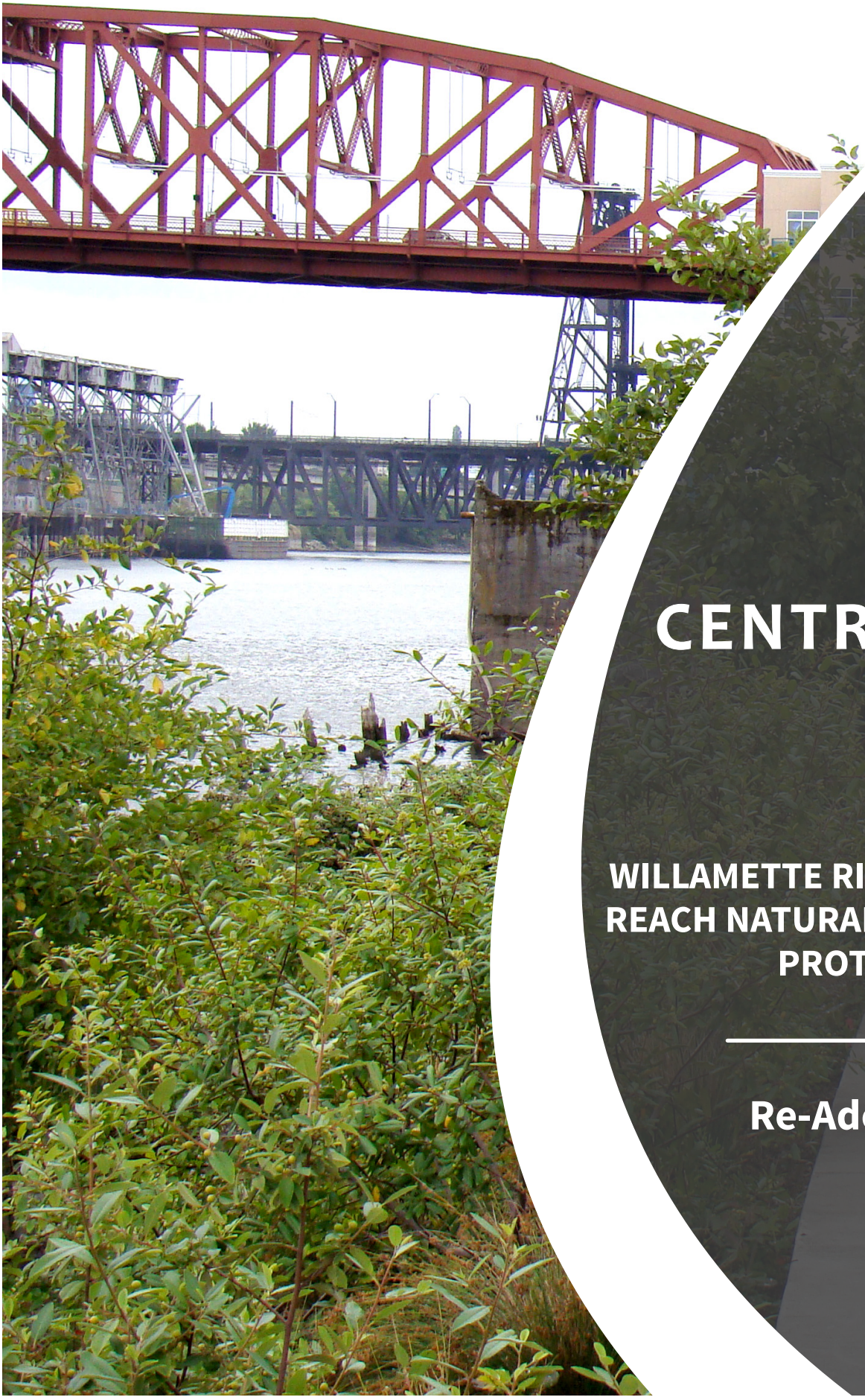

CENTRALCITY 2035

Volume 3B
WILLAMETTE RIVER CENTRAL REACH NATURAL RESOURCES PROTECTION PLAN

Re-Adoption Draft

April 2020

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City of Portland, Oregon

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ACKNOWLEDGEMENTS

This plan is the culmination of work over many years on the Central City Concept Plan, three quadrant plans (North/Northeast Quadrant Plan, West Quadrant Plan, Southeast Quadrant Plan), Natural and Scenic Resources protection plans, and the Bonus and Transfer Study. Many thanks to the thousands of stakeholders who participated in those processes and whose contributions helped to shape this plan.

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Special thanks to the current and former PSC members who chaired Central City Plan committees: Don Hanson, Katherine Schultz and Michelle Rudd.

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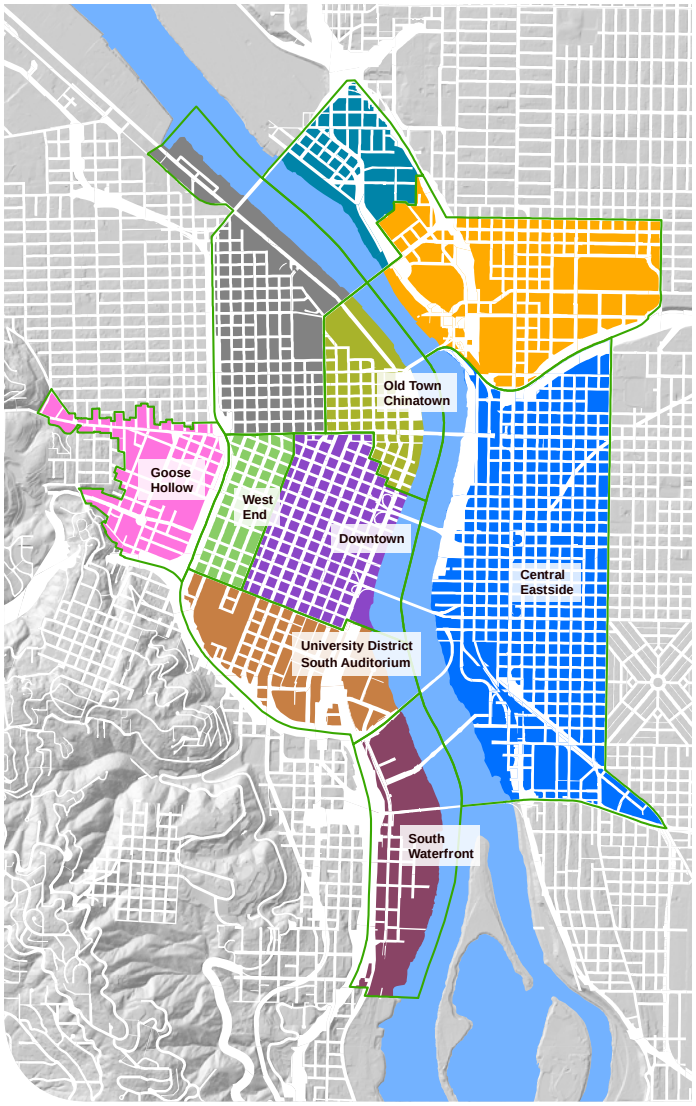

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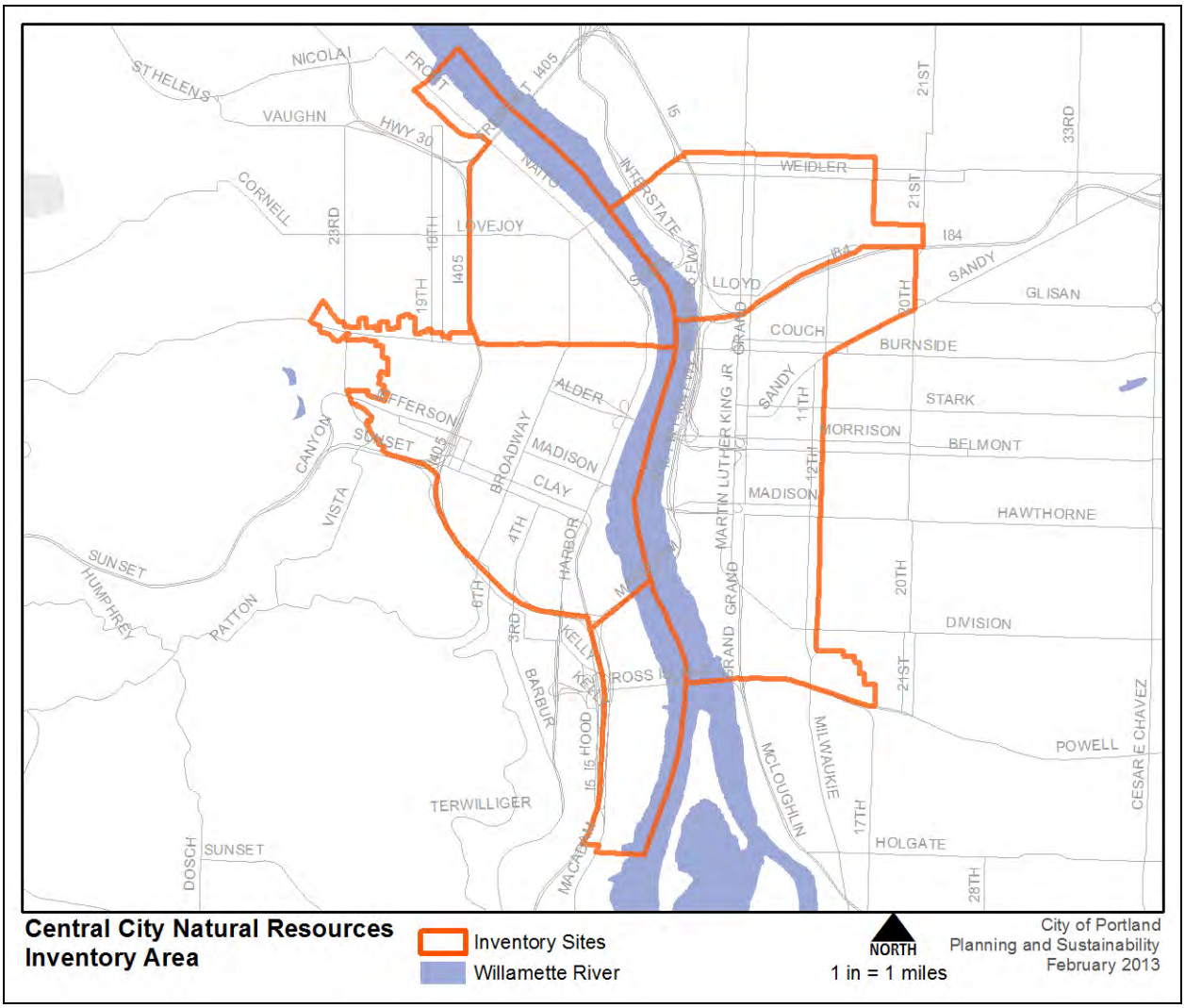
EXECUTIVE SUMMARY

Background and Process

As part of the River Plan / Central Reach and Central City 2035 (CC2035) projects, the City is updating the existing information and management tools to protect and enhance natural resources. This update is needed to aide in meeting the City of Portland's Comprehensive Plan watershed health goals and advancing the City's compliance with local, regional, state and federal regulations.

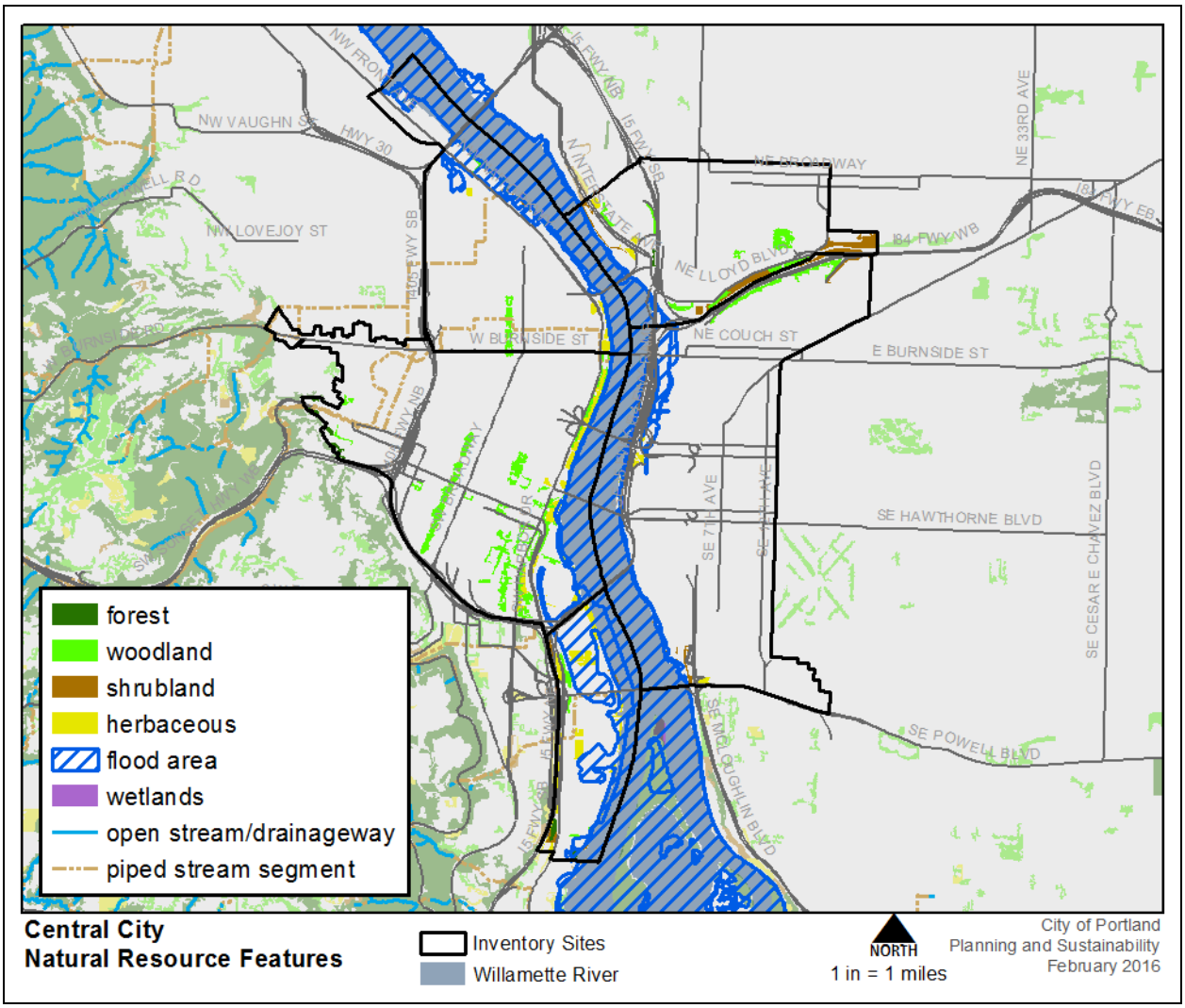
The Willamette River Central Reach Natural Resources Protection Plan (NRPP) describes the existing natural resources (e.g., vegetation, floodplain) in the CC2035 planning area, evaluates the functions and values they provide (e.g., flood storage, microclimate and shade) and recommends levels of protection along with tool to implement the recommendations.

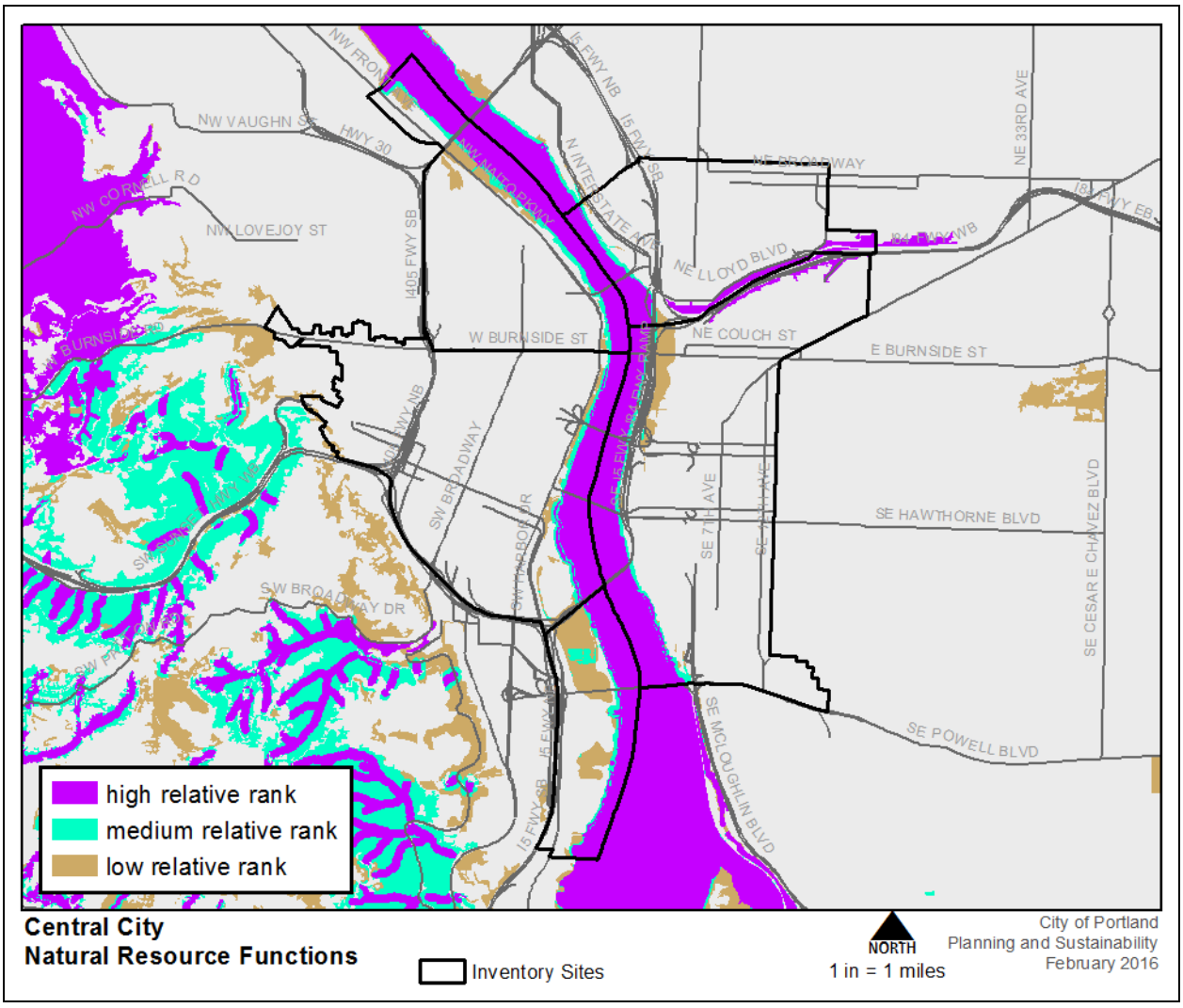


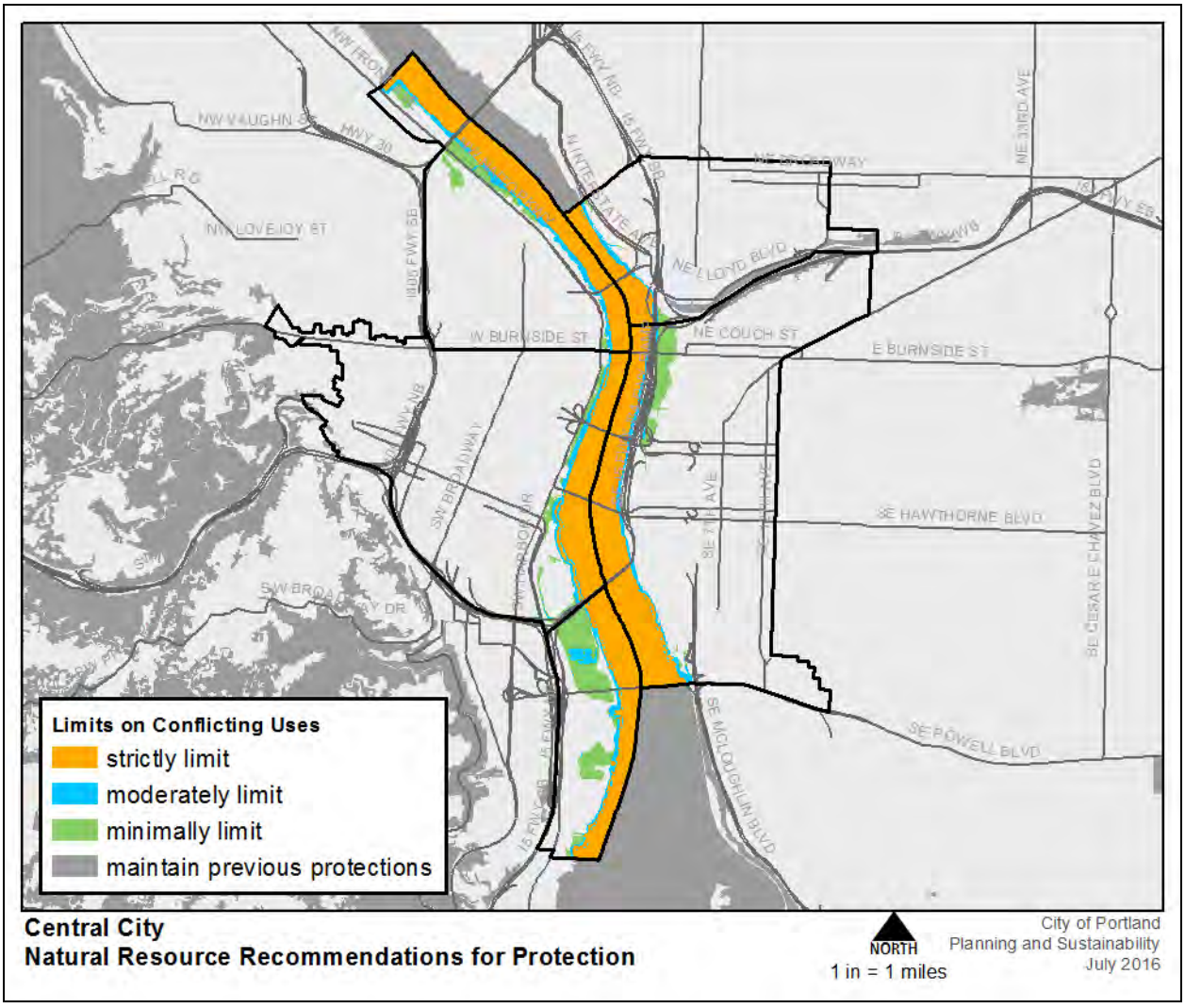
Results

The NRPP results contain narrative descriptions of the natural resource features, functions and recommendations for protections in the CC2035 planning area. In addition to the narratives, geographic information system (GIS) models are used to display the functions provided by the features, produce ranks of high, medium and low that depict the relative amount of functions provided by any given feature, and depict the recommendations for protection. For example, a large stand of trees located adjacent to the river provides numerous functions, such as shading the in-water habitat, and contributing leaf litter, structure and nutrients to the river. In a situation like this, the trees would receive a high relative rank for riparian corridor functions and the recommendation would be to strictly limit impacts on those resources.

The following three maps show the natural resource features, the results of the geographic information system (GIS) modeling of functions and the recommendations for protections of resources in the CC2035 planning area.




high relative rank
medium relative rank
low relative rank
Central City
Natural Resource Functions
Inventory Sites
NORTH
1 in = 1 miles
City of Portland
Planning and Sustainability
February 2016
NW VAUGHN ST
HWY 30
NW LOVEJOY ST
I405 FWY SB
W BURNSIDE ST
SW BROADWAY
I5 FWY NB
I5 FWY SB
NE BROADWAY
NE LLOYD BLVD
NE COUCH ST
E BURNSIDE ST
NE 33RD AVE
SE 7TH AVE
SE HAWTHORNE BLVD
SE CESAR E CHAVEZ BLVD
SE POWELL BLVD
SE MCLOUGHLIN BLVD
SW BROADWAY DR



Central City
Natural Resource Recommendations for Protection

Below is a brief summary of the results of the NRPP.

The Willamette River

The Lower Willamette River flows through the CC2035 planning area, providing the primary migration corridor for Endangered Species Act (ESA) listed Chinook, coho, and chum salmon, and steelhead and bull trout, to the Columbia River. These fish depend on clean, cool water and shallow areas for resting and feeding during migration. There are numerous small pockets of shallow water habitat along the Willamette's Central Reach.

The Willamette River is also part of the Pacific Flyway and is utilized by more than 200 resident and migratory bird species. Shorebirds and waterfowl use shallow water areas and exposed sand and mud for resting and feeding. Waterfowl and gulls use the vegetated shoreline along the river for resting, roosting and feeding. Peregrine falcon nest on Willamette River bridges and perch on pilings and buildings.

The Willamette River receives a high relative rank for riparian corridor functions and wildlife habitat and it is designated a *Special Habitat Area* for ESA-listed fishes.

The recommendation is to strictly limit uses that conflict with natural resource features and functions of the Willamette River.

River Banks

The features and quality of the Willamette's river banks are directly tied to the river itself. These riparian corridors provide the transition between the river, stream banks and upland areas.

Vegetation on the banks, even in a narrow strip, is important to watershed health. Native plant species generally provide a broader suite of benefits – such as varied wildlife food sources and effective slope stabilization – than non-native plants. However, plants of all types, including invasive species, provide functions such as water storage, nutrient cycling and cover and nesting opportunities for wildlife. Vegetated river banks receive a high or medium relative rank for riparian corridor functions.

The river banks in the Central Reach are impacted by development, fill and hardening. Hardened, non-vegetated river banks do not provide a suite of riparian corridor functions like vegetated river banks do. However, because of the direct impact and important relationship between all river banks and in-water habitat, hardened, non-vegetated river banks are still identified in the inventory as a feature. They receive a low relative rank.

The recommendation is to strictly limit uses that conflict natural resource features and functions of the Willamette River below top of bank and to moderately limit conflicting uses within high and medium ranked resources located above the top of bank.

Flood Area

Most of the flood area of the Willamette River has been filled and developed in the Central Reach. The remaining flood area is primarily comprised of the Willamette River itself and the river banks. Open water and vegetated flood areas provide a host of important functions, including water storage, nutrient cycling, microclimate and channel migration. In some locations, the flood area extends over the banks and into developed lands. The developed flood area provides for water storage during large storm events like the flood in early 1996.

The vegetated flood area, regardless of vegetation type, receives a high or medium relative rank for riparian corridor functions, while the developed flood area receives a low relative rank to acknowledge only the flood storage capacity it provides.

The recommendation is to moderately limit uses that conflict natural resource features and functions of undeveloped floodplain and to minimally limit conflicting uses within developed floodplain.

Trees and Landscape Vegetation

For purposes of the NRPP mapping and modeling, only patches of trees that are at least one-half acre in size are assigned a relative rank for wildlife habitat. In the Central City there are no patches of tree canopy that large. However, smaller landscaped areas and individual street trees, while not receiving a rank in the inventory, do provide functions including cleaning and cooling the air and water, capturing greenhouse gases, capturing and uptaking stormwater, reducing energy demand and providing wildlife habitat.

Across the entire planning area, neo-tropical migratory songbirds utilize landscape trees and shrubs for foraging and resting as they pass through during migration. Resident and migratory songbirds, raptors and hummingbirds use mature tree canopy along the North and South Park blocks, other street trees, patches of vegetation and landscaped areas.

Along I-84 is a steep, vegetated ravine called Sullivan's Gulch. A mix of tall native trees, including Big Leaf Maple, and non-native (primarily invasive) understory, including Himalayan Blackberry, provide habitat for multiple species. Migratory and resident birds, including red-tailed hawks, Bewick's wren, song sparrow and spotted towhee, nest in Sullivan's Gulch. White crowned sparrow and Anna's hummingbird were observed during a Spring 2011 site visit. The slope is prone to landslides and wild fire. Sullivan's Gulch is designated a *Special Habitat Area* and receives a high relative rank as a unique feature in the Central City.

Because the NRPP only address patches of trees at least one-half acre in size or larger, there are no specific recommendations regarding protecting smaller patches of trees. City Zoning Code Title 11, Trees, addresses the removal and replacement of individual trees.

CHAPTER 5. RESULTS

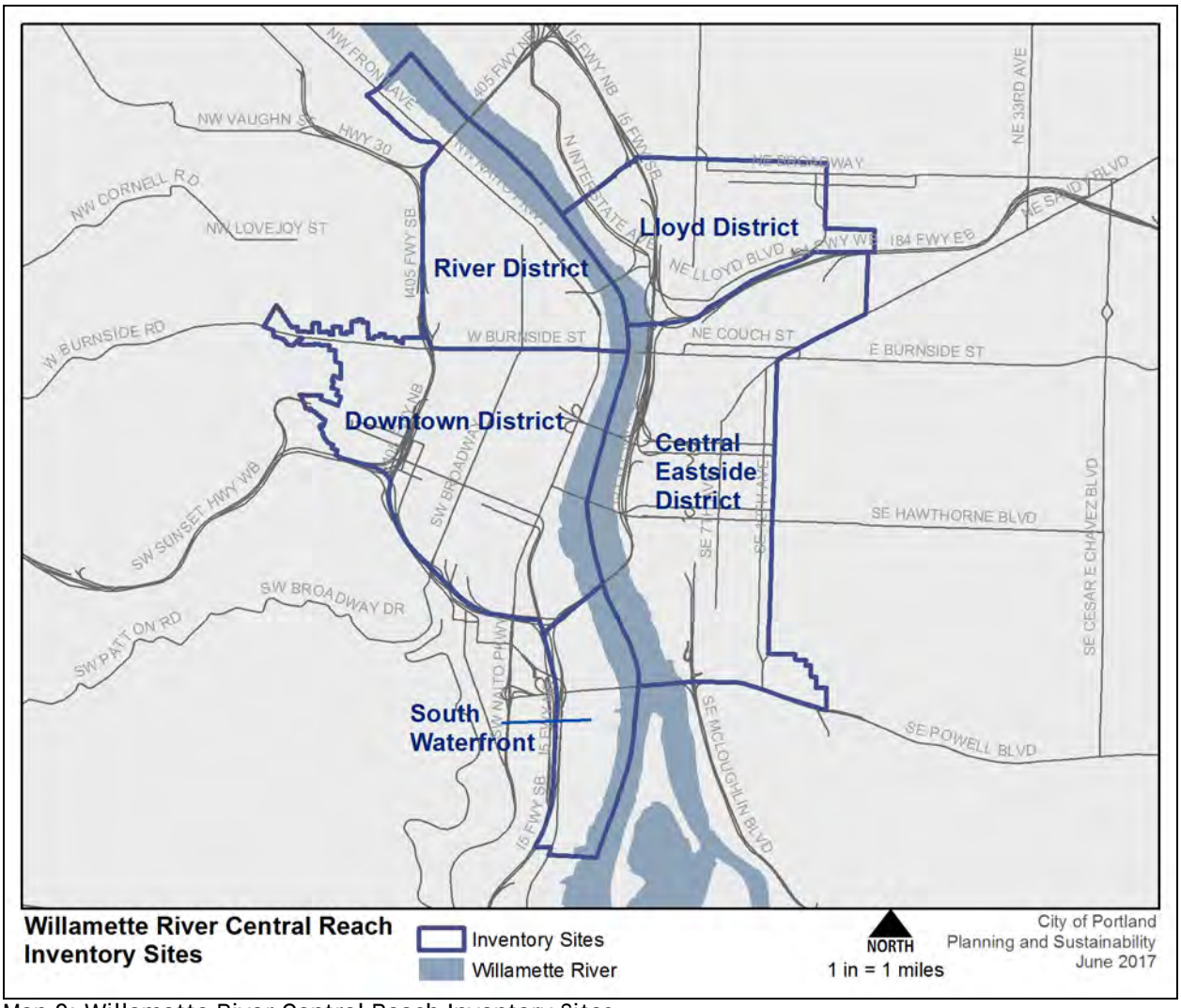
1. Introduction

Chapter 5 begins with an overview of the Willamette River Central Reach. The overview describes the general conditions of the Central Reach including hydrology, water quality and fish and wildlife habitat. Following the overview are results for the inventory sites. Each inventory site includes:

- An inventory (description and maps) of the existing natural resources features
- Identification and ranking of the riparian corridor and wildlife habitat functions provided by the inventoried features
- Recommended protection of the natural resources

2. Willamette River Central Reach Overview

The Willamette River Central Reach planning area (Map 9) is largely developed, and includes Portland's downtown core, industrial and commercial land, and various other land uses.



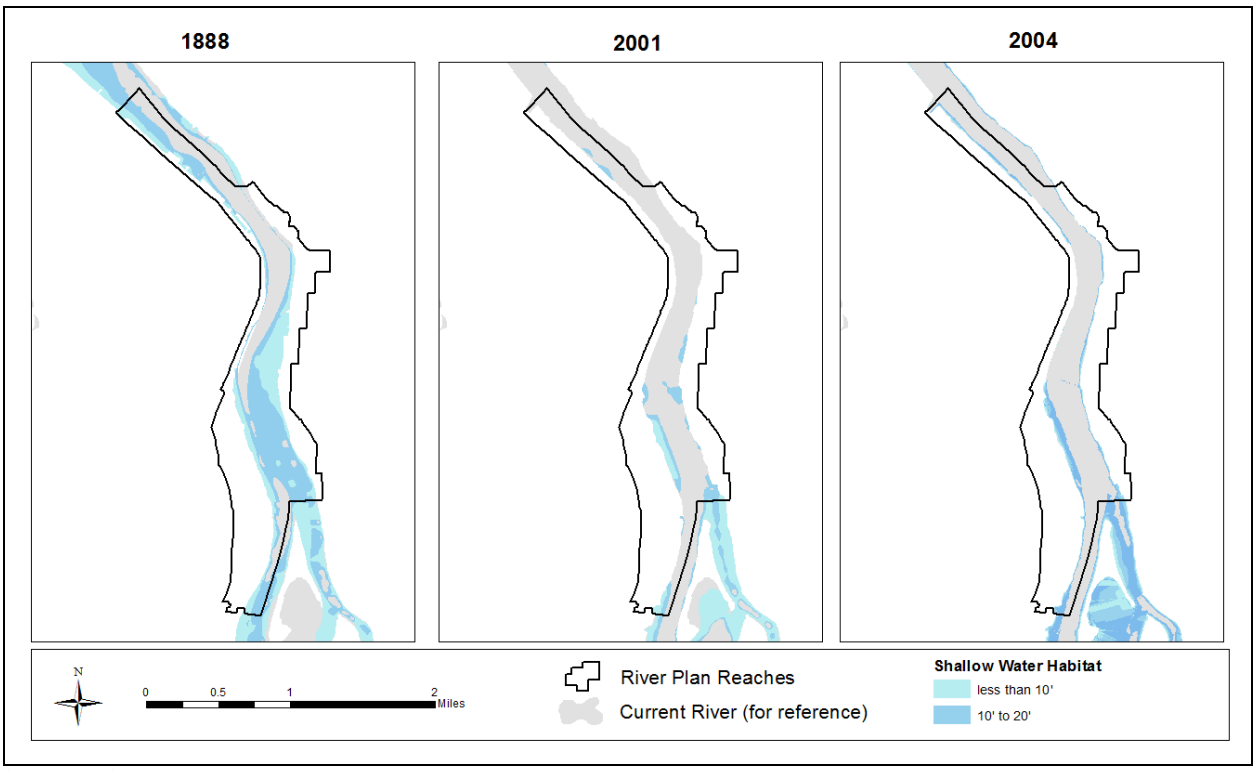
Map 9: Willamette River Central Reach Inventory Sites

The banks of the Lower Willamette River have been altered over time; approximately 85 percent of the river banks in the Central City are armored with seawalls, pilings, rock/fill or riprap (Table 6). In the Central City, the flood area has been largely filled and developed. The existing flood area is generally confined to the Willamette River itself; however, there are a few locations of developed flood area. The largest flood area is in South Waterfront, which is partially developed. Throughout the reach, wharves and piers extend into the river channel, and bulkheads and riprap armor the riverbank. Active dredging has produced a uniform channel with little diversity. Figure 5 shows how the filling, riverbank hardening and dredging have impacted the extent of shallow water habitat in the Central City. Shallow water habitat is critical for juvenile salmonids as they migrate to the Columbia River and Pacific Ocean.

Table 6: Central City Willamette River Bank Treatments

Bank Treatment	Linear Feet
Beach	1,131
Bioengineered	4,140
Non-Vegetated Riprap	1,689
Vegetated Riprap	15,922
Pilings	2,265
Seawall	6,095
Unclassified Fill	5,118
Total	**36,360**

Figure 5: Shallow water habitat in the Willamette River Central Reach



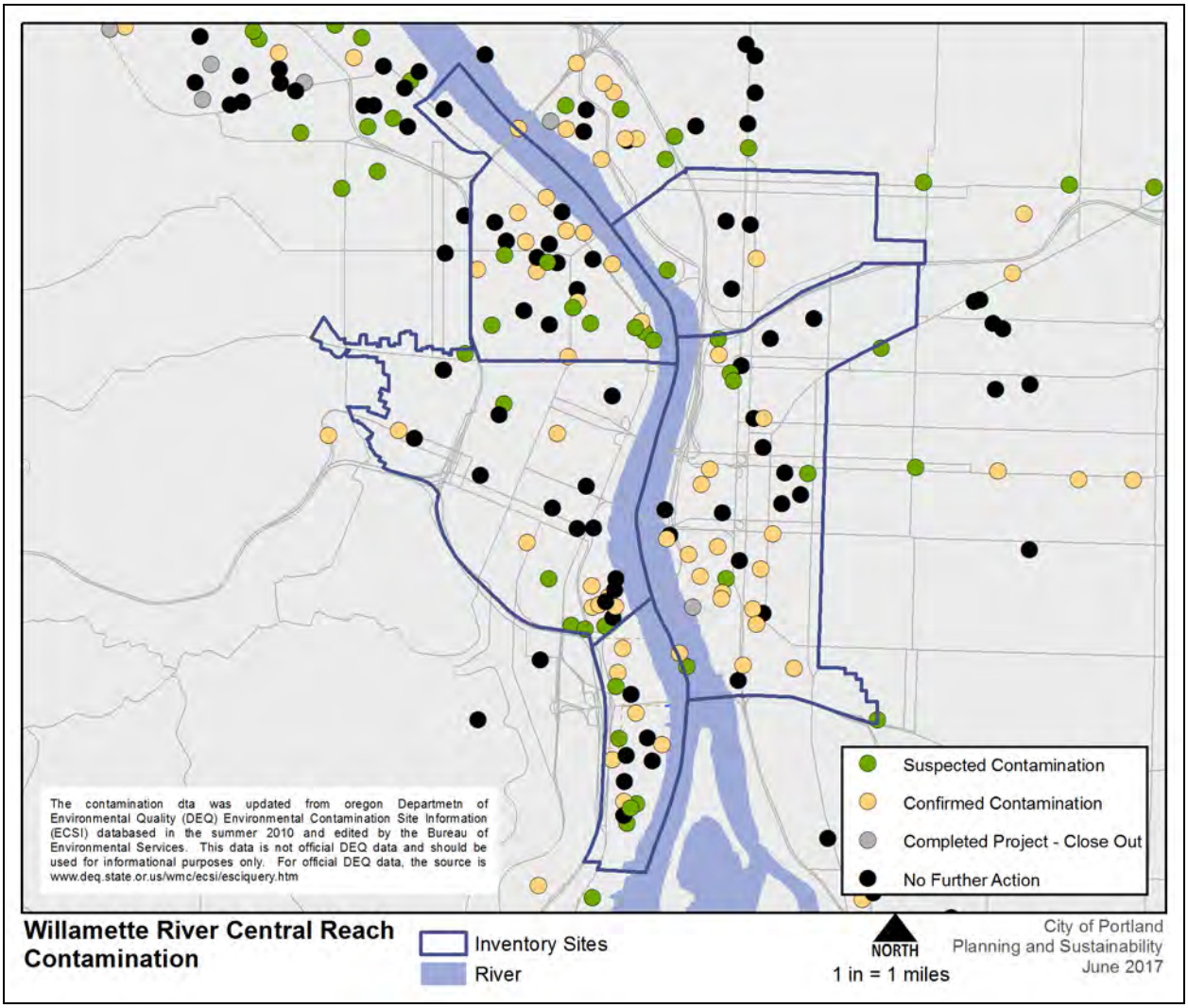
Source: BES, 2016

The Willamette River and considerable portions of the land in the Central City are contaminated with toxic compounds. More than 40 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: www.deq.state.or.us/lq/ECSI/ecsi.htm.

