

City of Portland, Oregon

**TERRESTRIAL ECOLOGY
ENHANCEMENT STRATEGY**

SUMMARY AND UPDATE



June 28, 2011

Contents

Section	Page
EXECUTIVE SUMMARY	iii
1: BACKGROUND	1-1
Why Does Portland Need a Terrestrial Ecology Enhancement Strategy?	1-1
Main Elements	1-2
Teams	1-3
City TEES Team	1-3
Technical Advisory Group	1-3
2: UPDATED INFORMATION	2-4
Special Status Species—Wildlife	2-4
Special Status Species—Plants	2-7
Special Status Habitats	2-8
Landscape and Urban Habitat Features	2-8
Threats and Limiting Factors	2-9
Key Management Issues	2-9
Species of Management Concern	2-11
Plants	2-11
Animals	2-12
TEES Mapping	2-16
3: WATERSHED-SPECIFIC OBJECTIVES	3-19
Introduction	3-19
Willamette Watershed	3-21
Columbia Slough Watershed	3-27
Columbia River Watershed	3-31
Tryon Creek Watershed	3-33
Fanno Creek Watershed	3-34
Johnson Creek Watershed	3-36
4: STRATEGIES AND PRIORITY ACTIONS	4-40
Introduction	4-40
Willamette Watershed	4-40
Columbia Slough Watershed	4-41
Columbia River Watershed	4-43
Tryon/Fanno Creek Watersheds	4-43
Johnson Creek Watershed	4-44

5:	GUIDANCE FOR IMPROVING TERRESTRIAL HABITAT	5-45
	TEES Site Assessment Forms	5-45
	Guidance Documents	5-46
	Specific Requests	5-46
	Desired Future Conditions	5-47
6:	MONITORING	6-48
	Habitats and Biological Communities	6-48
	Watershed Health Monitoring	6-49
	Project-Level and Species-Level Monitoring	6-49
7:	PROJECTS	7-53
	Citywide	7-53
	Willamette Watershed	7-54
	Columbia Slough Watershed	7-57
	Tryon/Fanno Creek Watersheds	7-58
	Johnson Creek Watershed	7-59
8:	OUTREACH AND EDUCATION	8-61
9.	FUTURE WORK	9-64
10.	ATTACHMENTS	10-67
	A: Vertebrate Wildlife Species for Portland, Oregon	
	B: Special Status Species—Wildlife	
	C: Example of Special Status Wildlife Database Information	
	D: Special Status Species—Plants	
	E: Special Status Habitats	
	F: Landscape and Urban Habitat Features	
	G: Threats and Limiting Factors	
	H: TEES Site Assessment Short Form	
	I: TEES Site Assessment Long Form	
	J: Using the TEES Site Assessment Forms	
	K: TEES Site Report Template	
	L: Guidance: “Avoiding Impacts on Nesting Birds During Construction and Revegetation Projects”	
	M: Guidance: “Living with American Beavers”	
	N: Portland Bird Agenda	
	O: Wildlife of Portland Poster	
	P: “Dogs for the Environment brochure and pledge form	
	Q: “Portland’s Sensitive Wildlife and Your Dog” brochure and poster	
	R: Oaks Bottom Wildlife Refuge Bird Checklist	
	S: Mt. Tabor Bird Checklist	

Executive Summary

Portland City Council adopted the *Portland Watershed Management Plan* and its supporting scientific foundation document, the *Framework for Integrated Management of Watershed Health* in March 2006. These established a definition of healthy urban watersheds; scientific principles and guidelines; a science-based watershed management approach; citywide watershed health goals and objectives for hydrology, physical habitat, water quality and biological communities; and strategies and actions for the next 2-5 years. The goals and objectives included both aquatic and terrestrial environments, but were aquatic-focused. Development of a Terrestrial Ecology Enhancement Strategy (TEES) was subsequently embarked upon in 2006. A multi-bureau city team coordinated the TEES work, with assistance from a technical advisory group--the Terrestrial Ecology Enhancement Strategy Advisory Group (TEESAG).

The purpose of the TEES is to have a common body of information and agreed-upon priorities for conservation and restoration of terrestrial plant and animal species and habitats in Portland within a regional and state context. The TEES is designed to help achieve the watershed health goals and objectives in the *Portland Watershed Management Plan*.

The main elements of the TEES include:

- Identification of plant and animal species and terrestrial habitats needing protection, conservation, and/or restoration
- Identification of key management issues
- Articulation of watershed-specific objectives for terrestrial habitats and biological communities
- Identification and implementation of priorities and actions for the next 2-5 years
- Guidance to city bureaus and citizens for improving habitat and addressing plant and wildlife management issues
- Selection of species and habitats to be monitored over time to determine the health of biological communities in Portland's urban watersheds

This *Summary and Update* summarizes the TEES and provides updated information as of June 2011 for each of these elements. It also identifies future work that will help the City achieve its watershed goals and objectives.

SECTION 1

Background

WHY DOES PORTLAND NEED A TERRESTRIAL ECOLOGY ENHANCEMENT STRATEGY?

Portland's City Council adopted the *Portland Watershed Management Plan (PWMP)* (<http://www.portlandonline.com/bes/index.cfm?c=38965>) and its supporting scientific foundation document, the *Framework for Integrated Management of Watershed Health (Framework)* (<http://www.portlandonline.com/bes/fish/index.cfm?c=33528>) in March 2006 (Resolution 36384). Together, these established a definition of healthy urban watersheds in Portland; scientific principles and guidelines; a science-based watershed management approach; citywide watershed health goals and objectives for hydrology, physical habitat, water quality, and biological communities; and strategies and actions for the next 2 to 5 years.

Watershed Health Goals

Hydrology—Move toward normative stream flows conditions to protect and improve watershed and stream health, channel functions, and public health and safety.

Physical Habitat—Protect, enhance and restore aquatic and terrestrial habitat conditions and support key ecological functions and improved productivity, diversity, capacity, and distribution of native fish and wildlife populations and biological communities

Water Quality—Protect and improve surface water and groundwater quality to protect public health and support native fish and wildlife populations and biological communities.

Biological Communities—Protect, enhance, manage and restore native aquatic and terrestrial species and biological communities to improve and maintain biodiversity in Portland's watersheds.

Although the City's watershed health goals include both the aquatic and the terrestrial environments, the objectives and actions in the *PWMP* are largely focused on the aquatic environment. The *PWMP* identified as a high priority the development and integration of a terrestrial component into watershed management. A Terrestrial Ecology Enhancement Strategy (TEES) was subsequently embarked upon in 2006. Work accomplished or underway was previously summarized in *TEES Summary and Update* documents dated August 2007 and

June 2010. This June 2011 *TEES Summary and Update* presents the most recent information for the TEES and supersedes the August 2007 and June 2010 versions.

The purpose of the TEES is to have a common body of information and agreed-upon priorities for conservation and restoration of terrestrial plant and animal species and habitats in Portland, within a regional and state context. The TEES is designed to help achieve the watershed health goals and objectives in the *PWMP*.

The information assembled during the development of the TEES (see “Main Elements” below) is available to BES watershed teams to supplement existing watershed characterizations; inform the selection and prioritization of actions; add value to projects and other actions; determine monitoring priorities; and support and inform the Grey to Green (G2G) project.¹ The TEES work also supports and informs an array of other City programs, plans, activities, projects, and decision-making processes, including the *Portland Plan* update, environmental regulatory improvement, parks and natural area management, and local bond share land acquisition.

In addition, the TEES supports efforts of Metro (e.g., Nature in Neighborhoods, Intertwine and the Regional Conservation Strategy), the U.S. Fish and Wildlife Service, the Oregon Department of Fish and Wildlife (e.g., the *Oregon Conservation Strategy*), the Oregon Watershed Enhancement Board, and the Northwest Power and Conservation Council’s sub-basin planning.

MAIN ELEMENTS

The main elements of the TEES include:

- Identification of plant and animal species and terrestrial habitats needing protection, conservation, and/or restoration (Special Status Species and Habitats)
- Identification of key management issues (e.g., invasive species)
- Articulation of watershed-specific objectives for terrestrial habitats and biological communities
- Identification and implementation of priorities and actions for the next 2 to 5 years, as well as identification of long-term actions
- Guidance to City bureaus and citizens for improving habitat and addressing plant and wildlife management issues
- Selection of species and habitats to be monitored over time to determine the health of biological communities in Portland’s urban watersheds

¹ Grey to Green is a 5-year effort that will complement ongoing BES implementation of the *Portland Watershed Management Plan* and the City’s *Stormwater Management Manual*. Key components of Grey to Green are:

- Acquiring land for habitat enhancement and watershed health.
- Increasing pervious surfaces through ecoroofs and green street facilities.
- Increasing the tree canopy by planting street and yard trees.
- Removing invasive weeds and increasing revegetation and restoration planting.
- Replacing culverts that block fish passage.

This *TEES Summary and Update* provides updated information as of June 2011 for each of these elements. A new section was added to this 2011 Summary and Update—Outreach and Education.

TEAMS

A multi-bureau team coordinates the citywide TEES work, with occasional assistance from a technical advisory group.

City TEES Team

- Claire Puchy, Bureau of Environmental Services (BES) – Science, Fish and Wildlife Division (lead)
- Chris Prescott, BES – Science, Fish and Wildlife Division
- Cindy Studebaker, BES – Science, Fish and Wildlife Division (through 2009)
- Melissa Brown, BES – Science, Fish and Wildlife Division
- Shannah Anderson, BES – Science, Fish and Wildlife Division
- David Helzer, BES – Columbia Slough Watershed
- Jennifer Devlin, BES – Fanno/Tryon Watershed
- Paul Ketcham, BES – Willamette Watershed
- Mary Bushman, BES – Willamette Watershed
- Ali Young, BES – Johnson Creek Watershed
- Jennifer Antak, BES – Johnson Creek Watershed
- James Allison, BES – Revegetation Program (through 2010)
- Roberta Jortner, Bureau of Planning and Sustainability
- Deborah Lev, Bureau of Parks and Recreation (through 2008)
- Emily Roth, Bureau of Parks and Recreation
- Lynn Barlow, Bureau of Parks and Recreation

Technical Advisory Group

The Terrestrial Ecology Enhancement Strategy Advisory Group (TEESAG) is a technical working sub-group of the City’s Watershed Advisory Committee (formerly called the Watershed Science Advisory Group). It also includes several additional members with expertise in terrestrial ecology, especially as it applies to urban areas in general and Portland in particular. The TEESAG meets on an as-needed basis. Members have included:

- Jennifer Thompson, U.S. Fish and Wildlife Service
- Lori Hennings and Paul Ketcham, Metro, Nature in Neighborhoods
- Tom Calabrese, EnviroLogic Resources, Inc.; Tryon Creek Watershed Council
- Bob Sallinger, Audubon Society of Portland
- Susan Barnes, Oregon Department of Fish and Wildlife
- Bruce McClelland, Multnomah County Drainage District
- Elaine Stewart, Metro, Parks and Greenspaces Science Team
- Dorothy Sperry (Christy Galen, alternate), Port of Portland

SECTION 2

Updated Information

SPECIAL STATUS SPECIES—WILDLIFE

As part of the TEES work, the City has refined Metro’s comprehensive wildlife species list to include those vertebrate wildlife species that are known to occur in Portland or that could occur, given their natural ranges and habitat requirements (Attachment A). Special Status Species were identified as those wildlife species whose range includes Portland *and* that are officially listed or identified in one or more of the following ways by various entities:

- U.S. Fish and Wildlife Service: Candidate, Listed Threatened or Endangered, Species of Concern
- Oregon Department of Fish and Wildlife: Listed Threatened or Endangered, State Sensitive, or State Strategy (*Oregon Conservation Strategy*)
- Oregon Natural Heritage Information Center: Ranked or Listed
- Oregon Watershed Enhancement Board: Priority
- Partners In Flight: Focal Species
- Northwest Power and Conservation Council *Willamette Basin Subbasin Plan*: Focal Species
- National Audubon Society: Watch List

The City’s Special Status Species list is informational and is provided to help land managers and planners identify actions that will help protect, restore, and enhance the identified wildlife species.

The original Special Status Species list was updated in 2009, primarily to reflect changes in the Oregon Department of Fish and Wildlife’s Sensitive Species list (Attachment B). As of the date of this report, there are 76 wildlife Special Status Species in Portland: 2 amphibians, 2 reptiles, 58 birds, and 14 mammals, as identified below.

AMPHIBIANS

Clouded salamander	<i>Aneides ferreus</i>
Northern red-legged frog	<i>Rana aurora aurora</i>

REPTILES

Western pond turtle	<i>Actinemys marmorata</i>
Western painted turtle	<i>Chrysemys picta bellii</i>

BIRDS

American bittern	<i>Botaurus lentiginosus</i>
American kestrel	<i>Falco sparverius</i>
American white pelican	<i>Pelecanus erythrorhynchos</i>

Bald eagle	<i>Haliaeetus leucocephalus</i>
Band-tailed pigeon	<i>Columba fasciata</i>
Black-throated gray warbler	<i>Dendroica nigrescens</i>
Brown creeper	<i>Certhia americana</i>
Bufflehead	<i>Bucephala albeola</i>
Bullock's oriole	<i>Icterus bullockii</i>
Bushtit	<i>Psaltriparus minimus</i>
Chipping sparrow	<i>Spizella passerina</i>
Common nighthawk	<i>Chordeiles minor</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Downy woodpecker	<i>Picoides pubescens</i>
Dunlin	<i>Calidris alpina</i>
Great blue heron	<i>Ardea herodias</i>
Green heron	<i>Butorides virescens</i>
Hammond's flycatcher	<i>Empidonax hammondi</i>
Hermit warbler	<i>Dendroica occidentalis</i>
Hooded merganser	<i>Lophodytes cucullatus</i>
House wren	<i>Troglodytes aedon</i>
Hutton's vireo	<i>Vireo huttoni</i>
Loggerhead shrike	<i>Lanius ludovicianus</i>
Long-billed curlew	<i>Numenius americanus</i>
Merlin	<i>Falco columbarius</i>
Nashville warbler	<i>Vermivora ruficapilla</i>
Northern harrier	<i>Circus cyaneus</i>
Olive-sided flycatcher	<i>Contopus cooperi</i>
Orange-crowned warbler	<i>Vermivora celata</i>
Pacific-slope flycatcher	<i>Empidonax difficilis</i>
Peregrine falcon	<i>Falco peregrinus</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Purple finch	<i>Carpodacus purpureus</i>
Purple martin	<i>Progne subis</i>
Red crossbill	<i>Loxia curvirostra</i>
Red-eyed vireo	<i>Vireo olivaceus</i>
Red-necked grebe	<i>Podiceps grisegena</i>
Rufous hummingbird	<i>Selasphorus rufus</i>
Short-eared owl	<i>Asio flammeus</i>
Sora	<i>Porzana carolina</i>
Streaked horned lark	<i>Eremophila alpestris strigata</i>
Swainson's hawk	<i>Buteo swainsoni</i>
Swainson's thrush	<i>Catharus ustulatus</i>

Thayer's gull	<i>Larus thayeri</i>
Varied thrush	<i>Ixoreus naevius</i>
Vaux's swift	<i>Chaetura vauxi</i>
Vesper sparrow	<i>Pooecetes gramineus</i>
Western meadowlark	<i>Sturnella neglecta</i>
Western sandpiper	<i>Calidris mauri</i>
Western wood-pewee	<i>Contopus sordidulus</i>
White-breasted (slender-billed) nuthatch	<i>Sitta carolinensis aculeata</i>
White-tailed kite	<i>Elanus leucurus</i>
Willow flycatcher (little)	<i>Empidonax traillii brewsteri</i>
Wilson's warbler	<i>Wilsonia pusilla</i>
Winter wren	<i>Troglodytes troglodytes</i>
Wood duck	<i>Aix sponsa</i>
Yellow warbler	<i>Dendroica petechia</i>
Yellow-breasted chat	<i>Icteria virens</i>

MAMMALS

American beaver	<i>Castor canadensis</i>
California myotis	<i>Myotis californicus</i>
Camas pocket gopher	<i>Thomomys bulbivorus</i>
Fringed myotis	<i>Myotis thysanodes</i>
Hoary bat	<i>Lasiurus cinereus</i>
Long-eared myotis	<i>Myotis evotis</i>
Long-legged myotis	<i>Myotis volans</i>
Northern river otter	<i>Lontra canadensis</i>
Red tree vole	<i>Arborimus = Phenacomys longicaudus</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Townsend's big-eared bat	<i>Corynorhinus townsendii townsendii</i>
Western gray squirrel	<i>Sciurus griseus</i>
White-footed vole	<i>Arborimus = Phenacomys albipes</i>
Yuma myotis	<i>Myotis yumanensis</i>

The City has established a searchable database that includes all of these wildlife species and the entities that have listed them (Attachment C). Information about the species' habitat associations, life history information, and limiting factors (where known) are being added to the database. City staff are exploring the potential for populating the database with information about Special Status Species documented during TEES-related field assessments.

