

SITE CONSERVATION PLAN

Cazadero Natural Area



March 2020



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Craig Dirksen, District 3

Juan Carlos González, District 4

Sam Chase, District 5

Bob Stacey, District 6

Auditor

Brian Evans



Cazadero Natural Area

Approvals for Site Conservation Plan

Date routed for final signatures: 3/10/2020

Please return to Lori Hennings (Primary author: Brian Vaughn)

Jonathan Soll

Signature



Date

3/18/2020

Justin Takkunen

Signature

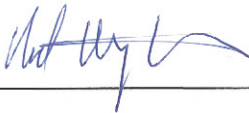
Justin Takkunen

Date

4/6/2021

Rod Wojtanik

Signature



Date

3/11/2021

Dan Moeller

Signature

Daniel L Moeller

Digitally signed by Daniel L Moeller
DN: cn=Daniel L Moeller, o=Metro, ou,
email=dan.moeller@oregonmetro.gov, c=US
Date: 202103.11 08:22:27 -0800

Date

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SECTION 1: INTRODUCTION

1.1 CONTEXT

Cazadero Natural Area is in Boring, Oregon and lies directly north of Barton Park and adjacent to the Cazadero State Trail, a multi-use path that is an extension to the 40-mile Springwater Corridor. One hundred years ago, trains chugged through the corridor transporting timber from Cascade forests to the Portland riverfront. A streetcar also ran through this corridor connecting people from Portland to Estacada. Today, Metro's ownership of Cazadero and other nearby natural areas in the area, including River Island Natural Area, North Logan Natural Area, and Barton Natural Area, provide opportunities to establish connectivity for wildlife and recreation in the Clackamas watershed. In total, Metro's ownership in the vicinity encompasses 554 acres, including the 24.3-acre Cazadero Natural Area. This site-based conservation plan will address only the Cazadero Natural Area site.

Historically, the site was used for a combination of agricultural and forestry purposes with much of the site having been logged in 2005. Currently, the Cazadero Natural Area is primarily an upland forested area with a mix of young deciduous and coniferous trees including Douglas-fir (*Pseudotsuga menziesii*), Oregon ash (*Fraxinus latifolia*), Oregon white oak (*Quercus garryana*), cascara (*Frangula purshiana*), and bigleaf maple (*Acer macrophyllum*). For the purpose of this conservation plan, we are combining these upland forest species into one single habitat type and conservation target.

The Cazadero Natural Area site conservation plan is a tool for protecting and enhancing the unique characteristics of the site and considering appropriate levels for future access. This conservation plan has been developed by Metro and includes an overview of the history, existing conditions, conservation targets, and recreation and access objectives for the site.

1.2 GOALS AND OBJECTIVES OF THE CONSERVATION PLAN

The goal of this site conservation plan is to identify conservation priorities and describe a general course of action that will protect and enhance the area as an environmental and recreational resource for Clackamas County and the Portland metropolitan region.

With the potential to serve as a primary refuge and corridor for wildlife, Cazadero Natural Area will be managed as a core habitat patch; retaining mature trees and limiting trail development within the core of the natural area to maximize refuge areas for wildlife.

To achieve this goal, the site conservation plan establishes a series of priority objectives, including:

- Restore and maintain high quality upland forest.
- Promote wildlife connectivity.
- Limit trail and trail development to the outer extent of the site and preserve the inner core as a wildlife refuge and corridor.
- Provide opportunities for research and education to local schools and groups.
- Develop appropriate funding strategies to implement strategic restoration and access improvement projects.

Metro’s natural areas bond program

During the last 25 years, three voter-approved natural areas bond measures have allowed Metro to protect and manage 17,000 acres across the region. Voters have protected more than 100 miles of river and stream banks, opened four nature parks, and supported hundreds of community projects. Metro continues to protect land in 27 target areas, chosen for their water quality, wildlife habitat, and outdoor recreation opportunities.

Metro’s bond for the Cazadero Trail target area has emphasized the idea of public access. The 2006 refinement plan for the target area stated a goal to “...protect the public investment made to date in establishing a significant, publicly accessible regional natural area.” According to the refinement plan, acquisition and enhancement of land within the Cazadero corridor “will connect campgrounds, future interurban trails, and Portland (via the Springwater Corridor) to Mt. Hood and the Pacific Crest Trail.”

The table below shows the history of the Cazadero Natural Area purchase.

