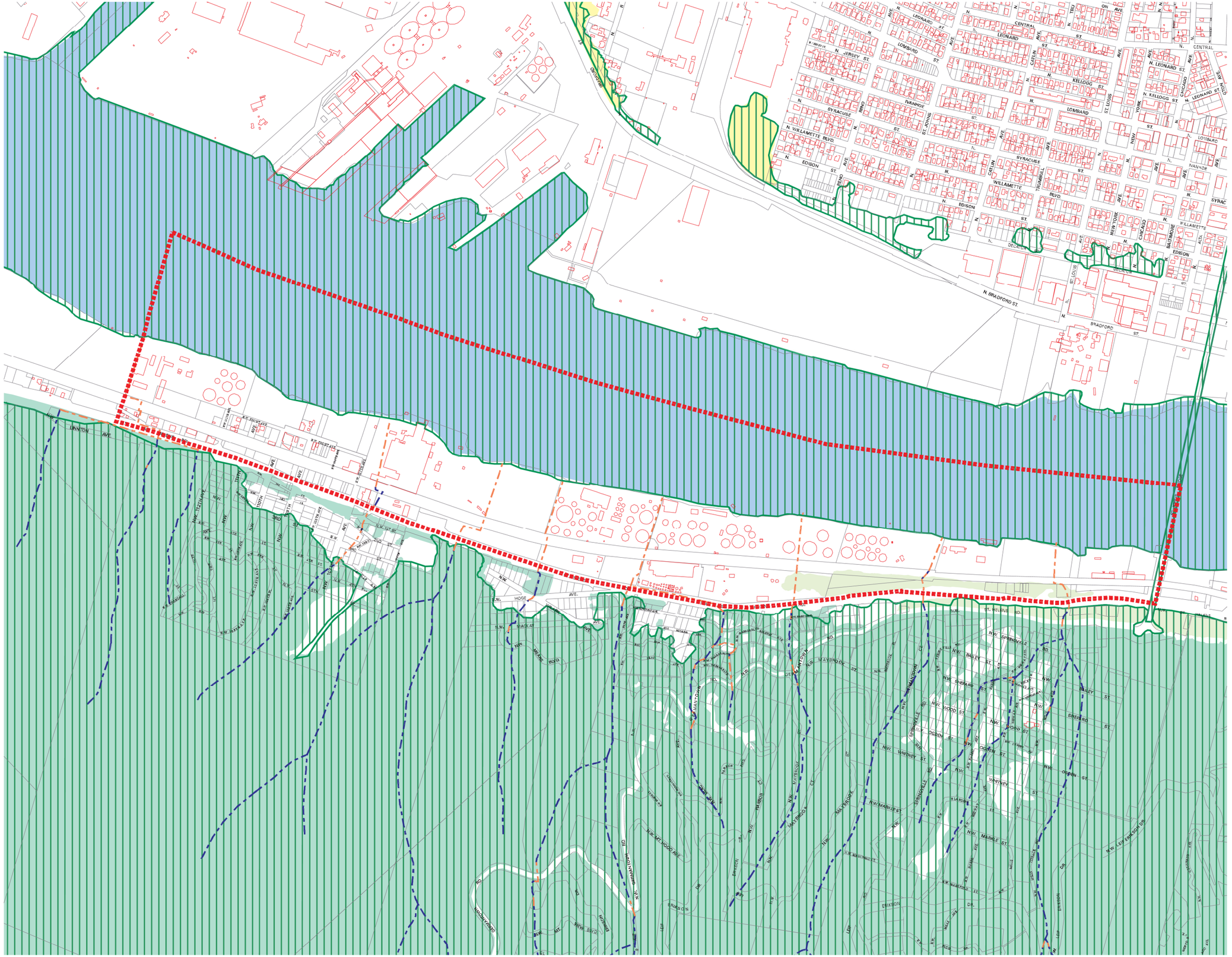
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Site WR6 - Map 5: Linnton

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

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Site WR6 - Map 6: Linnton

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

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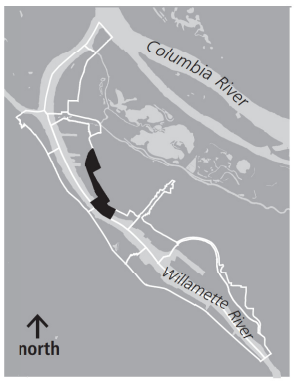
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Inventory Site WR7: NORTH OAK PALISADES/ CATHEDRAL PARK



Summary Information

Watershed: Willamette River Watershed

Neighborhood: St. Johns and Cathedral Park Neighborhoods

USGS quadrangle and quarter section maps: 1N1W01, 1N1W02, 1N1W11, 1N1W12, 2N1W35, and 1820, 1920-21, 2020-21, 2120-21, 2221

River Mile: 5.4 – 6.0

Site Size: 250 acres (land and water)

Previous Inventory: Lower Willamette River Wildlife Habitat Inventory, March 1986

Zoning:

General Industrial (IG2)
Heavy Industrial (IH)
General Employment (EG1, EG2)
Residential (R1, R2 and R5)
Open Space (OS)

River General overlay (g)
River Water Quality overlay (q)
River Recreational overlay (r)
Scenic overlay (s)

Existing Land Use: Industrial; commercial; residential; natural area

General Description: The site includes bluffs containing remnant native Oregon white oak stands that provide connectivity from upland habitat to the Willamette River at Cathedral Park, and along the river to Willamette Cove.

Resource Features: Foothill savanna/oak woodland; upland forest; woodland and shrubland vegetation; riparian area; herbaceous vegetation; vegetated flood area; beach; open water

Functional Values: Microclimate and shade; stream flow moderation and water storage; bank function, and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; wildlife habitat; habitat connectivity/ movement

Special Habitat Area: **Willamette River** – Area critical to sensitive species including NOAA designated Critical Habitat (S) and connectivity corridor (C). **Willamette Bluff Complex: Roberts/ Railroad Bluff, Weyerhauser Ave Woodlands, Edison Street Woodlands** – Native oak (O) and wildlife habitat connectivity corridor (C). **St. Johns Bridge Nests** – Area critical to sensitive species (S) and resource or structure that provides unique habitat function in natural or built environment (U).

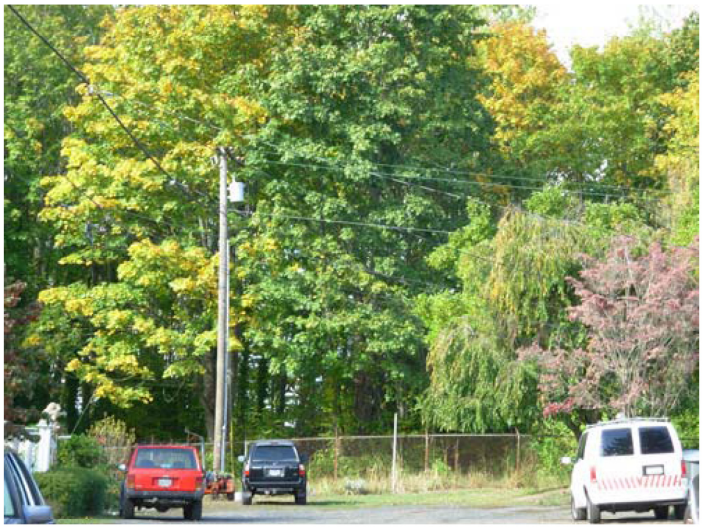
Special Status Species: **Wildlife:** American Peregrine falcon, river otter. **Fish:** Lower Columbia River Chinook salmon; Lower Columbia River steelhead trout; Pacific lamprey

Natural Hazards: Landslide Willamette River Columbia River north

Contamination: Yes

Site Description

The North Oak Palisades inventory site is 250 acres in size. The terrestrial portion of this site is approximately 201 acres and connects Pier and Chimney Parks to Cathedral Park and the western portion of Willamette Cove. The northwest and western site boundaries follow N Bradford St from Lombard Ave to Cathedral Park. Lombard Ave, Weyerhauser Ave and Edison St. generally form the northeast boundary from the intersection of N Bradford St and Lombard Ave to Cathedral Park. WR7 Map 1 shows the aerial view of the North Oaks Palisades inventory site.



Oaks at the northern terminus of Edison Street.

A roughly 49-acre section of the Willamette River, extending from the shore to the river centerline, is part of this site. The 62-acre flood area includes 49 acres of open water, 9 acres of vegetation, and 4 acres of non-vegetated area. There are no wetlands within the site.

Vegetated areas at least ½ acre include approximately 10 acres of forest or dense tree canopy, 15 acres of woodland, 12 acres of shrubland and 16 acres of herbaceous cover. Several remnant native oak woodlands exist along the bluff. The woodlands are surrounded by residential and commercial property and provide a buffer between the industrial and residential development.

Industrial, commercial and residential development exists within the site. The site contains 120 acres (48%) impervious surface coverage, including 5.5 miles of road. The site includes Cathedral Park and the bluffs overlooking Port of Portland Terminal 4, where the Toyota auto receiving shipyard is located. The site contains a portion of the St. Johns Bridge. The City of Portland Bureau of Environmental Services (BES) Water Pollution Control Lab is located just southeast of the bridge.

This site contains steep slopes. The area above Bradford St, from St. Johns Bridge to the northwest site boundary, is within the Potential Landslide Hazard area (City of Portland, 2002). A small part of the site adjacent to the river is in the flood area (City of Portland 2007).

Table 24: Summary of Natural Resource Features in WR7: North Oak Palisades/Cathedral Park

	Study Area (250 acres)
Stream (miles)	
Willamette River (linear feet/acres)	3,170 / 49
Open Stream Channel (linear feet)	0
Piped Stream Segments (linear feet)	0
Wetlands (acres)	**0**
Flood Area (acres)*	**62**
Vegetated (acres)	9
Non-vegetated (acres)	4
Open Water (acres)	49
Vegetated Areas >= ½ acre (acres)+	**53**
Forest (acres)	10
Woodland (acres)	15
Shrubland (acres)	12
Herbaceous (acres)	16
Impervious Surfaces (acres)	**120**

* The flood area includes the FEMA 100-year floodplain combined with the adjusted 1996 flood inundation area.

\+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and is currently being updated based on 2006 aerial photography.

Active dredging in the Willamette River has produced a uniform channel with little complexity. The inventory site is bordered by heavy industrial uses that have substantially modified bank conditions and nearshore areas. Marine cargo activities are common in river, with large vessels docking or passing through to upstream berths. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships. Beaches and associated nearshore shallow-water areas provide habitat for migrating salmonids, shorebirds and other wildlife species.

The Oregon Department of Environmental Quality has documented three areas of soil or sediment contamination within this site, in addition to contaminated sediments in the Willamette River. BES manages three active revegetation projects on the Cathedral Park property.

Natural Resources Description

This site contains both aquatic and terrestrial resources and is an important habitat connectivity corridor (key resource features are shown in WR7 Maps 2 and 3). Four upland vegetated areas exist along Roberts Railroad Bluff, Weyerhauser Avenue, and Edison and Decatur Streets. These areas contain native Oregon white oak and Pacific madrone, which are characteristic of the foothill savanna/oak woodland community type. Other trees species include ponderosa pine and Bigleaf maple. These areas contain a mix of large trees that are approximately 95 to 120 years old. The woodlands are one of the only sources of local cover for bird and small mammal species that use the area. Acorns and oak galls, as well as insects found on trees, are a good food source, while tree cavities in the oak provide nesting habitat for birds such as swallows, wrens, and great horned owls. The bluffs also provide recreation and scenic resource benefits and opportunities.

The vegetated areas along the bluffs provide habitat connectivity between Pier and Chimney Parks to the north-northeast of the Roberts Railroad Bluff, to the Willamette River via Cathedral Park, and along the Willamette River via a nearly continuous stretch of vegetated riverbank and beaches. The upland habitat corridor along the bluff extends southward beyond the site to the Fremont Bridge. Roberts Railroad Bluff is connected to Pier and Chimney Parks by shrubland and woodland vegetation along a railroad corridor. Portions of the railroad corridor are steeply sloped. The corridor is heavily disturbed, and there is a distinct break in connective vegetation for approximately 600 feet before reaching the Edison Street Woodland.

At the northern end of the site, and located along the Roberts Railroad Bluff, is a forested area known as Crown Cork. Crown Cork is approximately 6 acres of forest vegetation containing a mix of Douglas fir, Bigleaf maple, black cottonwood and some Oregon white oaks. The majority of the forest canopy is located on relatively flat topography, becoming steeper along the north and west edge of the forest. Crown Cork is contiguous to the bluffs identified in the site and is part of the wildlife connectivity corridor that extends from Pier and Chimney Park to the Fremont Bridge.

Along the steep slopes are a series of woodland patches. A mixture of medium-aged Douglas fir, Bigleaf maple, black cottonwood, and Scouler willow also occur within the woodland patches. The canopy is fairly open, with canopy cover ranging from 30 to 45 percent. Bigleaf maple, black cottonwood, and Douglas fir dominate the northern section of the woodland. The open canopy has allowed an invasive and disturbance-based shrub and herbaceous understory to develop on the moderately dry and exposed ridge. The shrub understory of the woodland is largely composed of Himalayan blackberry, young holly, cultivated apple trees, Scot's broom, and trailing blackberry. The herbaceous understory contains a non-native-dominated mixture of reed canarygrass, fowl mannagrass, western sword fern, tansy ragwort, clematis, English ivy, vetch, Canada thistle, and bedstraw. A few snags are located within the woodland, and the majority of large mature white oak trees are within 100 feet of the edge of the bluff. The edge of the bluff is densely carpeted with English ivy that is suppressing most other vegetation on this west-facing exposed shelf.

The understory throughout the woodland contains large areas of disturbance, including many intersecting areas of severely compacted and eroding dirt trails, debris piles, and small excavated pits which contained surface water at the time of the field surveys. The upland habitats are also fragmented by the railroad, residential development and roads. Light, noise, landscaping and pets may affect wildlife using this habitat.

Steep slopes along Decatur Street separate the residential from industrial development. The industrial development below the steep slopes consists of very large paved areas that reduce habitat connections to the Willamette River. The large area of pavement can also form an island of reflected heat, which can scorch vegetation and prevent many species from utilizing surrounding habitat areas. Noise from terminal activities can also disturb wildlife.

The Roberts Railroad Bluff SHA contains a forest comprised of Ponderosa pine, native Oregon white oak and Pacific madrone with poison oak understory. The Weyerhauser Avenue Woodlands SHA contains native oak woodland, and foothill savanna habitats. The Edison Street Woodlands and Decatur Bluff SHAs contains oak palisades and foothill savanna habitats and habitat connectivity between Pier and Chimney Park and Cathedral Park. These four SHAs are part of an approximately seven-mile corridor of remnant oak bluffs that extend from Pier and Chimney Park to Cathedral Park, Willamette Cove and Willamette Bluff.

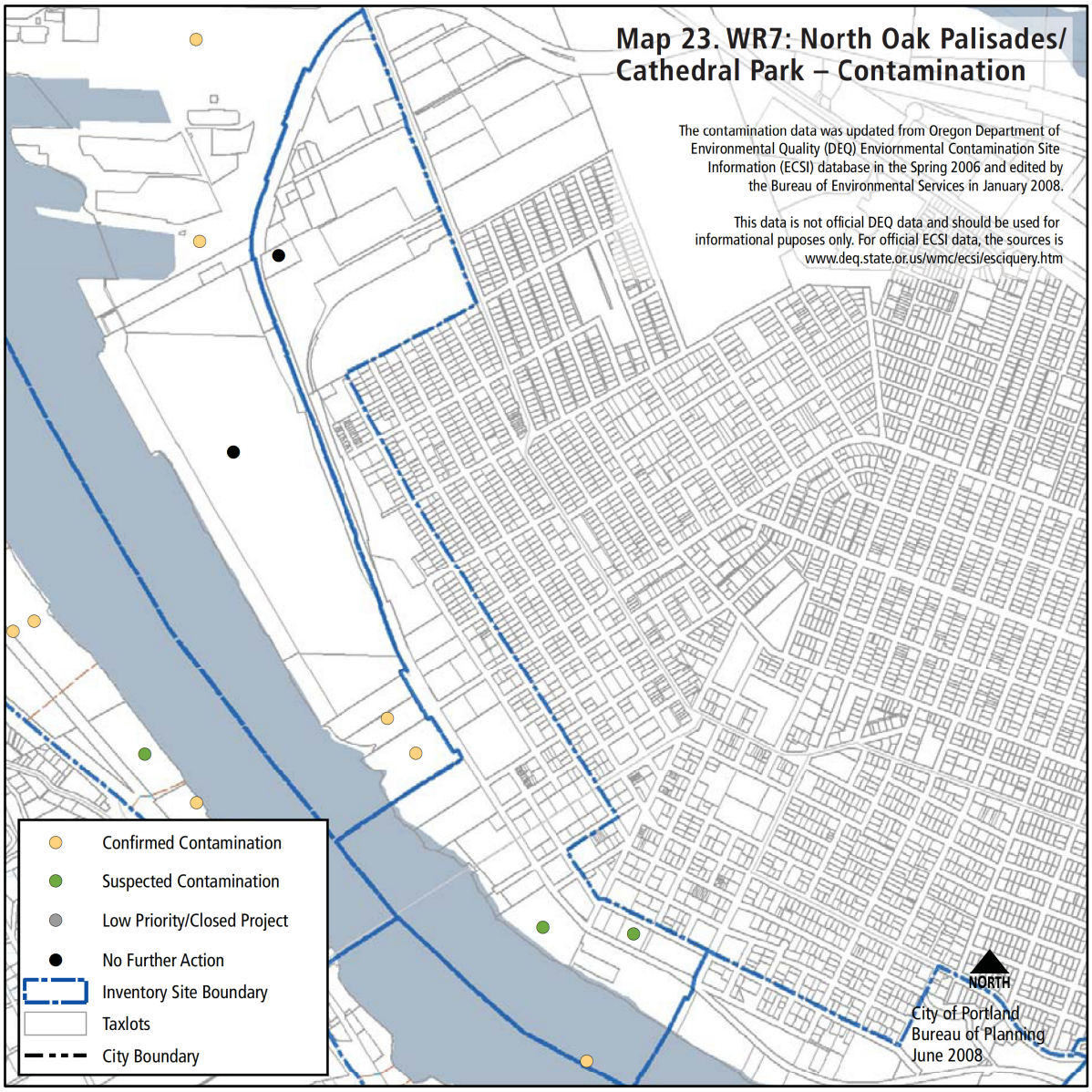
To the south of the industrial area, Cathedral Park contains large trees and managed herbaceous vegetation. Although maintained as an active park, Cathedral Park provides rare wildlife habitat connectivity between the upland bluffs and the Willamette River. A narrow corridor of mixed bottomland forest exists south of the Portland Bureau of Environmental Services Water Quality Lab. The forested area extends south to the northern end of Willamette Cove. The forest is dominated by young black cottonwood trees and contains some non-native tree species, including Lombardy poplar, catalpa and holly. Cherry and birch also occur, although infrequently. Himalayan blackberry and clematis dominate the understory and are suppressing most plant species other than sword fern. English ivy is also carpeting the understory and topping the crowns of many trees.

Bird species observed at the site included dark-eyed junco, song and house sparrows, starlings, American robin, and golden-crowned kinglet. Several raccoon tracks and mole holes were also found on the site. It is likely that raptors such as red-tailed hawks may hunt this site while utilizing the updrafts of warm air that form along the bluff face. Bird species observed at the site include American Peregrine falcon, which is listed as an endangered species in Oregon.

At Cathedral Park, the river beach contains some riprap and driftwood, and grades into a planted lawn. The near-shore substrate is silt with some sand and clay and provides shallow water habitat. The bank consists of rocks with driftwood and small amounts of debris. The beach extends from Cathedral Park southward to the Willamette Cove site. Native plantings of Pacific willow and black cottonwoods line the sand and rock bank. To the south the beach becomes heavily littered with debris and rubble juxtaposed with well-established groupings of Pacific willow, and grades into a relatively steep bank vegetated with reed canarygrass, Himalayan blackberry, and English ivy.

The beach and near-shore shallow water areas provide important habitat for salmonids that are listed as threatened species under the Endangered Species Act, including Lower Columbia River Chinook salmon and Lower Columbia River steelhead trout (ODFW, 2005). The river channel provides a migration corridor for fish, birds, and mammals. Adult salmon and steelhead utilize the Willamette River during migration. Other indigenous fish such as Pacific lamprey and sturgeon are expected to be present although their use of the reach may be limited by dredging. Fish such as sucker and carp may also be abundant in these uniform habitats (ODFW, 2005).

The open water also provides feeding areas for birds such as ducks, cormorants, gulls, herons; and mammals such as river otter and mink. Insectivores such as swallows and bats also forage over the water. A wildlife migration corridor crosses the river in this reach providing a connection between Forest Park and Smith and Bybee Wetlands.



The Willamette River is designated SHA, reflecting its role as a wildlife habitat corridor and NOAA designations as "Critical Habitat" for salmonids species listed as threatened under the Endangered Species Act. The beach and near-shore shallow water areas along the Willamette River also provide important habitat for salmonids and macroinvertebrates (ODFW, 2005).