“SPECIAL STATUS” SPECIES—PLANTS

The City has compiled a Special Status Species list for plants that comprise species in Multnomah County that are designated as Ranked or Listed by the Oregon Natural Heritage Information Center (except those species that are demonstrably widespread, abundant, and secure) (Attachment D). The list will be reviewed by botanists and ecologists familiar with the Portland area and updated as needed. The City’s Special Status Species list is informational and is provided to help land managers and planners identify actions that will help protect, restore, and enhance the identified plant species.

Species currently on the City’s Special Status Species plant list are:

Howell’s bentgrass	<i>Agrostis howellii</i>
Tall bugbane	<i>Cimicifuga elata</i> var. <i>elata</i>
White rock larkspur	<i>Delphinium leucophaeum</i>
Peacock larkspur	<i>Delphinium pavonaceum</i>
Water howellia	<i>Howellia aquatilis</i>
Columbian yellowcress, Columbia cress	<i>Rorippa columbiae</i>
Columbian white-top aster	<i>Sericocarpus rigidus</i> (syn <i>Aster curtus</i>)
Oregon sullivantia (coolwort)	<i>Sullivantia oregana</i>
Golden Indian-paintbrush	<i>Castilleja levisecta</i>
Northern wormwood	<i>Artemisia campestris</i> var. <i>wormskioldii</i>
Bristly sedge	<i>Carex comosa</i>
Long-bracted knotsheath retrorse sedge	<i>Carex retrorsa</i>
Upland Nuttall’s larkspur	<i>Delphinium nuttallii</i>
Indian rice/black lilly	<i>Fritillaria camschatcensis</i>
Salt heliotrope	<i>Heliotropium curassavicum</i>
Toothcup	<i>Rotala ramosior</i>
Columbia water-meal	<i>Wolffia Columbiana</i>
Sierra mock-stonecrop	<i>Sedella pumila</i>
Grand redstem (loosestrife family)	<i>Ammannia robusta</i>
Nuttall’s waterweed	<i>Elodea nuttallii</i>
Holy grass	<i>Hierochloa odorata</i>
Dotted smartweed	<i>Polygonum punctatum</i>
Pale bulrush	<i>Scirpus pallidus</i>
Golden Alexanders	<i>Zizia aptera</i>
Texas bergia	<i>Bergia texana</i>
Oregon bolandra	<i>Bolandra organa</i>
Mountain lady’s slipper	<i>Cypripedium montanum</i>
Western wahoo	<i>Euonymus occidentalis</i>
Howell’s montia	<i>Montia howellii</i>
Loose-flowered bluegrass	<i>Poa laxiflora</i>
Weak bluegrass	<i>Poa marcida</i>
Meadow checker-mallow	<i>Sidalcea campestris</i>

SPECIAL STATUS HABITATS

A variety of habitat classification systems are in use in the Pacific Northwest. City staff decided to use a classification system developed by Johnson and O'Neil (1999) because it has been widely used by Metro, as well as by state and federal agencies. All habitat types in Portland were identified. Following that, habitat types considered as having special significance (because they are State Strategy Habitats in the *Oregon Conservation Strategy* http://www.dfw.state.or.us/conservationstrategy/read_the_strategy.asp or are of particular importance in Portland and the Metro area) were identified as Special Status Habitats. These are:

- Herbaceous wetlands
- Upland prairie and native grasslands
- Oak woodlands
- Interior forests
- Late successional conifer forests
- Bottomland hardwood forests and riparian habitats

These habitat types are described in a separate document, along with their status, threats and limiting factors (Attachment E).

The TEES team is in the process of identifying the historic and current locations of Special Status Habitat types in Portland, starting with oak woodlands and interior forest habitats.

LANDSCAPE AND URBAN HABITAT FEATURES

Some features—both natural and human-made—are not habitat types based on vegetation classification systems. Nonetheless, they are important to wildlife for feeding, resting, roosting, nesting, etc. (see Attachment F). For example, natural landscape features are important for wildlife (e.g., tidal mudflats are important for shorebirds; rock outcrops are important for certain birds and reptiles). Some human-constructed urban habitat features provide important functions for wildlife (e.g., certain bridges serve as roosts for bats and nesting sites for peregrine falcons).

Natural Landscape Features include:

- Beaches, mudflats and intertidal areas
- Buttes
- Riverine islands and river deltas
- Rock habitats

Urban Features include:

- Bridges
- Channel markers, utility poles and utility towers
- Chimneys
- Corridors between patches or habitats
- Ecoroofs

- Neighborhood tree canopy and backyard habitats
- Structural habitat features such as nest boxes, platforms and bat boxes
- Wildlife crossings (typically under roads)

THREATS AND LIMITING FACTORS

Threats are the human actions that cause adverse changes in the habitat; the changes may be severe enough to become limiting factors. Limiting factors are environmental elements that limit the growth, abundance, or distribution of a population. For example, the absence of old, hollow trees is a limiting factor for some bat species; the cutting of such trees for human safety reasons may comprise the threat. Identifying the key limiting factors for particular species is very important in determining what actions are most needed and will be most effective in restoring biological communities.

The City has developed a list of limiting factors, grouped by major categories and numbered (Attachment G). These limiting factors are linked to species and habitat tables, matrices, and databases. The main categories of limiting factors are:

- Biological Stressors
- Climate Change
- Disruption of Natural Disturbance Regimes
- Habitat Change
- Degradation and Loss
- Habitat Fragmentation and Access
- Human Disturbance
- Pollution

KEY MANAGEMENT ISSUES

Urban and rural areas share similar challenges—habitat fragmentation and invasive species, for example. However, urban areas face some unique wildlife and habitat management issues that require unique actions and partnerships. The Terrestrial Ecology Enhancement Strategy Advisory Group (TEESAG) helped City staff identify such issues in the Portland area and possible actions and partnerships to address them. The issues are organized according to the *Oregon Conservation Strategy* categories (below):

- Land Use Changes
- Invasive Species
- Disruption of Natural Disturbance Regimes
- Access/Barriers to Fish and Wildlife Movement
- Water Quantity and Quality
- Institutional Barriers to Voluntary Conservation
- Wildlife Disturbances and Hazards

The City added an additional category (“Other”) to accommodate several identified issues that do not fall within the *Oregon Conservation Strategy* categories (for example, the illegal collecting of native plants and animals).

Some ways in which the City is addressing some of these key management issues include:

Land Use Changes: TEES staff provide input on a variety of individual land use decisions, as well as broader efforts such as the *Portland Plan* and *Airport Futures*.

Invasive Species: This is discussed in greater detail under “Species of Management Concern”.

Disruption of Natural Disturbance Regimes: A TEES site assessment will inform future restoration of Oregon white oak, madrone and grassland types, and address plant and animal Special Status Species on Elk Rock Island. Because natural disturbances (e.g., fire) have not recently occurred on the island, this experimental project involved thinning in 2010 and may include burning. The City hopes to learn more about how such techniques can be used to help restore oak habitats. In addition, the TEES team developed guidelines for how habitat may be enhanced for a variety of species (e.g., salmon, red-legged frogs) through beaver activities in appropriate locations, and is testing these guidelines in 2011.

Access/Barriers to Fish and Wildlife Movement: The City is considering providing passage beneath a trail at a stormwater discharge drain from a treatment swale (which may provide some nesting habitat for painted turtles) just east of NE 181st Avenue in the Columbia Slough (Big Four Corners area). At the Oaks Bottom Wildlife Refuge, an existing culvert will be replaced with a larger box culvert to enhance fish and wildlife passage and significantly improve the flow of Willamette River water in and out of the refuge. Elsewhere in the City, fish passage projects are also considering wildlife passage issues.

Water Quantity and Quality: The City is addressing this management issue through implementation of numerous actions under the hydrology, physical habitat, and water quality goals and objectives of the *PWMP*.

Wildlife Disturbances and Hazards: The TEES team supported a citywide campaign aimed at reducing disturbance to wildlife in parks and other sensitive areas. TEES information informed the development of a city “Dogs for the Environment” brochure; a “Portland’s Sensitive Wildlife and Your Dog” brochure and poster focused on keeping dogs on-leash in sensitive areas; identification of sites needing protection; employment of rangers to patrol priority areas; and placement of physical structures (e.g., fencing) at select sites. Keeping dogs on leashes, and keeping cats indoors were messages in a “Wildlife of Portland” poster produced in 2010.

The TEES team also developed guidelines for minimizing impacts on, and improving habitats for, nesting birds. “Avoiding Impacts on Nesting Birds During Construction and Revegetation Projects” were issued in March 2010, and beta-tested that year. The voluntary guidelines were refined in October 2010, and are being used by BES watershed and revegetation teams

These documents and products are described in more detail in other sections of this Summary (“Guidance for Improving Terrestrial Habitat” and “Outreach and Education”).

SPECIES OF MANAGEMENT CONCERN

The TEESAG identified invasive species (plants and animals, native and non-native) as one of the key management issues that is of management concern. Invasive species such as garlic mustard, English and Irish ivies, red-eared sliders, and nutria are just a few examples of plants and animals that have negative effects on biological communities and watershed health. Because this issue is so important, it is the focus of a significant amount of staff and volunteer time and deserves a separate section in this report.

In addition, changes to the landscape and ecosystem processes since European settlement have altered the population dynamics and survival strategies of many native species, resulting in behaviors (such as foraging strategies) that little resemble those of the pre-settlement landscape state. For example, increased human interactions with opossums, raccoons and coyotes as a result of altered habitat, human activities and modified wildlife behavior, are examples of management issues of concern in an urban environment.

Plants

The City has developed an invasive plant strategy in response to City Council Resolution 36360 (adopted in November 2005). The resolution directed the City to develop a 3-year work plan and 10-year goals that incorporate invasive plant management into existing programs. In response to Resolution 36360, an Invasive Species Coordinator position was established, and the City of Portland *Invasive Plant Strategy* (Strategy) was developed in October 2008 <http://www.portlandonline.com/bes/index.cfm?a=332727&c=47815>. The Strategy is administered by the Invasive Species Program of BES.

In August 2009, the City Council established the Strategy as the City’s management plan for invasive plants, and adopted the 10-year management goals that are outlined in the strategy report. The goals fall within the following categories:

- Policy and Code Changes
- Outreach and Education
- Coordination
- Control and Restoration

The City has been implementing the following elements of the Strategy’s 3-year work plan, which will lead to achievement of the 10-year goals:

- BES has worked with the Bureau of Planning and Sustainability (BPS) and the Bureau of Development Services (BDS) to evaluate and implement policy and code changes and enforcement requirements to improve the management of invasive plants on public and

private property. The Invasive Plant Policy Review and Regulatory Improvement Project was unanimously adopted by the Portland Planning Commission on November 10, 2009. City Council then approved the project with a unanimous vote on February 10, 2010, noted as Ordinance No. 183534. Most provisions took effect on July 1, 2010.

- BES has developed and implemented additional outreach and education programs targeted at gardeners in addition to the GardenSmart publication <http://www.portlandonline.com/bes/index.cfm?c=47570&a=197414>. BES is also providing technical guidance and training in weed identification to City employees, partners and public at no cost.
- BES is coordinating invasive plant control efforts with City bureaus, the public, regional agencies, and non-profit groups.
- BES has assisted the Portland Bureau of Parks and Recreation (PP&R) with the updating and development of Habitat Management Plans and Desired Future Conditions, and assists each bureau with identifying invasive plant control priorities.
- BES has developed and implemented a highly effective and respected Early Detection/Rapid Response (EDRR) program to control small populations of invasive plants before they become large infestations.
- BES has coordinated with the Comprehensive Plan (Portland Plan) to ensure that invasive species are addressed in the update. Through the Portland Plan, the City should establish clear and ambitious policies regarding invasive species management in the context of public health, safety, environment, and economy.
- BES continues to work with BPS to improve invasives policy and provide clear regulatory guidance to citizens, City employees, and those conducting relevant business within the City.
- BES continually assists the City with securing funding sources for implementation of invasive plant control efforts.

Council Resolution 35726 also identified the need to conduct an invasive animal assessment (see next section for details).

Animals

The TEES team developed a draft matrix of non-native animal species of management concern and presented it at a Regional Invasive Species Summit held in November 2008. One outcome of the summit was recognition of the need for the City to prepare an invasive animal assessment to define the City's role in addressing this issue locally and to support State efforts to implement invasive animal management, as outlined in the *Oregon Conservation Strategy*. Consequently, the City signed an Intergovernmental Agreement with the Oregon Department of Agriculture to

prepare an invasive animal assessment to determine the status and threats and to identify and guide management actions.

City Council's 2009 Resolution 36726 identified the need to conduct an invasive animal species assessment to determine status and threats and to identify and guide management actions. BES developed an interagency agreement with the Oregon Department of Agriculture to conduct this City-specific invasive animal assessment as part of a larger statewide assessment of invasive species. The invasive animal assessment report was completed in March 2010, and presented to City of Portland scientists, as well as the Oregon Invasive Species Council <http://www.portlandonline.com/bes/fish/index.cfm?a=284002&c=31006>.

The Assessment accomplishes several important tasks:

- Identifies invasive terrestrial and aquatic invasive wildlife species present in the City of Portland.
- Identifies invasive terrestrial and aquatic invasive wildlife species that might be likely to invade habitats in the City of Portland in the next 5 to 10 years.
- Identifies likely existing regulatory authority.
- Assesses current roles and responsibilities of entities involved with invasive terrestrial and aquatic invasive species management and education in Portland.
- Incorporates elements of the statewide assessment into the Portland assessment to establish context.
- Provides recommendations that prioritize invasive terrestrial and aquatic species.

Further, the Assessment includes the following recommendations from the Oregon Invasive Species Council:

- Develop performance measures to track progress in preventing the introduction of invasive animal species and controlling/eradicating existing invasive animal species in the City of Portland.
- Conduct a year-long awareness and engagement campaign, targeting specific audiences with key messages about prevention and control.
- Expand partnerships created by Audubon Society of Portland and the Feral Cat Coalition to enhance awareness and education about abandonment and feral pet issues and reduce numbers of animals in the City over time.
- Broaden the scope of entities that work on invasive animal issues by reaching out to organizations.

- Develop a prioritized list of species in the City and a steering committee of entities with authority for management to develop a long-range plan.
- Focus on vectors of species threatened to invade the City, and develop priority strategies to lessen the threat of invasion.
- Increase work with landowners, soil and water conservation districts, watershed councils, and other groups.
- Consider local ordinances and regulations that both discourage the spread of animal invasives and provide incentives for people to take action to lessen their spread.

The Assessment also proposes action items for other state, national, and local partners that would address these threats within the City of Portland.

A public review draft of the Assessment was presented to the Oregon Invasive Species Council early in 2010. TEES and TEESAG participated in a one-day workshop in November 2010 to discuss the Assessment, including refinements to the draft species lists and priority actions. A final report issued to the City of Portland will be the basis for an Invasive Animals Strategy.

Based on input from the TEES/TEESAG workshop, and discussions with regional and national experts and stakeholders, invasive animal lists for the City of Portland were developed.

