NATURAL RESOURCE INVENTORY UPDATE

RIPARIAN CORRIDORS AND WILDLIFE HABITAT | CITY OF PORTLAND, OREGON

PROJECT SUMMARY REPORT

DISCUSSION DRAFT JUNE 2007

CITY OF PORTLAND, OREGON
BUREAU OF Planning

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INTRODUCING....

PORTLAND'S NATURAL RESOURCE INVENTORY UPDATE PROJECT!

Overview

This document summarizes Portland's Natural Resource Inventory Update Project to date. A detailed account of this work is documented in the Portland Natural Resource Inventory: Riparian Corridors and Wildlife Habitat – Project Report, Discussion Draft June 2007.

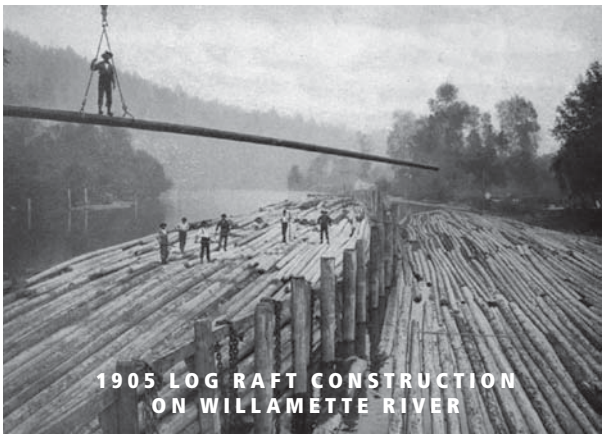
*The **Introduction** section describes the context and need for the inventory update. The **Project History** section explains the project origin, and introduces Metro's regional inventory which provided the scientific and methodological basis for the City inventory update. The **Project Approach** section highlights the science basis for the work, and outlines the steps taken to customize the regional information and produce new inventory information for Portland. Some key information from the City inventory project is featured in the **Project Results** section. Information about the types of natural resources that exist today, and their relative quality, is presented for the City's watersheds and for the city as a whole. Concluding sections describe how inventory **Products and Uses**, and outlines a set of **Next Steps.***

The updated inventory:

- Greatly improves quality and accessibility of information about riparian corridors and wildlife habitat in Portland
- Is "information only" - not propose programs or regulations
- Will inform and support many actions in the City's River Renaissance Strategy and Portland Watershed Management Plan
- Doesn't start from scratch - builds on and refines the well-vetted science and methods used to produce Metro's regional resource inventory
- Reflects the urban landscape, resource conditions range from good to highly degraded; includes "natural" and "constructed" features
- Uses current data and state-of-the-art mapping tools that allow the information to be kept up-to-date over time

INTRODUCTION

Portland would not be here today, were it not for an historic abundance of natural resources. The waterways, forests, woodlands and prairies, fish and fur-bearing animals, and fertile soils, have supported people for thousands of years.



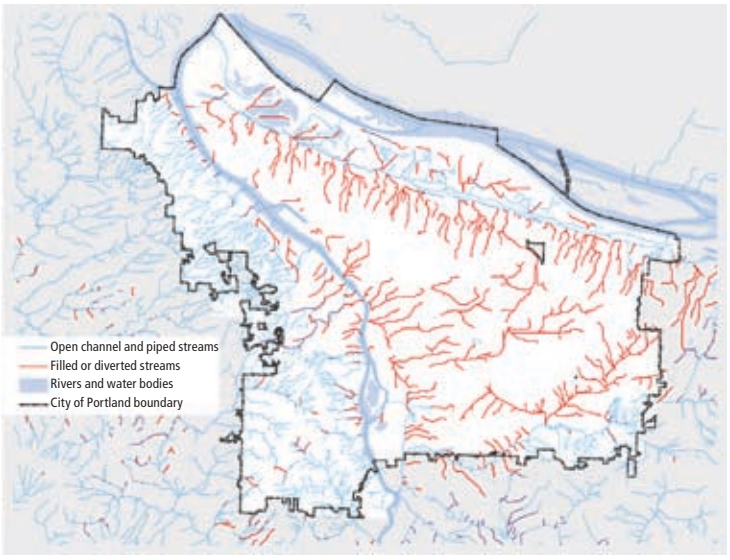
1905 LOG RAFT CONSTRUCTION ON WILLAMETTE RIVER

Today more than 560,000 people call Portland home. The landscape has changed dramatically over the past 150 years. In some areas, much of the trees and vegetation have been removed to make way for roads and buildings. Many of the streams in Portland have been placed underground in pipes, and many of Portland's waterways do not meet current water quality standards for pollution and temperature.

Yet, a wealth of rivers, streams, wetlands, forests and other types of vegetation remain interwoven throughout Portland's parks and natural areas, many residential neighborhoods, golf courses, cemeteries, college campuses, and along the Willamette River and in the Columbia corridors.

These natural resources provide important functions and services across today's urban landscape. Rivers, streams, floodplains and wetlands provide conveyance and storage for streamflows and stormwater, and provide critical habitats for aquatic and terrestrial plants and animals. Trees and vegetation stabilize stream banks and slopes and prevent landslide risks. Vegetation also intercepts rain and slows stormwater runoff, thereby reducing peak streamflows and flooding. Trees and vegetation also filter sediments and pollutants. Such services reduce costs to maintain and expand the City sewer systems and treatment facilities.

Trees and vegetation help maintain healthful air quality, reduce energy demand, and help capture carbon dioxide which contributes to global warming. Trees are often associated with higher property values and desirable neighborhoods within which to live, work and play.



PORTLAND'S CURRENT AND HISTORIC STREAMS

NEIGHBORHOOD STREET TREES

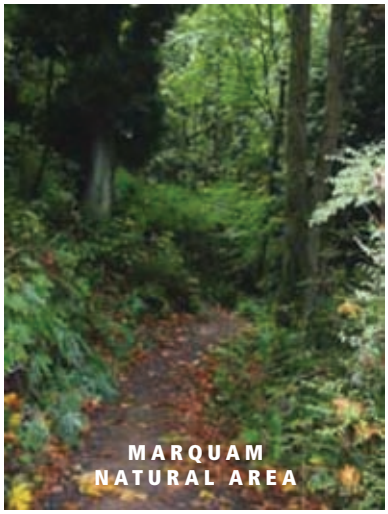
Tree shading helps keep the water in local streams cool enough to support native fish. Trees and vegetation also provide critical habitat for numerous wildlife species that live in or migrate through Portland. A number of the fish and wildlife species that rely on local habitats in Portland have been deemed 'at risk' by state or federal agencies and wildlife organizations.

BALCH CREEK

CUTTHROAT TROUT, TRYON CREEK 2007

The Natural Resource Inventory Update project is part of Portland's long-standing investment in conserving the natural resources in the City.

Over the past 60 years, the City has acquired and now manages 7,000 acres of natural area parks. The City also actively pursues partnership and sponsors revegetation and stormwater retrofit projects to enhance the condition of Portland's watersheds.



MARQUAM NATURAL AREA

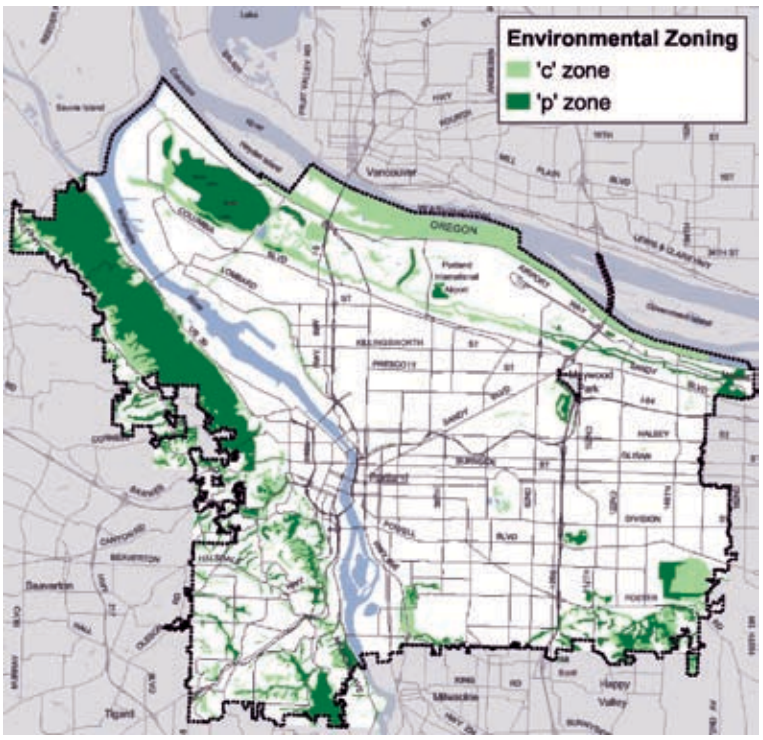
NATURAL RESOURCE INVENTORY AREAS*

1. Columbia Corridor (1989)
2. Balch Creek (1991)
3. Northwest Hills (1991)
4. Johnson Creek Basin (1991); Boring Lava Domes Supplement (1997)
5. Southwest Hills (1992)
6. Fanno Creek and Tributaries (1993)
7. East Buttes, Terraces and Wetlands (1993)
8. Skyline West (1994)

* Willamette River and Multnomah County pockets inventories not shown.

The City has established regulatory tools to safeguard important natural resources in Portland. Programs are in place to manage stormwater, prevent erosion, maintain flood storage capacity, and to protect important natural resources as the city continues to grow through land use and zoning.

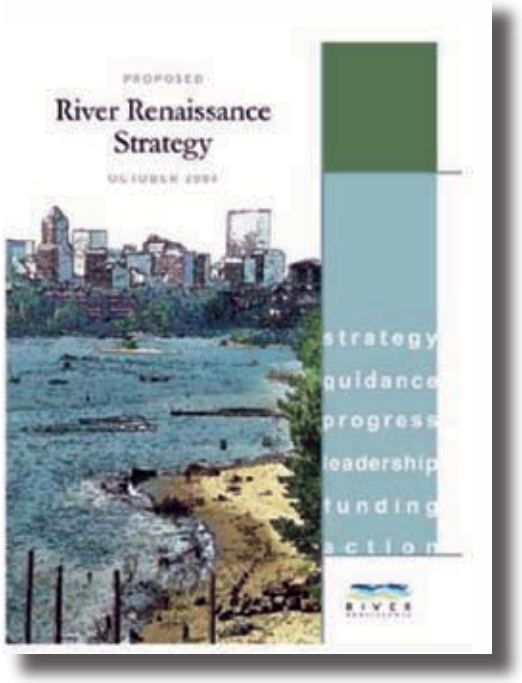
Natural resource inventories were created to document the location and extend to resources and their relative condition. This information was used to inform the design of land use and zoning tools such as the City's Environmental and Willamette Greenway overlay zoning programs. These programs were developed to meet statewide land use planning goals to protect significant natural resources, maintain air, land and water quality, reduce public health and safety risks from natural hazards, and meet multiple objectives for the Willamette River Greenway.