The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, and temperature. Oregon Water Quality Index values from 1986 to 1995 for the Lower Willamette Basin in Portland range from fair to very poor. The Lower Willamette River in Portland is also deemed unsafe for swimming.

Contamination has been identified at a few properties within this site. Soils, groundwater and river sediments contain contamination from past and current industrial activities (see Map 23). Types of pollutants found here include petroleum products, lead, mercury, polycyclic aromatic hydrocarbons (PAHs), tributyltin, and others. Potential environmental and health risks include direct contact or ingestion of contaminated sediments or groundwater by humans, aquatic organisms, birds or mammals and consumption of fish or crayfish by recreational anglers. For more information regarding contamination, visit the DEQ website at http://www.deq.state.or.us/lq/ecsi/ecsi.htm.

Natural Resource Evaluation

The natural resources located within this site have been evaluated for relative riparian and wildlife habitat quality. Relative quality is presented in the form of relative functional value ranks for riparian corridors, wildlife habitat, and riparian/wildlife habitat value combined (Table 25). The relative ranks are produced using GIS models and information on Special Habitat Areas. The model criteria are not sensitive to the species of vegetation present or whether vegetation is native or non-native. However, the model criteria do assign different values to cultivated, heavily manicured and managed landscapes and semi-natural and natural vegetation. The approach used to generate the relative ranks is summarized in the introduction to the North Reach sites. Additional detail is provided in the Methodology Overview section of this report in Appendix E - *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

All of the ranked resource areas provide significant riparian and/or wildlife habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can help inform planning programs, design of development or redevelopment projects, mitigation and restoration activities.

Riparian Corridors – Relative Ranks

The site contains portions of the Willamette River and vegetated flood area that contribute to the riparian functions as detailed in the natural resource description. These landscape features provide the following riparian functions:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank function, and sediment, pollution and nutrient control
- Large wood and channel dynamics
- Organic inputs, food web and nutrient cycling
- Riparian wildlife movement corridor

High relative ranks are assigned to the Willamette River and flood area containing woodland and shrubland vegetation. High and medium relative ranks are assigned to beach and vegetated banks and associated land within 50 feet of the river. Medium relative ranks are assigned to portions of the flood areas containing herbaceous vegetation. Low relative ranks are assigned to remaining portions of flood area that are not vegetated and to hardened, non-vegetated river banks. Other vegetated areas are assigned a high, medium, or low relative rank depending on the proximity and extent of the vegetation relative to the Willamette River or the wetland (WR7 Map 4).

Wildlife Habitat – Relative Ranks

The primary wildlife habitat feature in this site is remnant Oregon white oak woodland and associated vegetated areas along the bluff. Based solely on the wildlife habitat attributes mentioned in the previous section (size, interior area, connectivity/proximity to other patches and water), the wildlife habitat model assigns a low relative rank to the forest/woodland patches in this site.

However, due to the presence of rare native oak stands, and the importance of the habitat corridors along the bluffs, these areas qualify as Special Habitat Areas. All in all, the site contains seven Special Habitat Areas (SHAs): Roberts Railroad Bluff, Weyerhauser Avenue Woodlands, Edison Street Woodlands, and Decatur Bluff Woodlands, the east portion of the St. Johns Bridge, a portion of Willamette Cove Bottomland and the Willamette River.

The SHAs contain unique features and provide critical wildlife habitat as described in the Natural Resources Description section above. SHAs receive a high relative rank for wildlife habitat. The SHA ranking supersedes lower rankings generated by the GIS model. Therefore, all SHAs within the site rank high for wildlife habitat (WR7 Map 5).

Combined Riparian/Wildlife Habitat Relative Ranks

Where areas mapped as riparian corridors and wildlife habitat overlap, and their relative ranks differ, the combined relative rank will be the higher of the two ranks. For example, an area that ranks medium for riparian function and low for wildlife habitat will receive a medium combined relative rank. Areas that are assigned a high combined relative rank include those that rank high for riparian functions or wildlife habitat, including Special Habitat Areas (Map 6.)

Table 25: Summary of Ranked Resources in WR7: North Oak Palisades/Cathedral Park

Total Inventory Site = 250 acres **Terrestrial* = 201 acres** **Willamette River = 49 acres**				
	High	Medium	Low	Total
Riparian Corridor **				
acres	53	9	3	65
percent total inventory site area	21	4	1	26
Wildlife Habitat				
acres	0	0	11	11
percent total inventory site area	0	0	5	5
Special Habitat Areas **				
acres	72			
percent total inventory site area	29			
Wildlife Habitat- adjusted for Special Habitat Areas ***				
acres	72	0	2	74
percent total inventory site area	29	0	1	30
Combined Riparian Corridor/Wildlife Habitat +				
acres	73	8	5	86
percent total inventory site area	29	3	2	34
Combined Riparian Corridor/Wildlife Habitat (excludes Willamette River)				
acres	24	8	5	37
percent total inventory site area	10	3	2	15

* Terrestrial includes the land, tributary streams, drainageways and wetlands

** High-ranked riparian resources, wildlife habitat, and Special Habitat Areas includes the Willamette River

*** Special Habitat Areas rank high for wildlife habitat

\+ Because riparian resources, wildlife habitat, and Special Habitat Areas overlap, the results cannot be added together to determine the combined area.

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Site WR7 - Map 1: North Oak Palisades/ Cathedral Park

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

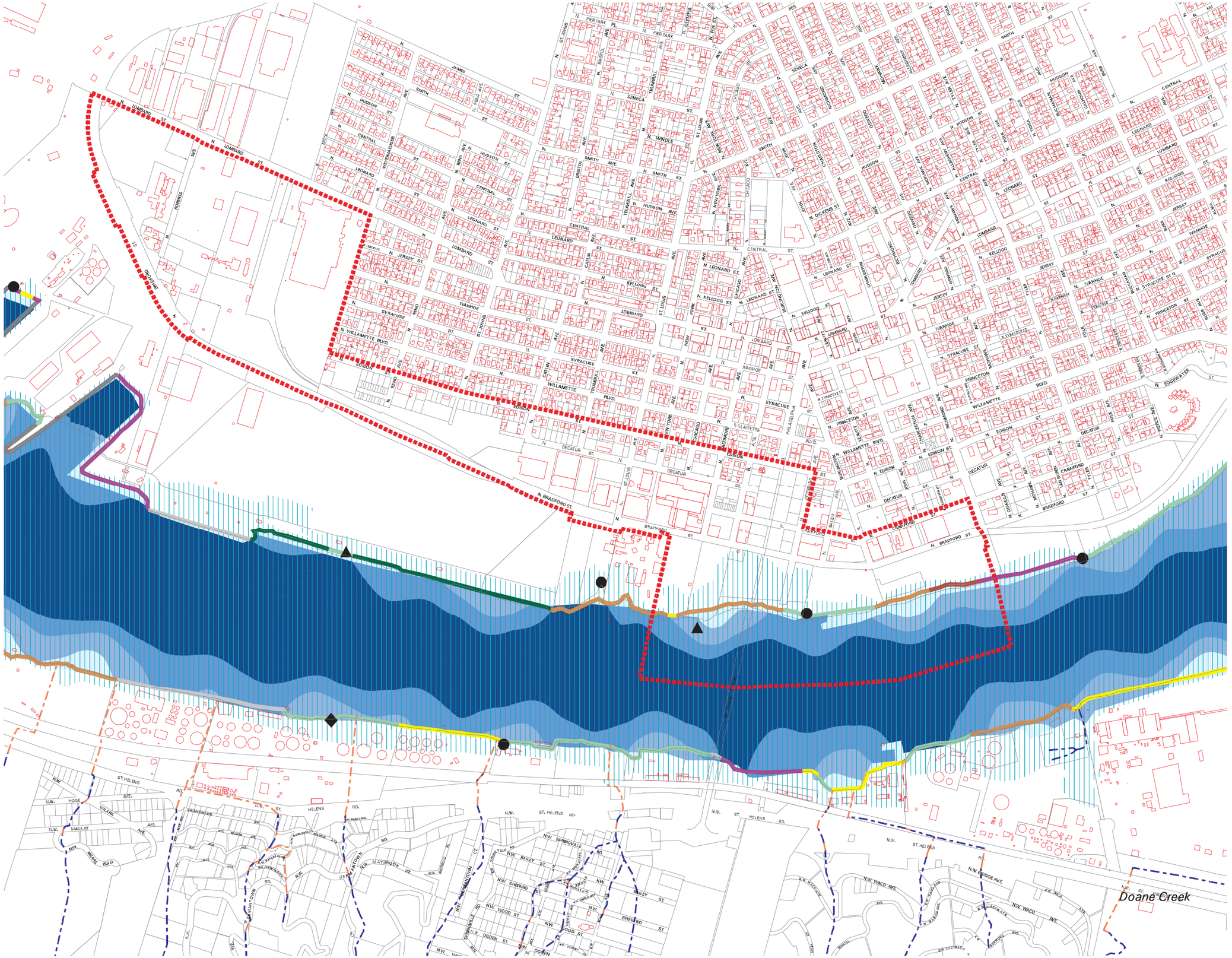
All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 800'

0' 400' 800' 1200'

N

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N. LOMBARD ST.
N. BRADFORD ST.
CENTRAL ST.
DECATUR ST.
WILLAMETTE BLVD.
SYRACUSE ST.
LEONARD ST.
IVANHOE ST.
KELLOGG ST.
JERSEY ST.
HUDSON ST.
SMITH ST.
SENECA ST.
WINDLE ST.
PRINCETON ST.
EDISON ST.
CRAWFORD ST.
N. CHICAGO AVE.
N. PHILADELPHIA AVE.
N. ST. LOUIS AVE.
N. ST. JOHNS AVE.
N. BRISTOL AVE.
N. TRUMBULL AVE.
N. CATLIN AVE.
N. HOUGHETTE AVE.
N. DENVER AVE.
N. CHARLESTON AVE.
N. DAWSON AVE.
N. MONTANA AVE.
N. NEW YORK AVE.
N. OMAHA AVE.
N. ATLANTA AVE.
N. WHITAKER AVE.
N. KNOTT ST.
N. MISSISSIPPI AVE.
N. ALBINA AVE.
N. VOLLUM AVE.
N. MICHIGAN AVE.
N. MISSOURI AVE.
N. INTERSTATE AVE.
N. RIVERSIDE AVE.
N. BRANDON AVE.
N. WOLFORD ST.
N. MACRUM CT.
N. FIR PARK PL.
N. FIR PARK AVE.
N. OLYMPIA ST.
N. KERBY AVE.
N. KNOTT ST.
N. MAIN AVE.
N. MAYFIELD ST.
N. MOSELEY ST.
N. MOHAWK ST.
N. MONTANA ST.
N. NEW YORK ST.
N. OMAHA ST.
N. ATLANTA ST.
N. WHITAKER ST.
N. KNOTT ST.
N. MISSISSIPPI ST.
N. ALBINA ST.
N. VOLLUM ST.
N. MICHIGAN ST.
N. MISSOURI ST.
N. INTERSTATE ST.
N. RIVERSIDE ST.
N. BRANDON ST

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Site WR7 - Map 3: North Oak Palisades/ Cathedral Park

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

All data compiled from source materials at different scales.
For more detail, please refer to the source materials or
City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 800'

0' 400' 800' 1200'

N

Doane Creek

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Site WR7 - Map 4: North Oak Palisades/ Cathedral Park

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

For more information, please visit our website:
http://www.portlandonline.com/planning/index.cfm?c=40437

NOTE: Portland's resource inventory is still being evaluated for accuracy and consistency and should be considered preliminary. The inventory has not yet been adopted by the City of Portland.

All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 800'

0' 400' 800' 1200'

N

Doane Creek

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Site WR7 - Map 5: North Oak Palisades/ Cathedral Park

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

For more information, please visit our website:
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Site WR7 - Map 6: North Oak Palisades/ Cathedral Park

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

For more information, please visit our website:
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NOTE: Portland's resource inventory is still being evaluated for accuracy and consistency and should be considered preliminary. The inventory has not yet been adopted by the City of Portland.

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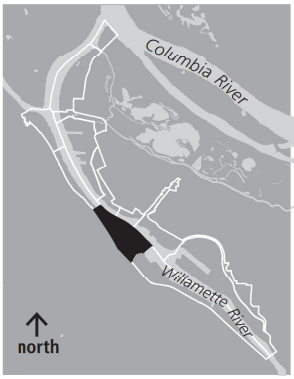
Scale: 1" = 800'

0' 400' 800' 1200'

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Inventory Site WR8: DOANE LAKE



Summary Information

Watershed: Willamette River

Neighborhood: Northwest Industrial Neighborhood

USGS quadrangle, quarter section maps: 1N1W11, 1N1W12, 1N1W13, 1N1W18 and 2120-21, 2220-22, 2321-23, 2421-23

River Mile: 5.5 – 7.1

Site Size: 481 acres (land and water)

Previous Inventory: Lower Willamette River Wildlife Habitat Inventory, March 1986; Northwest Hills Natural Areas Protection Plan, July 1991

Zoning:
- Heavy Industrial (IH).
- Environmental Conservation overlay (c)
- River Natural (n)
- Scenic overlay (s)
- Environmental Protection overlay (p)
- River Industrial overlay (i)
- River Water quality (q)

Existing Land Use: Industrial; undeveloped area; railroad

Landscape Setting: The site provides an important connection between Forest Park and the Willamette River. The site contains wetlands and contaminated soils, including within the open channels along Doane Lake.

Resource Features: Bottomland forest; upland scrub/shrub; wetland scrub/shrub; grassland; emergent wetland; beach; open water

Functional Values: Microclimate and shade; stream flow moderation and water storage; bank function, and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; wildlife habitat; habitat connectivity/ movement corridor

Special Habitat Area: **Willamette River** – Area critical to sensitive species including NOAA designated Critical Habitat (S) and wildlife habitat connectivity corridor (C). **North Doane Lake, Doane Creek and upland habitat** – Wetland (W), Bottomland hardwood forest (B), migratory stopover habitat (M), wildlife habitat connectivity corridor (C), area critical to sensitive species (S), upland meadow, prairie or grassy area (G) and resource or structure that provides unique habitat function in natural or built environment (U). **Railroad Bridge - peregrine falcon nesting site** – Area critical to special status species (S) and resource or structure that provides unique habitat function in natural or built environment (U).

Special Status Species: **Wildlife:** American Peregrine falcon, Western Painted Turtle, river otter. **Fish:** Lower Columbia River Chinook salmon; Lower Columbia Coho salmon; Lower Columbia River steelhead trout, Pacific lamprey

Natural Hazards: Landslide, flood area

Contamination: Yes

Site Description

This 481-acre inventory site is located on the west bank of the Willamette River, extending from the St. Johns Bridge at the northwest end to NW 61st Avenue at the southeastern end of the site. The Burlington Northern Railroad Bridge is located approximately in the middle of the site.

The inventory site has approximately 8,600 feet of shoreline along the Willamette, and provides an important link between Forest Park to the west and the river to the east. WR8 Map 1 shows the aerial view of the Doane Lake inventory site.

Most of this site is developed with industrial uses. The site contains 157 acres (33%) of impervious surface including 3.7 miles of road. The site also contains wetlands, stream segments and a vegetated area around the Burlington Northern railroad bridge.

The original Doane Lake was a large wetland of about 80 acres, which was filled during construction of the railroad. Today, a 7-acre wetland, North Doane Lake, exists near the center of the site between the rail lines. West Doane Lake, a 1-acre pond is located immediately south of the rail line. A segment of Doane Creek is also located on the site. Doane Creek is a seasonal stream that drains from Forest Park. It flows under Highway 30 in a culvert, is open channel for approximately 1,600 linear feet, and is then piped through the remainder of the site before discharging to the Willamette via an outfall.



Deer near North Doane Lake.

Table 26: Summary of Natural Resource Features in WR8: Doane Lake

	Study Area (481acres)
Stream (miles)	
Willamette River (miles/acres)	1.6
Open Stream Channel (linear feet)	5,810
Piped Stream Segments (linear feet)	3,809
Wetlands (acres)	**7**
Flood Area (acres)*	**199**
Vegetated (acres)	14
Non-vegetated (acres)	26
Open Water (acres)	159
Vegetated Areas >= ½ acre (acres)+	**112**
Forest (acres)	12
Woodland (acres)	6
Shrubland (acres)	25
Herbaceous (acres)	69
Impervious Surfaces (acres)	**157**

* The flood area includes the FEMA 100-year floodplain combined with the adjusted 1996 flood inundation area.

\+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and is currently being updated based on 2006 aerial photography.

Vegetated areas at least ½ acre in size include 12 acres of forest or dense tree canopy, 6 acres of woodland, 25 acres of shrubland and 69 acres of herbaceous cover. Roughly 14 acres of the flood area is vegetated, while about 26 acres of flood area is non-vegetated and largely developed with industrial uses.

The site contains a mix of riverbank types including beach, vegetated riprap, non-vegetated riprap, seawall and unclassified fill.

Portions of the site are within the Potential Landslide Hazard area (City of Portland, 2002).

This site contains contaminated soils, groundwater and river sediments resulting from industrial uses.

Active dredging in the Willamette River has produced a relatively uniform channel with little complexity. The inventory site is bordered by heavy industrial uses, which have substantially modified bank conditions and nearshore areas. Marine cargo activities are common in river, with large vessels docking or passing through to upstream berths. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships.

Beaches and associated nearshore shallow-water areas provide habitat for migrating salmonids, shorebirds and other wildlife species.

Natural Resources Description

Aquatic and terrestrial resources within the site are located along the bank of the Willamette River, within the river, and in the vicinity of North Doane Lake and the open portion of Doane Creek (key resource features are shown in WR8 Maps 2 and 3).

The banks of the Willamette River are within the active flood area, and are generally vegetated with shrubland or herbaceous cover. Bottomland forest exists around the railroad bridge, and extends approximately 700 feet south of the bridge along the river. The banks are characterized primarily by beach and vegetated riprap, as well as nonvegetated riprap, seawall and unclassified fill.

The remnant of Doane Lake is approximately 6 acres of shallow open-water surrounded by 4 acres of forested wetland, scrub-shrub wetland, and emergent wetland contained within railroad berms called North Doane Lake. The forested wetland is diverse, multi-layered, has a closed canopy of 90%, and consists of black cottonwood, Oregon ash, Pacific willow, cherry, red alder, and black hawthorn. Downed wood and snags are abundant. North Doane Lake is fed by an unnamed seasonal stream that originates in Forest Park and crosses under St. Helens Road in culverts.

Studies of the area show that red-legged frogs, a sensitive species in Oregon, have used North Doane Lake as breeding habitat in the past 15 years (ODFW, 1996). An inventory done in March 2002 did not find any red-legged frogs or egg masses in North Doane Lake. However, the report stated that due to abnormally high water, the conditions may not have been optimal for northern red-legged frogs at these particular locations (Environmental Science & Assessment, LLC, 2002). During the 2002 inventory, Western Painted Turtle, which is a state listed sensitive species, was found in the lake. It is likely that several other species of reptiles and amphibians occur in North Doane Lake, including garter snakes and northwestern salamanders, which commonly feed on red-legged frogs at certain life stages.

Surrounding North Doane Lake is a diverse, multi-layered forest of black cottonwood, Oregon ash, Pacific willow, cherry, red alder, and black hawthorn. Downed wood and snags are abundant. Scrub-shrub wetlands are transitional habitats that often occupy former wet-prairie areas associated with freshwater wetland depressions and alluvial and riparian bottomlands. These willow shrub thickets provide insectivorous species such as warblers, flycatchers and swallows food, cover, and nesting habitat. Small mammals and snakes are commonly found within emergent wetlands, which in turn attract coyotes and raptors such as northern harriers, red tail hawks and owls, which feed upon small mammals and snakes.

Approximately 100 yards to the north of North Doane Lake, at the west end of the railroad corridor, the perennial Doane Creek flows in a narrow 1600-foot open channel on the east side of the rail lines. Doane Creek is covered by a gallery of 20 to 30-year old red alder trees. Himalayan blackberry and English ivy dominate the understory. Doane Creek is piped for approximately 2,200 feet to the Willamette River.

Adjacent to Doane Creek, north of the railroad, is an upland meadow habitat that, in conjunction with Doane Creek and North Doane Lake, provides a wildlife connectivity corridor between Forest Park and the Willamette

River. This area provides opportunities for grazing, food for raptors, and critical access to water from Doane Creek and the Willamette River. There are few remaining upland habitat connections in the Willamette River North Reach. During site visits, deer and Canada geese were observed utilizing the habitat for grazing, numerous swallows were foraging, and a Red Tailed Hawk was observed circling the grassy areas. The meadow is dominated by Himalayan blackberry, non-native turf grasses and other invasive species. Connectivity is impacted by Highway 30 and the railroad corridor.

The area between St. Johns Bridge and the railroad bridge is heavily developed. Shrubland and herbaceous vegetation exist along the bank and remnant forest vegetation remains along Highway 30.