Invasive Animal Lists for the City of Portland*

Present and established in the City of Portland	Present, but not yet established, in the City of Portland	Likely to establish in the City of Portland in the next 10 years
<p><u>Amphibians</u></p> <ul style="list-style-type: none"> ▪ American bullfrog <p><u>Birds</u></p> <ul style="list-style-type: none"> ▪ Feral, domestic duck and goose species ▪ European starling ▪ House sparrow ▪ Monk parakeet ▪ Peafowl ▪ Rock pigeon ▪ Eurasian collared dove <p><u>Invertebrates, Aquatic</u></p> <ul style="list-style-type: none"> ▪ Asian clam ▪ Siberian prawn <p><u>Invertebrates, Terrestrial</u></p> <ul style="list-style-type: none"> ▪ Bronze birch borer ▪ Brown marmorated stink bug ▪ Spotted wing drosophila ▪ Black stem borer ▪ Cherry bark tortrix ▪ Brown garden snail ▪ Banded European woodsnail ▪ Grey garden slug ▪ Three-band garden slug ▪ Yellow slug ▪ Leopard slug ▪ Greenhouse slug ▪ Dark-bodied glass snail ▪ Garlic snail ▪ Shelled slug ▪ Red slug complex ▪ Dusky arion <p><u>Mammals</u></p> <ul style="list-style-type: none"> ▪ Eastern cottontail ▪ Feral rabbit ▪ Feral cat ▪ House mouse ▪ Black rat ▪ Norway rat ▪ Eastern fox squirrel ▪ Eastern gray squirrel ▪ Virginia opossum ▪ Nutria <p><u>Reptiles</u></p> <ul style="list-style-type: none"> ▪ Red-eared slider 	<p><u>Birds</u></p> <ul style="list-style-type: none"> ▪ Mute swan <p><u>Invertebrates, Terrestrial</u></p> <ul style="list-style-type: none"> ▪ Japanese beetle ▪ Alder flea beetle <p><u>Reptiles</u></p> <ul style="list-style-type: none"> ▪ Soft-shelled turtle ▪ Box turtle ▪ Yellow-bellied slider ▪ Common snapping turtle 	<p><u>Invertebrates, Aquatic</u></p> <ul style="list-style-type: none"> ▪ Rusty crayfish ▪ Ringed crayfish ▪ New Zealand mudsnails <p><u>Invertebrates, Terrestrial</u></p> <ul style="list-style-type: none"> ▪ Light brown apple moth ▪ Oak ambrosia beetle ▪ Emerald ash borer ▪ Viberium leaf beetle ▪ European chafer ▪ Asian longhorned beetle ▪ Wrinkled dune snail ▪ Apple snails (various species) ▪ Chinese mystery snails ▪ Alder leaf beetle ▪ European gypsy moth
Possible future colonization in the City of Portland based on current distribution, behavior and vectors		
	<p><u>Invertebrates, Aquatic</u></p> <ul style="list-style-type: none"> ▪ Virile crayfish ▪ Zebra mussel ▪ Quagga mussel <p><u>Invertebrates, Terrestrial</u></p> <ul style="list-style-type: none"> ▪ Rosy gypsy moth ▪ Asian gypsy moth ▪ Nun moth ▪ Asian ambrosia beetle ▪ Woodwasps (various species) ▪ Oak splendour beetle ▪ Alder leaf beetle <p><u>Mammals</u></p> <ul style="list-style-type: none"> ▪ Feral swine 	
	<p>* Invasive Animal Lists for the City of Portland are based on the results of the 2010 “City of Portland Terrestrial and Aquatic Invasive Animal Assessment” discussions with regional and national experts and stakeholders, and recommendations of the City’s Terrestrial Ecology Enhancement Strategy Advisory Group.</p> <p><i>Note:</i> Several taxonomic groups were not included in either the Assessment or the Lists: planktonic crustaceans, annelids, polychaetes, and fish. These taxa contain numerous invasive species and may be included in future versions of the Lists.</p>	

The City also participated in a pilot project in 2009 (along with PP&R, Metro, and other entities) with the Oregon Department of Agriculture and U.S. Department of Agriculture. The project involved citizen surveying for two Early Detection/Rapid Response invasive insect pests (the emerald ash borer and the Asian longhorned beetle) in Forest Park, Smith & Bybee Lakes Natural Area, Kelly Point Park, and Powell Butte. Plans are underway to conduct field surveys for these species in 2011, focusing on Forest Park and the Columbia Slough. Forest Park and the Columbia Slough are particularly vulnerable to introduction of new exotic forest pests, since they are located along an industrial corridor and near major port activity. The Asian longhorned beetle (which is not attracted to any known trap or lure) has not yet been detected in the City, so conducting surveys is the best defense against a future unintended introduction.

BES watershed teams and project teams are now using TEES site assessment forms (see the “Guidance for Improving Terrestrial Habitat” section of this report) for recording terrestrial elements on sites. The forms include a section for plant and animal Species of Management Concern that are observed, including EDRR species. If these species are observed, their occurrence is reported to appropriate authorities within the City and state/federal governments.

In 2010, the City expanded the duties of its Invasive Species Coordinator to include animals as well as plants. This significant decision will enable the City to move forward on actions to address invasive animals.

TEES MAPPING

Because comprehensive inventories and GIS layers did not exist for terrestrial ecology elements, the City’s TEES coordinating team and TEESAG held several mapping workshops in spring 2007. Information was gleaned regarding the location of:

- Anchor habitats
- Connectors
- Gaps within or between important habitat patches or connectors
- Vulnerable best remaining high-quality habitat areas
- Areas with high restoration value
- Key urban features
- Sites of importance to Special Status Species or species assemblages (e.g., stopover areas for migrating waterfowl)
- Significant wildlife crossings and barriers
- Attractive nuisances and other known wildlife hazards
- Areas with concentrations of invasive plant or animal species, and sites and pathways for possible introduction of invasive species
- Sites of social and/or cultural importance
- Places where people make (or potentially could make) connections with nature

The results were compiled in matrices, reviewed by watershed teams and external experts, and used to develop recommendations for watershed-specific objectives. GIS map layers were

developed depicting anchor habitats and some connectors and gaps. These layers were further refined as part of the Grey to Green Initiative (described below).

The TEES team conceptually and spatially mapped some of the key areas to be protected, connected, and/or restored in order to achieve the non-aquatic Biological Communities Goal and its objectives in the *PWMP*. The resulting Grey to Green Terrestrial Priorities Map, a component of the Grey to Green Initiative, provided the foundation for a citywide vision of a “system” of connected habitats that support native plant and wildlife species.

The Grey to Green Terrestrial Priorities Map was the precursor to the development of two main GIS component layers:

- The Portland Ecological Assets (PEA) Layer
<http://www.portlandonline.com/bes/fish/index.cfm?c=51052&a=354721>.
- The Priority Habitat Enhancement (PHE) Area Layer
<http://www.portlandonline.com/bes/fish/index.cfm?c=51052&a=354720>

The Portland Ecological Assets (PEA) Layer: Based on the Scientific Principle, “Protect and restore the best existing habitats,” in the City’s *Framework for Integrated Management of Watershed Health*,² this layer includes:

- Anchor habitat and connector habitats
- Special Habitat Areas (SHAs) from the Bureau of Planning and Sustainability’s Natural Resource Inventory (NRI)
- High- and medium- quality Combined Relative Resource Value sites from the NRI
- Natural area parks
- Key urban features, including golf courses and cemeteries that are of high quality for wildlife
- Existing canopied riparian areas
- Vulnerable high-quality habitat areas
- Areas with high restoration value
- Sites of importance to Special Status Species or species assemblages (e.g., stopover areas for migrating waterfowl)
- Significant wildlife crossings

The Priority Habitat Enhancement (PHE) Area Layer: Based on another important Scientific Principle in the City’s *Framework*, “Build outward from existing rare and high-quality habitats, and consider connectivity of habitat patches,” this layer includes:

- Areas along streams without existing closed canopy
- Expanded riparian areas to 300 feet
- Existing public parks (non Natural areas) with habitat value

² The *Framework for Integrated Management of Watershed Health* was adopted by the Portland City Council in March 2006 as the scientific foundation for planning and decision-making related to watershed health, including the *Portland Watershed Management Plan*.

- Key urban features, including low-quality cemeteries, golf courses, and water treatment plants
- Low-quality Combined Relative Resource Value sites from the NRI
- Desirable anchor habitat expansions
- Desirable connectors between anchor habitats
- Desirable cross-watershed and cross-jurisdictional connections

The PEA and PHE layers are being used to develop priority maps for specific Grey to Green program elements: land acquisition, canopy, green roofs, green streets, and invasive plants. They are also being used for updating the Portland Plan, City Green element.

Metro is in the process of identifying existing and desirable wildlife corridors throughout the region, including Portland. Once this information becomes available, it will be incorporated into the Terrestrial Priorities Map. In addition, the TEES team is developing maps that designate special habitat types throughout the City, separate from the Grey to Green work.

Watershed-Specific Objectives

INTRODUCTION

The *Portland Watershed Management Plan (PWMP)* establishes citywide goals and objectives for hydrology, physical habitat, water quality, and biological communities. The goals and objectives that address terrestrial ecosystems in particular are:

Citywide Goal for Physical Habitat: Protect, enhance, and restore aquatic and terrestrial habitat conditions and support key ecological functions and improved productivity, diversity, capacity, and distribution of native fish and wildlife populations and biological communities.

Citywide Objectives for Physical Habitat:

Terrestrial Habitat: Protect and improve upland habitat extent, quality, and connectivity that supports the persistence of native terrestrial communities and connectivity to aquatic and riparian habitat.

Aquatic Habitat: Protect and improve aquatic, riparian, and floodplain habitat extent, quality, and connectivity that supports the persistence of native fish and wildlife communities.

Citywide Goal for Biological Communities: Protect, enhance, manage and restore native aquatic and terrestrial species and biological communities to improve and maintain biodiversity in Portland's watersheds.

Citywide Objective for Biological Communities:

Terrestrial Wildlife and Vegetation: Implement watershed actions to restore populations of terrestrial organisms to healthy, self-sustaining levels, protect and restore the composition and structure of native vegetation communities, and reduce populations of non-native plants and organisms to levels that do not compete with native species.

To help identify more specifically how these citywide goals and objectives can be achieved in each of the City's watersheds, watershed-specific objectives are needed. As a first step, the Terrestrial Ecology Enhancement Strategy Advisory Group (TEESAG) identified some general concepts that are important to incorporate into the watershed-specific objectives for *all* of the City's watersheds:

1. Anchor Habitats³
 - Protect, expand, enhance, and restore anchor habitats.
 - Enhance and restore areas adjacent to anchor habitats.
2. Patch Habitats⁴
 - Protect, expand, enhance, and restore patch habitats.
 - Enhance and restore areas adjacent to anchor habitats.
3. Special Status Habitats
 - Protect, expand, enhance, and restore wetlands.
 - Protect, expand, enhance, and restore upland prairie and native grasslands.
 - Protect, expand, enhance, and restore oak woodlands.
 - Protect, expand, enhance, and restore interior forests.
 - Protect, expand, enhance, and restore late successional conifer forests.
4. Corridors and Connectivity
 - Protect, enhance, and restore corridors to connect anchor and patch habitats.
 - Protect, enhance, and restore corridors to connect anchor and patch habitats to streams.
 - Enhance and restore areas adjacent to corridors.
 - Establish corridors between habitats.
5. Urban Features
 - Protect natural non-vegetation-based urban habitat features important for wildlife (e.g., rock outcrops, snags).
 - Protect key human-made urban habitat features important for wildlife (e.g., bridges, street trees).
 - Create additional urban habitat features where appropriate (e.g., ecoroofs, bird boxes).
6. Special Status Species
 - Protect, enhance, and restore sites important for Special Status Species (both plants and animals).
 - Protect, enhance, and restore for other identified priority species (both plants and animals).
7. Assemblages of Species
 - Protect, enhance, and restore sites for assemblages of species.
8. Management Issues
 - Address significant wildlife management issues, including attractive nuisances, hazards, and invasive animal species.

³ Anchor habitats are sites that are relatively large (e.g., generally over 30 acres) and currently provide conditions and functions favorable to biological communities.

⁴ Patch habitats are ecologically important, but are smaller than anchor habitats. The quality of patch habitats may be lower than anchor habitats because of size, isolation, location, or condition.

- Address significant invasive plant issues, including impact of vegetation removal timing on wildlife.

9. Community Engagement

- Create opportunities where people can learn, recreate, restore, and monitor terrestrial species and habitats with minimal negative impacts.

In addition, the TEESAG recommended that the City develop objectives that address the importance of developing a network or system of habitat anchors and connectors across watersheds within the City and of coordinating with other jurisdictions to create a larger-scale system that connects habitats in other jurisdictions.

Terrestrial ecology watershed-specific objectives were drafted following the 2007 TEESAG mapping workshops, and were refined as part of the Grey to Green/TEES mapping work. They will be integrated into the *PWMP* during the future update of the *PWMP*. The watershed-specific TEES objectives are provided on the following pages.

WILLAMETTE WATERSHED

OBJECTIVE: Protect anchor habitats currently functioning for Special Status Species (wildlife and plants), including:

- Forest Park and Washington Park
- Oaks Bottom and Ross Island Complex
- Willamette Bluffs Escarpments—North and South
- Mt. Tabor
- Harborton Forest and Wetland Complex
- Elk Ross Island and Elk Rock
- South Portland Riverbank
- Rose City Golf Course
- Waverly Golf Course
- Laurelhurst Park
- Burlington Bottoms
- Westside Wildlife Corridor, including:
 - Council Crest and the tree canopy north to Highway 26
 - Marquam Nature Park
 - Terwilliger Wilds
 - Stephens Creek Canyon (and Riverview Mausoleum)
 - George Himes Park
 - Riverview Cemetery

OBJECTIVE: Restore sites with high restoration value, including:

- Ross Island—enhance habitat
- Elk Rock Island—enhance diverse habitats; protect the best (TPB)

- Willamette River riparian and bottomland forests—daylight streams at culverts; address wildlife passage to river; enhance habitat diversity; reconnect to floodplain; restore wetlands:
 - Tributary confluences: Doane, Miller, Stephens, Balch, Saltzman
 - Powers Marine Park—improve connectivity with Riverview Cemetery
 - Willamette Park
 - Cathedral Park
 - Willamette Cove
 - Oaks Bottom
 - Wapato patch and riparian and floodplain area at Swan Island Lagoon
 - South Waterfront
- Willamette River Bluffs—oak/madrone habitats on both sides of river, to the north and south:
 - Mocks Crest
 - University of Portland
 - Willamette Cove
 - Baltimore Woods
 - Marquam Oaks
 - Dunthorpe Oaks
 - Oaks Bottom Bluffs
 - Elk Rock/Bishops Close
- Westside Wildlife Corridor—tree canopy and habitat diversity (locations as described in anchor concept list)
- Rocky Butte bluffs, forest, and potential future prairie habitat at N.E. 82nd landfill
- Mt. Tabor Park—enhance habitat diversity

OBJECTIVE: Protect existing corridors between anchor habitats and between anchor habitats and streams, including:

- Doane Lake and Creek—connects Forest Park to the Willamette River
- Miller Creek—connects Forest Park to Sauvie Island
- Forest Park to the north—connects Forest Park to the Coast Range (for elk, deer, bear, wildcats and other wildlife species)
- South Waterfront—connects to Oaks Bottom, Westside Wildlife Corridor, and Ross Island
- Willamette Park—connects flyway from Oaks Bottom/Ross Island to Westside Wildlife Corridor
- Westside Wildlife Corridor to Forest Park and Tryon State Park
- Powers Marine Park to Riverview Cemetery
- Riverview Cemetery to Tryon Creek
- NW Willamette River Forested Wetland
- Harborton Forest and Wetland Complex
- Mt. Tabor—neotropical bird flyway to other bluffs
- Marquam Woods and Council Crest, south to Riverview Cemetery and Tryon Creek State Natural Area and north to Forest Park
- Washington Park (tree canopy) south to Westside Wildlife Corridor, north to Forest Park

- Oak habitats along the Willamette River—for oak-associated avian species
 - University of Portland
 - Willamette Cove
 - Baltimore Woods
 - Marquam Oaks
 - Dunthorpe Oaks
 - Oaks Bottom Bluffs
 - Elk Rock/Bishops Close
 - Mocks Crest

OBJECTIVE: Restore and establish corridors between anchor habitats and water bodies where there are gaps or barriers.

- Restore 1.1 miles along South Waterfront to complete the connection with Oaks Bottom and Ross Island.
- Restore Mocks Crest terrestrial connection to the Willamette River.
- Establish a connection to Forest Park across the Willamette River from Time Oil Road area. (Highway 30 is a barrier, as is industrial land.)
- Enhance the connection between Riverview Cemetery and the Willamette River at Powers Marine Park. (Highway 43 and culverts are barriers.)
- Enhance connectivity between Westside Wildlife Corridor and the Willamette River:
 - Corbett Bluffs to Willamette Park
 - Riverview Cemetery to Powers Marine Park
 - Stephens Creek Canyon to Stephens Creek Confluence
 - Marquam Nature Park to South Waterfront
 - George Himes Park to Willamette Park and the Willamette River
- Look for opportunities to increase the canopy connectivity between Forest Park and the Willamette River:
 - Balch Creek
 - Doane Creek
 - Saltzman Creek
- Look for opportunities to connect Baltimore Woods with the Willamette River by increasing tree canopy and building ecoroofs in the north industrial areas.