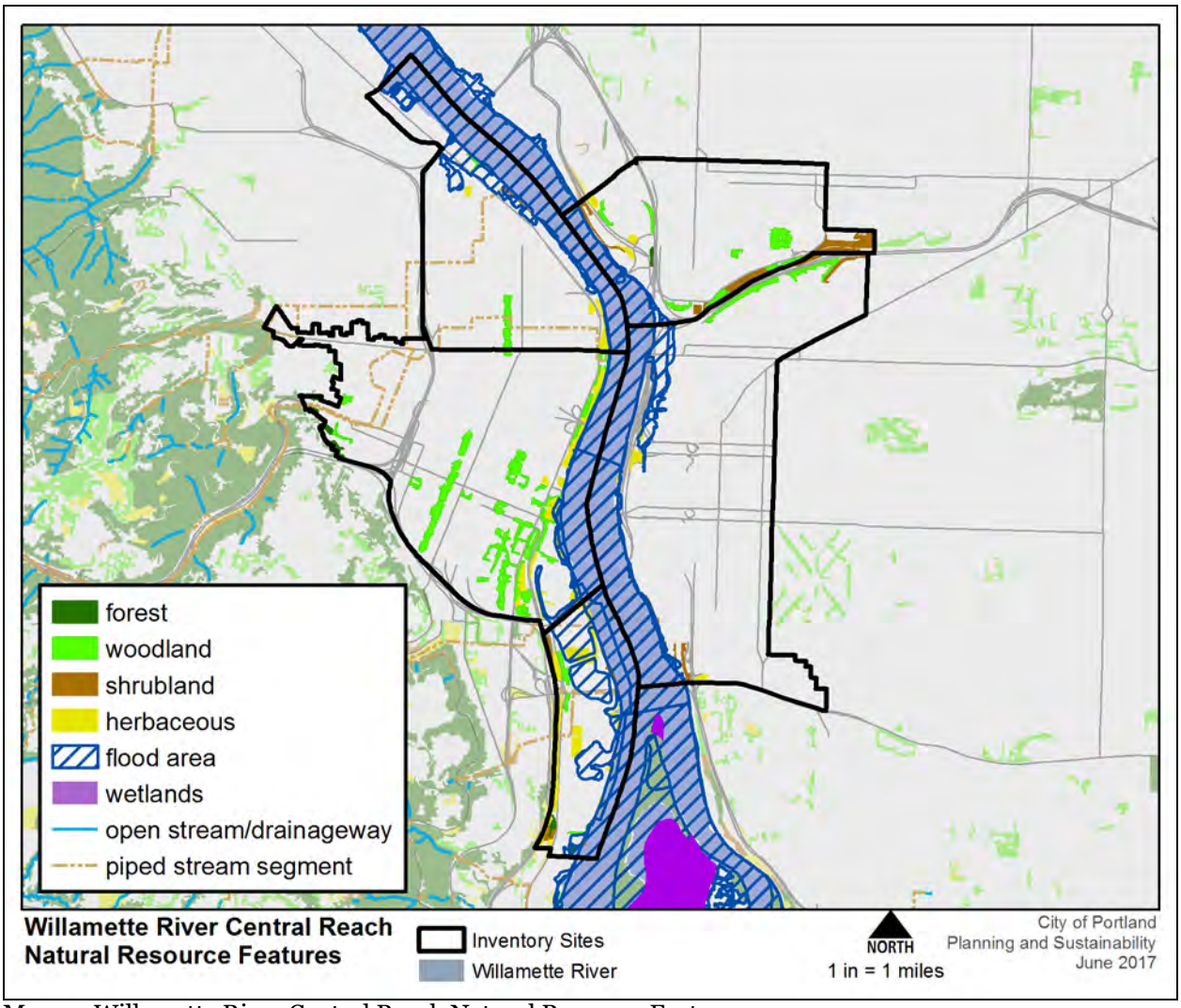
Currently, the Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin and temperature. Oregon Water Quality Index values from 1986 to 1995 for the Lower Willamette Basin in Portland range from fair to very poor. Cool water is one of the necessities of many aquatic species, including salmonids. Tributary streams can influence water temperature in portions of the Willamette by providing cool water. However, many tributaries to the Lower Willamette do not meet standards for temperature and other pollutants, such as sediment and heavy metals.

Due to the documented presence of mercury, PCBs, dioxins and pesticides in Lower Willamette River fish, there is a fish advisory for the mainstem of the river. The advisory recommends that people, especially pregnant or breastfeeding women, limit or avoid consuming fatty fish such as carp, bass and catfish. There is no restriction on the consumption of salmon or steelhead. The Lower Willamette River in Portland is deemed unsafe for swimming when sewers overflow into the mainstem during large storm events. The City has worked to curtail overflows over the past decade, and has completed a multi-million-dollar sewer pipe retrofit and upgrade project that will capture 94 percent of sewer runoff and transport it to treatment facilities.



Map 10: Willamette River Central Reach Contamination

Even with the alterations and impacts, the Central Reach still contains important natural resources, including 4 miles and 408 acres of the Willamette River channel, river banks and flood area (Map 11). The Willamette River provides significant habitat for Chinook and coho salmon, rainbow/steelhead trout, Pacific Lamprey, beaver, river otter, red-legged frog, western pond turtle and bats. The Willamette River in the Central Reach is part of the Pacific Flyway and is used by numerous bird species; some are year-round residents, while others pass through the city during spring and fall migrations. Over 210 species regularly occur in Portland, many of which are resident or migratory in the Central Reach and broader Central City. Iconic species, such as great blue heron, osprey, Peregrine falcon and bald eagle are commonly sighted in the Central City.



Map 11: Willamette River Central Reach Natural Resource Features

The Willamette River is the primary migration corridor for both fish and wildlife. The water, river banks, riparian vegetation and upland vegetation in the Central City serve important functions for fish and wildlife.

Anadromous Fish Species

Several fish species that use the Willamette River Central Reach have been listed under the Endangered Species Act. Although most of the rearing and migratory habitats have been heavily developed in this reach, many of these fish continue to use the Central Reach as they migrate from their natal tributary streams to the Pacific Ocean and back to spawn and die. The area identified as Critical Habitat for ESA-

listed fishes includes designated rivers and streams up to the ordinary high water mark (OHWM). The OHWM for the Willamette River is determined by the U.S. Army Corps of Engineers. The Central Reach OHWM is elevation 20ft (NAVD88). The National Oceanographic and Atmospheric Administration (NOAA) has designated the Willamette River within the Central Reach as Critical Habitat for the following species:

Chinook Salmon
- Lower Columbia River Chinook – listed Threatened
- Upper Willamette River Chinook – listed Threatened

Coho Salmon
- Lower Columbia River – listed Threatened

Steelhead Trout
- Lower Columbia River Steelhead – listed Threatened
- Upper Willamette River Steelhead – listed Threatened

Bull Trout
- Columbia Basin Bull Trout (Lower Willamette is a Recovery Unit of habitat) – listed Threatened

White sturgeon are distributed throughout the Lower Willamette River, including the Central Reach. White sturgeon are not currently listed at the state or federal level; however ODFW published a Conservation Plan for white sturgeon because their population is in distress (ODFW, 2011).

Pacific lamprey also inhabit the Central Reach. The Willamette River is one of the most important production areas for Pacific lamprey in the entire Columbia River Basin (ODFW, 2002). The sand and small-sized gravel substrate in the Lower Willamette River is used by lamprey juveniles for rearing before migration out to the ocean. The Central Reach is also a vital migratory corridor for adults returning to spawning grounds.

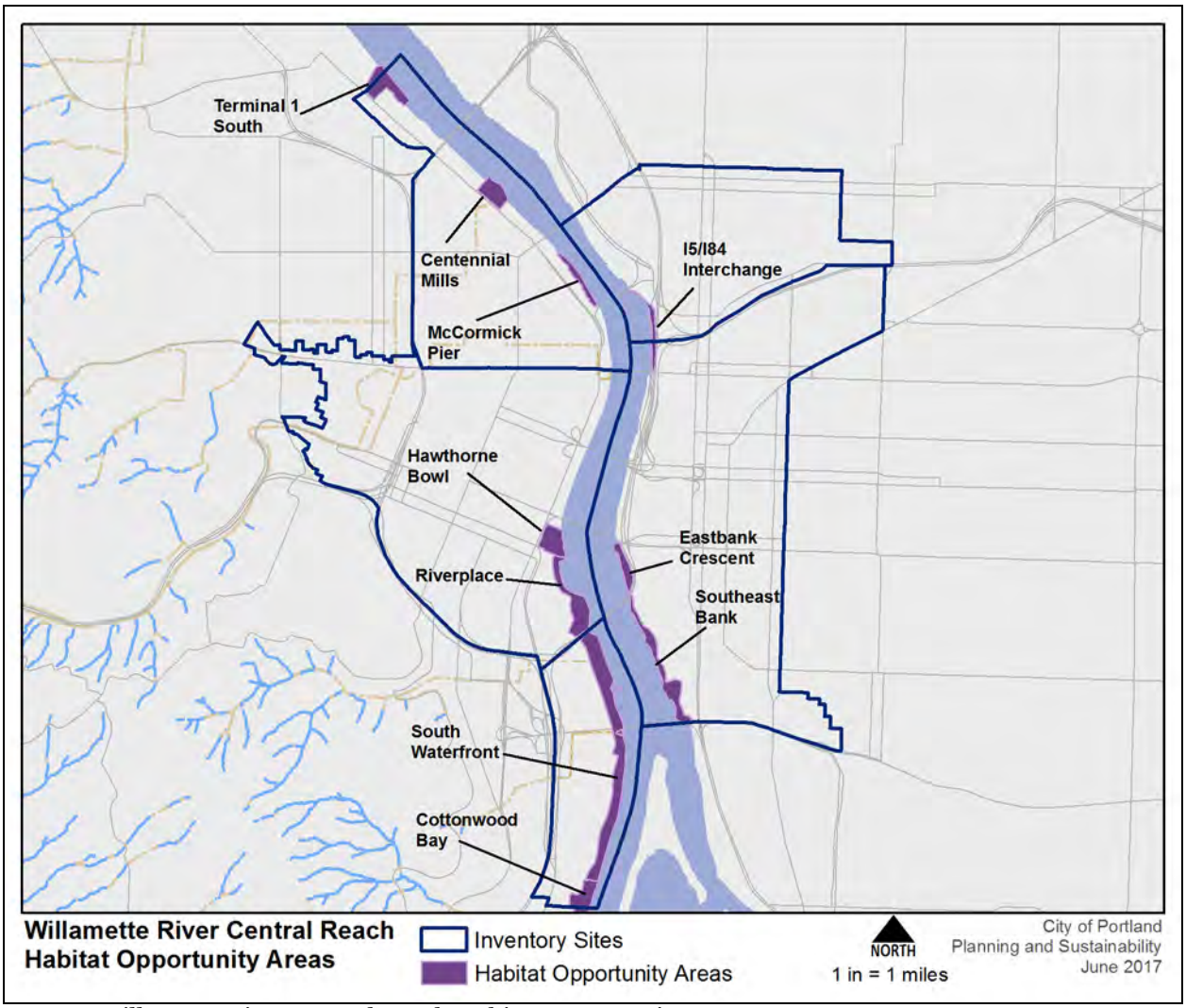
Anadromous fish depend on resources in the Central Reach at various times of the year; their presence is usually predictable:
- Juvenile salmon and steelhead are present year-round; outmigration generally peaks between March and July.
- Spring Chinook outmigration peaks in April.
- Winter steelhead, fall Chinook and Coho salmon outmigration peaks in May and June.
- White sturgeon generally move from the Columbia River estuary into the Willamette River in the spring and summer.
- Pacific lamprey adults move into the lower Willamette River between May and August, with a peak in June.

All of these anadromous fish enter the Lower Willamette River system to forage on the annual shad run and to spawn downstream of Willamette Falls. Meyers et al. (1998) identified habitat modification, dams and hatchery management as factors for salmonid decline in the Willamette River basin. Immediately downstream from the South Reach, urban development, river bank armoring, river dredging and filling within the flood plain have substantially altered habitat availability and habitat quality for salmonid fishes. These impacts affect fish as they travel through the South Reach.

Habitat connectivity along the shoreline is crucial to the salmon's survival. As both juveniles and adults move along the shoreline, they seek refugia habitat that provides opportunities to feed, rest and hide from predators. Refugia habitat, in this context, includes shallow water areas, defined as –21.0 feet to +9.5 feet (NAVD88 vertical datum) of the OHWM, with sandy substrates and overhanging vegetation that provide food, resting and recharging opportunities for juvenile salmonids. Shallow water areas also provide important habitat for shorebirds and waterfowl.

The distance between shallow-water refugia is important to the health and survival of salmonids. Long periods of sustained swimming between refugia deplete energy reserves. Fish with low energy resources migrating between refugia are more vulnerable to predation, as their flight response diminishes with a reduction in stamina. The more "rest stops" a fish has, the more likely they will complete their migrations in good health. Therefore, salmonid productivity and survival is expected to be greater in locations with the shortest distance between refugia, where the fish can rest, feed and rebuild their energy supplies. (C.L. Groot, 1995; M.B. Foreman, 1990; R.C. Eaton, 1991; Sauter, 2001; Sedell, 1990).

Existing important shallow water areas in the Central Reach include: Terminal 1 South, Centennial Mills, McCormick Pier, Hawthorne Bowl, Riverplace, Eastbank Crescent, South Waterfront and Cottonwood Bay (Map 12). These areas offer an opportunity to improve fish and wildlife habitat. Additional information about these shallow water habitat is provided in the inventory site descriptions.



Map 12: Willamette River Central Reach Habitat Opportunity Areas

Terminal 1 South – Terminal 1 South is an approximately 3.5 acre alcove off the mainstem of the Willamette River. The banks are comprised of pilings and docks on the western and northwestern sides of the alcove, and riprap and unclassified fill on the southern shore. The exposed banks on the southern shore are steeply sloped. The banks are sparsely vegetated, primarily with Himalayan blackberry, with a few small trees interspersed. The shallow water areas contain primarily muddy sand.

Centennial Mills – The Centennial Mills site, including the adjacent Mounted Police Unit barn, is approximately 4.3 acres in size. Tanner Creek is piped beneath the site and discharges along the banks. The banks are comprised of pilings and the overwater mill structure along the downstream half, and vegetated riprap along the upstream half of the site. The bank is vegetated with a mix of Himalayan blackberry and a few small maples and cottonwoods. Landward of the top of bank, in front of the horse barn, there is a small area of maintained grass. Shallow water habitat along the bank from the Broadway Bridge to the Fremont Bridge is large relative to other shallow water areas in the Willamette River Central Reach. The sediments along this stretch are sand and muddy sand.

McCormick Pier – McCormick Pier includes roughly 1,100 feet of bank that are comprised of vegetated riprap and 300-400 feet of sandy beach shoreline. Although the sandy beach is small, it is a rare feature within the Willamette River Central Reach. The riprap in the downstream portion is lightly vegetated with Himalayan blackberry, with isolated small trees and shrubs also present. The bank is mostly steepened along its length, although portions of the lower toe of the slope and the sandy beach area are more gradually sloped. There is a limited thin strip of shallow water along this site, expanding slightly in the area near the beach. On a site visit in spring 2011, an Osprey was observed perched on an in-water structure at the pier. A second was observed soaring over the river.

Sullivan's Gulch – Sullivan's Gulch is located along I-84 between NE 21st Avenue and the Willamette River. The gulch is very steep and is vegetated with woodland to the east and west and a large patch of Himalayan blackberry in the middle. Sullivan's Gulch meets the Willamette River underneath the I-5/I-84 interchange. The river banks here are largely riprap and unclassified fill with no vegetation due to shading by the ramps. A few small stretches of shallow water exist here. The sediments at this site are sand and hard ground.

Waterfront Park Bowl – Waterfront Park Bowl is a slight embayment with gradually sloping banks down to the river. The banks below ordinary high water are non-vegetated riprap; above the riprap is maintained lawn. A concrete overlook and the Hawthorne Bridge demark the upstream and downstream edges of the embayment, respectively. There is narrow area of shallow water at the downstream end near the seawall, which widens at the upstream end. Sediments at the site are predominantly muddy sand.

Riverplace – Riverplace is a slight embayment just south of Waterfront Park Bowl and is developed with a marina, docks and a restaurant. The concave banks are mostly non-vegetated and vegetated riprap. A few trees grow along the top of bank. Buildings and sidewalks are present just beyond the top of bank. The strip of shallow water is wider in this site than at most other sites within the Willamette River Central Reach. Only Eastbank Crescent has a wider area of shallow water. The sediment in the embayment is sandy mud and sand.

Eastbank Crescent – Eastbank Crescent is comprised of an 1, 800 foot-long, steeply-sloped bank with vegetated unclassified fill along its length. A bench of shallow water off the banks widens downstream as the thalweg switches from the east to the west bank. This represents the widest stretch of shallow water in the Willamette River Central Reach. The bank is dominated by Himalayan blackberry. One large tree and a few shrubs are also present. The sediment is gravelly sand and sand, with a small amount of hard ground at the downstream end near the Hawthorne Bridge.

Southeast Bank –Extending from the Marquam Bridge south to the Ross Island Bridge is a 3,000-foot stretch of river bank that steeply-sloped and comprised of vegetated and unvegetated unclassified fill. From the Holgate Channel to the south, which is some of the highest functioning shallow water habitat, fish traverse the Southeast Bank before reaching the Eastbank Crescent. There is little in-water beneficial structure and the vegetation on the bank is dominated by Himalayan blackberry. There are a few large trees scattered along the bank. Recently completed plantings under the Tilikum Crossing could grow to provide additional habitat.

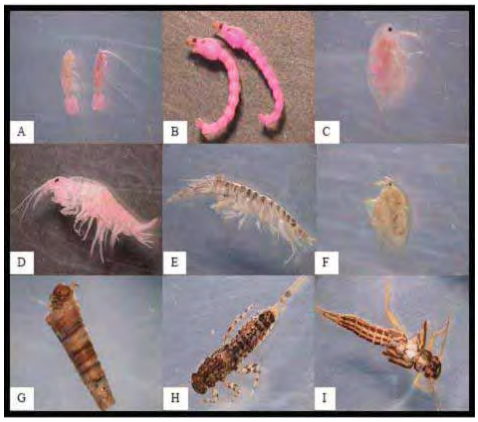
South Waterfront – South Waterfront stretches over 5,000 feet along the eastern river bank. The banks are a highly-varied mix of unclassified fill – concrete, piers and pilings, ramps and riprap.

Recently, some bioengineered banks with root wads were installed in front of the new development. Root wads provide bank stabilization and in-water structure for aquatic species. There is a row of trees along the banks at the Landing at Macadam and at other points along the bank, but this area is otherwise sparsely vegetated and the vegetation is dominated by Himalayan blackberry. A thin strip of shallow water in the southern half widens in the northern half as the thalweg transitions to the eastern side of the river. Much of the river bottom is hard ground with patches of gravelly sand, sandy mud, muddy sand and sand.

Cottonwood Bay – Cottonwood Bay spans from the Willamette River Central Reach into South Reach. Cottonwood Bay is one of the larger natural resources areas in the Central/South Reach and provides many riparian corridor and wildlife habitat functions. The larger northern embayment is approximately 1.2 acres in size and the southern embayment is approximately 0.6 acres. The banks are primarily non-vegetated and vegetated riprap with an abandoned concrete boat ramp in the northern embayment. There is a grove of large cottonwoods along the innermost banks of the two embayments. The water within the embayment is shallow, and the bottom is hard ground within the northern embayment and sand in the southern embayment.

Macroinvertebrates

Macroinvertebrates (aquatic insects), zooplankton and phytoplankton are 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 greatly. 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).



Source: The Xerces Society

Birds

The Central City, including the Willamette River, is part of the Pacific Flyway and is used by numerous bird species during spring and fall migrations. Over 210 species regularly occur in Portland, many of which are resident or migratory in the Central City.

Current bird habitat in the Central City planning area includes:

- Mature tree canopy of the North and South Park blocks, street trees, patches of vegetation and landscaped areas used by resident and migratory raptors and hummingbirds.
- Trees and shrubs used by Neotropical migrant songbirds for foraging and resting as they pass through the area on migration.
- Beaches and open water, used by great blue heron, double-crested cormorant and waterfowl.
- Vegetated shoreline along the river, used by waterfowl and gulls.
- Built features such as bridges, pilings and buildings, used by peregrine falcon and cliff swallows.

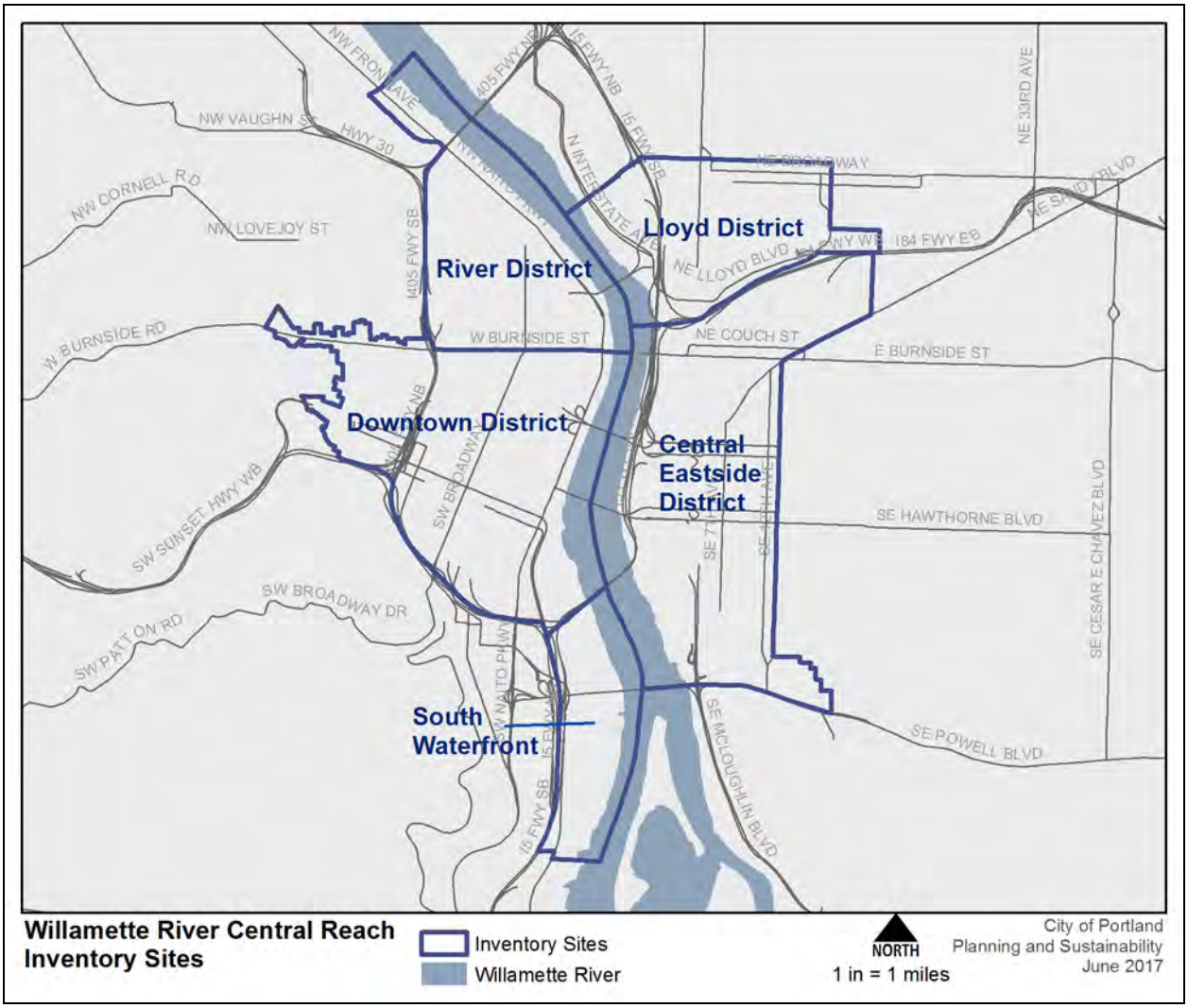
Larger patches of native and non-native vegetation along Sullivan's Gulch and in Holiday Park provide nesting sites for red-tailed hawks and other resident species such as Bewick's Wren and Spotted Towhee. There are nesting sites near beaches in the planning area which are used by bald eagles and osprey. Bridges in the Central City play a vital role in the recovery of the peregrine falcon; once listed as a Federal Endangered Species, and recently delisted by the State of Oregon, Portland bridges provide successful nest sites and year-round habitat for these peregrine falcons. Five percent of Oregon's known nesting population are Portland birds.

Birds observed during 2011 site visits in the Central City included: American crow, American robin, Anna's hummingbird, bushtit, Cooper's hawk, European starling, house finch, house sparrow, peregrine falcon, osprey, scrub jay, red-tailed hawk, song sparrow, rock pigeon (dove), white-crowned sparrow and yellow-rumped warbler.

3. Inventory Site Results and Recommendations

There are five inventory sites in the Central Reach Planning Area (Map 13), which include portions of the Willamette River channel, banks, and riparian and upland areas:

Inventory Site WR14 – Lloyd District
Inventory Site WR15 – River District
Inventory Site WR16 – Downtown District
Inventory Site WR17 – Central Eastside
Inventory Site WR18 – South Waterfront



Map 13: Willamette River Central Reach Inventory Sites

The following report sections provide information for each inventory site. Each site section starts with a summary of site characteristics (Table 8) and is followed by a description and evaluation of natural resources.

Table 8: Explanation of Inventory Site Summary Information

Characteristic	Explanation
Watershed:	The name of the watershed(s) in which the resource site is located.
Neighborhood:	The name of the neighborhood(s) in which the resource site is located.
Legal Description:	USGS quadrangle maps and quarter section maps.
River Mile:	Willamette River river mile, beginning at the confluence with the Columbia River.
Site Size:	Size estimates include land features, streams and drainageways, wetland and 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., height, design, open space, scenic, greenway and environmental).
Existing Land Use:	Primary land uses currently within 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 within the site (e.g., stream, drainageway, wetland, flood area, vegetation, beach, steep slopes and open water). Features may be in relatively good or poor/degraded condition.
Resource Functions:	Riparian and wildlife habitat resource functions relate directly to the resource features found within the site; these are the functions that may be performed by the resources present.
Special Habitat Area:	Special Habitat Areas (SHAs) are designated where natural resources have been documented to include critical, 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 officially listed by the NOAA Fisheries or the U.S. Fish and Wildlife Service (Candidate, Threatened, Endangered, Species of Concern), or the Oregon Department of Fish and Wildlife (Threatened, Endangered, State Sensitive, State Strategy), or ranked by Oregon Natural Heritage Information Center (Ranked or Listed Species), Oregon Watershed Enhancement Board (Priority Species), Partners In Flight (Focal Species), the National Audubon Society & American Bird Conservancy (Watch List), and the Northwest Power and Conservation Council Willamette and Columbia Subbasin Plans (Focal Species). Special status species lists for Portland can be found in Appendix C.
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 flood plain and/or adjusted 1996 flood inundation area).
Contamination:	Indicates whether any portion of the site is contaminated per the Oregon Department of Environmental Quality, Environmental Cleanup Site Information (ECSI) database.
Recommended Protections:	States the natural resource features and functions to be protected. Recommendations to *strictly limit* or *limit* conflicting uses are implemented using overlay zones, development standards and approval criteria.

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 natural resource description provides an account of the types and condition of natural resources present within the site, including information on water bodies, wetlands, water quality, plant assemblages, habitat types and wildlife species found within 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, 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 site visits completed by City staff between 2010 and 2011. Other information sources used to develop these descriptions include: 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: (1) riparian areas, (2) wildlife habitat, and (3) 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 G – Natural Resource Inventory Update: Project Report.

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.

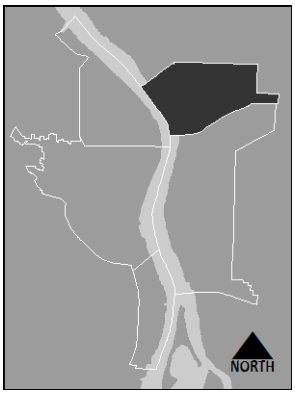
It is important to emphasize that the relative rankings denote the current conditions and the relative functional quality of natural resources in a given site. The relative quality of existing natural resources in the study area ranges from relatively functional to highly degraded. This information is 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.

Natural Resource Protection Recommendations

A general recommendation regarding natural resources protection was provided in Chapter 4. That recommendation is applied to the specific inventory site and refined as appropriate. A map of the recommendations is provided.

Inventory Site WR14 - Lloyd District

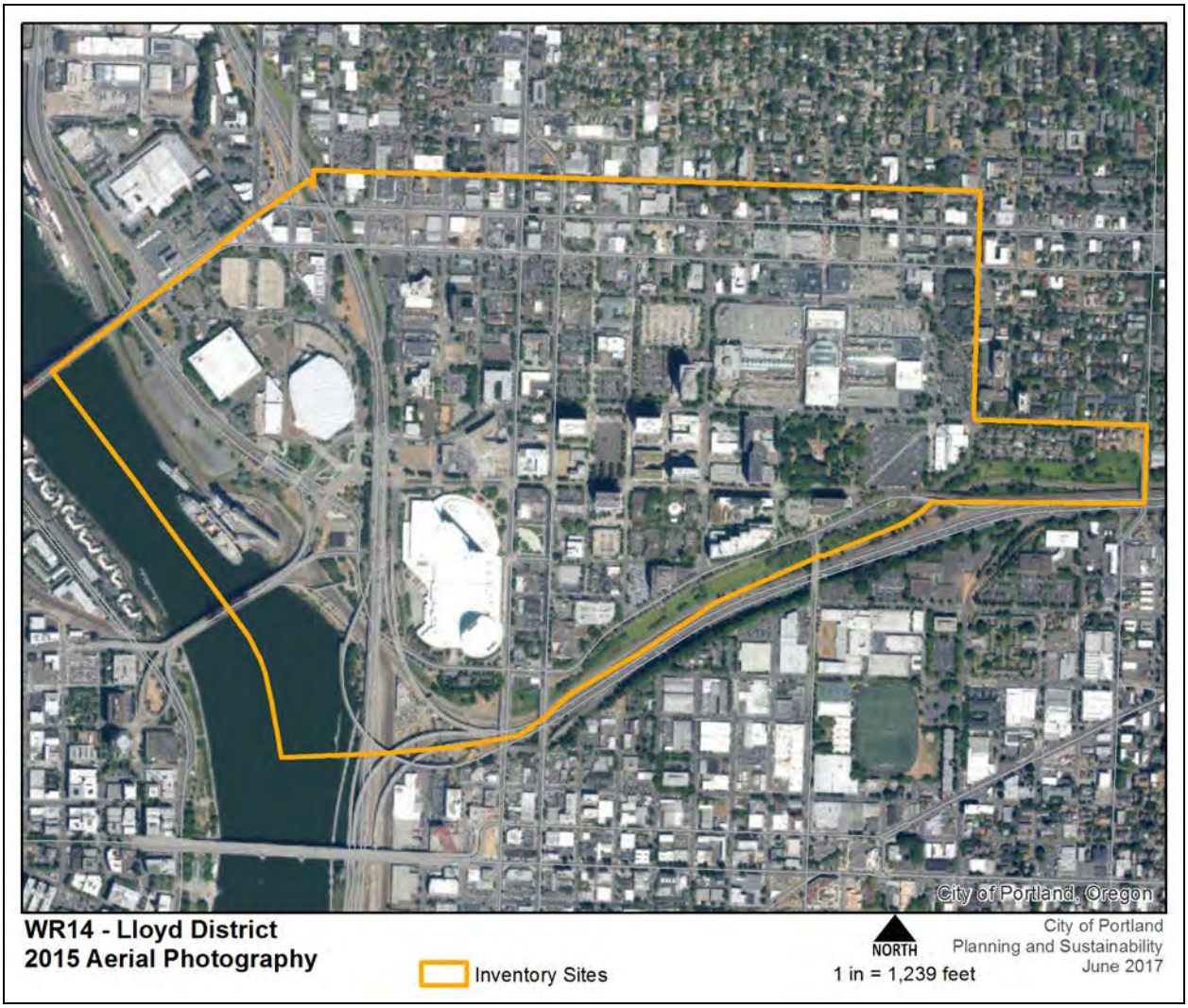


Summary Information

Watershed:	Willamette River Watershed
Neighborhood:	Lloyd, Sullivan's Gulch, Irvington, Eliot
USGS Quadrangle and Quarter Section Maps:	1N1E34, 1N1E35, 1S1e03, and 2929-30, 3030-31, 3130
River Mile:	11.3 – 12.7
Site Size:	423 acres (land and water)
Previous Inventory:	Lower Willamette River Wildlife Habitat Inventory, March 1986
Zoning:	Central Commercial (CX) Central Employment (EX) Central Multi-dwelling Residential (RX) General Industrial 1 (IG1) High Density Multi-dwelling Residential (RH) Open Space (OS) Design overlay (d) River General overlay (g) Scenic overlay(s)
Existing Land Use:	Commercial, residential, industrial, parks and open space, railroad, freeway
General Description:	This mostly commercial site extends between the Broadway Bridge to the north and the Burnside Bridge to the south. Along the Willamette River, there is a public walkway surrounded by herbaceous and shrubland vegetation. There are railroad lines and several freeways with access ramps within this site.
Resource Features:	Open water, shallow water habitat, river bank, flood plain, riparian vegetation
Resource Functions:	Microclimate and shade; stream flow moderation and water storage; bank function and sediment, nutrient and pollution control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; and wildlife habitat and movement corridor
Special Habitat Area:	Willamette River: (S) – provides habitat for at-risk wildlife species; (C) – wildlife connectivity corridor Sullivan's Gulch: (U) – unique feature
Special Status Species:	Fish: Lower Columbia River Chinook salmon, Columbia River chum salmon, lower Columbia River steelhead trout, Pacific lamprey
Natural Hazards:	Flood area, wildfire, landslide
Contamination:	Yes
Recommended Protections:	Strictly Limit – Willamette River, riverbanks below top-of-bank and high ranked resources above top-of-bank Limit – Floodplain (undeveloped and developed) and medium ranked resources above top-of-bank and developed floodplain *Maintain previously adopted protections for Sullivan's Gulch*

Site Description

This 423-acre site is located from the Willamette River centerline eastward to NE 21st Avenue and between Broadway Bridge to the north and I-84 to the south. The site is bordered by industrial, residential and commercial uses, and a major freeway runs through much of the site. As a result of development, most of the connections between the few remaining pockets of forested upland habitat and the river bank have been removed. The shoreline is defined by banks of vegetated and non-vegetated riprap, unclassified fill, rock, seawall and bioengineered bank treatment. There is a public walkway along the river, running from the Steel Bridge to the Hawthorne Bridge. Map 14 shows the aerial view of the Lloyd District inventory site.



Map 14: Lloyd District Aerial Photography

The site contains 241 acres (57 percent) impervious surface coverage, including 20 miles of road. Of the vegetated areas over ½ acre in size, there is are approximately 14 acres of forest and woodland vegetation, 14 acres of shrubland and 2 acres of herbaceous vegetation. There are 37 acres of flood area on this site (City of Portland, 2002), most of which is open water; the on-land portion is developed for industrial or transportation uses.

Table 9: Summary of Natural Resource Features in WR14 - Lloyd District	
	Study Area (miles/acres)
River (miles/acres)	0.6/31
Stream/Drainageway (miles)	0
Wetlands (acres)	0
Flood Area (acres)*	
Vegetated (acres)	2
Non-vegetated (acres)	4
Open Water** (acres)	31
Vegetated Areas >= ½ acre (acres)+	
Forest (acres)	<1
Woodland (acres)	13
Shrubland (acres)	14
Herbaceous (acres)	2
Impervious Surfaces (acres)	241

* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.
** Open Water includes portions of the Willamette River.
+ 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 2008 aerial photography.

Natural Resource Description

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. Today, the Lloyd District is a largely-developed landscape. The predominant existing natural resources are the Willamette River, including the flood area, and vegetation along the banks. Elements of the built environment also provide natural resource functions, including street trees, ecoroofs and vegetated landscaping.

The natural resources description is divided into sections that focus on habitat types:

- Open Water and Flood Area
- River Banks and Riparian Vegetation
- Steep Slopes

<u>Open Water</u>
Below is a summary of the Lower Willamette River in inventory site WR14. Additional information about the water quality, hydrology, and fish and wildlife use of the Willamette River is provided in Section 3.c: The Central City.

Inventory site WR14 includes 31 acres of the Lower Willamette River. The river is the primary habitat linkage providing connectivity to upstream and downstream aquatic habitats. This linkage is critical for supporting salmonids, resident and migrating birds, and other species.

The Willamette River is the primary migration corridor for ESA-listed upper Willamette River Chinook salmon and steelhead trout; and lower Columbia River Chinook salmon, coho salmon, and steelhead trout. These fish enter the Lower Willamette River system both as opportunistic migrants to forage the annual shad run and to spawn in reaches throughout the Willamette watershed. Anadromous fish depend on resources in the Central Reach at various times of the year; their presence is usually predictable:

- Juvenile salmon and steelhead are present year-round; outmigration generally peaks between March and July.
- Spring Chinook outmigration peaks in April.
- Winter steelhead, fall Chinook and Coho salmon outmigration peaks in May and June.
- White sturgeon generally move from the Columbia River estuary into the Willamette River in the spring and summer.
- Pacific lamprey adults move into the lower Willamette River between May and August, with a peak in June.

Columbia eulachon pass through the lower Columbia and Willamette rivers as opportunistic migrants as well. Adults return to their natal river every winter; however, their out-migration timing is not as well documented.

White sturgeon are distributed throughout the Lower Willamette River, including the Central Reach. White sturgeon are not currently listed at the state or federal level; however ODFW published a Conservation Plan for white sturgeon because their population is in distress (ODFW, 2011).

Pacific lamprey also inhabit the Central Reach. The Willamette River is one of the most important production areas for Pacific lamprey in the entire Columbia River Basin (ODFW, 2002). The sand and small-sized gravel substrate in the Lower Willamette River is used by lamprey juveniles for rearing before migration out to the ocean. The Central Reach is also a vital migratory corridor for adults returning to spawning grounds.

Resident fish assemblages within this reach include both native and non-native species that both support and prey upon native salmonids. These species include natives such as largescale sucker, sculpin (prickly and reticulate), redside shiner and northern pikeminnow. Nuisance species include large and smallmouth bass, asian carp and several varieties of perch.

Inventory site WR14 is part of the Pacific Flyway and is utilized by over 200 resident and migratory bird species, including iconic species such as great blue heron, osprey, Peregrine falcon and bald eagle. Species use the open water habitat for foraging and as a migratory corridor. Avian species also use man-made structures for perching, resting and foraging. Shallow water areas and exposed sand and mud are used by shorebirds and waterfowl. Upland trees and shrubs are used by Neotropical migratory songbirds.

The Willamette River in the inventory site does not meet water quality standards for bacteria, mercury, dioxin, temperature, and various other toxics and heavy metals (see Table 10).TMDLs for bacteria and temperature as well as a phased TMDL for mercury were established in 2006. Oregon Water Quality Index values from 2001 to 2010 for the Lower Willamette River in Portland have been fair and the trend is steady.

Table 10: 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-round	1998, 2002	Fishing, drinking water, resident fish and aquatic life, anadromous fish passage
Heavy Metals (iron, manganese, mercury)	Year-round	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

Due to the presence of mercury, PCBs, dioxins and mainly legacy pesticides (DDT, dieldrin) in Willamette River fish tissue, a fish advisory for the mainstem recommends that people, especially pregnant or breastfeeding women, limit or avoid consuming fatty fish such as carp, bass and catfish. There is no restriction on the consumption of salmon or steelhead. The Lower Willamette River in Portland is deemed unsafe for swimming during and immediately after sewer overflows as a result of larger storm events. However, in 2011, the City completed a large infrastructure project to address combined sewer overflows. The result is that combined sewer overflows should be very infrequent (about one every three years) during the summer recreating season.

In the inventory site, the flood area is generally confined to the Willamette River itself; but the flood area extends on to developed land south of the I-84 and I-5 interchange, riverward of NW Front Ave. The developed floodplain provides the function of water storage during events like the 1996 flood.

River Banks and Riparian Vegetation

This inventory site was historically industrialized, resulting in a highly modified river channel, bank and nearshore areas. Wharves and piers extending out from the channel and bulkheads and riprap revetments armor the riverbank.

There is little riparian vegetation except a 1,030-foot-long, narrow strip of woodland vegetation south of the Steel Bridge. There is some low-structure vegetation south of the Broadway Bridge. Riparian vegetation in the inventory site is a mix of native, non-native and invasive plants, including cottonwood, Oregon Ash, Himalayan blackberry and Scot's broom. Native plant species generally provide a broader suite of benefits, such as varied wildlife food sources and effective slope stabilization. However, all plants, including non-native and invasive species, provide important watershed functions such as water storage, nutrient cycling, and cover and nesting opportunities for wildlife.

WR14 - Lloyd District River Bank

Due to extensive development, armored river banks and limited remnant riparian vegetation, wildlife use is limited in this site. During a spring 2011 site visit, species observed using river banks and riparian vegetation in inventory site WR14 included: yellow-rumped warbler, osprey, mallards and geese.