Table 1: Metro natural area bond purchased land

PROPERTY NAME (PREVIOUS OWNER)	ACRES	BOND YEAR	DATE ACQUIRED	MANAGEMENT
Oregon State University Foundation	24.3	2006	5/19/2010	Metro

Additional information about the 2006 and 2019 natural areas bond measures can be found on the Metro web site, www.oregonmetro.gov/naturalareas.

Metro’s natural areas and parks levy

By law, capital bond measures must be used for capital investments such as property acquisition and stabilization. In May 2013 and November of 2016, the region’s voters approved five-year local option levies to care for Metro’s growing portfolio of natural areas and regional parks. About half of the levy funds will go towards natural area restoration and maintenance. The levy is the first of its kind in the U.S. The citizens’ investment will raise about \$10 million per year to maintain and improve water quality; preserve regional parks, natural areas and stream frontages; maintain current and implement new restoration projects; and provide new public access opportunities.

The levy will make a difference for most of the 17,000 acres of natural areas that Metro oversees. Some of the strategic restoration actions identified in this plan will be funded with the levy.

SECTION 2: PLANNING PROCESS SUMMARY

2.1 PLANNING AREA

This conservation plan addresses conditions, plans and activities for 24.3 acres within the Cazadero Natural Area. Metro ownership and an outline of the planning area are shown on Map 1 and Map 2.

2.2 PLANNING PROCESS

Developing a useful site conservation plan means providing for a site’s habitat conservation, enhancement, and management as well as considering the potential opportunities for compatible public access. This plan will build on previous planning, restoration and management efforts while

acknowledging that future conservation requires analysis of the site, meaningful engagement of stakeholders, and integration of historic, current, and future needs. This plan includes several important elements; development of conservation targets; access needs; and implementation of projects.

A two-tiered approach is used to improve natural resource conservation and integrate meaningful human experiences through physical and visual access. The plan recognizes that the conservation of species, habitat, and natural features must occur simultaneously with the consideration of provision for human access to these natural systems. Education and exposure are the cornerstones for protecting the natural area for decades to come. This two-tiered approach also recognizes that conservation and access have different stakeholders, different funding sources, and different strategic approaches. Initially, the plan reviewed the overarching project goals and objectives common to both conservation and access. The project team then developed conservation and access strategies independently which are discussed in the “Conservation” and “Recreation and Access” sections below.

Planning project goals

The planning goals for both the natural resource conservation and access portions of this plan are listed below.

Natural resource conservation

- Map and define major habitat types.
- Establish habitat and species conservation targets.
- Define key ecological attributes and analyze stresses and their sources for the conservation targets.
- Establish strategies and actions to restore habitat.
- Prioritize actions and implement.

Access

- Assess existing and future public use of Cazadero Natural Area.
- Identify and implement priority actions.

SECTION 3: EXISTING CONDITIONS

This section of the conservation plan provides background on existing conditions for Cazadero Natural Area.

3.1 PHYSICAL ENVIRONMENT

Roughly triangular in shape, the Cazadero Natural Area lies directly south of the Barton gas station and the Cazadero State Trail. Defining the southern border is a driveway that provides access to the ranger station at Barton Park and to an area used by the Clackamas County Transportation Department.

The topography of the site is somewhat hummocky and sloped gently downward toward the southwest. The site has been impacted from previous forestry and agricultural uses and currently contains grasses, brush, and scattered trees that were either retained or replanted after logging occurred throughout the site in 2005.

Soils

The properties of soils found within a watershed influence to a large extent the movement of water through and within the soil layers, as well as the vegetation that can grow in them. Information on soils in the soil survey of the Clackamas area (NRCS, 1985; 1998) is published by the USDA Natural Resources Conservation Service (NRCS; formerly the Soil Conservation Service).

Soils present at the site include Salem gravelly silt loam and Salem silt loam which are typically well-drained soils found along stream terraces. Map 3 shows the soils present at the Cazadero Natural Area.

Streams and wetlands

No streams or wetlands have been observed at the site. Map 4 and Map 5 show the details for topography, streams, wetlands and rivers of Cazadero Natural Area.

3.2 MAJOR HABITAT TYPE

Cazadero Natural Area is primarily an upland forest. Map 6 shows upland forest areas present at the site. Map 7 and Map 8 show historical conditions present at the site.