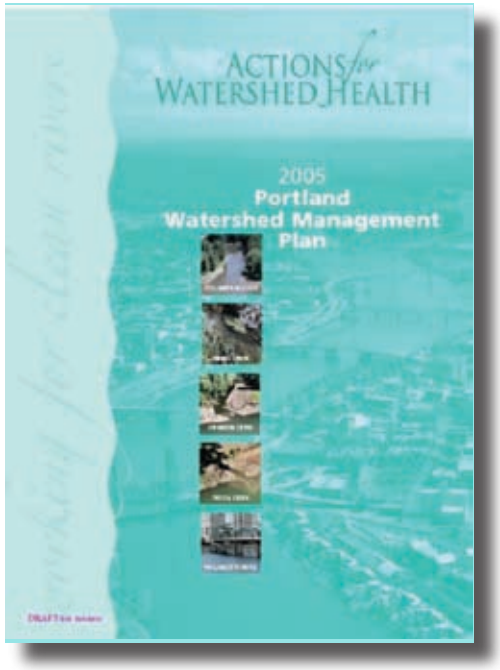
CITY OF PORTLAND ENVIRONMENTAL ZONING

The Natural Resource Inventory Update Project also helps to implement recent City initiatives that recognize healthy watersheds as a key to a sustainable, vibrant city.

In 2001, the City Council adopted the *River Renaissance Vision* to revitalize the Willamette River. The *River Renaissance Vision* calls for City government, citizens, business, and public agency partnerships to foster natural systems, a prosperous working harbor, vibrant waterfront districts and neighborhoods, and opportunities for recreation and river access. The *River Renaissance Strategy*, adopted in December 2004, establishes additional policy guidance, progress measures, and a set of actions for the city's river-related activities.



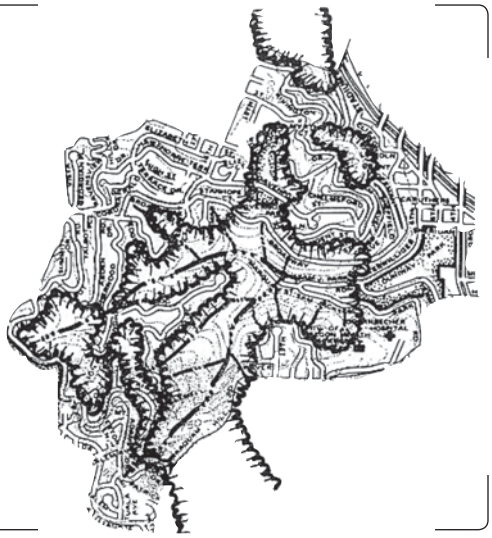
In early 2006, the City Council adopted the *Portland Watershed Management Plan and Framework for Integrated Management of Watershed Health*. Together, the *Framework* and the *Portland Watershed Management Plan* establish ecological principles and citywide watershed health goals and objectives to guide City bureaus in implementing their respective programs. The plan also contains strategies and actions to achieve watershed health goals.



Both the *River Renaissance Strategy* and the *Portland Watershed Management Plan* call for the City's natural resource inventories to be updated to provide current, high-quality information in the future.

PROJECT HISTORY

As the *River Renaissance Vision and Portland Watershed Management Plan* were emerging, Portland's Bureau of Planning was taking initial steps to update the City's natural resource inventories. Updating the City's inventories would be a big undertaking involving large areas and complex landscapes. The existing inventories contain good information on which to build, however the reports are somewhat dated and many of the maps were produced before the advent of geographic information systems (GIS) technology and are therefore difficult to keep current.



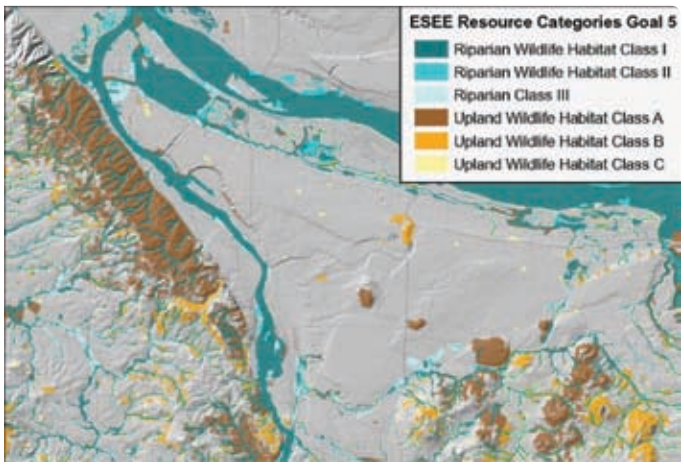
SOUTHWEST HILLS RESOURCE PROTECTION PLAN INVENTORY MAP (1992) CITY OF PORTLAND

The Bureau of Planning took initial steps to update the natural resources inventories as part of the former Healthy Portland Streams project to update the City's environmental overlay zones. After releasing the draft *Healthy Portland Streams* proposal in 2002, the Bureau decided to continue working to improve the inventories, but to defer any major environmental overlay zone updates until 1) the *Portland Watershed Management Plan* was completed, and 2) Metro had established the new Nature in Neighborhoods program to protect and restore riparian corridors and wildlife habitat, and to improve water quality in the tri-county region.

One of Metro's first steps toward developing the Nature in the Neighborhoods program was to produce a comprehensive inventory of riparian corridors and wildlife habitat in the region.

To make best use of work already done, the City used Metro's inventory as the scientific and methodological basis for Portland's inventory update project.

Metro's inventory was based on current scientific relating to watershed and ecological systems. After completing a comprehensive review of the scientific literature, Metro mapped key natural resources and developed GIS models to rank and map the relative quality of riparian corridors and wildlife habitats in the region. Metro's inventory was reviewed by leading experts in the Pacific Northwest and Metro's technical and policy advisory committees. Public workshops were held in different parts of the region and a public hearing was conducted before the Metro Council. After evaluating different program options through an Economic, Social, Environmental, and Energy Analysis, Metro adopted the inventory as part of the Title 13 Nature in Neighborhoods program in September 2005. Metro's inventory project is documented in 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).*



METRO REGIONAL INVENTORY OF RIPARIAN CORRIDORS AND WILDLIFE HABITAT

PROJECT APPROACH

The Bureau of Planning has incorporated and built on the science, analysis, technical review, and public scrutiny that went into developing Metro's the regional inventory. The basic project approach is described below.

Scientific Foundation

The City's inventory incorporates the following information on the key features, functions and attributes of riparian corridors and wildlife habitat.

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. Intact riparian corridors provide the following critical watershed functions:

- **Microclimate and shade** – Open water bodies, wetlands, and surrounding trees and woody vegetation are associated with localized air cooling and increased humidity.
- **Bank stabilization and control of sediments, nutrients and pollutants** – 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.
- **Stream flow 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 streamflow fluctuations or "flashiness" that often occurs in urban watersheds.
- **Large wood and channel dynamics** – Streams, riparian wetlands, floodplains and large trees and woody vegetation contribute to the natural changes in location and configuration of stream channels over time.
- **Organic inputs, food web and nutrient cycling** – Water bodies, wetlands and nearby vegetation provide food for aquatic species (e.g., plants, leaves, twigs, insects) and are part of an ongoing chemical, physical and biological nutrient cycling system.
- **Wildlife habitat/corridors** – Vegetated corridors along waterways, and between waterways and uplands, allow wildlife to migrate and disperse among different habitat areas, and provide access to water.

COLUMBIA SLOUGH

Wildlife habitats provide food, cover, roosting and nesting sites, and movement pathways for a broad array of birds, mammals, reptiles and amphibians. Terrestrial features providing these functions include forests, woodland, shrubland, grassland and meadows, rocky slopes and uplands, and buttes. Urban tree canopy and landscaped areas can also provide important habitats for wildlife.

The inventory identifies the following wildlife habitat attributes as indicators of habitat function and habitat fragmentation due to urbanization:

- **Habitat patch size** – Larger patch sizes generally provide more food, cover and nesting opportunities for a diverse wildlife species.
- **Habitat interior area** – Rounder-shaped habitat patches experience lesser "edge effects" (disturbance from urban land uses, predation and invasive species) than narrow patches.
- **Connectivity between habitat patches** – Patches located closer together allow for species dispersal and migration, and provide additional access to food, cover, nesting sites, and reproduction opportunities.
- **Connectivity/proximity to water** – Habitat patches located close to water are valuable to wildlife survival.

EDGE EFFECT

INVENTORY STEPS

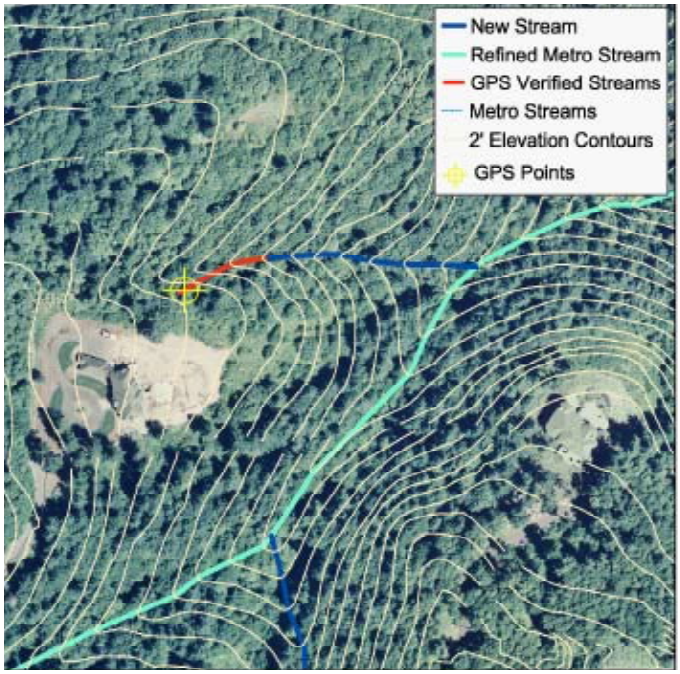
Relying on this fundamental information, and Metro's general methodology, the Bureau of Planning:

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

Natural resource feature data is the basic building block of Metro's and Portland's inventories. The quality of the inventory reflects the quality of available data for streams, wetlands, floodplains, vegetation and topography. The Bureau of Planning produced new or revised data sets to increase the level of detail and improve on the accuracy of the regional data, including:

- Remapping more than 160 miles of stream centerlines; adding 70 stream miles to the maps
- Mapping smaller vegetation units (1/2 acre minimum), and classifying forest, woodland, shrubland and herbaceous vegetation over a wider area (using the National Vegetation Classification System)
- Updating the City's flood area data for use in the inventory, including incorporation of the 2004 FEMA 100-year floodplain

Streams – Between 2002 and 2004, the Bureau of Planning remapped more than 160 miles of stream centerlines; adding 70 stream miles to the maps. The stream remapping was based on recent aerial photographs, other data sources, and information collected during site visits. The City provided the new GIS stream data to Metro for inclusion in the regional inventory.