Sullivan's Gulch and Steep Slopes

Along I-84 is a steeply-sloped, largely vegetated corridor, known as Sullivan's Gulch. Sullivan's Gulch begins outside of the inventory site, near NE 21st Avenue, and continues west to the Willamette River. Between the Lloyd Blvd/I-84 on-ramp and NE 12th Avenue, vegetation is comprised of black cottonwoods to the east, indicating the presence of surface or subsurface water, and big leaf maple to the west. The understory is a mix of hawthorn, English holly, Pacific dogwood, ivy, clematis, Himalayan blackberry and some Scott's broom. Between NE 12th Avenue and NE Grand Avenue the vegetation includes big leaf maple, cherry, one Oregon white oak, hawthorn, butterfly bush, English holly and English ivy. The middle of this stretch of the gulch is void of large trees and dominated by Himalayan blackberry. Between NE Grand Ave and the

Sullivan's Gulch

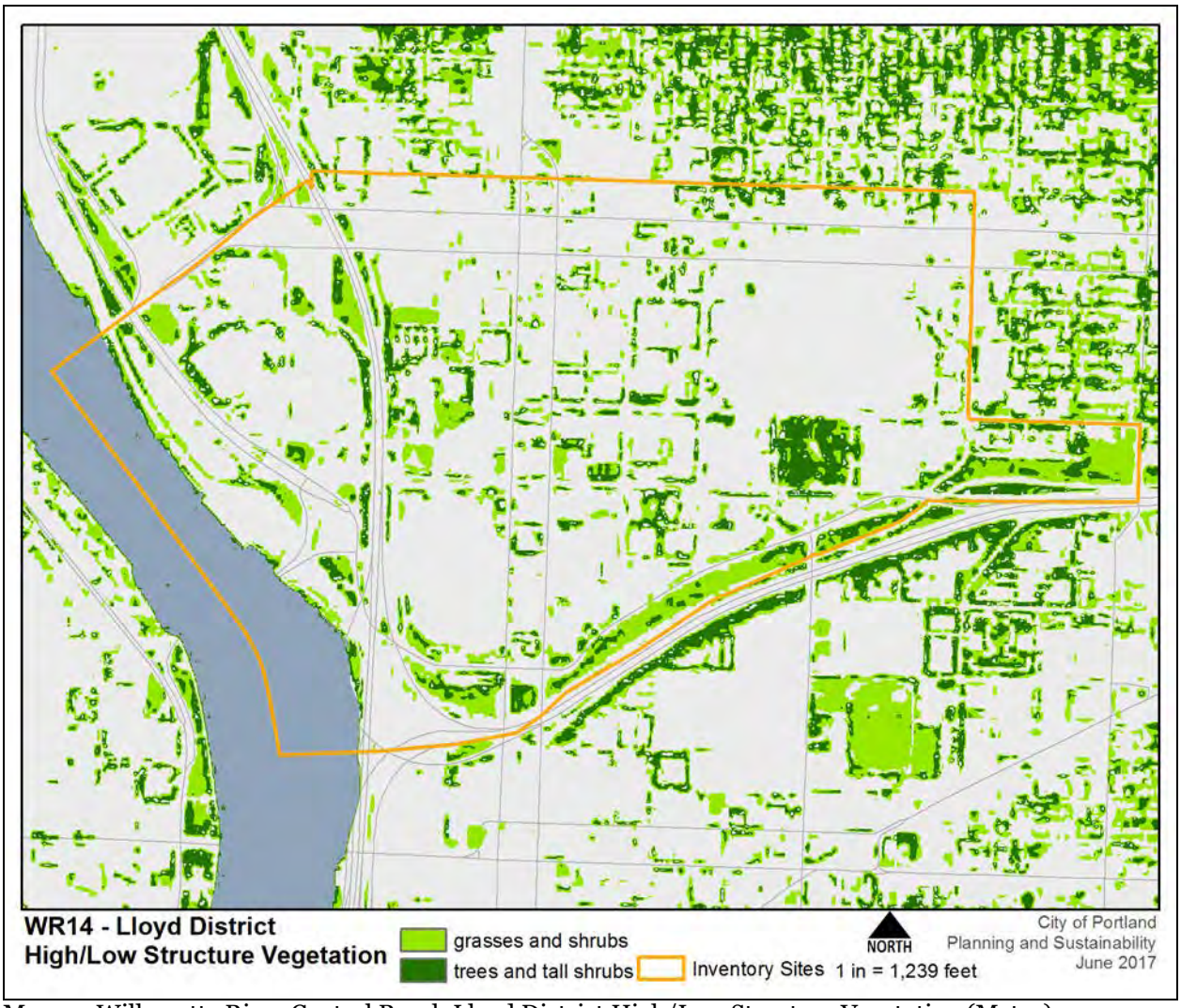
river, the vegetation includes some large trees, including one Oregon white oak, and an understory of Himalayan blackberry or turf grass. There is standing water under the I-84/I-5 on-ramp.

During a spring 2011 site visit, birds observed using Sullivan's Gulch included: song sparrow, Western scrub jay, American robin, bushtit, crow, Anna's hummingbird, white-crowned sparrow and yellow-rumped warbler. In the standing water under the I-84/I-5 onramp, two mallards were observed.

Steep slopes in Portland are relatively prone to wildfire and landslides. Although Sullivan's Gulch has not burned recently, north of the inventory site is Waud Bluff which experienced fires in 2001 and 2003. The primary sources of fuel were non-native plant species such Himalayan blackberry. Native species, including Oregon oak, Douglas fir, Oregon grape, snowberry, Gilia capitata (globe gilia) and Penstemon ovatus (broad leaved penstemon), are more fire-resistant plants.

Landscape Vegetation and Street Trees

For purposes of the Natural Resources Inventory mapping and modeling, only vegetation patches at least ½ acre in size are captured. However, smaller landscaped areas and individual street trees also provide functions, including cleaning and cooling the air and water, capturing greenhouse gases, capturing and uptaking stormwater, reducing energy demand and providing wildlife habitat (Map 15: High/Low Structure Vegetation). Along with the parks located throughout the site, the southern half of the site contains a significant amount of landscape vegetation and street trees.



Map 15: Willamette River Central Reach Lloyd District High/Low Structure Vegetation (Metro)

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 11). The relative ranks are produced using GIS models and information on Special Habitat Areas.

The approach used to generate the relative ranks is summarized in the introduction to the inventory sites. Additional detail is provided in Chapter 2: Methodology Overview of this report and Appendix E: Natural Resources Inventory: Riparian Corridors and Wildlife Habitat Project Report.

All of the ranked resource areas provide at least some important riparian and habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can inform planning projects and programs, including regulations, design of development or redevelopment projects, and mitigation and restoration activities.

Riparian Areas

The site contains the Willamette River and river bank, flood area and riparian vegetation. These features contribute to the riparian functions as detailed in the natural resource descriptions, specifically:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank functions, 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 itself. High and medium relative functional ranks are assigned to vegetated, non-hardened river banks or flood areas. Low relative ranks are generally assigned to non-vegetated flood areas and hardened, non-vegetated river banks.

Wildlife Habitat

Within the context of this inventory model, a wildlife habitat patch is defined as forest and/or wetland areas 2 acres in size or greater, including adjacent woodland vegetation (note: Special Habitat Areas may be smaller and may contain different types of vegetation or other resource features). The model assigns relative ranks to qualifying habitat patches based on their size, interior area, proximity to other patches and proximity to water. Site WR14 contains no forests and/or wetland areas 2 acres or larger in size.

Special Habitat Areas (SHA) consist of rare and declining habitat types and unique features that provide critical habitat for at-risk plant and animal species 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, and include:

- Willamette River, including shallow water habitat areas, are designated SHA because they meet the following criteria:
  (S) – An at-risk species uses the habitat area or feature on more than an incidental basis to complete one or more life history phases
  (M) – Migratory stopover habitat
  (C) – Wildlife connectivity corridor

- Sullivan's Gulch upland habitat along I-84 that is also subject to potential landslides and wildfire is designated SHA because it meets the following criteria:
  (U) – Unique feature

Combined Relative Riparian/Wildlife Habitat Ranking
Where areas that are 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.

Table 11: Summary of Ranked Resources in WR14 - Lloyd District

Total Inventory Site = 423				
	High	**Medium**	**Low**	**Total**
Riparian Resources*				
acres	33	7	3	43
percent total inventory site area	8	2	1	11
Wildlife Habitat				
Wildlife Habitat*				
acres	0	0	0	0
percent total inventory site area	0	0	0	0
Special Habitat Areas**				
acres	50			
percent total inventory site area	12			
Wildlife Habitat - adjusted by Special Habitat Areas***				
acres	50	0	0	50
percent total inventory site area	12	0	0	12
Combined Total***				
acres	51	7	3	61
percent total inventory site area	12	2	1	15

* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include the Willamette River.
** Special Habitat Areas rank high for wildlife habitat.
*** Because riparian resources, Special Habitat Areas, and wildlife habitat overlap, the results cannot be added together to determine the combined results.

Natural Resource Protection Recommendation

The Willamette River and associated floodplain and riparian areas in resource site WR14 have been significantly reduced in extent, simplified and degraded over time. The remaining natural resource areas are fragmented and impacted by adjacent development. However, the natural resource areas also provide the remaining habitat for fish and wildlife that reside in and migrate through this highly urbanized environment. The importance of the remaining natural resource areas is underscored by the relationship to the regional ecosystem and migration corridors.

In addition to being a significant area for fish and wildlife; the Lloyd District is an important and unique area for employment, commerce, transportation, housing, entertainment and recreation.

The general recommendation, shown on Map 7, balances the environmental, economic and social consequences of protecting natural resources. The resource site is a highly developed area and impacts from conflicting uses cannot be fully avoided. Allowing some future development in natural resource area is inevitable, particularly development associated with utilities and public infrastructure. However, conflicting uses should be limited overall.

The recommendation for riparian areas is to:

1. Provide the highest level of protection by strictly limiting conflicting uses within areas of high ranked natural resources, including land and water located below the top-of-bank of the Willamette River, and land within the undeveloped floodplain.
2. Provide a moderate level of protection by limiting conflicting uses within medium ranked riparian areas.
3. Provide a minimum level of protection by limiting conflicting uses with the developed floodplain, which typically receives a low rank.
4. Allow conflicting uses within low ranked natural resource areas outside of the floodplain.

The recommendation for wildlife habitat areas outside of riparian areas is to:

1. Maintain the current level of protections applied by previously adopted natural resources protection and management plans or through Title 11, Trees.

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WR14 - Lloyd District
Map 1: 2015 Aerial Photography
Legend
Inventory Sites
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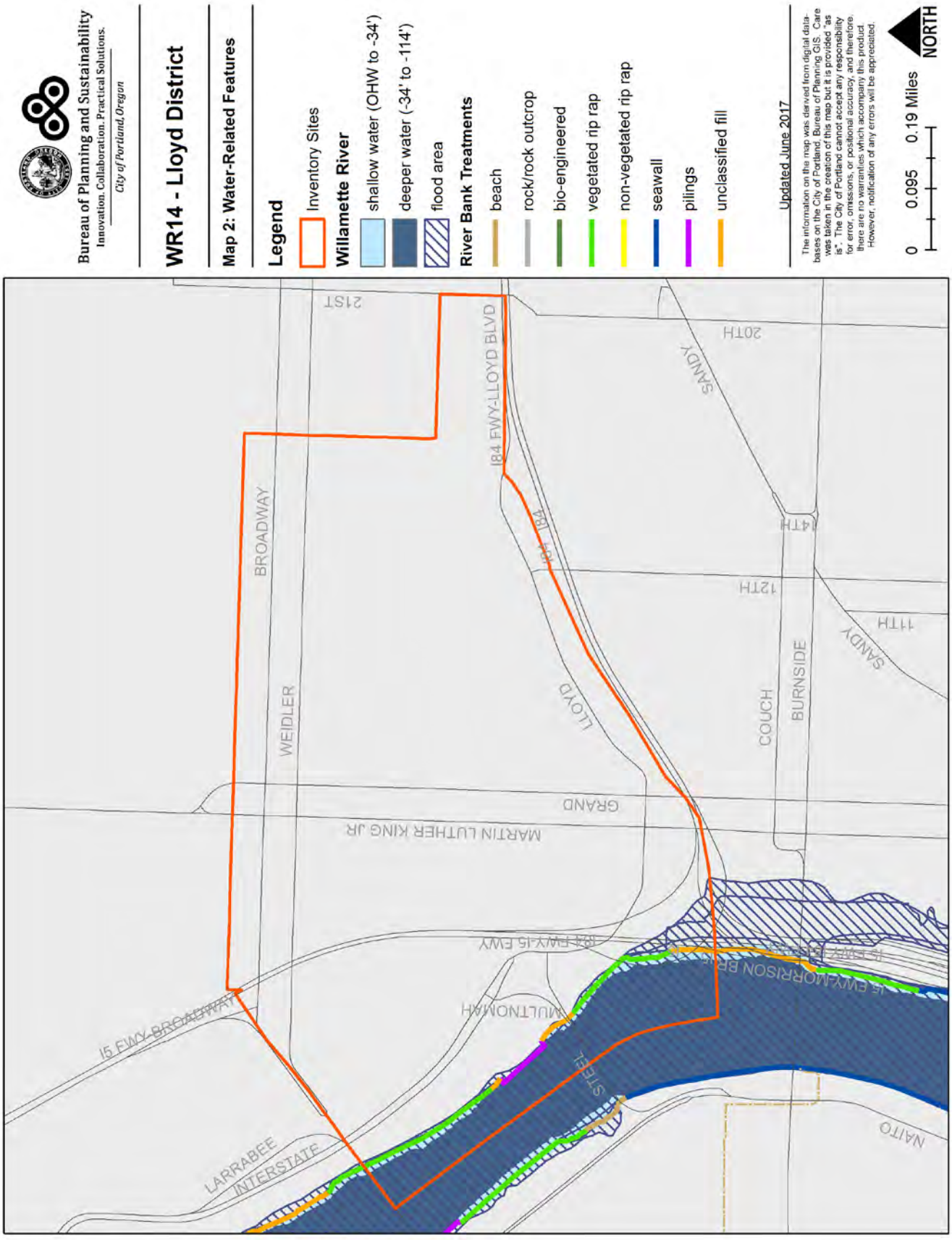
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WR14 - Lloyd District
Map 2: Water-Related Features
Legend
Inventory Sites
Willamette River
shallow water (OHW to -34')
deeper water (-34' to -114')
flood area
River Bank Treatments
beach
rock/rock outcrop
bio-engineered
vegetated rip rap
non-vegetated rip rap
seawall
pilings
unclassified fill
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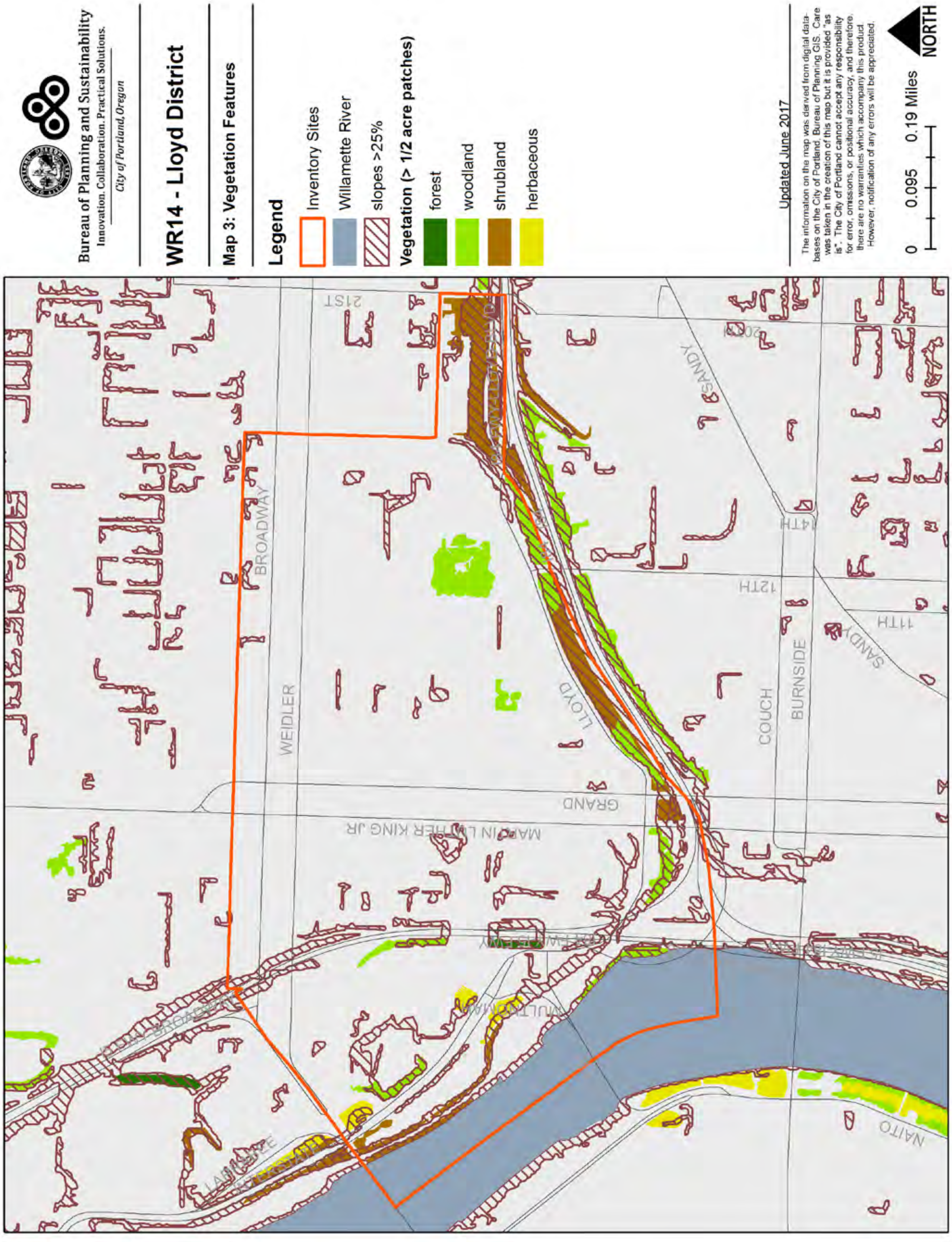
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City of Portland, Oregon
WR14 - Lloyd District
Map 3: Vegetation Features
Legend
Inventory Sites
Willamette River
slopes >25%
Vegetation (> 1/2 acre patches)
forest
woodland
shrubland
herbaceous
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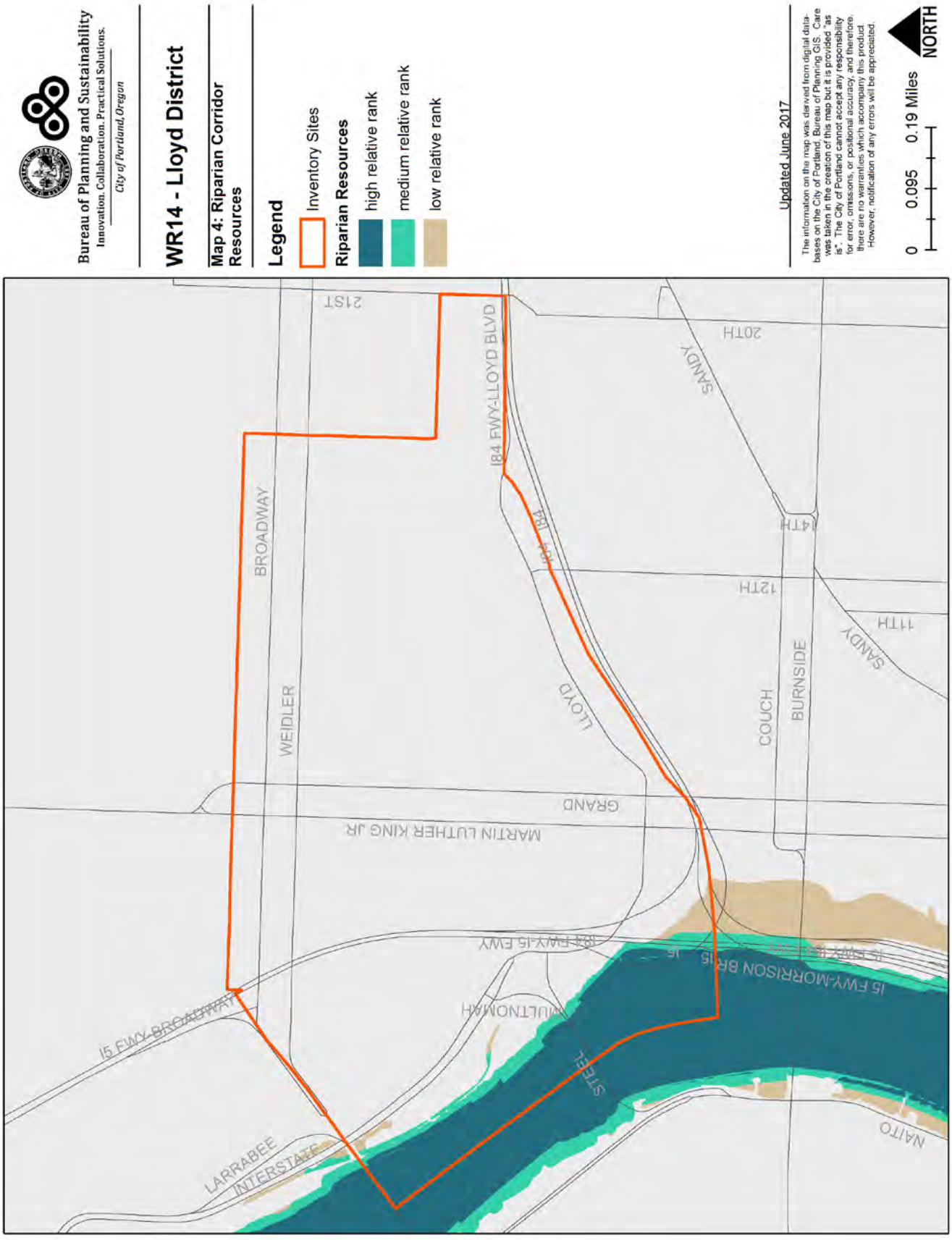
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WR14 - Lloyd District
Map 4: Riparian Corridor Resources
Legend
Inventory Sites
Riparian Resources
high relative rank
medium relative rank
low relative rank
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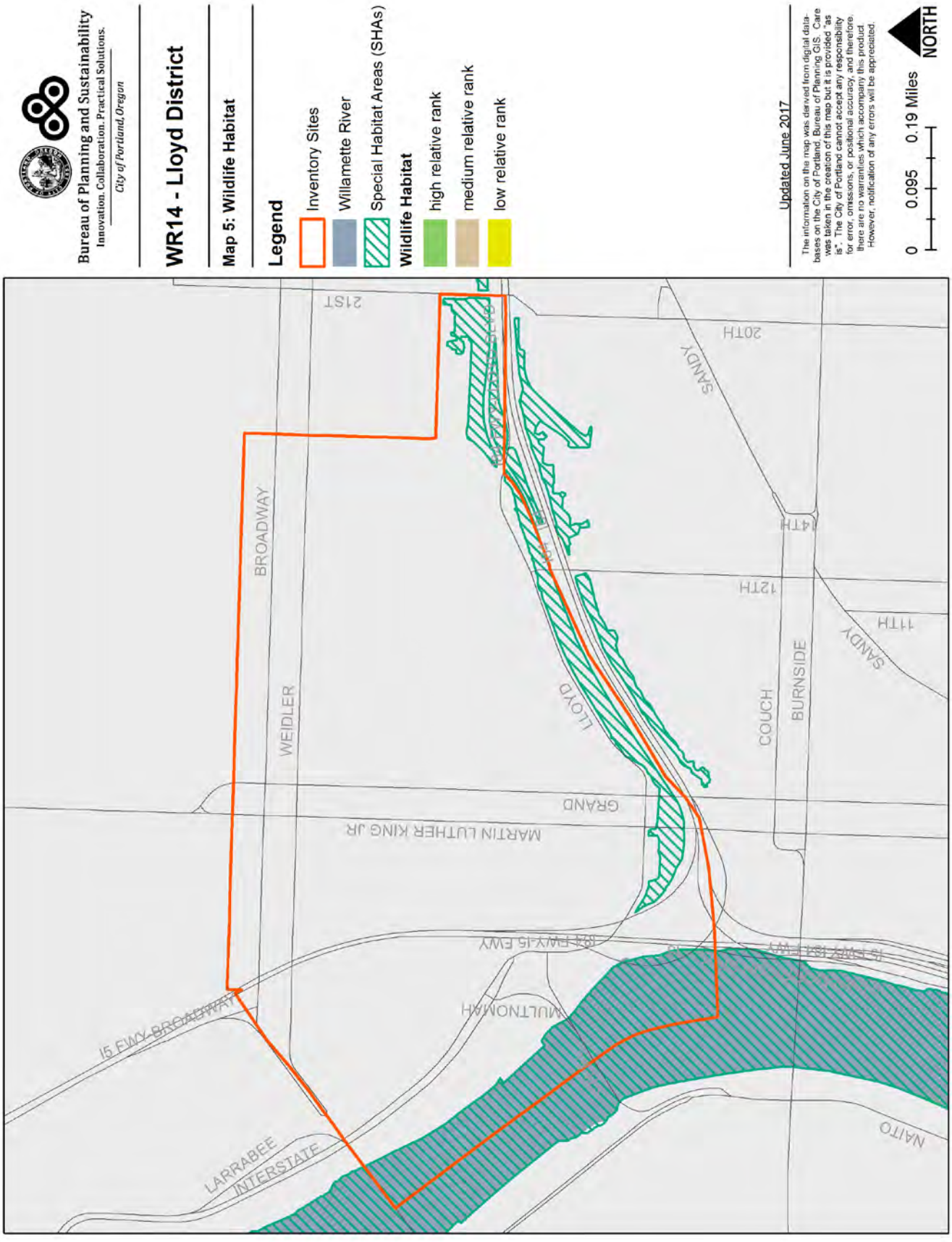
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WR14 - Lloyd District
Map 5: Wildlife Habitat
Legend
Inventory Sites
Willamette River
Special Habitat Areas (SHAs)
Wildlife Habitat
high relative rank
medium relative rank
low relative rank
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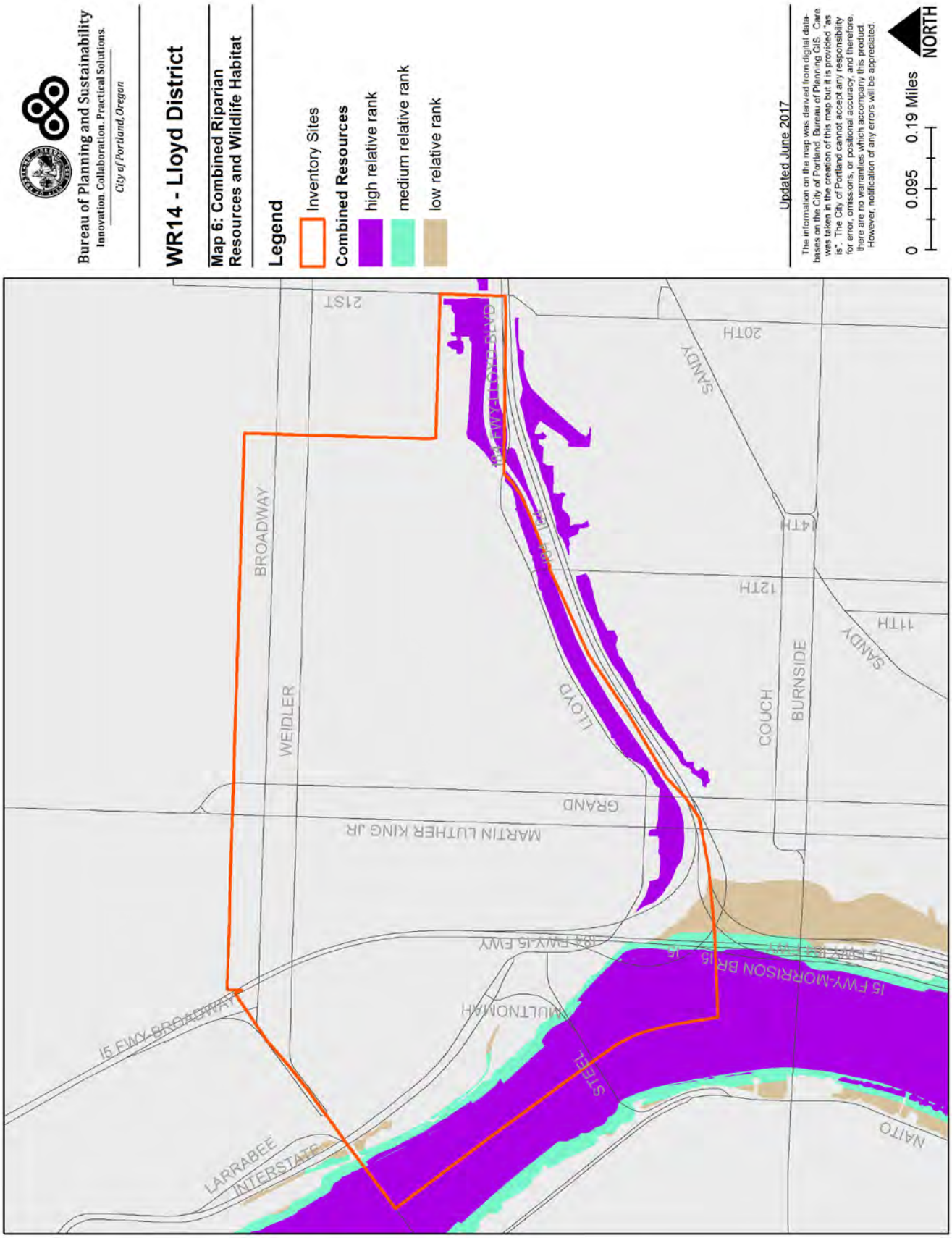
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WR14 - Lloyd District
Map 6: Combined Riparian Resources and Wildlife Habitat
Legend
Inventory Sites
Combined Resources
high relative rank
medium relative rank
low relative rank
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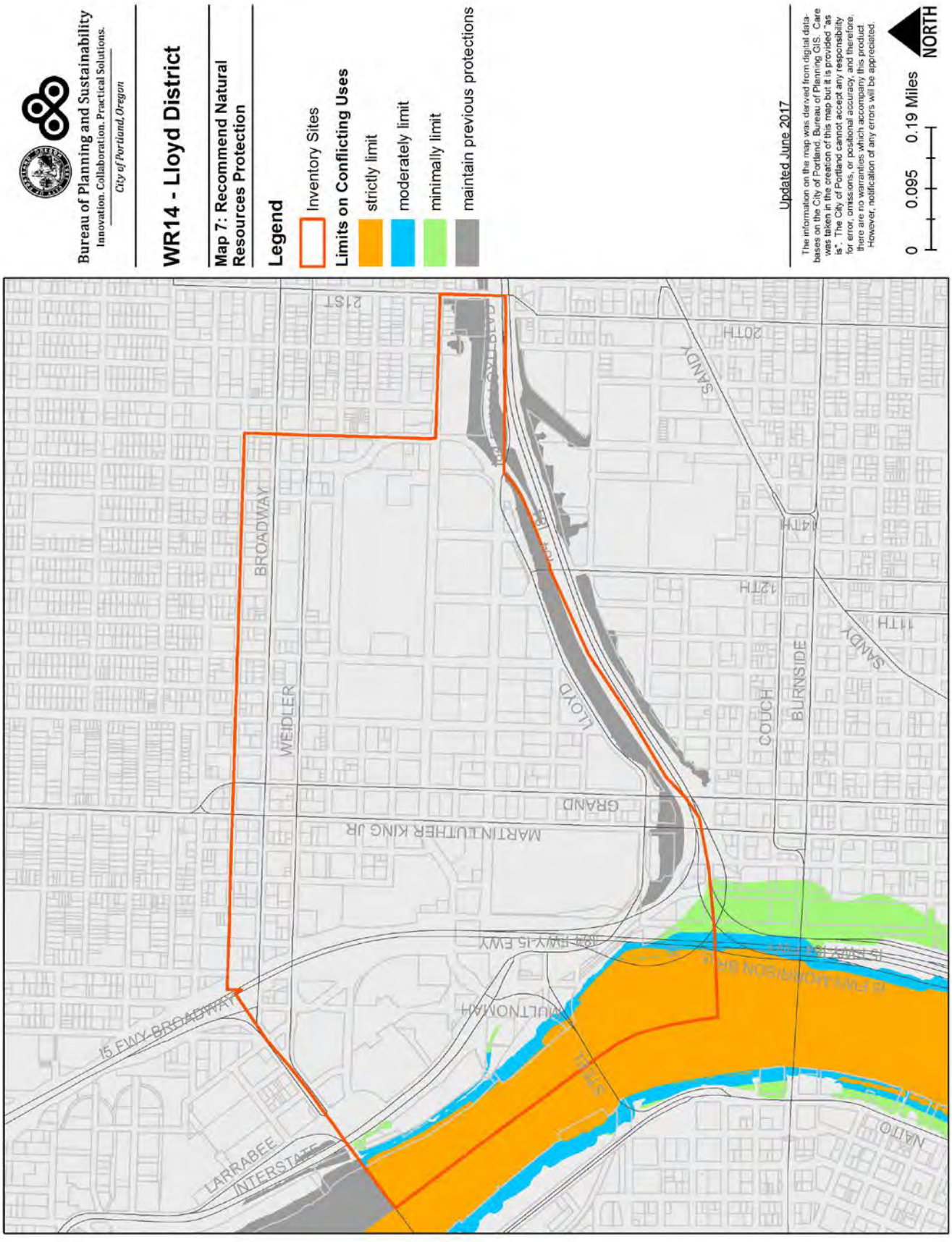
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WR14 - Lloyd District
Map 7: Recommend Natural Resources Protection
Legend
Inventory Sites
Limits on Conflicting Uses
strictly limit
moderately limit
minimally limit
maintain previous protections
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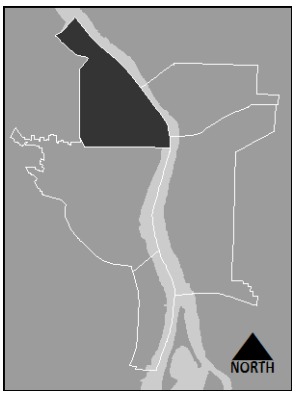
Inventory Site WR15 - River District

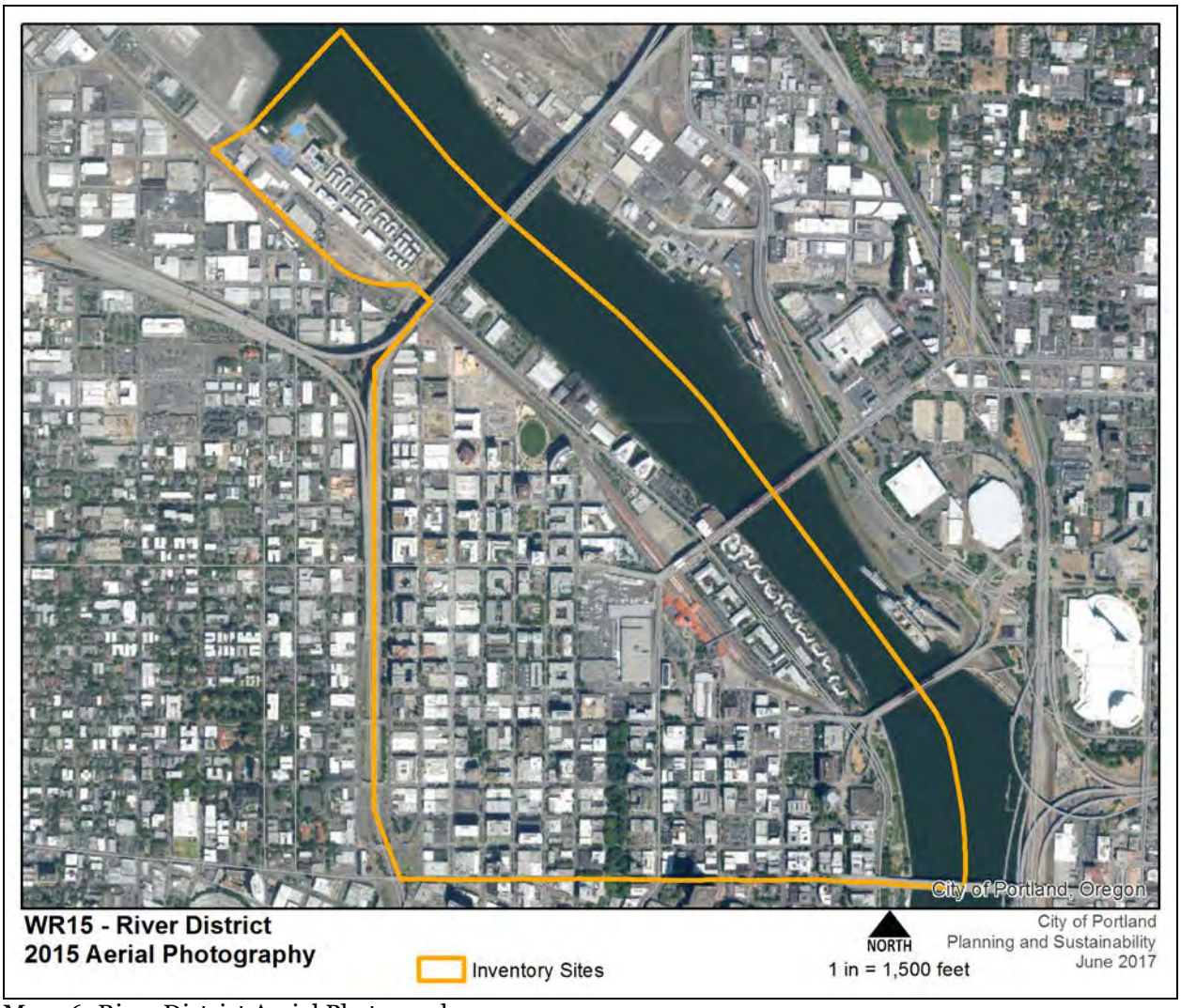


Summary Information

Watershed:	Willamette River Watershed
Neighborhood:	Northwest District, Pearl, Old Town/Chinatown
USGS Quadrangle and Quarter Section Maps:	1N1E28D, 1N1E27C, 1N1E33A, 1N1E33B, 1N1E34A, 1N1E34B, 1N1E34C, 1N1E34D
River Mile:	10.5 – 12.3
Site Size:	675 acres (land and water)
Previous Inventory:	Lower Willamette River Wildlife Habitat Inventory, March 1986
Zoning:	Central Employment (EX) Central Multi-dwelling Residential (RX) Central Commercial (CX) Heavy Industrial (HI) Open Space(OS)
Existing Land Use:	Commercial, residential, industrial, parks and open space, railroad, freeway
General Description:	This site is a mix of primarily residential and commercial uses. Along the Willamette River, there are newly-developed, multi-family residential, condominiums with some surrounding vegetation. The North Park Blocks are located in the southern portion of the site. There are rail lines and four bridges within the site.
Resource Features:	Open water, shallow water habitat, river bank, flood plain, riparian vegetation
Resource Functions:	Microclimate and shade; stream flow moderation and water storage; bank function and sediment, nutrient and pollution control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; wildlife habitat and movement corridor
Special Habitat Area:	Willamette River: (S) – provides habitat for at-risk wildlife species; (C) – wildlife connectivity corridor; (M) – migratory stopover habitat
Special Status Species:	Fish: Lower Columbia River Chinook salmon, Columbia River chum salmon, lower Columbia River steelhead trout, Pacific lamprey
Natural Hazards:	Flood area, wildfire, landslide
Contamination:	Yes
Recommended Protections:	Strictly Limit – Willamette River, riverbanks below top-of-bank and high ranked resources above top-of-bank Limit – Floodplain (undeveloped and developed) and medium ranked resources above top-of-bank and developed floodplain

Site Description

This 489-acre site is located from the Willamette River centerline westward, between the Balch Creek outfall on the north, I-405 on the west and the Burnside Bridge on the south. The site developed primarily with commercial and residential uses. As a result of development, most of the connections between the few remaining pockets of forested upland habitat and the river bank have been eliminated. The shoreline is defined by banks of vegetated and non-vegetated riprap, unclassified fill and seawall. Map 16 shows the aerial view of the River District inventory site.



Map 16: River District Aerial Photography

The site contains 280 acres (41 percent) impervious surface coverage, including 23 miles of road. Of the vegetated areas at least ½ acre in size, there are approximately 5 acres of forest and woodland vegetation, 1 acre of shrubland and 4 acres of herbaceous vegetation. There are 136 acres of flood area on this site (City of Portland, 2002), most of which is the Willamette River (105 acres). The remaining flood area on land is largely developed.

Table 12: Summary of Natural Resource Features in WR15 - River District	
	Study Area (miles/acres)
River (miles/acres)	2/107
Stream/Drainageway (miles)	0
Wetlands (acres)	0
Flood Area (acres)*	
Vegetated (acres)	2
Non-vegetated (acres)	30
Open Water** (acres)	105
Vegetated Areas >= ½ acre (acres)+	
Forest (acres)	0
Woodland (acres)	5
Shrubland (acres)	1
Herbaceous (acres)	4
Impervious Surfaces (acres)	280

* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.
** Open Water includes portions of the Willamette River.
+ 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 2008 aerial photography.

Natural Resource Description

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. Today, the River District is a largely-developed landscape. The predominant existing natural resources are the Willamette River, including the flood area and vegetation along the banks. Elements of the built environment also provide natural resource functions, including street trees, ecoroofs and vegetated landscaping.

The natural resources description is divided into sections that focus on habitat types:

- Open Water and Flood Area
- River Banks and Riparian Vegetation
- North Park Blocks
- Landscape Vegetation and Street Trees

<u>Open Water and Flood Area</u>
The Willamette River historically experienced seasonal and periodic flooding. These floods maintained mudflats, off-channel streams, lakes and wetlands. As develop occurred in the district, the floodplain was filled in and the riverbank built up to keep high flows within the river channel. However, flood events continue to top the bank.