Upland forest

Upland coniferous and mixed conifer/deciduous forests (upland forests) are the dominant habitat of the site and in the region. Low-elevation Pacific Northwest old-growth forests typically are dominated by the conifers Douglas-fir, western red cedar (*Thuja plicata*), and western hemlock (*Tsuga heterophylla*), with grand fir (*Abies grandis*), and hardwood species also occurring. Under historic conditions, many of the dominant species lived to be 350 to 750 years old or older and frequently had diameters of eight feet or more. Plant and animal use of forests follows the changes in forests over time, with different suites of species dominating depending on forest age, canopy closure, and site conditions. Biodiversity is higher in forests where some light reaches the forest floor and where standing and fallen dead wood is ample and of mixed age and size. Forests younger than 60 years dominate western Oregon due to current forestry practices, and the decline of old growth-associated species reflects these changes in overall forest structure across the region.

As part of the upland forest habitat at Cazadero Natural Area, there are openings or gaps where conifers or other trees have not readily established or are dominated by shrubs in the understory. Shrub habitat (commonly called scrub shrub) includes areas dominated by woody vegetation less than six meters (20 feet) tall (Portland-Vancouver Biodiversity Guide 2012). Characteristic species include shrubs, young trees and trees or shrubs that are small or stunted because of environmental conditions. Shrubs add complexity to forested habitats, greatly increasing the amount of area available for cover and nesting. Numerous studies in the Pacific Northwest document the importance of shrubs to a wide variety of arthropods, amphibians, small mammals and birds. The fruit and flowers of shrubs – particularly deciduous ones – host abundant pollinator and prey species. The

diets of deer and elk consist largely of shrub browse. Shrubs also provide important habitat connectivity and may effectively widen a forested biodiversity corridor.

Stands of forest can be categorized by the age of trees, species, and composition of understory species. Upland forests in the greater Portland-Vancouver region provide primary habitat for at least 94 species and are used by at least 129 more species (Portland-Vancouver Regional Conservation Strategy 2012).

3.3 VEGETATION AND WILDLIFE

The Cazadero site includes 24.3 acres of upland forest habitat, with tree age primarily in the ranges of 8-10 years and 20–50 years. The ranges in age reflect recent plantings by Metro and trees that were retained during previous logging. Douglas-fir, bigleaf maple, and Oregon white oak trees are present and should be retained. Hundreds of wildlife species have been observed at nearby natural areas including River Island. While formal surveys have not been completed at Cazadero, a similar suite of species are anticipated for this site. Described below are key plants and wildlife that the Cazadero Natural Area currently supports or has the potential to support.

Key plants

Native forbs found at the site include tough-leaf iris (*Iris tenax*), forest scurfpea (*Rupertia physodes*), bracken fern (*Pteridium aquilinum*), bluehead gilia (*Gilia capitata*), and native grasses including blue wildrye (*Elymus glaucus*). Other native forbs that occur in this habitat include broadleaf lupine (*Lupinus latifolius*), western sword fern (*Polystichum munitum*), woodland strawberry (*Fragaria vesca*), and yarrow (*Achillea millefolium*).

Shrubs and trees found at this site include Douglas-fir, Oregon ash, Oregon white oak, cascara, bigleaf maple (*Acer macrophyllum*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), pine (*Pinus* spp.), beaked hazelnut (*Corylus cornuta*), tall Oregon grape (*Mahonia aquifolium*), snowberry (*Symphoricarpos albus*), oceanspray (*Holodiscus discolor*), black hawthorn (*Crataegus douglasii*), western serviceberry (*Amelanchier alnifolia*), mock orange (*Philadelphus lewisii*), osoberry (*Oemleria cerasiformis*), poison oak (*Toxicodendron diversilobum*), baldhip rose (*Rosa gymnocarpa*), trailing blackberry (*Rubus ursinus*), and red-flowering currant (*Ribes sanguineum*). Other shrubs and trees found in an upland forest habitat may include Pacific yew (*Taxus brevifolia*), Pacific madrone (*Arbutus menziesii*), red alder (*Alnus rubra*), dull Oregon grape (*Mahonia nervosa*), blue and red elderberry (*Sambucus nigra* ssp. *cerulea* and *S. racemosa*), salal (*Gaultheria shallon*), and red huckleberry (*Vaccinium parvifolium*).