Steep slopes exist around the railroad tracks as well as along the river. The railroad corridor is approximately 150 feet wide and is separated from beaches along the river by NW Front Avenue. This corridor is a migration route for large mammals such as deer and bobcats that come from Forest Park. It is bounded on the south side by a 25-foot berm on which the railroad is located. The berm is vegetated primarily with Big leaf maples and Himalayan blackberry, and the corridor is bordered by Himalayan blackberry and Scot's broom. The majority of the corridor is an open grassland area, dominated by invasive grass species including reed canarygrass, timothy, foxtail, witchgrass, and orchard grass. The grassland area appears to be maintained to some degree by the railroad. Approximately 100 yards to the north of North Doane Lake, at the west end of the railroad corridor, the seasonal Doane Creek passes through a north-south oriented stream channel covered by a gallery of 20 to 30-year old red alder trees. Himalayan blackberry and English ivy dominate the understory.

Immediately south of the railroad berm is West Doane Lake and the Historic Drainage Ditch. At one time West Doane Lake received runoff from Forest Park and was hydrologically connected to the Historic Drainage Ditch, which flowed to the Willamette River via an outfall. In 1980, during construction of NW Front Avenue, the culvert between the Historic Drainage Ditch and the Willamette River was blocked. The pipe between West Doane Lake and the Historic Drainage Ditch was also blocked. Today the Historic Drainage Ditch does not have the characteristics of a stream or a wetland and the primary vegetation present is Himalayan Blackberry. West Doane Lake is a pond with surrounding shrubland and herbaceous vegetation. West Doane Lake is also contaminated from historic industrial land uses.

Three beach areas exist at this site. The northernmost beach is approximately 1,100 feet long and is located northeast (riverward) of the Northwest Natural property. The second beach begins at the railroad and extends south approximately 1,400 feet. South of the second beach the third beach extends 1,300 feet to the end of this site and continues into site WR11: Northwest Industrial for roughly 1,000 feet. The bank between the northern and middle beach consists of riprap, while the bank between the middle and southern beach is unclassified fill.

The beaches and near-shore shallow water areas provide important habitat for salmonids that are listed as threatened species under the Endangered Species Act, including Lower Columbia River Chinook salmon and Lower Columbia River steelhead trout (ODFW, 2005). Fish assemblages within this reach are expected to be oriented more toward non-native warm-water fish and opportunistic indigenous fish that do not appear to be as adversely affected by development as salmonid species. These species include peamouth, largescale sucker, and carp, which were found in abundance adjacent to shorelines by Farr and Ward (1993). Developed shoreline areas provide habitat opportunities for warm-water species, particularly bass and sunfish (ODFW, 2005). The open water of the Willamette River provides feeding areas for birds such as ducks, cormorants, gulls, herons; and mammals such as river otter and mink. Insectivores such as swallows and bats also forage over the water. A wildlife migration corridor crosses the river in this reach providing a connection between Forest Park and Smith and Bybee Wetlands.

The beach south of the railroad is approximately 125 feet wide at its widest point, and contains an expanse of unvegetated sand that grades abruptly into an early successional disturbance-based herbaceous community

above the ordinary high water mark. Vegetation includes annual and perennial herbs and grasses closer to the river, and young to moderately-aged trees and shrubs closer to Front Avenue. The herbaceous species include reed canarygrass, fowl mannagrass, yarrow, common horsetail, nightshade, ladysthumb, creeping bentgrass, western yellowcress, and marsh cudweed. Small amounts of driftwood and pieces of rubble were incorporated into the herbaceous stratum. The tree stratum is limited to a narrow band, primarily on an elevated bankcut. This fragmented forest corridor extends south to the Saltzman Creek outlet. A wide variety of trees are present within a small area, most within 20 to 40 years of age. Tree species included black cottonwood, bigleaf maple, black hawthorn, Oregon ash, red alder, cherry, and Pacific willow. Active beaver sign was recorded on two large cottonwood trees in this area. A dense shrub stratum extends about 20 feet riverward from the trees, and includes Himalayan blackberry, red elderberry, Scot's broom, and Scouler's willow.

Numerous wildlife species were observed within this site during the winter/spring 2000 field investigations, including herons, beaver, and deer. The complex and varied habitats that are present here provide natural habitat and cover for birds and small mammals. A large variety of birds were observed including great blue heron, doublecrested cormorant, dark eyed junco, scrub jay, rufous-sided towhee, hooded merganser, American coot, red-winged blackbird, Bewick's wren, Townsend's warbler, white-breasted nuthatch, varied thrush, mourning dove, American goldfinch, fox and song sparrow, and golden-crowned kinglet. Active beaver use was noted in several places within the site, and signs of small mammal use including pocket gopher, raccoon, and nutria were noted. Signs of deer were also noted.

Three Special Habitat Areas (SHAs) are designated within the site: North Doane Lake, the Willamette River and associated beaches and shallow-water areas, and the Burlington Northern Railroad bridge.

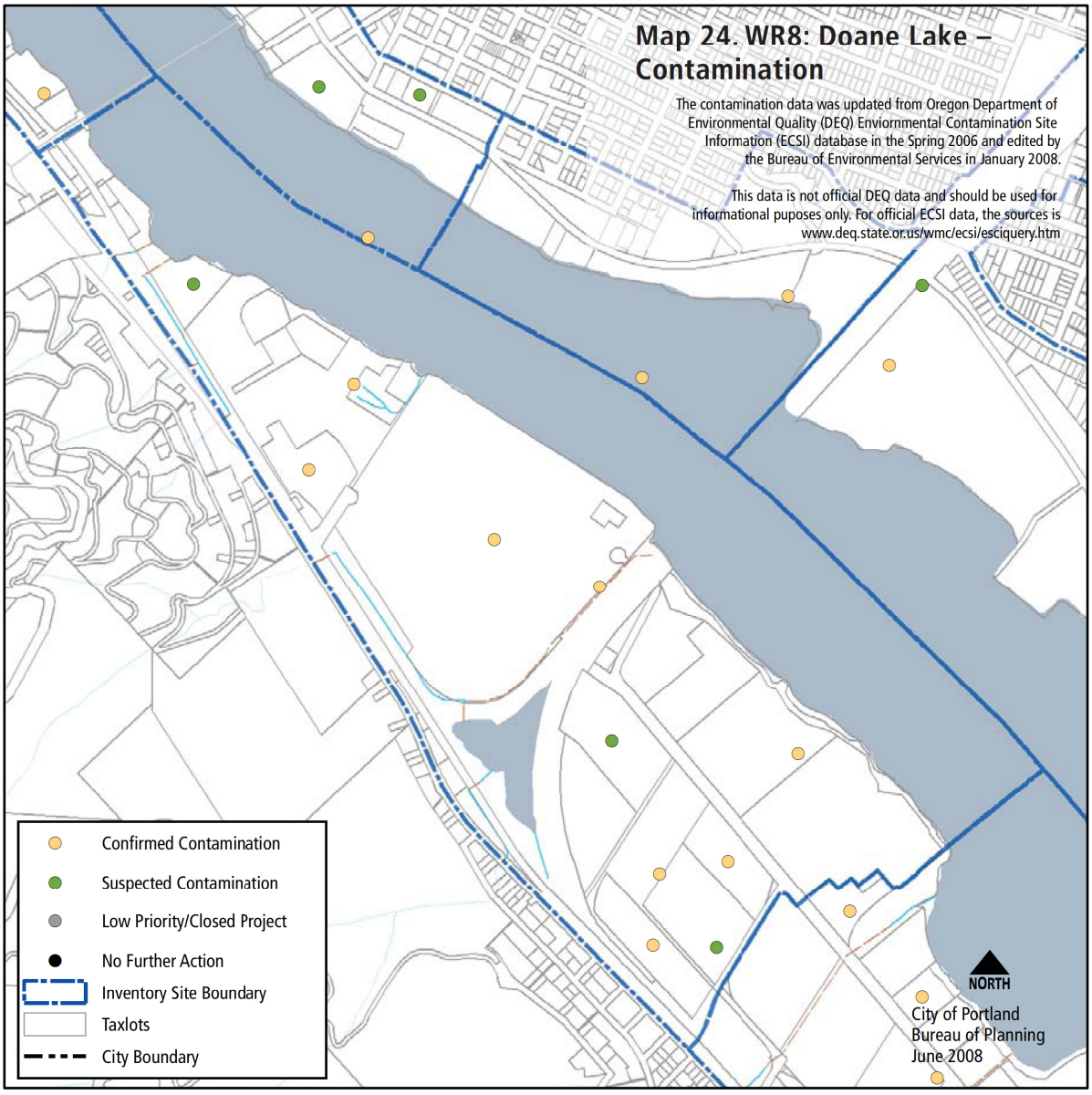
The North Doane Lake SHA contains approximately seven acres of shallow open-water surrounded by four acres of forested wetland, scrub-shrub wetland, and emergent wetland between railroad berms. Scrub-shrub wetlands provide insectivorous species such as warblers, flycatchers and swallows with food, cover, and nesting habitat. Small mammals and snakes are also found within emergent wetlands and are a food sources for coyotes and raptors such as northern harriers, red tail hawks and owls. North Doane Lake has been used by red-legged frogs as breeding habitat at some points during the past 15 years. Also included in the North Doane Lake SHA is Doane Creek, a seasonal stream draining from Forest Park. The creek is open-channel for approximately 1,600 feet. To the east of Doane Creek is a large open area dominated by mowed Himalayan blackberry. Doane Creek and the open vegetated area provide a connectivity corridor from Forest Park to the Willamette River. Deer have been observed using the open area.

The Willamette River SHA provides an important wildlife habitat corridor and has been designated by NOAA as "Critical Habitat" for salmonids species listed as threatened under the Endangered Species Act. The beach and near-shore shallow water area along the Willamette River provides important habitat for salmonids (ODFW, 2005).

The Burlington Northern Railroad bridge SHA provides nesting habitat for American Peregrine falcons.

Railroad corridors are very prominent within the site and border most of the natural areas. Railroads can pose difficulties for migrating large and small mammals, amphibians and reptiles. The combination of railroad embankments and roads (including NW St. Helens and NW Front) produces a dangerous passage for many terrestrial species inhabiting Forest Park that access Doane Lake and the Willamette River.

The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, and temperature. Oregon Water Quality Index values from 1986 to 1995 for the Lower Willamette Basin in Portland range from fair to very poor. The Lower Willamette River in Portland is also deemed unsafe for swimming.



Contamination has been identified at multiple locations in this inventory site. This inventory site contains contaminated soils, groundwater and river sediments, resulting from industrial uses such as coal gasification, lead smelting, agricultural chemical production, private landfill, solid waste transfer station, acetylene manufacturing, and other uses (see Map 24). Types of pollutants found here include arsenic, benzene, lead, petroleum hydrocarbons, sulfuric acid, toluene, zinc, calcium hydroxide, dioxin, dieldrin, and others. Potential environmental and health risks include Willamette River sediment contamination that is likely toxic to benthic organisms, bottom-feeding fish and potential anadromous fish that migrate through the area. Groundwater contamination may impact North Doane Lake and West Doane Lake. For more information regarding contamination, visit the DEQ website at http://www.deq.state.or.us/lq/ecsi/ecsi.htm.

Natural Resource Evaluation

The natural resources located within this site have been evaluated for relative riparian and wildlife habitat quality. Relative quality is presented in the form of relative functional value ranks for riparian corridors, wildlife habitat, and riparian/wildlife habitat value combined (Table 27). The relative ranks are produced using GIS models and

information on Special Habitat Areas. The model criteria are not sensitive to the species of vegetation present or whether vegetation is native or non-native. However, the model criteria do assign different values to cultivated, heavily manicured and managed landscapes and semi-natural and natural vegetation. The approach used to generate the relative ranks is summarized in the introduction to the North Reach sites. Additional detail is provided in the Methodology Overview section of this report and Appendix E – *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

All of the ranked resource areas provide significant riparian and/or wildlife habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can help inform planning programs, design of development or redevelopment projects, mitigation and restoration activities.

Riparian Corridors – Relative Ranks

The site contains portions of the Willamette River, flood area, and wetlands and vegetation that contribute to the riparian functions as detailed in the natural resource description. These landscape features provide the following riparian functions:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank function, and sediment, pollution and nutrient control
- Large wood and channel dynamics
- Organic inputs, food web and nutrient cycling
- Riparian wildlife movement corridor

High relative ranks are assigned to the Willamette River, the vegetated wetlands, and forest, woodland, and shrubland within the flood area. High and medium relative ranks are assigned to beach and vegetated banks and associated land within 50 feet of the river. Medium relative ranks are assigned to portions of the flood areas with herbaceous vegetation. Low relative ranks are assigned to portions of flood area that are not vegetated and to hardened, non-vegetated river banks. Other vegetated areas are assigned a high, medium, or low relative rank depending on the proximity and extent of the vegetation relative to the Willamette River, streams, or wetlands (WR8 Map 4)

Wildlife Habitat – Relative Ranks

The site contains wetland and stream features with surrounding vegetation provide important wildlife habitat. Open water areas, including streams and lakes, provide habitat for fish, aquatic invertebrates, reptiles, amphibians and water-dependent mammals.

Based on the wildlife habitat attributes mentioned in the previous section (size, interior area, connectivity/proximity to other patches and water), the wildlife habitat model assigns a medium relative rank to forest/woodland vegetation including the North Doane Lake forested wetland and Doane Creek and surrounding forest vegetation. The forest vegetation along the river near the railroad bridge is assigned a low relative rank.

Three Special Habitat Areas (SHAs) are designated within the site: North Doane Lake, the Willamette River and associated beaches and shallow-water areas, and the Burlington Northern Railroad bridge. The SHAs contain unique features and provide critical wildlife habitat as described in the Natural Resources Description section above. SHAs receive a high relative rank for wildlife habitat. The SHA ranking supersedes lower rankings generated by the GIS model. Therefore, all SHAs within the site rank high for wildlife habitat (WR2 Map 5).

Three Special Habitat Areas (SHAs) are designated within the site: the Willamette River, the Railroad Bridge and the North Doane Lake, Doane Creek and upland habitat complex.

Combined Riparian/Wildlife Habitat Relative Ranks

Where areas mapped as riparian corridors and wildlife habitat overlap, and their relative ranks differ, the combined relative rank will be the higher of the two ranks. For example, an area that ranks medium for riparian function and low for wildlife habitat will receive a medium combined relative rank. Areas that are assigned a high combined relative rank include those that rank high for riparian functions or wildlife habitat, including Special Habitat Areas (WR8 Map 6).

Table 27: Summary of Ranked Resources in WR8: Doane Lake

Total Inventory Site = 481 acres **Terrestrial* = 314 acres** **Willamette River = 167 acres**				
	High	Medium	Low	Total
Riparian Corridor**				
acres	189	19	35	242
percent total inventory site area	39	4	7	50
Wildlife Habitat **				
acres	0	19	0	19
percent total inventory site area	0	4	0	4
Special Habitat Areas **				
acres	210			
percent total inventory site area	44			
Wildlife Habitat- adjusted for Special Habitat Areas ***				
acres	210	1	0	211
percent total inventory site area	44	<1	0	44
Combined Riparian Corridor/Wildlife Habitat +				
acres	220	16	29	266
percent total inventory site area	46	3	6	55
Combined Riparian Corridor/Wildlife Habitat (excludes Willamette River)				
acres	61	16	29	106
percent total inventory site area	12	3	6	22

* Terrestrial includes the land, tributary streams, drainageways and wetlands

** High-ranked riparian resources, wildlife habitat, and Special Habitat Areas includes the Willamette River

*** Special Habitat Areas rank high for wildlife habitat

\+ Because riparian resources, wildlife habitat, and Special Habitat Areas overlap, the results cannot be added together to determine the combined area.

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Site WR8 - Map 1: Doane Lake

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 800'

0' 400' 800' 1200'

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Site WR8 - Map 2: Doane Lake

Water-Related Features

Water Bodies

River Depths

- 0 to -20′
- -20 to -30′
- -30 to -40′
- deeper than 40′
- Stream/Drainage
- Culvert or Piped

Other Features

- Flood Area
- Wetlands
- Beach
- Bio-engineered
- Vegetative Rip Rap
- Non-vegetative Rip Rap
- Site Boundary
- City Boundary

Outfalls

- Stormwater
- Combined stormwater /sanitary
- Abandoned/Unclassified Fill Bank
- Rock Bank
- Seawall
- Pilings
- Urban Services

INFORMATION SOURCES:

Water Bodies:
Rivers, lakes and other water features. Originally digitized by Metro (1994). Data collection scale: 1:100′ - 1:400′. City of Portland and Multnomah County pockets updated by City of Portland, Bureau of Planning, to refine waterbody geometry, remove erroneously mapped waterbodies, and add missing waterbodies. Aerial photos were the primary data source used as reference for re-mapping waterbodies. This is an interim dataset reflecting all work completed to date.
Outfalls: Maintained by BES (June 2008) Location is approximate and data may be incomplete.

All data compiled from source materials at different scales.
For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1″ = 800′

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Site WR8 - Map 3: Doane Lake

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

All data compiled from source materials at different scales.
For more detail, please refer to the source materials or
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Site WR8 - Map 4: Doane Lake

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

For more information, please visit our website:
http://www.portlandonline.com/planning/index.cfm?c=40437

NOTE: Portland's resource inventory is still being evaluated for accuracy and consistency and should be considered preliminary. The inventory has not yet been adopted by the City of Portland.

All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

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Site WR8 - Map 5: Doane Lake

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

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Site WR8 - Map 6: Doane Lake

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

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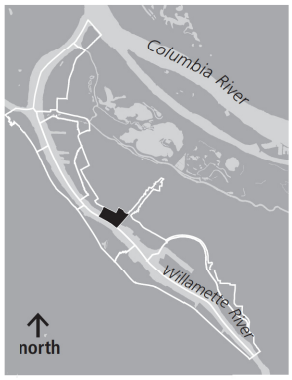
Scale: 1" = 800'

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Inventory Site WR9: WILLAMETTE COVE



Summary Information

Watershed: Willamette River

Neighborhood: Cathedral Park

USGS quadrangle and quarter section maps: 1N1W12, 1N1E07 and 2121-22, 2221-23

River Mile: 6.0 – 6.5

Site Size: 119 acres (land and water)

Previous Inventory: Lower Willamette River Wildlife Habitat Inventory, March 1986.

Zoning:
Open Space (OS)
Employment (EX)
Heavy Industrial (IH)
General Industrial (IG)
Residential 2,000 (R2)
Residential 5,000 (R5)
Conservation overlay (c)
River Water Quality overlay (q)
River Natural overlay (n)
River General overlay (g)

Existing Land Use: Open space, residential and railroad

General Description: The site primarily contains river frontage and lowlands, Willamette Cove, and railroad tracks.

Resource Features: Bottomland forest; upland scrub/shrub, grassland; beach, steep slopes; open water.

Functional Values: Microclimate and shade; stream flow moderation and water storage; bank function, and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; wildlife habitat; habitat connectivity/ movement corridor

Special Habitat Area: **Willamette River** – Area critical to sensitive species including NOAA designated Critical Habitat (S) and wildlife habitat connectivity corridor (C). **Willamette Cove Bottomland** - Bottomland hardwood forest (B), native oak (O), upland meadow, prairie or grassy area (G) and wildlife habitat connectivity corridor (C). **Edgewater Street Forest and Ravine** – Native oak (O) and wildlife habitat connectivity corridor (C).

Special Status Species: **Wildlife:** American beaver, river otter. **Fish:** Lower Columbia River Chinook salmon; Lower Columbia River steelhead trout, Pacific lamprey.

Natural Hazards: Landslide; wildfire; flood area

Contamination: Yes

Site Description

This 119-acre site is located between N Richmond Ave to the northwest and the Burlington Northern Railroad bridge to the southeast. The northeastern boundary is formed by N Crawford St and Willamette Blvd. Residential uses exist in the upland portions of the site. The Willamette Cove property was acquired by Metro in 1996. The intended future use of the property is as an urban natural area with passive recreation opportunities. WR9 Map 1 shows the aerial view of the inventory site.



Willamette Cove with the Burlington Northern Railroad Bridge.

The site has approximately 3,500 linear feet of Willamette riverfront. The river makes up roughly 54 acres of the site. The bank type is fill and vegetated riprap.

Vegetated areas at least ½ acre include 7 acres of forest and tree canopy, 17 acres of woodland, 14 acres of shrubland and 5 acres of herbaceous cover. In addition to 54 acres of open water, the 5 acres of flood area are almost entirely vegetated (4 acres); the remaining flood area includes the Willamette river bank. The site contains 11 acres (9%) impervious surface, including 1 mile of road.

Active dredging in the Willamette River has produced a uniform channel with little complexity. Marine cargo activities are common in river, with large vessels passing through to upstream berths in the Portland Harbor. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships.

Table 28: Summary of Natural Resource Features in WR9: Willamette Cove

	Study Area (119 acres)
Stream (miles)	
Willamette River (miles/acres)	0.5/54
Open Stream Channel (linear feet)	0
Piped Stream Segments (linear feet)	0
Wetlands (acres)	**0**
Flood Area (acres)*	**59**
Vegetated (acres)	4
Non-vegetated (acres)	1
Open Water (acres)	54
Vegetated Areas >= ½ acre (acres)+	**43**
Forest (acres)	7
Woodland (acres)	17
Shrubland (acres)	14
Herbaceous (acres)	5
Impervious Surfaces (acres)	**11**

* The flood area includes the FEMA 100-year floodplain combined with the adjusted 1996 flood inundation area.

