DRAFT Appendix F

2018 Regional Transportation Plan
Environmental Analysis and Potential Mitigation Strategies

July 20, 2018

Purpose

The purpose of this appendix is to summarize the methods and data used to conduct a system-level environmental analysis of the 2018 Regional Transportation Plan (RTP) constrained priorities project list and discuss potential environmental mitigation strategies. Findings from the environmental analysis are reported in Chapter 7 of the Regional Transportation Plan.

The environmental analysis included vegetation, aquatic and terrestrial wildlife species and habitat, wetlands, floodplains, other biological resources and historic resources that may be affected by projects in the Regional Transportation Plan. A separate appendix, Appendix E, documents the system-level transportation equity evaluation conducted for the 2018 Regional Transportation Plan and potential environmental justice mitigation strategies.

This appendix addresses federal metropolitan transportation planning requirements for the Regional Transportation Plan to:

- discuss environmental and historic resources that may be affected by projects identified in the Regional Transportation Plan;
- discuss potential environmental mitigation activities and potential areas to carry out these activities; and
- consult with Native American Tribes and appropriate federal and state resource and regulatory agencies.

This appendix, Appendix E and Chapter 7 of the Regional Transportation Plan are the basis for consultation with Native American Tribes and appropriate federal and state land management, wildlife and regulatory agencies. The consultation opportunity will occur from July 20 to August 20, 2018. As part of this consultation, Metro will host a meeting on August 6, 2018 to provide a brief overview of the draft 2018 Regional Transportation Plan and address questions or concerns that Native American Tribes and federal and state agencies may have for this process. Agencies and tribes are requested to provide any additional written comments by August 20, 2018 so they can be considered as part of finalizing the 2018 Regional Transportation Plan.

Introduction

Transportation impacts the natural and built environment in many ways, potentially having significant effects on the region's air quality, water quality, noise, fish and wildlife habitat, historic resources, tribal lands and public health. These impacts are particularly important to Metro since the natural and social environment is deeply connected to the identity and quality of life of the greater Portland region. When asked what they enjoy most about the quality of life in the region, people living in the region have consistently chosen clean air and water and access to nature as things they value and want to protect.

The Portland metropolitan region is situated at the northern end of the Willamette valley ecoregion, a fertile river valley surrounded by dramatic natural features - the Coast range to the west, the Cascades to the east, and the Columbia River to the north (including the Columbia River Gorge National Scenic

area). Inside of the region, natural landscape is created by broad river valleys with wetlands, narrow river canyons with riparian vegetation, buttes and forests, mountains and meadows, foothills and farms.

The protection of natural and cultural resources has long been a key responsibility of Metro. The preamble of the 1992 Metro Charter proclaims that "Metro's most important service is to preserve and enhance the quality of life and the environment for ourselves and future generations." This ethic of sustainability is central to several Metro plans and programs, including the Regional Transportation Plan, Climate Smart Strategy, Greenspaces Master Plan, Nature in Neighborhoods Initiative and the region's overarching land use and transportation strategy for managing growth, the 2040 Growth Concept. Clean air and water is one of the six desired outcomes adopted by the Metro Council in 2008.

Regulatory Environment

Construction of the projects identified in the Regional Transportation would be subject to federal, state and local regulations concerning impacts to biological and historic resources. The principal regulations, ordinances and permit actions that could apply to implementation of these projects are summarized in **Table 1**. Many of the requirements and processes identified below would be addressed in detail during the project development design and permitting phase (after selection of a preferred alternative), as part of the environmental and land use review, consultation and permitting processes all construction projects must undergo. Early consideration of environmental impacts also helps address National Environmental Policy Act (NEPA) requirements more effectively when federal funding or federal action is involved than if such issues would be left for consideration later in the project development process.

Table 1. Summary of Potential Natural Resource Permit Requirements

Regulation/Permit	Responsible Agency	Documentation or Processes Required	Regulated Resource(s)
Federal			
National Environmental Policy Act (NEPA)	Federal Transit Administration (FTA) and Federal Highway Administration (FHWA)	NEPA FONSI, CE, EA or EIS addressing natural resource conditions, impacts and mitigation	Human and natural environment, and related social and economic effects
Clean Water Act (CWA) Section 404 Individual Permit	U.S. Army Corps of Engineers (USACE)	Alternatives analysis; wetland delineation study; wetland functional assessment and impact analysis; mitigation plan	Waters of the U.S., including wetlands
Federal Endangered Species Act (ESA) and Magnuson-Stevens Fishery Conservation Management Act	National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS)	Biological Assessment addressing project impacts to listed species, species proposed for listing and candidate species	Vegetation, wildlife, fisheries
Fish and Wildlife Coordination Act	USFWS, NMFS and Oregon Department of Fish and Wildlife (ODFW)	Agency consultation; identify impacts to fish and wildlife resources; recommend mitigation	Vegetation, wildlife, fisheries
Federal Migratory Bird Treaty Act	USFWS	Identify impacts to migratory birds; avoid destruction of active nests or eggs, and killing of individuals	Wildlife