OBJECTIVE: Coordinate with adjacent jurisdictions to maintain anchor habitats and other important habitat areas, as well as maintain and/or restore linkages and corridors between them.

- Coordinate with Multnomah County, Washington County, and Tualatin Basin jurisdictions to maintain existing anchor habitats and other important habitat areas in the headwater areas of the Forest Park Corridor, as well as linkages and corridors between them.
- Coordinate with Multnomah County regarding Sauvie Island.
- Coordinate with Oregon State Parks, Riverview Cemetery, and Lewis and Clark College to protect and restore corridors between Riverview Cemetery and Tryon State Park.
- Coordinate with Clackamas County regarding Elk Rock Island.

- Coordinate with West Multnomah Soil and Water Conservation District (SWCD) and East Multnomah SWCD to encourage stewardship on large private properties critical to maintaining important anchor habitats and connectivity corridors.

OBJECTIVE: Encourage ivy removal and other invasive species control methods (including revegetation) in private properties adjacent to anchor habitats and corridors.

- Support the West Willamette Restoration Partnership Program to aggressively reduce invasive species (and replant native species) on private properties in the Westside Wildlife Corridor.
- Support the Backyard Habitat Certification Program to promote wildlife stewardship in all areas of the City of Portland.
- Support Friends of Baltimore Woods to promote stewardship of private properties in the oak woodland habitat.
- Work with PP&R, Portland Water Bureau, Friends of Mt. Tabor, and the BES Watershed Revegetation Program (WRP) to promote the removal of non-native invasive species and replanting of native species in Mt. Tabor Park and on adjacent private properties.
- Support the Forest Park Conservancy’s work to promote the removal of non-native invasive species and replanting of native species in Forest Park and on adjacent private properties.

OBJECTIVE: Protect key urban habitat features important for wildlife, and create additional features where appropriate.

- Protect and manage large street trees in the Westside Park Blocks, Ladds Addition, and other older neighborhoods.
- Enhance street and neighborhood trees throughout the developed portions of the watershed, particularly in older eastside commercial, industrial, and residential neighborhoods.
- Protect the Chapman School chimney for Vaux’s swifts.
- Create bat habitat when repairing or replacing bridges.
- Protect bridge nest sites and Elk Rock for peregrine falcons.
- Promote bird and pollinator-friendly ecoroofs in densely developed portions of the watershed, including:
 - Industrial areas (north and east)
 - Downtown
- Protect Waterfront Park cherry trees, which provide stopover habitat for songbirds.

OBJECTIVE: Protect and restore sites of importance to Special Status Species and other identified priority species, including:

- Great blue heron rookeries on Ross Island, Oaks Bottom (and elsewhere)—protect from human disturbance
- Interior conifer forest in Forest Park—for Douglas squirrels
- Osprey nesting sites along the Willamette River
- Bald eagle nests and peregrine falcon eyries along the Willamette River

- Mt. Tabor—for neotropical migratory birds
- Elk Rock Island—for oaks and other native and rare plant species
- Elk Rock—for native rare plant species
- Doane Lake and all westside streams—for red-legged frogs
- Swan Island Lagoon and Wapato Wetland—for wapato
- Butterfly Park—for key sparrow habitat
- Willamette mudflats—for shorebirds
- Oak habitats along the Willamette River—for oak-associated avian species, including:
 - University of Portland
 - Willamette Cove
 - Baltimore Woods
 - Marquam Oaks
 - Dunthorpe Oaks
 - Oaks Bottom Bluffs
 - Elk Rock/Bishops Close
 - Mocks Crest
- Willamette River riparian and bottomland forests (daylight streams at culverts; address wildlife passage to the river; enhance habitat diversity; reconnect to the floodplain; restore wetlands), including:
 - Tributary confluences: Doane, Miller, Stephens, Balch, Saltzman
 - Powers Marine Park—improve connectivity with Riverview Cemetery
 - Willamette Park
 - Cathedral Park
 - Willamette Cove
 - Oaks Bottom
 - Wapato patch and riparian and floodplain area at Swan Island Lagoon
 - South Waterfront

OBJECTIVE: Protect and restore sites of importance to assemblages of species, including:

- Harborton Forest and Wetland Complex
- Balch Creek
- Doane Lake
- Willamette Park mudflats—for waterfowl and songbirds
- Powers Marine Park and Riverview Cemetery
- Swan Island Lagoon Beach and Wapato Wetland –foraging mudflats for migratory and resident shorebirds
- Oaks Bottom and Ross Island Complex (wetlands, riparian forest, oak bluffs)—for birds and other species
- Mudflats at Cottonwood Bay along the Willamette River—stopover habitat for migratory and resident shorebirds
- Mt. Tabor—for neotropical migratory birds
- Forest Park—for interior and late successional forest species
- Stephens Creek Confluence (wetlands)

- Oak habitat along the Willamette River—for oak-associated species, including:
 - University of Portland
 - Willamette Cove
 - Baltimore Woods
 - Marquam Oaks
 - Dunthorpe Oaks
 - Oaks Bottom Bluffs
 - Elk Rock/Bishops Close
 - Mocks Crest

OBJECTIVE: Address significant plant and wildlife management issues, including:

- Broadway Bridge (starling populations)
- Laurelhurst Park (nutria, ducks, and geese)
- South Portland riverbank (purple loosestrife)
- Oaks Bottom (purple loosestrife)
- Forest Park and Westside Wildlife Corridor (ivy and other invasive plant species)
- Swan Island (snapping turtles)
- Forest corridor along Highway 26 (ivy and clematis)
- Terrestrial Superfund sites
- Waterfront Park geese
- South Waterfront (new, tall, reflective glass buildings)
- Sites known to be sources of stormwater runoff/non-point source pollution
- Willamette Cove (exposure of humans and animals to pollutants, and safety hazards)

OBJECTIVE: Create opportunities where people can make connections with nature where they do not negatively impact wildlife or their habitats, including:

- Provide interpretive opportunities along Forest Park trails, including the Wildwood Trail.
- Provide interpretive opportunities on trails and in educational buildings at the Audubon Society of Portland complex and elsewhere in the Balch Creek subwatershed.
- Provide interpretive opportunities about diverse wildlife and habitats at Oaks Bottom.
- Provide interpretive opportunities about diverse wildlife and habitats at Mt. Tabor Park.
- Provide interpretive and viewing opportunities of peregrine falcons that nest on the Marquam, Fremont, and St. John’s bridges.
- Assist Baltimore Woods citizens in their involvement in oak habitat restoration and other terrestrial enhancements.
- Provide Marquam Nature Park (south) interpretive signage.
- Provide interpretive opportunities and trails at Elk Rock Island (e.g., information about the unique habitat features, rocky outcrops, oak woodlands, alcove, and mudflats).
- Provide interpretive opportunities at Powers Marine Park, and promote information about beach habitats (e.g., large wood function, litter, fish consumption).
- Provide interpretive information at Cathedral and Willamette parks, and increase visibility of signage concerning invasive aquatic organisms.

OBJECTIVE: Protect Special Status Habitats, including:

- Northwest Willamette River Forested Wetland near Oregon Steel Mill (bottomland hardwood forest, wetlands)
- Willamette Bluff Complex (oaks and prairies)
- Willamette Cove (diverse habitats)
- Baltimore Woods (diverse forest habitats, including oaks)
- Forest Park (interior coniferous forest and oaks)
- Doane Lake and Wetlands (wetlands)
- Powers Marine Park (bottomland forest and wetlands)
- South Sellwood Bluff (oaks)
- Dunthorpe Oaks (oaks, madrone, and other native plant species)
- Marquam Oaks (interspersed in Westside Wildlife Corridor)
- Elk Rock Island (diverse habitats)
- Elk Rock (peregrine eyrie and rare plants)
- Swan Island Lagoon (wapato patch, wetlands)
- Riverview Cemetery (interior forest)
- Willamette Park (very old riparian oaks)
- Stephens Confluence (wetlands and bottomland forest)
- Tryon Confluence wetlands (future) and terrestrial features
- Oaks Bottom (bottomland forest)
- Mt. Tabor Park (flyway, forest)
- Escarpment near Adidas (grasslands)

COLUMBIA SLOUGH WATERSHED

OBJECTIVE: Protect, expand, enhance, and restore anchor habitats; and enhance and restore areas adjacent to anchor habitats, including:

- Columbia Slough confluence with the Willamette River/Kelley Point Park
- Smith & Bybee Wetlands, including Ramsey Wetlands, the St. John's Landfill, and the vegetated south shore of the Columbia Slough to the railroad bridge
- Vanport Wetlands, Force Lake, Heron Rookery, Portland International Raceway (PIR) restoration areas
- Rocky Butte
- Fairview Creek headwaters
- Big Four Corners
- Golf courses and cemeteries
- Columbia Boulevard Wastewater Treatment Plant natural area and Triangle Lake
- Rivergate Fields
- Chimney and Pier parks
- Delta Park/Walker Slough

OBJECTIVE: Protect, expand, enhance, and restore patch habitats; and enhance and restore areas adjacent to anchor habitats, including:

- Wilkes Creek
- NE 143rd cross levee natural habitat area / NE 148th water quality facility (WQF) / NE 138th WQF
- Little Four Corners / Inverness wetlands
- Johnson Lake
- Whitaker Ponds
- Peninsula Canal
- Peninsula Crossing trail
- Developed public parks
- Water Bureau sites (tanks, groundwater stations, etc.)
- School yards
- NE 158th WQF
- NE 162nd WQF
- Thomas Cully Park
- Port Buffalo mitigation site
- Children's Arboretum/Brandwein/Jubitz
- Wright Island
- Moore Island
- Parcel A

OBJECTIVE: Protect, expand, enhance, and restore imperiled habitats—wetlands, upland prairie and native grasslands, oak woodlands, interior forests, late successional conifer forests, beaches, and rocky outcrops—including:

- Big Four Corners oaks
- Columbia Slough oaks
- Big Four Corners interior forest
- Rocky Butte interior forest and rocky outcrops
- Banks of Slough bottomland hardwood forest

OBJECTIVE: Protect, expand, enhance, and restore corridors to connect anchor and patch habitats; protect, expand, enhance, and restore corridors to connect anchor and patch habitats to streams; enhance and restore areas adjacent to corridors; and establish corridors between habitats, including:

- Peninsula Crossing Trail between Willamette River and Columbia Slough
- All of the waterways and ponds (including Pen 1, Pen 2, Peninsula Canal, Wilkes Creek)
- West Wye/T-5 powerline corridor between Willamette River and Columbia Slough
- Undeveloped corridor between Rocky Butte and Johnson Lake
- NE 143rd cross levee natural habitat area between Sandy Blvd. and Columbia River
- Columbia River levee
- Recreational trails (40-mile loop, Slough Trail)

OBJECTIVE: Protect natural non-vegetation-based urban habitat features important for wildlife (e.g., rock outcrops, snags); protect key human-made urban habitat features important for wildlife (e.g., bridges, street trees); and create additional urban habitat features where appropriate (e.g., ecoroofs, bird and bat boxes), including:

- Natural non-vegetation-based urban habitat features, including:
 - Rocky Butte cliffs
 - Alice Springs springs
 - Winmar snag
- Human-made urban habitat features (with documented use by wildlife), including:
 - Cell tower by Whitaker Ponds
 - I-5 bridge
 - I-205 bridge
 - Lombard bridge
 - Pedestrian bridge at wastewater treatment plant
 - Power pole at Smith & Bybee Wetlands
 - Chimneys used by Vaux’s swifts
- Human-made urban habitat features likely to be used by wildlife
- Features similar to those listed above (bridges, cell towers, power poles)

OBJECTIVE: Protect, enhance, and restore sites important for Special Status Species and for other identified priority species (both plants and animals), including:

- Big Four Corners oaks
- Columbia Slough oaks
- Big Four Corners interior forest
- Rocky Butte interior forest, rocky outcrops
- Banks of Slough bottomland hardwood forest
- Rocky Butte cliffs
- Alice Springs springs
- Winmar snag
- Cell tower by Whitaker Ponds
- I-5 bridge
- I-205 bridge
- Lombard bridge
- Pedestrian bridge at wastewater treatment plant
- Power pole at Smith & Bybee Wetlands
- Chimneys used by Vaux’s swifts
- All mapped imperiled habitats for their associated Special Status Species
- Additional sites that are important to Special Status Species, but not identified as an imperiled habitat, including:
 - Open water
 - Mixed coniferous/deciduous forest
 - Golf courses
 - Parks with mature conifer groves
 - Cemeteries with mature trees

- Beaches
- Mudflats

OBJECTIVE: Protect, enhance, and restore sites important for assemblages of species, including:

- Big Four Corners oaks
- Columbia Slough oaks
- Big Four Corners interior forest
- Rocky Butte interior forest, rocky outcrops
- Banks of Slough bottomland hardwood forest
- Rocky Butte cliffs
- Alice Springs springs
- Winmar snag
- Cell tower by Whitaker Ponds
- I-5 bridge
- I-205 bridge
- Lombard bridge
- Pedestrian bridge at wastewater treatment plant
- Power pole at Smith & Bybee Wetlands
- Chimneys used by Vaux's swifts

OBJECTIVE: Address significant wildlife management issues, including attractive nuisances, hazards, and invasive animal species; and address significant invasive plant issues, including impact of vegetation removal timing on wildlife, including:

- Limitation of project impacts during wildlife breeding seasons (turtles, amphibians, birds)
- Coordination with project partners (Multnomah County Drainage District, Port of Portland, PP&R)
- Water management (beavers, shore birds, invasive plants)
- Co-existence with urban wildlife (coyotes, beavers)
- Human/wildlife conflicts (airport wildlife)
- Recreation/wildlife conflicts (snags on trails)
- Habitat-healthy levees

OBJECTIVE: Create opportunities where people can learn, recreate, restore, and monitor terrestrial species and habitats with minimal negative impacts, including:

- Columbia Slough Watershed Council events
- Canoe the Slough Week
- Explorando el Columbia Slough
- Columbia Slough Regatta
- Slough 101
- Wetlands 101
- Stewardship Saturdays

- Subs on the Slough
- Brew on the Slough
- Soup on the Slough
- Moonlight Paddle
- Eyes on the Slough
- Audubon field trips
- Metro school trips
- Friends of Trees watershed tree plantings

COLUMBIA RIVER WATERSHED

OBJECTIVE: Protect, expand, enhance, and restore anchor habitats; and enhance and restore areas adjacent to anchor habitats, including:

- West Hayden Island
- Government Island

OBJECTIVE: Protect, expand, enhance, and restore patch habitats; and enhance and restore areas adjacent to anchor habitats, including:

- East Hayden Island beach segments
- Broughton Beach
- Port mitigation site next to T-6
- Tri-Club Island

OBJECTIVE: Protect, expand, enhance, and restore imperiled habitats—wetlands, upland prairie and native grasslands, oak woodlands, interior forests, late successional conifer forests, beaches, and rocky outcrops—including:

- Government Island interior forest
- Hayden Island interior forest
- Columbia River beaches

OBJECTIVE: Protect, expand, enhance, and restore corridors to connect anchor and patch habitats; protect, expand, enhance, and restore corridors to connect anchor and patch habitats to streams; enhance and restore areas adjacent to corridors; and establish corridors between habitats, including:

- Columbia River beaches
- Columbia River waterway
- Columbia River levee

OBJECTIVE: Protect natural non-vegetation-based urban habitat features important for wildlife (e.g., rock outcrops, snags); protect key human-made urban habitat features

important for wildlife (e.g., bridges, street trees); and create additional urban habitat features where appropriate (e.g., ecoroofs, bird and bat boxes), including:

- Natural non-vegetation-based urban habitat features, including:
 - West Hayden Island snag
- Human-made urban habitat features with documented use by wildlife, including:
 - Cell tower at Broughton Beach
 - I-5 bridge
 - I-205 bridge
 - Platform on pier near Salty's
 - Platform on pier in Oregon Slough at east end of Bridgeton neighborhood
 - Platform on pier off Marine Drive west of railroad bridge
- Human-made urban habitat features likely to be used by wildlife
- Features similar to those listed above (bridges, cell towers, piers)

OBJECTIVE: Protect, enhance, and restore sites important for Special Status Species and for other identified priority species (both plants and animals), including:

- All mapped imperiled habitats for their associated Special Status Species
- Additional sites that are important to Special Status Species, but not identified as an imperiled habitat, including:
 - Open water
 - Beaches
 - Mudflats

OBJECTIVE: Protect, enhance, and restore sites important for assemblages of species, including:

- Columbia River islands

OBJECTIVE: Address significant wildlife management issues, including attractive nuisances, hazards, and invasive animal species; and address significant invasive plant issues, including impact of vegetation removal timing on wildlife, including:

- Limitation of project impacts during wildlife breeding seasons (turtles, amphibians, birds)
- Co-existence with urban wildlife (coyotes, beavers)
- Habitat-healthy levees

OBJECTIVE: Create opportunities where people can learn, recreate, restore, and monitor terrestrial species and habitats with minimal negative impacts, including:

- West Hayden Island tours

TRYON CREEK WATERSHED

OBJECTIVE: Protect, expand, enhance, and restore anchor habitats. Enhance and restore areas adjacent to anchor habitats.