While floods are most often thought of in terms of the impact on property, infrastructure and safety, undeveloped floodplains provide critical important habitat. By eliminating seasonal flooding and reducing periodic flooding, the habitat forming and maintaining functions of floods are eliminated. Floodplain habitats, including riparian forests, have disappeared.

Below is a summary of the existing Lower Willamette River in inventory site WR15. Inventory site WR15 includes 107 acres of the Lower Willamette River. The river is the primary habitat linkage providing

connectivity to upstream and downstream aquatic habitats. This linkage is critical for supporting salmonids, migrating birds and other species.

Active dredging has produced a uniform channel with little diversity. Although limited to very small pockets, nearshore, undeveloped shallow water habitats still exist in several areas along the river bank. Shallow water areas provide habitat for migrating fishes, including federally-listed salmonids.

The Willamette River is the primary migration corridor for ESA-listed upper Willamette River Chinook salmon and steelhead trout; and lower Columbia River Chinook salmon, coho salmon, and steelhead trout. These fish enter the Lower Willamette River system both as opportunistic migrants to forage the annual shad run and to spawn in reaches throughout the Willamette watershed. Anadromous fish depend on resources in the Central Reach at various times of the year; their presence is usually predictable:

- Juvenile salmon and steelhead are present year-round; outmigration generally peaks between March and July.
- Spring Chinook outmigration peaks in April.
- Winter steelhead, fall Chinook and Coho salmon outmigration peaks in May and June.
- White sturgeon generally move from the Columbia River estuary into the Willamette River in the spring and summer.
- Pacific lamprey adults move into the lower Willamette River between May and August, with a peak in June.

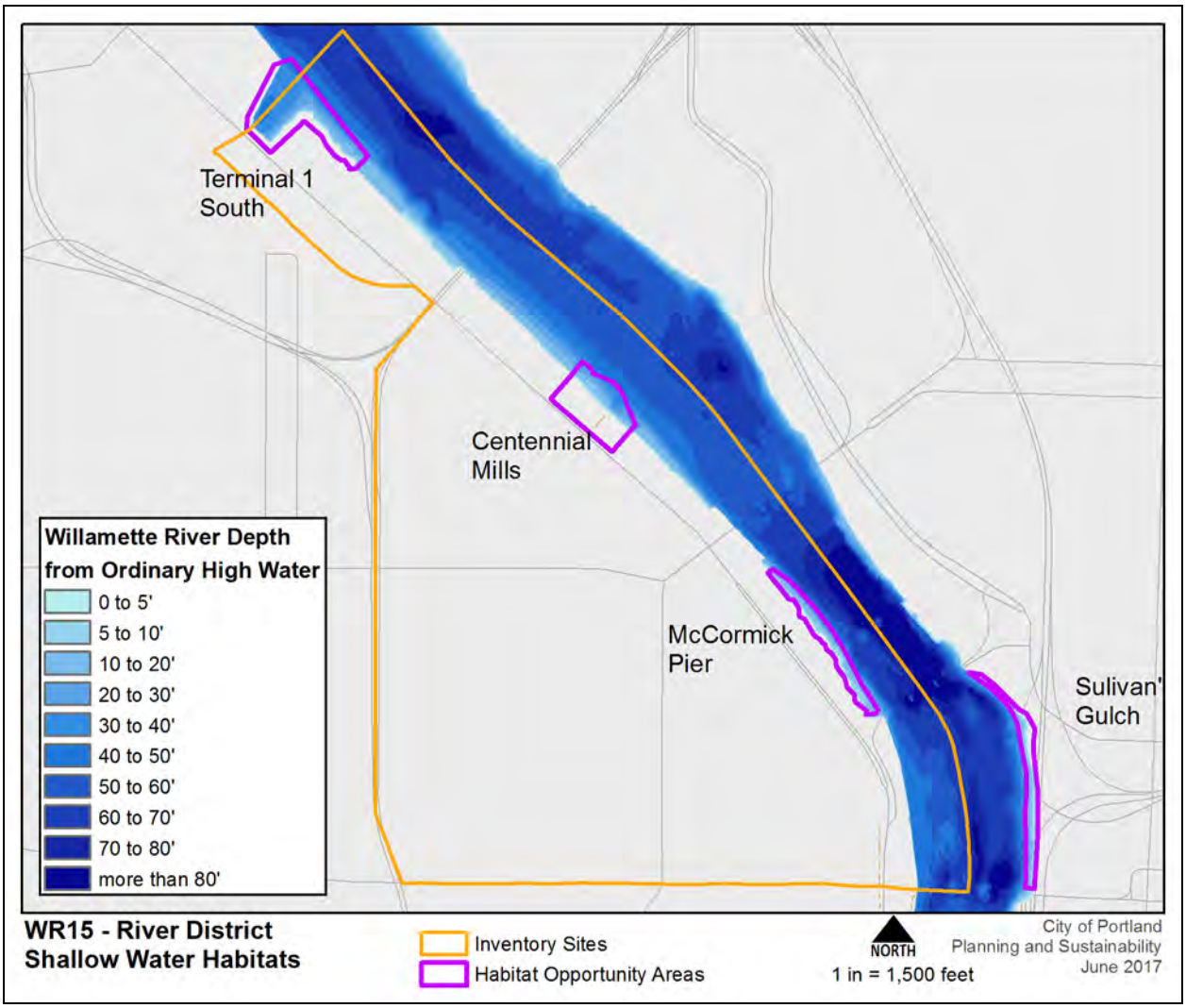
Columbia eulachon pass through the lower Columbia and Willamette rivers as opportunistic migrants as well. Adults return to their natal river every winter; however, their out-migration timing is not as well documented.

White sturgeon are distributed throughout the Lower Willamette River, including the Central Reach. White sturgeon are not currently listed at the state or federal level; however ODFW published a Conservation Plan for white sturgeon because their population is in distress (ODFW, 2011).

Pacific lamprey also inhabit the Central Reach. The Willamette River is one of the most important production areas for Pacific lamprey in the entire Columbia River Basin (ODFW, 2002). The sand and small-sized gravel substrate in the Lower Willamette River is used by lamprey juveniles for rearing before migration out to the ocean. The Central Reach is also a vital migratory corridor for adults returning to spawning grounds.

Resident fish assemblages within this reach include both native and non-native species that both support and prey upon native salmonids. These species include natives such as largescale sucker, sculpin (prickly and reticulate), redside shiner and northern pikeminnow. Nuisance species include large and smallmouth bass, asian carp and several varieties of perch.

There are three notable shallow water habitats in site WR15: (1) Terminal 1 South, (2) Centennial Mills and (3) McCormick Pier (Map 17).



Map 17: River District Shallow Water Habitats

The Terminal 1 South, located in the northwestern portion of the site, is a small, shallow water area associated with confluence of Balch Creek. River depths range from approximately -10 feet to -38 feet below ordinary high water (NAVD88 vertical datum). The substrate is primarily muddy sand.

The Centennial Mills site, including the adjacent Mounted Police Unit barn, is approximately 4.3 acres in size. Tanner Creek, once an open stream that flowed from the forested hills to Couch Lake, is now piped beneath the site and discharges along the banks. As a result of the Tanner Creek Stream Diversion Project, stormwater and overflow sewage were separated from the pipe and a series of stormwater treatment facilities constructed upstream. The result of removing sewage and treating surface runoff improved the water quality discharging to the Willamette River at Centennial Mills. The Tanner Creek Water Quality Characterization (City of Portland, 2011) found that current water quality of the discharge is supportive of aquatic species. The sediments along this stretch are sand and muddy sand.


Centennial Mill Bank

McCormick Pier includes roughly 300 to 400 feet of sandy beach shoreline. Although the sandy beach is small, it is a rare feature within the Willamette River Central Reach. There is a limited thin strip of shallow water along this site that expands slightly in the area near the beach. On a site visit in spring 2011, an osprey was observed perched on an in-water structure at the pier. A second was observed soaring over the river.


McCormick Pier Bank

Inventory site WR15 is part of the Pacific Flyway and is used by over 200 resident and migratory bird species, including iconic species such as great blue heron, osprey, peregrine falcon and bald eagle. Species use the open water habitat for foraging and as a migratory corridor. Avian species also use man-made structures for perching, resting and foraging. Shallow water areas and exposed sand and mud are used by shorebirds and waterfowl. Upland trees and shrubs are used by Neotropical migratory songbirds.

The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, temperature, and various other toxics and heavy metals (see Table 13). TMDLs for bacteria and temperature, as well as a phased TMDL for mercury, were established in 2006. Oregon Water Quality Index values from 2001 to 2010 for the Lower Willamette River in Portland have been fair and the trend is steady.

Table 13: 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-round	1998, 2002	Fishing, drinking water, resident fish and aquatic life, anadromous fish passage
Heavy Metals (iron, manganese, mercury)	Year-round	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

Due to the presence of mercury, PCBs, dioxins and mainly legacy pesticides (DDT, dieldrin) in Willamette River fish tissue, a fish advisory for the mainstem recommends that people, especially pregnant or breastfeeding women, limit or avoid consuming fatty fish such as carp, bass and catfish. There is no restriction on the consumption of salmon or steelhead. The Lower Willamette River in Portland is deemed unsafe for swimming during and immediately after sewer overflows as a result of larger storm events. However, since 2011, such overflows are exceedingly rare (about one every three years) during the summer recreating season.

In the inventory site, the flood area is generally confined to the Willamette River itself, but the flood area extends onto developed and vacant lands between the Fremont and Broadway bridges. The developed flood plain provides the function of water storage during events like the 1996 flood.

River Banks and Riparian Vegetation

This site was historically industrialized, resulting in a highly modified river channel, bank and nearshore areas. Wharves and piers extending out from the channel and bulkheads and riprap revetments armor the riverbank.

There is little riparian vegetation except in landscaped areas around development. There are some riparian trees just south of the Fremont Bridge, near the Tanner Creek outfall. There are some low-structure vegetation and a few trees south of the Steel Bridge in the northern portion of Willamette Park.

Riparian vegetation in the inventory site is a mix of native, non-native and invasive plants, including cottonwood, Oregon Ash, Himalayan blackberry and Scott's broom. Native plant species generally provide a broader suite of benefits, such as varied wildlife food sources and effective slope stabilization. However, all plants, including non-native and invasive species, provide important watershed functions, such as water storage, nutrient cycling and cover and nesting opportunities for wildlife.

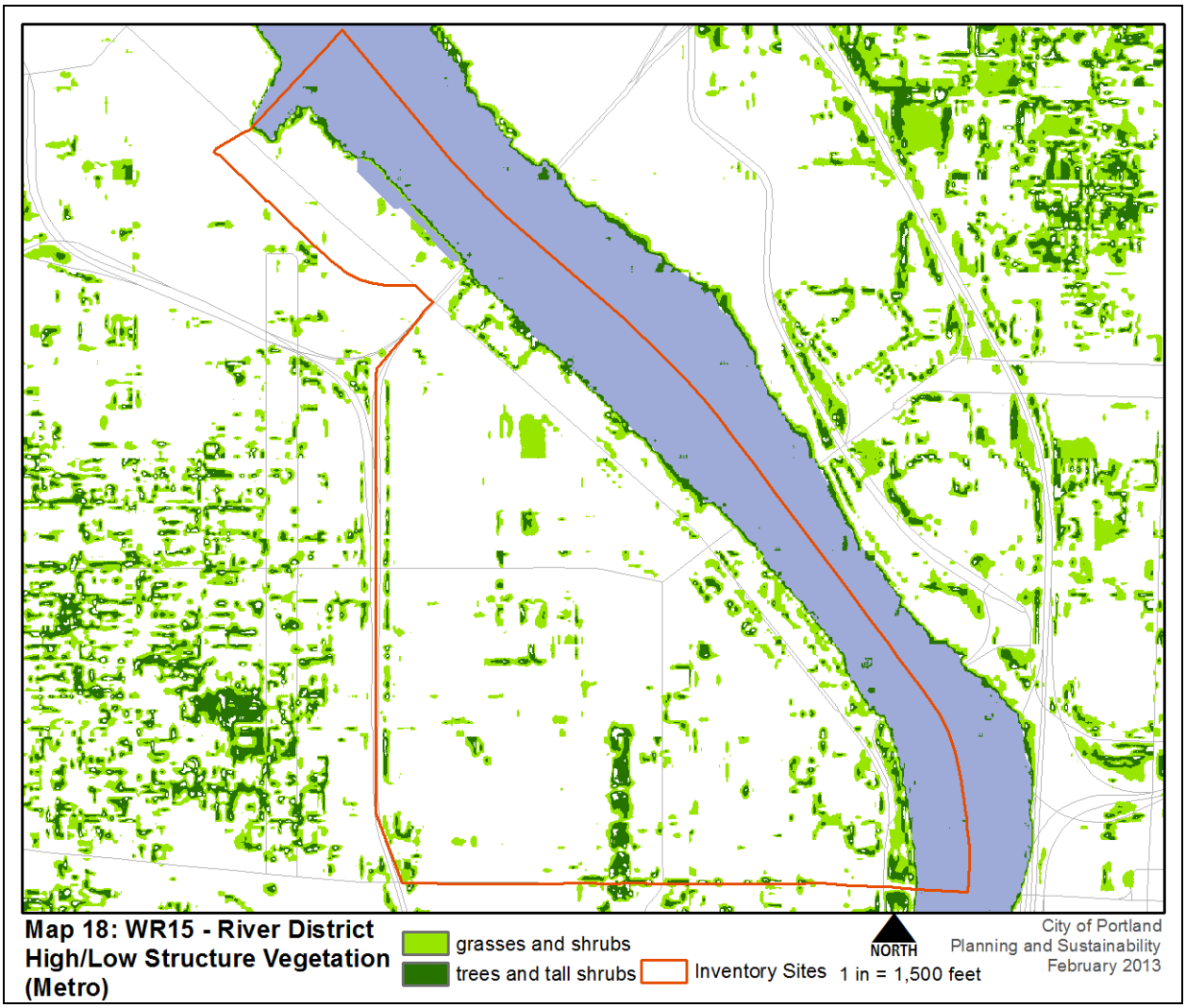
Due to extensive development, armored river banks and limited remnant riparian vegetation, wildlife use is limited in this site. During a spring 2011 site visit, a nesting osprey was observed on a dolphin in the Willamette River (photo).

North Park Blocks

The North Park Blocks are located between Burnside Street and NW Glisan Street along NW 9th Avenue and NW Park Avenue. The park contains stands of large trees and the understory is primarily turf grass. The park is entirely surrounded by commercial and residential development and it is located far from the west hills or the Willamette River; therefore, the North Park Blocks do not provide connectivity between other habitat areas. However, Portland is on the Pacific Flyway for migratory birds, and the North Park Blocks likely provide habitat for resident birds and for migratory birds during spring and fall migration periods.

Landscape Vegetation and Street Trees

For purposes of the Natural Resources Inventory mapping and modeling, only vegetation patches at least ½ acre in size are captured. However, smaller landscaped areas and individual street trees also provide functions, including cleaning and cooling the air and water, capturing greenhouse gases, capturing and uptaking stormwater, reducing energy demand and providing wildlife habitat (Map 18: High/Low Structure Vegetation). Most of the tree canopy within the inventory site is found within the North Park Blocks.



Map 18: River District High and Low Structure Vegetation

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 14). The relative ranks are produced using GIS models and information on Special Habitat Areas.

The approach used to generate the relative ranks is summarized in the introduction to the inventory sites. Additional detail is provided in Chapter 2: Project Approach and Methodology Overview and Appendix E: Natural Resources Inventory: Riparian Corridors and Wildlife Habitat Project Report.

All of the ranked resource areas provide at least some important riparian and habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can inform planning projects and programs, including regulations, design of development or redevelopment projects, and mitigation and restoration activities.

Riparian Areas

The site contains the Willamette River, and river bank, flood area and riparian vegetation. These features contribute to the riparian functions as detailed in the natural resource descriptions, specifically:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank functions, 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 itself. High and medium relative functional ranks are assigned to vegetated, non-hardened river banks or flood areas. Low relative ranks are generally assigned to non-vegetated flood area and hardened, non-vegetated river banks.

Wildlife Habitat

Within the context of this inventory model, a wildlife habitat patch is defined as forest and/or wetland areas 2 acres in size or greater, including adjacent woodland vegetation (note: Special Habitat Areas may be smaller and may contain different types of vegetation or other resource features). The model assigns relative ranks to qualifying habitat patches based on their size, interior area, proximity to other patches and proximity to water.

Site WR15 contains no forests and/or wetland areas 2 acres or larger in size.

Special Habitat Areas (SHA) consist of rare and declining habitat types and unique features that provide critical habitat for at-risk plant and animal species 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, and include:

- Willamette River, including shallow water habitat areas, are designated SHA because they meet the following criteria:
  (S) – An at-risk species uses the habitat area or feature on more than an incidental basis to complete one or more life history phases
  (M) – Migratory stopover habitat
  (C) – Wildlife connectivity corridor

Combined Relative Riparian/Wildlife Habitat Ranking
Where areas that are 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.

Table 14: Summary of Ranked Resources in WR15 - River District

Total Inventory Site = 489				
	High	**Medium**	**Low**	**Total**
Riparian Resources*				
acres	109	17	21	148
percent total inventory site area	22	4	4	30
Wildlife Habitat				
Wildlife Habitat*				
acres	0	0	0	0
percent total inventory site area	0	0	0	0
Special Habitat Areas**				
acres	104			
percent total inventory site area	21			
Wildlife Habitat - adjusted by Special Habitat Areas***				
acres	104	0	0	104
percent total inventory site area	21	0	0	21
Combined Total***				
acres	109	19	21	148
percent total inventory site area	22	4	4	30

* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include the Willamette River.
** Special Habitat Areas rank high for wildlife habitat.
*** Because riparian resources, Special Habitat Areas, and wildlife habitat overlap, the results cannot be added together to determine the combined results.

Natural Resource Protection Recommendation

The Willamette River and associated floodplain and riparian areas in resource site WR15 have been significantly reduced in extent, simplified and degraded over time. The remaining natural resource areas are fragmented and impacted by adjacent development. However, the natural resource areas also provide the remaining habitat for fish and wildlife that reside in and migrate through this highly urbanized environment. The importance of the remaining natural resource areas is underscored by the relationship to the regional ecosystem and migration corridors.

In addition to being a significant area for fish and wildlife; the River District is an important and unique area for employment, commerce, transportation, housing, social services, civic engagement and recreation.

The general recommendation, shown on Map 7, balances the environmental, economic and social consequences of protecting natural resources. The resource site is a highly developed area and impacts from conflicting uses cannot be fully avoided. Allowing some future development in natural resource area is inevitable, particularly development associated with utilities and public infrastructure. However, conflicting uses should be limited overall.

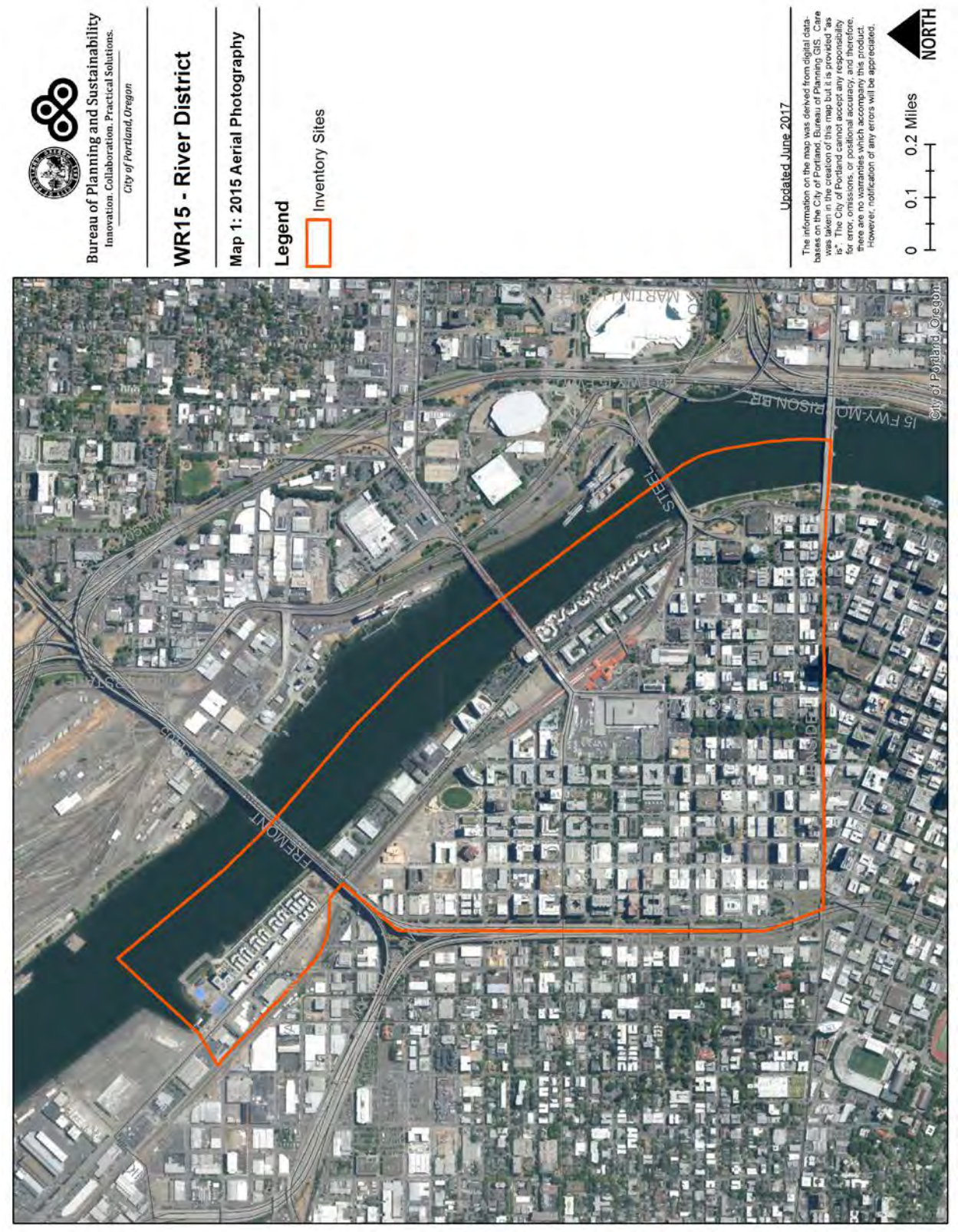
The recommendation for riparian areas is to:

1. Provide the highest level of protection by strictly limiting conflicting uses within areas of high ranked natural resources, including land and water located below the top of bank of the Willamette River, tributaries o the river and land within the undeveloped floodplain.
2. Provide a moderate level of protection by limiting conflicting uses within medium ranked riparian areas.

3. Provide a minimum level of protection by limiting conflicting uses with the developed floodplain, which typically receives a low rank.
4. Allow conflicting uses within low ranked natural resource areas outside of the floodplain.

The recommendation for wildlife habitat areas outside of riparian areas is to:

1. Maintain the current level of protections applied by previously adopted natural resources protection and management plans or through Title 11, Trees.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City of Portland, Oregon
WR15 - River District
Map 1: 2015 Aerial Photography
Legend
Inventory Sites
Updated June 2017
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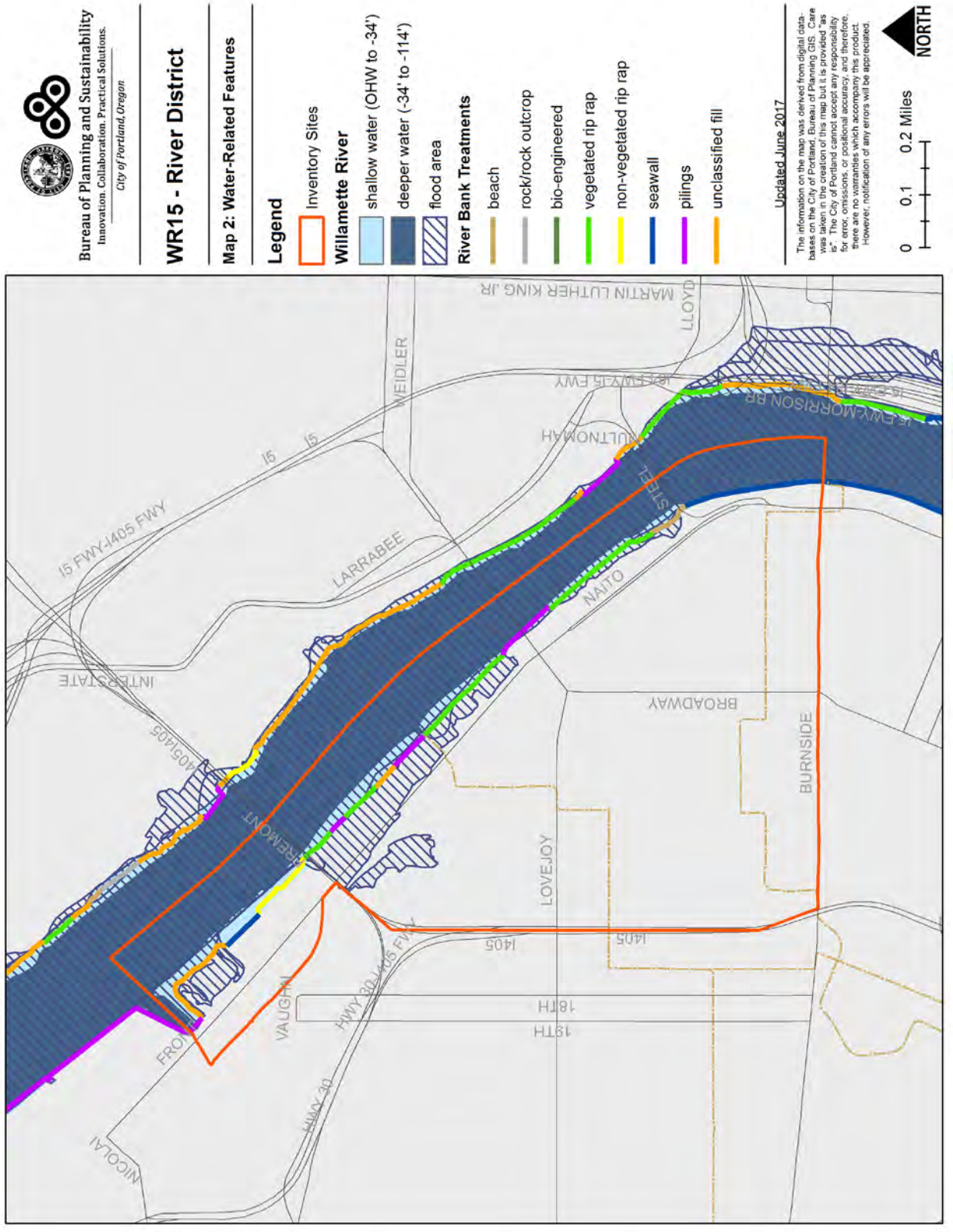
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WR15 - River District
Map 2: Water-Related Features
Legend
Inventory Sites
Willamette River
shallow water (OHW to -34')
deeper water (-34' to -114')
flood area
River Bank Treatments
beach
rock/rock outcrop
bio-engineered
vegetated rip rap
non-vegetated rip rap
seawall
pilings
unclassified fill
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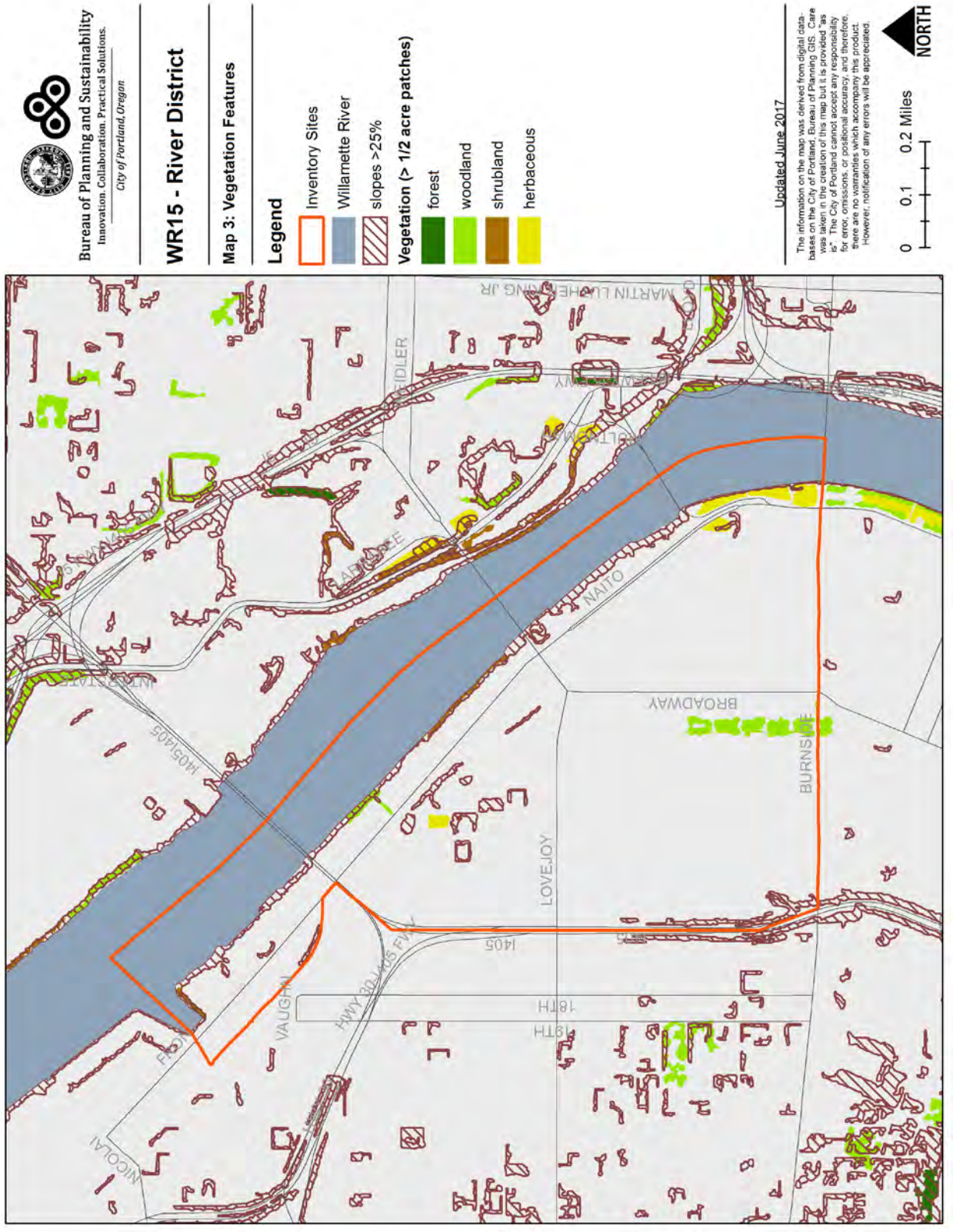
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City of Portland, Oregon
WR15 - River District
Map 3: Vegetation Features
Legend
Inventory Sites
Willamette River
slopes >25%
Vegetation (> 1/2 acre patches)
forest
woodland
shrubland
herbaceous
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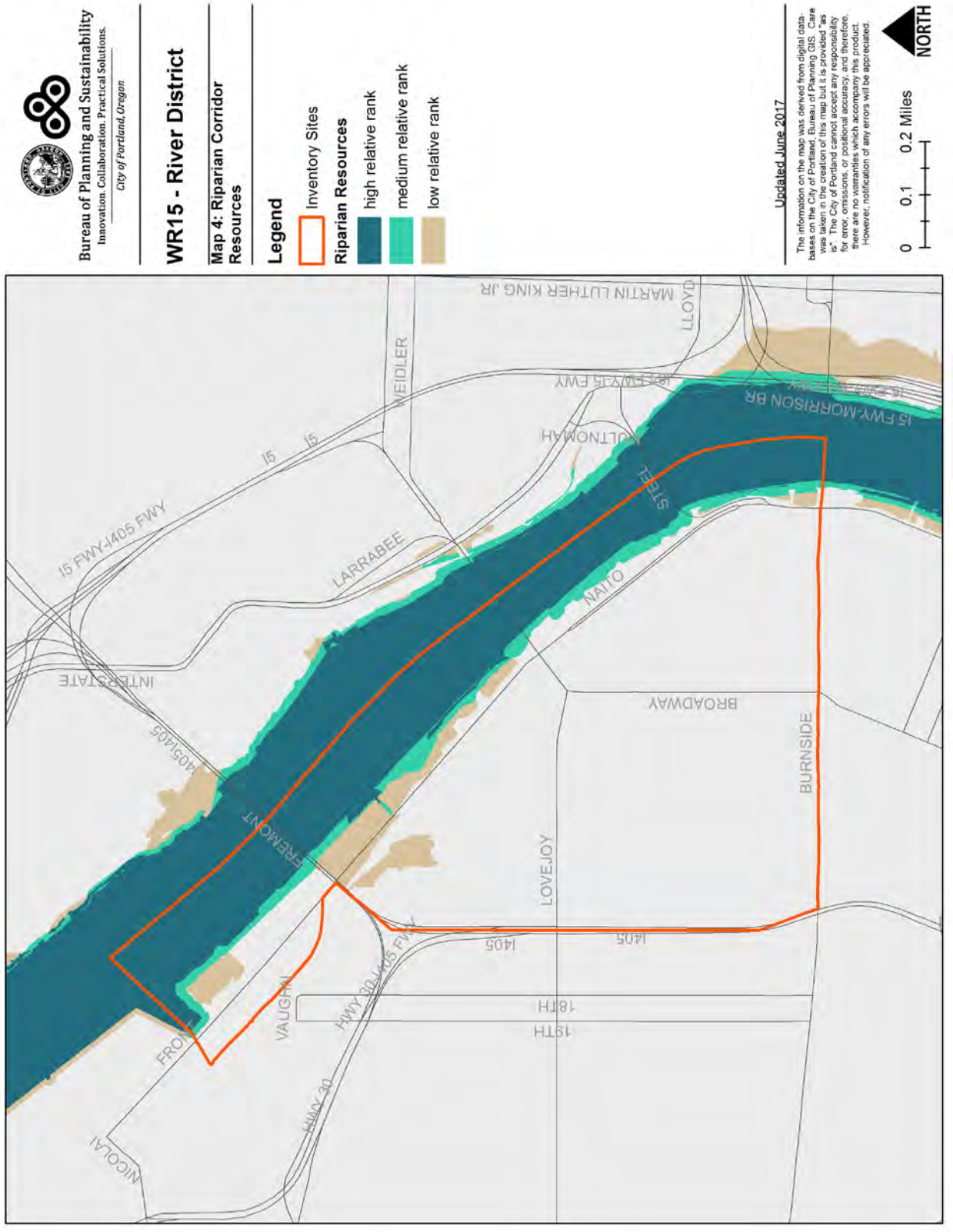
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WR15 - River District
Map 4: Riparian Corridor Resources
Legend
Inventory Sites
Riparian Resources
high relative rank
medium relative rank
low relative rank
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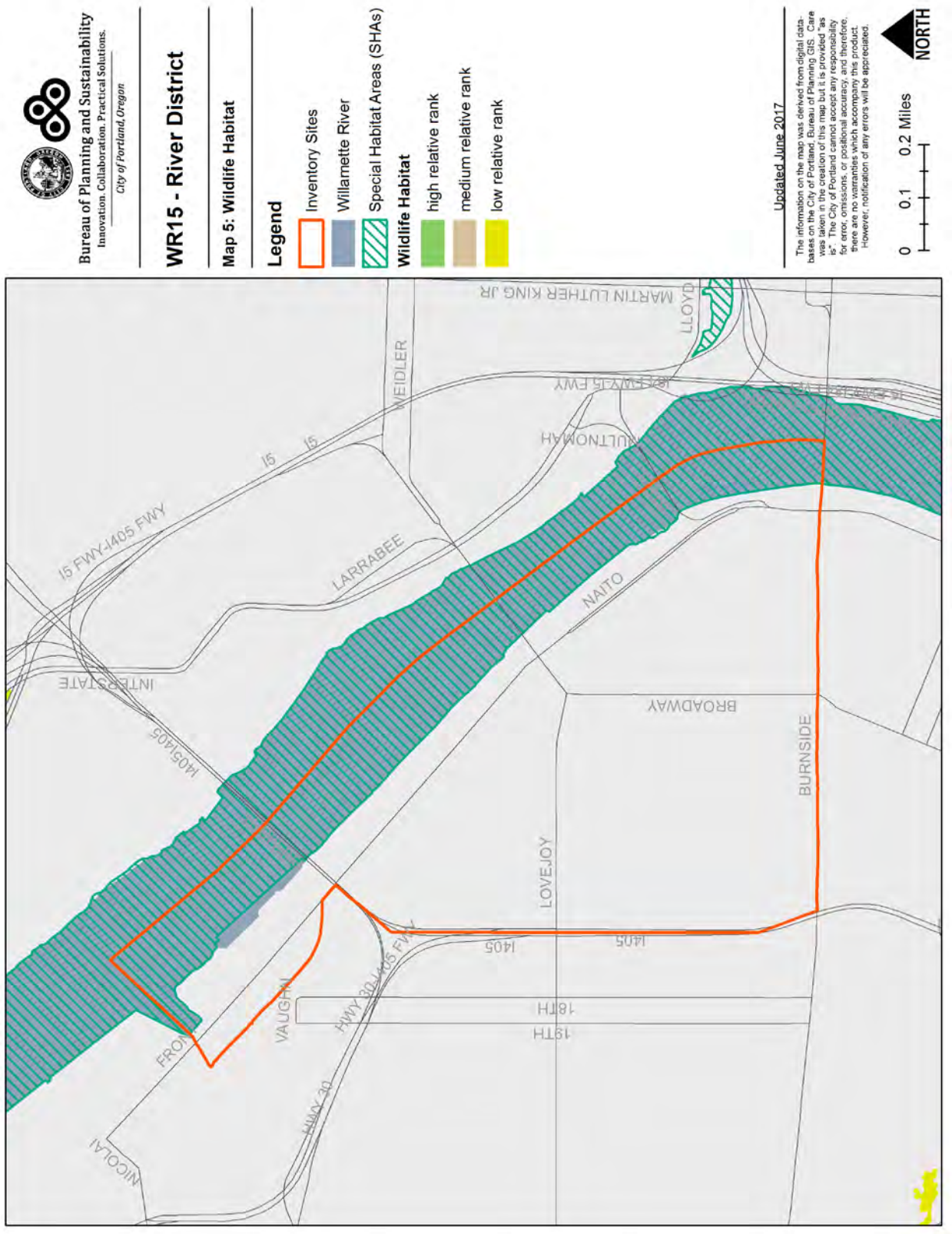
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WR15 - River District
Map 5: Wildlife Habitat
Legend
Inventory Sites
Willamette River
Special Habitat Areas (SHAs)
Wildlife Habitat
high relative rank
medium relative rank
low relative rank
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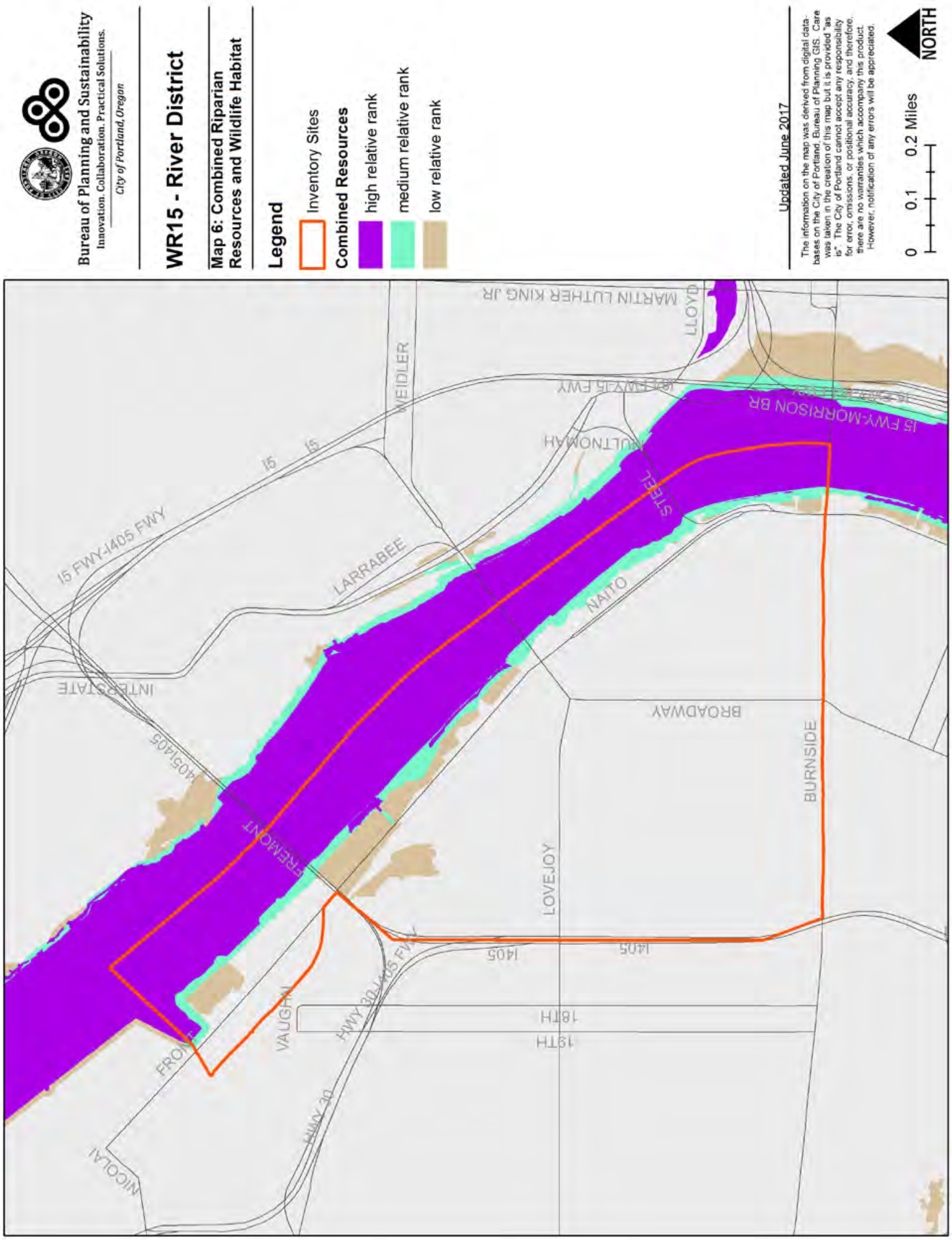
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WR15 - River District
Map 6: Combined Riparian Resources and Wildlife Habitat
Legend
Inventory Sites
Combined Resources
high relative rank
medium relative rank
low relative rank
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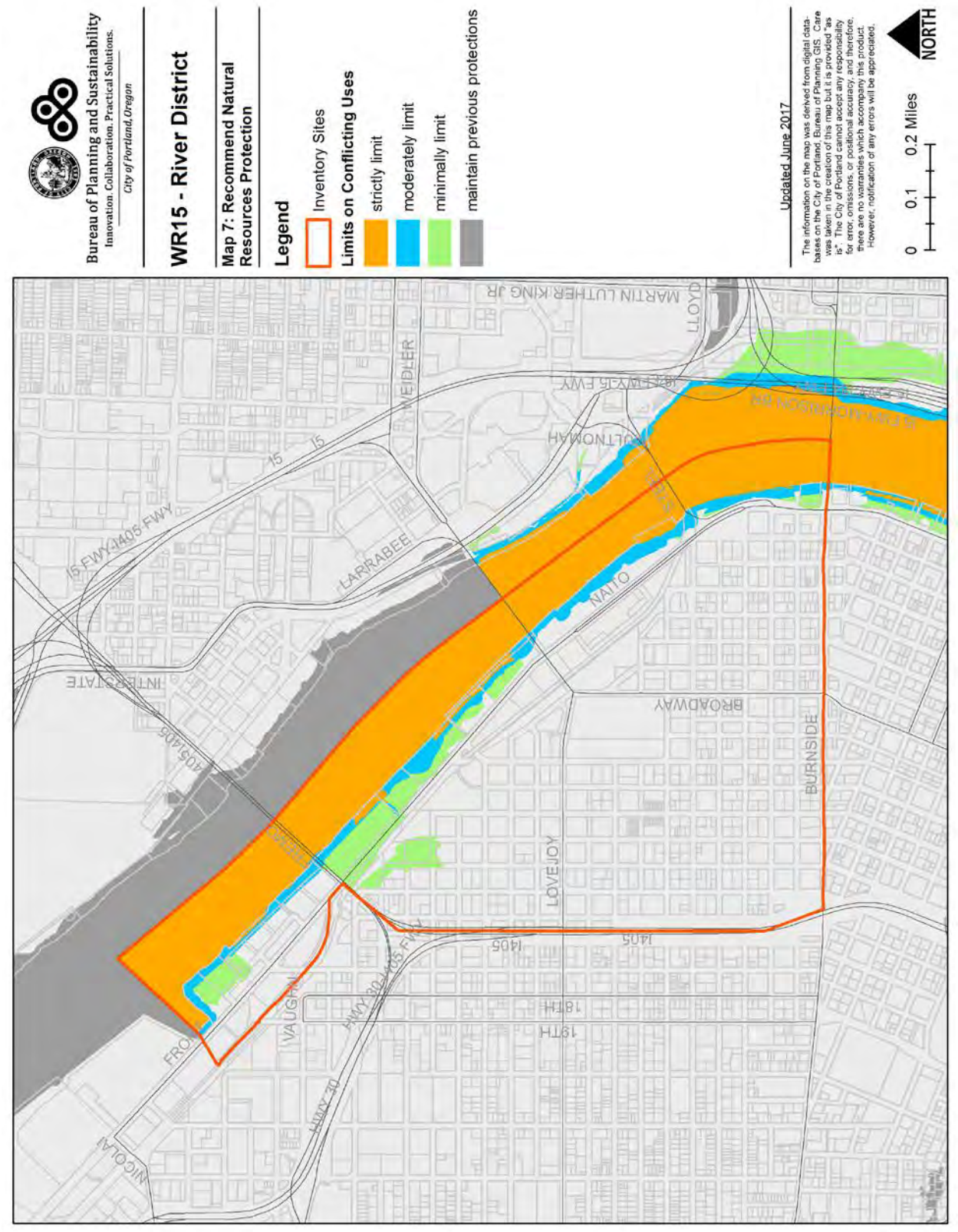
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Map 7: Recommend Natural Resources Protection
Legend
Inventory Sites
Limits on Conflicting Uses
strictly limit
moderately limit
minimally limit
maintain previous protections
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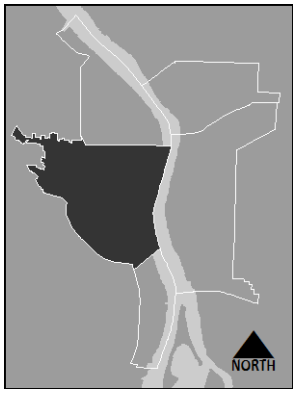
Inventory Site WR16 - Downtown District