Regulation/Permit	Responsible Agency	Documentation or Processes Required	Regulated Resource(s)
Bald Eagle and Golden Eagle Protection Act	USFWS	Identify bald eagle nesting habitats; agency consultation	Wildlife
State			
Oregon Removal – Fill Permit	Oregon Department of State Lands (DSL)	Alternatives analysis; wetland delineation study; wetland functional assessment and impact analysis; mitigation plan	Waters of the state, including wetlands
Oregon State ESA	ODFW and Oregon Department of Agriculture (ODA)	Identify project impact to state-listed and candidate species not currently listed under federal ESA	Vegetation, wildlife, fisheries
CWA Section 401 Water Quality Certification	Oregon Department of Environmental Quality (DEQ)	Assess project compliance with state water quality standards; implement mitigation measures	Rivers, streams, other bodies of water
Fish Passage Act	ODFW	Agency consultation; identify crossed streams with native migratory fish; implement passage at identified streams	Native migratory fish

Under Oregon land use regulations, local and state jurisdictions are required to compile inventories of wetland and other natural areas and protect the highest-ranking inventoried sites. This protection is provided by local regulations such as local environmental zones, sensitive lands overlay zones and other locally identified regulated areas and resources. Such areas include sites that meet the standards of Statewide Planning Goal 5 for open space, scenic or natural values.

In general, the overlay zones are intended to allow development in situations where adverse impacts from the development can be avoided or mitigated. Regulations implementing these ordinances provide guidelines for, among other things, identifying, protecting and mitigating impacts, and managing important natural resources. Each jurisdiction has its own process for assessment and approval of transportation projects in the vicinity of sensitive ecosystem resources. The processes generally include an assessment of existing conditions, analysis of potential impacts from a project, and documentation of actions taken to avoid, minimize or compensate for impacts to the resources. In addition, each jurisdiction has its own urban forestry or tree code, as well as local requirements for storm water management and treatment.

Environmental Considerations Analysis

The analysis reported in Chapter 7 of the Regional Transportation Plan identifies areas of potential conflicts where proposed RTP projects intersect with environmental and historic resources. The environmental analysis also included an evaluation of mobile source emissions and potential impacts to tribal lands. Considering the complexity and diversity of the environment across the region, Metro uses readily available published environmental inventories to identify protected resources, including vegetation and wildlife habitats, fishery resources, wetlands, floodplains and historical resources.

This Appendix documents the methodology used, areas of potential conflict and potential mitigation strategies. Identifying these areas of potential conflict early in the transportation planning process allows for more meaningful consideration of mitigation strategies, including project alignment, design

and construction features that avoid or minimize impacts on the resource area. Many of these mitigation strategies are addressed specifically during the project development process as part of the environmental and land use review, consultation and permitting processes all construction projects must undergo. Early consideration of environmental impacts also helps address National Environmental Policy Act (NEPA) and other requirements more effectively than if such issues would be left for consideration later in the project development process.

Overview of Methodology and Data Used for the Environmental Analysis

The methodology and data used for the analysis is organized into eight sections:

1. High value habitat areas analysis
2. Wildlife Incident hotspots analysis
3. Fish passage barriers and fish bearing streams analysis
4. Wetlands analysis
5. Floodplain analysis
6. Historic resources analysis
7. Tribal lands analysis
8. Clean air and greenhouse gas emissions analysis

The summary of the methodology and data used for the analysis is followed by an overview of Metro efforts to implement and encourage environmental mitigation activities. Findings from the analysis are reported in Chapter 7 of the 2018 Regional Transportation Plan (sections 7.4.12 – 7.4.16).

1. Analysis of potential impacts to high value habitat areas

Metro used the best available regional scale data to identify the potential areas of conflict between the proposed RTP project and high value habitat areas identified by the Regional Conservation Strategy within the planning area. Using Geographic Information System (GIS) mapping software, projects identified in the draft list of projects for the RTP were overlaid with the Regional Conservation Strategy high value habitat areas within the planning area.

As noted previously, the Intertwine Regional Conservation Strategy serves as a framework for efforts to conserve biodiversity within the greater Portland-Vancouver region. Data was developed from 2010 to 2013 by the Intertwine – a broad coalition of public, civic, private, and nonprofit organizations. The analysis considered many features, including existing vegetation, wetlands, hydric soils, floodplains, habitat patch size and shape, distance from streams and wetlands, and the presence of roads. High value habitat areas ranked in the top quarter of all areas because of the type, location and size of their habitat.

The Intertwine Regional Conservation Strategy high value habitat data set[1] includes much of the environmental data recommended by the Federal Highway Administration (FHWA) for consideration to meet federal requirements. The RCS data includes: wetlands identified in the National Wetland Inventory (NWI), forest land, 100-year floodplains identified by the Federal Emergency Management Agency (FEMA), U.S. Geological Survey stream and hydrography data, SSURGO soil data collected by the National Cooperative Soil Survey developed by the U.S. Department of Agriculture, LIDAR data and land cover data.