CITY STREAM REMAPPING PROJECT

Vegetation – Vegetation mapping was carried out between 2004 and 2006. The Bureau of Planning produced new GIS vegetation data and maps for Portland using the most recent aerial photographs and targeted site visits.The City's minimum vegetation mapping unit size is ½ acre, down-sized from Metro's minimum 1 acre mapping unit. In addition, Metro mapped vegetation types other than forest only within 300 feet of a stream. The Bureau extended the classification of vegetation types (forest, woodland, shrubland and herbaceous) to ¼ mile from any stream, environmental zone or regionally significant resources. The Bureau used the National Vegetation Classification System (NVCS) which allowed this data to be merged with existing vegetation information produced by the Bureau of Parks and Recreation for the City's natural areas.

METRO'S VEGETATION DATA

PORTLAND'S VEGETATION DATA

Flood Area – The Bureau of Planning continues to update the City's flood area data for use in the inventory, including incorporation of the 2004 FEMA 100-year floodplain and information from the Port of Portland and others regarding alterations to the floodplain as a result of development or other alterations to the landscape.

BROOKSIDE CONSTRUCTED WETLANDS

2. Developed criteria and GIS models to "rank" and map the relative quality of natural resources based on the specific riparian functions and wildlife habitat attributes listed above.

The City's **riparian corridor model** assigns primary and secondary scores to natural resources for each of the riparian functions listed above. Scores reflect the types of natural resource features present, and how close the features are 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 model assigns riparian functions to all land within 50 feet of a river, stream or wetland regardless of land cover; this is consistent with the regional approach. The predominance of riparian functions take place within 30 to 100 meters (approximately 100 to 300 feet) of a water body. However some functions can occur up to several hundred feet from a water body. The primary and secondary scores are combined to produce overall relative riparian corridor rankings of high, medium or low.

TABLE OF FEATURES THAT PROVIDE RIPARIAN CORRIDOR FUNCTIONS

RIPARIAN FUNCTION	LANDSCAPE FEATURE	FUNCTIONAL DISTANCES*
Microclimate and Shade	Rivers, streams and wetlands**	Primary – water body or wetland feature itself
	Trees and woody or shrubby vegetation; floodplain	Primary – woody vegetation in a flood area, or up to 100 ft. Secondary – between 50 and 780 ft.
Stream Flow Moderation and Water Storage	Rivers, streams, and wetlands	Primary – water body or wetland feature itself
	Flood Area	Primary – vegetated flood area Secondary – non-vegetated flood area
	Vegetation	No primary Secondary – woody vegetation up to 780 ft.; herbaceous vegetation up to 100 ft or 200 ft. if slope is at least 25%
Bank Stability and Sediment, Pollution and Nutrient Control	Rivers, streams, and wetlands	Primary – water body or wetland feature itself
	Vegetation	Primary – woody vegetation up to 100 ft; or up to 200 ft. if slope is at least 25% Secondary – up to 100 ft. for herbaceous vegetation, or 200 ft. if slope is at least 25%
Large Wood and Channel Dynamics	Rivers, streams, and wetlands	Primary – water body or wetland feature itself
	Flood Area	Primary – wetland within the flood area or 150 ft. No secondary
	Vegetation	Primary – trees/forest vegetation within a flood area or up to 150 ft. Secondary – trees/forest vegetation between 150 and 260 ft.
Organic Inputs, Food Web and Nutrient Cycling	Rivers, streams, and wetlands	Primary – water body or wetland feature itself
	Vegetation	Primary – woody vegetation in flood area, or up to 100 ft. Secondary – trees/forest or woody vegetation between 100 and 170 ft.
Wildlife Movement Corridor	Rivers, streams, and wetlands	Primary – water body or wetland feature itself
	Vegetation	Primary – contiguous to water body, and up to 100 ft. Secondary – contiguous to water body, and between 100 and 300 ft.

* Distance is measure from a river, stream, drainageway or wetland – mapping is edge of mapped wetland or surface water area from Willamette and Columbia Rivers, Columbia Slough, and Johnson Creek; otherwise distances are mapped from stream centerline due to data limitations. Some criteria vary for areas within local drainage districts.

**Includes wetlands located with ¼ mile of a river or stream

The City's **wildlife habitat model** assigns relative rankings of high, medium, or low to mapped habitat patches based on their size, shape, and connectivity to other patches or water bodies.

- **Habitat Patch Size – Low:** 2 to 30 acres in size; **Medium:** 30 to 585 acres; **High:** at least 585 acres in size

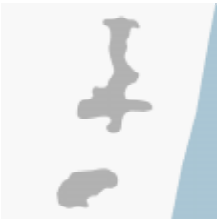
- **Interior Habitat Area (forest/wetland area net 200 ft. buffer around patch perimeter) – Low:** 2 to 15 acres; **Medium:** 15 to 500 acres; **High:** at least 500 acres

- **Connectivity between patches –** Fragstats 3.3. "proximity index" measures relative size and distance between patches **Low:** index value less than 30; **Medium:** index value between 30 and 100; **High,** index value at least 100

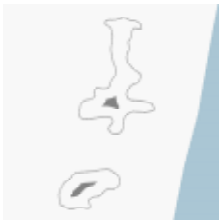
- **Connectivity/proximity to water – Low:** less than 25% of patch is w/in 300 feet; **Medium:** between 25% and 75% of patch is w/in 300 feet; **High:** at least 75% of patch is w/in 300 feet of a river, stream, or wetland

Rankings for each of the four habitat patch attributes are combined to produce an overall relative ranking of high, medium or low for wildlife habitat patches in the inventory. For example, a small patch could receive low ranks for size and interior area, but could receive higher rank if located close to other patches or water.

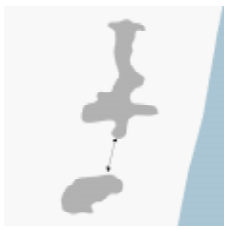
City refinements to regional mapping/ranking criteria: The City's inventory models are comprised of the same general mapping criteria that Metro developed for the regional inventory, however, the City has refined and "customized" some of the regional criteria to reflect additional detail and local information.



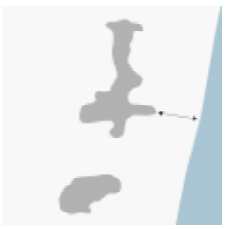
HABITAT PATCH SIZE



PATCH SHAPE/INTERIOR AREA



CONNECTIVITY BETWEEN PATCHES



PROXIMITY TO WATER

For example, the City's riparian corridor mapping criteria are more detailed in terms of the functions provided by wetlands and by different vegetation types (e.g., lawn vs. tree canopy or more complex assemblages).

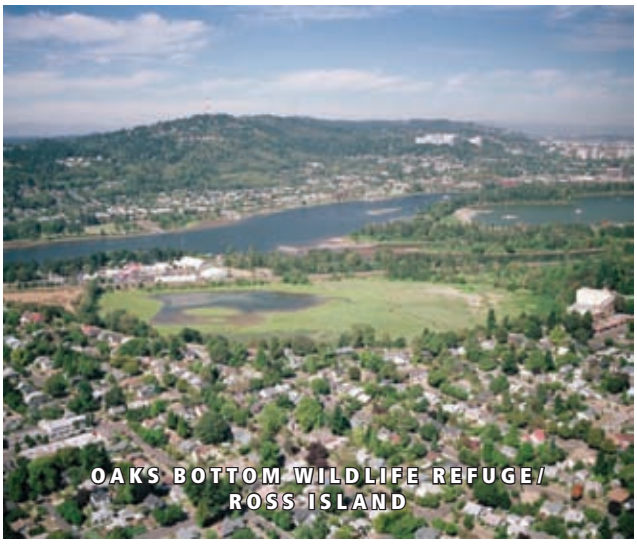
The City's mapping criteria also reflect differences in how riparian areas function within local drainage districts (where flows, water levels, and channels are heavily managed). Drainage districts manage the levee system, drainage channels, and flows to prevent flooding in the Columbia Corridor.

COLUMBIA SLOUGH AND LEVEE

However, even within the managed floodplain, resources provide important functions including water quality and habitat.

However, the City's mapping criteria assigns wildlife habitat function to woodland vegetation that is adjacent to core forest/wetland patches. (Metro included only forest vegetation and wetlands in the regional habitat patches). In addition, the regional criteria for patch size, interior habitat area, and connectivity have been scaled to correlate more closely with Portland's urban conditions, and to incorporate information from more recent local research. For example, the regional criteria assigns Oaks Bottom and Ross Island low ranks for habitat patch size compared to all the habitat patch sizes in the region. Applying the City's scaled criteria, Oaks Bottom and Ross Island receive medium relative ranks for habitat patch size.

SHOREBIRDS ON MUDFLATS, COLUMBIA SLOUGH



OAKS BOTTOM WILDLIFE REFUGE/ ROSS ISLAND

3. Designated Special Habitat Areas and updated Metro's regional species lists.

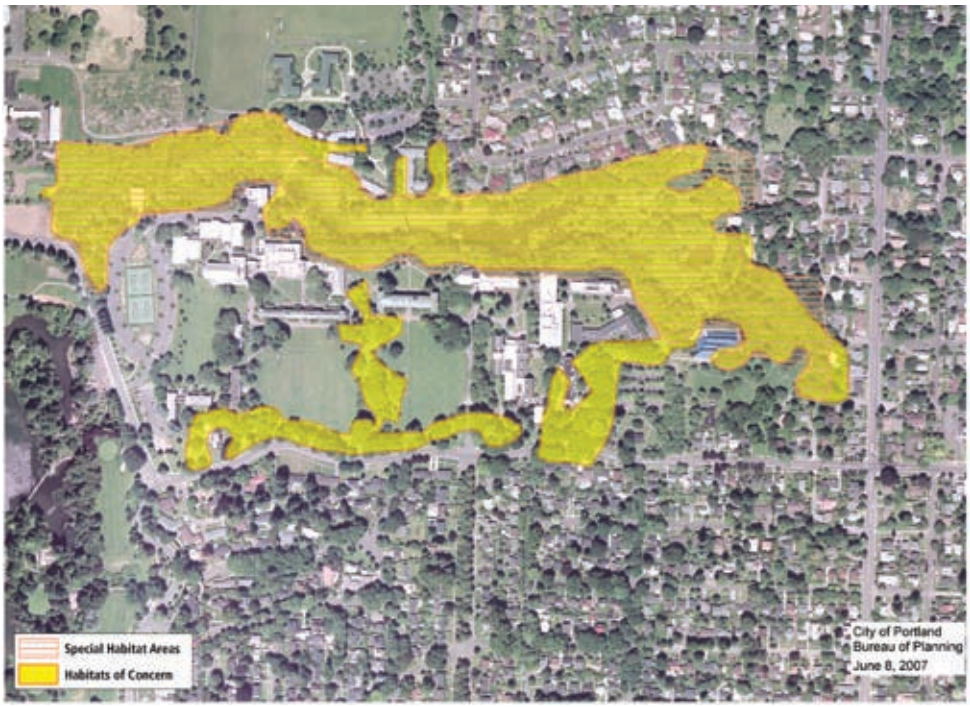
The Bureau of Planning worked with the Bureaus of Environmental Services and Parks and Recreation to update regional Habitats of Concern that Metro had designated within the city.