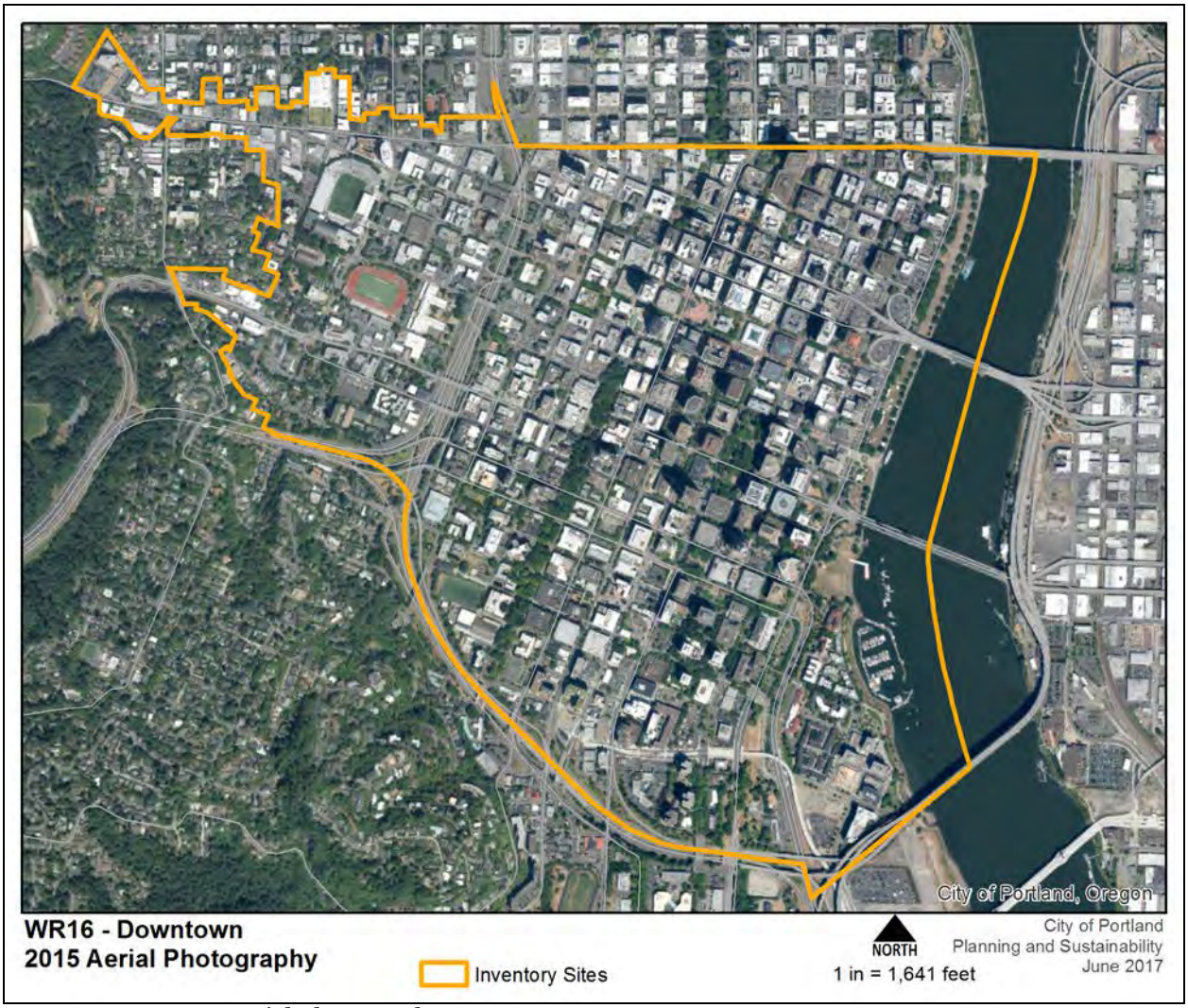


Summary Information

Watershed:	Willamette River Watershed
Neighborhood:	Downtown, Goose Hollow, Old Town/ Chinatown
USGS Quadrangle and Quarter Section Maps:	1N1E33c, 1N1E33d, 1N1E34c, 1N1E34d, 1S1E03a, 1S1E03b, 1S1E03c, 1S1E03d, 1S1E04a, 1S1E04b, 1S1E04d, 1S1E10b
River Mile:	12.3 – 13.4
Site Size:	778 acres (land and water)
Previous Inventory:	Lower Willamette River Wildlife Habitat Inventory, March 1986
Zoning:	Central Commercial (CX) Central Multi-dwelling Residential (RX) High Density Multi-dwelling Residential (RH) Central Employment (EX) Open Space (OS)
Existing Land Use:	Downtown commercial, residential, parks and open space, university, freeway
General Description:	This site is a mix of primarily commercial, residential and open space uses. The Willamette River frontage is occupied by public parks and a marina. The South Park Blocks are located in the central to southern portion of the site. The I-405 loop extends around the southern edge of the site and exits through the north end of the site. There are four bridges in the site: Burnside, Morrison, Hawthorne and Marquam. The foot of the West Hills extends down to the western edge of the site.
Resource Features:	Open water, shallow water habitat, river bank, flood plain, riparian vegetation
Resource Functions:	Microclimate and shade; stream flow moderation and water storage; bank function, and sediment, nutrient, pollution control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; wildlife habitat and movement corridor
Special Habitat Area:	Willamette River: (S) – provides habitat for at-risk wildlife species; (C) – wildlife connectivity corridor; (M) – migratory stopover habitat
Special Status Species:	Fish: Lower Columbia River Chinook salmon, Columbia River chum salmon, lower Columbia River steelhead trout, Pacific lamprey
Natural Hazards:	Flood area, landslide
Contamination:	Yes
Recommended Protections:	Strictly Limit – Willamette River, riverbanks below top-of-bank and high ranked resources above top-of-bank Limit – Floodplain (undeveloped and developed) and medium ranked resources above top-of-bank and developed floodplain

Site Description

This 812-acre site is located between the Burnside Bridge to the north, I-405 on the south and the foot of the West Hills on the west. The site is developed primarily with commercial, residential and open space uses. The shoreline extends from Waterfront Park to Riverplace Marina**.** Map 19 shows the aerial view of the Downtown District inventory site. As a result of development, most of the connections between the forested upland habitat of the West Hills and the river have been eliminated. The South Park Blocks offer limited wildlife habitat as do landscape and street trees.



Map 19: Downtown Aerial Photography

The site contains 407 acres (52 percent) of impervious surface coverage, including 45 miles of road. Of the vegetated areas over ½ acre in size, there are approximately 43 acres of forest and woodland vegetation and 17 acres of herbaceous vegetation. There are 87 acres of flood area on this site (City of Portland, 2002), most of which is the Willamette River (76 acres). The remaining flood area on land is largely developed.

Table 15: Summary of Natural Resource Features in WR16 - Downtown District	
	Study Area (mile/acres)
River (miles/acres)	1/76
Stream/Drainageway (miles)	0
Wetlands (acres)	0
Flood Area (acres)*	
Vegetated (acres)	4
Non-vegetated (acres)	8
Open Water** (acres)	76
Vegetated Areas >= ½ acre (acres)+	
Forest (acres)	3
Woodland (acres)	40
Shrubland (acres)	0
Herbaceous (acres)	17
Impervious Surfaces (acres)	407

* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.
** Open Water includes portions of the Willamette River.
+ 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 2008 aerial photography.

Natural Resource Description

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. Today, the Downtown District is a largely developed landscape. The predominant existing natural resource is the Willamette River, including the flood area and vegetation along the banks. Elements of the built environment also provide limited natural resource functions, including street trees, ecoroofs and vegetated landscaping.

The natural resources description is divided into sections that focus on habitat types:

- Open Water and Flood Area
- River Banks and Riparian Vegetation
- South Park Blocks
- Landscape Vegetation and Street Trees

<u>Open Water</u>
Below is a summary of the Lower Willamette River in inventory site WR16. Additional information about the water quality, hydrology, and fish and wildlife use of the Willamette River is provided in Section 3.c: The Central City.

Inventory site WR16 includes 75 acres of the Lower Willamette River. The river is the primary habitat linkage providing connectivity to upstream and downstream aquatic habitats. This linkage is critical for supporting salmonids, migrating birds and other species.

Historic dredging and bank hardening has produced a uniform channel with little diversity. Near-shore, shallow water habitats still exist along the river bank in the southern portion of the site. Shallow water areas provide habitat for migrating fishes, including federally-listed salmonids.

The Willamette River is the primary migration corridor for ESA-listed upper Willamette River Chinook salmon and steelhead trout; and lower Columbia River Chinook salmon, coho salmon, and steelhead trout. These fish enter the Lower Willamette River system both as opportunistic migrants to forage the annual shad run and to spawn in reaches throughout the Willamette watershed. Anadromous fish depend on resources in the Central Reach at various times of the year; their presence is usually predictable:

- Juvenile salmon and steelhead are present year-round; outmigration generally peaks between March and July.
- Spring Chinook outmigration peaks in April.
- Winter steelhead, fall Chinook and Coho salmon outmigration peaks in May and June.
- White sturgeon generally move from the Columbia River estuary into the Willamette River in the spring and summer.
- Pacific lamprey adults move into the lower Willamette River between May and August, with a peak in June.

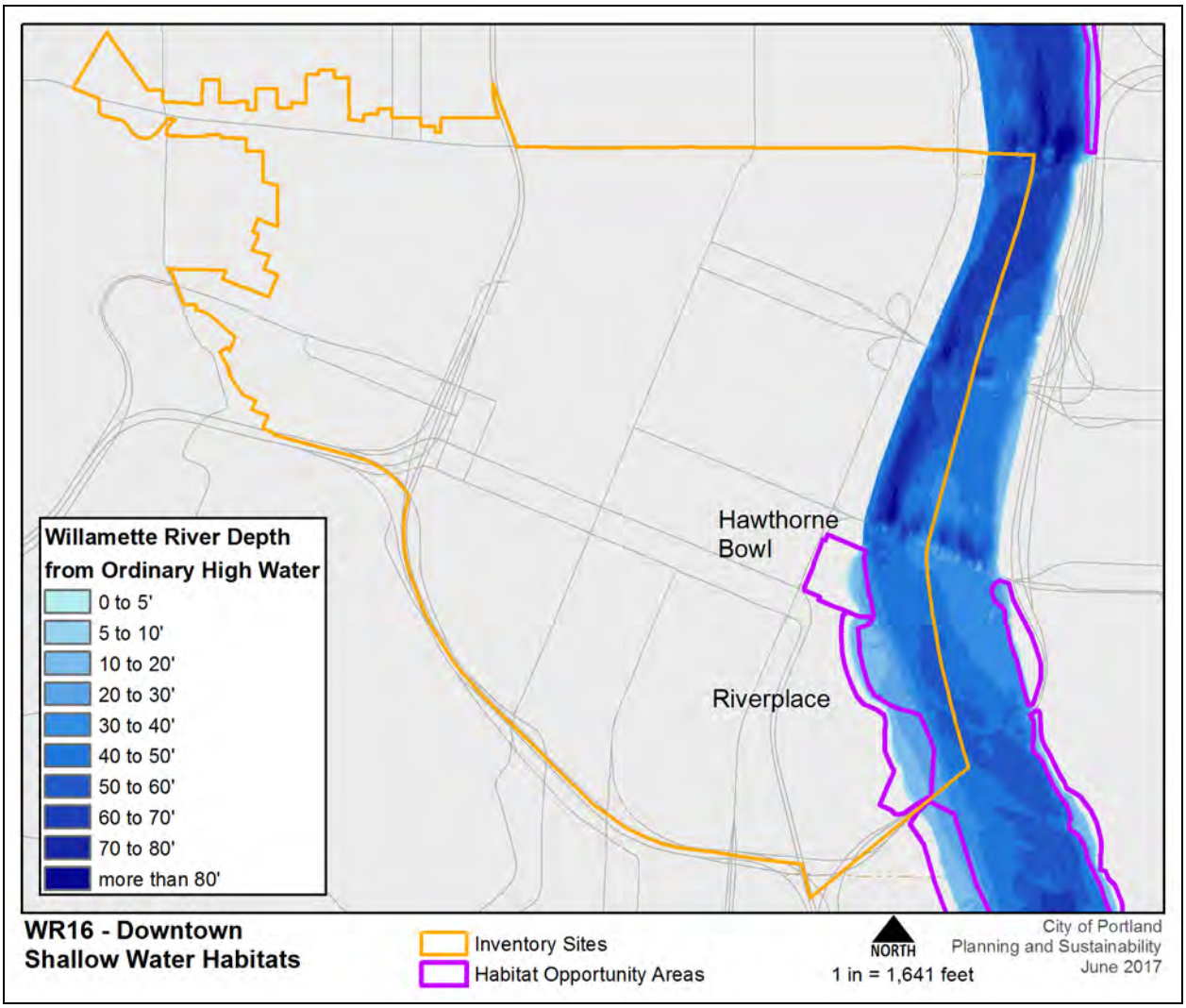
Columbia eulachon pass through the lower Columbia and Willamette rivers as opportunistic migrants as well. Adults return to their natal river every winter; however, their out-migration timing is not as well documented.

White sturgeon are distributed throughout the Lower Willamette River, including the Central Reach. White sturgeon are not currently listed at the state or federal level; however ODFW published a Conservation Plan for white sturgeon because their population is in distress (ODFW, 2011).

Pacific lamprey also inhabit the Central Reach. The Willamette River is one of the most important production areas for Pacific lamprey in the entire Columbia River Basin (ODFW, 2002). The sand and small-sized gravel substrate in the Lower Willamette River is used by lamprey juveniles for rearing before migration out to the ocean. The Central Reach is also a vital migratory corridor for adults returning to spawning grounds.

Resident fish assemblages within this reach include both native and non-native species that both support and prey upon native salmonids. These species include natives such as largescale sucker, sculpin (prickly and reticulate), redside shiner and northern pikeminnow. Nuisance species include large and smallmouth bass, asian carp and several varieties of perch.

There are two notable shallow water habitats in site WR16: (1) Willamette Park Bowl and (2) Riverplace (Map 20).



Map 20: Downtown Shallow Water Habitats

The Waterfront Park Bowl is a slight embayment with gradually sloping banks down to the river. The banks below ordinary high water are gravel and sand, which provide habitat for macroinvertebrates and shorebirds, and maintained lawn above the riprap. Below the riprap and gravel is a muddy/sandy beach. A concrete overlook and the Hawthorne Bridge demark the downstream edge of the embayment. The upstream edge is comprised of non-vegetated riprap. A narrow area of shallow water exists at the downstream end near the seawall, and widens at the upstream end. Sediments at the site are predominantly muddy sand.

Riverplace is a slight embayment just south of Waterfront Park Bowl and is developed with a marina, docks and a restaurant. The concave banks are mostly non-vegetated and vegetated riprap. A few trees grow along the top of the bank. Vegetation is a mix of native plant species, including Douglas spirea, red osier dogwood, salal and Oregon grape, and non-native species. Buildings and sidewalks are present just beyond the top of bank. Wildlife observed using the riparian area includes house sparrow, stellar jay, blue heron and pigeon. The strip of shallow water is wider in this site than at most other sites within the Willamette River Central Reach. Only Eastbank Crescent has a wider area of shallow water. The sediment in the embayment is sandy mud and sand.


Riverplace

Inventory site WR16 is part of the Pacific Flyway and is used by over 200 resident and migratory bird species, including iconic species such as great blue heron, osprey, peregrine falcon and bald eagle. Wildlife use the open water habitat for foraging and as a migratory corridor. Avian species also use man-made structures for perching, resting and foraging. Shallow water areas and exposed sand and mud are used by shorebirds and waterfowl. Vegetation on the banks, including trees and shrubs, are used by Neotropical migratory songbirds.

The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, temperature, and various other toxics and heavy metals (see Table 16). TMDLs for bacteria and temperature, as well as a phased TMDL for mercury, were established in 2006. Oregon Water Quality Index values from 2001 to 2010 for the Lower Willamette River in Portland have been fair and the trend is steady.

Table 16: 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-round	1998, 2002	Fishing, drinking water, resident fish and aquatic life, anadromous fish passage
Heavy Metals (iron, manganese, mercury)	Year-round	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

Due to the presence of mercury, PCBs, dioxins and mainly legacy pesticides (DDT, dieldrin) in Willamette River fish tissue, a fish advisory for the mainstem recommends that people, especially pregnant or breastfeeding women, limit or avoid consuming fatty fish such as carp, bass and catfish. There is no restriction on the consumption of salmon or steelhead. The Lower Willamette River in Portland is deemed unsafe for swimming during and immediately after sewer overflows as a result of larger storm events. However, since 2011, such overflows are exceedingly rare (about one every three years) during the summer recreating season.


Waterfront Park

In the inventory site, the flood area is generally confined to the Willamette River itself, but the flood area extends under the Marquam Bridge and further south. The developed flood plain provides the function of water storage during events like the 1996 flood.

River Banks and Riparian Vegetation

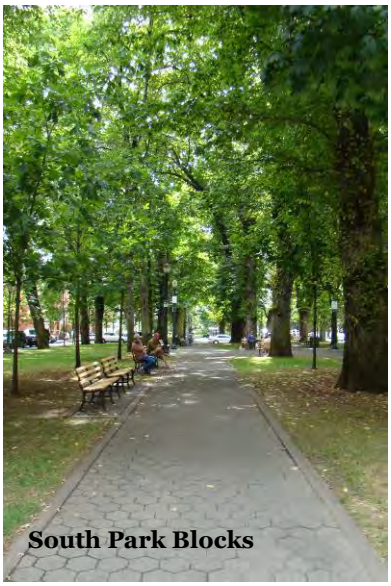
The majority of the river bank in this inventory site is a seawall along Waterfront Park. The seawall prevents bank erosion but provides few other natural resource functions. Above the seawall, the park is vegetated with turf grass and large trees. South of the Waterfront Park Bowl, the bank is non-vegetated riprap, with landscape trees above the riprap. This riparian vegetation is comprised of a mix of native, non-native and invasive plants, including cottonwood, Oregon Ash, Himalayan blackberry and Scott's broom. Native plant species generally provide a broader suite of benefits, such as varied

wildlife food sources and effective slope stabilization. However, all plants, including non-native and invasive species, provide important watershed functions, such as water storage and infiltration, organic materials, nutrient cycling, and cover and perching/nesting opportunities for wildlife.

Due to extensive development, seawall and limited remnant riparian vegetation, wildlife use is limited in this site.

South Park Blocks

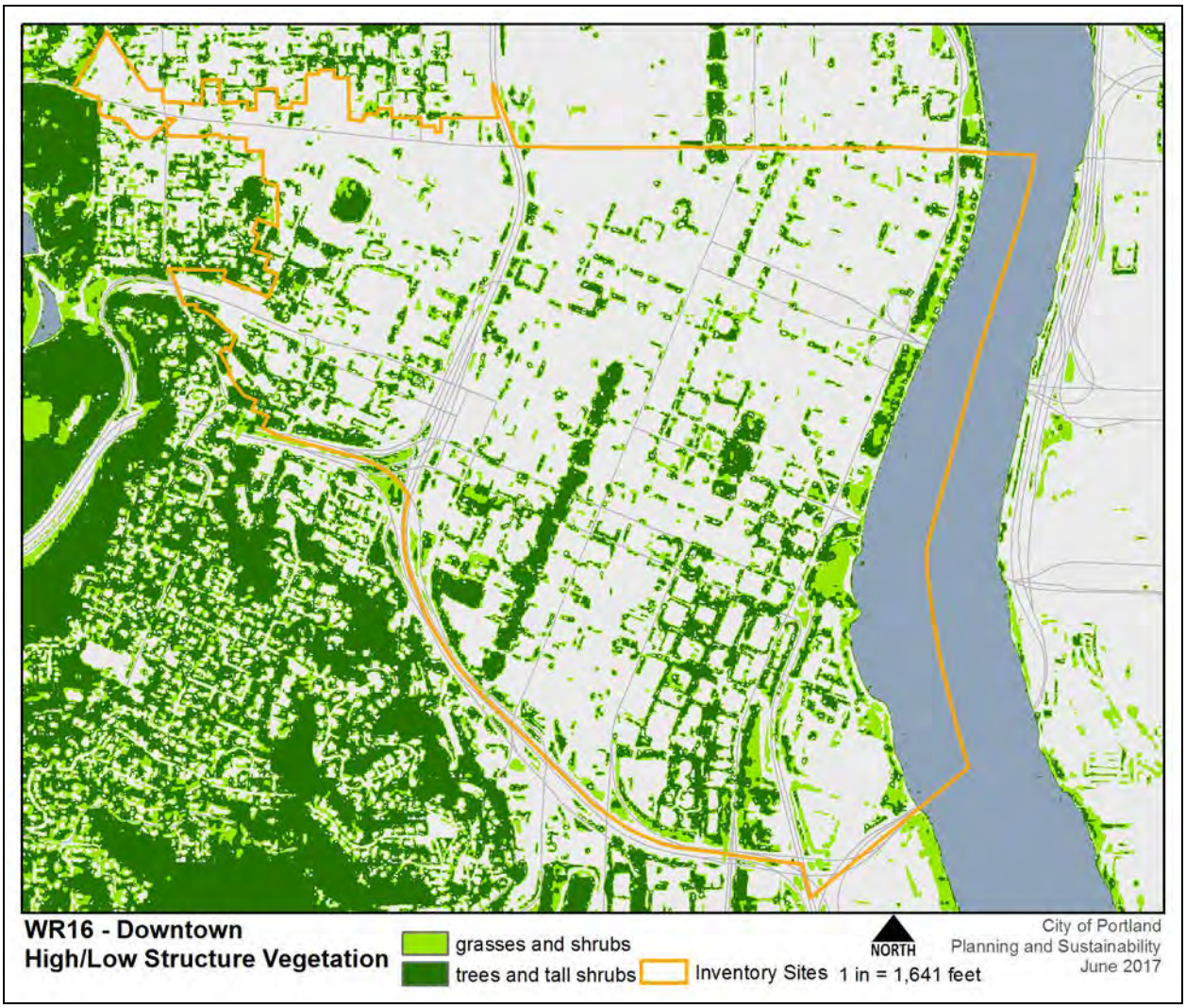
The South Park Blocks are located between I-405 and SW Salmon Street along SW 9th Avenue and SW Park Avenue. The park contains stands of large trees and the understory is primarily turf grass. The park is entirely surrounded by commercial and residential development and it is located far from the west hills or the Willamette River; therefore, the South Park Blocks do not provide connectivity between other habitat areas. However, Portland is on the Pacific Flyway for migratory birds, and the South Park Blocks likely provide habitat for resident birds and for migrating birds during the spring and fall migration periods.



South Park Blocks

Landscape Vegetation and Street Trees

For purposes of the Natural Resources Inventory mapping and modeling, vegetation patches at least ½ acre in size are captured. However, smaller landscaped areas and individual street trees also provide functions, including cleaning and cooling the air and water, capturing greenhouse gases, capturing and uptaking stormwater, reducing energy demand and providing wildlife habitat (Map 21: High/Low Structure Vegetation). The Downtown District has more tree canopy than much of the rest of the Central City planning area, particularly in Waterfront Park, the South Park Blocks and along streets.



Map 21: Downtown High and Low Structure Vegetation

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 approach used to generate the relative ranks is summarized in the introduction to the inventory sites. Additional detail is provided in Chapter 2: Project Approach and Methodology Overview of this report and Appendix E: Natural Resources Inventory: Riparian Corridors and Wildlife Habitat Project Report.

All of the ranked resource areas provide at least some important riparian and habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can inform planning projects and programs, including regulations, design of development or redevelopment projects, and mitigation and restoration activities.

Riparian Areas

The site contains the Willamette River, and river bank, flood area and riparian vegetation. These features contribute to the riparian functions as detailed in the natural resource descriptions, specifically:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank functions, 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 itself. High and medium relative functional ranks are assigned to vegetated, non-hardened river banks or flood areas. Low relative ranks are generally assigned to non-vegetated flood area and hardened, non-vegetated river banks.

Wildlife Habitat

Within the context of this inventory model, a wildlife habitat patch is defined as forest and/or wetland areas 2 acres in size or greater, including adjacent woodland vegetation (note: Special Habitat Areas may be smaller and may contain different types of vegetation or other resource features). The model assigns relative ranks to qualifying habitat patches based on their size, interior area, proximity to other patches, and proximity to water.

Site WR16 contains no forests and/or wetland areas 2 acres or larger in size.

Special Habitat Areas (SHA) consist of rare and declining habitat types and unique features that provide critical habitat for at-risk plant and animal species 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, and include:

- Willamette River, including shallow water habitat areas, are designated SHA because they meet the following criteria:
  (S) – An at-risk species uses the habitat area or feature on more than an incidental basis to complete one or more life history phases
  (M) – Migratory stopover habitat
  (C) – Wildlife connectivity corridor

Combined Relative Riparian/Wildlife Habitat Ranking
Where areas that are 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.

Table 17: Summary of Ranked Resources in WR16 - Downtown District

Total Inventory Site = 812				
	High	**Medium**	**Low**	**Total**
Riparian Resources*				
acres	80	13	13	106
percent total inventory site area	9	2	2	13
Wildlife Habitat				
Wildlife Habitat*				
acres	0	0	3	<1
percent total inventory site area	0	0	<1	<1
Special Habitat Areas**				
acres	75			
percent total inventory site area	9			
Wildlife Habitat - adjusted by Special Habitat Areas * **				
acres	75	0	3	79
percent total inventory site area	9	0	<1	10
Combined Total***				
acres	80	13	16	109
percent total inventory site area	10	2	2	14

* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include the Willamette River.
** Special Habitat Areas rank high for wildlife habitat.
*** Because riparian resources, Special Habitat Areas, and wildlife habitat overlap, the results cannot be added together to determine the combined results.

Natural Resource Protection Recommendation

The Willamette River and associated floodplain and riparian areas in resource site WR16 have been significantly reduced in extent, simplified and degraded over time. The remaining natural resource areas are fragmented and impacted by adjacent development. However, the natural resource areas also provide the remaining habitat for fish and wildlife that reside in and migrate through this highly urbanized environment. The importance of the remaining natural resource areas is underscored by the relationship to the regional ecosystem and migration corridors.

In addition to being a significant area for fish and wildlife; the Downtown District is an important and unique area for employment, commerce, transportation, housing, education, civic engagement, entertainment, social services and recreation.

The general recommendation, shown on Map 7, balances the environmental, economic and social consequences of protecting natural resources. The resource site is a highly developed area and impacts from conflicting uses cannot be fully avoided. Allowing some future development in natural resource area is inevitable, particularly development associated with utilities and public infrastructure. However, conflicting uses should be limited overall.

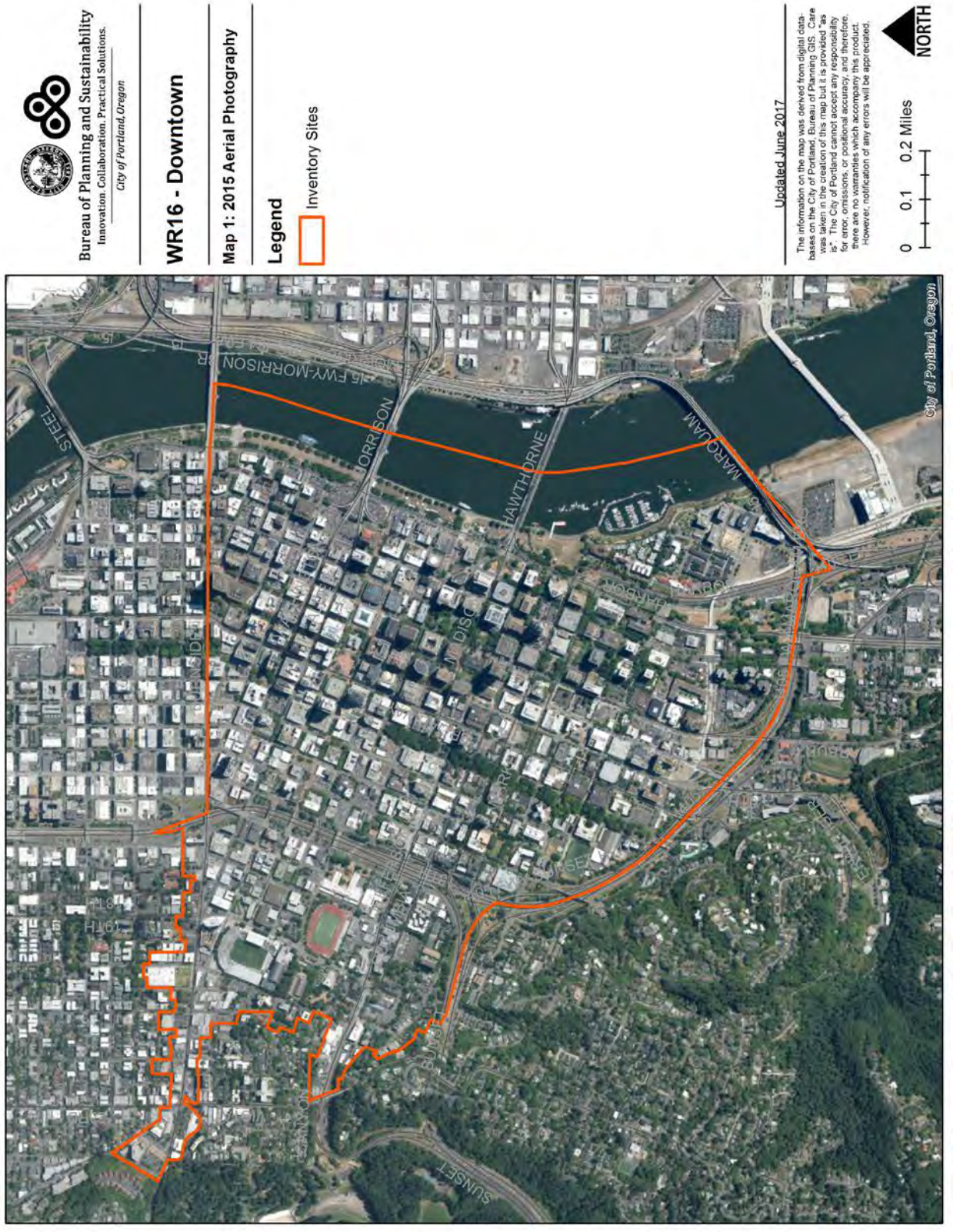
The recommendation for riparian areas is to:

1. Provide the highest level of protection by strictly limiting conflicting uses within areas of high ranked riparian areas, including area located below the top of bank of the Willamette River and its tributaries and within the undeveloped floodplain.

2. Provide a moderate level of protection by limiting conflicting uses within medium ranked riparian areas.
3. Provide a minimum level of protection by limiting conflicting uses with the developed floodplain, which typically receives a low rank.
4. Allow conflicting uses within low ranked natural resource areas outside of the floodplain.