Findings from the analysis are reported in Chapter 7 of the 2018 Regional Transportation Plan (see

[1] Visit regionalconservationstrategy.org for more information.

section 7.4.14).

2. Analysis of potential impacts to wildlife hotspot incident locations

The purpose of the wildlife incident hotspot inventory is to identify key areas in the region where wildlife mortalities are caused by motor vehicles. This information highlights key areas where wildlife crossings designs should be considered in the transportation planning and project development process. Identification of these projects early in the planning process provides an opportunity to consider wildlife corridor acquisition/restoration, wildlife crossing design treatments and other strategies as part of future project development.

In August, 2002, Metro completed a study that compiled wildlife mortality data for the three county Portland region. It used several sources, including: city, county and state road maintenance department road kill pick-up records; ODOT's Crash Analysis and Reporting Unit; County animal control agencies; and animal care and rehabilitation centers. The study reported more than 2,000 deer and elk deaths between 1992 and 2001 due to collisions with vehicles. The analysis began with a wider scope but was restricted to elk and deer due to limitations of available data—many agencies do not consistently report other wildlife mortalities. In a second study in 2005, the Oregon Department of Transportation used an expert-opinion approach to identify 86 hot spots along state maintained roads in ODOT Region 1. Most of these hot spots are locations where deer-vehicle collisions are frequent, although the experts also identified hot spots that served as crossing locations. ODOT maintains this database and updated the data in 2016 for the 2007- 2016 time period for state-owned roadways in the region.

This analysis is not complete. Findings from the analysis will be added to Chapter 7 of the 2018 Regional Transportation Plan and projects in the 2018 RTP project lists intersecting these hotspot locations will be identified.

3. Analysis of potential impacts to fish passage barriers and fish bearing streams

In 2002, Metro inventoried culverts in the region to identify barriers to fish passage. Fish passage barriers can be man-made or natural blockages to the free movement of fish species through a waterway. Upstream blockages that prevent spawning of fish, especially those that are identified as threatened or endangered, are of significant importance. Fish barriers can come in the form of culvert blockages, dams, shallow water, or a combination of factors that prevent fish from reaching their spawning grounds. Transportation projects that may develop new barriers, or intersect existing barriers will require adequate fish passage as directed by State law.

This analysis is not complete. Findings from the analysis will be added to Chapter 7 of the 2018 Regional Transportation Plan and projects in the 2018 RTP project lists intersecting these fish passage barrier locations and fish bearing streams (current and historic) will be identified.

4. Analysis of potential impacts to wetlands

Metro included wetlands in the analysis of potential conflicts as part of the high value habitat areas analysis. A separate analysis is planned. Findings from the analysis will be added to Chapter 7 of the 2018 Regional Transportation Plan and projects in the 2018 RTP project lists intersecting wetlands will be identified.

5. Analysis of potential impacts to flood hazard areas/floodplains

Metro included floodplains in the analysis of potential conflicts as part of the high value habitat areas analysis. A separate analysis is planned. Findings from the analysis will be added to Chapter 7 of the 2018 Regional Transportation Plan and projects in the 2018 RTP project lists intersecting flood hazard areas/floodplains will be identified.

6. Analysis of potential impacts to historic resources

Metro reviewed data from the National Register of Historic Places.[2] More than 650 historic places and structures have been listed in the National Register in the planning area. Using Geographic Information System (GIS) mapping software and data from National Register of Historic Places, the analysis identified projects within the planning area that are located within 100 feet of historic properties listed in the National Register.

Potential transportation project related impacts may include physical changes to historic transportation infrastructure, effects of road widening on historic settings or structures, effects on historic roadside elements, effects of air pollution on resources due to increased traffic, and disturbance or infringement on cultural landscapes. The nature of these impacts is highly site and project specific, and the information about historic resources is constantly evolving. It is important for each project to be evaluated in the specific context and timeframe in which it is designed with up-to-date information. There are several state and federal laws and regulations that call for preservation and/or enhancement of historic and cultural resources. Of specific relevance to transportation projects are Section 106 of the National Historic Preservation Act (NHPA) of 1966 and Section 4(f) of the Department of Transportation Act of 1966.

Findings from the analysis are reported in Chapter 7 of the 2018 Regional Transportation Plan (see section 7.4.15).

7. Analysis of potential impacts to tribal lands

Metro also reviewed tribal lands data available from the Bureau of Indian Affairs to identify potential federally recognized tribal lands in the planning area. No tribal lands were identified within or adjacent to the metropolitan planning area.

Findings from the analysis are reported in Chapter 7 of the 2018 Regional Transportation Plan (see section 7.4.15).

8. Analysis of potential impacts to clean air and greenhouse gas emissions

The greater Portland region achieved attainment status under federal law in October 2017 and is no longer required to complete an air quality conformity determination. Metro estimated future mobile source emissions of criteria pollutants: carbon monoxide (CO), precursors of smog – nitrogen oxide (NOX) and volatile organic compounds (VOC), particulate matter (PM10 and PM2.5), carbon dioxide emissions from cars and trucks operating within the greater Portland region's airshed.