The City inventory refers to "Habitats of Concern" as "Special Habitat Areas." The new name is meant to focus attention on the special role of these areas. Special Habitat Areas contain or support sensitive/ threatened fish or wildlife species, sensitive/unique plant populations, wetlands, native oak stands, grasslands, bottomland hardwood forests, riverine islands, migratory bird stopover areas and connectivity corridors.

Special Habitat Areas SHA) include some natural resource features not addressed by inventory mapping models. These areas are also mapped more generally than the landscape features which serve as inputs to the riparian and wildlife models. Therefore the SHA boundaries may extend beyond the specific landscape features.

The City inventory has produced more detailed SHA boundaries and eligibility criteria than were developed for the regional Habitats of Concern.

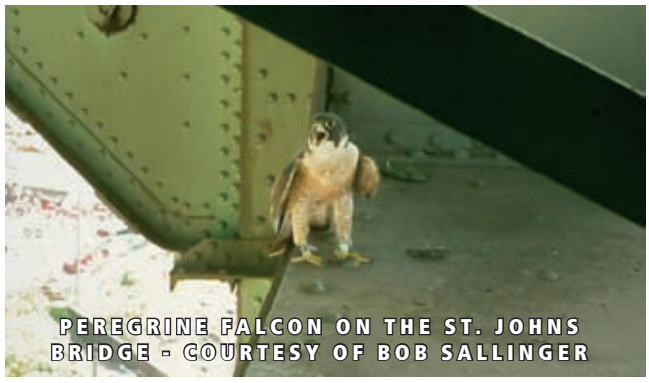
For example, the City has included waterways that are designated Critical Habitat Areas under the Endangered Species Act. These include the Willamette River, Johnson and Kelley Creeks, and portions of Tryon Creek and the Columbia Slough. The City has also established a new SHA classification for beaches along the Willamette River. The designation of Willamette beaches is based on a four-year study conducted by the Oregon Department of Fish and Wildlife (2005). The study found significant correlations between Willamette River beaches and the occurrence of listed salmonids in the river.



COMPARISON METRO HABITAT CONCERN AND PORTLAND SPECIAL HABITAT AREA: REED LAKE/CRYSTAL SPRINGS CREEK

The City has also designated several structures as Special Habitat Areas such as chimney roosting sites for Vaux's Swifts and several bridges on the Willamette and Columbia rivers that provide nesting sites for Peregrine Falcons. In addition, the City has "localized" the regional fish and wildlife species lists by removing species that are either known or expected to not occur in the city.

LINNTON BEACH



PEREGRINE FALCON ON THE ST. JOHNS BRIDGE - COURTESY OF BOB SALLINGER

4. Produced resource ranking maps based on GIS model results and information on Special Habitat Areas.

The City developed formulae to rank and map the relative value of riparian corridor and wildlife habitat areas. The City's ranking formulae are similar to those Metro used for the regional inventory. Riparian corridors and wildlife habitat are ranked "high," "medium," or "low" based on the aggregated GIS model-based scores for specific functions and attributes. In addition, all Special Habitat Areas receive a high rank which supersedes lower model-based ranks for wildlife habitat. The City can produce maps showing the overall riparian corridor and wildlife habitat ranks. The City has also produced a combined riparian corridor/wildlife habitat rank and a single relative ranking map. Where riparian corridors and wildlife habitat areas overlap, the higher of the two relative rankings is retained on the combined inventory map.

5. Consulted with experts to ensure that City refinements are appropriate.

The Bureau of Planning worked closely with Metro and the Bureau of Environmental Services to ensure that the refinements to the regional inventory would be consistent with Metro's work and would support the City's watershed health goals.

"Wetlands, even away from a stream channel, affect nutrient processing, microbial production, etc. The hydrologic connection between streams and wetlands is not always apparent from the surface topography." Nancy Munn, NOAA/ National Marine Fisheries Service, June 21, 2006

In May 2006, the Bureau of Planning convened a group of technical experts to review the City's proposed refinements to Metro's regional inventory methodology. The technical reviewers included representatives from U.S. Fish and Wildlife Services, Oregon Department of Fish and Wildlife, Oregon Department of Environmental Quality, Metro, Multnomah County Drainage District, Audubon Society of Portland, Port of Portland, Portland State University, and consulting companies in environmental science and planning-related fields.

On scaling the habitat patch size to reflect smaller patches in the City: "Overall this change appears very sound...My one concern is with the 2-acre minimum at the low end...some species of native flora and fauna may yet thrive in smaller patches..." Dr. Alan Yeakley, PSU, July 16, 2006

The technical reviewers provided valuable critique, information, insights, and suggestions. They concurred with many parts of the inventory update proposal, commending the City for incorporating more recent data and locally-based research. Reviewers also raised concerns and provided valuable suggestions to improve several parts of the proposal. For example, while most reviewers agreed with the proposal to downgrade rankings assigned to riparian corridors dominated by herbaceous vegetation (i.e., without trees or woody vegetation), a number of reviewers had concerns because even low-functioning riparian corridors still provide important functions and may have high restoration potential. The reviewers' input helped to hone and clarify some of the refinements, and led to some changes to the City's mapping and Special Habitat Area designation criteria.

"I support ascribing a lower functional value to lawns...given their potential negative contributions (e.g., pesticides, nutrients, bacteria)." Karen Font Williams, Oregon Department of Environmental Quality, June 13, 2006

On ranking herbaceous riparian vegetation lower than trees and woody vegetation: "My concern is whether by taking this approach the restoration potential of a site is lost." Mike Houck, Urban Greenspaces Institute, July 12, 2006,

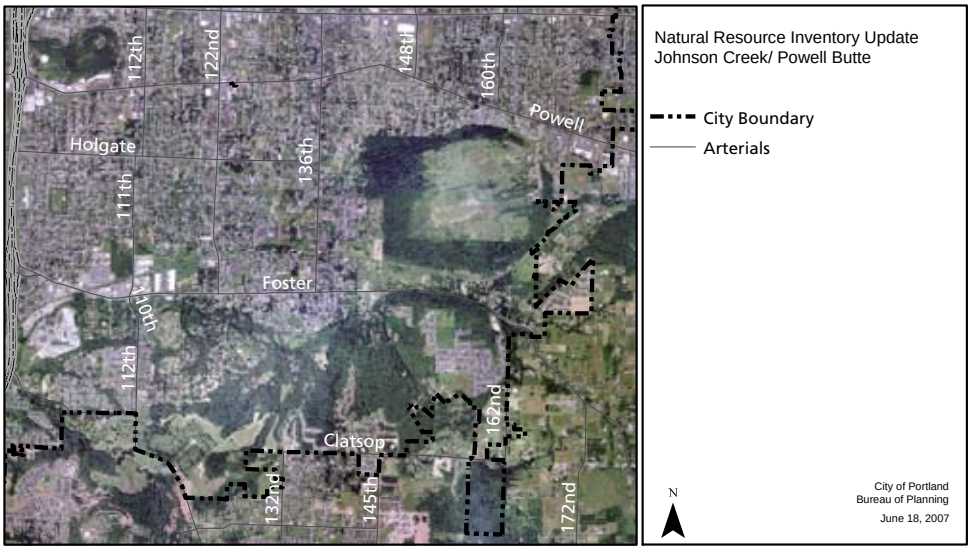
STEPHENS CREEK AT APARTMENT COMPLEX

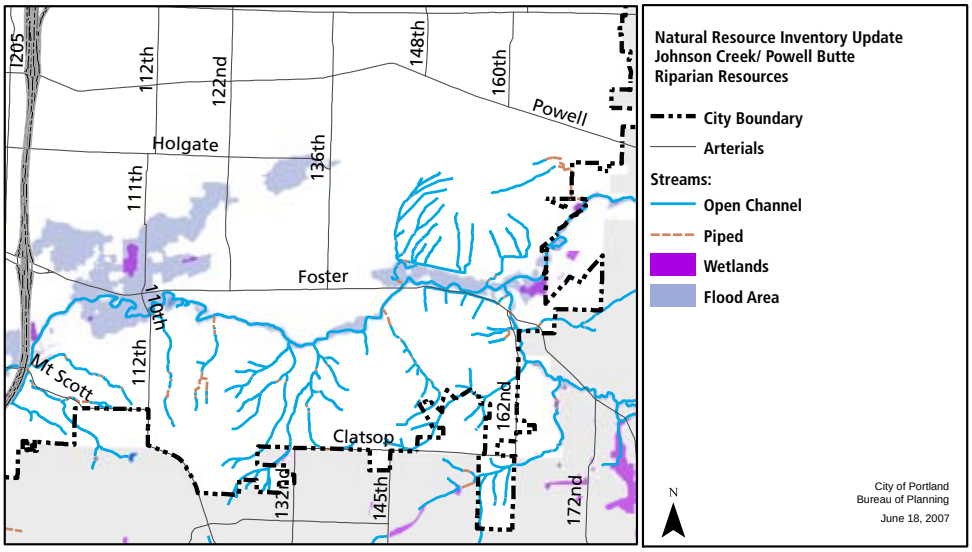
SAMPLE MAPS

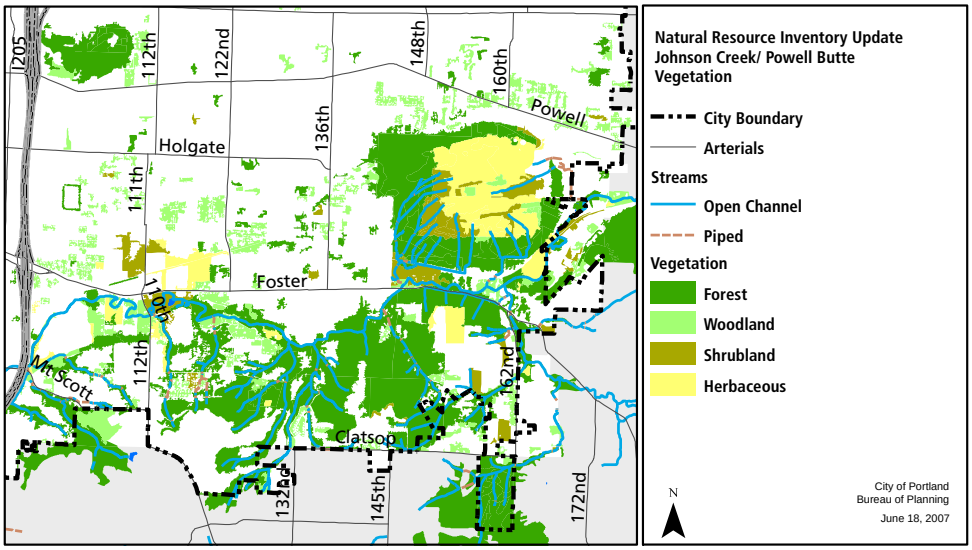
The two map series presented on the next pages show the City's inventory "building blocks" for different areas of the city: 1) Southwest Hills and Willamette River, including Ross Island, and 2) Johnson Creek, Kelley Creek and Powell Butte. The maps are presented in the following order to demonstrate how natural resource features provide the basis mapping and ranking riparian corridor and wildlife habitat functions and values.