The recommendation for wildlife habitat areas outside of riparian areas is to:

1. Maintain the current level of protections applied by previously adopted natural resources protection and management plans or through Title 11, Trees.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City of Portland, Oregon
WR16 - Downtown
Map 1: 2015 Aerial Photography
Legend
Inventory Sites
Updated June 2017
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City of Portland, Oregon
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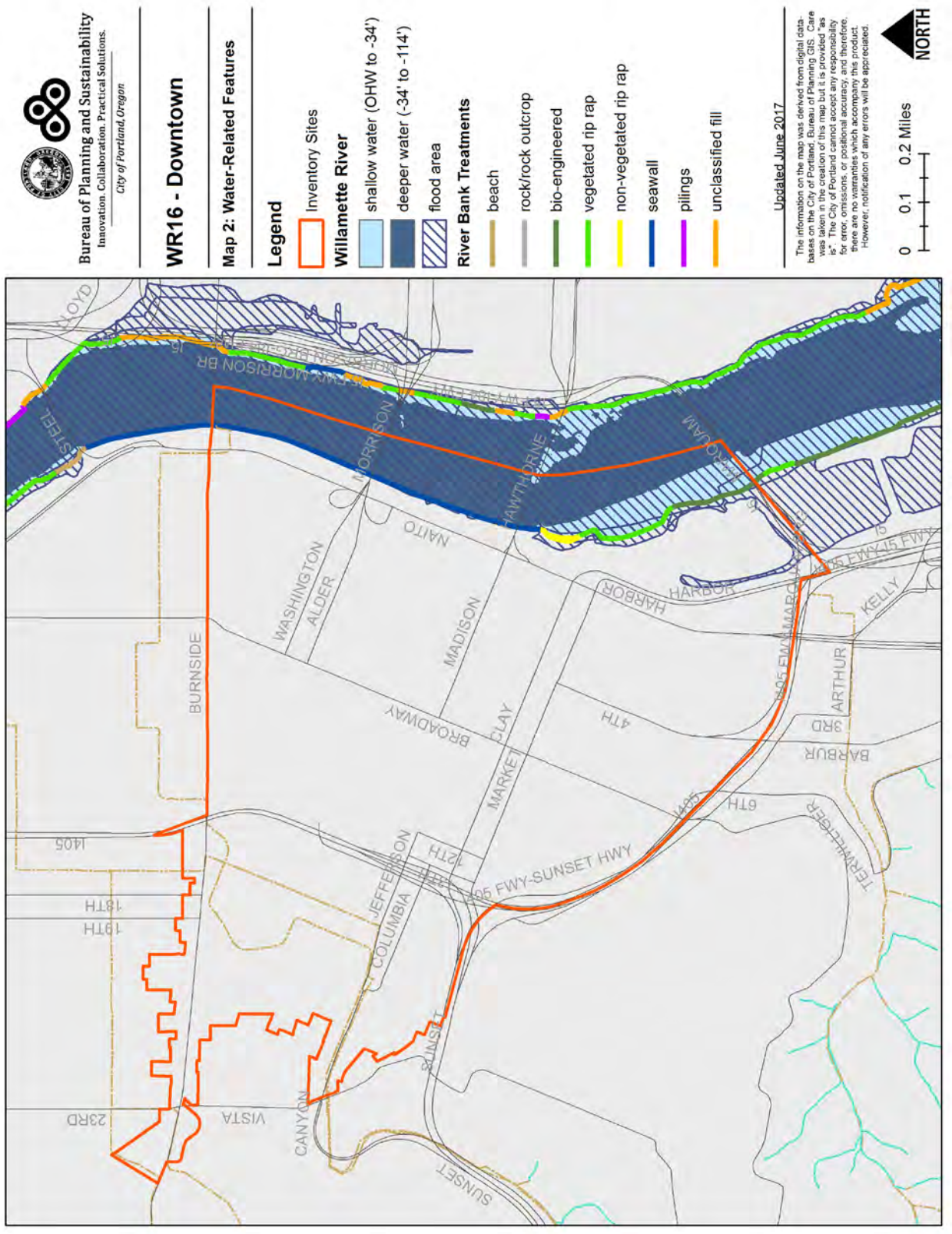
MORRISON
HAWTHORNE
MARQUAM
STEEL
SUNSET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WR16 - Downtown
Map 2: Water-Related Features
Legend
Inventory Sites
Willamette River
shallow water (OHW to -34')
deeper water (-34' to -114')
flood area
River Bank Treatments
beach
rock/rock outcrop
bio-engineered
vegetated rip rap
non-vegetated rip rap
seawall
pilings
unclassified fill
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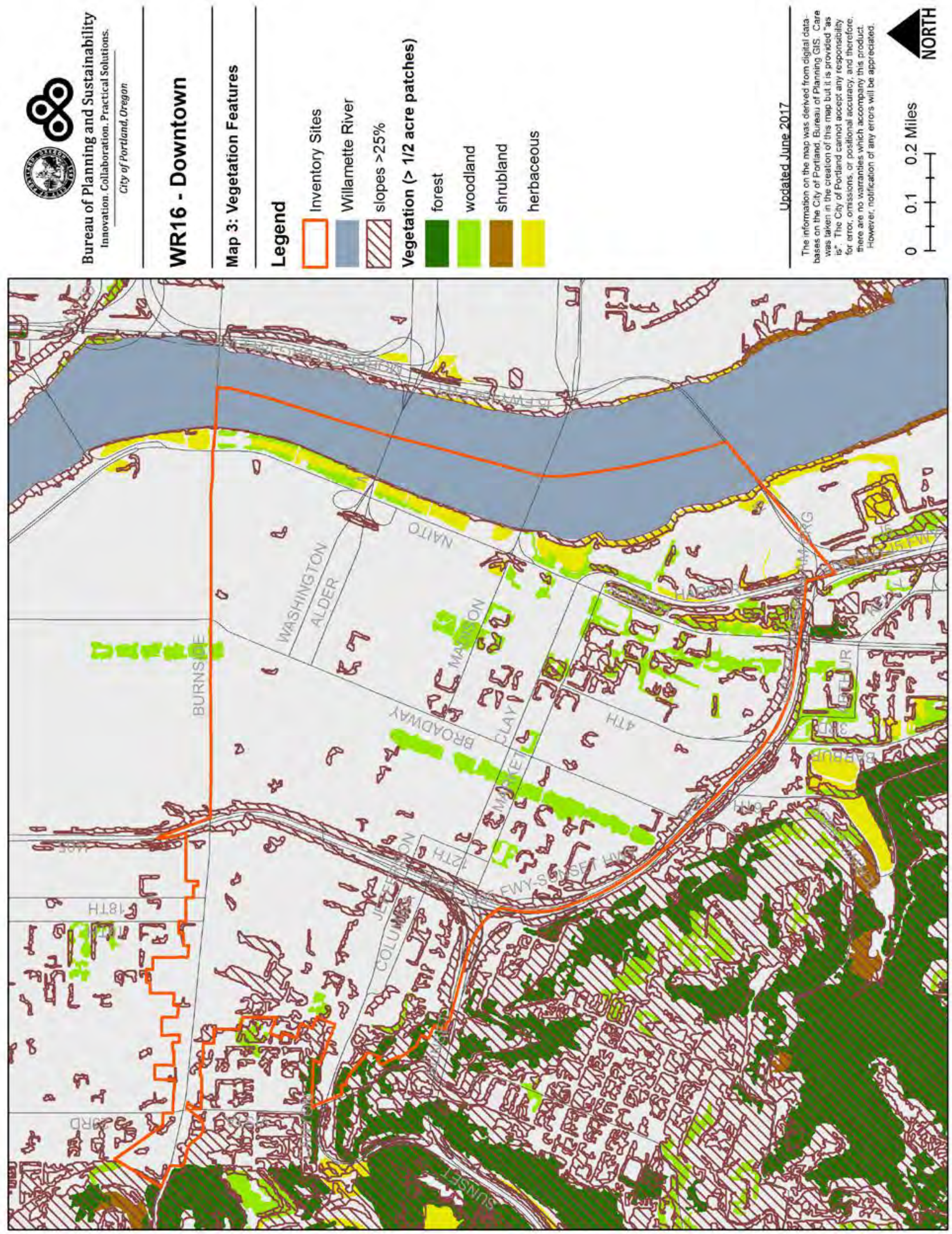
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WR16 - Downtown
Map 3: Vegetation Features
Legend
Inventory Sites
Willamette River
slopes >25%
Vegetation (> 1/2 acre patches)
forest
woodland
shrubland
herbaceous
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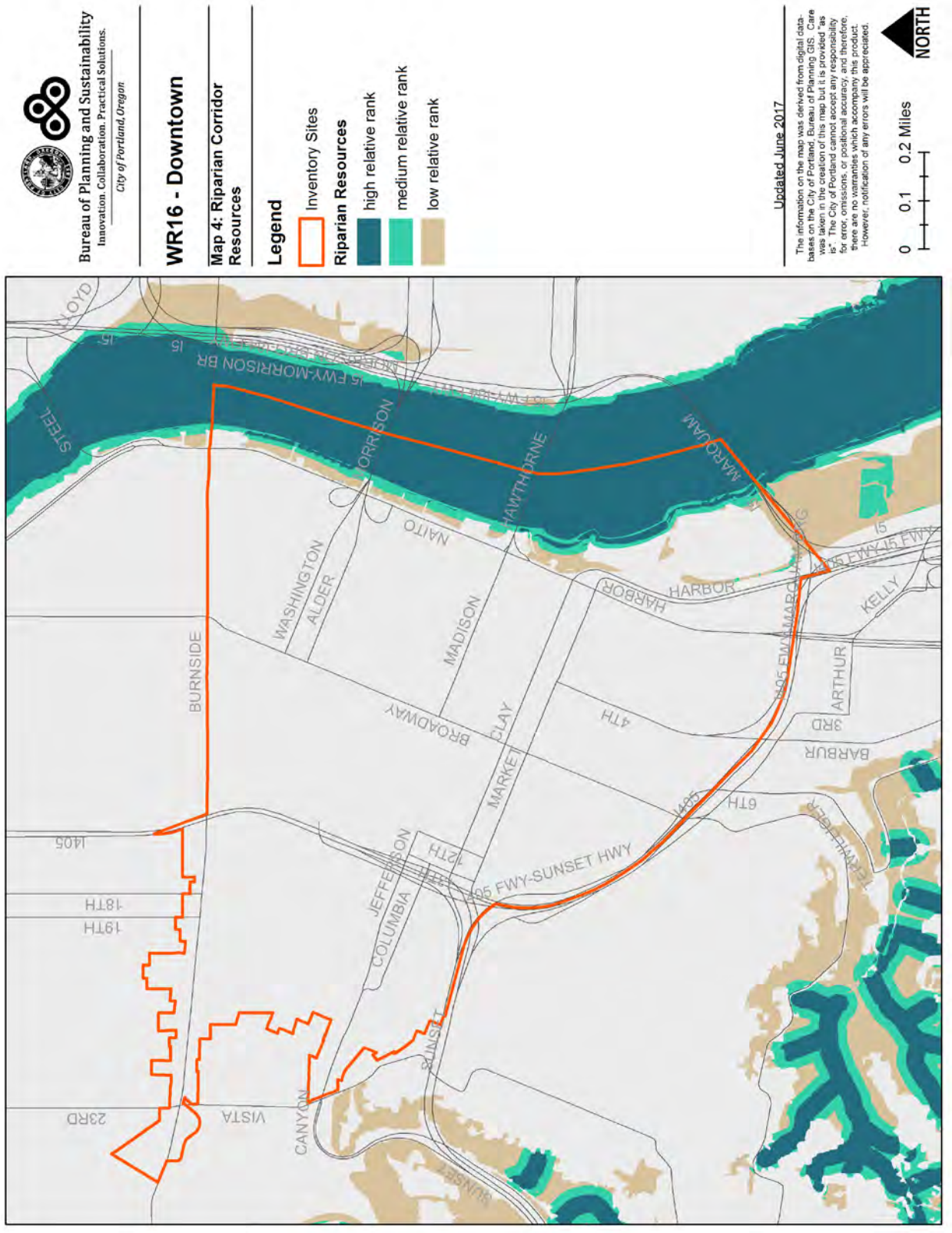
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Map 4: Riparian Corridor Resources
Legend
Inventory Sites
Riparian Resources
high relative rank
medium relative rank
low relative rank
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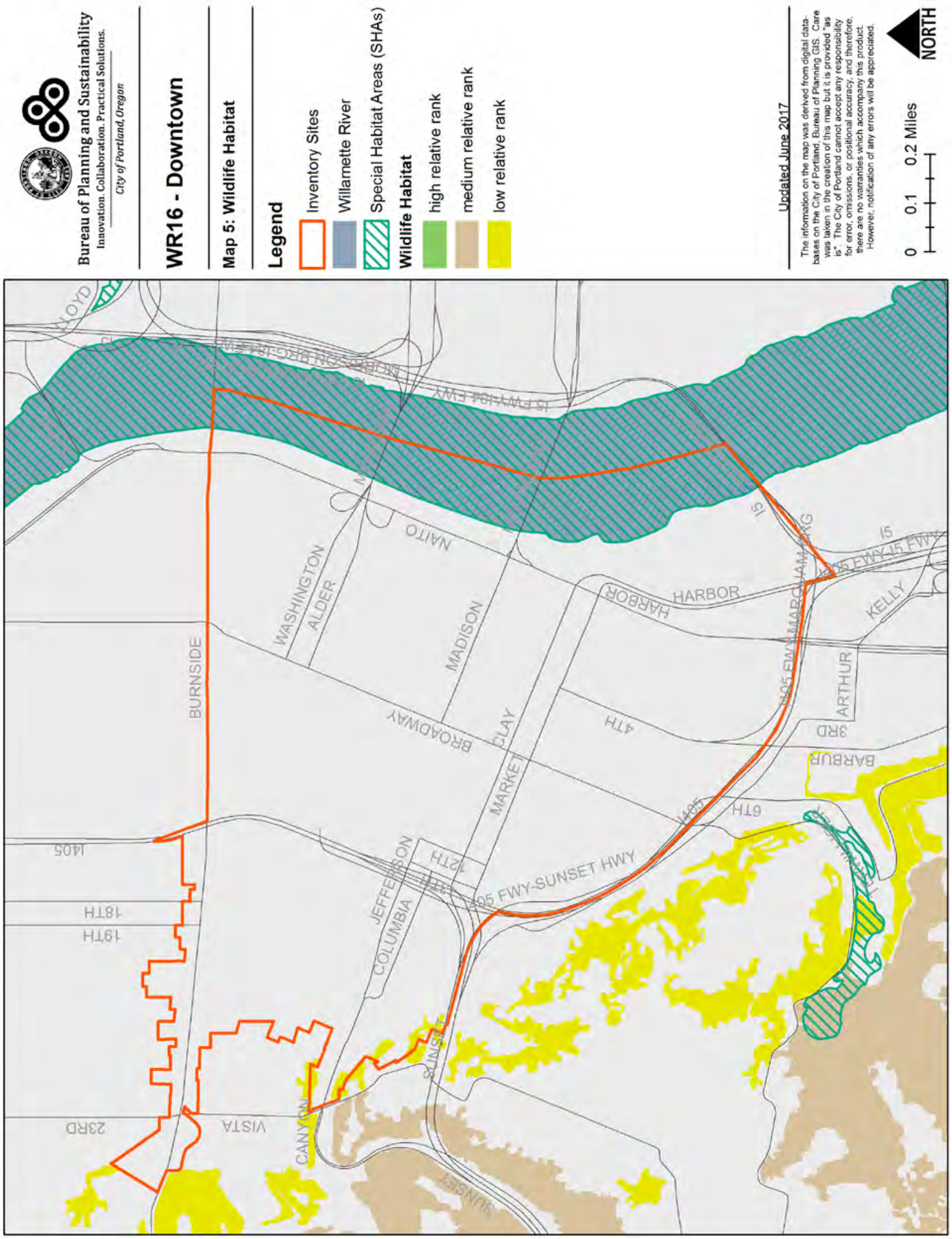
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Map 5: Wildlife Habitat
Legend
Inventory Sites
Willamette River
Special Habitat Areas (SHAs)
Wildlife Habitat
high relative rank
medium relative rank
low relative rank
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I5 FWY-I84 FWY
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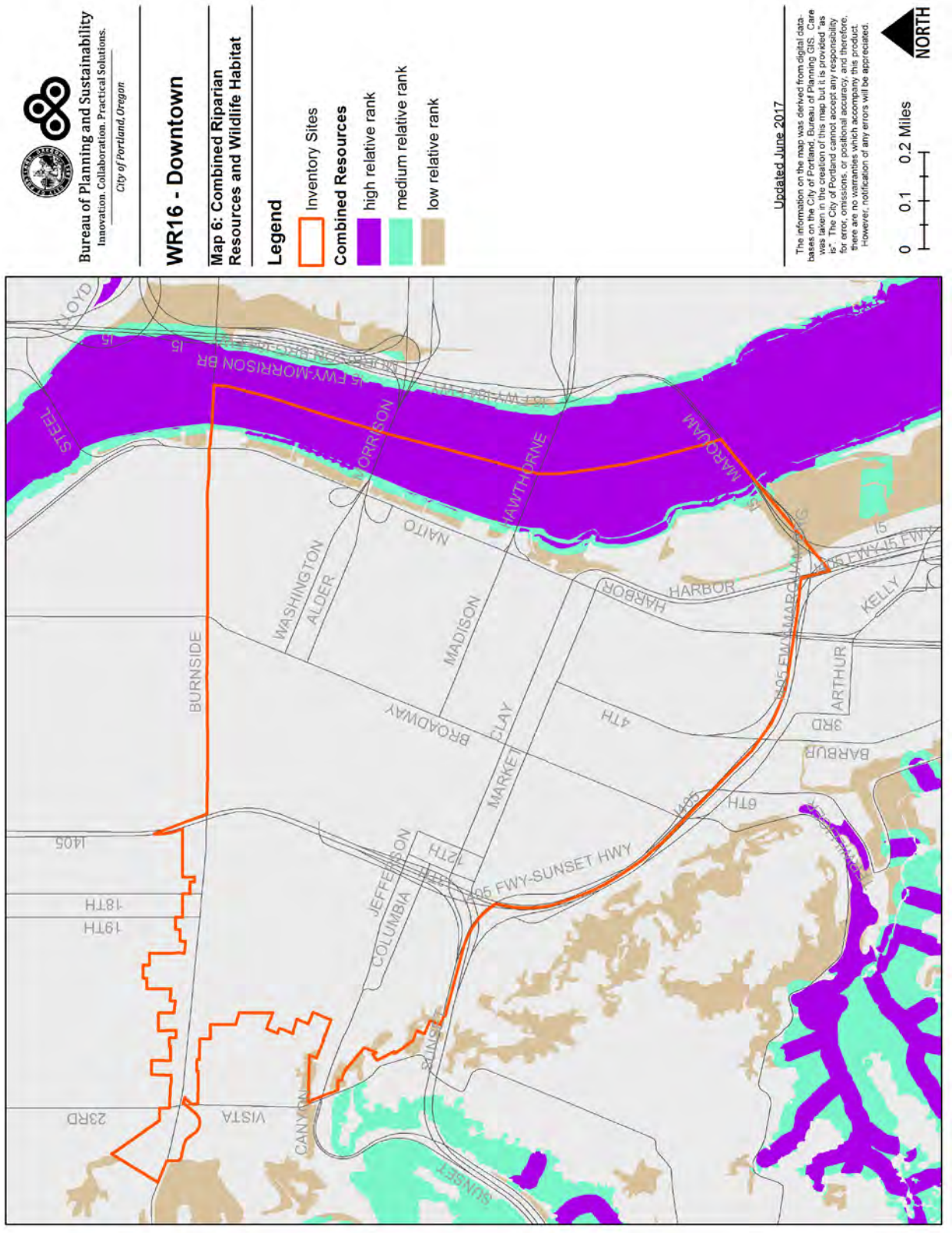
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Map 6: Combined Riparian Resources and Wildlife Habitat
Legend
Inventory Sites
Combined Resources
high relative rank
medium relative rank
low relative rank
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MORRISON
NAITO
HAWTHORNE
MARQUAM
WASHINGTON
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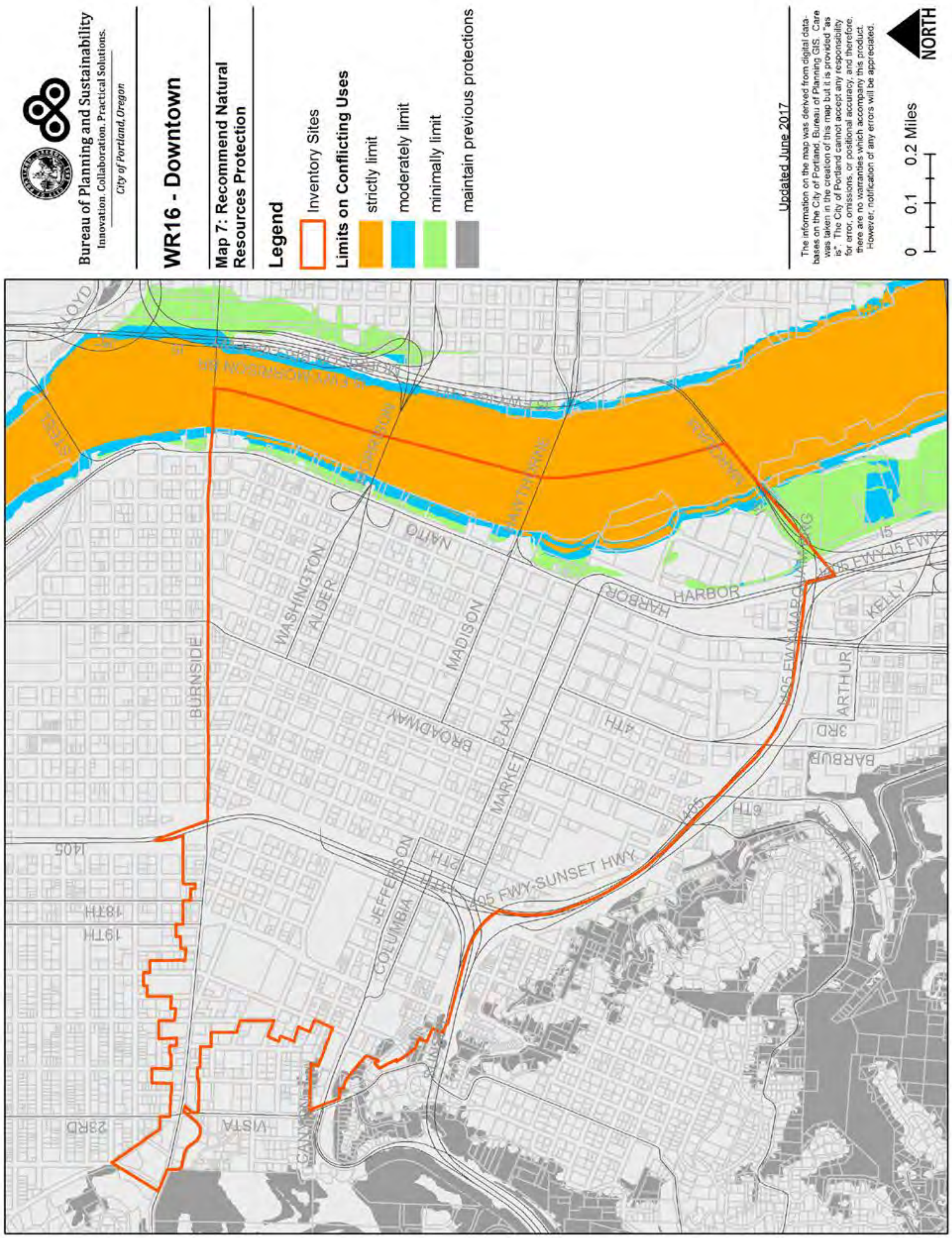
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Map 7: Recommend Natural Resources Protection
Legend
Inventory Sites
Limits on Conflicting Uses
strictly limit
moderately limit
minimally limit
maintain previous protections
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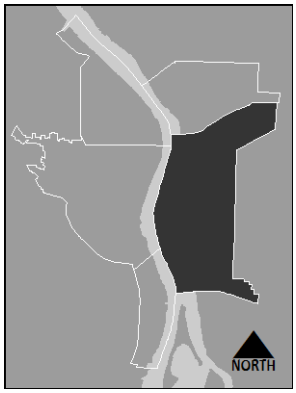
Inventory Site WR17 - Central Eastside

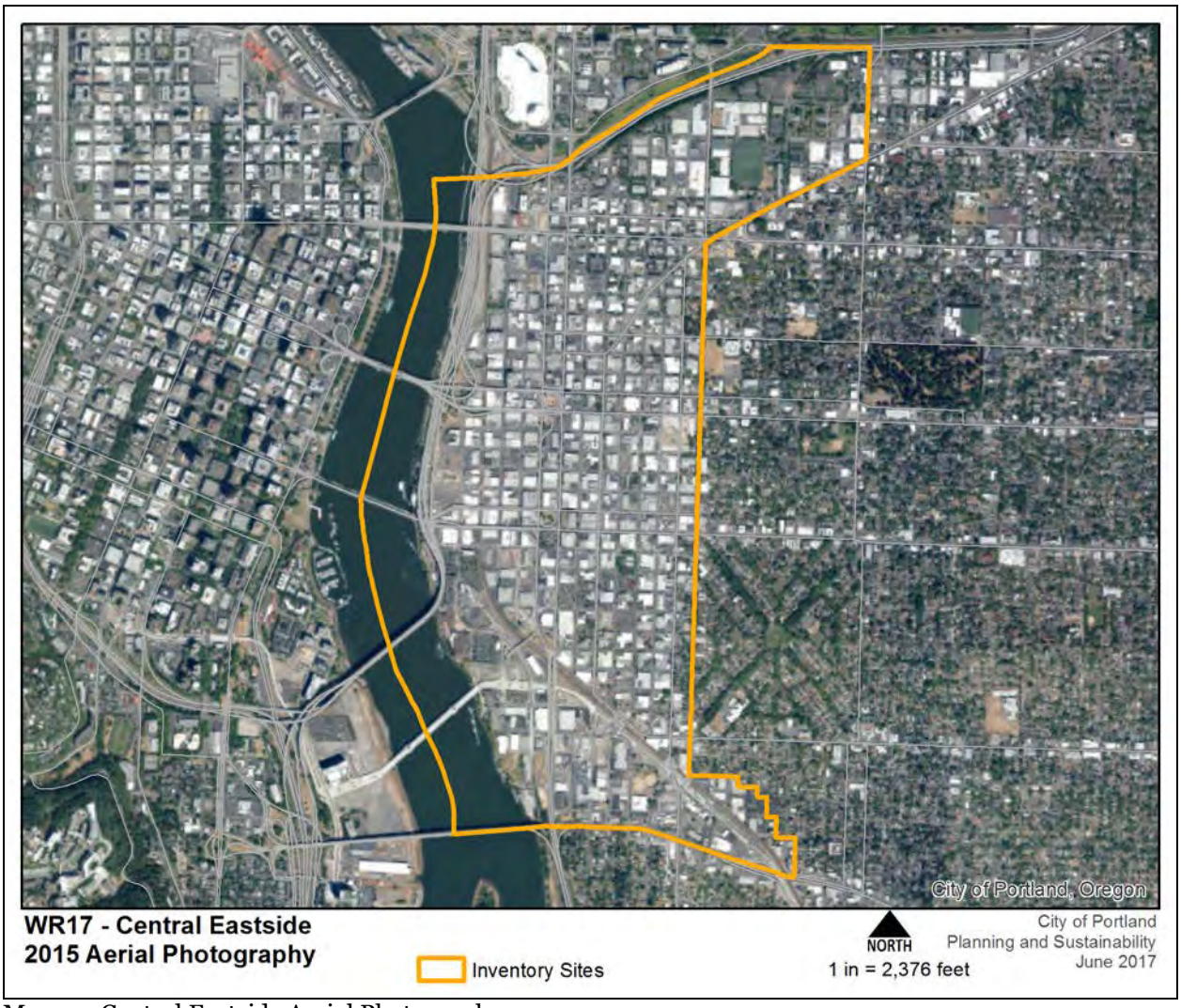


Summary Information

Watershed:	Willamette River Watershed
Neighborhood:	Kerns, Buckman, Hosford-Abernethy
USGS Quadrangle and Quarter Section Maps:	1N1E34d, 1N1E35a, 1N1E35b, 1N1E35c, 1N1E35d, 1S1E02b, 1S1E02c,1N1S03a, 1N1S03d, 1S1E10a, 1S1E10b, 1S1E11a
River Mile:	12.2 – 13.9
Site Size:	925 acres (land and water)
Previous Inventory:	Lower Willamette River Wildlife Habitat Inventory, March 1986
Zoning:	General Industrial 1 (IG1) Heavy Industrial (IH) Central Employment (EX) General Employment 2 (EG2) General Employment 1 (EG1) Central Commercial (CX) Storefront Commercial (CS) General Commercial (CG) High Density Multi-dwelling Residential (RH) Medium Density Multi-dwelling Residential (RI) Open Space (OS)
Existing Land Use:	Downtown commercial, industrial, parks and open space, freeway and residential to the east
General Description:	This site is a mix of primarily industrial, commercial, and parks and open spaces. The Willamette River frontage is occupied by industry to the south and the East Bank Esplanade to the center and north. I-5 crosses the site, as does Highway 99. There are four bridges in the site: Burnside, Morrison, Hawthorne and Marquam.
Resource Features:	Open water, shallow water habitat, river bank, flood plain, riparian vegetation
Resource Functions:	Microclimate and shade; stream flow moderation and water storage; bank function, and sediment, nutrient, pollution control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; wildlife habitat and movement corridor
Special Habitat Area:	Willamette River: (S) – provides habitat for at-risk wildlife species; (C) – wildlife connectivity corridor; (M) – migratory stopover habitat Sullivan's Gulch: (U) – unique feature
Special Status Species:	Fish: Lower Columbia River Chinook salmon, Columbia River chum salmon, lower Columbia River steelhead trout, Pacific lamprey
Natural Hazards:	Flood area, landslide, fire hazard
Contamination:	Yes
Recommended Protections:	Strictly Limit – Willamette River, riverbanks below top-of-bank and high ranked resources above top-of-bank Limit – Floodplain (undeveloped and developed) and medium ranked resources above top-of-bank and developed floodplain *Maintain previously adopted protections for Sullivan's Gulch*

Site Description

This 925 acre site is located between the Burnside Bridge to the north, Powell Boulevard to the south and 12th Avenue to Sandy Boulevard to 21st Avenue on the east. The site is developed primarily with industrial, commercial, and parks and open spaces, with some residential on the eastern edge. The shoreline is defined by industry in the southern portion of the site, and the Eastbank Esplanade along the central and northern portions of the site. The southern edge of Sullivan's Gulch, which is located along I-84, is also within the site.



Map 22: Central Eastside Aerial Photography

The site contains 484 acres (52 percent) of impervious surface coverage, including 51 miles of road. Of the vegetated areas over ½ acre in size, there are approximately 7 acres of woodland vegetation, 7 acres of shrubland vegetation and 5 acres of herbaceous vegetation. There are 165 acres of flood area in this site (City of Portland, 2002), most of which is the Willamette River (127 acres). The remaining flood area on land is largely developed.

Table 18: Summary of Natural Resource Features in WR17 - Central Eastside	
	Study Area (miles/acres)
River (miles/acres)	2/127
Stream/Drainageway (miles)	0
Wetlands (acres)	0
Flood Area (acres)*	
Vegetated (acres)	4
Non-vegetated (acres)	33
Open Water** (acres)	128
Vegetated Areas >= ½ acre (acres)+	
Forest (acres)	0
Woodland (acres)	7
Shrubland (acres)	7
Herbaceous (acres)	5
Impervious Surfaces (acres)	484

* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.
** Open Water includes portions of the Willamette River.
+ 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 2008 aerial photography.

Natural Resource Description

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. Today, the Central Eastside is a largely developed landscape. The predominant existing natural resource is the Willamette River, including the flood area and vegetation along the banks. Elements of the built environment also provide natural resource functions, including street trees, ecoroofs and vegetated landscaping.

The natural resources description is divided into sections that focus on habitat types:
- Open Water and River Banks
- Landscape Vegetation and Street Trees

<u>Open Water and River Banks</u>
Below is a summary of the Lower Willamette River in inventory site WR17. Additional information about the water quality, hydrology, and fish and wildlife use of the Willamette River is provided in Section 3.c: The Central City.

Inventory site WR17 includes 128 acres of the Lower Willamette River. The river is the primary habitat linkage providing connectivity to upstream and downstream aquatic habitats. This linkage is critical for supporting salmonids, migrating birds and other species.

The Willamette River is the primary migration corridor for ESA-listed upper Willamette River Chinook salmon and steelhead trout; and lower Columbia River Chinook salmon, coho salmon, and steelhead trout. These fish enter the Lower Willamette River system both as opportunistic migrants to forage the annual shad run and to spawn in reaches throughout the Willamette watershed. Anadromous fish depend on resources in the Central Reach at various times of the year; their presence is usually predictable:
- Juvenile salmon and steelhead are present year-round; outmigration generally peaks between March and July.
- Spring Chinook outmigration peaks in April.
- Winter steelhead, fall Chinook and Coho salmon outmigration peaks in May and June.

- White sturgeon generally move from the Columbia River estuary into the Willamette River in the spring and summer.
- Pacific lamprey adults move into the lower Willamette River between May and August, with a peak in June.

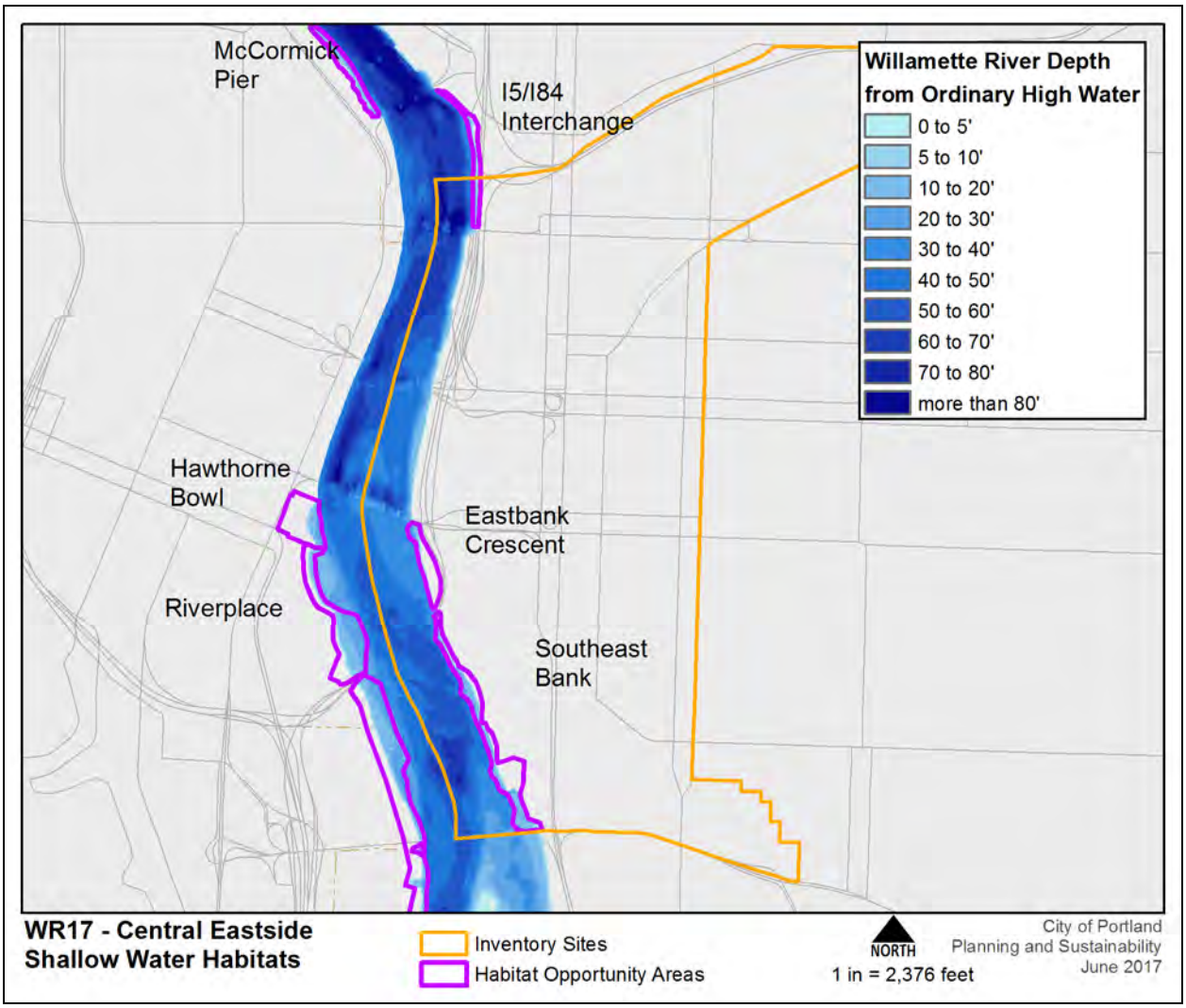
Columbia eulachon pass through the lower Columbia and Willamette rivers as opportunistic migrants as well. Adults return to their natal river every winter; however, their out-migration timing is not as well documented.

White sturgeon are distributed throughout the Lower Willamette River, including the Central Reach. White sturgeon are not currently listed at the state or federal level; however ODFW published a Conservation Plan for white sturgeon because their population is in distress (ODFW, 2011).

Pacific lamprey also inhabit the Central Reach. The Willamette River is one of the most important production areas for Pacific lamprey in the entire Columbia River Basin (ODFW, 2002). The sand and small-sized gravel substrate in the Lower Willamette River is used by lamprey juveniles for rearing before migration out to the ocean. The Central Reach is also a vital migratory corridor for adults returning to spawning grounds.

Resident fish assemblages within this reach include both native and non-native species that both support and prey upon native salmonids. These species include natives such as largescale sucker, sculpin (prickly and reticulate), redside shiner and northern pikeminnow. Nuisance species include large and smallmouth bass, asian carp and several varieties of perch.

There is one notable shallow water habitats in site WR17: Eastbank Crescent (Map 23). The Eastbank Crescent is comprised of an 11,000 foot-long, steeply sloped bank with unclassified fill along its length. A bench of shallow water off the banks widens downstream as the thalweg switches from the east to the west bank. This represents the widest stretch of shallow water in the Willamette River Central Reach. The bank is dominated by Himalayan blackberry. One large tree and a few shrubs are also present. The sediment is gravelly sand and sand, with a small amount of hard ground at the downstream end near the Hawthorne Bridge.



Map 23: Central Eastside Shallow Water Habitats

Inventory site WR17 is part of the Pacific Flyway and is used by over 200 resident and migratory bird species, including iconic species such as great blue heron, osprey, Peregrine falcon and bald eagle. Wildlife use the open water and habitat in the reach for foraging and as a migratory corridor. Avian species also use man-made structures for perching, resting and foraging. Shallow water areas and exposed sand and mud are used by shorebirds and waterfowl. Vegetation on the banks, including trees and shrubs, are used by Neotropical migratory songbirds.

The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, temperature, and various other toxics and heavy metals (see Table 19). TMDLs for bacteria and temperature as well as a phased TMDL for mercury were established in 2006. Oregon Water Quality Index values from 2001 to 2010 for the Lower Willamette River in Portland have been fair and the trend is steady.

Table 19: 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-round	1998, 2002	Fishing, drinking water, resident fish and aquatic life, anadromous fish passage
Heavy Metals (iron, manganese, mercury)	Year-round	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

Due to the presence of mercury, PCBs, dioxins and mainly legacy pesticides (DDT, dieldrin) in Willamette River fish tissue, a fish advisory for the mainstem recommends that people, especially pregnant or breastfeeding women, limit or avoid consuming fatty fish such as carp, bass and catfish. There is no restriction on the consumption of salmon or steelhead. The Lower Willamette River in Portland is deemed unsafe for swimming during and immediately after sewer overflows as a result of larger storm events. However, since 2011, such overflows are exceedingly rare (about one every three years) during the summer recreating season.

In the inventory site, the flood area is generally confined to the Willamette River itself, but the flood area extends under the Marquam Bridge and further south. The developed flood plain provides the function of water storage during events like the 1996 flood.

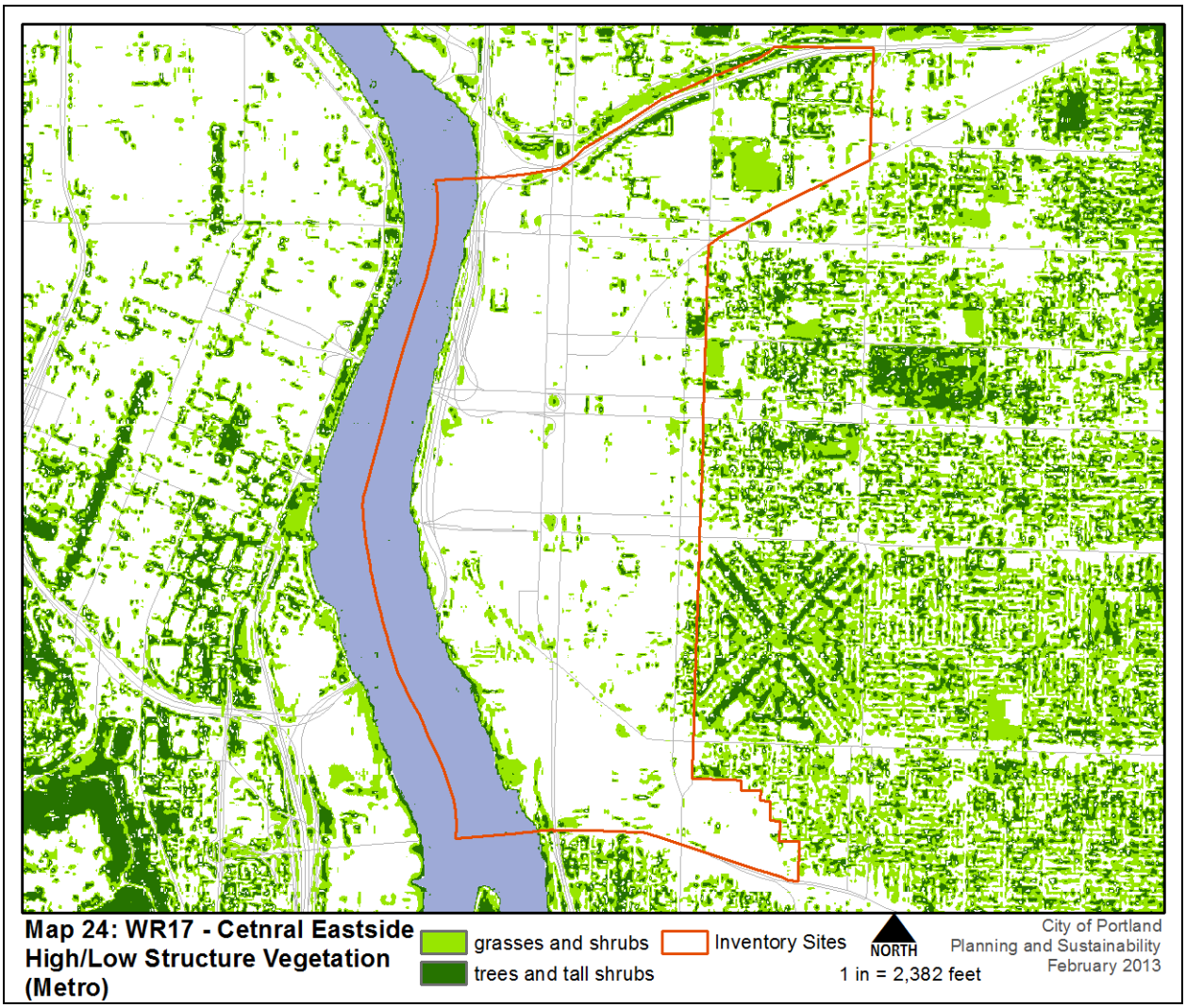
Sullivan's Gulch and Steep Slopes

Along I-84 is a steeply sloped, largely vegetated corridor, known as Sullivan's Gulch. Sullivan's Gulch runs along both sides of I-84 from NE 28th Avenue to the Willamette River. On the south side of I-84, between NE 20th Avenue and NE Grand Avenue, vegetation includes some non-native large trees and understory of Himalayan blackberry and English Ivy.

Steep slopes in Portland are relatively prone to wildfire and landslides. Although Sullivan's Gulch has not burned recently, north of the inventory site is Waud Bluff which experienced fires in 2001 and 2003. The primary sources of fuel were non-native plant species such Himalayan blackberry. Native species, including Oregon oak, Douglas fir, Oregon grape, snowberry, Gilia capitata (globe gilia) and Penstemon ovatus (broad leaved penstemon), are more fire-resistant plants.

Landscape Vegetation and Street Trees

For purposes of the Natural Resources Inventory mapping and modeling, only vegetation patches at least ½ acre in size are captured. However, smaller landscaped areas and individual street trees also provide functions, including cleaning and cooling the air and water, capturing greenhouse gases, capturing and uptaking stormwater, reducing energy demand and providing wildlife habitat (Map 15: High/Low Structure Vegetation).



Map 24: Central Eastside High and Low Structure Vegetation

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 20). The relative ranks are produced using GIS models and information on Special Habitat Areas.

The approach used to generate the relative ranks is summarized in the introduction to the inventory sites. Additional detail is provided in Chapter 2: Project Approach and Methodology Overview of this report and Appendix E: Natural Resources Inventory: Riparian Corridors and Wildlife Habitat Project Report.

All of the ranked resource areas provide at least some important riparian and habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can inform planning projects and programs, including regulations, design of development or redevelopment projects, and mitigation and restoration activities.