\+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and is currently being updated based on 2006 aerial photography.

Beaches and associated nearshore shallow-water areas, and the Willamette River/Columbia Slough confluence provide habitat for migrating salmonids, shorebirds and other wildlife species.

This site is the former location of Willamette Cove Sawmill, which operated until the 1960s. As a result of the industrial activities on this site, and on the McCormick and Baxter Superfund site to the south, there has been contamination of soils, groundwater, and near-shore sediments in the river, and this site is currently a brownfield. Portions of the site are within the City of Portland Wildfire Hazard Zone (City of Portland, 1998) and the Potential Landslide Hazard area (City of Portland, 2002).

Natural Resources Description

Located between the North Oak Palisades and McCormick/Baxter inventory sites, this 119-acre site has both aquatic and terrestrial resources (key resource features are shown in WR9 Maps 2 and 3). This site provides important habitat connectivity between Cathedral Park and the North Oak Palisades site to the west, with the nearshore riparian habitat at the McCormick/Baxter site to the east, and with the upland bluffs. Vegetation includes forest, woodland and shrubland with some associated herbaceous cover. The banks of the river and along the railroad are steeply sloped.

The dominant resource feature of the site is the nearly continuous stretch of vegetated banks and beach, extending from the northwestern boundary of the site to the Railroad Bridge. The beach varies in width from five feet to over forty feet, and is bordered by a steep riprap bank. The upstream beach is heavily littered with debris and rubble juxtaposed with well-established groupings of Pacific willow. The beach grades into a relatively steep bank vegetated with reed canarygrass, Himalayan blackberry, and English ivy. The debris becomes sparse and the beach becomes narrower near the cove, where more riprap and a narrow shoulder of sandy beach grade into the steep bank cut. The cove contains small areas of beach with driftwood and rubble. Toward the northwest end of the site, as the bank becomes less steep, the forest comes closer to the river and the beach decreases in width.

The beach and near-shore shallow water areas provide important habitat for salmonids that are listed as threatened species under the Endangered Species Act, including Lower Columbia River Chinook salmon and Lower Columbia River steelhead trout (ODFW, 2005). The river channel provides a migration corridor for fish, birds, and mammals. Adult salmon and steelhead utilize the Willamette River during migration. Other indigenous fish such as Pacific lamprey and sturgeon are expected to be present although their use of the reach may be limited by dredging. Fish such as sucker and carp may also be abundant in these uniform habitats (ODFW, 2005). The open water also provides feeding areas for birds such as ducks, cormorants, gulls, herons; and mammals such as river otter and mink. Insectivores such as swallows and bats also forage over the water.

A narrow corridor of mixed bottomland woodland extends through the entire site. The woodland is dominated by young black cottonwood trees and contains some non-native tree species, including Lombardy poplar, catalpa, and holly. Cherry and birch also occur infrequently. Himalayan blackberry and clematis dominate the understory and are suppressing most other plant species other than sword fern. English ivy is also carpeting the understory and topping the crowns of many trees. The exotic invasion within the understory has a detrimental effect on the majority of understory plant species, and is limiting the productivity of this woodland. The woodland contains few large trees and snags (most were trees killed by ivy), and is bisected in areas by well-worn and compacted dirt trails. Tree canopy cover within this forest varies from 50 to 70 percent. Within the understory, shrubs cover from 50 to 80 percent, and herbaceous vegetation covers only 15 to 25 percent.

An area of open grassland is located between the woodland corridor and the railroad. The grassland is fairly large (over 3 acres) and is dominated by many invasive grass and herb species, including reed canarygrass, Queen Anne's lace, nightshade, vetch, timothy, witchgrass, common horsetail, water horsetail, common velvetgrass, and crabgrass. Native species including red columbine and fowl mannagrass are present in lower numbers than the invasive plants. The northern area of the grassland contains small puddles of open water and saturated soils characteristic of a seasonal wetland, and these areas were dominated by reed canarygrass. This open grassland grades into a more prominent scrub/shrub complex farther south, which is dominated by Scot's broom, Himalayan blackberry, Indian plum, and native hawthorn. Other scrub/shrub species include trailing blackberry, elderberry, butterfly bush, and sumac. The two vegetative assemblages intermingle, with the scrub/shrub becoming dominant in areas to the south.

The site contains a unique assemblage of vegetative community types within a relatively small area. In conjunction with the river, the variety of plant communities creates a habitat mosaic that supports a diverse group of resident and migratory birds, small mammals, reptiles, amphibians, invertebrates, and fish. The quality of food sources is more likely to be sustained year-round with so many habitat types in proximity to each other, making this an important forage area for most species found here.

The wildlife detected within this reach included a moderately diverse assemblage of birds and small mammals. The complex of habitats in this reach attracts a varied collection of bird species year round. Terrestrial bird species observed include scrub jay, spotted towhee, downy woodpecker, fox and song sparrow, black-capped chickadee, bushtit, flicker, sharp-shinned hawk, red-tailed hawk, and northern harrier. River birds included great blue heron, common merganser, and double-crested cormorant. Small mammals included raccoon, beaver, woodrat, pocket gopher, and field mice. The area does have sufficient forage to attract deer, and the railroad may serve as a migration corridor for them. Deer were documented on the beach located across the river (at site WR8 Doane Lake). Several common species of reptiles and amphibians including garter snakes and Pacific chorus (tree) frogs may be found here.

This site contains three Special Habitat Areas (SHAs): the Edgewater Street Forest; the Willamette Cove Bottomland SHA; and the Willamette River.

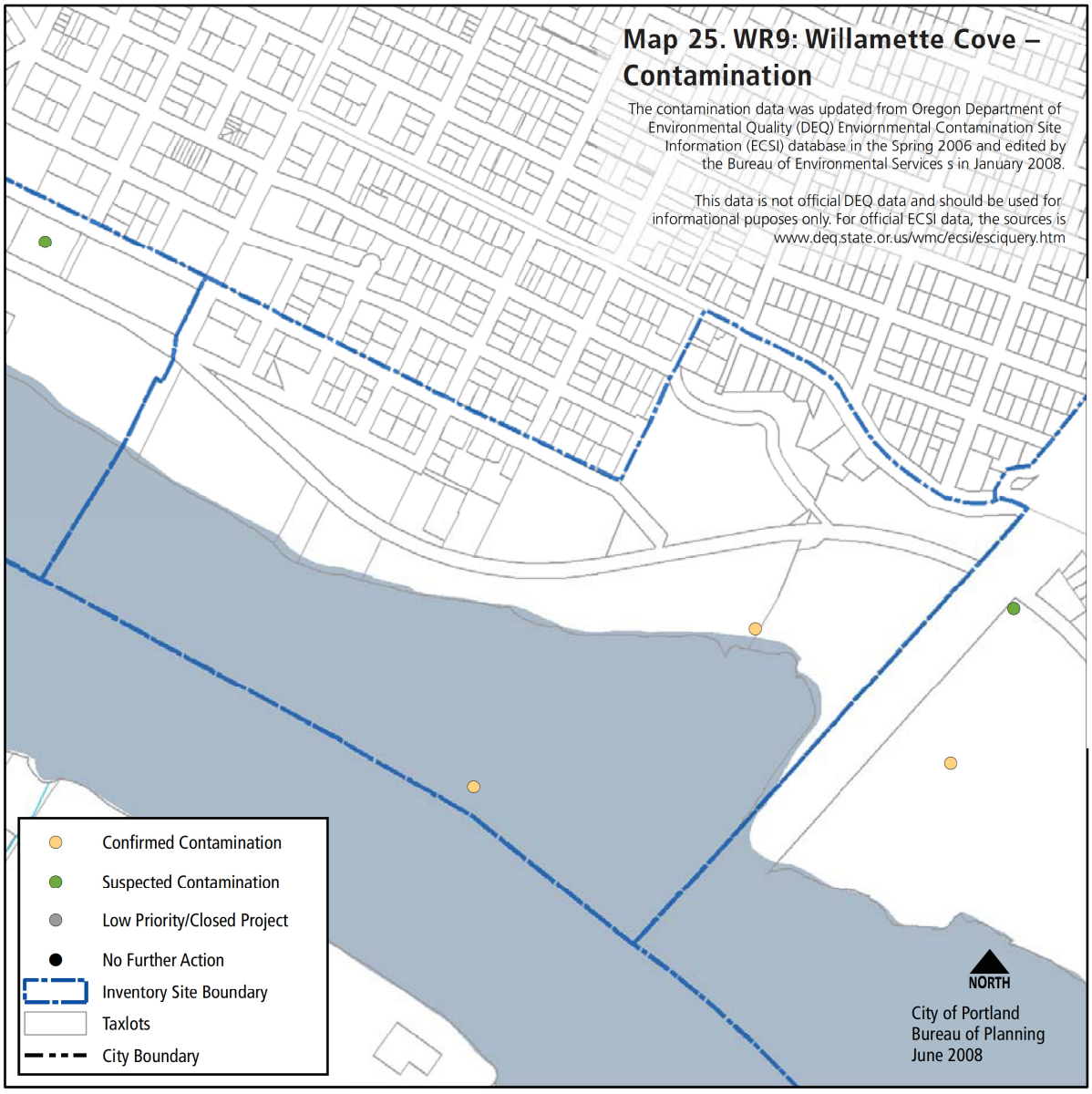
The Edgewater Street Forest SHA includes bottomland hardwood forest that provides connectivity between upland and riparian resources. The Willamette Cove Bottomland SHA contains bottomland hardwood forest and three acres of meadow habitat. This is one of the few relatively natural riparian areas on the east side of the Willamette River downstream of Ross Island.

The Willamette River is a designated Special Habitat Area, reflecting its value as a wildlife corridor and as federally designated "Critical Habitat" for salmonids species listed as threatened under the Endangered Species Act. The beach and near-shore shallow water areas along the Willamette River also provide important habitat for ESA-listed salmonids and macroinvertebrates (ODFW, 2005).

There is an extensive trail system within the southern half of this site, which has created large areas of compacted, unvegetated soil with increasing erosion of the substrate within the forest and shrub areas of the site. Use of the trail system, including use by dogs, can impact wildlife use of the adjacent habitat areas.

The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, and temperature. Oregon Water Quality Index values from 1986 to 1995 for the Lower Willamette Basin in Portland range from fair to very poor. The Lower Willamette River in Portland is also deemed unsafe for swimming.

Soil, groundwater and river sediments with in the site contain contamination resulting from past industrial activities including a lumber mill, plywood mill, barrel manufacturing, and shipbuilding and repair (see Map 25.) Types of pollutants found here include arsenic, metals (chromium, copper, lead, mercury, etc.), petroleum products, and others. Potential environmental and health risks include direct contact or ingestion of contaminated sediments or groundwater by humans, aquatic organisms, birds or mammals and consumption of fish or crayfish by recreational anglers. For more information regarding contamination, visit the DEQ website at http://www.deq.state.or.us/lq/ecsi/ecsi.htm.



Natural Resource Evaluation

The natural resources located within this site have been evaluated for relative riparian and wildlife habitat quality. Relative quality is presented in the form of relative functional value ranks for riparian corridors, wildlife habitat, and riparian/wildlife habitat value combined (Table 29). The relative ranks are produced using GIS models and information on Special Habitat Areas. The model criteria are not sensitive to the species of vegetation present or whether vegetation is native or non-native. However, the model criteria do assign different values to cultivated, heavily manicured and managed landscapes and semi-natural and natural vegetation. The approach used to generate the relative ranks is summarized in the introduction to the North Reach sites. Additional detail is provided in the Methodology Overview section of this report and Appendix E – *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

All of the ranked resource areas provide significant riparian and/or wildlife habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can help inform planning programs, design of development or redevelopment projects, mitigation and restoration activities.

Riparian Corridors – Relative Ranks

The site contains portions of the Willamette River, vegetated flood area and other vegetation that contributes to the riparian functions as detailed in the natural resource description. These landscape features provide the following riparian functions:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank function, and sediment, pollution and nutrient control
- Large wood and channel dynamics
- Organic inputs, food web and nutrient cycling
- Riparian wildlife movement corridor

High relative functional ranks are assigned to the Willamette River and woodland and shrubland vegetation within the flood area. The river banks and associated land within 50 feet of the river receive a high medium rank. Medium relative ranks are assigned to portions of the flood areas with herbaceous vegetation. Other vegetated areas are assigned a high, medium or low relative functional rank depending on the proximity, slope and extent of the vegetation relative to the Willamette River (WR9 Map 4).

Wildlife Habitat – Relative Ranks

Based on the wildlife habitat attributes mentioned in the previous section (size, interior area, connectivity/proximity to other patches and water), the wildlife habitat model assigns a low relative rank to the forest/woodland patch inland of the railroad corridor.

This site contains three Special Habitat Areas (SHAs): the Edgewater Street Forest; the Willamette Cove Bottomland SHA; and the Willamette River. The SHAs contain unique features and provide critical wildlife habitat as described in the Natural Resources Description section above. SHAs receive a high relative rank for wildlife habitat. The SHA ranking supersedes lower rankings generated by the GIS model. Therefore, all SHAs within the site rank high for wildlife habitat (WR9 Map 5).

Combined Riparian/Wildlife Habitat Relative Ranks

Where areas mapped as riparian corridors and wildlife habitat overlap, and their relative ranks differ, the combined relative rank will be the higher of the two ranks. For example, an area that ranks medium for riparian function and low for wildlife habitat will receive a medium combined relative rank. Given that the four SHAs cover most of the site and overlap with riparian and wildlife resources, the combined relative rank is high for all resources within this site (WR9 Map 6).

Table 29: Summary of Ranked Resources in WR9: Willamette Cove

Total Inventory Site = 119 acres **Terrestrial* = 65 acres** **Willamette River = 54 acres**				
	High	Medium	Low	Total
Riparian Corridor **				
acres	59	5	16	80
percent total inventory site area	50	4	13	66
Wildlife Habitat				
acres	0	0	9	9
percent total inventory site area	0	0	8	8
Special Habitat Areas **				
acres	97			
percent total inventory site area	81			
Wildlife Habitat- adjusted for Special Habitat Areas ***				
acres	97	0	1	99
percent total inventory site area	81	0	1	83
Combined Riparian Corridor/Wildlife Habitat+				
acres	97	0	2	98
percent total inventory site area	81	0	1	82
Combined Riparian Corridor/Wildlife Habitat (excludes Willamette River)				
acres	43	0	1	44
percent total inventory site area	36	0	1	37

* Terrestrial includes the land, tributary streams, drainageways and wetlands

** High-ranked riparian resources, wildlife habitat, and Special Habitat Areas includes the Willamette River

*** Special Habitat Areas rank high for wildlife habitat

\+ Because riparian resources, wildlife habitat, and Special Habitat Areas overlap, the results cannot be added together to determine the combined area.

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Site WR9 - Map 1: Willamette Cove

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 800'

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Site WR9 - Map 2: Willamette Cove

Water-Related Features

Water Bodies

River Depths

- 0 to -20′
- -20 to -30′
- -30 to -40′
- deeper than 40′
- Stream/Drainage
- Culvert or Piped

Other Features

- Flood Area
- Wetlands
- Beach
- Bio-engineered
- Vegetative Rip Rap
- Non-vegetative Rip Rap
- Site Boundary
- City Boundary

Outfalls

- Stormwater
- Combined stormwater /sanitary

- Abandoned
- Unclassified Fill Bank
- Rock Bank
- Seawall
- Pilings
- Urban Services

INFORMATION SOURCES:

Water Bodies:
Rivers, lakes and other water features. Originally digitized by Metro (1994). Data collection scale: 1:100′ - 1:400′. City of Portland and Multnomah County pookets updated by City of Portland, Bureau of Planning, to refine waterbody geometry, remove erroneously mapped waterbodies, and add missing waterbodies. Aerial photos were the primary data source used as reference for re-mapping waterbodies. This is an interim dataset reflecting all work completed to date.
Outfalls: Maintained by BES (June 2008) Location is approximate and data may be incomplete.

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Site WR9 - Map 3: Willamette Cove

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

All data compiled from source materials at different scales.
For more detail, please refer to the source materials or
City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 800'

0' 400' 800' 1200'

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Site WR9 - Map 4: Willamette Cove

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

For more information, please visit our website:
http://www.portlandonline.com/planning/index.cfm?c=40437

NOTE: Portland's resource inventory is still being evaluated for accuracy and consistency and should be considered preliminary. The inventory has not yet been adopted by the City of Portland.

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Site WR9 - Map 5: Willamette Cove

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

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October 16, 2009

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Site WR9 - Map 6: Willamette Cove

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

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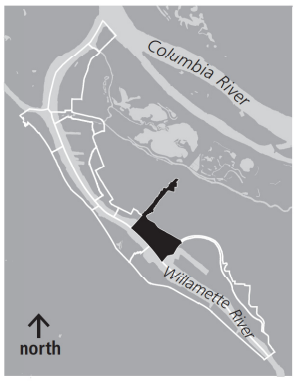
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Inventory Site WR10: MCCORMICK/BAXTER AND TRIANGLE PARK



Summary Information

Watershed: Willamette River

Neighborhood: University Park Neighborhood, St. Johns

USGS quadrangle, quarter section maps: 1N1E06, 1N1E07, 1N1E18, and 2024, 2123-24, 2222-24, 2322-25, 2423-24

River Mile: 6.5 – 7.6

Site Size: 475 acres (land and water)

Previous Inventory: Lower Willamette River Wildlife Habitat Inventory, March 1986; East Buttes Terraces and Wetlands Conservation Plan, July 1993

Zoning:

Heavy Industrial (IH)	River Water Quality overlay (q)
General Industrial (IG)	River General overlay (g)
Residential 5,000 (R5)	River natural overlay (n)
Residential 2,000 (R2)	Conservation overlay (c)
River Industrial overlay (i)	

Existing Land Use: Superfund site; undeveloped; residential; university; railroad track.

General Description: This site once contained active industrial uses, which contaminated soils, groundwater and near shore sediments. There is riparian vegetation and steep slopes. The site provides connectivity between Willamette Cove and Willamette Bluffs.

Resource Features: Riparian woodland, foothill savannah/oak woodland; upland scrub/shrub; grassland; emergent wetland; flood area; beach; open water; steep slopes.

Functional Values: Microclimate and shade; stream flow moderation and water storage; bank stability, and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; wildlife movement corridor; connectivity

Special Habitat Area: **Willamette River** – Area critical to sensitive species including NOAA designated Critical Habitat (S) and wildlife habitat connectivity corridor (C). **Willamette Bluff Complex** - Native oak (O) and wildlife habitat connectivity corridor (C). **Burlington Northern Railroad Bridge** - peregrine falcon nesting site – Area critical to special status species (S) and resource or structure that provides unique habitat function in natural or built environment (U).

Special Status Species: **Wildlife:** American Peregrine falcon **Fish:** Lower Columbia River Chinook salmon; Lower Columbia River steelhead trout; Pacific lamprey.

Natural Hazards: Landslide; wildfire; flood area

Contamination: Yes

Site Description

The McCormick/Baxter and Triangle Park site is approximately 475 acres in size and is located on the east bank of the Willamette River between the Burlington Northern Railroad bridge and the southeast side of the University of Portland, and west of Swan Island. The site extends northeast along the Burlington Northern Railroad corridor to the junction of the Burlington Northern Railroad track and the Union Pacific Railroad track, connecting Smith and Bybee Wetlands and the Columbia Slough to the Willamette River. Map WR10 1 shows the aerial view of the McCormick Baxter/ Triangle Park inventory site.



McCormick/Baxter property.

Table 30: Summary of Natural Resource Features in WR10: McCormick/Baxter and Triangle Park

	Study Area (475 acres)
Stream (miles)	
Willamette River (miles/acres)	1.1/151
Open Stream Channel (linear feet)	0
Piped Stream Segments (linear feet)	0
Wetlands (acres)	**0**
Flood Area (acres)*	**177**
Vegetated (acres)	15
Non-vegetated (acres)	12
Open Water (acres)	150
Vegetated Areas >= ½ acre (acres)+	**149**
Forest (acres)	44
Woodland (acres)	30
Shrubland (acres)	21
Herbaceous (acres)	54
Impervious Surfaces (acres)	**105**

* The flood area includes the FEMA 100-year floodplain combined with the adjusted 1996 flood inundation area.

\+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and is currently being updated based on 2006 aerial photography.

Roughly 151 acres of the Willamette River extending to the river centerline is included in this site. The site includes approximately 7,500 linear feet of river front. Of the approximately 177 acres of flood area on the site, 150 acres are open water, 15 are vegetated, and 12 are non-vegetated. The site contains 105 acres (22%) of impervious surface coverage, including 6.1 miles of road.

There are approximately 149 acres of vegetated areas at least ½ acre in size. These include 44 acres of forest or dense tree canopy, 30 acres of woodland, 21 acres of shrubland and 54 acres of herbaceous cover. Steeply sloped bluffs along the southern half of the site are part of a 7-mile corridor of remnant oak escarpment extending north to Chimney and Pier Parks and south to the Fremont Bridge.