1. **Aerial photo** – 2005 aerial of the area and main arterial streets, which are labeled
2. **Riparian Resources** – water bodies, stream channels both open and piped, wetlands and flood areas
3. **Vegetation** – forest, woodland, shrubland and herbaceous cover
4. **Riparian corridor relative ranks**
5. **Wildlife habitat relative ranks** – including Special Habitat Areas Special Habitat Areas receive a high rank, which supersedes lower ranked wildlife habitat
6. **Combined relative riparian and wildlife habitat ranks**

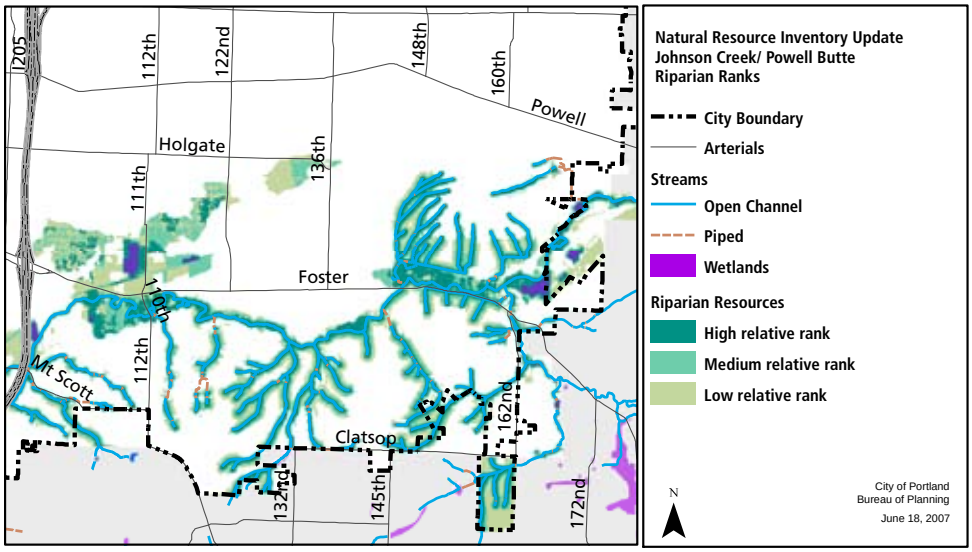
JOHNSON CREEK AND POWELL BUTTE NATURAL RESOURCE INVENTORY MAP SERIES

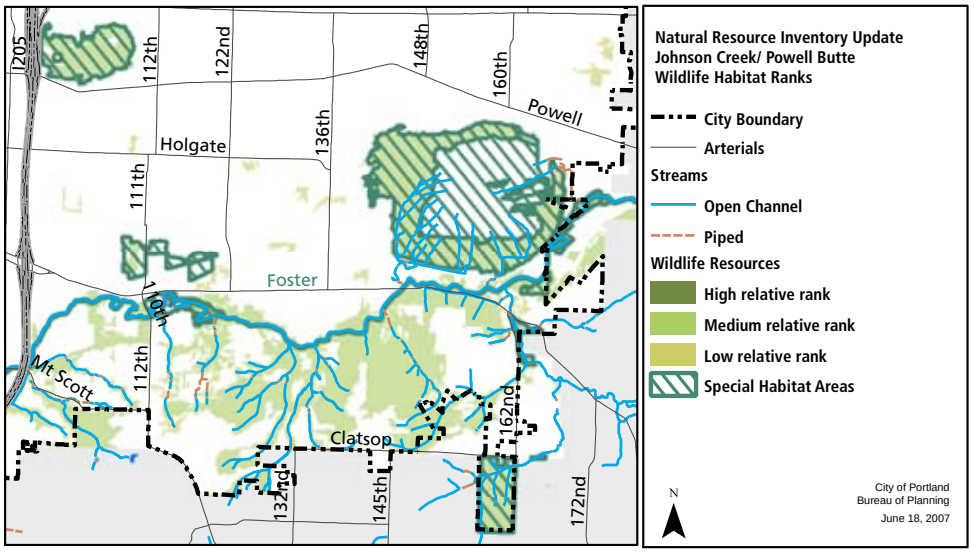


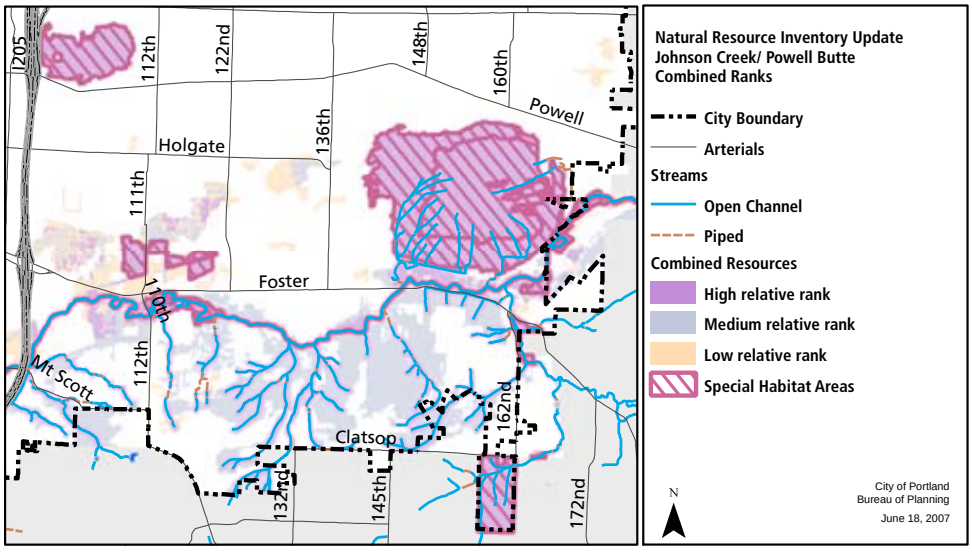




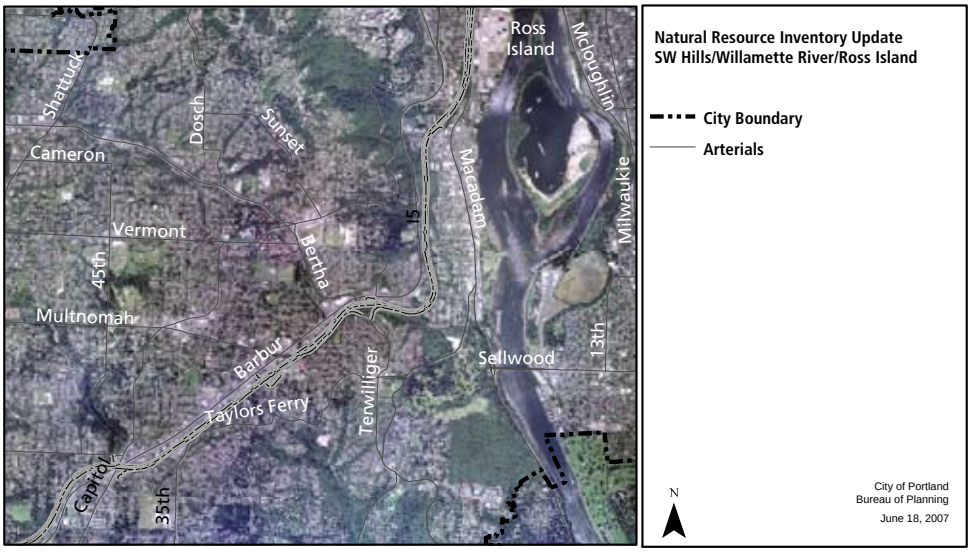
JOHNSON CREEK AND POWELL BUTTE NATURAL RESOURCE INVENTORY MAP SERIES

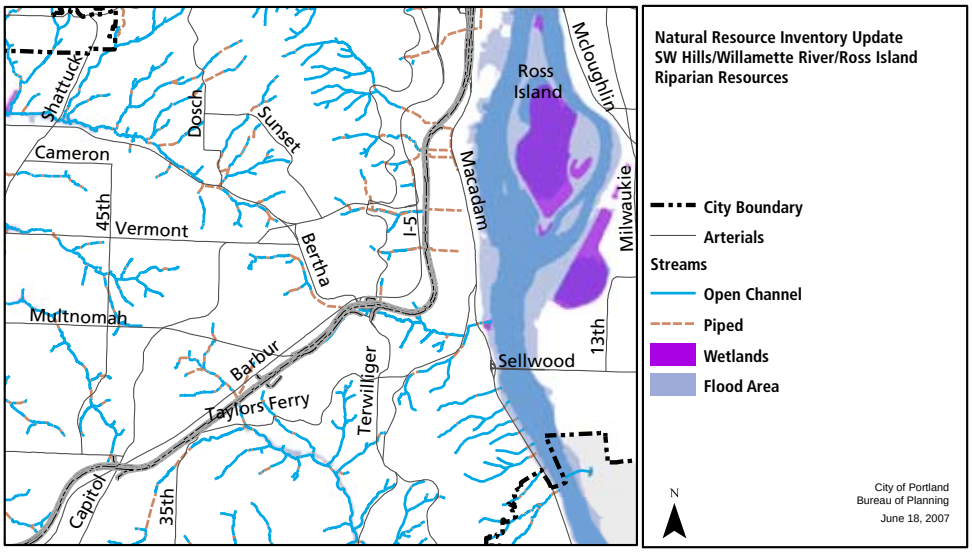


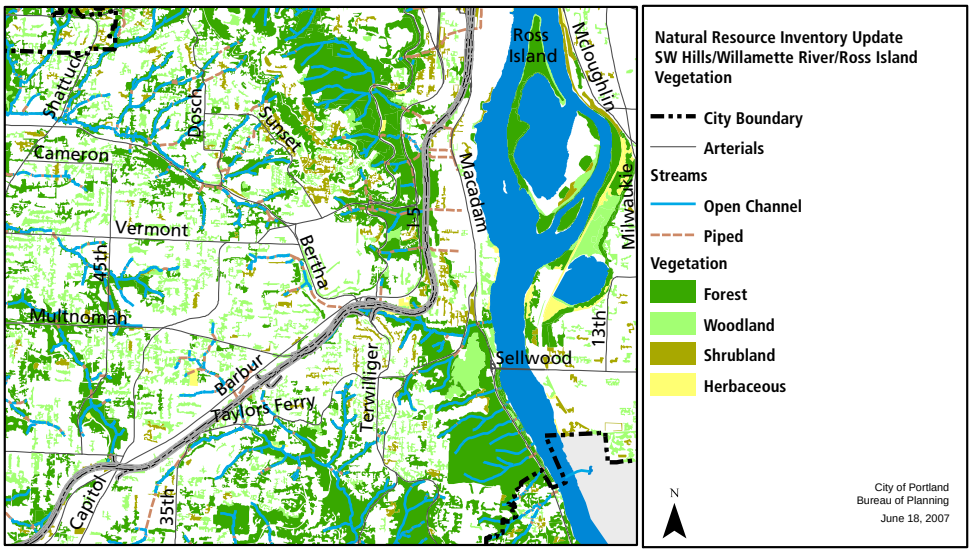




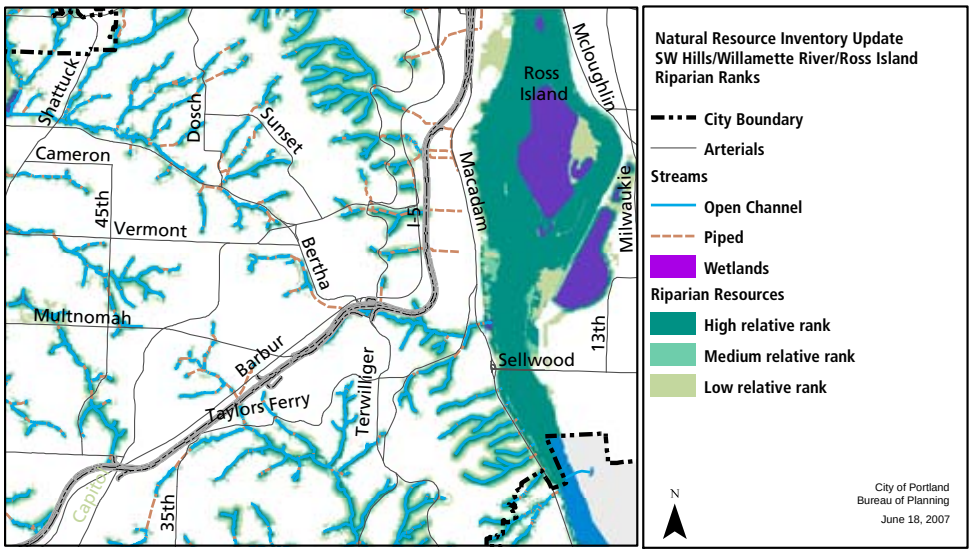
SOUTHWEST HILLS, WILLAMETTE RIVER AND ROSS ISLAND NATURAL RESOURCE INVENTORY MAP SERIES