Riparian Areas
The site contains the Willamette River and river bank, flood area and riparian vegetation. These features contribute to the riparian functions as detailed in the natural resource descriptions, specifically:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank functions, 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 itself. High and medium relative functional ranks are assigned to vegetated, non-hardened river banks or flood areas. Low relative ranks are generally assigned to non-vegetated flood area and hardened, non-vegetated river banks.

Wildlife Habitat
Within the context of this inventory model, a wildlife habitat patch is defined as forest and/or wetland areas 2 acres in size or greater, including adjacent woodland vegetation (note: Special Habitat Areas may be smaller and may contain different types of vegetation or other resource features). The model assigns relative ranks to qualifying habitat patches based on their size, interior area, proximity to other patches, and proximity to water.

Site WR17 contains no forests and/or wetland areas 2 acres or larger in size.

Special Habitat Areas (SHA) consist of rare and declining habitat types and unique features that provide critical habitat for at-risk plant and animal species 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, and include:

- Willamette River, including shallow water habitat areas, are designated SHA because they meet the following criteria:
  (S) – An at-risk species uses the habitat area or feature on more than an incidental basis to complete one or more life history phases
  (M) – Migratory stopover habitat
  (C) – Wildlife connectivity corridor

- Sullivan's Gulch, upland habitat along I-84 that is also subject to potential landslides and wild fire is designated SHA because it meets the following criteria:
  (U) – Unique feature

Combined Relative Riparian/Wildlife Habitat Ranking
Where areas that are 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.

Table 20: Summary of Ranked Resources in WR16 - Downtown District

Total Inventory Site = 925				
	High	**Medium**	**Low**	**Total**
Riparian Resources*				
acres	132	18	25	175
percent total inventory site area	14	2	3	19
Wildlife Habitat				
Wildlife Habitat*				
acres	0	0	0	0
percent total inventory site area	0	0	0	0
Special Habitat Areas**				
acres	137			
percent total inventory site area	15			
Wildlife Habitat - adjusted by Special Habitat Areas***				
acres	137	0	0	137
percent total inventory site area	15	0	0	15
Combined Total***				
acres	142	18	25	185
percent total inventory site area	15	2	3	20

* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include the Willamette River.
** Special Habitat Areas rank high for wildlife habitat.
*** Because riparian resources, Special Habitat Areas, and wildlife habitat overlap, the results cannot be added together to determine the combined results.

Natural Resource Protection Recommendation

The Willamette River and associated floodplain and riparian areas in resource site WR17 have been significantly reduced in extent, simplified and degraded over time. The remaining natural resource areas are fragmented and impacted by adjacent development. However, the natural resource areas also provide the remaining habitat for fish and wildlife that reside in and migrate through this highly urbanized environment. The importance of the remaining natural resource areas is underscored by the relationship to the regional ecosystem and migration corridors.

In addition to being a significant area for fish and wildlife; the Central Eastside District is an important and unique area for employment, industry, commerce, transportation, housing, entertainment and recreation.

The general recommendation, shown on Map 7, balances the environmental, economic and social consequences of protecting natural resources. The resource site is a highly developed area and impacts from conflicting uses cannot be fully avoided. Allowing some future development in natural resource area is inevitable, particularly development associated with utilities and public infrastructure. However, conflicting uses should be limited overall.

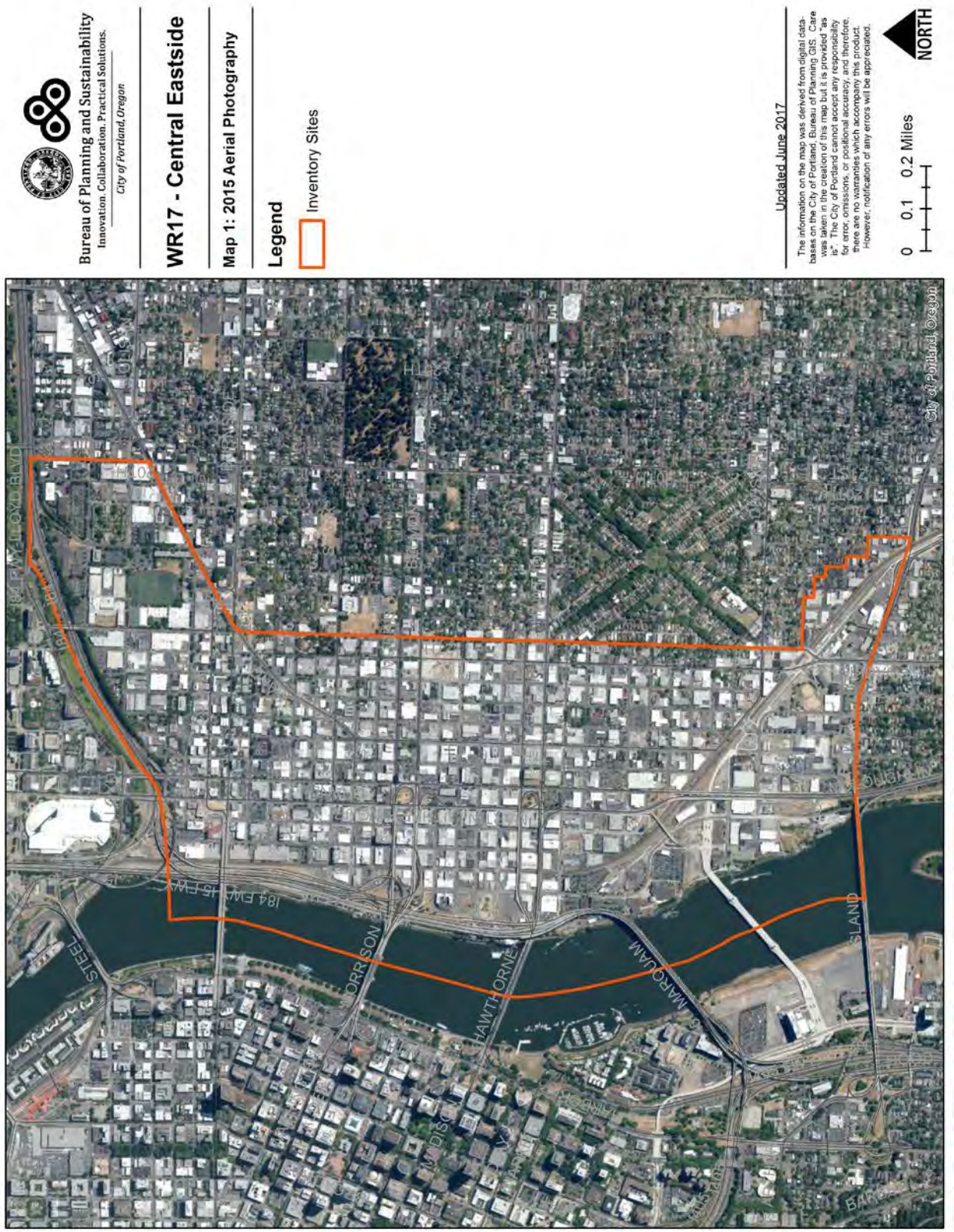
The recommendation for riparian areas is to:

1. Provide the highest level of protection by strictly limiting conflicting uses within areas of high ranked riparian areas, including area located below the top of bank of the Willamette River and its tributaries and within the undeveloped floodplain.

2. Provide a moderate level of protection by limiting conflicting uses within medium ranked riparian areas.
3. Provide a minimum level of protection by limiting conflicting uses with the developed floodplain, which typically receives a low rank.
4. Allow conflicting uses within low ranked natural resource areas outside of the floodplain.

The recommendation for wildlife habitat areas outside of riparian areas is to:

1. Maintain the current level of protections applied by previously adopted natural resources protection and management plans or through Title 11, Trees.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City of Portland, Oregon
WR17 - Central Eastside
Map 1: 2015 Aerial Photography
Legend
Inventory Sites
Updated June 2017
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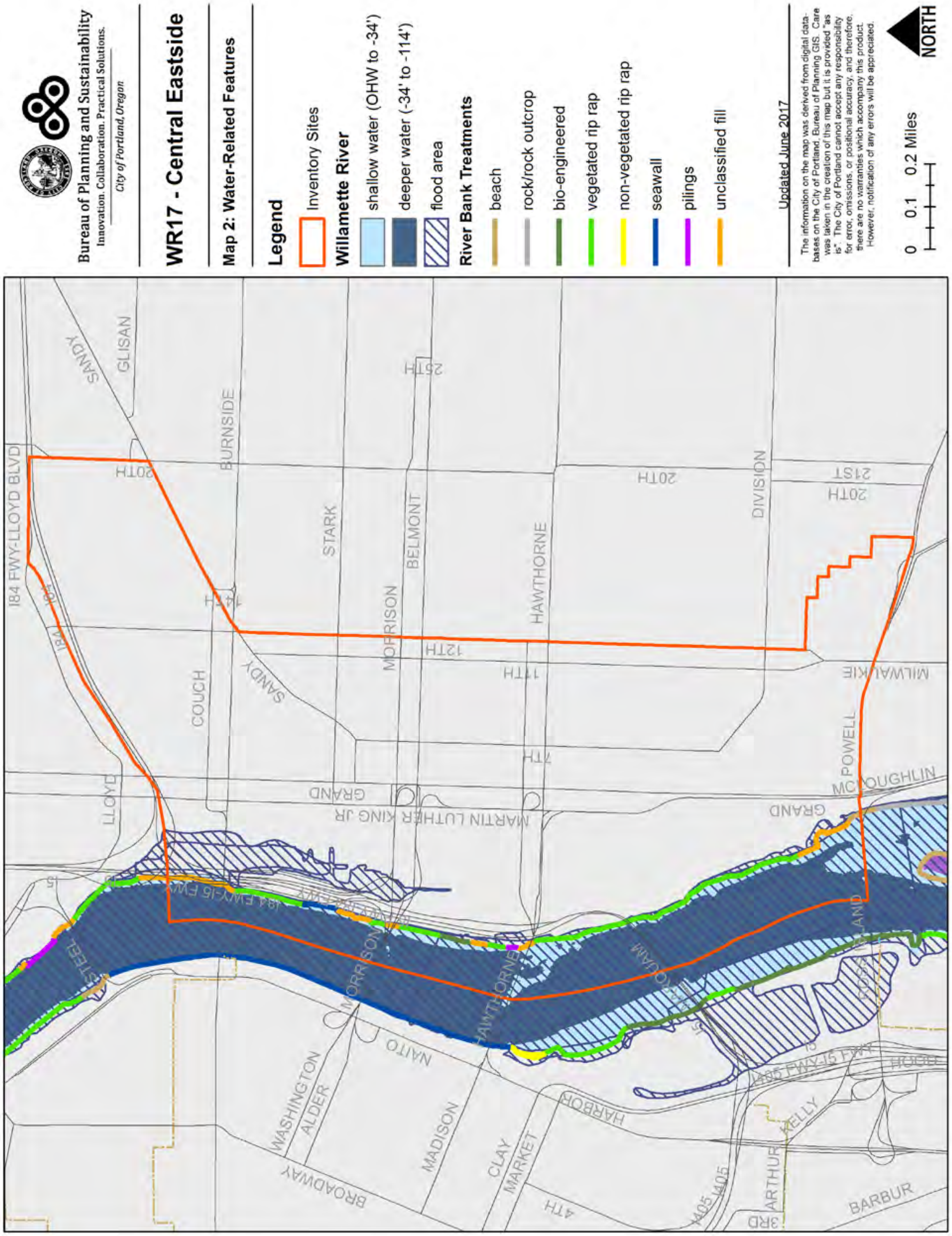
STEEL
MORRISON
HAWTHORNE
MARQUAM
RIVER
BARBUR
City of Portland, Oregon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WR17 - Central Eastside
Map 2: Water-Related Features
Legend
Inventory Sites
Willamette River
shallow water (OHW to -34')
deeper water (-34' to -114')
flood area
River Bank Treatments
beach
rock/rock outcrop
bio-engineered
vegetated rip rap
non-vegetated rip rap
seawall
pilings
unclassified fill
Updated June 2017
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POWELL
MCLOUGHLIN
COUCH
LLOYD
GRAND
MARTIN LUTHER KING JR
7TH
STEEL
NAITO
WASHINGTON
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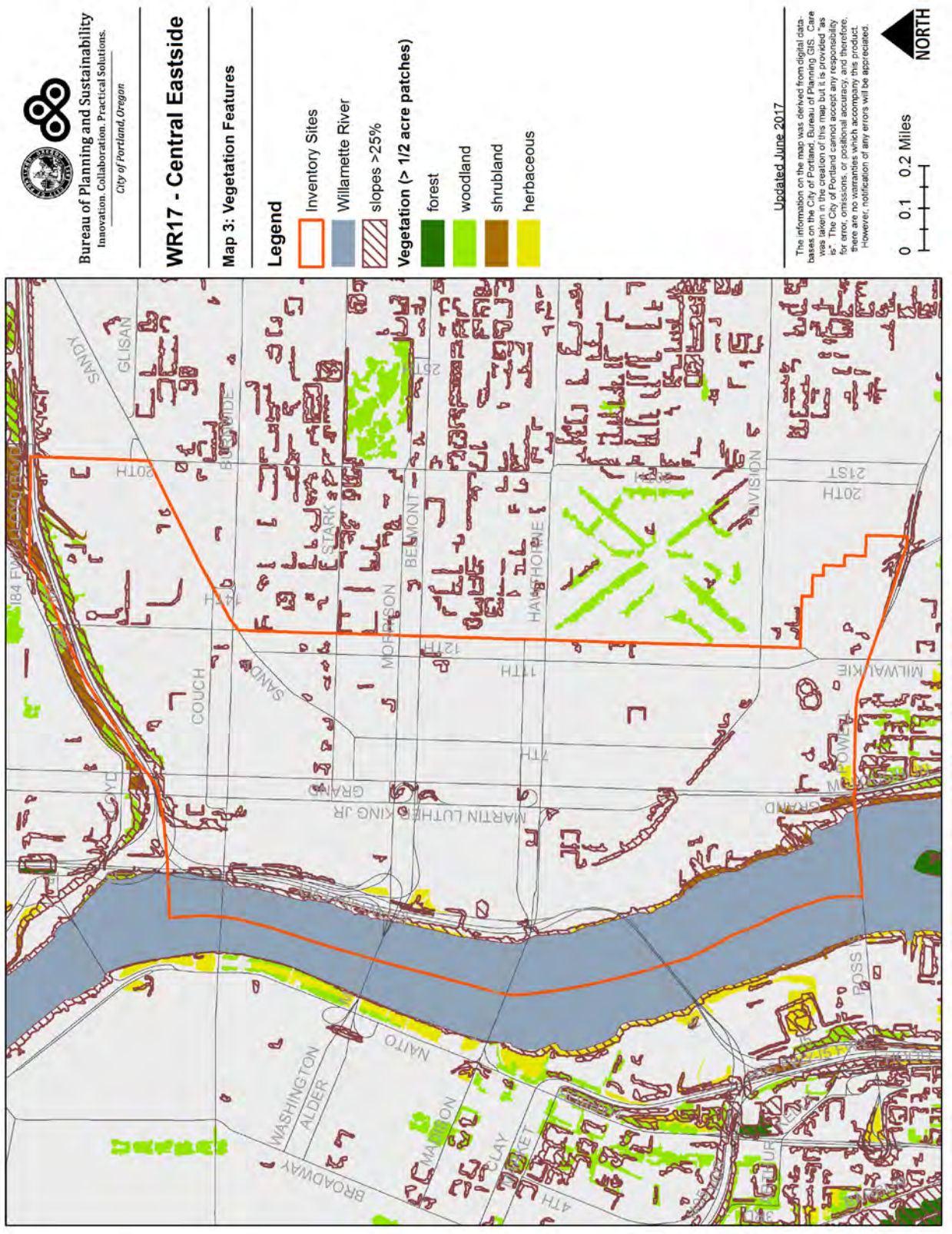
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City of Portland, Oregon
WR17 - Central Eastside
Map 3: Vegetation Features
Legend
Inventory Sites
Willamette River
slopes >25%
Vegetation (> 1/2 acre patches)
forest
woodland
shrubland
herbaceous
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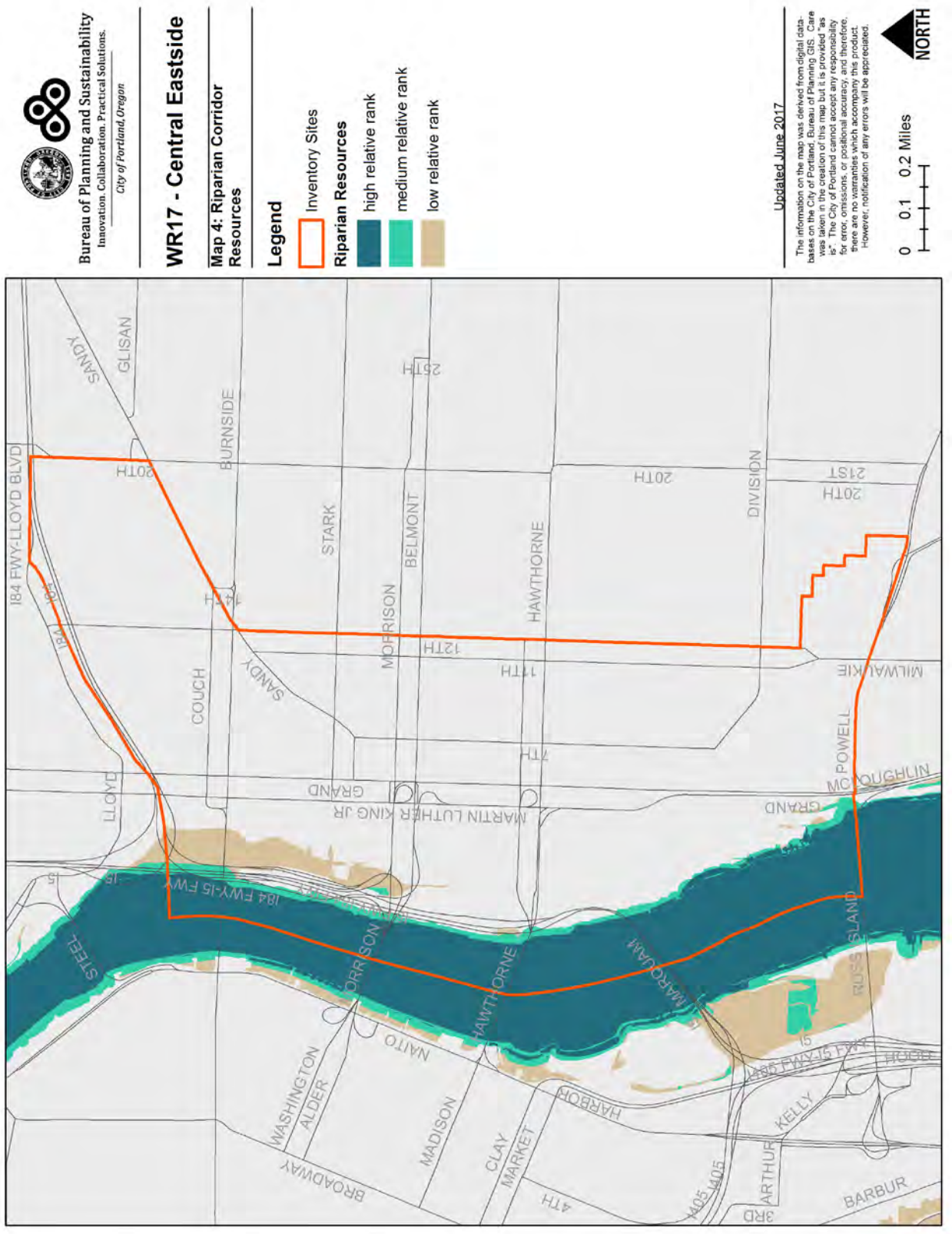
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City of Portland, Oregon
WR17 - Central Eastside
Map 4: Riparian Corridor Resources
Legend
Inventory Sites
Riparian Resources
high relative rank
medium relative rank
low relative rank
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RUSSELL ISLAND
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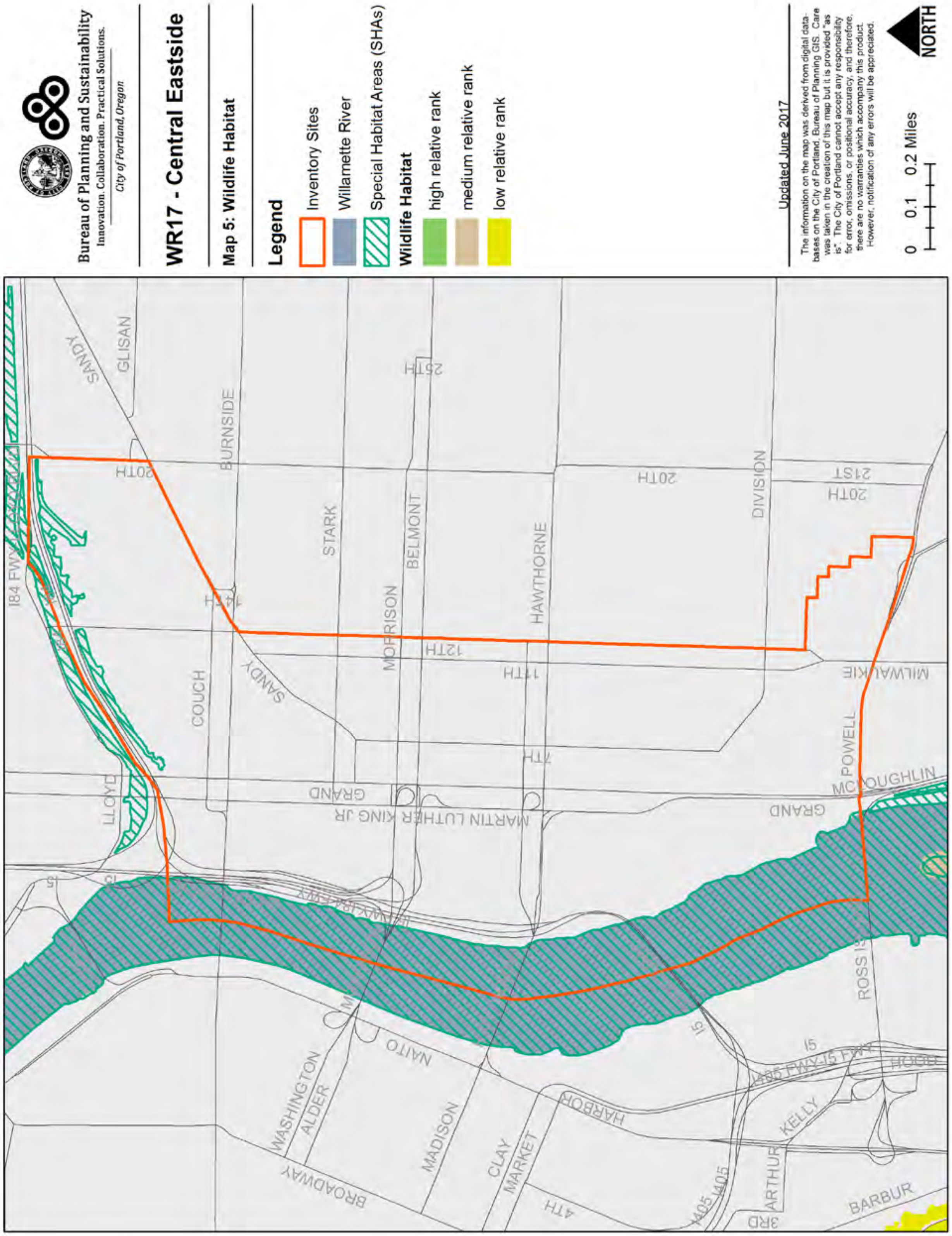
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WR17 - Central Eastside
Map 5: Wildlife Habitat
Legend
Inventory Sites
Willamette River
Special Habitat Areas (SHAs)
Wildlife Habitat
high relative rank
medium relative rank
low relative rank
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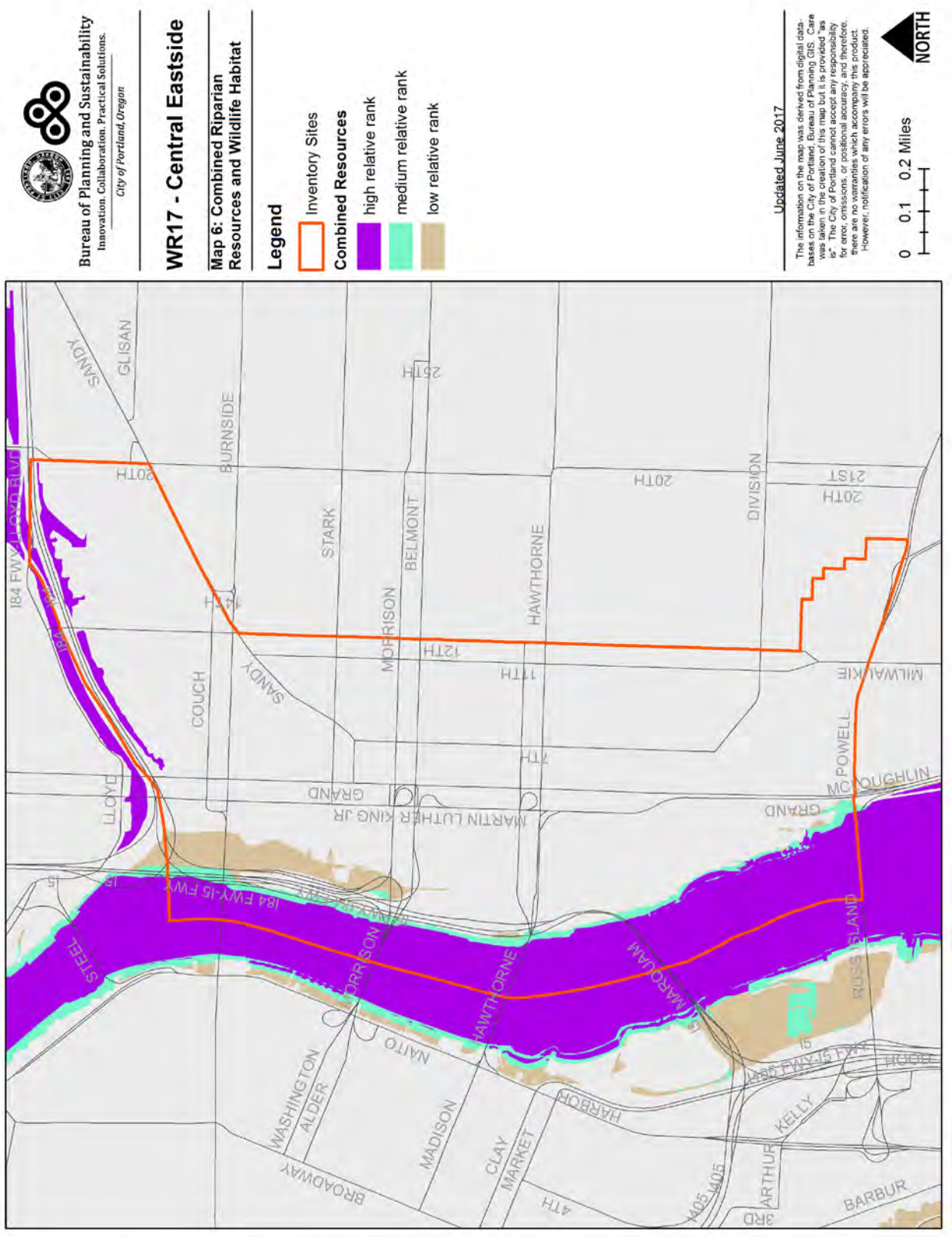
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City of Portland, Oregon
WR17 - Central Eastside
Map 6: Combined Riparian Resources and Wildlife Habitat
Legend
Inventory Sites
Combined Resources
high relative rank
medium relative rank
low relative rank
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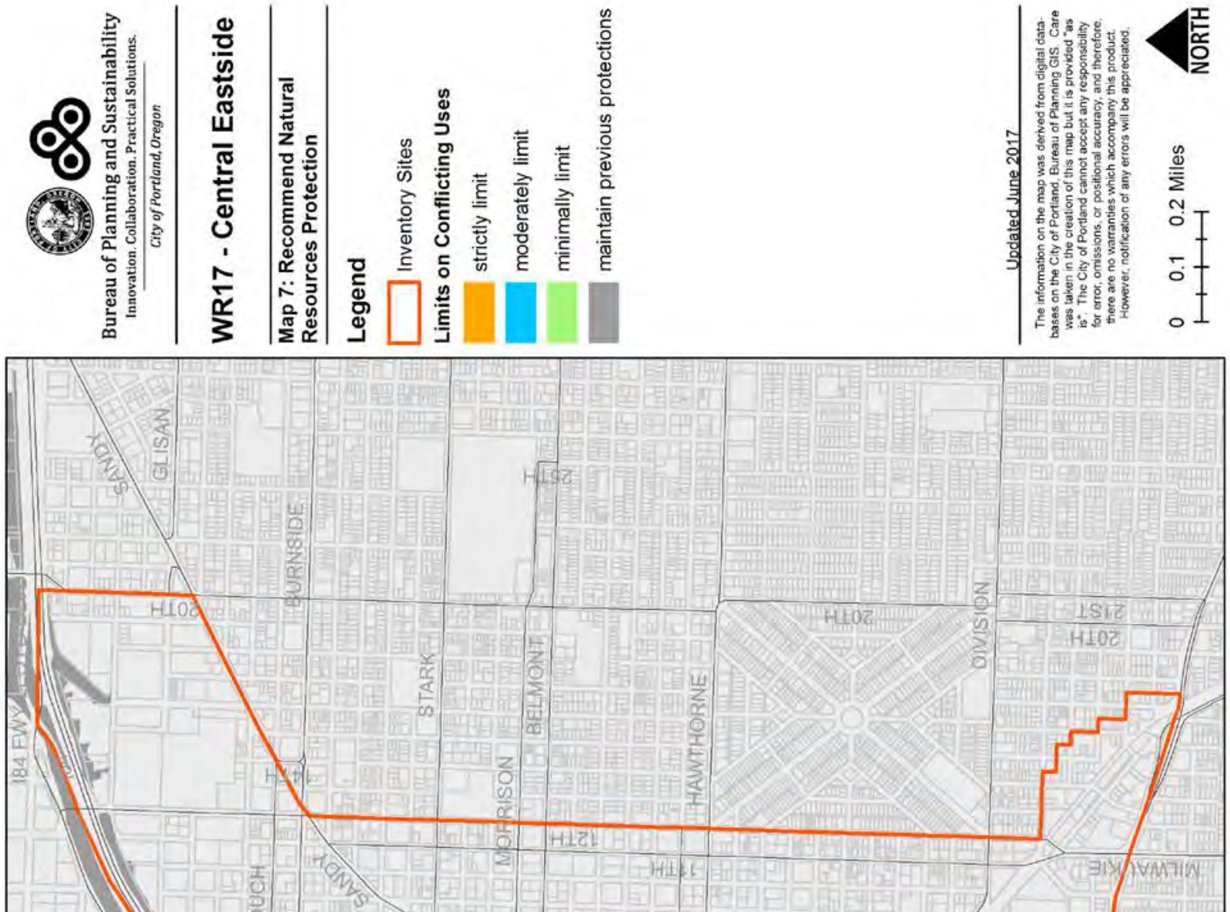
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WR17 - Central Eastside
Map 7: Recommend Natural Resources Protection
Legend
Inventory Sites
Limits on Conflicting Uses
strictly limit
moderately limit
minimally limit
maintain previous protections
Updated June 2017
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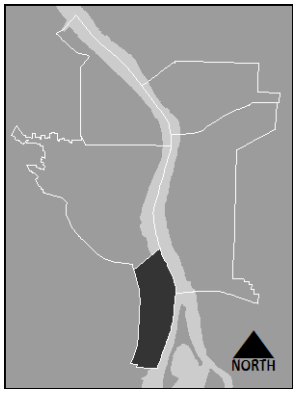
Inventory Site WR18 - South Waterfront



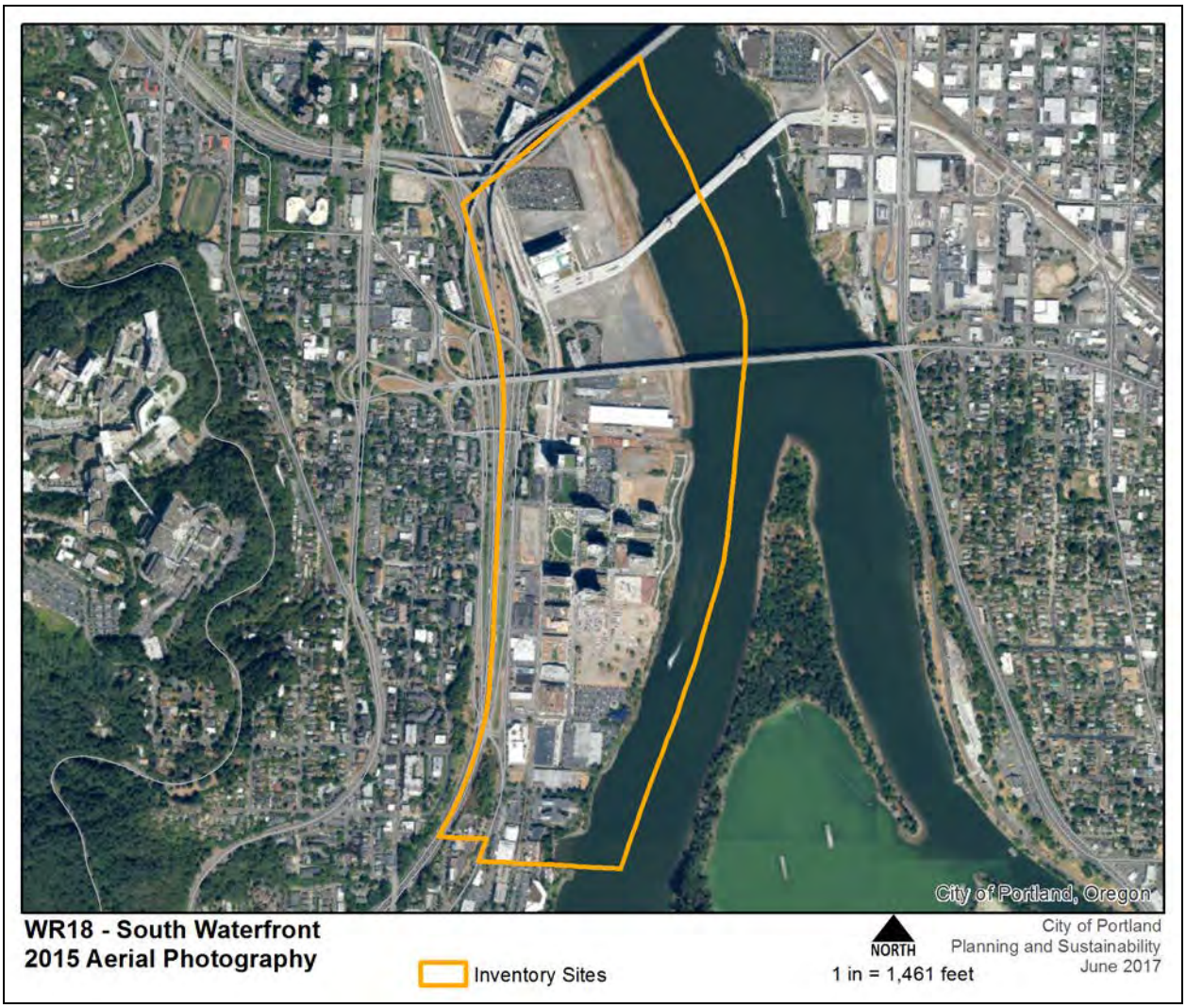
Summary Information

Watershed:	Willamette River Watershed
Neighborhood:	South Portland
USGS Quadrangle and Quarter Section Maps:	1S1E03, 1S1E10, 1S1E15, and 3229-30, 3329-30, 3429-30, 3529-30
River Mile:	12.9 – 14.3
Site Size:	318 acres (land and water)
Previous Inventory:	Lower Willamette River Wildlife Habitat Inventory, March 1986
Zoning:	Central Commercial (CX) Office Commercial 2 (CO2) Storefront Commercial (CS) High Density Residential (RH) Open Space (OS) Design Overlay (d) River General Overlay (g)
Existing Land Use:	Commercial, residential, park
General Description:	The site begins at the southern property line for Waterfront Park and extends south to SW Hamilton Court
Resource Features:	Bottomland forest, scrub/shrub upland, beach, open water, flood plain
Resource Functions:	Microclimate and shade; streamflow moderation and water storage; bank function, and sediment, nutrient, pollution control; large wood and channel dynamics; organic inputs, food web and nutrient cycling; riparian wildlife movement corridor; wildlife habitat migratory stopover habitat; connectivity
Special Habitat Area:	Willamette River: (S) – provides habitat for at-risk wildlife species; (C) – wildlife connectivity corridor; (M) – migratory stopover habitat
Special Status Species:	Fish: Lower Columbia River Chinook salmon, Columbia River chum salmon, lower Columbia River steelhead trout, Pacific lamprey
Natural Hazards:	Landslide, flood area
Contamination:	Yes
Recommended Protections:	Strictly Limit – Willamette River, riverbanks below top-of-bank and high ranked resources above top-of-bank Limit – Floodplain (undeveloped and developed) and medium ranked resources above top-of-bank and developed floodplain

Site Description

This 243 acre site extends from the Willamette River centerline westward, where the western boundary follows SW Harbor Drive and I-5. On the north end, the site extends southward from the southern property line of South Waterfront Park to SW Hamilton Court, and the southern property lines of R991100170 and R991100890. The terrestrial portion of this site is approximately 244 acres in size and contains more than 7,485 linear feet of bank along the Willamette River. Map 1 shows the aerial view of the South Waterfront inventory site.

This site is characterized by intensive shoreline development related to commercial, industrial and public uses. The river bank in this site is mostly unclassified fill. South Waterfront Park is located along the waterfront in the northeast corner of land within this site. Adjacent to South Waterfront Park are condominiums which comprise the majority of residential development on this site. South of the condominium development, the site is dominated by commercial and industrial uses. The cove known as Cottonwood Bay begins at the southernmost section of this site and continues into site WR20 John's Landing. This site represents a transition from the heavily modified and industrial conditions downstream to the less developed conditions upstream.



Map 25: South Waterfront Aerial Photography

The site contains 96 acres of impervious surface coverage, including 9 miles of road. Of vegetated areas over 1/2 acre in size, there are roughly 6 acres of forest and woodland vegetation, 3 acres of shrubland and 18 acres of herbaceous vegetation. There are 129 acres of flood area on this site, more than half of which is the Willamette River (67 acres). The remaining flood area on land is largely developed.

Table 21: Summary of Natural Resource Features in WR18 - South Waterfront	
	Study Area (mile/acres)
River (miles/acres)	1.2/67
Stream/Drainageway (miles)	0
Wetlands (acres)	0
Flood Area (acres)*	
Vegetated (acres)	12
Non-vegetated (acres)	51
Open Water** (acres)	67
Vegetated Areas >= ½ acre (acres)+	
Forest (acres)	2
Woodland (acres)	3
Shrubland (acres)	3
Herbaceous (acres)	18
Impervious Surfaces (acres)	96

* The flood area includes the FEMA 100-year flood plain plus the adjusted 1996 flood inundation area.
** Open Water includes portions of the Willamette River.
+ 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 2008 aerial photography.

Natural Resource Description

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. Today, the South Waterfront is a largely developed landscape. The predominant existing natural resource is the Willamette River, including the flood area and vegetation along the banks. Elements of the built environment also provide natural resource functions including street trees, ecoroofs and vegetated landscaping.

The natural resources description is divided into sections that focus on habitat types:

- Open Water and River Banks
- Landscape Vegetation and Street Trees

<u>Open Water and River Banks</u>
Below is a summary of the Lower Willamette River in inventory site WR18. Additional information about the water quality, hydrology, and fish and wildlife use of the Willamette River is provided in Section 3.c: The Central City.

Inventory site WR18 includes 67 acres of the Lower Willamette River. The river is the primary habitat linkage providing connectivity to upstream and downstream aquatic habitats. This linkage is critical for supporting salmonids, migrating birds and other species.

The Willamette River is the primary migration corridor for ESA-listed upper Willamette River Chinook salmon and steelhead trout; and lower Columbia River Chinook salmon, coho salmon, and steelhead trout. These fish enter the Lower Willamette River system both as opportunistic migrants to forage the

annual shad run and to spawn in reaches throughout the Willamette watershed. Anadromous fish depend on resources in the Central Reach at various times of the year; their presence is usually predictable:

- Juvenile salmon and steelhead are present year-round; outmigration generally peaks between March and July.
- Spring Chinook outmigration peaks in April.
- Winter steelhead, fall Chinook and Coho salmon outmigration peaks in May and June.
- White sturgeon generally move from the Columbia River estuary into the Willamette River in the spring and summer.
- Pacific lamprey adults move into the lower Willamette River between May and August, with a peak in June.