- Tryon Creek State Natural Area
- Marshall Park
- The confluence of Tryon Creek and the Willamette River and surrounding habitats such as the Tryon Creek Wastewater Treatment Plant
- Jensen Park and the Foley Balmer property
- Upstream habitats such as Spring Garden Park and Headwaters Park

OBJECTIVE: Protect, expand, enhance, and restore patch habitats. Enhance and restore areas adjacent to anchor habitats.

- Encourage ivy removal and other invasive species control methods (including revegetation) in private properties adjacent to anchor habitats and corridors (e.g., to help identify where to focus outreach efforts and community/neighborhood Backyard Habitat programs).
- Prioritize land for acquisition that expands protected anchor habitats and corridors.

OBJECTIVE: Protect, enhance, and restore corridors to connect anchor and patch habitats. Protect, enhance, and restore corridors to connect anchor and patch habitats to streams. Enhance and restore areas adjacent to corridors. Create new corridors.

- Protect private riparian property, Marshall Park, Jensen Park, and the Foley Balmer property as connectors to Tryon Creek State Park.
- Connect the Tryon Creek Confluence area with Tryon Creek State Natural Area (via providing a wildlife corridor across/under Highway 43 as part of the culvert replacement project).
- Provide both fish and wildlife passage within the Tryon Creek State Natural Area as part of the Boones Ferry culvert replacement project.
- Establish a corridor between Tryon Creek State Natural Area and public and private properties along both Arnold Creek and Tryon Creek mainstem.
- Coordinate with Washington and Clackamas counties and the City of Lake Oswego to maintain anchor and other important habitat areas, as well as maintain and/or restore linkages and corridors between them.

OBJECTIVE: Protect key urban habitat features important for wildlife (bridges, ecoroofs, street trees, snags, bird boxes, etc.), and create additional features where appropriate.

- Create bat habitat in Tryon Creek Natural Area on existing bridges.
- Create bat habitat as culverts are replaced by bridges.
- Protect riparian and upland snags on public and private property when they pose no threat to human safety.
- Install or create snags in restoration projects.

OBJECTIVE: Protect, enhance, and restore sites important for Special Status Species. Protect, enhance, and restore for other identified priority species.

- Encourage the protection/creation of bat habitat in Tryon Creek State Natural Area (older, hollow trees and snags).
- Create bat habitat in Tryon Creek Natural Area on existing bridges.
- Create bat habitat as culverts are replaced by bridges.
- Protect and restore habitat for pileated woodpeckers.
- Protect riparian snags for olive-sided flycatchers.
- Protect and restore habitat for purple martins at Tryon Creek's confluence with the Willamette River.

OBJECTIVE: Protect, enhance, and restore sites for assemblages of species.

- Protect mixed conifer forests within anchor habitats, including Tryon Creek State Natural Area and Marshall Park.
- Restore cottonwood/willow forest habitat at the confluence of Tryon Creek and the Willamette River.
- Restore ash wetland forest habitats at Headwaters and Spring Garden Park and Jackson Middle School.

OBJECTIVE: Address significant wildlife management issues, including attractive nuisances, hazards, and invasive animal species. Address significant invasive plant issues, including impact of vegetation removal timing on wildlife.

- Encourage ivy removal and other invasive species control methods (including revegetation) in public and private properties adjacent to anchor habitats and corridors.

OBJECTIVE: Create opportunities where people can learn, recreate, restore, and monitor terrestrial habitat with minimal negative impacts.

- Support opportunities for interpretive signage and wildlife viewing in Tryon Creek State Natural Area, Marshall Park, and other Tryon Creek Watershed parks.
- Provide connections to Fanno Creek watersheds.
- Support opportunities for interpretive signage in conjunction with the Highway 43 culvert replacement project.

FANNO CREEK WATERSHED

OBJECTIVE: Protect, expand, enhance, and restore anchor habitats. Enhance and restore areas adjacent to anchor habitats.

- Woods Creek riparian zone in Woods Memorial Park, April Hill Park, and private properties
- Vermont Creek (Gabriel Park and private riparian zone)

- Red Tail Golf Course
- South Ash Creek (including BES properties and Dickenson)
- Pendleton Woods (private)
- Fanno main stem riparian areas (including Albert Kelley Park, Thomas & 53rd)
- Fanno Natural Area Park—aka Columbia Creek, SW 62nd property, Hillsdale
- PP&R, BES, and private properties along Fanno main stem)

OBJECTIVE: Protect, expand, enhance, and restore patch habitats. Enhance and restore areas adjacent to anchor habitats.

- Encourage Naturescaping projects in small forested patches in private ownerships near the headwaters of Fanno Creek.
- Increase street tree canopy in partnership with Friends of Trees.

OBJECTIVE: Protect, expand, enhance, and restore Special Status Habitats, including wetlands, upland prairie and native grasslands, oak woodlands, interior forests, and late successional conifer forests.

- Support PP&R efforts to enhance wetlands at April Hill Park, Gabriel Park, Maricara Natural Area, and Headwaters Natural Area.
- Support PP&R efforts to enhance oak woodland at Dickenson Park and protect oaks throughout the South Ash Creek Watershed.
- Support efforts to expand and enhance interior forests at Tryon Creek State Natural Area, Marshall Park, Woods Memorial Park, West Portland Park, and others.

OBJECTIVE: Protect, enhance, and restore corridors to connect anchor and patch habitats. Protect, enhance, and restore corridors to connect anchor and patch habitats to streams. Enhance and restore areas adjacent to corridors. Create new corridors.

- Protect all small tributaries draining into Fanno Creek.
- Protect upland forests (especially conifers on private and public properties).
- Support local “Friends” groups to protect natural areas.
- Add wildlife passage and greenway corridors when replacing culverts and doing stormwater retrofits.
- Encourage Naturescaping projects along small, intermittent streams in private ownerships near the headwaters of all tributaries to Fanno Creek.
- Coordinate with the State of Oregon to reduce noxious weeds.
- Coordinate with Clean Water Services, the cities of Tigard and Beaverton, and Metro to protect anchor habitats and maintain and restore connectors.

OBJECTIVE: Protect key urban habitat features important for wildlife (bridges, ecoroofs, street trees, snags, bird boxes, etc.), and create additional features where appropriate.

- Consider replacing or creating bat habitat features when bridges are replaced (e.g., Stephens Creek and Fanno Creek bridge at Capitol Highway and Hillsdale).

OBJECTIVE: Protect, enhance, and restore sites important for Special Status Species. Protect, enhance, and restore for other identified priority species.

- Protect large conifers in Woods Memorial Park, April Hill Park, and private properties for the pileated woodpecker.
- Protect riparian snags in Woods Memorial Park and other locations for the olive-sided flycatcher.

OBJECTIVE: Address significant wildlife management issues, including attractive nuisances, hazards, and invasive animal species. Address significant invasive plant issues, including impact of vegetation removal timing on wildlife.

- Reduce road hazards for wildlife by creating appropriate corridors.
- Provide technical assistance to citizens for guarding trees against beaver damage; provide financial and other incentives to citizens for replanting beaver-damaged trees.

OBJECTIVE: Create opportunities where people can learn, recreate, restore, and monitor terrestrial habitat with minimal negative impacts.

- Connect anchor habitats with trails. Support efforts (SW Trails, Friends groups, etc.) to redesign trails and close trails to minimize impacts on habitat fragmentation.
- Support the Friends of Tryon Creek State Parks and the Tryon Creek Watershed Council's education and monitoring efforts at Tryon Creek State Natural Area and other properties.
- Support restoration activities through PP&R Friends groups at Maricara, Marshall, April Hill, Gabriel, and Woods parks.
- Support BES's Clean Rivers Education Program's work with area schools and natural areas.

JOHNSON CREEK WATERSHED

OBJECTIVE: Protect and restore anchor habitats, including:

- Johnson Creek itself
- Powell Butte
- Clatsop Butte
- Reed College Canyon
- East Moreland Golf Course
- Errol Creek and Errol Heights wetlands
- Tideman Johnson Park/Tideman Johnson Target Area
- Springwater Wetlands Complex (including Zenger Farms and Beggars Tick)
- The headwaters of Mitchell Creek
- The confluence of Kelley and Johnson creeks
- The confluence of Johnson Creek and the Willamette River
- The confluence of Clatsop and Kelley creeks

OBJECTIVE: Restore habitats with high restoration value, including:

- Flavel Ridge Wetland
- Brookside Wetlands
- Willamette National Cemetery
- The confluence of Johnson Creek and the Willamette River and surrounding habitat
- The confluence of Mitchell Creek and Kelley Creek and surrounding habitat
- Crystal Springs Creek
- East Powell Butte Target Area
- East Lents Target Area
- West Lents Target Area

OBJECTIVE: Protect existing corridors between anchor habitats, and between habitats and streams, including:

- Kelley Creek Refuge
- Circle Avenue Wetlands
- East Buttes riparian areas and upland habitat
- East Powell Butte Restoration Area

OBJECTIVE: Restore and establish corridors between anchor habitats and water bodies where there are gaps or barriers, including:

- Restore and establish habitat along Johnson Creek where there are gaps and opportunities to fill them.
- Restore and establish habitat between Errol Wetlands and Errol Confluence.
- Restore and establish habitat to connect the Crystal Springs Complex (i.e., Reed College Canyon, East and West Moreland Parks) and the Willamette River.
- Restore and establish habitat between the Powell/Kelley confluence and the East Buttes.
- Coordinate with other jurisdictions to restore and establish corridors with Scouter Mountain Uplands (East and West), Flavel Ridge Wetland, Upper Mitchell Creek, Clatsop Butte (to the south) and East Buttes (to the east).
- Restore and establish habitat along Mitchell, Clatsop, and Kelley creeks, within the City of Portland urban growth boundary, where there are gaps and opportunities to fill them.
- Restore and establish corridors between the Willamette National Cemetery and Johnson Creek via multiple tributaries, such as Deardorff Creek, Wahoo Creek, and Veterans Creek
- Restore and establish habitat to connect Kelly Butte to East Buttes and Mt Tabor.
- Restore and establish habitat connectivity along the length of the Springwater Corridor Trail.

OBJECTIVE: Restore areas adjacent to anchor habitats and corridors to increase their size and functionality, including:

- Encourage ivy and blackberry removal and other invasive species control methods (including revegetation) in private properties adjacent to anchor habitats and corridors (to help identify where to focus outreach efforts and community/ neighborhood Backyard Habitat programs), including:
 - Foster Place Wetlands
 - Private property on Powell Butte
 - All streamside properties
- Encourage ivy and blackberry removal and other invasive species control methods (including revegetation) by home owners' associations in environmental tracts that are adjacent to anchor habitats and corridors, including:
 - Clatsop Butte Home Owners' Association
 - Environmental tract at end of SE 108th

OBJECTIVE: Protect key urban habitat features important for wildlife, and create additional features where appropriate, including:

- Create bat habitat when repairing or replacing bridges.
- Create underpasses for terrestrial species when repairing or replacing bridges.

OBJECTIVE: Protect and restores sites of importance to Special Status Species and other identified priority species, including:

- Encourage the protection/creation of habitat at Reed College Canyon. Focus on green herons, bitterns, rails, and northern red-legged frogs.
- Protect Kelly Butte's rare plant species.

OBJECTIVE: Protect and restore sites of importance to assemblages of species, including:

- Protect primary anchor habitats, including Powell and Kelly buttes (for native grassland species, rare plant species, mammals, reptiles, and migratory birds).
- Protect the North and South Circle Avenue Wetlands for amphibians and plant assemblages.
- Protect Alsop Wetland for Oregon ash forested wetland habitat for amphibians (including red-legged frogs), reptiles, mammals, and birds.
- Protect native sedges and rushes along the Springwater Trail.
- Protect the Springwater Wetlands Complex, including:
 - Beggars Tick Marsh for wintering waterfowl, neotropical migratory birds, and other species
 - Zenger Farm and the North and Central Wetlands for frogs (including red-legged frogs), salamanders, and migratory birds
- Protect bottomland hardwood forests along Johnson Creek and at Reed College Canyon and Tideman-Johnson Park.
- Protect the relatively undisturbed forest at East and West Scouter Mountain uplands for sensitive species such as pileated woodpeckers and red-legged frogs.

OBJECTIVE: Address significant wildlife management issues, including attractive nuisances, hazards, and invasive plant and animal species, including:

- Encourage ivy and blackberry removal and other invasive species control methods (including revegetation) in publicly owned anchor habitats.
- Encourage ivy and blackberry removal and other invasive species control methods (including revegetation) on private properties adjacent to anchor habitats and corridors.
- Discourage trespassing and off-leash dog walking in natural areas.

OBJECTIVE: Create opportunities for people to make connections with nature where they do not negatively impact wildlife or their habitats, including:

- Support efforts to provide interpretive signs and wildlife-viewing opportunities at Tideman-Johnson Park, Reed College Canyon/Crystal Springs, Powell Butte, and along the Springwater Trail.
- Establish interpretive signs and wildlife viewing opportunities in conjunction with projects at Springwater Wetlands Complex, East Powell Butte Restoration Area, and the East and West Lents restoration areas.
- Provide interpretive signs and opportunities for the public to view salmon migrating at East Moreland Golf Course, Tideman-Johnson Park, and at the bridge at the confluence of Kelley and Johnson creeks.

SECTION 4

STRATEGIES AND PRIORITY ACTIONS

INTRODUCTION

The *Portland Watershed Management Plan (PWMP)* laid out six Watershed Improvement Strategies. These provide the link between watershed goals and objectives and the work of the City. The six strategies are:

- Stormwater Management
- Revegetation
- Aquatic and Terrestrial Enhancement
- Protection and Policy
- Operations and Maintenance
- Education, Involvement and Stewardship

All of these strategies (and many of the actions identified in the *PWMP* for each of the strategies) relate in some way to improving terrestrial biological communities. However, the *PWMP* also called for additional terrestrial enhancement actions. For that, the Terrestrial Ecology Enhancement Strategy Advisory Group (TEESAG) provided input on a draft matrix of key management issues, and possible actions and partnerships to address the issues. These were organized according to the key conservation issues in the *Oregon Conservation Strategy*. They were then regrouped according to the *PWMP* strategies.

Further refinement, based on citywide and watershed-specific objectives, resulted in priority TEES actions, which are presented below by watershed.

WILLAMETTE WATERSHED

- Protect Riverview Cemetery to enhance important interior forest habitat and connectivity between the Westside Wildlife Corridor, Tryon State Park, and the Willamette River at Powers Marine.
- Restore diverse terrestrial habitats at Willamette Cove and the Mocks Crest escarpment. Actions include restoration of oak, madrone, bottomland hardwood forests, and wetlands.
- Protect islands in the Willamette River. Actions include oak release at Elk Rock Island and enhancing wetlands and riparian habitats on Ross Island.

- Protect the best of Portland’s interior and late successional forest habitats in Forest Park. Actions include control of invasive species and investment in protection of the forest from wildfire risk.
- Restore Oaks Bottom Wildlife Refuge habitat. Remove non-native invasive plants to enhance wetlands and oak and riparian habitats, and plant native plants
- Restore and enhance terrestrial habitats in the heavily developed Eastside through the Tabor to the River Brooklyn Creek Basin Program. Actions include planting street trees, building green streets, and enhancing diverse forest habitats for neotropical migratory birds on Mt Tabor.
- Improve connectivity between the Willamette River and upland forest habitat anchors in the Westside Wildlife Corridor and Forest Park. Actions include enhancing connectivity at key corridors such as Doane Creek, Balch Creek Powers Marine Park, and Stephens Creek.
- Restore and enhance oak and bluff habitats in the heavily developed North Portland. Support neighborhood involvement and City investments through grants and Grey to Green investments in the Baltimore Woods/St. Johns area.