Northeast of the Union Pacific Railroad tracks steep slopes extend through the entire site from the northwest to the southeast site boundaries. These slopes and the area below the slopes are within the Potential Landslide Hazard area (City of Portland, 2002). The University of Portland campus and sections of the site along the bluffs northwest of the campus are within the City of Portland Wildfire Hazard Zone (City of Portland, 1998.

Active dredging in the Willamette River has produced a uniform channel with little complexity. Marine cargo activities are common in river, with large vessels passing through to upstream berths in the Portland Harbor. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships.

Beaches and associated nearshore shallow-water areas, and the Willamette River/Columbia Slough confluence provide habitat for migrating salmonids, shorebirds and other wildlife species.

Three areas of contamination are associated with former industrial uses on this site including the McCormick and Baxter Creosoting company that was located here from 1944 to 1991. The site of the former creosote company is now a federal Superfund site.

The City's Bureau of Environmental Services (BES) manages three active revegetation areas, two along Willamette Bluff and one at McCormick/Baxter.

Natural Resources Description

This site contains both aquatic and terrestrial resources and is an important connectivity corridor between Smith and Bybee Wetlands, the Willamette Bluffs, and the Willamette River (key resource features are shown in WR10 Maps 2 and 3). Located between the Willamette Cove and Swan Island inventory sites, this site includes the University of Portland, steep bluffs and a vegetated railroad corridor. Cleanup activities have occurred on the McCormick/Baxter property in the northern portion of this inventory site.

Along the western and southern edge of the resource site to the University of Portland, a mostly continuous strip of herbaceous and shrubland vegetation follows the shore of the Willamette River. This vegetated strip connects to woodland and forest cover west of the University of Portland campus, providing connectivity between Willamette Cove, the Willamette River, and the Willamette Bluff.

Northwest of the McCormick/Baxter and Triangle Park properties, the steep bluffs are a continuation of the bluffs in sites WR7 North Oak Palisades and WR9 Willamette Cove. The bluffs are located up to 1000 feet east of the river in the vicinity of the McCormick/Baxter property. At the University of Portland, the bluffs meet the river before abruptly angling eastward around the Swan Island area.

The slopes are densely vegetated throughout the majority of the reach. Forest cover is seldom wider than 500 feet, and average approximately 200 feet in width. A foothill savanna/oak woodland community exists on the upper slopes and terrace, with elements of the bottomland forest mixed in lower on the slopes. Oregon white oak, Pacific madrone, and occasional Ponderosa pine dominate the foothill savanna/ oak woodland community. This is a transition zone away from the moister bottomland forest on the floodplain. Bigleaf maple, Douglas fir, Western red cedar, and red alder also occur infrequently within this site. On the lower slopes, especially at the University of Portland where the bluffs are closer to the river, black cottonwood, bitter cherry, and Pacific dogwood are found. Tree canopy cover varies, averaging between 25 and 35 percent. Downed wood is common in the forested areas, and trees tend to be younger due in part to occasional windthrow and landslides on these steep, exposed slopes.

The shrub understory within the forested area is dominated by Himalayan blackberry and Scot's broom, but also contains several important native species such as red elderberry, western hazel, snowberry, serviceberry, and oceanspray. The herbaceous understory is largely composed of English ivy, clematis, and Oregon grape. The shrub cover is close to 25 percent, and ground cover exceeds 90 percent.

In 2005, the BES Watershed Revegetation Program developed a Vegetation Management Strategy for the McCormick/Baxter property, including plans for planting, maintenance and monitoring of the site. As part of this plan, the site will receive two feet of loam/sandy loam topsoil, being obtained from a quarry in St. Helens, Oregon. The sandy loam will provide growing conditions to support native plantings. The general goals of this plan are: protect the impermeable cap; reduce erosion forces and protect soil cap; maximize on-site stormwater retention; provide limited wildlife habitat complexity with native plant communities; minimize maintenance requirements and long-term maintenance costs; maximize survival potential for plantings; and provide a native-vegetated landscape that allows for future development of active and passive park recreation. As of November 2006, the site had undergone initial planting and Year 1 monitoring had taken place in October 2006.

The rail corridor extends northeast from the Willamette River to the junction with the Union Pacific railway. The corridor is a narrow cut approximately 300 feet wide and 80 feet deep. Railroad tracks are located on the floor, flanked by steep, vegetated slopes averaging 40 degrees. Most of the vegetation within the site is located on the steep banks of the bluffs and the railroad corridor. The corridor follows a ravine that provides wildlife habitat and connectivity between the Willamette River, Smith and Bybee Wetlands and the Columbia Slough. The dominant tree species is the Bigleaf maple, approximately 30-40 years in age. Other occasional trees include Douglas fir, apple, cherry and hawthorn. Shrubs include western hazel, snowberry, oceanspray, Oregon grape, poison oak, thimbleberry, vine maple, Himalayan blackberry, laurel and holly. The herbaceous layer contains sword fern, lady fern, clematis and English ivy.

The Burlington Northern Railroad bridge provides critical nesting habitat for American Peregrine falcon, which is listed as an endangered species in Oregon and is a priority wildlife species in the City of Portland.

The Triangle Park property, in the southern portion of the site, is within the boundaries of the Portland Harbor federal Superfund site and is currently under a voluntary agreement with the Oregon Department of Environmental Quality (DEQ) to conduct a Remedial Investigation and Feasibility Study under DEQ oversight. Most of the Triangle Park property is within the flood area. Much of the site is comprised of undeveloped compacted soils and herbaceous vegetation. The banks, except at the middle of the inventory site, are steeply sloping.

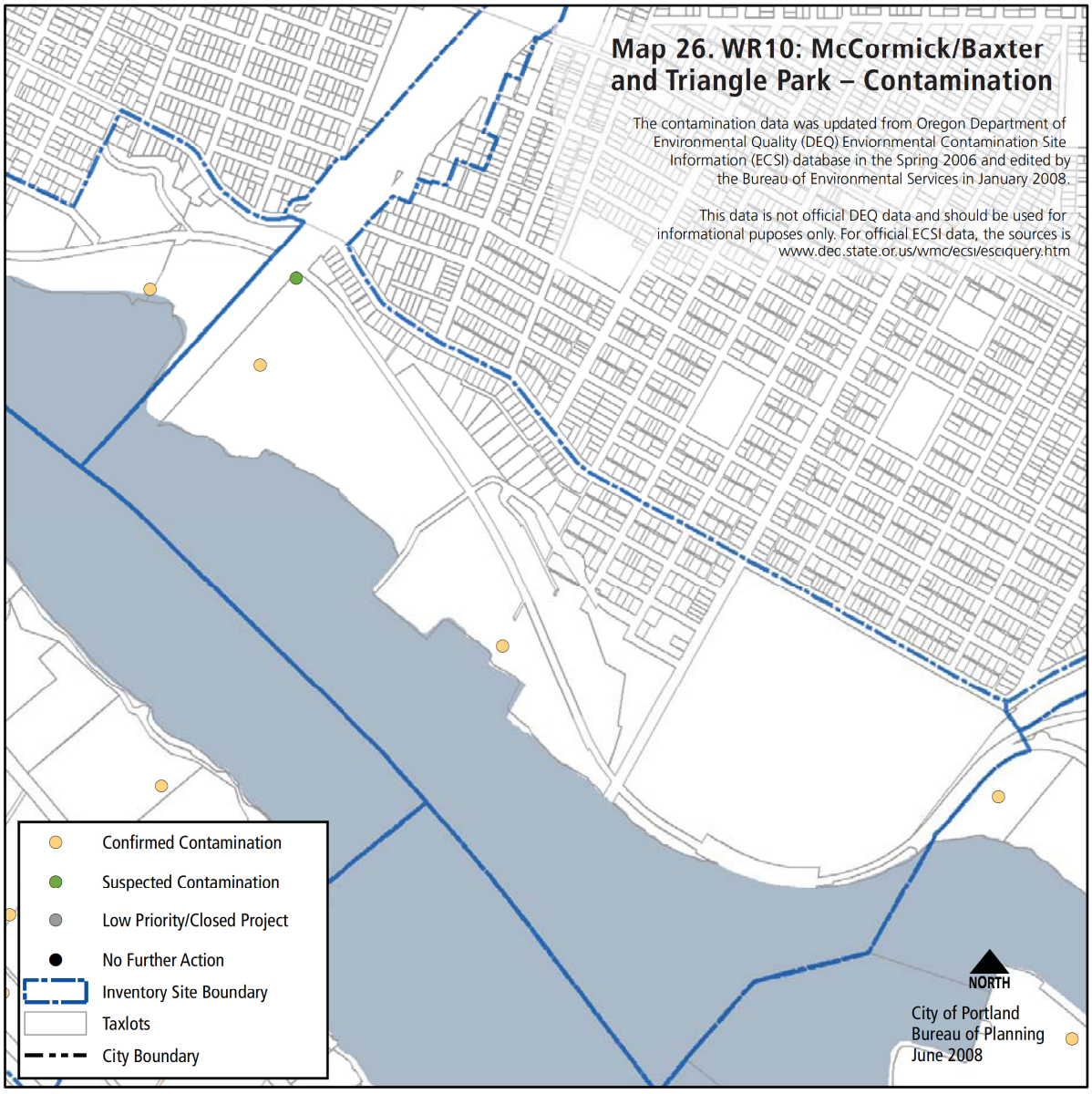
Along the bank of the river at McCormick/Baxter property is beach and associated near-shore shallow water areas. The bank of the Triangle Park property is unclassified fill and rock. There is also a shallow water area in the alcove in the middle of Triangle Park. Beaches and near-shore shallow areas provide important habitat for salmonids that are listed as threatened species under the Endangered Species Act, including Lower Columbia River Chinook salmon and Lower Columbia River steelhead trout (ODFW, 2005). Adult salmon and steelhead utilize the Willamette River during migration. Other indigenous fish such as Pacific lamprey and sturgeon are expected to be present although their use of the reach may be limited by dredging. Fish such as sucker and carp may also be abundant in these uniform habitats (ODFW, 2005). The open water habitat also provides feeding areas for birds such as ducks, cormorants, gulls, herons; and mammals such as river otter and mink. Insectivores such as swallows and bats also forage over the water.

The site contains three Special Habitat Areas (SHAs): the Willamette River, a portion of the Willamette Bluff SHA and the Burlington Northern Railroad Bridge. The Willamette River is a designated Special Habitat Area, reflecting its value as a wildlife corridor and as federally designated "Critical Habitat" for salmonids species listed as threatened under the Endangered Species Act. The beach and near-shore shallow water areas along the Willamette River also provide important habitat for ESA-listed salmonids and macroinvertebrates (ODFW, 2005).

The Willamette Bluff SHA is that portion of the bluff commonly known as "Waud Bluff," adjacent to the University of Portland campus. The SHA contains remnant Oregon white oak and provides critical upland wildlife habitat corridor that connects to the Willamette River at Cathedral Park, and to Willamette Cove and southward along the bluff to the Fremont Bridge.

The Burlington Northern Railroad bridge SHA provides nesting habitat for American Peregrine falcons.

The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, and temperature. Oregon Water Quality Index values from 1986 to 1995 for the Lower Willamette Basin in Portland range from fair to very poor. The Lower Willamette River in Portland is also deemed unsafe for swimming.



Several areas of contamination exist within the site. Soil, groundwater and river sediments contain contamination resulting from past industrial activities such as wood treatment, locomotive fueling and service operations, marine construction and hazardous waste storage (see Map 26). Types of pollutants found here include hydrocarbons, metals (chromium, copper, nickel, zinc, etc.), arsenic, polycyclic aromatic hydrocarbons (PAHs), benzene, petroleum products, toluene, and others. Potential environmental and health risks include direct contact or ingestion of contaminated sediments or groundwater by humans, aquatic organisms, birds or mammals and consumption of fish or crayfish by recreational anglers. The McCormick/Baxter site is fenced, with warning signs posted at the perimeter, and control via an alarm system to reduce exposure to contaminants. For more information regarding contamination, visit the DEQ website at http://www.deq.state.or.us/lq/ecsi/ecsi.htm.

Natural Resource Evaluation

The natural resources located within this site have been evaluated for relative riparian and wildlife habitat quality. Relative quality is presented in the form of relative functional value ranks for riparian corridors, wildlife habitat, and riparian/wildlife habitat value combined (Table 31). The relative ranks are produced using GIS models and information on Special Habitat Areas. The model criteria are not sensitive to the species of vegetation present or whether vegetation is native or non-native. However, the model criteria do assign different values to cultivated, heavily manicured and managed landscapes and semi-natural and natural vegetation. The approach used to generate the relative ranks is summarized in the introduction to the North Reach sites. Additional detail is provided in the Methodology Overview section of this report and in Appendix E - *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

All of the ranked resource areas provides significant riparian and/or wildlife habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can help inform planning programs, design of development or redevelopment projects, mitigation and restoration activities.

Riparian Corridors – Relative Ranks

The site contains portions of the Willamette River, vegetated and non-vegetated flood area, and other areas of vegetation that contribute to riparian functions as detailed in the natural resource description. These landscape features provide the following riparian functions:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank function, and sediment, pollution and nutrient control
- Large wood and channel dynamics
- Organic inputs, food web and nutrient cycling
- Riparian wildlife movement corridor

High relative functional ranks are to the Willamette River and to woodland and shrubland vegetation within the flood area. High and medium relative ranks are assigned to beach and vegetated banks and associated land within 50 feet of the river. Medium relative ranks are assigned to portions of the flood areas with herbaceous vegetation. Low relative ranks are assigned to portions of flood area that are not vegetated and to hardened, non-vegetated river banks. Other vegetated areas are assigned a high, medium, or low relative rank depending on the proximity and extent of the vegetation relative to the Willamette River (WR10 Map 4).

Wildlife Habitat – Relative Ranks

Based on the wildlife habitat attributes mentioned in the previous section (size, interior area, connectivity/proximity to other patches and water), the GIS wildlife habitat model assigns low relative functional ranks to the forest/woodland patch adjacent to the railroad corridor that connects Smith and Bybee Wetlands and the Columbia Slough to the Willamette River. Medium relative functional ranks are assigned to the forest/woodland patches along the bluffs, southwest and west of the University of Portland.

The site contains three Special Habitat Areas (SHAs): the Willamette River, a portion of the Willamette Bluff SHA and the Burlington Northern Railroad Bridge. The SHAs contain unique features and provide critical wildlife habitat as described in the Natural Resources Description section above. SHAs receive a high relative rank for wildlife habitat. The SHA ranking supersedes lower rankings generated by the GIS model. Therefore, all SHAs within the site rank high for wildlife habitat (WR10 Map 5).

Combined Riparian/Wildlife Habitat Relative Ranks

Where areas mapped as riparian corridors and wildlife habitat overlap, and their relative ranks differ, the combined relative rank will be the higher of the two ranks. For example, an area that ranks medium for riparian function and low for wildlife habitat will receive a medium combined relative rank. Areas that are assigned a high combined relative rank include those that rank high for riparian functions or wildlife habitat, including Special Habitat areas (WR10 Map 6).

Table 31: Summary of Ranked Resources in WR10: McCormick/Baxter and Triangle Park

Total Inventory Site = 475 acres
Terrestrial* = 324 acres
Willamette River = 151 acres

	High	Medium	Low	Total
Riparian Corridor **				
acres	157	22	27	206
percent total inventory site area	33	5	6	44
Wildlife Habitat				
acres	0	0	53	53
percent total inventory site area	0	0	11	11
Special Habitat Areas **				
acres	194			
percent total inventory site area	41			
Wildlife Habitat — adjusted for Special Habitat Areas ***				
acres	194	0	30	224
percent total inventory site area	41	0	6	47
Combined Riparian Corridor/Wildlife Habitat +				
acres	199	16	44	259
percent total inventory site area	42	3	9	54
Combined Riparian Corridor/Wildlife Habitat (excludes Willamette River)				
acres	48	16	44	108
percent total inventory site area	10	3	9	22

* Terrestrial includes the land, tributary streams, drainageways and wetlands

** High-ranked riparian resources, wildlife habitat, and Special Habitat Areas includes the Willamette River

*** Special Habitat Areas rank high for wildlife habitat

\+ Because riparian resources, wildlife habitat, and Special Habitat Areas overlap, the results cannot be added together to determine the combined area.



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Site WR10 - Map 1: McCormick/Baxter and Triangle Park

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

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Site WR10 - Map 2: McCormick/Baxter and Triangle Park

Water-Related Features

Water Bodies

River Depths

- 0 to -20′
- -20 to -30′
- -30 to -40′
- deeper than 40′

- Stream/Drainage
- Culvert or Piped

Other Features

- Flood Area
- Wetlands
- Beach
- Bio-engineered
- Vegetative Rip Rap
- Non-vegetative Rip Rap
- Site Boundary
- City Boundary

Outfalls

- Stormwater
- Combined stormwater /sanitary
- Abandoned
- Unclassified Fill Bank
- Rock Bank
- Seawall
- Pilings
- Urban Services

INFORMATION SOURCES:

Water Bodies:
Rivers, lakes and other water features. Originally digitized by Metro (1994). Data collection scale: 1:100′ - 1:400′, City of Portland and Multnomah County pooketa updated by City of Portland, Bureau of Planning, to refine waterbody geometry, remove erroneously mapped waterbodies, and add missing waterbodies. Aerial photos were the primary data source used as reference for re-mapping waterbodies. This is an interim dataset reflecting all work completed to date.
Outfalls: Maintained by BES (June 2008) Location is approximate and data may be incomplete.

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Site WR10 - Map 3: McCormick/Baxter and Triangle Park

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

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Site WR10 - Map 4: McCormick/Baxter and Triangle Park

Riparian Resources Relative Rankings

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- Low relative rank
- Stream/Drainage
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Site WR10 - Map 5: McCormick/Baxter and Triangle Park

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
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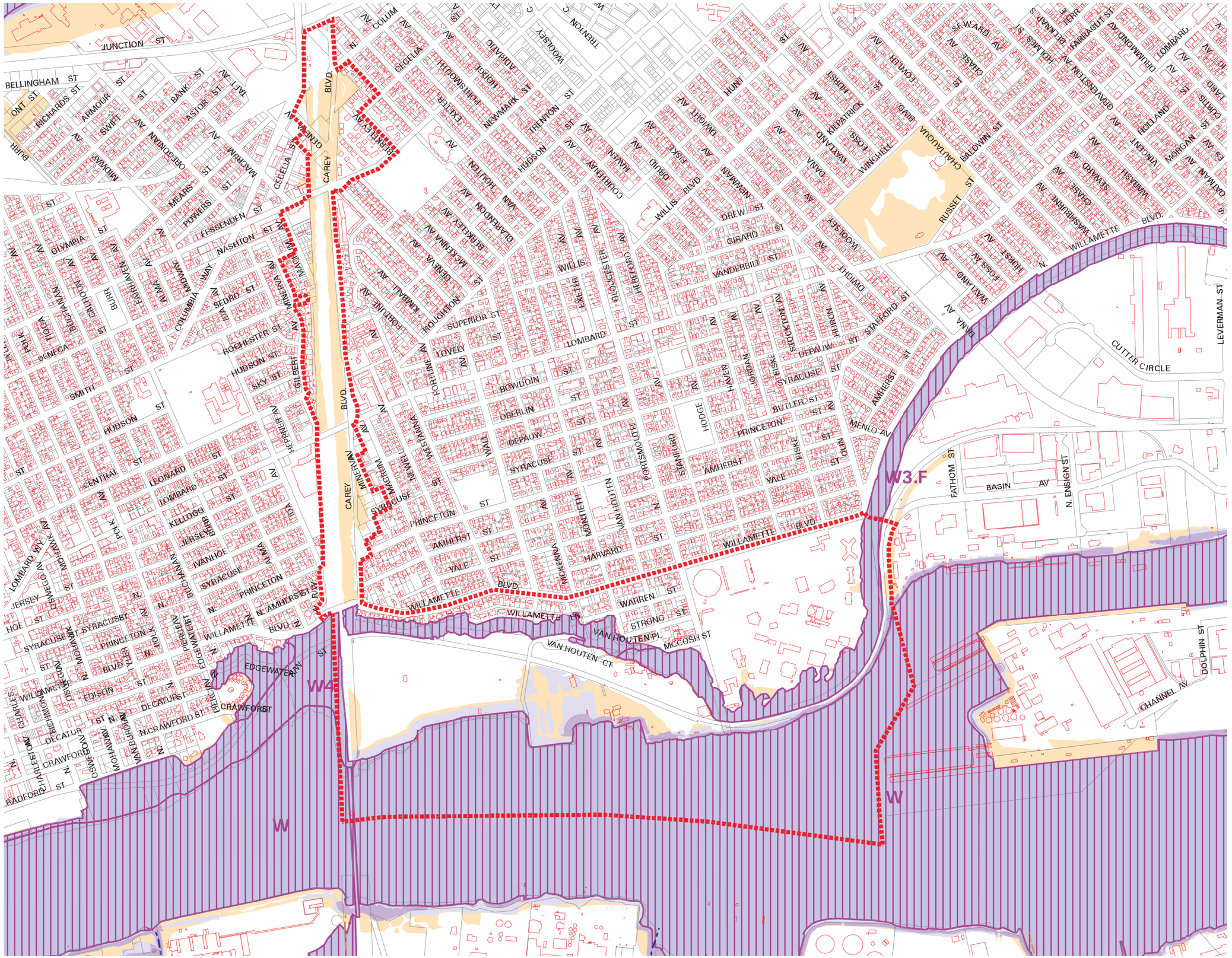
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Site WR10 - Map 6: McCormick/Baxter and Triangle Park

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
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NOTE: Portland's resource inventory is still being evaluated for accuracy and consistency and should be considered preliminary. The inventory has not yet been adopted by the City of Portland.