Key wildlife

A few of the Partners in Flight-identified focal bird species for upland hardwood and coniferous forests at various successional stages to be considered at this site include: brown creeper (*Certhia americana*), pileated woodpecker (*Dryocopus pileatus*), band-tailed pigeon (*Patagioenas fasciata*), varied thrush (winter) (*Ixoreus naevius*), Townsend's warbler (*Setophaga townsendi*), black-throated gray warbler (*Setophaga nigrescens*), Hutton's vireo (*Vireo huttoni*), and Cooper's hawk (*Accipiter cooperi*). Other species may include Douglas squirrel (*Tamiasciurus douglasii*), common garter snake (*Thamnophis sirtalis*), rubber boa (*Charina bottae*), Roosevelt elk (*Cervus canadensis roosevelti*), black-tailed deer (*Odocoileus hemionus columbianus*), mountain lion (*Puma concolor*), bobcat (*Lynx*

rufus), coyote (*Canis latrans*), red (*Vulpes vulpes*) and common gray fox (*Urocyon cinereoargenteus*), long-tailed weasel (*Mustela frenata*), several bat species, wood rat (*Neotoma* ssp.), chipmunks (*Tamias* ssp.), voles and mice, mink (*Mustela vison*), and black bear (*Ursus americanus*).

A similar suite of species is anticipated for this site as what were documented at nearby River Island. These include at least 76 bird species, eight mammals, and seven Lepidoptera species. It is highly likely that birds and mammals use the site for breeding, nesting, foraging, and migration. The site has diverse cover, breeding, and travel habitats which provide numerous food sources including seeds, fruit, pollen sources, bark, and insects. This would include species such as hawks, falcons, neotropical migrants such as willow flycatcher (*Empidonax traillii*) and solitary vireo (*Vireo cassinii*), and gallinaceous birds such as ruffed grouse (*Bonasa umbellus*) or ring-necked pheasant (*Phasianus colchicus*). Small and large mammals and birds also provide food for species such as raptors and large predatory mammals, including mountain lion.

Biodiversity connectivity (corridors)

Native animals and plants require the ability to establish or re-establish local populations in a specific location to persist over time.. Furthermore, ongoing breeding interaction between small populations can create a larger, more genetically robust meta-population. In areas such as the Portland metro area where significant habitat fragmentation has occurred, relatively narrow, linear connections (corridors) can help meet these needs.

In 2010-2011, Metro hosted a series of biodiversity corridor workshops on behalf of The Intertwine Alliance. The results were compiled and made available to participants via a map server. The workshops gathered the opinions of wildlife and habitat professionals in the region; the results are best professional opinion only, are not meant to be property specific, and make no attempt to prioritize or assess on-the-ground issues such as barriers. Nonetheless, the information can provide valuable insight into existing and potential connectivity from Cazadero Natural Area to other important habitat areas in the region.

Biodiversity corridors in the area of Cazadero Natural Area include:

- North and east of the Cazadero Natural Area along the Cazadero State Trail.
- North of the Cazadero Natural Area to the Deep Creek and North Fork Deep Creek riparian corridors.
- South of the Cazadero Natural Area to Barton Park, River Island Natural Area, and the riparian corridors east and west along the Clackamas River.
- West of the Cazadero Natural Area to Barton Natural Area's riparian corridor north of the Clackamas River.

Climate change adaptation considerations

In coming decades, climate change is expected to increase summer temperatures and the severity of winter storms, as well as reduce precipitation in summer.

Direct effects that may occur

- Increased summer temperatures.
- Increased severity of winter rain events leading to flashier stream flows.
- Decreased water availability in summer; future summer flow and its deviation from historic conditions are not known.

Indirect effects that may occur

- Range shifts by undesirable plants increasing competition.
- Disease introductions and/or increased vulnerability to disease.
- Loss of synchronicity of plant reproduction and pollinators.
- Loss of synchronicity of resident and migratory animals, habitat and food sources (e.g., insect hatches and stream flows for rearing Chinook salmon [*Oncorhynchus tshawytscha*]).

The Cazadero Natural Area may provide a steppingstone and habitat for organisms that must shift their ranges in response to climate change.

3.4 RECENT MANAGEMENT HISTORY

Since 1938, the site was used for a combination of agricultural and forestry purposes with much of it having been logged in 2005. Several excavated test pits and four groundwater monitoring wells exist on the site that are remnants from studies conducted to determine the site's suitability as a gravel pit. Currently undeveloped, the site serves primarily as wildlife habitat.