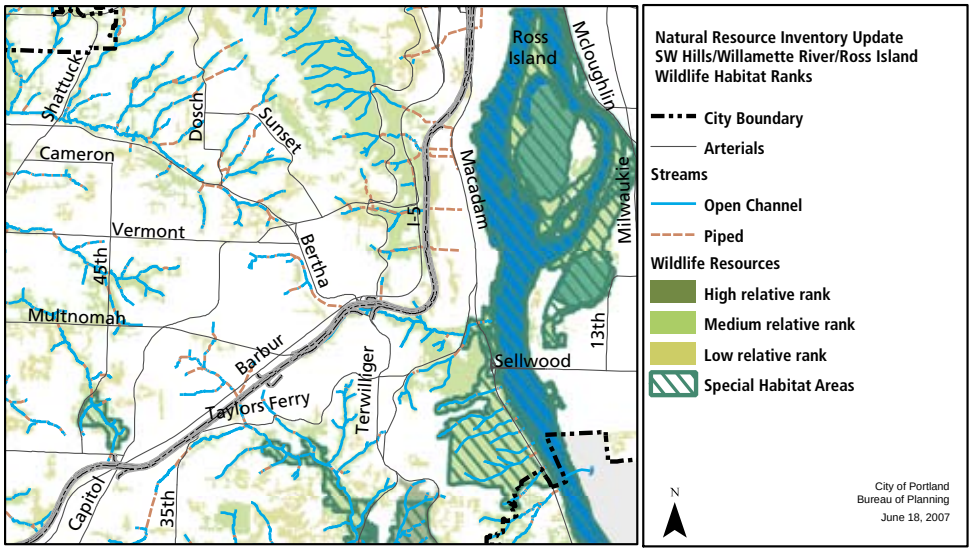


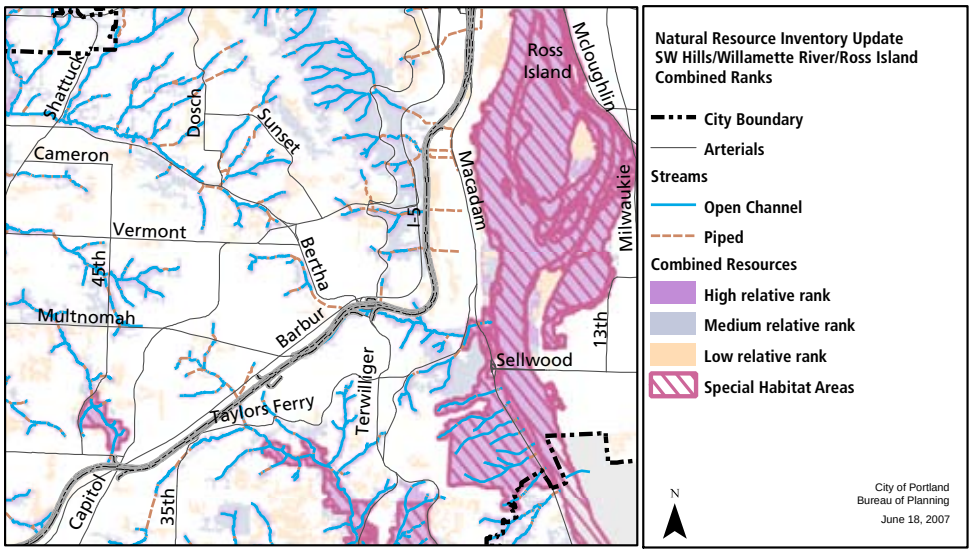




SOUTHWEST HILLS, WILLAMETTE RIVER AND ROSS ISLAND NATURAL RESOURCE INVENTORY MAP SERIES



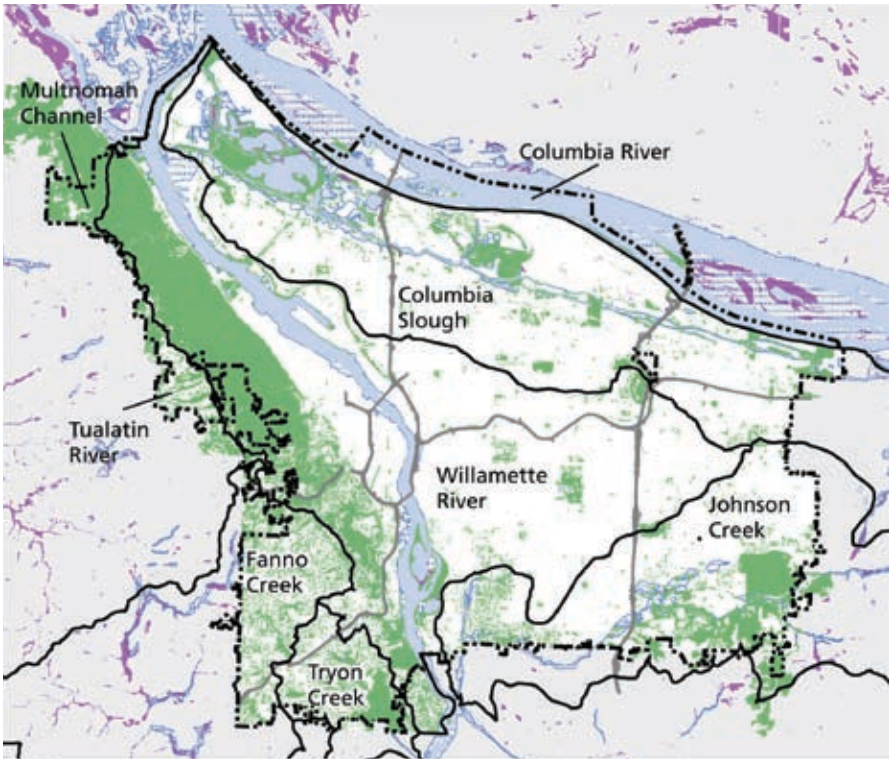




PROJECT RESULTS

CITYWIDE RESULTS AND COMPARISON TO METRO'S REGIONAL INVENTORY

As a result of the recent inventory work, the City has mapped and ranked 18,110 acres of riparian resources, 17,720 acres of wildlife habitat, and 11,490 acres of Special Habitat Area citywide, including portions of Multnomah County located within Portland's Urban Service Boundary. Accounting for the overlap between these areas, the updated inventory totals 23,446 acres of ranked resource areas on the land, including approximately 240 miles of streams and 2,450 acres of wetlands. Portions of the Willamette and Columbia rivers within the City comprise an additional 5,540 acres of ranked resources. The total mapped and ranked resource area represents roughly 30% percent of the area of the City of Portland and Multnomah County pockets.