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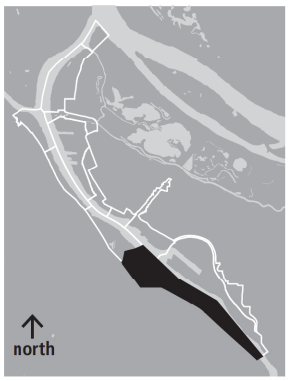
Scale: 1" = 1000'

0' 500' 1000' 1500'

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Inventory Site WR11: NORTHWEST INDUSTRIAL AREA



Summary Information

Watershed: Willamette River

Neighborhood: The northern three-quarters of the site is in the Northwest Industrial Neighborhood and the remaining southern portion is in the Northwest District Neighborhood

USGS quadrangle, quarter section maps: 1N1W13, 1N1E18, 1N1E19, 1N1E20, 1N1E28, and 2323, 2422-24, 2522-26, 2624-27, 2726-28, 2827-29, 2929

River Mile: 7.1 11.2

Site Size: 963 acres (land and water)

Previous Inventory: Lower Willamette River Wildlife Habitat Inventory, March 1986

Zoning:
Heavy Industrial (IH)
Employment (EX)
Residential (RX)
Open Space (OS)
Design overlay (d)
Scenic overlay (s)
River General overlay (g)
River Industrial overlay (i)

Existing Land Use: Industrial; railroad

Landscape Setting: The site is located along the west bank of the Willamette River between NW 61st Ave and the Broadway Bridge. The site is almost entirely developed. Saltzman and Balch Creek both have outfalls to the Willamette River within the site.

Resource Features: Riparian woodland, shrubland and herbaceous vegetation; streams; flood area

Functional Values: Microclimate and shade; stream flow moderation and water storage; bank function, and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; wildlife habitat; habitat connectivity/ movement corridor

Special Habitat Area: **Willamette River** – Area critical to sensitive species including NOAA designated Critical Habitat (S) and wildlife habitat connectivity corridor (C).

Special Status Species: **Wildlife:** river otter **Fish:** Lower Columbia River Chinook salmon; Lower Columbia Coho salmon; Lower Columbia River Steelhead trout, Pacific lamprey

Natural Hazards: Flood area

Contamination: Yes

Site Description

The 963-acre inventory site is located on the west bank of the Willamette River. The northwest boundary is formed by the southeast edge of site WR8 Doane Lake. The Broadway Bridge forms the southeastern site boundary. The site consists primarily of industrial uses, including Port of Portland Terminals 1 and 2. WR11 Map 1 includes an aerial map of the inventory site.



Balch Creek

The site has little vegetation. Nearly 50% of the site is covered with impervious surfaces (462 acres), including 11.5 miles of road. Vegetated areas at least ½ acre cover roughly 19 acres of the site (2%) and include 2 acres of woodland, 12 acres of shrubland and 5 acres of herbaceous vegetation.

The Willamette River constitutes approximately 428 acres of the site (shore to centerline). The site contains approximately 25,000 linear feet of bank. Roughly 3,000 linear feet of the bank is comprised of noncontiguous beach while the remainder is a mix of vegetated and non-vegetated riprap, pilings, and unclassified fill. The flood area along the eastern edge of the site includes 12 acres of vegetated area and 74 acres of developed area and river bank.

Active dredging in the Willamette River has produced a uniform channel with limited complexity. Marine cargo activities are common in river, with large vessels passing through to upstream berths in the Portland Harbor.. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships.

Beaches and associated nearshore shallow-water areas, and the Willamette River/Columbia Slough confluence provide habitat for migrating salmonids, shorebirds and other wildlife species.

Table 32: Summary of Natural Resource Features in WR11: Northwest Industrial Area

	Study Area (963 acres)
Stream (miles)	
Willamette River (miles/acres)	4.1/428
Open Stream Channel (linear feet)	582
Piped Stream Segments (linear feet)	20,600
Wetlands (acres)	**0**
Flood Area (acres)*	**510**
Vegetated (acres)	12
Non-vegetated (acres)	74
Open Water (acres)	424
Vegetated Areas >= ½ acre (acres)+	**19**
Forest (acres)	0
Woodland (acres)	2
Shrubland (acres)	12
Herbaceous (acres)	5
Impervious Surfaces (acres)	**462**

* The flood area includes the FEMA 100-year floodplain combined with the adjusted 1996 flood inundation area.

\+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and is currently being updated based on 2006 aerial photography.

There are several areas of soil, sediment and groundwater contamination on this site, resulting from historic and current industrial uses.

Natural Resources Description

Inventoried resources within this site are primarily developed flood area with some vegetation (resource features are shown in WR11 Maps 2 and 3). The riparian corridor along the bank of the Willamette is fragmented by river dependent uses. No terrestrial wildlife connections exist between upland habitats in Forest Park and the Willamette River. Six streams are piped through the site and discharge to the river.

This site contains small patches of shrubland and herbaceous vegetation, vegetated riprap and beaches. Aside from the two beaches in the northeastern third of the site, the banks of the river are steep and consist of fill and rock to the north, vegetated riprap in the middle, and pilings to the south.

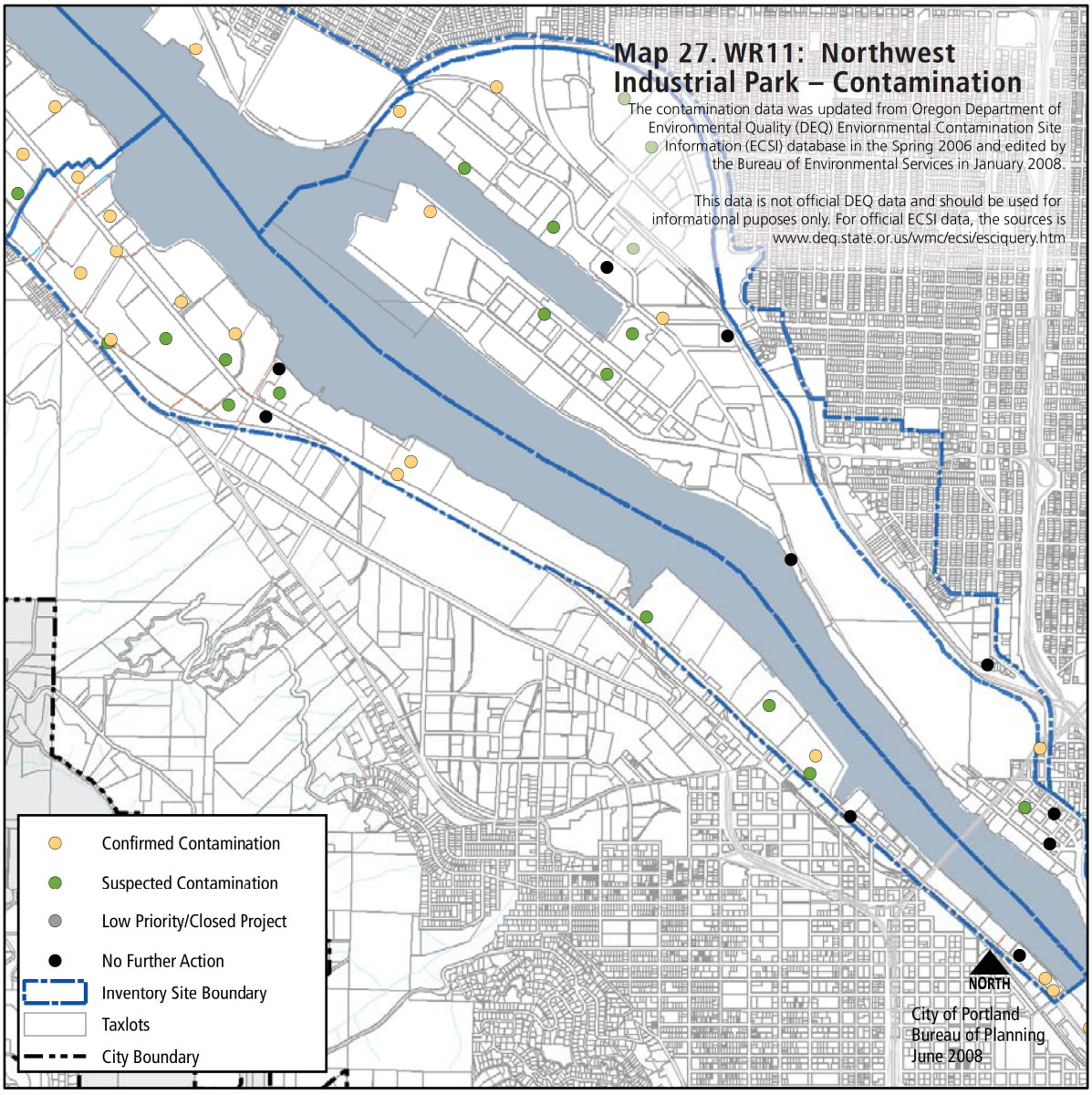
Saltzman and Balch creeks are piped underneath this site, and have outfalls to the Willamette. Saltzman Creek is daylighted for approximately 300-400 feet prior to discharging to the river. Bathymetry data show shallow water areas adjacent to the beach and mudflats. Shrubland vegetation is dominated by Himalayan blackberry. Another shallow water area is located at an inlet where an outfall discharges multiple streams, including Balch Creek, to the river. The substrate here primarily consists of sand and is exposed during low tide (ODFW, 2005). The vegetation type surrounding the outfall is herbaceous.

The river channel provides a migration corridor for fish, birds, and mammals. The beach and near-shore shallow water areas do provide important habitat for salmonids that are listed as threatened species under the Endangered Species Act, including Lower Columbia River Chinook salmon and Lower Columbia River steelhead trout (ODFW, 2005). Other indigenous fish such as Pacific lamprey and sturgeon are expected to be present although their use of the reach may be limited by dredging. Fish such as sucker and carp may also be abundant in these uniform habitats (ODFW, 2005). The open water habitat also provides feeding areas for birds such as ducks, cormorants, gulls, herons; and mammals such as river otter and mink. Insectivores such as swallows and bats also forage over the water. In addition, a wildlife migration corridor crosses the river in this reach providing a connection to Doane Lake and Forest Park.

The Willamette River is a designated Special Habitat Area, reflecting its value as a wildlife corridor and as federally designated "Critical Habitat" for salmonids species listed as threatened under the Endangered Species Act. The beach and near-shore shallow water areas along the Willamette River also provide important habitat for ESA-listed salmonids and macroinvertebrates (ODFW, 2005).

The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, and temperature. Oregon Water Quality Index values from 1986 to 1995 for the Lower Willamette Basin in Portland range from fair to very poor.

Contamination exists at multiple locations within this site. Soil, groundwater and river sediments contain contamination resulting from past and current industrial activities including roofing material manufacturing, waste management, fueling and fuel storage, asphalt refinery, ship maintenance, acetylene plant, metal recycling, and other activities (see Map 27). Types of pollutants found here include benzene, hydrocarbons, petroleum products, DDT, metals (chromium, lead, mercury, aluminum, cobalt, etc.), fluorene, arsenic, PAHs, PCBs, acetone, and others. Potential environmental and health risks include direct contact or ingestion of contaminated sediments or groundwater by humans, aquatic organisms, birds or mammals and consumption of fish or crayfish by recreational anglers. For more information regarding contamination, visit the DEQ website at http://www.deq.state.or.us/lq/ecsi/ecsi.htm.



Natural Resource Evaluation

The natural resources located within this site have been evaluated for relative riparian and wildlife habitat quality. Relative quality is presented in the form of relative functional value ranks for riparian corridors, wildlife habitat, and riparian/wildlife habitat value combined (Table 33). The relative ranks are produced using GIS models and information on Special Habitat Areas. The model criteria are not sensitive to the species of vegetation present or whether vegetation is native or non-native. However, the model criteria do assign different values to cultivated, heavily manicured and managed landscapes and semi-natural and natural vegetation. The approach used to generate the relative ranks is summarized in the introduction to the North Reach sites. Additional detail is provided in the Methodology Overview section of this report and in Appendix E - *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

All of the ranked resource areas provide significant riparian and/or habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can help inform planning programs, design of develop or redevelopment projects, mitigation and restoration activities.

Riparian Corridors – Relative Ranks

The site contains the Willamette River and vegetation in the flood area that contribute to the riparian functions as detailed in the natural resource description. These landscape features provide the following riparian functions:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank function, and sediment, pollution and nutrient control
- Large wood and channel dynamics
- Organic inputs, food web and nutrient cycling
- Riparian wildlife movement corridor

High relative ranks are assigned to the Willamette River, and flood area vegetated with woodland or shrubland. High and medium relative ranks are assigned to beaches and vegetated bank and associated land within 50 feet of the river. Medium relative ranks are assigned to portions of the flood areas with herbaceous vegetation. Low relative ranks are assigned to portions of flood area that are not vegetated and to hardened, non-vegetated river banks. Other vegetated areas are assigned a high, medium, or low relative functional rank depending on the proximity and extent of the vegetation relative to the Willamette River (WR11 Map 4).

Wildlife Habitat – Relative Ranks

Based on the wildlife habitat attributes mentioned in the previous section (size, interior area, connectivity/proximity to other patches and water), the wildlife habitat model assigns no relative functional rank to natural resources in this site.

The Willamette River is a designated Special Habitat Area. The SHAs contain unique features and provide critical wildlife habitat as described in the Natural Resources Description section above. SHAs receive a high relative rank for wildlife habitat.

Combined Riparian/Wildlife Habitat Relative Ranks

Where areas mapped as riparian corridors and wildlife habitat overlap, and their relative ranks differ, the combined relative rank will be the higher of the two ranks. For example, an area that ranks medium for riparian function and low for wildlife habitat will receive a medium combined relative rank. Areas that are assigned a high combined relative rank include those that rank high for riparian functions or wildlife habitat, including Special Habitat areas (WR11 Map 6).

Table 33: Summary of Ranked Resources in WR11: Northwest Industrial Area

Total Inventory Site = 963 acres
Terrestrial* = 428 acres
Willamette River = 535 acres

	High	Medium	Low	Total
Riparian Corridor **				
acres	440	14	67	521
percent total inventory site area	46	2	7	55
Wildlife Habitat				
acres	0	0	0	0
percent total inventory site area	0	0	0	0
Special Habitat Areas **				
acres	426			
percent total inventory site area	44			
Wildlife Habitat- adjusted for Special Habitat Areas ***				
acres	426	0	0	426
percent total inventory site area	44	0	0	44
Combined Riparian Corridor/Wildlife Habitat+				
acres	440	14	67	521
percent total inventory site area	46	2	7	55
Combined Riparian Corridor/Wildlife Habitat (excludes Willamette River)				
acres	13	14	67	94
percent total inventory site area	1	2	7	10

* Terrestrial includes the land, tributary streams, drainageways and wetlands

** High-ranked riparian resources, wildlife habitat, and Special Habitat Areas includes the Willamette River

*** Special Habitat Areas rank high for wildlife habitat

\+ Because riparian resources, wildlife habitat, and Special Habitat Areas overlap, the results cannot be added together to determine the combined area.



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Site WR11a - Map 1: Northwest Industrial Area

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 900'

0' 450' 900' 1350'

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Site WR11b - Map 1: Northwest Industrial Area

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

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Site WR11a - Map 2: Northwest Industrial Area

Water-Related Features

Water Bodies

River Depths

- 0 to -20′
- -20 to -30′
- -30 to -40′
- deeper than 40′
- Stream/Drainage
- Culvert or Piped

Other Features

- Flood Area
- Wetlands
- Beach
- Bio-engineered
- Vegetative Rip Rap
- Non-vegetative Rip Rap
- Site Boundary
- City Boundary

Outfalls

- Stormwater
- Combined stormwater /sanitary
- Abandoned/Unclassified
- Fill Bank
- Rock Bank
- Seawall
- Pilings
- Urban Services

INFORMATION SOURCES:

Water Bodies:
Rivers, lakes and other water features. Originally digitized by Metro (1994). Data collection scale: 1:100′ - 1:400′. City of Portland and Multnomah County pockets updated by City of Portland, Bureau of Planning, to refine waterbody geometry, remove erroneously mapped waterbodies, and add missing waterbodies. Aerial photos were the primary data source used as reference for re-mapping waterbodies. This is an interim dataset reflecting all work completed to date.
Outfalls: Maintained by BES (June 2008) Location is approximate and data may be incomplete.

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Site WR11b - Map 2: Northwest Industrial Area

Water-Related Features

Water Bodies

River Depths

- 0 to -20′
- -20 to -30′
- -30 to -40′
- deeper than 40′
- Stream/Drainage
- Culvert or Piped

Other Features

- Flood Area
- Wetlands
- Beach
- Bio-engineered
- Vegetative Rip Rap
- Non-vegetative Rip Rap
- Site Boundary
- City Boundary

Outfalls

- Stormwater
- Combined stormwater /sanitary
- Abandoned/Unclassified Fill Bank
- Rock Bank
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Site WR11a - Map 3: Northwest Industrial Area

Vegetation Features

Vegetation Types
- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

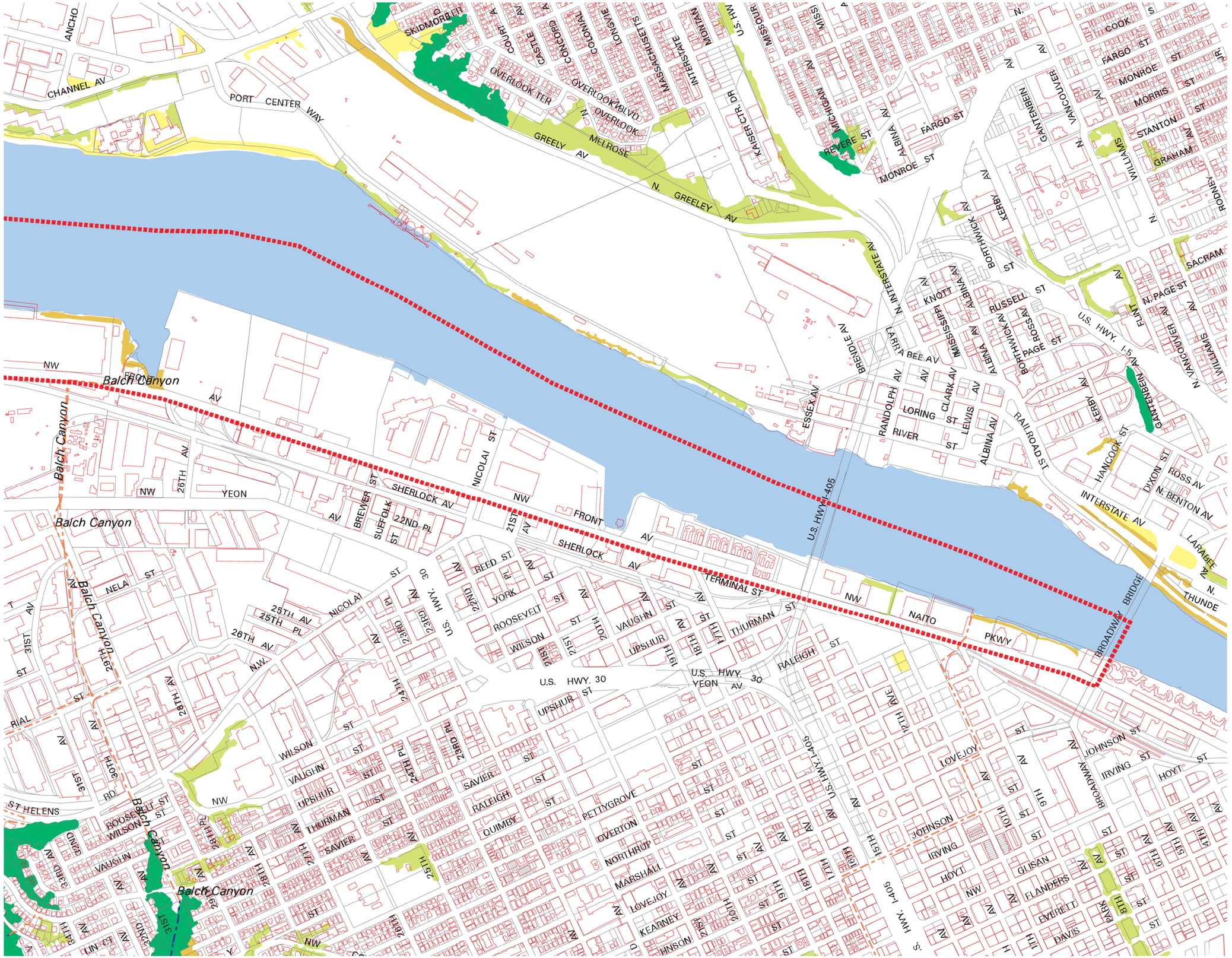
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Site WR11b - Map 3: Northwest Industrial Area

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

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Site WR11a - Map 4: Northwest Industrial Area

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

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Site WR11b - Map 4: Northwest Industrial Area

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

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Site WR11a - Map 5: Northwest Industrial Area

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

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Site WR11b - Map 5: Northwest Industrial Area

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

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Site WR11a - Map 6: Northwest Industrial Area

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

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Site WR11b - Map 6: Northwest Industrial Area

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

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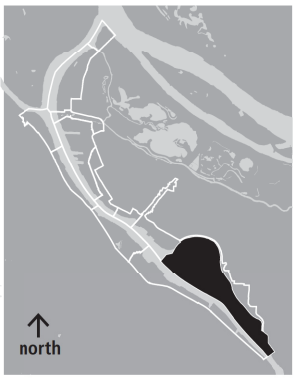
Scale: 1" = 900'

0' 450' 900' 1350'

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Inventory Site WR12: SWAN ISLAND



Summary Information

Watershed:	Willamette River
Neighborhood:	Overlook Neighborhood
USGS quadrangle, quarter section maps:	1N1E17, 1N1E18, 1N1E20, 1N1E21, 1N1E27, 1N1E28, 1N1E34 and 2324-27, 2424-27, 2524-27, 2626-28, 2727-29, 2828-30, 2929-30
River Mile:	7.6 – 11.3
Site Size:	1,454 acres (land and water)
Previous Inventory:	Lower Willamette River Wildlife Habitat Inventory, March 1986
Zoning:	Heavy Industrial (IH) General Industrial (IG) General Employment (EG) Open Space (OS) River Industrial overlay (i) River General overlay (g) River Recreational overlay (r) Scenic overlay (s)
Existing Land Use:	Industrial; railroad
General Description:	The site is located below Willamette Bluff and is almost entirely developed with industrial uses.
Resource Features:	Bottomland forest; upland scrub/shrub; grassland; wapato wetland; flood area; beach; open water
Functional Values:	Microclimate and shade; stream flow moderation and water storage; bank function, and sediment, pollution and nutrient control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; wildlife habitat; habitat connectivity/ movement corridor
Special Habitat Area:	**Willamette River** – Area critical to sensitive species including NOAA designated Critical Habitat (S) and wildlife habitat connectivity corridor (C). **Swan Island Lagoon and Wapato Wetland** – Wetland (W), migratory stopover habitat (M), area critical to sensitive species (S), and resource or structure that provides unique habitat function in natural or built environment (U).
Special Status Species:	**Plants:** Wapato **Fish:** Lower Columbia River Chinook salmon; Lower Columbia River steelhead trout; Pacific lamprey
Natural Hazards:	Landslide, wildfire, flood area
Contamination:	Yes

SITE DESCRIPTION

The Swan Island inventory site is approximately 1,454 acres in size. The site is located below the Willamette Bluff and extends to the Broadway Bridge in the southeast. The northern, northeast and eastern boundary is the foot of the Willamette Bluff. The centerline of the Willamette River provides the western boundary. WR12 Map 1 shows the aerial view of the Swan Island inventory site.