Metro estimates future mobile source emissions by inputting existing and proposed transportation project information into the travel demand model to understand how travel behavior will change in the region with and without proposed investments for the years 2027 and 2040. Key travel behavior outputs include trip generated, mode split (i.e. percentage of trips taken by different transportation modes), trip distances, and vehicles miles traveled. This information is then post-processed in the transportation emissions model approved by the U.S. Environmental Protection Agency (known as MOVES2014a). MOVES includes information about vehicle fleet mix, fuel composition, and emissions rates to determine what the projected emissions of individual air pollutants and greenhouse gas emissions would be with and without the proposed transportation investments for the Portland airshed in 2027 and 2040.

[2] For more information on each site visit www.nationalregisterofhistoricplaces.com/or/state.html and click on Clackamas, Multnomah or Washington County.

Further, the region has estimated that other pollutants, for which there are not federal or state regulations, but which nevertheless can have health or environmental impacts. The amount of air toxics[3] and ozone generated from on-road transportation sources are estimated by Metro on a voluntary basis and reported in Chapter 7 of the Regional Transportation. Both air toxics and ozone are estimated to decreases substantially in the future to the year 2040 the furthest year analyzed.

Other environmental data considered by not analyzed for the 2018 Regional Transportation Plan
Other inventories previously suggested by FHWA, but not included in this analysis due to a lack of a comprehensive regional database include: Scenic/Historic/Backcountry Roads, Superfund sites, archeologically sensitive areas, previous ODOT mitigation sites, potential ODOT mitigation banks, Division of State Lands existing mitigation banks, water quality limited bodies (defined by the Department of Environmental Quality), National Marine Fisheries and U.S. Fish and Wildlife recovery/conservation plans.

Implications for projects in the 2018 Regional Transportation Plan
The RTP project lists in Appendix A, B and C identify projects that intersect with the Regional Conservation Strategy high-value habitat areas and properties listed on the National Registry for Historic Places. Information will be added to the project lists to identify projects that intersect with wildlife hotspot incident locations, culverts that are barriers to fish passage, fish bearing streams, wetlands and floodplains.

It is important to note a project's inclusion on this list does not guarantee the project will impact a given environmental or historic resource. Rather, the agency responsible for the project should be aware of its potential impacts and potential mitigation strategies available, and work to mitigate any potential issues during the project development phase as part of the environmental and land use review, consultation and permitting processes all construction projects must undergo.

Potential environmental mitigation activities are described in the next section and more generally in Chapter 3 of the Regional Transportation Plan. Projects that intersect environmental or historic resources should consider alignment options that avoid the resource area as well as environmental mitigation strategies during future project development as described in the next section and Chapter 3 of the Plan. Identifying these areas of potential conflict early in the transportation planning process allows for more meaningful consideration of mitigation strategies, including project alignment, design and construction features that avoid or minimize impacts on the resource area. It also provides information that could be used to inform estimating project planning, construction and mitigation costs as part of the overall project cost to reduce help delay in project delivery.

[3] Nitrogen oxide and volatile organic compounds are precursors to Ozone. Transportation-related air toxics are: Acrolein, Arsenic, Benzene, 1,3-Butadiene, Chromium 6, Diesel particulate matter plus diesel exhaust organic gases (Diesel PM), Formaldehyde, Naphthalene, Polycyclic organic matter

Overview of Metro Efforts to Implement and Encourage Environmental Mitigation activities

The analysis conducted for the 2018 Regional Transportation Plan complements other Metro efforts to incorporate and encourage environmental mitigation strategies during the long-range planning and project development processes:

Metro Planning and Development Department Environmental Mitigation Activities and Resources:

- **Complete Streets Program** – published six best practices in transportation design handbooks – (1) *Creating Livable Streets: Street Design Guidelines for 2040* (2002), (2) *Green Streets: Innovative Solutions for Stormwater and Stream Crossings* (2002), (3) *Trees for Green Streets* (2002), (4) *Green Trails: Guidelines for Environmentally Friendly Trails* (2004), (5) *Wildlife Crossings* (2009), (6) *Lighting Regional Trails Best Practices and Recommendations* (2016) – to provide design and construction guidelines to minimize transportation impacts on natural resources and wildlife when avoidance is not possible. The first three handbooks are currently being updated and will incorporate and reference the last three more recent handbooks related to trails and wildlife.
- **Regional Active Transportation Plan and Top Ten Natural Resource Considerations for Trails Planners** – adopted in 2014 by the Metro Council, the Regional Active Transportation Plan defines a vision and policies that will make it easier to walk, bike and access to transit to work, school, parks and other destinations throughout the region. The plan recommends "Top 10 Natural Resource Considerations for Trails Planners" and mapped the Regional Active Network with the Regional Conservation Strategy high value habitat areas to show places where these considerations should be applied during future planning, project development and construction.
- **Climate Smart Strategy** – adopted in 2014 by the Metro Council, the strategy defines policies, strategies and near-term actions to guide how the region integrates reducing greenhouse gas emissions with on-going agency efforts to implement the 2040 Growth Concept and Regional Transportation Plan. Implementation of the strategy, through the Regional Transportation Plan, will reduce stormwater run-off and related water pollution, air pollution and greenhouse gas emissions.
- **Growth Management Program** – This program is responsible for managing the region's urban growth boundary. Land inside the urban growth boundary supports community development and urban services such as roads, water and sewer systems, parks, schools and fire and police protection. The boundary is one of the tools to protect farms, forests and natural areas from urban sprawl and promote the efficient use of land, public facilities and services inside the boundary. In 2007, a system for designating urban and rural reserves was put in place, further honing criteria for bringing land into the boundary.
- **Regional Functional Plans** – Metro's Urban Growth Management Functional Plan and Regional Transportation Functional Plan direct how local governments implement the 2040 Growth Concept and Regional Transportation Plan. Title 3 of the UGMFP addresses water quality and flood management, Title 13 addresses habitat conservation areas, including protection of riparian and upland wildlife habitat and use of habitat-friendly development practices. Metro reviews local plans as they are amended and publishes an annual compliance report. Title 1 of the RTFP addresses system design to ensure the street designs and best practices set forth in the Complete Street program handbook can be implemented in local planning and project development. Title 1 of the RTFP also provides direction on limiting new street connections and bike and pedestrian accessways that cross water resources.
- **Ongoing Consultation Activities** – Ongoing environmental mitigation consultation with relevant federal and state agencies occurs through Metro's Transportation Policy Alternatives Committee

(TPAC) and Joint Policy Advisory Committee on Transportation (JPACT), which includes representatives from the Oregon Department of Environmental Quality (DEQ), the Oregon Department of Transportation (ODOT), and port and transit districts; the Metro Technical Advisory Committee (MTAC) and Metro Policy Advisory Committee (MPAC), which include representatives from the Oregon Department of Land Conservation and Development (DLCD), and port and transit districts. Consultation with relevant federal and state resource agencies has typically occurred as part of major project development activities, such as EIS and EA's, on a project by project basis occurred through CETAS (Collaborative Environmental and Transportation Agreement for Streamlining). Consultation with CETAS was conducted for the 2010 Regional Transportation Plan. CETAS was invited to consult on the 2014 Regional Transportation Plan. A consultation meeting with CETAS was scheduled but canceled. CETAS was dissolved in 2016. In the absence of CETAS, Metro will convene a consultation meeting with federal and state land management, wildlife and regulatory agencies and Native American Tribes for the 2018 Regional Transportation Plan on August 6, 2018. The consultation meeting will seek feedback on how best to consult with relevant agencies and Native American Tribes during future metropolitan transportation planning efforts.

Metro Parks and Nature Department Environmental Mitigation Activities and Resources:

- **Metropolitan Greenspaces Master Plan** – adopted in 1992 by the Metro Council, provides a vision for a regional system of parks, natural areas, greenways, and trails and identifies 57 urban natural areas and 34 trail and greenway corridors that define the green infrastructure for wildlife and people in the Portland metropolitan region.
- **Parks and Nature System Plan** – adopted in 2016 by the Metro Council, the Parks and Nature System Plan spells out Metro's role in protecting clean water, restoring fish and wildlife habitat and connecting people with nature close to home – and sets priorities for this unique park system into the future. The plan also describes Metro's 17,000-acre portfolio of parks, trails, natural areas and historic cemeteries.
- **Regional Natural Areas Acquisition program** – initiated in 1996 and expanded in 2006 and again in 2013 and 2016, directs Metro to purchase natural areas, trails and greenways to be held for future use as open space, parks, trails and fish and wildlife habitat. More than 17,000 acres and 90 miles of river and stream banks have been acquired by Metro since the program was initiated. In addition, Metro has investment more than $90 million to support a broad range of community nature projects across greater Portland, helping to preserve land, restore habitat, build visitor amenities, expand nature education programs and provide outdoor experiences for historically marginalized communities.
- **Nature in Neighborhoods Initiative** – includes Metro's fish and wildlife protection program, conservation education, restoration, habitat-friendly development practices guidelines, and on-going monitoring and reporting of key natural resource indicators.
- **Regional Conservation Strategy** – The Intertwine Alliance published the Regional Conservation Strategy in 2012 as a way to identify high value habitat and develop strategies to promote effective protection and enhancement of the region's fish and wildlife habitat, water quality, and other vital ecosystems services through strong, clear vision and strategic, science-based approaches. When combined with its companion document, the Biodiversity Guide for the Greater Portland-Vancouver Region, the Regional Conservation Strategy presents a shared understanding of the nature of our region. It defines the challenges facing local wildlife and ecosystems and offers a vision, framework and tools for moving forward collaboratively to protect and restore our natural systems. The Intertwine Alliance is a coalition of more than 140 private firms, public agencies and nonprofit organizations. Representatives from Alliance

partner organizations collaborated for 2 years to create the Regional Conservation Strategy (with its supporting Biodiversity Guide for the Greater Portland-Vancouver Region) to guide the expansion, restoration and management of The Intertwine—the region's network of parks, trails, natural areas and watersheds. The Alliance has also produced management tools, research and best practices resources on urban forestry, public engagement and other topics to advance Regional Conservation Strategy goals. This includes:

- **Regional Urban Forestry Assessment** completed in partnership with the Audubon Society and Portland State University.
- **Intertwine trail counts and survey data** – Every September since 2008, volunteers count and survey people who are biking and walking the Intertwine – the region's trails, parks and natural areas – using nationally standardized surveying and recording methods. The count is part of the National Bicycle and Pedestrian Documentation Project's annual gathering of trail use data at over 90 sites nationwide. Sites are selected by their link to current or future trail projects.
- **Wildlife corridors and connectivity inventory** – The Regional Connectivity Work Group (RCWG) was formed in 2016 to identify key habitat areas and the best remaining, feasible connections between these "anchor" habitats. The group's mission is to "understand, create, and protect connectivity to support an ecologically viable, interconnected habitat system for native fish, wildlife, and plants that allows for healthy populations, safe movement and migration across rural and urban landscapes." The RCWG has created a Connectivity Toolkit that uses GIS to identify wildlife habitat areas and potential connectivity zones, followed by ground-truthing to assess habitat conditions and potential barriers to wildlife movement. By December 2018, shapefiles of surrogate species' habitat and connectivity barriers will be completed. The group is currently writing a strategic action plan, which includes a collaborative process for prioritizing the most important remaining habitat and connectivity areas for conservation. The timeline and partners to be engaged in identifying high priority areas at the regional scale will be determined during the strategic planning process.
- **Oregon white oak habitats inventory** – The Regional Oak Prairie Work Group (OPWG) was formed in 2012 to address conservation needs for declining Oregon white oak and associated species. Only approximately 8 percent of Oregon white oak remains in the Willamette Valley. Oregon white oak is a Habitat of Concern under Metro's Title 13 and a high priority for many agencies and conservation organizations. The group has just completed mapping Oregon white oak on the Oregon side of the Portland-Vancouver Regional Conservation Strategy, and the data will be publicly available by summer 2018. The OPWG recently completed a Strategic Action Plan, which will guide the group's future collaborative efforts including identifying high priority areas for future conservation. The OPWG coordinates a regional partnership of over 30 public agencies, park districts, non-profits and community-based organizations.

- **Metro Culvert Inventory** – identifies areas where fish passage was blocked. This data has not been updated since 2002.

Summary of potential mitigation strategies by resource area

When impacts cannot be avoided, efforts are made to minimize and or mitigate impacts. Environmental mitigations during project development are established in consultation with numerous federal, state and local agencies as well as interested parties responsible for and interested in environmental stewardship, including:

- Federal Highway Administration
- Federal Transit Administration
- National Marine Fisheries Service
- United States Army Corps of Engineers
- United States Bureau of Land Management (Northwest OR district office)
- United States Environmental Protection Agency
- United States Fish and Wildlife Service
- United States Forest Service
- Oregon Department of Environmental Quality
- Oregon Department of Fish and Wildlife
- Oregon Department of Forestry
- Oregon Department of State Lands
- Oregon Department of Transportation
- Oregon State Historic Preservation Office
- Oregon Parks and Recreation Department
- Oregon Water Resources Department
- Oregon Watershed Enhancement Board
- Clean Water Services

The specific types of environmental mitigation activities implemented are ultimately determined by the governing regulatory authority and are dependent upon the resource being impacted and the severity of that impact.

Mitigation activities generally follow an ordered approach:

- avoiding the impact altogether by not taking a certain action or parts of an action.
- minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action or project.
- compensating for the impact by replacing or providing substitute resources or environments.

This ordered approach to mitigation is known as "sequencing" and involves understanding the affected environment and assessing transportation effects throughout the project development process. Among the key environmental mitigation areas of interest to Metro are:

High value habitat areas
The greater Portland region's ecosystem provides habitat to nearly hundreds of wildlife species and in an effort to help protect these species and the biodiversity of the Portland-Vancouver region, the Intertwine Regional Conservation Strategy identified high value habitat areas in the region. Avoiding disturbance of these natural areas is most desirable to preserve these resources. Where transportation improvements do have negative impacts, such impacts should be minimized and mitigated.

A discussion of additional resource specific mitigation strategies follows.

Vegetation and wildlife
Mitigation for vegetation and wildlife impacts should be coordinated with mitigation for other related environmental impacts (e.g., wetlands).

Mitigation strategies available include:

- Reducing habitat fragmentation and maintaining wildlife travel routes by strategic placement of the projects;
- Screening sensitive habitats from project view and noise; and
- Enhancing vegetation associated with wetlands and water courses for wildlife.

Fisheries
Concerns with stream crossings include the potential for water quality degradation during construction, long-term storm water treatment and loss of floodplain functions. Agency coordination with the project design team should develop potentially effective stream crossing methods and storm water management plans.