COLUMBIA SLOUGH WATERSHED

- Columbia Slough Confluence: Add wood to the channel to increase complexity for turtles, amphibians, and birds. Manage invasive plant species. Enhance terrestrial habitat through revegetation. Install bird and bat boxes. Educate and involve the public through signs and revegetation work parties.
- Kelley Point Park Restoration: Conduct ongoing invasive plant species management and revegetation.
- Ramsey Stormwater Wetlands: This stormwater wetland retrofit project includes installing verticals snags and downed wood for bird, amphibian, and turtle habitat. Manage invasive plant species. Enhance terrestrial habitat through revegetation.
- Smith and Bybee Wetlands Natural Resource Management Plan Update: Advocate for upland prairie habitat on the St. John’s Landfill and management/protection of wetland habitat.
- Lower Slough Refugia: Add wood to the channel to increase complexity for turtles, amphibians, and birds. Manage invasive plant species. Enhance terrestrial habitat through revegetation. Install bird and bat boxes. Educate and involve the public through signs and revegetation work parties.

- NE 33rd Culvert Improvement: Add terrestrial wildlife passage to the culvert. Improve connectivity.
- Whitaker Ponds Culvert to Bridge: Improve habitat for turtles, shorebirds, and amphibians by allowing water levels to fluctuate. Manage invasive plant species. Enhance terrestrial habitat through revegetation, including native emergent wetland plant communities. Improve connectivity between west pond and Whitaker Slough.
- Metro Metals Mitigation: Enhance turtle habitat. Manage invasive plant species. Enhance terrestrial habitat through revegetation.
- NE 112th Culvert Removal: Create nesting and basking habitat for turtles. Manage invasive plant species. Enhance terrestrial habitat through revegetation, including native emergent wetland plant communities. Improve connectivity along Whitaker Slough.
- Airport Middle Slough Plan District and E-Zone Update: Focus on a variety of terrestrial habitats, and elevate the understanding of grassland species.
- Rocky Butte Revegetation: Manage invasive plant species, including English ivy, clematis, and weedy trees. Enhance terrestrial habitat through revegetation, and restore second growth Douglas fir/big leaf maple forest.
- NE 148th Water Quality Facility: Manage invasive plant species. Enhance terrestrial habitat through revegetation. Implement recommendations of the *NE 148th WQF TEES Assessment*.
- Winmar (Mason) Flats: Modify topography to enhance habitat for amphibians, reptiles, and birds, including red legged frog, painted turtle, and willow flycatcher. Manage invasive plant species. Enhance terrestrial habitat through revegetation.
- Big Four Core Habitat Restoration: Manage invasive plant species. Enhance terrestrial habitat through revegetation. Habitat restoration includes oak woodland, cottonwood/willow forest, herbaceous wetland, bottomland hardwood forest, and cedar/alder forest.
- Property Acquisition: Acquire properties to increase/buffer anchor and patch habitats, and conduct invasive plant species management and revegetation on acquired properties.
- Develop a beaver management policy.
- Develop a coyote management policy.
- Protect, enhance, and expand the entire Slough riparian buffer.
- Move NE Cornfoot Road north to expand the riparian buffer.
- Work with the Multnomah County Drainage District to increase in-channel wood in the main-stem Slough and Peninsula Canal for wildlife habitat, including turtles.

- Work with the Multnomah County Drainage District to enhance terrestrial riparian habitat along the secondary drainageways, including but not limited to Pen 1, Pen 2, and Elrod Slough.
- Track revegetation potential on the federally regulated levee.
- Enhance turtle habitat on the north levee where revegetation is not possible.
- Increase vegetative understory in hybrid parks.

COLUMBIA RIVER WATERSHED

- Acquire Property: Increase/buffer anchor and patch habitats, and conduct invasive plant species management and revegetation on acquired properties.
- Plant the toe of the levee to create shallow water and riparian habitat.
- West Hayden Island: Increase anchor habitats; conduct invasive plant species management and revegetation; enhance shallow water/riparian, wetland, interior forest, and grassland habitats.
- East Hayden Island: Conduct revegetation. Plant in rip-rapped areas to enhance riparian habitat.

TRYON/FANNO CREEK WATERSHEDS

- Acquire property adjacent to Woods Memorial Park to expand anchor habitat and interior forest.
- Support Metro in acquiring property between Tryon Creek State Natural Area and the Boones Ferry Road culvert to protect and enhance connectivity between anchor and patch habitats.
- Install nest boxes for Special Status Species (wood duck and downy woodpecker) and common species (black-capped chickadee and tree swallow) at the Tryon/Willamette Confluence prior to construction of the Tryon Confluence Phase 2 Project.
- Support the Tryon Creek Watershed Council's Mentor Program with a Community Watershed Stewardship grant to enhance patch habitats and areas adjacent to anchor habitats.
- Enhance wetlands at April Hill Park for amphibians.
- Support Pendleton Creek revegetation with students and staff from Hayhurst Elementary School and AmeriCorps members to restore patch habitat.

- Install food plants for resident American beaver along upper Fanno Creek
- Protect wetlands, interior forests, common habitat types, Special Status Species, and common species in Woods Park and April Hill Park natural areas by minimizing impacts from off-leash dogs through increased enforcement and dog owner education by park rangers.
- Support Friends of Vermont Creek with a Community Watershed Stewardship grant to enhance bird nesting habitat in Gabriel Park.
- Support the Portland Community College Habitat Team with a Community Watershed Stewardship grant to enhance patch habitats at Portland Community College Sylvania Campus and Sylvania Natural Area.
- Protect existing snags during South Ash outfall enhancement construction in Dickenson Park.

JOHNSON CREEK WATERSHED

- Acquire, enhance, and protect upland anchor habitat in the East Buttes.
- Restore high-value habitat by working with Jameson Partners to enhance terrestrial habitat and habitat connectivity to Johnson Creek on the Freeway Land Property.
- Acquire, enhance, and protect riparian buffers around tributaries to Johnson Creek (working with Willamette National Cemetery).
- Improve terrestrial connectivity from headwaters of tributaries to Johnson Creek through subwatershed planning, conservation, and stewardship.
- Mitigate and treat stormwater runoff to Johnson Creek from I-205.
- Implement the Crystal Springs Restoration Partnership with partners such as Metro, Reed College, PPP&R, SMILE, and TriMet to remove culvert barriers and restore stream, riparian, and terrestrial habitat through conservation easements and stewardship of private and public properties.
- Work with the Johnson Creek Green Spaces Partnership (Johnson Creek Watershed Council, City of Gresham, Metro, PP&R, Audubon Society, and the Trust for Public Lands) to develop a watershed-wide land acquisition plan.
- Acquire, enhance, and restore areas of high restoration value, such as West Lents Wetlands and Flavel Ridge Wetlands.
- Protect Special Status Species by acquiring, enhancing, and restoring areas such as Springwater Wetlands Complex.

SECTION 5

GUIDANCE FOR IMPROVING TERRESTRIAL HABITAT

The Terrestrial Ecology Enhancement Strategy (TEES) is informing many City projects and efforts. Some of the key ways in which this is occurring are described below.

TEES SITE ASSESSMENT FORMS

TEES Site Assessment Forms were developed as tools that are used to integrate terrestrial ecology elements into City projects. They are intended to be used in the field to capture information about a site's biological communities and physical features and to develop preliminary recommendations for possible actions. Orientation sessions about the use of these forms were held for City staff in spring 2009.

There are two versions of the TEES Site Assessment Form—a short form <http://www.portlandonline.com/bes/fish/index.cfm?c=51052&a=308970> (Attachment H) and a longer, more detailed form (Attachment I). The short form is intended for use in the field in the early stages of project planning and design. The longer form (under development) can be used for large, complex, or diverse sites; for follow-up site visits to further document site conditions; or to refine restoration opportunities.

TEES Site Assessment Forms have been completed for a number of City projects, including Oaks Bottom, Tryon Confluence, Marshall Park Habitat Management Plan, Elk Rock and Elk Rock Island, Willamette Cove, Riverview Cemetery, TGD-12 and TDG-14 (Taggart D Basin), April Hill Park, Bishop's Close, NE 148th Water Quality Facility, Columbia Blvd. Water Treatment Plant Support Facility, Stephens Creek Confluence Project, East Moreland Golf Course, Errol Confluence, South Ash Creek Stream Enhancement and Sewer Protection Project, Tryon Creek Wastewater Treatment Facility, South Ash Sewer Repair, Luther Road Restoration Area (Lents II), and a number of potential land acquisition sites.

The following two documents are companions to the TEES Site Assessment Forms:

Using the Terrestrial Ecology Enhancement Strategy (TEES) Site Assessment Forms: (Attachment J)

This document answers questions such as: who should use the forms, when to use the short form vs. the long form, and the types of projects that are high priority for using the forms.

<http://www.portlandonline.com/bes/fish/index.cfm?c=51052&a=272863>

TEES Site Report Template:

(Attachment K)

This document can be used when developing written reports to summarize information collected during site visits and to present preliminary recommendations for actions.

<http://www.portlandonline.com/bes/fish/index.cfm?c=51052&a=308971>

GUIDANCE DOCUMENTS

Information about identifying and managing specific terrestrial habitats and species is being assembled and synthesized. The intended audiences currently include BES watershed and project teams and PP&R, but some of the information could potentially be useful to other bureaus, non-profit organizations, and private landowners. The top priority—identified by BES watershed teams, the Bureau of Planning and Sustainability, and PP&R—was to develop guidelines for minimizing impacts on, and improving habitats for, nesting birds. Guidelines for “Avoiding Impacts on Nesting Birds During Construction and Revegetation Projects” were issued in March 2010 <http://www.portlandonline.com/bes/fish/index.cfm?a=322164&c=31006>. Subsequently, three training sessions for BES employees were held in March, and the guidelines were beta-tested in 2010. The guidelines were refined in October 2010 and presented at a regional conference that month (Attachment L).

Guidelines for another priority management issue—“Living with American Beaver”—were developed in 2011 <http://www.portlandonline.com/bes/fish/index.cfm?c=55195&a=354182> (Attachment M). This keystone species is also a species of management concern, particularly in this urban setting.

Other guideline priorities (at various stages of development) will address:

- Wildlife Trees, Down Wood and Brushpiles for Wildlife (to be completed in 2011)
- Oak Habitat (to be completed in 2011)
- Turtles
- Amphibians
- Wetlands
- Living with Coyotes
- Biuroofs for Wildlife

SPECIFIC REQUESTS

As needed and as time allows, the TEES team assists watershed and project teams with specific requests (e.g., document reviews, guidelines for trail location, wildlife-friendly building design, proper construction of brushpiles for wildlife). Examples of work that has used TEES information and guidance include:

- Grey to Green
- West Hayden Island Annexation
- Siltronic Site
- Grassland/Prairie Calculator

- Airport Futures
- Marine Drive Interchange
- Harbor Oil Baseline Ecological Risk Assessment Review
- Pedestrian Bridge Design
- Milwaukie Light Rail
- Ross Island
- Local Recovery Plan
- Natural Resource Inventory
- Portland Plan
- Colwood Golf Course rezoning decision
- Brandywein Wetlands and other land decisions
- PDOT walking maps
- Local share bond measure expenditure prioritization
- Forest Park planning

DESIRED FUTURE CONDITIONS

PP&R is using TEES information to inform the development of Desired Future Conditions for natural area parks and other sites (e.g., Mount Tabor, Clatsop Butte, Oaks Bottom, Ross Island, Elk Rock Island, Forest Park).

SECTION 6

MONITORING

HABITATS AND BIOLOGICAL COMMUNITIES

Watershed functions and conditions need to be described in ways that are measurable so that changes in watershed health can be detected and progress assessed over time. Citywide goals and objectives, along with watershed-specific objectives, “paint the picture” of what the City would like to achieve. The City’s Physical Habitat and Biological Communities goals and objectives are the most relevant for the TEES. Identification of what should be monitored (at various scales and at various times) in order to provide clear feedback on the conditions of our urban watersheds and the effectiveness of implemented actions is a key step. Selecting a suite of meaningful measures, including targets and benchmarks, is vital.

It will not be practical to monitor all Special Status Habitats or Species. A combination of species and habitats that are easy to monitor and that provide feedback on the effectiveness of implemented actions and conditions of habitat and biological communities over time is needed.

The concept of “focal species and habitats” is useful and appears in numerous scientific publications. Focal species are species selected for use as surrogate measures in the assessment of ecological integrity. Their distribution and abundance over time provide insights into the integrity of the larger ecological system to which they belong. Focal species selected represent the range of environments within the City, serve an umbrella function, or play key roles in maintaining community structure or processes.

Focal species are those 1) whose habitat associations represent the range of habitats associated with a wildlife group⁵, 2) whose human impact-associated factors are representative of the range of the group, 3) whose populations or habitats could be monitored, 4) for which viability concerns are known such as federally-listed or federal or state “sensitive” species, and 5) that are relatively well-studied relative to the effects of various human actions on their habitat use.⁶

TEES uses the term, “focal wildlife species” broadly to include:

- **Keystone Species:** Species that are representative of entire ecosystem health; their absence is detrimental to functioning of the ecosystem. Example: American Beaver
- **Indicator Species:** Species whose presence indicates healthy conditions of Special Status Habitat types. Example: White-breasted Nuthatch for Oak Woodland
- **Umbrella Species:** Species whose presence means that sufficient habitat exists for a variety of other species as well. Example: Bald Eagle

⁵ Wildlife groups may be such things as “late-successional forest habitat-associated species, riparian-associated species, waterfowl and colonial nesting birds, primary cavity excavators, etc.

⁶ The City also recognizes the importance of a 6th “criteria—species that are “emblematic” or that have social or cultural importance (e.g., great blue heron).

- **Flagship Species:** Charismatic, iconic or emblematic species or other species having cultural importance. Example: Great Blue Heron (Portland’s City Bird)

WATERSHED HEALTH MONITORING

The City’s *Framework for Integrated Management of Watershed Health* identifies four essential types of monitoring:

- **Implementation monitoring** assesses whether activities or projects have been carried out as planned.
- **Effectiveness monitoring** determines the extent to which the completed actions are functional and working.
- **Compliance monitoring** determines whether specific performance standards are being met.
- **Validation monitoring** measures the extent to which implemented actions are successful at achieving benchmarks, objectives and goals—and ultimately, the overall health of Portland’s watersheds.

BES has embarked upon an effort to develop a validation monitoring program that addresses all four watershed health goals, and that fulfills as many compliance monitoring requirements as possible (the “Measures” Project), as part of PWMP implementation. The Portland Area Watershed Monitoring and Assessment Program (PAWMAP) was established in 2011. The monitoring program is aimed at assessing the status and long-term trends in watershed health, using a probabilistic survey design. The survey design unites monitoring for stream hydrology, water quality, aquatic habitat, riparian habitat, and aquatic organisms into a single monitoring program. A similar monitoring program and survey design has been developed for terrestrial plant communities, upland habitats, and terrestrial organisms. Indicators and metrics have been selected that will provide meaningful trend data over time. Monitoring for terrestrial communities currently focus on plant communities, birds and may possibly include pond-breeding and terrestrial-breeding amphibians in the future.

Breeding birds are included in the City’s PAWMAP Program. This is a watershed health monitoring effort based on the EPA’s nationwide methodology. Starting in 2011 and continuing annually, birds are sampled for PAWMAP as an indicator of riparian habitat health. A *Riparian Bird Integrity Index* for the Willamette Valley is used to generate a relative score for Portland’s watersheds as part of the data analysis. By incorporating birds as an upland indicator, the City is both directly monitoring birds, and assessing terrestrial habitat for a holistic look at watershed health.

PROJECT-LEVEL AND SPECIES-LEVEL MONITORING

In addition to the PWMP Monitoring Program described above, project-level monitoring of various terrestrial elements to determine the effectiveness of actions taken is taking place, or will be initiated.