Swan Island Beach

The site includes Swan Island, Swan Island Lagoon, and approximately 19,400 feet of shoreline along the Willamette River. Three beaches existing within the site are fragmented by riprap and fill.

Vegetation in the site is associated primarily with the river banks. Vegetated areas at least ½ acre in size consist of 22 acres of forest and woodland, 15 acres of shrubland and 21 acres of herbaceous vegetation.

In addition to the open water area, there are 128 acres of flood area on the site. Approximately 30 are vegetated. The remaining 98 acres include developed areas and non-vegetated portions of the river bank. The site contains 786 acres (54%) impervious surface coverage, including 27.6 miles of road.

Active dredging in the Willamette River has produced a uniform channel with little diversity. The inventory site is bordered by heavy industrial uses, which have substantially modified bank conditions and nearshore areas. Marine cargo activities are common in river, with large vessels passing through to upstream berths in the Portland Harbor. Maintenance dredging of the channel allows for continued access to this reach by large ocean-going ships.

Table 34: Summary of Natural Resource Features in WR12: Swan Island

	Study Area (963 acres)
Stream (miles)	
Willamette River (miles/acres)	3.7/434
Open Stream Channel (linear feet)	0
Piped Stream Segments (linear feet)	0
Wetlands (acres)	**0**
Flood Area (acres)*	**565**
Vegetated (acres)	30
Non-vegetated (acres)	98
Open Water (acres)	437
Vegetated Areas >= ½ acre (acres)+	**57**
Forest (acres)	<1
Woodland (acres)	21
Shrubland (acres)	15
Herbaceous (acres)	21
Impervious Surfaces (acres)	**786**

* The flood area includes the FEMA 100-year floodplain combined with the adjusted 1996 flood inundation area.

\+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and is currently being updated based on 2006 aerial photography.

Beaches and associated nearshore shallow-water areas, and the Willamette River/Columbia Slough confluence provide habitat for migrating salmonids, shorebirds and other wildlife species

As a result of historic and current industrial uses, there are numerous areas of soil, surface water, groundwater, and near shore sediment contamination exist within this site. Portions of the site are within the City of Portland Wildfire Hazard Zone (City of Portland, 1998), the Potential Landslide Hazard area (City of Portland, 2002).

Natural Resources Description

This site has aquatic and terrestrial resources and provides connectivity between the Willamette River and Willamette Bluffs (key resource features are shown in WR12 Maps 2 and 3). The majority of the vegetation in this inventory site is found at the edges of the Swan Island Lagoon and along the beaches. The rest of the site contains little vegetation, except some herbaceous cover and shrubland and vegetated riprap.

The historic course of the river was to the north, flowing along the east side of Swan Island through what is now the Swan Island Lagoon. The historic channel was filled, except for the lagoon, and the river now flows west of the "island." Much of the river banks are steep. Bank treatments include pilings, vegetated and non-vegetated rip rap, seawall, rock and unclassified fill. A beach situated along the former main river channel at Swan Island Lagoon. Two more beach areas are located along the river side of Swan Island. Large wood accumulation is common along the beaches.

The beach at Swan Island Lagoon is associated with a wetland containing native Wapato vegetation. The beach begins on the eastern shore near N Ensign Street and continues to the south end of the lagoon. Remnant forest, woodland and shrubland vegetation line the banks of the Swan Island Lagoon beach. At the southeast end of the lagoon is a large vacant parcel with grass, shrubs and some young cottonwoods. The vegetation association is characteristic of more disturbed sites along the river, with Himalayan blackberry and black cottonwood as dominant species. Riparian cover along the banks is fragmented by active river industrial uses, but the lagoon riverbanks are only partly lined with riprap, and in many places contain well-established stands of black cottonwood. On the southern tip of the lagoon the Port of Portland has removed non-native invasive species and planted native trees and shrubs in order to enhance bank habitat and reduce erosion.

Beaches located along the shore of the Willamette River have accumulated on top of fill where the main channel of the river historically flowed. One of the beach segments is 7,000 feet long and up to 100 feet wide at mean low water. Farther south exists an 800-foot long, somewhat narrower beach. Shallow water areas adjacent to the beaches are primarily composed of silt and sand.

The river channel provides a migration corridor for fish, birds, and mammals. Adult salmon and steelhead utilize the Willamette River during migration. During field investigations in winter 1999/2000, a large salmon was observed jumping in the river offshore from the Swan Island beach. The beaches and near-shore shallow water areas provide important habitat for salmonids that are listed as threatened species under the Endangered Species Act, including Lower Columbia River Chinook salmon and Lower Columbia River steelhead trout (ODFW, 2005). Other indigenous fish such as Pacific lamprey and sturgeon are expected to be present although their use of the reach may be limited by dredging. Fish such as sucker and carp may also be abundant in these uniform habitats (ODFW, 2005).

The vegetated beaches and associated large wood accumulation occurring at this site are uncommon in much of the North Reach. The stretch of beach northwest of the railroad yard (riprap bank notwithstanding) provides a good reference beach condition for other sites that may be constrained by shoreline development. A variety of willow species (e.g., Pacific, Columbia River, and Piper's willow) and black cottonwood saplings have established on the Swan Island beaches. The beach vegetation is in transition from a shrub to a riparian forest community, though this successional process could change quickly in the event of major flooding. The shrubby vegetation serves several functions: it dissipates erosive forces of the river, traps sand and sediment, and is responsible for the large accumulation of driftwood on the beach. Large cobbles and boulders have also been deposited on the beach. The banks of the river are uniformly covered by riprap, but below the banks are scattered stands of cottonwoods and willows. The sandy beach, large wood, boulders, shrubby beach vegetation, and the above bank trees combine to provide valuable forage and cover habitat for birds and small mammals.

The beaches, natural banks, and riparian cover at this site provide limited forage and perch sites for belted kingfishers, great blue herons, and passerines. The lagoon beach provides a bird migration corridor connecting the habitat at the lagoon terminus to the Willamette Bluff area.

The open water habitat provides feeding areas for birds such as ducks, cormorants, gulls, herons; and mammals such as river otter and mink. Insectivores such as swallows and bats also forage over the water. In addition, a wildlife migration corridor crosses the river in this reach providing a connection to Doane Lake and Forest Park.

This site contains two Special Habitat Areas (SHAs): Swan Island Wapato Wetland and the Willamette River itself. The Swan Island Wapato Wetland SHA includes a wetland with the rare native Wapato plant.

The Willamette River is a designated Special Habitat Area, reflecting its value as a wildlife corridor and as federally designated "Critical Habitat" for salmonids species listed as threatened under the Endangered Species Act. The beach and near-shore shallow water areas along the Willamette River also provide important habitat for ESA-listed salmonids and macroinvertebrates (ODFW, 2005).

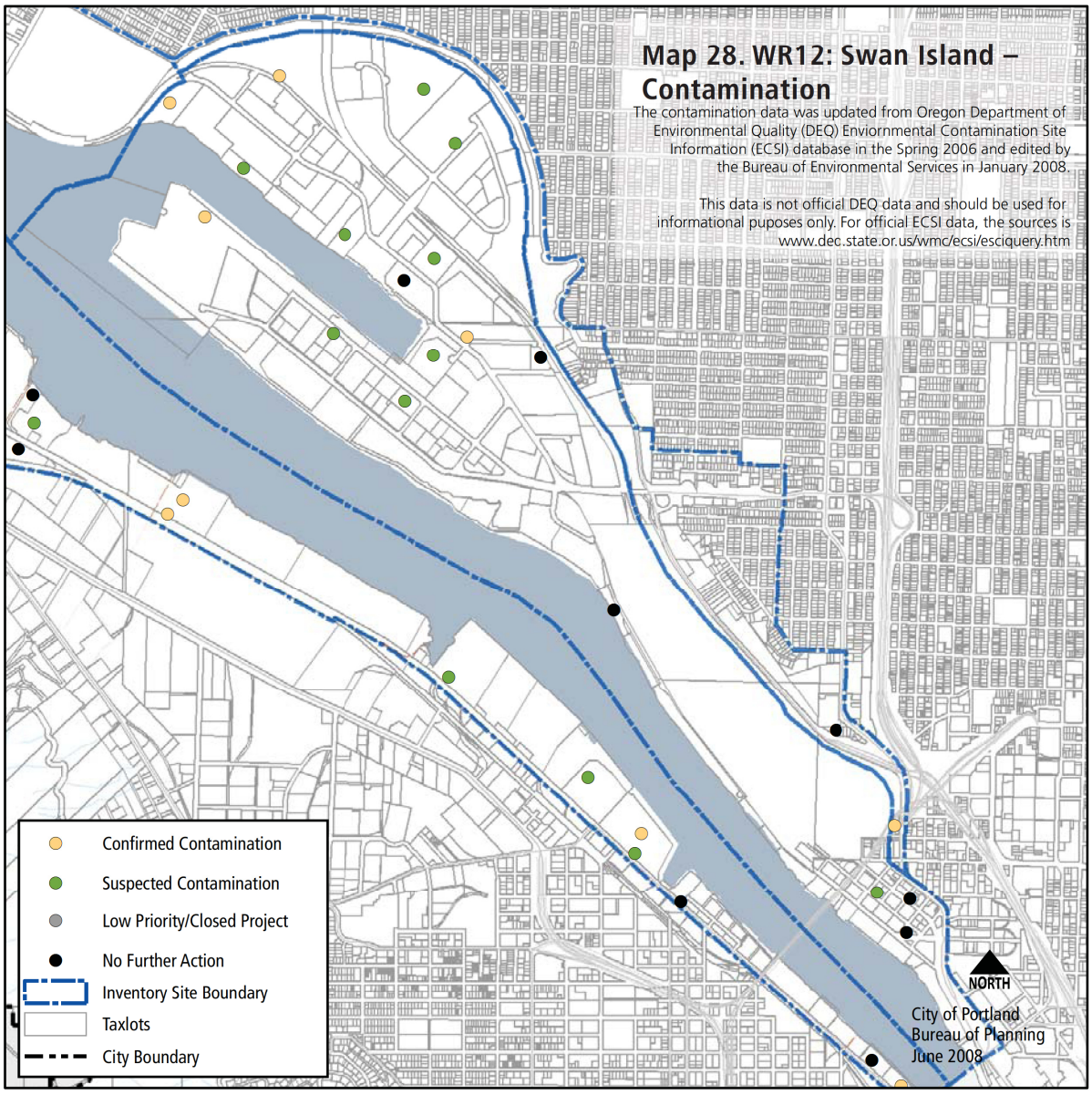
The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, and temperature. Oregon Water Quality Index values from 1986 to 1995 for the Lower Willamette Basin in Portland range from fair to very poor. The Lower Willamette River in Portland is also deemed unsafe for swimming.

Soil, groundwater and river sediments within the site are contaminated from past and current industrial activities including truck manufacturing, landfill, marine activities (treating ballast water), and other activities (see Map 28.) Types of pollutants found here include arsenic, PAHs, metals (copper, chromium, mercury, zinc, etc.) PCBs, tributyin, petroleum products, vinyl chloride, and others. Potential environmental and health risks include direct contact or ingestion of contaminated sediments or groundwater by humans, aquatic organisms, birds or mammals and consumption of fish or crayfish by recreational anglers. For more information regarding contamination, visit the DEQ website at http://www.deq.state.or.us/lq/ecsi/ecsi.htm.

Natural Resource Evaluation

The natural resources located within this site have been evaluated for relative riparian and wildlife habitat quality. Relative quality is presented in the form of relative functional value ranks for riparian corridors, wildlife habitat, and riparian/wildlife habitat value combined (Table 35). The relative ranks are produced using GIS models and information on Special Habitat Areas. The model criteria are not sensitive to the species of vegetation present or whether vegetation is native or non-native. However, the model criteria do assign different values to cultivated, heavily manicured and managed landscapes and semi-natural and natural vegetation. The approach used to generate the relative ranks is summarized in the introduction to the North Reach sites. Additional detail is provided in the Methodology Overview section of this report in Appendix E - *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

All of the ranked resource areas provide significant riparian and/or wildlife habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can help inform planning programs, design of development or redevelopment projects, mitigation and restoration activities.



Riparian Corridors – Relative Ranks

The site contains portions of the Willamette River and vegetated flood area, which contribute to the riparian functions as detailed in the natural resource description. These landscape features provide the following riparian functions:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank function, and sediment, pollution and nutrient control
- Large wood and channel dynamics
- Organic inputs, food web and nutrient cycling
- Riparian wildlife movement corridor

High relative functional ranks are assigned to the Willamette River and woodland and shrubland patches within the flood area. High and medium relative ranks are assigned to beaches and vegetated banks an associated land within 50 feet of the river. Medium relative ranks are assigned to portions of the flood areas with herbaceous vegetation.

Low relative ranks are assigned to portions of flood area that are not vegetated and to hardened, non-vegetated river banks. Other vegetated areas within this site are assigned a high or medium relative functional rank depending on the proximity and extent of the vegetation relative to the Willamette River (WR12 Map 4).

Wildlife Habitat – Relative Ranks

Based on the wildlife habitat attributes mentioned in the previous section (size, interior area, connectivity/proximity to other patches and water), the wildlife habitat model assigns no relative functional rank to natural resources in this site.

This site contains two Special Habitat Areas (SHAs): Swan Island Wapato Wetland and the Willamette River itself. The Swan Island Wapato Wetland SHA includes a wetland with the rare native Wapato plant. The SHAs contain unique features and provide critical wildlife habitat as described in the Natural Resources Description section above. SHAs receive a high relative rank for wildlife habitat.

Combined Riparian/Wildlife Habitat Relative Ranks

Where areas mapped as riparian corridors and wildlife habitat overlap, and their relative ranks differ, the combined relative rank will be the higher of the two ranks. For example, an area that ranks low for riparian function and high for wildlife habitat, such as the Willamette Beach SHAs, will receive a high combined relative rank (WR12 Map 6).

Table 35: Summary of Ranked Resources in WR12: Swan Island

Total Inventory Site = 1,454 acres
Terrestrial* = 1,018 acres
Willamette River = 439 acres

	High	Medium	Low	Total
Riparian Corridor**				
acres	456	29	92	577
percent total inventory site area	31	2	6	39
Wildlife Habitat				
acres	0	0	<1	<1
percent total inventory site area	0	0	<1	<1
Special Habitat Areas **				
acres	447			
percent total inventory site area	31			
Wildlife Habitat- adjusted for Special Habitat Areas ***				
acres	447	0	<1	447
percent total inventory site area	31	0	<1	31
Combined Riparian Corridor/Wildlife Habitat +				
acres	462	28	90	580
percent total inventory site area	32	2	6	40
Combined Riparian Corridor/Wildlife Habitat (excludes Willamette River)				
acres	25	28	90	143
percent total inventory site area	2	2	6	10

* Terrestrial includes the land, tributary streams, drainageways and wetlands
** High-ranked riparian resources, wildlife habitat, and Special Habitat Areas includes the Willamette River
*** Special Habitat Areas rank high for wildlife habitat
\+ Because riparian resources, wildlife habitat, and Special Habitat Areas overlap, the results cannot be added together to determine the combined area.

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Site WR12a - Map 1: Swan Island

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 900'

0' 450' 900' 1350'

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Site WR12b - Map 1: Swan Island

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

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Site WR12a - Map 2: Swan Island

Water-Related Features

Water Bodies

River Depths

- 0 to -20′
- -20 to -30′
- -30 to -40′
- deeper than 40′
- Stream/Drainage
- Culvert or Piped

Other Features

- Flood Area
- Wetlands
- Beach
- Bio-engineered
- Vegetative Rip Rap
- Non-vegetative Rip Rap
- Site Boundary
- City Boundary

Outfalls

- Stormwater
- Combined stormwater /sanitary
- Abandoned/Unclassified Fill Bank
- Rock Bank
- Seawall
- Pilings
- Urban Services

INFORMATION SOURCES:

Water Bodies:
Rivers, lakes and other water features. Originally digitized by Metro (1994). Data collection scale: 1:100′ - 1:400′. City of Portland and Multnomah County pookets updated by City of Portland, Bureau of Planning, to refine waterbody geometry, remove erroneously mapped waterbodies, and add missing waterbodies. Aerial photos were the primary data source used as reference for re-mapping waterbodies. This is an interim dataset reflecting all work completed to date.
Outfalls: Maintained by BES (June 2008) Location is approximate and data may be incomplete.

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Site WR12b - Map 2: Swan Island

Water-Related Features

Water Bodies

River Depths

- 0 to -20′
- -20 to -30′
- -30 to -40′
- deeper than 40′
- Stream/Drainage
- Culvert or Piped

Other Features

- Flood Area
- Wetlands
- Beach
- Bio-engineered
- Vegetative Rip Rap
- Non-vegetative Rip Rap
- Site Boundary
- City Boundary

Outfalls

- Stormwater
- Combined stormwater /sanitary
- Abandoned
- Unclassified Fill Bank
- Rock Bank
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Site WR12a - Map 3: Swan Island

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

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Site WR12b - Map 3: Swan Island

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

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Site WR12a - Map 4: Swan Island

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

For more information, please visit our website:
http://www.portlandonline.com/planning/index.cfm?c=40437

NOTE: Portland's resource inventory is still being evaluated for accuracy and consistency and should be considered preliminary. The inventory has not yet been adopted by the City of Portland.