Mitigation strategies available include:

- Limiting in-water construction to designated fisheries windows;
- Provide treatment of storm water run-off;
- Limit removal of riparian vegetation and restore/replant all areas temporarily distributed during constructions;
- Limit fill within floodplains and effects to floodplain functions;
- Construct bridges or open bottom culverts when feasible; and
- Provide restoration and enhancement of fish habitat where feasible.

Wetlands
Generally, wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface For regulatory purposes under the Clean Water Act, the term wetlands means "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.[4]

Mitigation strategies available include:

- designing transportation facility to avoid or minimize the “footprint” of new impervious surfaces;
- creating new wetland areas at ratios established by the permitting agency;
- restoring or rehabilitating damaged wetlands;
- purchasing wetland credit acres from an existing wetland mitigation bank within the same watershed, if available;

Wetland mitigation should be coordinated with other environmental mitigation planning to minimize mitigation costs and to ensure a comprehensive approach to mitigation is achieved.

[4] http://www.epa.gov/owow/wetlands/what/definitions.html

Mitigation Banks
A mitigation bank is a wetland, stream, or other aquatic resource area that has been restored, established, enhanced, or (in certain circumstances) preserved for the purpose of providing compensation for unavoidable impacts to aquatic resources permitted under Section 404 or a similar state or local wetland regulation. A mitigation bank may be created when a government agency, corporation, nonprofit organization, or other entity undertakes these activities under a formal agreement with a regulatory agency.

Since 2010, in the metropolitan planning area, there are two mitigation banks identified by the Oregon Department of State Lands and the United States Army Corps of Engineers. They are:

Bank Name – Fern Hill in the Tualatin Watershed
Nearest City – Forest Grove
Approval Status - Approved
Approximate Size - 28 acres
Maximum credits to be developed – 16.75 credits potential; not selling credits at this time

Bank Name – Foster Creek in the Clackamas Watershed
Nearest City - Damascus
Approval Status - Approved July 2006
Approximate Size - 72 acres
Maximum credits to be developed – 28 credits

Flood hazard areas/floodplains
A floodplain is an area designated either by the state or federal governments as being susceptible to flooding (the inundation of water in an otherwise dry area). This data is included in the Regional Conservation Strategy described previously. Floodplains are usually flat areas near a prominent water feature such as a river, creek, or lake. Transportation projects and land development can change natural drainage and create new paths for runoff, with potentially dangerous consequences. Any development within a regulated flood hazard zone or floodplain is required to take all reasonable measures necessary to minimize adverse environmental impacts resulting from the construction of the proposed project.

Mitigation strategies available include:

- building in and maintaining effective drainage systems, including ditches, culverts, and catch basins are critical in infrastructure improvements and maintenance;
- restoring temporarily disturbed vegetation with vegetation of equal or higher quality;
- restoring all habitats to their pre-construction condition;
- restoring all land and water features to their pre-construction condition; and
- preventing sedimentation and erosion to the greatest extent possible.

Threatened and endangered species
Table 1 displays potentially occurring endangered wildlife species that were considered during Metro's Goal 5 inventory in 2001. This list is based on the best professional opinion of more than two-dozen local wildlife experts at that time.

Table 1. Potentially occurring endangered wildlife species in the greater Portland region[5]

Common name	Scientific name	ODFW Strategy Species?
Aleutian Canada Goose (wintering)	*Branta canadensis leucopareia*	*Yes*
American Bald Eagle	*Haliaeetus leucocephalus*	*Yes*
Oregon Slender Salamander	*Batrachoseps wrighti*	*No*
Tailed Frog	*Ascaphus truei*	*No*
Northern Red-legged Frog	*Rana aurora aurora*	*No*
Northwestern Pond Turtle	*Clemmys marmorata marmorata*	*No*
Harlequin Duck	*Histrionicus histrionicus*	*No*
Northern Goshawk	*Accipiter gentilis*	*Yes*
Band-tailed Pigeon	*Columba fasciata*	*Yes*
Lewis's Woodpecker (extirpated as breeding species)	*Melanerpes lewis*	*Yes*
Acorn Woodpecker	*Melanerpes formicivorus*	*Yes*
Olive-sided Flycatcher	*Contopus cooperi (= borealis)*	*Yes*
Streaked Horned Lark	*Eremophila alpestris strigata*	*Yes*
Purple Martin	*Progne subis*	*Yes*
Yellow-breasted Chat	*Icteria virens*	*Yes*
Oregon Vesper Sparrow	*Pooecetes gramineus affinis*	*Yes*
Tricolored Blackbird	*Agelaius tricolor*	*No*
Yuma Myotis	*Myotis yumanensis*	*No*
Long-legged Myotis	*Myotis volans*	*Yes*
Fringed Myotis	*Myotis thysanodes*	*Yes*
Long-eared Myotis	*Myotis evotis*	*No*
Silver-haired Bat	*Lasionycteris noctivagans*	*Yes*
Pacific Western Big-eared Bat	*Corynorhinus townsendii townsendii*	*No*
Camas Pocket Gopher	*Thomomys bulbivorus*	*No*
White-footed Vole	*Arborimus (= Phemacomys) albipes*	*No*
Red Tree Vole	*Arborimus (= Phenacomys) longicaudus*	*Yes*

This list will be refined as part of the 2018 RTP consultation process to reflect listing changes and state and federal threatened, endangered and sensitive plant and wildlife species.