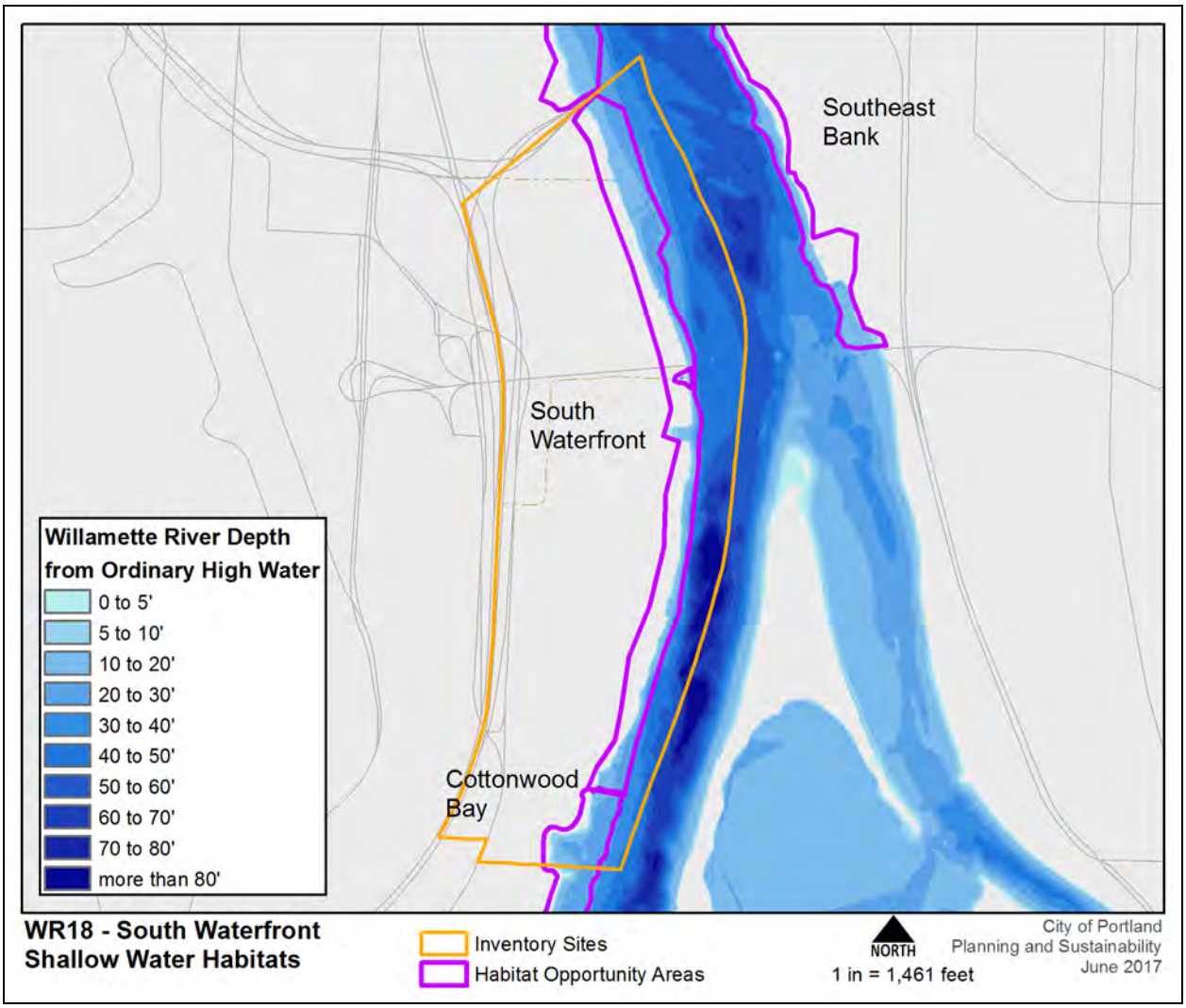
Columbia eulachon pass through the lower Columbia and Willamette rivers as opportunistic migrants as well. Adults return to their natal river every winter; however, their out-migration timing is not as well documented.

White sturgeon are distributed throughout the Lower Willamette River, including the Central Reach. White sturgeon are not currently listed at the state or federal level; however ODFW published a Conservation Plan for white sturgeon because their population is in distress (ODFW, 2011).

Pacific lamprey also inhabit the Central Reach. The Willamette River is one of the most important production areas for Pacific lamprey in the entire Columbia River Basin (ODFW, 2002). The sand and small-sized gravel substrate in the Lower Willamette River is used by lamprey juveniles for rearing before migration out to the ocean. The Central Reach is also a vital migratory corridor for adults returning to spawning grounds.

Resident fish assemblages within this reach include both native and non-native species that both support and prey upon native salmonids. These species include natives such as largescale sucker, sculpin (prickly and reticulate), redside shiner and northern pikeminnow. Nuisance species include large and smallmouth bass, asian carp and several varieties of perch.

There are two notable shallow water habitats in site WR18: (1) South Waterfront and (2) Cottonwood Bay (Map 26).



Map 26: South Waterfront Shallow Water Habitats

South Waterfront stretches over 5,000 feet along the river bank. The banks are a highly varied mix of unclassified fill – concrete, piers and pilings, ramps and riprap. Recently, some bioengineered banks with root wads were installed on in front of the new development. Root wads provide bank stabilization and in-water structure for aquatic species. There is a row of trees along the banks at the Landing at Macadam and at other points along the bank, but this area is otherwise sparsely vegetated and the vegetation is dominated by Himalayan blackberry. A thin strip of shallow water in the southern half widens in the northern half as the thalweg transitions to the eastern side of the river. Much of the river bottom is hard ground with patches of gravelly sand, sandy mud, muddy sand and sand.


white-crowned sparrow

Two projects have recently taken place within the South Waterfront stretch: (1) Zidell Marine Remediation and (2)_South Waterfront Greenway Project.


Zidell

Zidell Marine Remediation – One hundred years of heavy industry, including ship building and dismantling, left Zidell's 30 acres contaminated with PCBs, asbestos, lead, arsenic and other chemicals. The more than $20 million dollar cleanup targeted 3,000 feet along the Willamette River, capping and removing dangerous contaminants, and re-sloping and replanting the banks. Project elements included capping 16 acres with 154,000 cubic yards of clean fill, including smaller, more fish-friendly rock that made up the top 6 inches of clean fill. Along the banks, 15,000 shrubs and 200 trees were planted. The expected result is a renewed shoreline complete with a 100-foot-wide greenway and restored wildlife habitat. The remediation work took place during the summer of 2011 and was overseen by Oregon Department of Environmental Quality (DEQ).

So. Waterfront Greenway

South Waterfront Greenway Project – In the summer of 2012, Portland Parks and Recreation began the first phase of a $9.5 million central district greenway project that was born out of the South Waterfront Greenway Development Plan accepted by City Council in 2004. A partnership with TriMet has leveraged the City's $1 million contribution to improve the habitat along the riverbank in order to mitigate the impacts to fish habitat resulting from the Portland-Milwaukee Light Rail Project. This greenway project runs between SW Gibbs Street and Lane Street and will create shallow water fish habitat, stabilize the river banks, plant riparian vegetation, and create wildlife habitat. During Phase I (riverbank restoration), the work elements included: soil and debris excavation; the driving of sheet pile walls that will form the foundations for the SW Whitaker and SW Curry Street overlooks; the installation of vault walls (i.e., a system of interlocking concrete boxes) that shore up the upper portion of the Greenway; and erosion control measures. The water level of the Willamette River did not recede enough this summer to allow for the construction of the shallow water habitat (i.e., the beach) so this work will be done in summer 2013, along with the Phase II work elements. Phase II work elements will be a mixture of upland improvements that will include a combination of lawn, park and plaza areas, with separate paths for bicycles and pedestrians.

Cottonwood Bay – Cottonwood Bay spans from the Willamette River Central into South Reach. Cottonwood Bay is one of the larger natural resources areas in the Central/South Reach and provides many riparian corridor and wildlife habitat functions. The larger northern embayment is approximately 1.2 acres in size and the southern embayment is approximately 0.6 acres. The banks are primarily non-vegetated and vegetated riprap with an abandoned concrete boat ramp in the northern embayment. There is a grove of large cottonwoods along the innermost banks of the two embayments. The water within the embayment is shallow, and the bottom is hard ground within the northern embayment, and sand in the southern embayment.

Inventory site WR18 is part of the Pacific Flyway and is utilized by over 200 resident and migratory bird species, including iconic species such as great blue heron, osprey, peregrine falcon and bald eagle. Species use the open water habitat for foraging and as a migratory corridor. Avian species also use man-made structures for perching, resting and foraging. Shallow water areas and exposed sand and mud are used by shorebirds and waterfowl. Vegetation on the banks, including trees and shrubs, are used by Neotropical migratory songbirds.

The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, temperature, and various other toxics and heavy metals (see Table 22). TMDLs for bacteria and

temperature as well as a phased TMDL for mercury were established in 2006. Oregon Water Quality Index values from 2001 to 2010 for the Lower Willamette River in Portland have been fair and the trend is steady.

Table 22: 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-round	1998, 2002	Fishing, drinking water, resident fish and aquatic life, anadromous fish passage
Heavy Metals (iron, manganese, mercury)	Year-round	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

Due to the presence of mercury, PCBs, dioxins and mainly legacy pesticides (DDT, dieldrin) in Willamette River fish tissue, a fish advisory for the mainstem recommends that people, especially pregnant or breastfeeding women, limit or avoid consuming fatty fish such as carp, bass and catfish. There is no restriction on the consumption of salmon or steelhead. The Lower Willamette River in Portland is deemed unsafe for swimming during and immediately after sewer overflows as a result of larger storm events. However, since 2011, such overflows are exceedingly rare (about one every three years) during the summer recreating season.

The flood area of the Willamette River spreads out wider in this inventory site than in the rest of the reach. The flood area in South Waterfront is undergoing development, including filling which will reduce the amount of flood capacity. The developed flood plain provides the function of water storage during events like the 1996 flood.

Landscape Vegetation and Street Trees

For purposes of the Natural Resources Inventory mapping and modeling, only vegetation patches at least ½ acre in size are captured. However, smaller landscaped areas and individual street trees also provide functions, including cleaning and cooling the air and water, capturing greenhouse gases, capturing and uptaking stormwater, reducing energy demand and providing wildlife habitat (Map 15: High/Low Structure Vegetation).

Map 27: South Waterfront High and Low Structure Vegetation

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 approach used to generate the relative ranks is summarized in the introduction to the inventory sites. Additional detail is provided in Chapter 2: Project Approach and Methodology Overview and Appendix E: Natural Resources Inventory: Riparian Corridors and Wildlife Habitat Project Report.

All of the ranked resource areas provide at least some important riparian and habitat value, recognizing that current condition and function levels may vary considerably. The relative ranks can inform planning projects and programs, including regulations, design of development or redevelopment projects, and mitigation and restoration activities.

Riparian Areas

The site contains the Willamette River and river bank, flood area and riparian vegetation. These features contribute to the riparian functions as detailed in the natural resource descriptions, specifically:

- Microclimate and shade
- Stream flow moderation and water storage
- Bank functions, 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 itself. High and medium relative functional ranks are assigned to vegetated, non-hardened river banks or flood areas. Low relative ranks are generally assigned to non-vegetated flood area and hardened, non-vegetated river banks.

Wildlife Habitat

Within the context of this inventory model, a wildlife habitat patch is defined as forest and/or wetland areas 2 acres in size or greater, including adjacent woodland vegetation (note: Special Habitat Areas may be smaller and may contain different types of vegetation or other resource features). The model assigns relative ranks to qualifying habitat patches based on their size, interior area, proximity to other patches and proximity to water.

Site WR18 contains no forests and/or wetland areas 2 acres or larger in size.

Special Habitat Areas (SHA) consist of rare and declining habitat types and unique features that provide critical habitat for at-risk plant and animal species 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, and include:

- Willamette River, including shallow water habitat areas, are designated SHA because they meet the following criteria:
  (S) – An at-risk species uses the habitat area or feature on more than an incidental basis to complete one or more life history phases
  (M) – Migratory stopover habitat
  (C) – Wildlife connectivity corridor

Combined Relative Riparian/Wildlife Habitat Ranking

Where areas that are 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.

Table 23: Summary of Ranked Resources in WR18 – South Waterfront

Total Inventory Site = 243				
	High	**Medium**	**Low**	**Total**
Riparian Resources*				
acres	74	14	47	135
percent total inventory site area	30	6	19	55
Wildlife Habitat				
Wildlife Habitat*				
acres	0	0	0	0
percent total inventory site area	0	0	0	0
Special Habitat Areas**				
acres	68			
percent total inventory site area	28			
Wildlife Habitat - adjusted by Special Habitat Areas***				
acres	68	0	0	68
percent total inventory site area	28	0	0	28
Combined Total***				
acres	74	13	47	135
percent total inventory site area	30	6	19	55

* High-ranked riparian resources, Special Habitat Areas, and wildlife habitat include the Willamette River.
** Special Habitat Areas rank high for wildlife habitat.
*** Because riparian resources, Special Habitat Areas, and wildlife habitat overlap, the results cannot be added together to determine the combined results.

Natural Resource Protection Recommendation

The Willamette River and associated floodplain and riparian areas in resource site WR18 have been significantly reduced in extent, simplified and degraded over time. The remaining natural resource areas are fragmented and impacted by adjacent development. However, the natural resource areas also provide the remaining habitat for fish and wildlife that reside in and migrate through this highly urbanized environment. The importance of the remaining natural resource areas is underscored by the relationship to the regional ecosystem and migration corridors.

In addition to being a significant area for fish and wildlife; the South Waterfront District is an important and unique area for employment, commerce, transportation, housing, social services, education and recreation.

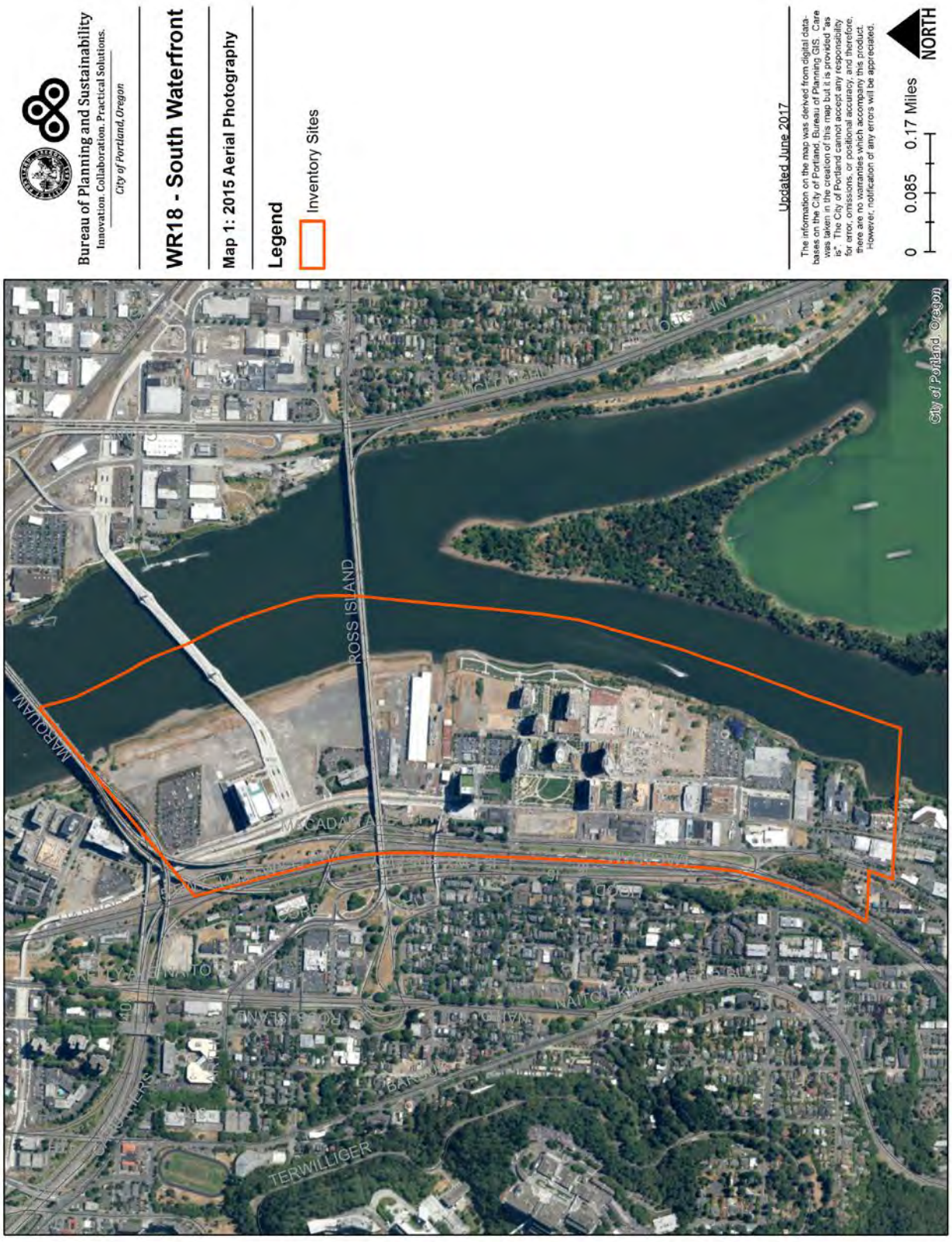
The general recommendation, shown on Map 7, balances the environmental, economic and social consequences of protecting natural resources. The resource site is a highly developed area and impacts from conflicting uses cannot be fully avoided. Allowing some future development in natural resource area is inevitable, particularly development associated with utilities and public infrastructure. However, conflicting uses should be limited overall.

The recommendation for riparian areas is to:

1. Provide the highest level of protection by strictly limiting conflicting uses within areas of high ranked riparian areas, including area located below the top of bank of the Willamette River and its tributaries and within the undeveloped floodplain.
2. Provide a moderate level of protection by limiting conflicting uses within medium ranked riparian areas.
3. Provide a minimum level of protection by limiting conflicting uses with the developed floodplain, which typically receives a low rank.
4. Allow conflicting uses within low ranked natural resource areas outside of the floodplain.

The recommendation for wildlife habitat areas outside of riparian areas is to:

1. Maintain the current level of protections applied by previously adopted natural resources protection and management plans or through Title 11, Trees.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WR18 - South Waterfront
Map 1: 2015 Aerial Photography
Legend
Inventory Sites
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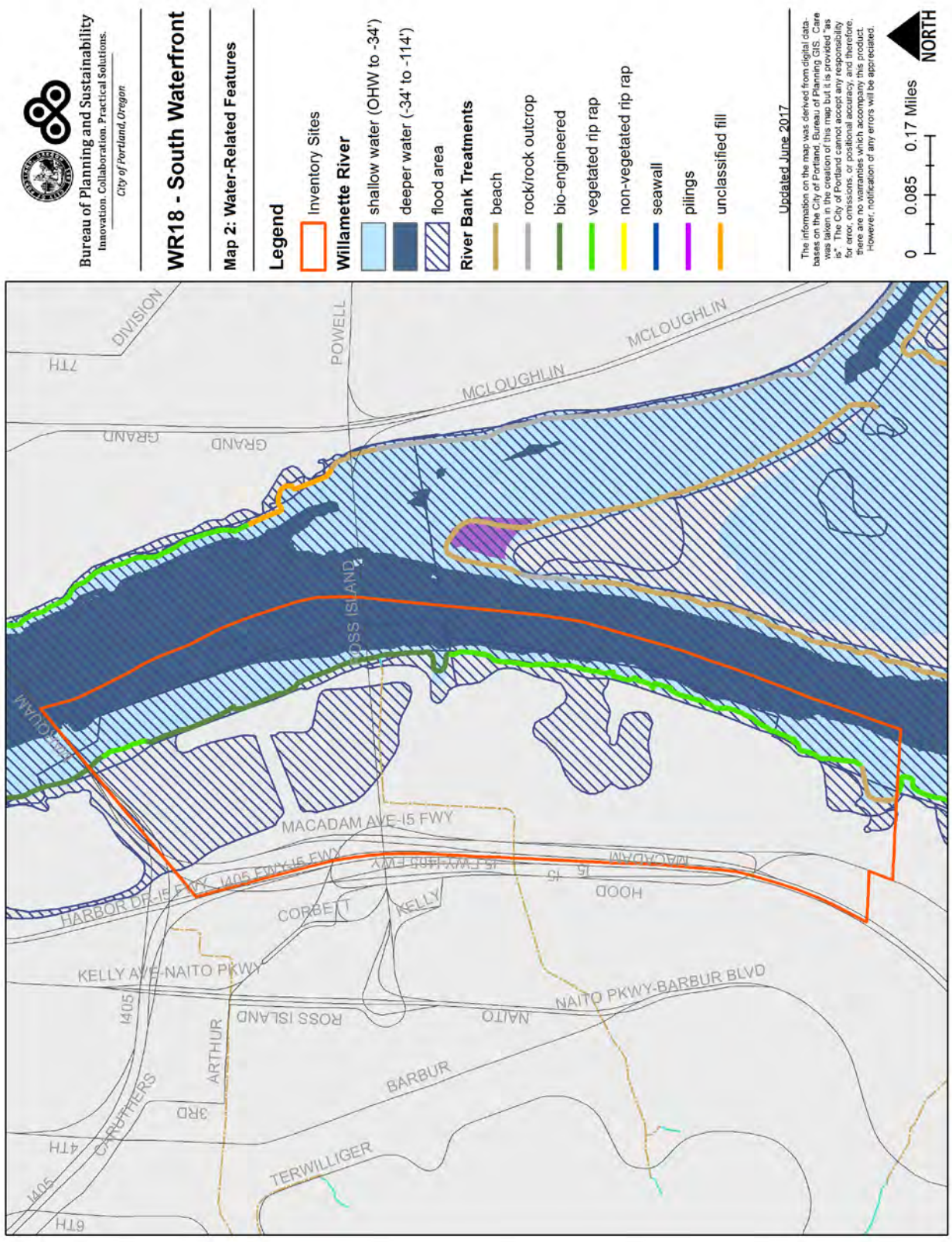
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Map 2: Water-Related Features
Legend
Inventory Sites
Willamette River
shallow water (OHW to -34')
deeper water (-34' to -114')
flood area
River Bank Treatments
beach
rock/rock outcrop
bio-engineered
vegetated rip rap
non-vegetated rip rap
seawall
pilings
unclassified fill
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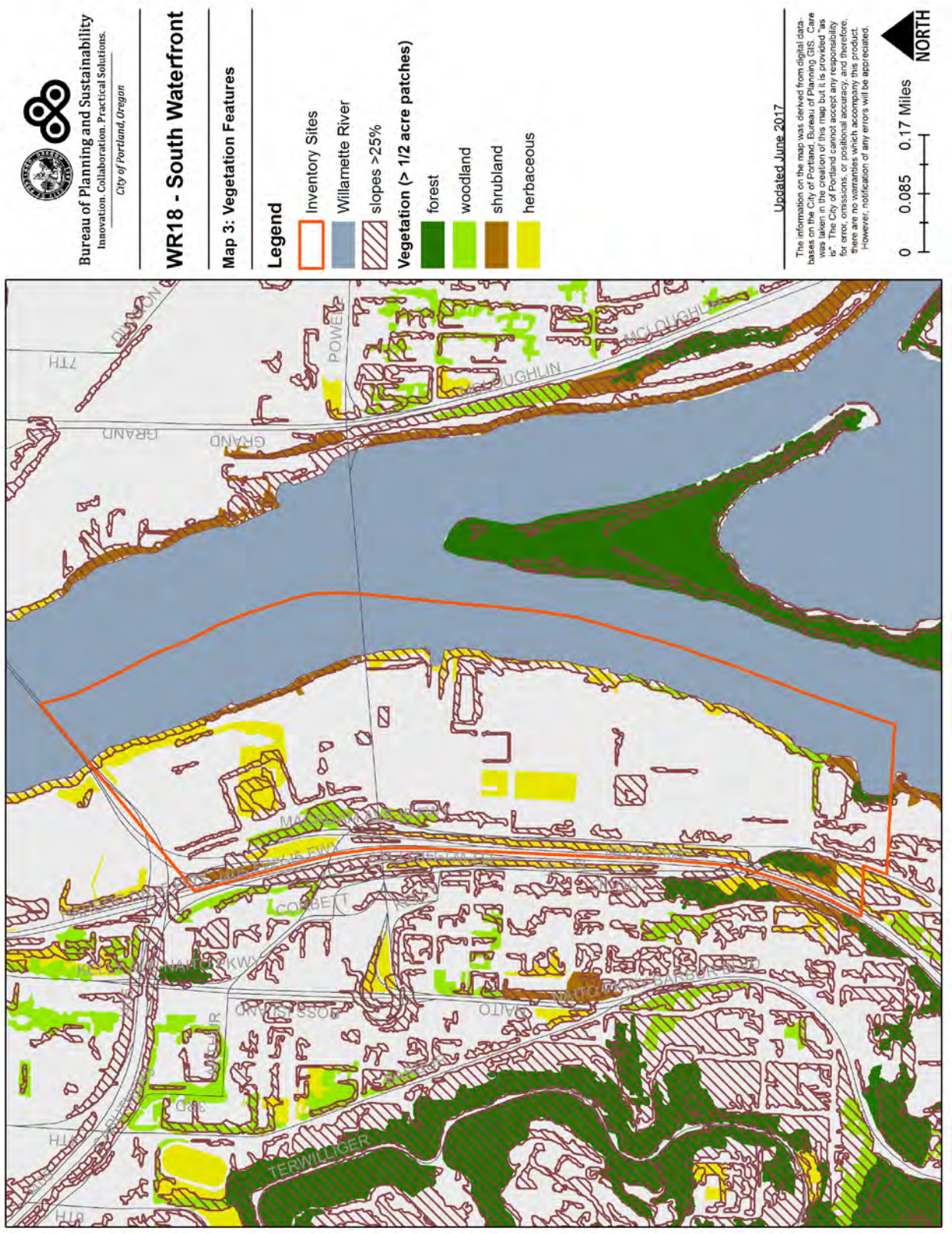
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Map 3: Vegetation Features
Legend
Inventory Sites
Willamette River
slopes >25%
Vegetation (> 1/2 acre patches)
forest
woodland
shrubland
herbaceous
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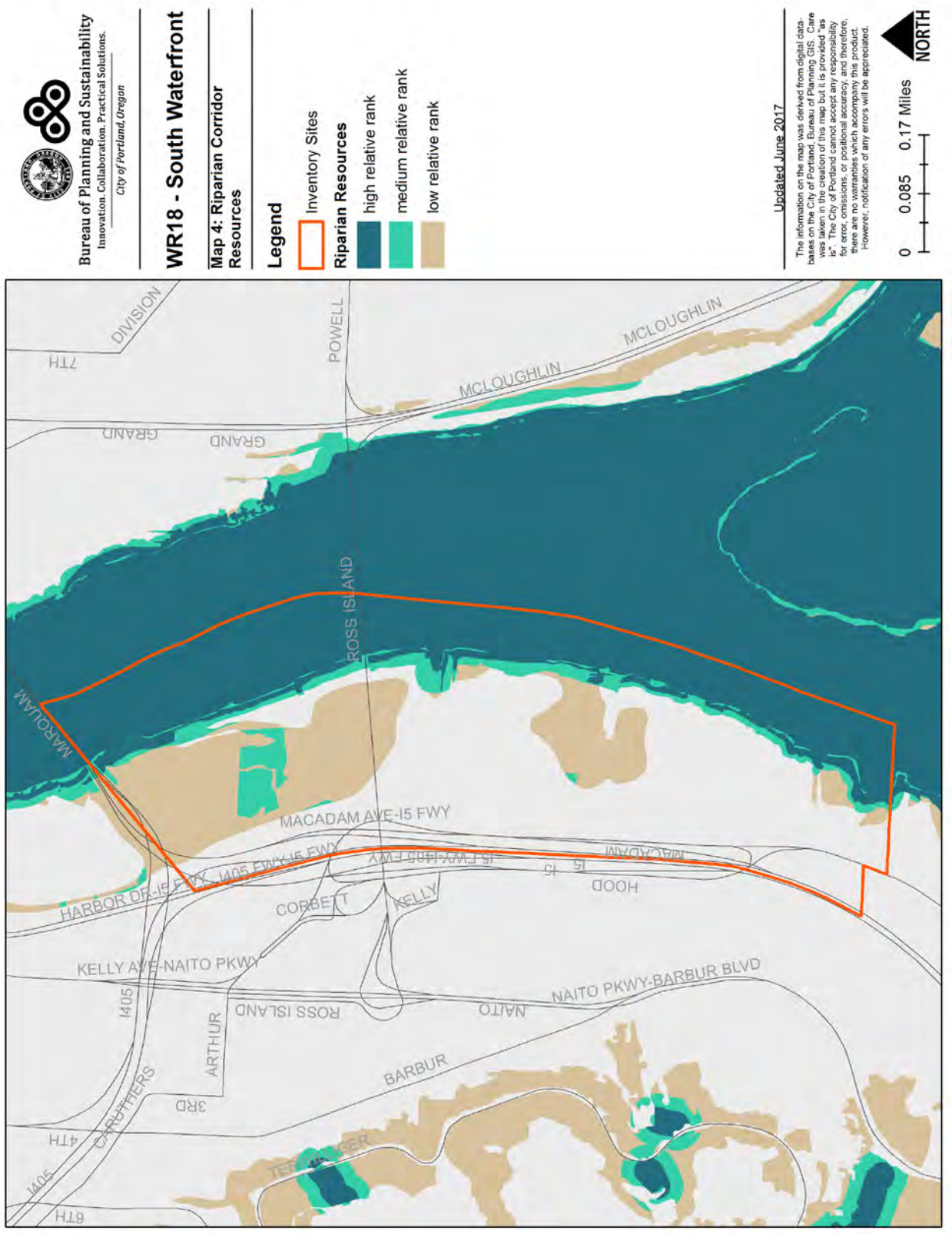
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Map 4: Riparian Corridor Resources
Legend
Inventory Sites
Riparian Resources
high relative rank
medium relative rank
low relative rank
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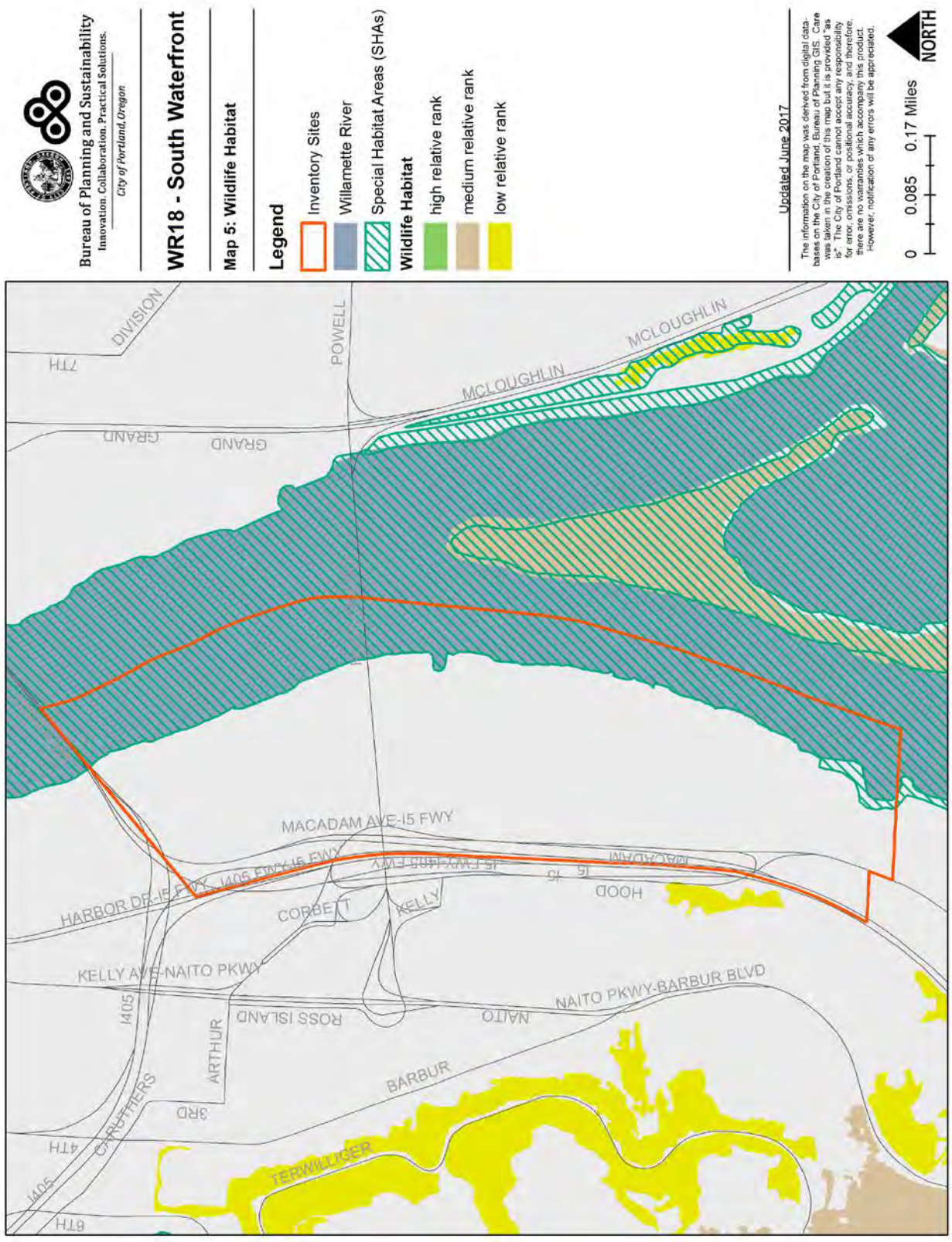
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Map 5: Wildlife Habitat
Legend
Inventory Sites
Willamette River
Special Habitat Areas (SHAs)
Wildlife Habitat
high relative rank
medium relative rank
low relative rank
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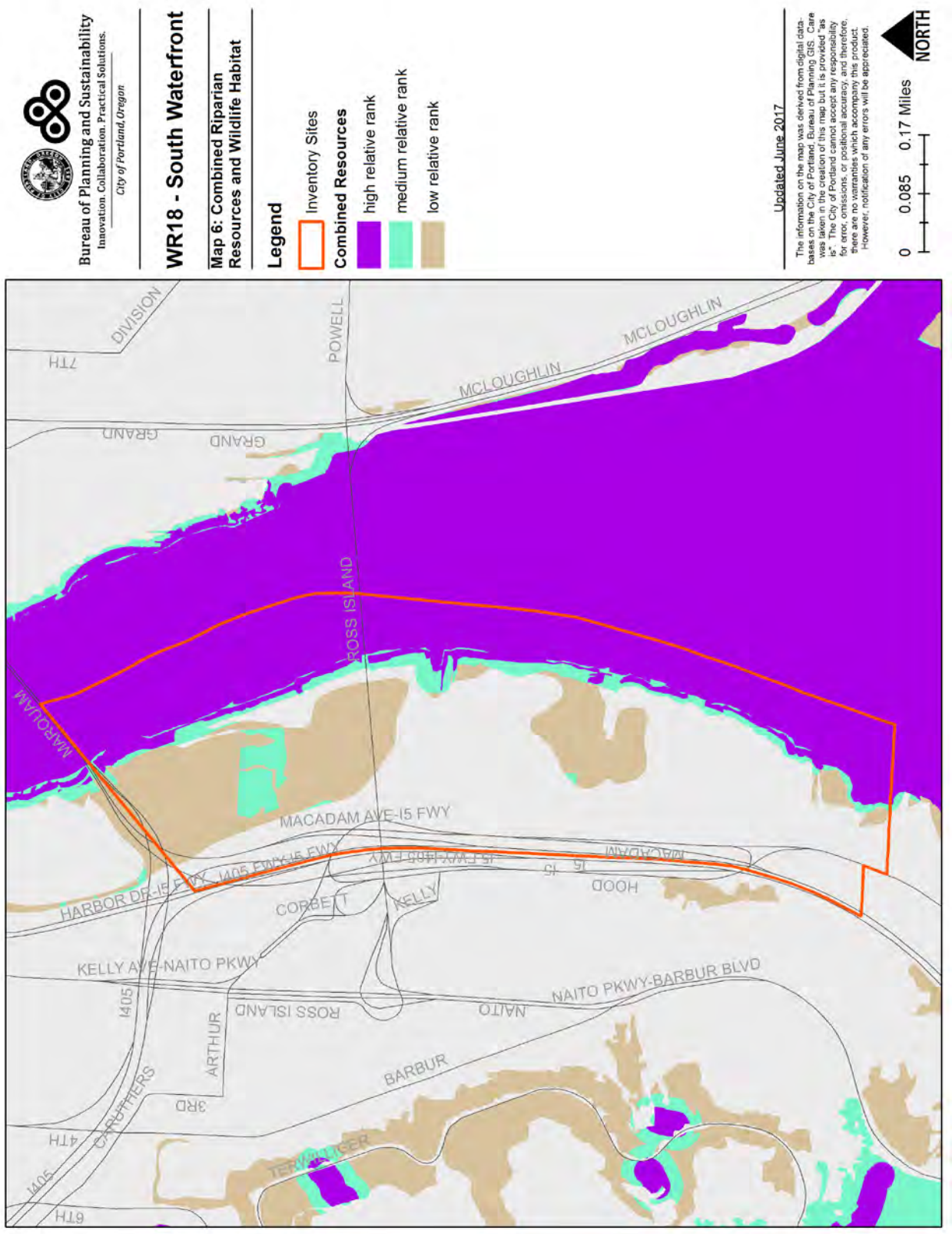
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WR18 - South Waterfront
Map 6: Combined Riparian Resources and Wildlife Habitat
Legend
Inventory Sites
Combined Resources
high relative rank
medium relative rank
low relative rank
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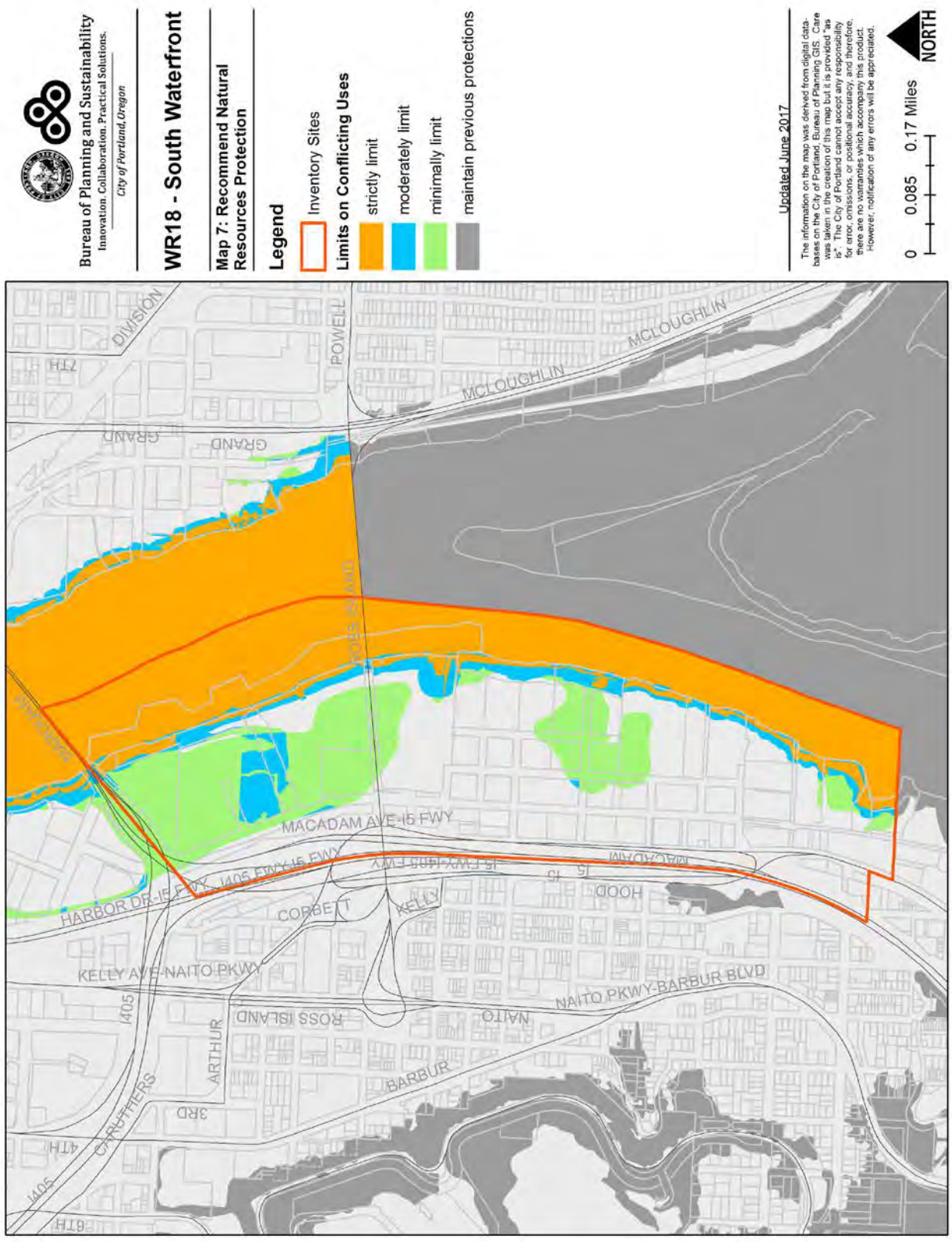
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Map 7: Recommend Natural Resources Protection
Legend
Inventory Sites
Limits on Conflicting Uses
strictly limit
moderately limit
minimally limit
maintain previous protections
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