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Site WR12b - Map 4: Swan Island

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

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Site WR12a - Map 5: Swan Island

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

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Site WR12b - Map 5: Swan Island

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

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Site WR12a - Map 6: Swan Island

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

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Site WR12b - Map 6: Swan Island

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

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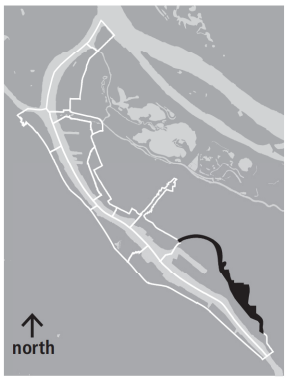
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Inventory Site WR13:
WILLAMETTE BLUFF



Summary Information

Watershed:	Willamette River
Neighborhood:	University Park, Overlook, and Albina Neighborhoods
USGS quadrangle, quarter section maps:	1N1E16, 1N1E17, 1N1E21, 1N1E27, 1N1E28 and 2325-27, 2427, 2527-28, 2627-29, 2728-29, 2829
River Mile:	7.6 – 10.82
Site Size:	258 acres
Previous Inventory:	Lower Willamette River Wildlife Habitat Inventory, March 1986. East Buttes Terraces and Wetlands Conservation Plan, July 1993
Zoning:	Residential 5,000 (R5) Residential 2,500 (R2.5) Residential 2,000 (R2) Residential 1,000 (R1) Open Space (OS) Industrial (IH, IR, IG) Employment (EX, EG) Commercial (CO, CN) Environmental Conservation overlay (c) River Industrial overlay (i) River Natural overlay (n)
Existing Land Use:	Residential, park, industrial; railroad
General Description:	The site is located above Swan Island and contains steep bluffs with remnant native oak habitat
Resource Features:	Foothill savannah/ oak woodland; conifer/ hardwood forest; upland scrub/shrub; grassland; steep slopes
Functional Values:	Bank function, and sediment, pollution and nutrient control; habitat connectivity/ movement corridor
Special Habitat Area:	**Willamette Bluff Complex** - Native oak (O) and wildlife habitat connectivity corridor (C).
Special Status Species:	N/A
Natural Hazards:	Landslide, wildfire
Contamination:	Yes

Site Description

This 258 acre upland site encompasses a forested bluff along the eastern river terrace that contains a relatively intact strip of native oak stands and upland vegetation. The bluff generally follows N. Willamette Boulevard and N. Greeley Avenue from the University of Portland at the northwest end of the site to N. Interstate Avenue near the Fremont Bridge, at the southeast end of the site. The site is bordered to the southwest by the Mock's Bottom/Swan Island industrial area and includes Willamette Bluff, from the top of the bluff along N. Willamette Blvd to the bottom of the bluff at Swan Island. WR13 Map 1 shows the aerial view of the Willamette Bluff inventory site.



Willamette Bluff

Vegetated areas at least $^1/_2$ acre in size include 42 acres of forest or dense tree canopy, 41 acres of woodland, 3 acres of shrubland and 5 acres of herbaceous cover. The remaining area is primarily in residential development. The site contains 63 acres (24%) impervious surface coverage, including 9.5 miles of road.

Three public parks are located within this site: the Bluff above Swan Island, Madrona Park, and Overlook Park. Also within this site is the Mocks Crest Property, a small public open space. The City's Bureau of Environmental Services manages two active revegetation projects on this site: Mocks Crest Bluff and Mocks Crest Landfill.

Contamination exists at the southeast end of the site within the Union Pacific Railroad's Albina Yard. Soil, surface water, groundwater, and nearshore sediments are contaminated from industrial uses associated with the railroad. The entire site is in a Potential Landslide Hazard area (City of Portland, 2002), and a large portion is also within the City of Portland Wildfire Hazard Zone (City of Portland, 1998).

Table 36: Summary of Natural Resource Features in WR13: Willamette Bluff

	Study Area (258acres)
Stream (miles)	
Willamette River (miles/acres)	0
Open Stream Channel (linear feet)	0
Piped Stream Segments (linear feet)	0
Wetlands (acres)	**0**
Flood Area (acres)*	**0**
Vegetated (acres)	0
Non-vegetated (acres)	0
Open Water (acres)	0
Vegetated Areas >= ½ acre (acres)+	91
Forest (acres)	42
Woodland (acres)	41
Shrubland (acres)	3
Herbaceous (acres)	5
Impervious Surfaces (acres)	**63**

* The flood area includes the FEMA 100-year floodplain combined with the adjusted 1996 flood inundation area.

\+ The vegetation classifications are applied in accordance with the National Vegetation Classification System specifications developed by The Nature Conservancy. The data within the primary study area and within 300 feet of all open water bodies in Portland is draft and is currently being updated based on 2006 aerial photography.



Bluff near the University of Portland.

Natural Resources Description

Although narrow and lacking interior habitat, this site contains one of the larger upland habitats in terms of acreage (258 acres, 3.6 miles in length) in the Willamette River corridor. This site also connects to the bluffs within the McCormick/Baxter and Triangle Park and Willamette Cove inventory sites to the north (key resource features are shown in Maps 2 and 3). The bluffs are part of an upland corridor extends for approximately 7 miles from Chimney and Pier Parks in the St. Johns neighborhood to the Fremont Bridge.

Vegetation at this site is characterized by a foothill savanna/oak woodland forest community comprised of Oregon White oak, Pacific madrone, and to a lesser extent Ponderosa pine. This bluff represents one of the few remnants of oak/madrone community in Portland. The large stand of Ponderosa pine, found on the warmer south-facing slopes by the University of Portland, also is rare in the Portland region.

Douglas fir, Bigleaf maple, and bitter cherry are interspersed with these species in some areas, and Western red cedar, Pacific dogwood, and red alder occur infrequently. Black cottonwood occurs on the lower slopes primarily at the northern and southern ends of the site where the bluff is closest to the Willamette River. The forest understory includes western hazel, red elderberry, vine maple, snowberry, oceanspray, Oregon grape, serviceberry, and cottonwood saplings. The ground layer throughout most of this site is covered by invasive species such as English ivy and clematis; sword fern is present but uncommon. Forest tree cover ranges from 25 to 40 percent, shrub cover is about 15 percent, and ground cover is 100 percent. The age of the forest vegetation is approximately 30 to 50 years old.

Small shrub and grassland habitats are scattered between the forest patches on the bluff, generally in areas where the trees have been cleared for park uses or to maintain views. The shrub vegetation is dominated by Himalayan blackberry and Scot's broom. Grassland pockets are generally areas of grasses or lawns maintained as local parks. Although many of the dominant plant species in the upland community are exotic invasives, most of the plants found within this habitat type produce fruit, nuts, and seeds that provide high food value for birds and mammals. Voles, pocket mice, snakes, and lizards are common within grassland habitat, making them prime feeding areas for hawks, falcons, owls, and coyotes. Butterflies are commonly found in grassland habitats. Crows, robins, song sparrows, and other common resident ground feeding bird species are also found within this habitat type.

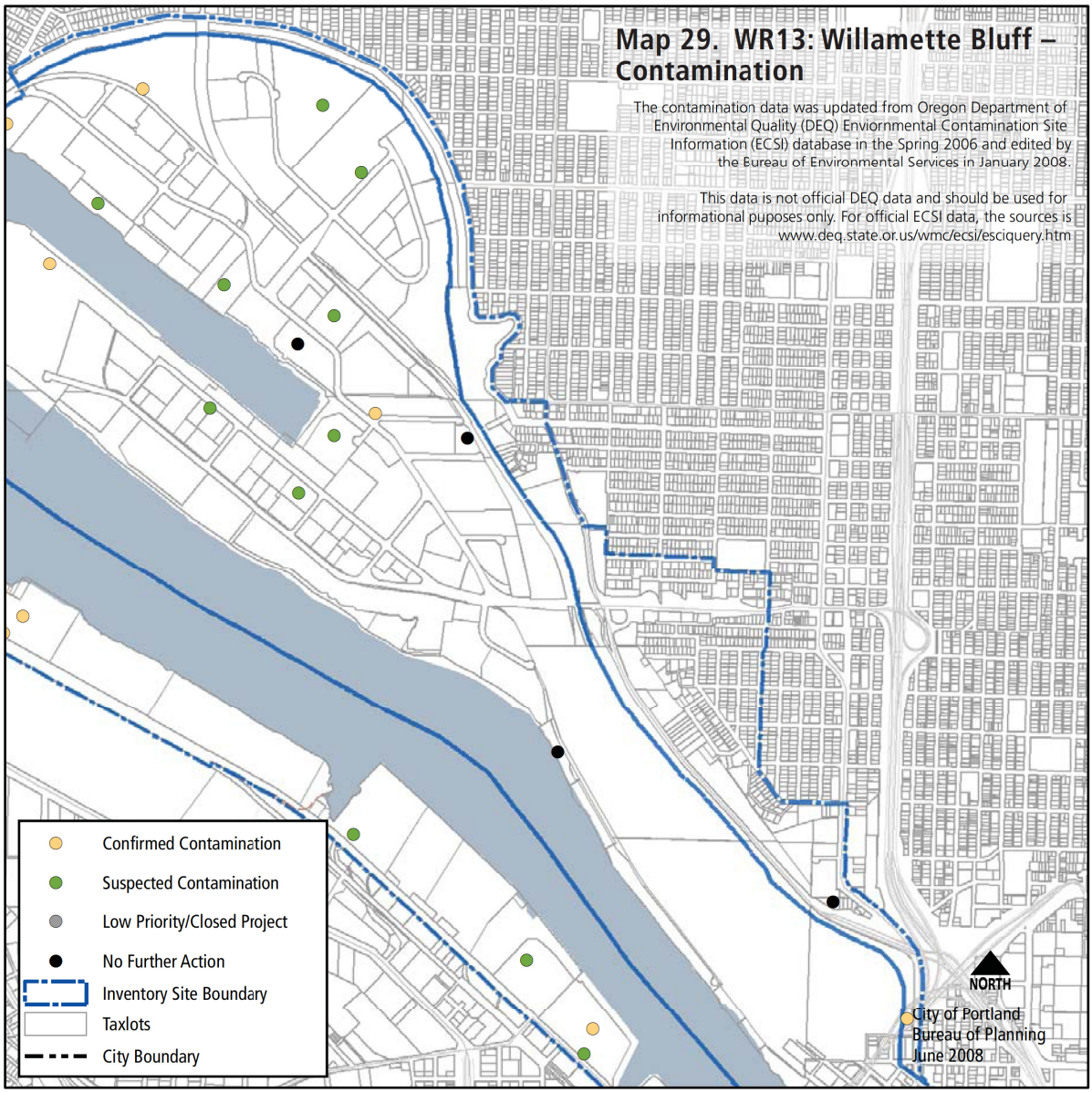
The remnant foothill savanna/oak woodland forest provides forage, perch, and limited nesting opportunities for wildlife. Avian fauna, passerines in particular, are the primary foragers at this site. A pair of Peregrine falcons nests each year on the Fremont Bridge located just south of this site. Peregrines may forage on the avian prey within this site. Mammals occurring at this site include squirrel, raccoon, and porcupine.

Relatively limited wildlife use was recorded at this site during the winter 1999/2000 field survey, in part due to the season and cold temperatures. Birds observed include winter wren, American robin, and northern flicker. Evidence of porcupine (quills) was also noted. The bluffs are located further from the river than the bluffs in the McCormick/Baxter site. The combination of distance from the river and extensive development in Mocks bottom limits non-avian wildlife movement and access to water.

The site contains one Special Habitat Areas (SHAs): the Willamette Bluff SHA and the Riverwood SHA. The southern portion of the 7-mile Willamette Bluff Complex contains remnant native oak habitat. The full bluff extends from Pier and Chimney Parks to the Fremont Bridge. The Willamette Bluff within the site wraps around the hill above Swan Island and continues along the bluff to Going Street just north of the Greeley Ave/ I-5 interchange.

The Willamette Bluff SHA provides important nesting and foraging habitat for a diverse array of bird and mammal species. Acorns and oak galls, as well as insects found on trees, are a good food source, while tree cavities in the oak provide nesting habitat for birds such as swallows, wrens, and great horned owls. This habitat type is critical for neotropical migratory birds.

The site contains two areas of contaminated soils and groundwater, resulting from past and current industrial activities including battery manufacturing, railyard and other activities (see Map 29.) Types of pollutants found here include lead, arsenic, bis(2-ethylhexyl)phthalate, chromium, petroleum hydrocarbons, zinc and others. Potential environmental and health risks include direct contact or ingestion of contaminated sediments or groundwater by humans, aquatic organisms, birds or mammals. For more information regarding contamination, visit the DEQ website at http://www.deq.state.or.us/lq/ecsi/ecsi.htm



Natural Resource Evaluation

The natural resources located within this site have been evaluated for relative riparian and wildlife habitat quality. Relative quality is presented in the form of relative functional value ranks for riparian corridors, wildlife habitat, and riparian/wildlife habitat value combined (Table 37). The relative ranks are produced using GIS models and information on Special Habitat Areas. The model criteria are not sensitive to the species of vegetation present or whether vegetation is native or non-native. However, the model criteria do assign different values to cultivated, heavily manicured and managed landscapes and semi-natural and natural vegetation. The approach used to generate the relative ranks is summarized in the introduction to the North Reach sites. Additional detail is provided in the Methodology Overview section of this report and Appendix E – *City of Portland Natural Resource Inventory Update: Project Report - Discussion Draft July 2008*.

All of the ranked resource areas provide significant riparian and/or habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can help inform planning programs, design of develop or redevelopment projects, mitigation and restoration activities

Riparian Corridors – Relative Ranks

The site contains forest vegetation on a steep slope. This landscape feature extends to this site from the Willamette River and provides bank function, slope stability, and sediment, pollution and nutrient control.The GIS model assigns a low relative functional ranks to this feature due to its distance from the river (WR13 Map 4).

Wildlife Habitat – Relative Ranks

The site contains two forest/woodland patches containing savanna/oak woodland forest community, upland scrub/shrub community, and grassland that contribute to wildlife habitat function.

Based on the wildlife habitat attributes mentioned in the previous section (size, interior area, connectivity/proximity to other patches and water), the wildlife habitat model assigns low relative ranks to sections of the upland forested bluffs in the site.

The site contains two forest/woodland patches containing savanna/oak woodland forest community, upland scrub/shrub community, and grassland that contribute to wildlife habitat function. The SHAs contain unique features and provide critical wildlife habitat as described in the Natural Resources Description section above. SHAs receive a high relative rank for wildlife habitat. The SHA ranking supersedes lower rankings generated by the GIS model. Therefore, all SHAs within the site rank high for wildlife habitat (WR2 Map 5).

Combined Riparian/Wildlife Relative Ranks

Where areas mapped as riparian corridors and wildlife habitat overlap, and their relative ranks differ, the combined relative rank will be the higher of the two ranks. For example, an area that ranks low for riparian function and high for wildlife habitat will receive a high combined relative rank. Areas that are assigned a high combined relative rank are those that rank high for riparian functions or wildlife habitat, including Special Habitat Areas (WR13 Map 6.)

Table 37: Summary of Ranked Resources in WR13: Willamette Bluff

Total Inventory Site = 258 acres
Terrestrial* = 258 acres
Willamette River = 0 acres

	High	Medium	Low	Total
Riparian Corridor **				
acres	0	0	2	2
percent total inventory site area	0	0	1	1
Wildlife Habitat				
acres	0	0	56	56
percent total inventory site area	0	0	22	22
Special Habitat Areas **				
acres	89			
percent total inventory site area	34			
Wildlife Habitat- adjusted for Special Habitat Areas ***				
acres	89	0	13	102
percent total inventory site area	34	0	5	39
Combined Riparian Corridor/Wildlife Habitat +				
acres	89	0	13	102
percent total inventory site area	34	0	5	39
Combined Riparian Corridor/Wildlife Habitat (excludes Willamette River)				
acres	89	0	13	102
percent total inventory site area	34	0	5	39

* Terrestrial includes the land, tributary streams, drainageways and wetlands

** High-ranked riparian resources, wildlife habitat, and Special Habitat Areas includes the Willamette River

*** Special Habitat Areas rank high for wildlife habitat

\+ Because riparian resources, wildlife habitat, and Special Habitat Areas overlap, the results cannot be added together to determine the combined area.



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Site WR13a - Map 1: Willamette Bluff

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

Scale: 1" = 800'

0' 400' 800' 1200'

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Site WR13b - Map 1: Willamette Bluff

2007 Aerial Photography

- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Aerial Orthophotographs:
Natural color and color infrared ortho-rectified digital imagery from flight in June of 2006. Photography has been rectified to adjust for curvature of the earth. Not registered to taxlot base map.

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Site WR13a - Map 2: Willamette Bluff

Water-Related Features

Water Bodies

River Depths

- 0 to -20′
- -20 to -30′
- -30 to -40′
- deeper than 40′
- Stream/Drainage
- Culvert or Piped

Other Features

- Flood Area
- Wetlands
- Beach
- Bio-engineered
- Vegetative Rip Rap
- Non-vegetative Rip Rap
- Site Boundary
- City Boundary

Outfalls

- Stormwater
- Combined stormwater /sanitary
- Abandoned
- Unclassified Fill Bank
- Rock Bank
- Seawall
- Pilings
- Urban Services

INFORMATION SOURCES:

Water Bodies:
Rivers, lakes and other water features. Originally digitized by Metro (1994). Data collection scale: 1:100′ - 1:400′. City of Portland and Multnomah County pockets updated by City of Portland, Bureau of Planning, to refine waterbody geometry, remove erroneously mapped waterbodies, and add missing waterbodies. Aerial photos were the primary data source used as reference for re-mapping waterbodies. This is an interim dataset reflecting all work completed to date.
Outfalls: Maintained by BES (June 2008) Location is approximate and data may be incomplete.

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Site WR13b - Map 2: Willamette Bluff

Water-Related Features

Water Bodies

River Depths

- 0 to -20′
- -20 to -30′
- -30 to -40′
- deeper than 40′
- Stream/Drainage
- Culvert or Piped

Other Features

- Flood Area
- Wetlands
- Beach
- Bio-engineered
- Vegetative Rip Rap
- Non-vegetative Rip Rap
- Site Boundary
- City Boundary

Outfalls

- Stormwater
- Combined stormwater /sanitary
- Abandoned/Unclassified Fill Bank
- Rock Bank
- Seawall
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Site WR13a - Map 3: Willamette Bluff

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

All data compiled from source materials at different scales.
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Site WR13b - Map 3: Willamette Bluff

Vegetation Features

Vegetation Types

- Forest
- Woodland
- Shrubland
- Herbaceous
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

Vegetation patches:
Vegetation patches larger than 1/2 acre mapped by the City of Portland, Bureau of Planning. Based on information from reference data sources including aerial photos, Parks and Recreation natural area assessments, and vegetation surveys along the banks of the Willamette and Columbia rivers. Vegetation patches area classified as forest, woodland, shrubland, or herbaceous. The mapping area includes all land within the City of Portland and the unincorporated parts of Multnomah County that are administered by the City of Portland. Updated through summer of 2004.

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Site WR13a - Map 4: Willamette Bluff

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

The Natural Resources Inventory Update (NRIU) is a citywide project to revise and update existing natural resource inventories (of trees, streams, wildlife habitat, etc.) in Portland. The update is part of Portland's River Renaissance Initiative to ensure that the Willamette River and its tributary watersheds are clean and healthy.

** SHA ranking supercedes lower relative values.

For more information, please visit our website:
http://www.portlandonline.com/planning/index.cfm?c=40437

NOTE: Portland's resource inventory is still being evaluated for accuracy and consistency and should be considered preliminary. The inventory has not yet been adopted by the City of Portland.

All data compiled from source materials at different scales. For more detail, please refer to the source materials or City of Portland, Bureau of Planning & Sustainability.

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Site WR13b - Map 4: Willamette Bluff

Riparian Resources Relative Rankings

- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
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Site WR13a - Map 5: Willamette Bluff

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

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Site WR13b - Map 5: Willamette Bluff

Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative value
- Medium relative value
- Low relative value
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

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Site WR13a - Map 6: Willamette Bluff

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

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Site WR13b - Map 6: Willamette Bluff

Combined Riparian / Wildlife Habitat Relative Rankings

- High relative value - Special Habitat Areas **
- High relative rank
- Medium relative rank
- Low relative rank
- Stream/Drainage
- Culvert or Piped
- Site Boundary
- City Boundary
- Urban Services Boundary

INFORMATION SOURCES:

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THE RIVER PLAN
NORTH REACH

River Plan / North Reach RECOMMENDED DRAFT

VOLUME 1A: POLICIES, OBJECTIVES, AND RECOMMENDATIONS (available in print)

VOLUME 1B: CODE AMENDMENTS AND ZONING MAPS (available in print)

VOLUME 2: ECONOMIC PROSPERITY BACKGROUND INFORMATION

VOLUME 3A: NATURAL RESOURCES INVENTORY: RIPARIAN CORRIDORS AND WILDLIFE HABITAT

VOLUME 3B: NATURAL RESOURCES INVENTORY: RIPARIAN CORRIDORS AND WILDLIFE HABITAT - APPENDICES

VOLUME 3C: ECONOMIC, SOCIAL, ENVIRONMENTAL AND ENERGY ANALYSIS AND RECOMMENDATIONS FOR RIPARIAN CORRIDORS AND WILDLIFE HABITAT

VOLUME 4: ACCESS BACKGROUND INFORMATION

VOLUME 5: ORDINANCE AND RESOLUTION (available in print)

Volumes 2, 3 and 4 are available on CD or in print by special request. Please allow seven days for printing.

City Council Public Hearing

Wednesday, December 16, 2009 at 6:30 pm
1221 SW 4th Avenue, Council Chambers

Please submit written comments to:
Council Clerk
1221 SW 4th Avenue, Room 140
Portland, OR 97204
Fax: (503) 823-4571
Email: kmoore-love@ci.portland.or.us

Written comments must be received by the hearing date.

riverplan@ci.portland.or.us
www.portlandonline.com/bps/riverplan
(503) 823-2281