Monitoring is also conducted to determine the presence/absence of certain species, along with other parameters important to understanding the status of those species. The City of Portland not

only has a role to play in the conservation of several Special Status Species, but also has an interest in helping to avert species from becoming listed as threatened or endangered by the state and/or federal governments.

Streaked Horned Lark

The streaked horned lark is a federal candidate for listing. Portland potentially will play an important role in improving the status of the species, since some of the last remaining habitat and breeding populations between Puget Sound and the Upper Willamette Valley are in Portland. This project is a City partnership with the U.S. Fish and Wildlife Service and other members of the Streaked Horned Lark Working Group. All known sites in Multnomah County were monitored in 2009, 2010 and 2011. Habitat management guidelines are being developed for the lark and other grassland-associated bird species.

Western Painted Turtle and Western Pond Turtle

Both turtle species are federal Species of Concern and State Sensitive Species, and both historically occurred in Portland. Surveys were conducted by the Northwest Ecological Research Institute (NERI) in the Columbia Slough and Johnson Creek watersheds in 2009 <http://www.portlandonline.com/bes/fish/index.cfm?c=55193&a=287691>. No turtles were detected in the Johnson Creek Watershed, but populations of the western painted turtle were found in the Slough Watershed, and site-specific management recommendations were made, supplementing general guidelines developed by the Oregon Department of Fish and Wildlife and the Lower Willamette Native Turtle Working Group.

The TEES and other participants of the working group provided funding for statewide assessments of both the painted turtle <http://www.portlandonline.com/bes/fish/index.cfm?c=55193&a=273016> and the pond turtle. <http://www.portlandonline.com/bes/fish/index.cfm?c=55193&a=273018>. The assessment for the western painted turtle is of particular importance for the City, since the species' range in Oregon is relatively small, and many areas where the species occurs in abundance are within or adjacent to urban areas, including Portland. Some of the key concerns identified in the assessment that are of importance to Portland are:

- Elevated mortality of adult turtles from road mortality
- Limited nest site availability
- Releases of pet turtles to natural areas (a growing threat), which may result in increased competition and disease transmission
- Recreational use adjacent to and within aquatic habitats, which affects turtles' behavior and likely causes harm
- Effects of climate change on the aquatic habitats of turtles, which need to be considered in long-term conservation planning

In 2011, the working group developed a draft Action Plan for the Lower Willamette Valley, and identified priority tasks. The assessments are playing a critical role in the development of the plan. Key action items identified being implemented in the summer of 2011 include surveys at

specific sites in Portland, and establishment of a pilot program in Portland for development of local (i.e., site-specific) conservation plans.

Amphibians

Monitoring of amphibians has taken place at a number of parks and project sites over the past several years, including Oaks Bottom

<http://www.portlandonline.com/bes/fish/index.cfm?c=55193&a=273024>, Whitaker Ponds, Ramsey Wetlands, Winmar Flats, Alice Springs, Big Four Corners, Schlesinger, Circle Avenue Wetlands, Powell Butte, Leach Gardens, Zenger Farm, Brookside, Beggars' Tick Marsh, Flavel Ridge, Errol Heights, Tideman-Johnson, Forest Park, Hoyt Arboretum, Marshall Park, Tryon Creek Headwaters, Foley-Balmer Park, Maricara Park, and April Hill

<http://www.portlandonline.com/bes/fish/index.cfm?c=55193&a=273021>;

<http://www.portlandonline.com/bes/fish/index.cfm?c=55193&a=354897>. Priorities have focused on collecting baseline information at project sites slated for construction in 2009 and 2010. Information about species' use of sites resulted in recommendations for habitat protection measures and, in some cases, project modifications. Further monitoring will take place at selected sites in 2011.

Bats

Several bat species that occur in Portland are on the Oregon Sensitive Species list and are considered Oregon Conservation Strategy Species (and therefore TEES Special Status Species). During summer 2008, presence/absence monitoring occurred at several City parks and surrounding neighborhoods

<http://www.portlandonline.com/bes/fish/index.cfm?c=55195&a=354192>. Using an Anabat device, species were identified. In 2009, professional bat biologists surveyed selected sites in the Columbia Slough Watershed. Several bat boxes of various designs were installed at Oaks Bottom Wildlife Refuge in 2009, and bat usage was monitored in 2010. Additional bat monitoring occurred at select sites in 2010 and will occur on West Hayden Island in 2011.

Birds

Point-count bird monitoring is being conducted for specific projects, including Elk Rock Island, Mt. Tabor, Stephens Creek Confluence, Columbia Slough Confluence, Winmar Wetlands, Ramsey Lake Natural Area, and Big Four Corners.

Several types of bird monitoring will begin in 2010 for the Oaks Bottom Habitat Enhancement Project, including: waterfowl monitoring at select monitoring stations (as part of a grant from the U.S. Fish and Wildlife Service), and continuation of breeding bird point count surveys (in partnership with the Audubon Society of Portland). Monitoring at the Mason Flats Wetland Enhancement Project, and on Powell Butte and Ross Island, identified as highly desirable by TEES, is taking place in 2011.

Oak Habitats

Oak woodlands provide important food, shelter, and cover for several TEES wildlife Special Status Species. The prevalence of oak woodlands, widespread in the 1850s, has diminished, and the health of existing oak woodlands is believed to be in decline. To protect remnant trees and woodlands and to develop a strategy for restoring these important areas, a monitoring protocol and management guidelines for oak woodlands are being developed. A citywide survey of historic and current oak woodlands was conducted through GIS mapping. Onsite surveys are being conducted at Elk Rock Island, Bishops Close, Baltimore Woods, and at Chase Washburne on Mocks Crest. These surveys will assist in the development of TEES oak management guidelines.

SECTION 7

PROJECTS

A number of City projects are focusing on “Special Status Species,” restoring Special Status Habitat types or incorporating terrestrial elements, using TEES information. Some have taken place, and others will be implemented in the next few years. Examples of these projects are provided below.

CITYWIDE

Urban Conservation Treaty for Migratory Birds and the Portland Bird Agenda

Over 209 species of birds are regularly observed and recorded in the Portland/Vancouver metropolitan region. Some are “resident” species, meaning they are non-migratory. Others spend winters in Central and South America, but breed here. Others pass through on their migratory routes and use local habitats for feeding and resting during their journeys. Twenty-three of the migratory species that occur here have been designated with some type of state or federal status for being at-risk due to population decline and threats.

In 2003, the City of Portland was selected by the U.S. Fish and Wildlife Service as an Urban Conservation Treaty for Migratory Birds Program Partner. In May of that year, Portland City Commissioner Jim Francesconi and USFWS Regional Director Dave Allen officially signed a Treaty, making a long-term commitment to help protect and conserve migratory birds through habitat creation, protection and restoration; reducing hazards; invasive species management; and education and outreach. At that time, 21 other entities and organizations signed on as Treaty partners. In May 2006, City Mayor Tom Potter and the USFWS renewed the Treaty commitment and ten new organizations signed on as partners.

The intent of signing the Treaty is to:

- Raise awareness of migratory birds in Portland’s urban ecosystems,
- Share and increase knowledge of the needs and ecological functions of migratory birds,
- Recognize and promote existing efforts to conserve and enhance the health of migratory bird populations,
- Identify and pursue new actions to maintain the diversity of migratory birds through time,
- Instill a sense of stewardship and responsibility in the City and its citizens, and
- Identify specific measure the City and its citizens can take to ensure migratory birds remain an important element in the urban landscape.

Since 2003, the Portland Parks & Recreation Bureau has been the lead entity for coordinating the City’s Treaty activities. Because many of the objectives and actions of the TEES support the intent of the Treaty, BES and Portland Parks & Recreation decided in February 2011 to coordinate the technically-based Portland Bird Agenda activities under the TEES “umbrella”.

Portland's Parks & Recreation Bureau has been coordinating the annual Migratory Bird Festival and other outreach efforts, and it will continue to do so in the future.

A plan of action for the City's bird conservation efforts was completed in June 2011. This plan—the "Portland Bird Agenda"—will be presented to City Council in 2011. (Attachment N) <http://www.portlandonline.com/bes/fish/index.cfm?c=55194&a=354681>

The Portland Bird Agenda summarizes some of the challenges that birds face locally, some of the City's accomplishments to date that benefit migratory birds, and specific actions that the City is committed to. The Bird Agenda also includes suggestions for actions that Treaty Partners and citizens can take to benefit birds. In the future, the Portland Bird Agenda can be broadened to include accomplishments and future actions of all Treaty partners.

Natural Resources Inventory (NRI)

Portland's Bureau of Environmental Services and Bureau of Planning and Sustainability have updated and refined species lists used in the City's NRI methodology. These lists highlight rare and declining birds and other species in our region. "Special Habitat Areas" (SHAs) are an element of the Wildlife Habitat Model in the NRI. Updated "At Risk" species and "Grassland Associated" species lists have been completed for the SHA criteria. These criteria are currently being applied in four area-specific NRIs: Airport/Middle Slough, North Reach, Central Reach, and Hayden Island.

WILLAMETTE WATERSHED

Mock's Crest Oak Restoration (Chase-Washburn Project)

Non-native invasive species were removed, funded by a FEMA grant. This was followed by planting of native trees and shrubs associated with oaks and madrones, using TEES funds. Oak is a TEES Special Status Habitat. This project will also establish connectivity between other oak patches.

Stephens Creek Headwaters to Confluence

Stephens Creek is the location of a number of stream restoration projects that include terrestrial habitat restoration. At the headwaters, the Texas Wetland has been enhanced through stormwater retrofits and wetland vegetation. In Stephens Creek Canyon, stream restoration was coupled with a large-scale project to remove non-native invasive plants and replant with native riparian trees and shrubs. The Stephens Creek Confluence included enhancement of Willamette River wetland habitats, removal of non-native invasive plants, and replanting of riparian trees and shrubs.

Elk Rock Island Oak Restoration Project

Oregon white oak (*Quercus garryana*) and oak savannah prairie were recorded in the core of the Portland metropolitan area in the early 1850's. Few stands remain, and the State and City of Portland consider oak habitats as having special status; oaks, and their associated plants and animals, are now high priorities for conservation and restoration. A 2008 assessment of oak woodland conditions on Elk Rock Island, a 13-acre Parks managed natural area, revealed that:

Douglas fir and grand fir were overtopping and shading oaks resulting in oak mortality, and poor mast production and seedling survival. Conifer shading was also resulting in the conversion of oak associated shrubs and native groundcover grasses and forbs to a conifer associated plant community.

“Oak release” work (i.e., conifer removal, girdling, topping) was performed in September 2010. Initial project planning began in 2004 with annual surveys of the island’s vegetation and the initiation of invasive species control. In the spring of 2010 a baseline avian survey was conducted and all recent vegetation survey data were compiled and compared to records from vegetation surveys of oak woodlands conducted locally in the early 1900’s. The records of species that once grew beneath the oaks provided clues about historic site conditions (i.e., oak spacing, understory light and species composition) and guided preparation of long term restoration and monitoring plans for the woodland.

Ross Island Natural Area

This 44.83-acre upland property is a refuge for migrating birds and is home to bald eagles, blue herons, deer, and other wildlife. Restoration here focuses on removing invasive shrubs and trees and encouraging the growth of a native cottonwood-ash forest. Project actions include removing invasive species, restoring native vegetation, and providing opportunities for education.

South Portland Riverbank Projects

The beaches, rocky outcrops, and shallow waters along the Willamette River in Portland’s South Riverbank are the focus of terrestrial elements that support the aquatic restoration that is also underway. Project actions include removing invasive species, restoring native vegetation, placing large wood complexes in the river, enhancing connectivity to tributary streams, and providing opportunities for education.

Oaks Bottom Wildlife Refuge Projects

At 170 acres, Oaks Bottom is one of the largest remaining natural areas in the lower Willamette River floodplain. BES and Portland Parks & Recreation are working together on a large-scale habitat enhancement project that will enhance 75 acres of wetland by:

- Replacing an existing culvert with a larger box culvert to enhance fish and wildlife passage and significantly improve the flow of Willamette River water in and out of the refuge.
- Excavating tidal slough channels and enhancing wetland habitats to provide off-channel refuge for federally-listed salmon.
- Removing invasive vegetation, such as purple loosestrife and revegetating with native species to improve wildlife habitat.
- Enhancing opportunities for environmental education and interpretation.

Amphibian monitoring and bat monitoring and resulting recommendations have also informed project design. Five species of bats were identified, emphasizing the importance of the wildlife refuge for bats. To benefit amphibians, additional vegetation will be placed in Salamander Slough; a split rail fence will be continued along the bluff trail (to minimize human disturbance); downed branches will be added in the pond along the bluff trail; invasive plant species

eradication will continue in Wapato Lake; and additional vegetation will be placed in the small pond near the bike path.

Tabor to the River

The Tabor to the River project will restore watershed functions through green stormwater projects, terrestrial enhancement (including planting over 4,000 street trees), and enhancement of diverse forest habitats for neotropical birds on Mt Tabor. The project includes a large-scale outreach component to educate the public about the watershed improvements.

The Mt. Tabor Revegetation Project is part of the larger Tabor to the River Program, and is particularly focused on improving stormwater management, ecological conditions and wildlife habitat for birds. Thus far, invasive shrubs and vines have been removed on 19.5 acres, and nuisance trees have been removed on over 70 acres (fall 2010). Over 1,000 native shrubs and trees were planted (February 2011).

The project recently received additional funding from the East Multnomah Soil and Water Conservation District Partners in Conservation Grant, Portland Parks & Recreation, and the Bureau Environmental Services. These funds will be used to remove invasive shrubs and vines and plant native plants on an additional 37 acres of natural area (starting in summer 2011).

Breeding bird surveys and winter bird surveys have taken place at the project site for three years (2009, 2010, 2011) and will continue annually. This will help BES avoid impacts to bird species, provide baseline and effectiveness monitoring data, and track any changes in bird species use of the park with changes in vegetation.

Baltimore Woods Connectivity Corridor

Baltimore Woods is a unique habitat corridor in North Portland consisting of remnant oak woodlands. Oregon white oaks are increasingly rare in the Willamette Valley and provide valuable habitat for a variety of regionally declining native wildlife species, including the Western gray squirrel, Western bluebird and acorn woodpecker. The Baltimore Woods corridor provides a natural buffer between the Willamette River's industrial activities and its residential neighbors, and acts as a north-south wildlife corridor for birds and other oak-dependent animals. BES, Friends of Baltimore Woods, PP&R, Metro, Columbia Land Trust and SOLV are partnering to acquire vacant parcels to protect the native landscape from development and restore oak woodland and savannah to the corridor.

City of Portland Water Quality Test Laboratory

Amphibian monitoring and resulting recommendations may inform the management of this site.

Hoyt Arboretum

Amphibian monitoring and resulting recommendations may inform the management of this area.

COLUMBIA SLOUGH WATERSHED

Columbia Slough Confluence

Wood will be put in this site for reptiles and amphibians; bird boxes will be installed on the banks; and bat boxes will be added to the bridge. These decisions were informed by the amphibian and turtle monitoring efforts.

Ramsey Stormwater Wetlands Retrofit Project

Amphibian monitoring and turtle monitoring resulted in recommendations that informed this project. Specifically, wood was added to the site for cover (for both amphibians and turtles) and breeding structure (for amphibians). Large logs were placed at the site to enhance basking opportunities for Western painted turtles. Standing snags were put up for birds. Bird point-counts have been conducted at this project site.

Winmar Wetlands/Mason Flats/Big Four Corners/Alice Springs

Monitoring in 2009 determined that this is currently the only breeding population of western painted turtles known in this section of the Slough. The project design was therefore modified to benefit this Special Status Species, as well as other Special Status Species, including the red-legged frog. Specifically, the project design was changed significantly to protect turtle habitat (by not making the connection to the mainstem to keep carp out of the turtle ponds). In addition, reed canarygrass will be removed to improve turtle and bird habitat. Amphibian surveys are also informing decisions about this site; specifically, the possible removal of garbage and tires from the pond at Alice Springs will be investigated. Bird point-counts have been conducted at this site, and it is hoped that the project will benefit willow flycatchers and yellow warblers.

Kelley Point Park

Bat monitoring has documented use by several species, which may inform management of this park. Bird point-counts have also been conducted.

NE 148th Water Quality Facility

A TEES Site Assessment resulted in a decision to avoid removing specific trees and girdling some trees to create snags.