NATURAL RESOURCE INVENTORY UPDATE - LANDSCAPE FEATURES

City Rankings: Riparian corridors and/or wildlife habitat in Portland

High Relative Riparian/Wildlife Habitat Value:	15,704 acres	67%
Medium Relative Riparian/Wildlife Habitat Value:	4,547 acres	19%
Low Relative Riparian/Wildlife Habitat Value:	3,195 acres	14%
Total	23,446 acres	100%

Note: Does not include inventoried area of the Willamette and Columbia rivers

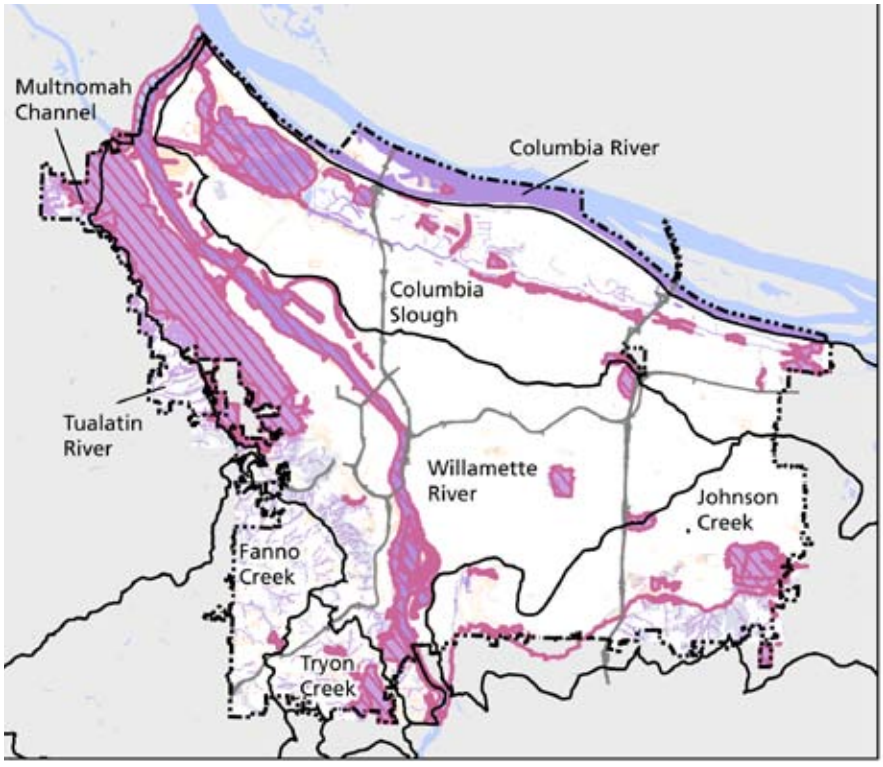
Metro Rankings: Riparian corridors and/or wildlife habitat in Portland

Class I Riparian/Class A Upland Wildlife Habitat:	18, 243 acres	76%
Class II Riparian/Class B Upland Wildlife Habitat:	3,194 acres	14%
Class III Riparian/Class C Upland Wildlife Habitat:	2,462 acres	10%
Total	23,899 acres	100%

Note: Does not include Willamette and Columbia Rivers

Overall, the City's inventory results are generally consistent with Metro regional inventory. However, some differences between the two inventories exist, reflecting updates and refinements to the regional natural resource data, mapping/criteria, and Special Habitat Areas.

The City inventory contains approximately 450 acres or about 2 percent more total resource area than Metro included in the regional inventory. The City's rankings are somewhat lower overall than the rankings produced for the regional inventory. The City assigns "high" relative rankings to approximately two-thirds of the identified resource areas, while the Metro assigns "high" rankings to about three-quarters of the resource areas in Portland. Conversely, the City has assigned "medium" or "low" relative resource rankings to approximately one-third of resource areas while Metro assigned lower rankings to about one-quarter of the resource areas in the City. Special Habitat Areas total about 11,495 acres, approximately 200 acres more than Metro included in the regional Habitats of Concern for Portland.



NATURAL RESOURCE INVENTORY UPDATE COMBINED RIPARIAN AND WILDLIFE HABITAT RELATIVE RANKS

WATERSHED-SPECIFIC RESULTS

The city landscape is very diverse and it is interesting to review the natural resource inventory results for each of Portland's watersheds.

Columbia Slough

The Columbia Slough watershed is a relatively large, comprising almost 30 percent of the study area.The Columbia Slough contains the vast majority of the remaining wetland area in the city, a considerable portion of the remaining active floodplains, but only about 23 percent of the stream miles.The watershed is 40 percent impervious and most of the larger vegetated areas are comprised solely of herbaceous vegetation. The watershed contains nearly the largest total area of inventoried riparian corridors and wildlife habitat, resources (with the exception of the Willamette Watershed). However, inventoried resources represent only 19 percent of the watershed area which is the lowest percentage of natural resources of any of the City's watersheds. Still, about ¾ of the inventoried resources receive a high relative rank. In addition, this watershed contains more than 15 Special Habitat Areas, including Smith and Bybee Wetlands, Big Four Corners, Rocky Butte and the Grotto, and the Wilkes Creek headwaters. These areas make up more than 3,000 acres or about 11 percent of the watershed area.

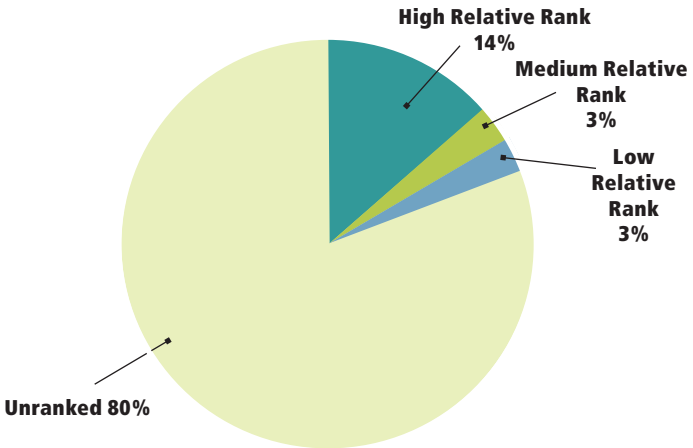
Fanno Creek Watershed

The Fanno Creek watershed comprises only about 5.5 percent, but contains more than 11 percent of the remaining stream miles in the inventory study area. The watershed is about 20 percent impervious. Most of the larger vegetated areas contain forest/tree canopy. Inventoried riparian corridors and wildlife habitat areas make up 28 percent of the watershed. This is highest percentage of identified resources in any of the City's watersheds. That said, only about 1/3 of the inventoried resource areas in the watershed receive a high relative rank. The watershed contains about 30 acres of Special Habitat Areas, primarily in Woods Memorial Park. This area provides important connectivity between larger habitat areas including Forest Park.

COMBINED RIPARIAN CORRIDOR/WILDLIFE HABITAT RESOURCE RANKS

COLUMBIA SLOUGH WATERSHED

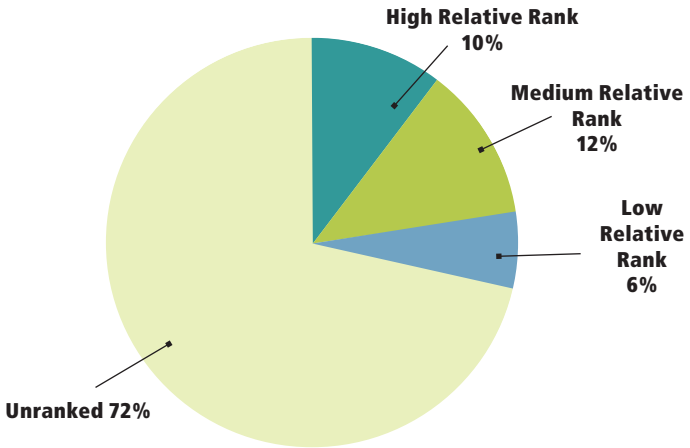
WATERSHED AREA = 27,216 ACRES



COMBINED RIPARIAN CORRIDOR/WILDLIFE HABITAT RESOURCE RANKS

FANNO CREEK WATERSHED

WATERSHED AREA = 5,135 ACRES



Johnson Creek Watershed

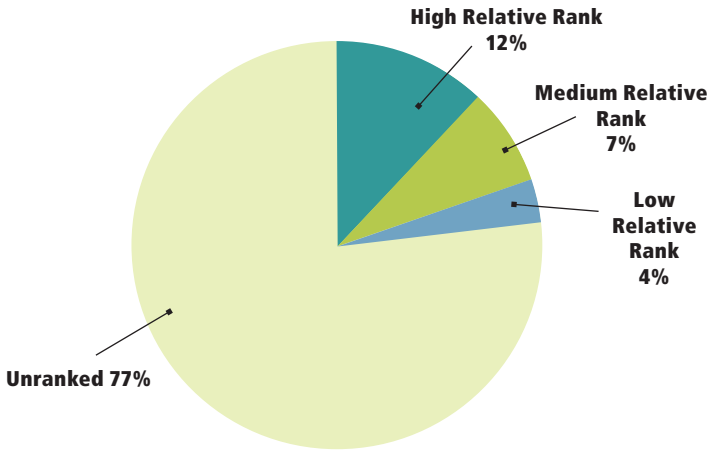
The Johnson Creek Watershed in Portland represents about 14 percent of the inventory study area. The watershed is about 30 percent impervious. About 60 percent of the larger vegetated areas are comprised forest/tree canopy, woodland or shrubland cover, while about 40 percent is herbaceous vegetation. The watershed contains about 16 percent of the stream miles and a considerable portion of the remaining active floodplain in the city. Almost 2/3 of the floodplain area is vegetated while slightly more than 1/3 of the floodplain area is developed. Inventoried riparian corridors and wildlife habitat areas make up 23 percent of the Johnson Creek watershed area. Slightly more than half of these resource areas receive a high relative rank. Thirteen Special Habitat Areas are designated in the Johnson Creek Watershed, including Powell Butte, Tideman Johnson Park, the Springwater Wetlands Complex, the Kelley Creek Refuge, and Johnson Creek itself. Special Habitat Areas total approximately 1,045 acres, or about 8 percent of the watershed area.

Tryon Creek Watershed

The Tryon Creek Watershed is the smallest watershed in the city and comprises about only about 3.5 percent of the inventory study area. The watershed contains about nine percent of the stream miles in the city and is about 20 percent impervious. More than 2/3 of the larger vegetation patches are comprised of forest or tree cover type. Inventoried resource areas comprise about 39 percent of the watersheds. About 2/3 of the resource areas receive a high relative rank. Tryon Creek State Park is a substantial portion of the resource area in the watershed. The park is also designated Special Habitat Areas (SHAs), along with several other small areas. Special habitat areas total 480 acres, or about 15 percent of the watershed.