A significant portion of ESA habitat is protected from development through enforcement of various federal and state regulations. In the event that a planned transportation project will encumber identified critical habitat, various mitigation measures are immediately triggered. These mitigation

[5] These species (as of 2001) are classified under the ESA as either Endangered, Listed Endangered, Threatened, Listed Threatened, Proposed Endangered, Proposed Threatened, Candidate, or a Species of Concern. This list includes all known native vertebrate species (and nonnative vertebrate species with established breeding populations) that currently exist within the greater Portland region for at least a portion of the year. Vagrant species (those that do not typically occur every year) are not included on this list. The species list is based on the opinion of more than two-dozen local wildlife experts.

measures included possible realignment of the entire facility or portion thereof or the establishment of new habitat either on- or off-site.

Storm water management
In 1987 Congress amended the Clean Water Act to include nonpoint sources of pollution. Nonpoint pollution occurs when runoff from land carries pollutants to receiving waters. Section 402 of the CWA provides the legal basis for the National Pollutant Discharge Elimination System (NPDES) permit program, which regulates point and nonpoint discharges. The U.S. Environmental Protection Agency (EPA) has delegated the implementation of the NPDES program to the state of Oregon. The Oregon Department of Environmental Quality administers the NPDES program through Oregon Revised Statute (ORS) 468B and associated Oregon Administrative Rules (OAR). ORS 468B.025 explicitly prohibits the discharge or placement of wastes into waters of the state, prohibits the discharge of waste that causes violations of water quality standards, and prohibits violations permit conditions. In addition to Federal requirements, many local jurisdictions have developed storm water management programs that include erosion and sediment control requirements.

Non-point pollution or uncontrolled and untreated storm water runoff from paved and other impervious surfaces carries pollutants into surface and ground waters, with negative effects on aquatic life, drinking water and recreational resources. Additionally, fast moving surface runoff erodes stream banks, channeling meandering streams into fast moving torrents during storm events. Storm water management rules regulate discharges of pollutants to surface and ground water by controlling the construction of impervious surfaces. These include paved roads and paths, parking facilities, and other development. In addition to limits on impervious surfaces, additional strategies are required to control and treat storm water in order to mitigate its potential impacts. Increasingly, “Green Infrastructure” such as pervious surfaces and the use of natural landscaping that encourage absorption of storm water at the source rather than channeling it elsewhere are encouraged where practicable. Some communities in the region, such as city of Portland, have adopted these practices.

Soil erosion and sediment control
To minimize unavoidable soil displacement occurring during construction and prevent future soil erosion, Soil Erosion and Sediment Control Plans are developed to prevent pollution of water resources as required by National Pollutant Discharge Elimination System permits and by other laws, permits, agencies and agreements. Soil Erosion and Sediment Control Plans help ensure that the proper soil stabilizing techniques have been fully incorporated into the project design prior to construction. In addition to Federal requirements, many local jurisdictions have developed storm water management programs that include erosion and sediment control requirements.

Mitigation activities available include:

- maintaining natural vegetation to the greatest extent possible;
- limiting the amount of exposed soil;
- seeding to establish vegetation in disturbed areas;
- dust control measures;
- stabilizing steep slopes;
- installing silt fencing, sediment barriers and other best management practices to secure the project area;
- re-vegetating all temporarily disturbed areas; and
- properly directing, collecting and conveying storm water runoff to reduce the volume and velocity of surface water runoff.

Historic resources
Where transportation improvements are developed which may impact on such resources, appropriate mitigation and design elements should be addressed. Section 106 of the National Historic Preservation Act (NHPA) requires all federal agencies to take into account the effects of their actions on historic properties. All properties listed in the National Register are protected by the Oregon State Historic Preservation Office. Typically mitigation activities include the preservation and documentation of these assets along with context-sensitive design of new or renovated infrastructure to complement existing streetscape or architectural features as closely as possible.

Clean air and greenhouse gas emissions
Mitigation activities are applicable throughout the region, represented throughout the Regional Transportation Plan by the emphasis on 2040 Growth Concept and Climate Smart Strategy implementation, supporting state efforts to advance cleaner, more fuel efficient vehicles as well as policies and investments that support increased use of transit, walking and biking, improving multimodal network connectivity, expanding deployment of a variety of transportation demand management (TDM) and system management and operational improvements, and strategically adding new throughway capacity. These approaches seek to reduce vehicle miles traveled and related vehicle emissions, including greenhouse gas emissions in accordance with the Metropolitan Greenhouse Gas Emissions Reduction Rule amended by the Land Conservation and Development Commission in 2017.