Whitaker Ponds

Amphibian, turtle, and bat monitoring and resulting recommendations have informed management of this site. Specifically, the maintenance schedule will be examined to determine whether the pollution reduction facility (PRF) hydroperiod can be extended for the amphibian breeding season. Non-native iris will be removed in the summer, and an effort will be made to remove non-native bullfrogs. The revegetation project will also probably be modified to enhance the habitat for the western painted turtle population using the site, rather than planting vegetation on the site as previously planned.

Whitaker Slough

Bat monitoring determined the presence of several species in this area. The turtle surveys documented that this site is not used for nesting, but is used as a pathway for turtles.

Inverness Wetland/112th (including “Turtle Bar” nesting habitat)

The turtle survey revealed that this is currently a low-value site for turtles; however, recommendations were made that informed project design (e.g., removal of reed canarygrass to provide possible nesting habitat).

Airport Futures Project and Natural Resources Inventory

The streaked horned lark monitoring project information is informing this project. Bat surveys conducted at sites on and near the Portland Air Guard Base (including Broadmoor and Colwood golf courses, Middle Columbia Slough, and Whitaker Ponds Natural Area) documented use by several bat species. This information will support a natural resources inventory the City is developing for the Middle Columbia Corridor/Airport in northeast Portland; the inventory is also aimed at meeting state and regional planning obligations (Goal 5, Title 13). This information will also support revised environmental zoning that affects how, and if, development will occur in this area over the next few decades.

Pier Park

Bat monitoring documented use by several species, which may inform management of this park.

TRYON/FANNO CREEK WATERSHEDS

Marshall Park Natural Areas Habitat Management and Trail Plan

This PP&R Plan (which includes Marshall Park as well as the Foley-Balmer, Jensen, and Arnold Creek natural areas) focuses on habitat management, trails, access, and connectivity between areas and Tryon Creek State Park. Amphibian monitoring and resulting recommendations informed development of the plan. Specifically, wood will be added to uplands to benefit terrestrial species. The plan notes the results of the bat monitoring and recommends additional surveys to pin down habitat enhancements to be considered. Recommendations for the 37 acres include reducing habitat fragmentation, rerouting recreational activities away from sensitive habitats, removing invasive species, and enhancing habitat for shrub and cavity-nesting birds and for bats.

Tryon Creek Headwaters

Amphibian monitoring resulted in a completed PP&R/BES pond-deepening project. The possibility of adding more plants and wood will be considered.

Maricara Park

Amphibian monitoring and resulting recommendations may inform management of this park in the future.

April Hill Park

Amphibian monitoring and resulting recommendations to deepen the pond have informed the management of this park and the development of a Desired Future Conditions Plan. BES and PP&R are working on permits for pond deepening.

JOHNSON CREEK WATERSHED

Crystal Springs Restoration Partnership

The Grey to Green Culverts Program identified the removal of eight fish passage barriers on Crystal Springs. Phase I focuses on three culverts on the lower river to open up most of the habitat in the short term. One of these culverts carries flow under a carport on SE 21st. Rather than rebuilding the carport, the entire property has been acquired to daylight the stream and improve riparian as well as instream habitat. The banks will be planted and maintained with native vegetation. Currently, the property is surrounded by mature invasive holly trees, which will be removed and replaced with a fence to minimize and limit public access to the natural area. However, the public will be able to view the restoration and learn about Crystal Springs at an overlook where the driveway currently exists.

Willing Seller Program

Five properties totaling 2.8 acres have been purchased to support the East Lents Floodplain Restoration Project, which targets upland and riparian habitat as well as instream species. Two properties totaling 3 acres have been acquired in the East Powell Butte Target area, which will be land banked for future restoration efforts.

Zenger Farm

Amphibian monitoring revealed that this site supports the healthiest populations of native amphibian species in the City. Furthermore, it was the only site monitored that did not have non-native, invasive bullfrogs. Because of this information, the Army Corps of Engineers project may be modified to provide minimal impact to the site, while still achieving other project objectives.

Circle Avenue Horse Pasture Pond

Amphibian monitoring and resulting recommendations may lead to removal of non-native iris, the addition of downed branches, and plantings of *Juncus* and *Eleocharis*.

Pompelly Property

Amphibian monitoring and resulting recommendations were provided to the private landowner of this site and hopefully will inform management decisions.

Powell Butte

Amphibian monitoring and resulting recommendations will inform management of this natural area park and the development of Desired Future Conditions. Specifically, fencing (either vegetated or actual fencing) will be added around the vernal pond, and the possibility of

constructing additional ponds will be investigated (i.e., hydrological conditions). Bird surveys began in 2011, coordinated by PP&R.

East Buttes Preservation Strategy

BES, PP&R and Metro have partnered to acquire and restore parcels in the City's East Buttes, often referred to as Forest Park East. These areas provide a welcome, "wild" respite from an otherwise urban setting. They also serve as critical green infrastructure that manages rainwater runoff and moderates flooding; recharges groundwater; prevents property damage due to flooding and landslides; supports native plants and wildlife; and serves as a recreation corridor that physically and socially connects Portland, suburban communities and rural areas. Since 2007, 197 acres have been acquired in the East Buttes, and the City of Portland has a goal of acquiring an additional 150 acres through the Grey to Green Land Acquisition Program.

Leach Gardens

Amphibian monitoring and resulting recommendations will inform management of this site. Specifically, additional vegetation (through organized plantings) will occur.

Brookside

Amphibian monitoring and resulting recommendations will inform management of this site. The possibility of invasive vegetation removal and replacement with native cover will be investigated.

Beggar's Tick Marsh

Amphibian monitoring and resulting recommendations (i.e., adding vegetation, particularly sturdy-stemmed plants, and replacing grass with woody debris and shrubbery) will inform management of this site.

Flavel Ridge

Amphibian monitoring and resulting recommendations will inform this project. Specifically, the feasibility and desirability of constructing new ponds and adding downed woody material will be investigated.

Errol Heights

Amphibian monitoring and resulting recommendations may inform management of this site.

Tideman-Johnson Park

Amphibian monitoring and resulting recommendations may inform management of this site.

Westmoreland Park

Bat monitoring results have informed management of this park. Specifically, the clusters of large Sequoia trees near the casting pond were identified as important night roosts that are worthy of protection.

Additional information about these projects and others can be found in the BES Watershed Services Update Program (WSUP) Database.

SECTION 8

OUTREACH AND EDUCATION

In addition to on-the-ground projects, a number of other efforts are occurring that are aimed at improving conditions for wildlife and their habitats through outreach and education.

Wildlife of Portland Poster

Many people who live in Portland are not aware of the fact that Portland is home to over 300 species of fish and wildlife and untold numbers of invertebrates. To address this, in 2010 TEES developed a poster that features some of the habitats and species found in the City, along with a list of actions that citizens can take to help wildlife and watersheds

<http://www.portlandonline.com/bes/fish/index.cfm?c=31006&a=307484> (Attachment O).

Nearly 4,000 posters have been distributed to schools and at conferences and lectures.

Website

BES maintains a website that includes TEES documents and information regarding terrestrial ecology <http://www.portlandonline.com/bes/fish/index.cfm?c=51052>.

<http://www.portlandonline.com/bes/fish/index.cfm?c=31006>

Urban Conservation Treaty for Migratory Birds and the Portland Bird Agenda

As noted earlier, the City of Portland was selected by the U.S. Fish and Wildlife Service as an Urban Conservation Treaty for Migratory Birds Program Partner in 2003. A major emphasis of the Program is to raise awareness of migratory birds in Portland's urban ecosystems and instill a sense of stewardship and responsibility in the City and its citizens.

Since 2003, the Portland Parks & Recreation Bureau has been the lead entity for coordinating the City's Treaty activities. Because many of the objectives and actions of the TEES support the intent of the Treaty, BES and Portland Parks & Recreation decided in February 2011 to coordinate the technically-based Portland Bird Agenda activities under the TEES "umbrella". Portland's Parks & Recreation Bureau has been coordinating the annual Migratory Bird Festival and other outreach efforts, and it will continue to do so in the future.

A plan of action for the City's bird conservation efforts was completed in June 2011. This plan—the "Portland Bird Agenda"—will be presented to City Council in 2011 (Attachment N). The Portland Bird Agenda summarizes the public outreach efforts to date, as well as outreach and education "next steps" to further achieve the intent of the Treaty.

Managing Land with Minimal Impact to Birds Conference

In October 2010, a one-day regional workshop—"Managing Land with minimal Impact to Birds"—was held at the Oregon Zoo. Over 200 people, representing regional municipalities, state and federal resource agencies, soil and water conservation districts, parks and recreation

managers, private landowners, and others, attended. The impetus for the workshop was the City's guidelines, "Avoiding Impacts on Nesting Birds During Construction and Revegetation Projects" (Attachment L).

Elk Rock Island Habitat Restoration

Elk Rock Island in the Willamette River is one of the last remaining oak habitats in the vicinity of Portland, and hosts oaks, madrones, a number of rare plants, and Special Status Species. The island is owned by the City of Portland and managed by Portland Parks & Recreation. Over time, Douglas firs had begun overtopping and outcompeting the shade-intolerant oak community. To benefit this community, the City of Portland performed an "oak release" project in September 2010. Forty firs were felled, girdled, or made into snags. Prior to project implementation, plant, bird and acorn mast surveys were conducted to establish baseline information. Subsequent monitoring will reveal responses to this BES/PP&R project.

Portland's Sensitive Wildlife and Your Dog

The City of Portland recognizes that responsible pet ownership means more than licensing and vaccinating dogs; it means controlling dogs' interactions with wildlife and natural areas. Unleashed dogs can harm birds and other wildlife, disturb breeding areas, or harass wintering birds, causing them to use valuable energy reserves. Dogs running loose also trample plants and habitat. Portland City Code requires that all dogs in parks must be kept on a leash unless in one of 31 designated off-leash areas. City Code also requires that all poop be picked up and disposed of in proper receptacles. Violation of either leash or scoop laws results in a \$150 fine. To educate the public about these problems and City Codes, several brochures and informational pieces were created:

The "Dogs For the Environment" Brochure and Pledge Form (Attachment P) includes basic information about responsible pet ownership and City Code requirements. It also includes a pledge form for owners, signifying they will keep their dog on leash and on trails in natural areas; scoop and properly dispose of poop; and avoid contact with streams and wildlife. In recognition of signing the pledge form, owners are sent a green bandana for their pet to wear.

A "Portland's Sensitive Wildlife and Your Dog" Brochure and poster were developed to inform people about the importance of keeping dogs on-leash in natural areas to reduce disturbance to birds and other wildlife (Attachment Q). A number of native birds nest on, or near the ground, and are particularly susceptible to harm by off-leash dogs. Ranger patrols were established to educate the public, and to help enforce City Codes.

Bird Checklists

In 2010, bird checklists for two of Portland's premier bird areas—Oaks Bottom Wildlife Refuge (Attachment R) <http://www.portlandonline.com/bes/fish/index.cfm?c=55194&a=280023> and Mt. Tabor Park (Attachment S) <http://www.portlandonline.com/bes/fish/index.cfm?c=55194&a=280021>—were developed by Christopher and Adrian Hinkle, respectively. These teen-aged twin boys volunteered many hours to develop these lists and accompanying bird illustrations. The lists were developed based on personal observations over the years, and vetting by other birders in the State or Oregon. The checklists have been posted in the City's BES website.

Historical Information

Achieving healthy biological communities not only depends on knowing about current conditions of fish and wildlife and their habitats; it should also be informed by knowing about historic conditions and decisions made by our predecessors. In 2008, several TEES team members conducted informal interviews, and held brown-bag presentations and conversations with Portlanders David B. Marshall and Tom McAllister--men in their 80's who have a wealth of knowledge and experience. Marshall had a long career as a biologist with the U.S. Fish and Wildlife Service, and wrote the first *Oregon Nongame Plan*. McAllister worked for the State Fish and Game Commission and was the outdoor writer and editor for the *Portland Journal* and later the *Oregonian*. All interviews, brown-bags and conversations were video-taped and transcripts posted on the BES/Science, Fish and Wildlife website.

<http://www.portlandonline.com/bes/fish/index.cfm?c=51343&a=279528>,

<http://www.portlandonline.com/bes/fish/index.cfm?c=51343&a=269478>,

<http://www.portlandonline.com/bes/fish/index.cfm?c=51343&a=269475>.

SECTION 9

FUTURE WORK

Much progress has been made regarding all of the main elements of the Terrestrial Ecology Enhancement Strategy (TEES), as summarized in this report. Implementation of the *Portland Watershed Management Plan (PWMP)* and the TEES (as part of the *PWMP*) is ongoing, but there are some elements that have defined end-products.

Some of the key work items for the TEES over the next several years are identified below, organized under the main TEES elements (as identified on page 2 of this Summary).

Identification of plant and animal species and terrestrial habitats needing protection, conservation, and/or restoration (Special Status Species and Habitats):

- Revise the City's lists if changes in the status of species or habitats occur and are officially recognized by the agencies and organizations the City bases its lists on.
- Map the locations of Special Status Habitats, with oaks and interior forests having the highest priority.

Identification of key management issues:

- Using the *City of Portland Terrestrial and Aquatic Invasive Animal Assessment* as a starting point, refine the species lists and identify high priority actions and partners for implementation.

Articulation of watershed-specific objectives for terrestrial habitats and biological communities:

- Integrate the TEES watershed-specific objectives into the next update of the *PWMP*.

Identification and implementation of priorities and actions for the next 2 to 5 years:

- Continue to inform and implement BES and PP&R projects, based on information collected during TEES site assessments.
- Implement selected priority recommendations regarding invasive animals.
- Continue the next phase of the Elk Rock Island oak habitat restoration project in partnership with PP&R.
- Continue to implement recommendations resulting from 2008-2011 turtle, bat, bird, and amphibian surveys.

- Continue to participate in interagency working groups for species of regional and statewide concern found in Portland, in order to identify priority actions and form collaborative partnerships to improve the status of those species. These working groups include:
 - Lower Willamette Turtle Working Group: Development of a regional conservation plan and coordination of monitoring and other activities to help recover Oregon’s two native turtle species
 - Streaked Horned Lark Working Group: Coordination of monitoring and other activities
- Finalize the “Portland Bird Agenda,” bring it before City Council, and begin implementing in partnership with PP&R, Bureau of Planning and Sustainable Development, Audubon Society of Portland and other partners.

Guidance to City bureaus and others for improving habitat and addressing plant and wildlife management issues:

- Continue to apply the guidelines for “Avoiding Impacts on Nesting Birds During Construction and Revegetation Projects”. Refine as necessary, based on what is learned.
- Beta-test, and refine the beaver guidelines.
- Finalize, beta-test, and refine guidelines for wildlife trees, down wood and brushpiles for wildlife.
- Finalize, beta-test, and refine guidelines for turtles and amphibians.
- Finalize and use guidelines for oak habitat.
- Develop and use guidelines for wetlands.
- Develop and use guidelines for coyotes.
- Develop guidelines for bioroofs for wildlife.
- Refine and finalize the long TEES Site Assessment Form.
- Continue to provide assistance to PP&R regarding Desired Future Conditions (DFCs) for specific natural area parks and other sites.
- Continue to assist watershed teams, BES Revegetation, PP&R, and Planning and Sustainable Development upon request, providing TEES information to inform their projects and decision making.
- Continue to conduct training for City staff as needed.

Selection of species and habitats to be monitored over time to determine the health of biological communities in Portland’s urban watersheds:

- *Watershed Health Index (WSHI) and Portland Watershed Management Plan (PWMP) Measures Monitoring:* As part of the long-term monitoring in the four watershed health goal categories (hydrology, physical habitat, water quality, and biological communities), continue PAWMAP monitoring efforts for birds and terrestrial biological communities.
- *Special Status Species Monitoring:* Because several wildlife species of particular concern are associated with specific habitats and/or are very limited in their distribution, monitor selected sites where they are known to occur and/or breed. This will help the City make decisions about management of specific sites and enable the City to take appropriate action if negative changes occur. High priority species include the streaked horned lark, the western painted turtle, amphibians (pond-breeding and terrestrial), and bats.

Monitor select species or species groups to determine the effectiveness of projects and to identify and address any unanticipated unintended consequences:

- *Project Monitoring:* Pre- and post-construction project monitoring will occur at many projects, including: Oaks Bottom Habitat Enhancement, Columbia Slough Confluence, Elk Rock Island Oak Restoration, Ramsey Pacific Willow Wetland and Refugia, Big Four Corners Natural Area, and Winmar Mason Flats.

SECTION 10
Attachments