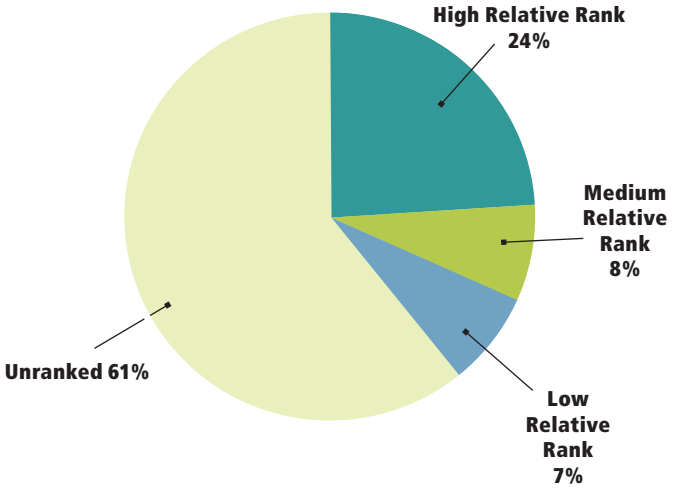
COMBINED RIPARIAN CORRIDOR/WILDLIFE HABITAT RESOURCE RANKS

JOHNSON CREEK WATERSHED
WATERSHED AREA = 13,660 ACRES



COMBINED RIPARIAN CORRIDOR/WILDLIFE HABITAT RESOURCE RANKS

TRYON CREEK WATERSHED
WATERSHED AREA = 3,290 ACRES



Willamette Watershed

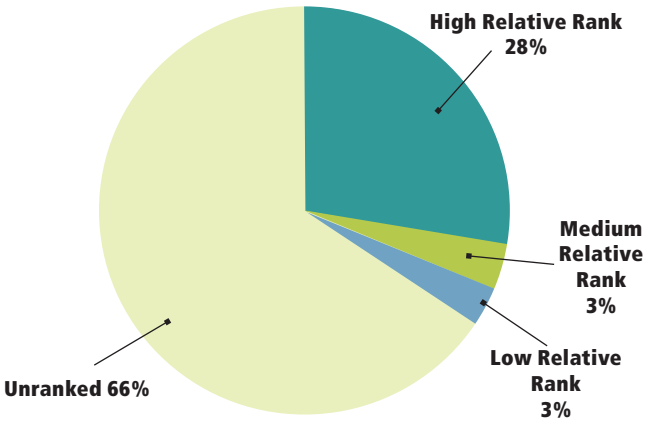
The Willamette is the largest of the watersheds in the city and comprises about 41 percent of the inventory study area. It contains only about 33 percent of the stream miles in the city, including the Willamette River mainstem. The watershed is about 35 percent impervious on average, though the level of impervious coverage varies considerably in different parts of this diverse watershed. The watershed contains substantial flood area areas, however nearly 2/3 of the flood areas are developed. More than 2/3 of the larger vegetated patches in the watershed are in forest vegetation cover, however the majority of the forested area is located within the City's 5,000 acre Forest Park. About 34 percent of the total watershed area consists of inventoried riparian corridors and wildlife habitat areas. More than ¾ of these resource areas receive high relative ranks. About 9,600 acres of the high-ranked resources are located within 23 designated Special Habitat Areas including the Willamette River mainstem, Oaks Bottom Wildlife Refuge, the Ross Island complex, and areas of bottomland forest and mudflats along the river. Special Habitat Areas also include Forest Park and the upland oak bluffs that parallel the east side of the river. More than ½ of the inventoried resources in the Willamette watershed, and much of the high-ranked resource areas consist of Forest Park and the Willamette River mainstem channel.

Other Watersheds

Portions of the Columbia River, Multnomah Channel and Tualatin River watersheds are located outside the Portland City limits but within the Urban Service Boundary. The largest portions of this area consist of land north and west of Forest Park, and portions of the Columbia River banks and channel. The "other watersheds" represent about seven percent of the inventory study area and contain eight percent of the total stream miles located therein. Approximately 10 percent of these areas are covered with impervious surfaces which is lower than in any of the other watersheds in Portland. Inventoried riparian corridors and/or wildlife habitat comprise about 70 percent of these areas. Approximately 85 percent of the resource areas receive a high relative resource rank. Special Habitat Areas include portions of the land adjacent to Forest Park and a small area at the east end of Hayden Island.

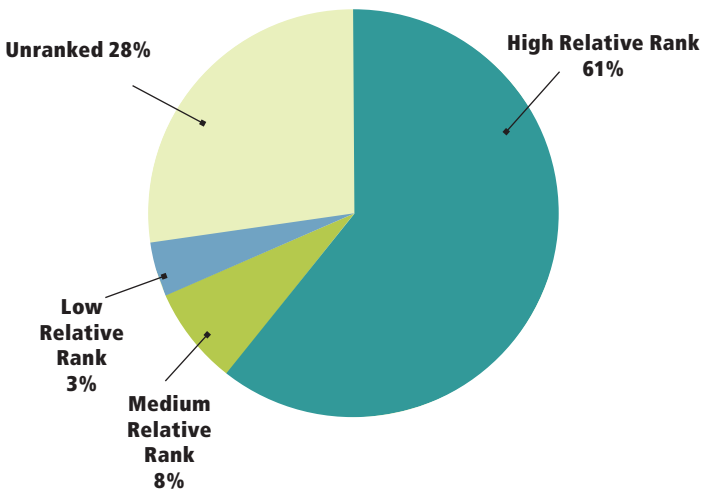
COMBINED RIPARIAN CORRIDOR/WILDLIFE HABITAT RESOURCE RANKS

WILLAMETTE WATERSHED
WATERSHED AREA = 39,159 ACRES



COMBINED RIPARIAN CORRIDOR/WILDLIFE HABITAT RESOURCE RANKS

OTHER WATERSHEDS
WATERSHED AREA = 6,598 ACRES



INVENTORY PRODUCTS AND USES

The following points are important to remember when considering the products and uses of the updated natural resource inventory information:

- **The inventory is "information only"** -- will inform a broad array of activities and does not propose any specific programs or regulations.

- **The new inventory information can be put to a number of uses, but will not automatically replace Portland's adopted inventories**. Inventories used to inform land use decisions will be updated through area-specific or citywide legislative projects, such as the River Plan.

- **The inventory addresses multiple watershed functions (not just a habitat inventory, and reflects Portland's urban landscape:**

  - **The inventory includes "natural" and "constructed" features** that contribute to the functional values of riparian corridor and wildlife habitats in the city.
  - **The conditions of inventoried resources range from relatively good to highly degraded.** Most resource areas in the city are affected to some extent by human disturbance, invasive species, and other factors. Degraded areas still contribute to important watershed functions in the city and the region. Knowing which areas are high and low functioning will help set priorities for protection and restoration.

- **The inventory maps reflect current information and technologies, both of which will evolve over time.** State-of-the-art mapping tools will allow the Bureau to incorporate new citywide or site-specific information as it becomes available.

Products

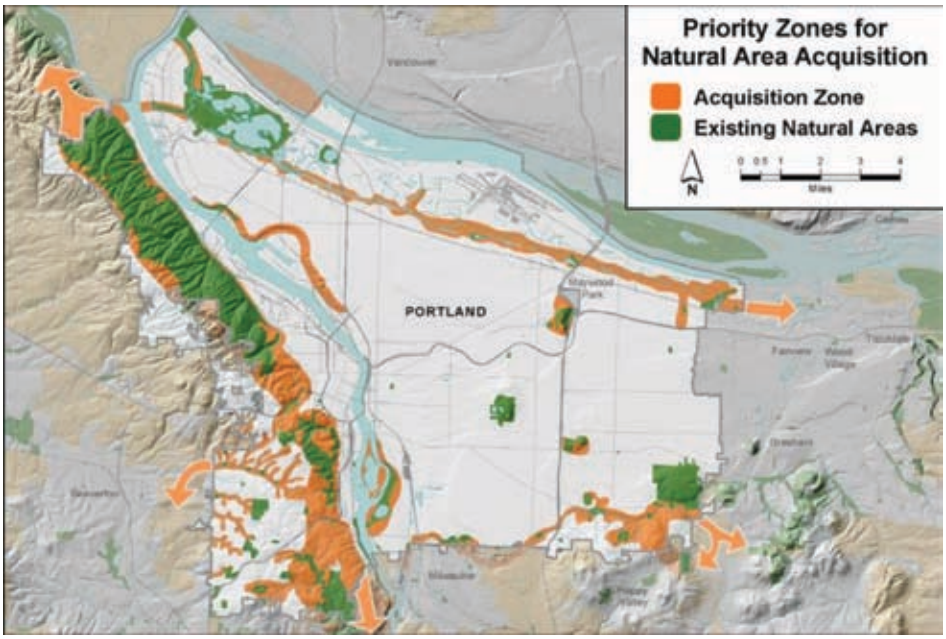
City staff, other agencies and organizations, and citizens now have access to updated information about Portland's natural resources. Maps of local streams, wetlands, flood areas and vegetation are available on on-line, by logging onto PortlandMaps.com. Maps can be viewed for individual properties and nearby areas. As data regarding the location and extent of natural resources is refined, the on-line maps can be updated.

New GIS modeling tools have been developed to map Portland's riparian corridors and wildlife habitat, and to assess their relative functional value. Resource rankings have also been produced in draft map form. Maintaining the GIS data and modeling tools will allow the City to update the inventory information data to reflect changing conditions in Portland's watershed. Species lists and special habitat information for Portland are also available.

More detailed information on the inventory update project is found in the Natural Resource Inventory: Riparian Corridors and Wildlife Habitat – Project Report – Discussion Draft June 2007. An update to the City inventory for the Willamette River is currently underway. The updated inventory will inform the River Plan; a multi-objective, comprehensive planning process for updating the Willamette Greenway Program.

Uses

The inventory maps and reports will inform an array of City and community activities, including setting priorities for land acquisition and restoration, updating local regulatory programs, and developing strategies to comply with various regional, state, and federal regulations.



CITY OF PORTLAND NATURAL AREA ACQUISITION STRATEGY, 2006

Draft inventory products are already being put to good use. Metro incorporated City's updated stream data to revise the regional inventory of riparian corridors and wildlife habitat. The City used the draft inventory maps to inform development of the Portland Watershed Management Plan. Draft inventory maps are also informing the development of a new City Terrestrial Ecology Enhancement Strategy. The City and Metro have used draft inventory information to help identify local and regional land acquisition priorities.

The updated inventory information will inform upcoming updates to the City's existing Willamette Greenway program and the environmental zoning program. The inventory will also support City efforts to comply with regional, state and federal regulatory requirements, including Metro's Title 3 and 13, Clean Water Act, and the Endangered Species Act.

Finally, the inventory provides a useful tool for reaching out to citizens and community organizations. Inventory maps can be used to prioritize public education and outreach activities, and to identify potential partnership opportunities.

NEXT STEPS

NEXT STEPS IN THE INVENTORY PROCESS:

The Bureau of Planning will make the draft updated inventory maps and project report available to key stakeholders including City bureaus and Metro, local, state and federal agencies (e.g., Port of Portland, ODFW, DEQ, NOAA Fisheries), organizations (e.g., neighborhood associations, watershed councils, business and environmental interests), and interested citizens. Stakeholders will be invited to review and provide feedback on the reports, including more current information about natural resources on the ground. The Bureau will use this information to continue improving the inventory.

JOHNSON CREEK

As directed by the Planning Commission in October 2006, the Bureau of Planning will develop a workplan to update, maintain and improve the City's Environmental Program. The workplan will identify key steps and timelines to update the existing City inventories and to maintain the inventory information over time. The workplan will also include potential strategies to meet the City's watershed goals and to comply with Metro Title 13 and the Clean Water Act pollutant load restrictions. Such steps likely include citywide or area-specific updates to the City's zoning programs and other regulations, as well as an array of non-regulatory approaches. The Bureau will consult with other bureaus, agencies and key stakeholders in developing the work program. The Bureau will ask Planning Commission to endorse the proposed workplan, including the updated inventory methodology later in 2007.


Natural
Resource
INVENTORY
UPDATE