3.5 EXISTING AND FUTURE PUBLIC USE

Currently, there is low to moderate level of public use of the northern and eastern borders of the site due to the Cazadero State Trail. A master plan is being developed by Clackamas County and Metro to help identify appropriate levels of public access and use of Cazadero Natural Area. Future trail and trailhead development will be included in the master plan.

SECTION 4: CONSERVATION

This section provides a comprehensive framework for conservation planning at Cazadero Natural Area. This framework generally follows The Nature Conservancy's Conservation Action Planning template (The Nature Conservancy, 2007) and includes analyzing the site, establishing conservation targets, evaluating key ecological attributes for each conservation target, analyzing threats affecting conservation targets, and developing action plans to abate serious threats. More detailed information is available in Appendix A.

4.1 CONSERVATION TARGETS

Conservation targets are composed of a species, suites of species (guilds), communities, and ecological systems that represent and encompass the full array of native biodiversity of the site, reflect local and regional conservation goals, and are viable or at least feasibly restorable (The Nature Conservancy, 2007). Map 9 shows the conservation targets for Cazadero Natural Area.

The methodology for determining conservation targets and key ecological attributes is discussed in detail in Appendix A.1, Conservation Targets, and Appendix A.2, Key Ecological Attributes. Using onsite natural habitat types and regional conservation planning efforts as guides, conservation targets were selected that encompass the site's biodiversity values and regional conservation priorities.

The conservation target for the site includes upland forest which is one of the of the region's most representative habitats. The site's role in habitat connectivity at the landscape level can help support native species like elk, deer, cougar, and coyote. More detail about each of these conservation targets can be found in Appendix A.1.

4.2 KEY ECOLOGICAL ATTRIBUTES

Key ecological attributes (KEAs) are aspects of a conservation target's biology or ecology that, if missing or altered, would lead to the loss of that target over time (The Nature Conservancy, 2007). KEAs define the conservation target's viability. They are the biological or ecological components that most clearly define or characterize the conservation target, limit its distribution, or determine its variation over space and time. They are the most critical components of biological composition, structure, interactions and processes, and landscape configuration that sustain a target's viability or ecological integrity. KEAs are rated from poor to good. This rating helps establish the restoration goals and guide us in development of restoration actions for the conservation targets.

Appendix A.2 (Key Ecological Attributes) and table 2 below describes the site's KEAs and indicators for each of the four conservation targets in more detail.

4.3 THREATS AND SOURCES

An effective conservation strategy requires understanding the threats to conservation targets and the sources of those threats. For example, adjacent development and subsequent disruption of natural systems place stress on the resource and its inhabitants and threaten the health of the greater ecosystem. At Cazadero Natural Area, the following threats are evident:

- Increased competition (invasive species present throughout the site; see Appendix A.4).
- Habitat conversion.
- Altered fire regime.
- Human disturbance.

The methodology for defining threats and sources was established by The Nature Conservancy. It is a well-established, objective methodology with a scientific basis, and is described in more detail in Appendix A.3, Threats and Sources.

Information on Cazadero Natural Area's conservation targets is summarized in Table 2 below. KEAs, significant threats, and management actions to address those threats are provided in more detail in Appendices A.1, A.2 and A.3. The following section outlines short- and long-term management strategies for conservation targets.

Table 2: Cazadero Natural Area conservation target

CONSERVATION TARGET	ATTRIBUTES OF HEALTHY HABITAT
Upland forest	<p>An abundant natural habitat of the region, low-elevation Pacific Northwest old-growth forests are typically dominated by Douglas-fir, western red cedar, and western hemlock, with Willamette Valley ponderosa pine (<i>Pinus ponderosa</i>), grand fir, and hardwood species also occurring. Plant and animal use of forests follows the changes in forests over time, with different suites of species dominating depending on forest age, canopy closure and site conditions. Biodiversity is higher in forests where some light reaches the forest floor and where standing and fallen dead wood is ample and of mixed age and size. The size of habitat (patch size) is a key consideration for wildlife diversity.</p> <p><i>Current cover:</i> Approximately 24.3 acres</p>

SECTION 5: MANAGEMENT ACTIONS

5.1 RESTORATION

This conservation plan outlines strategic actions to be carried out at Cazadero Natural Area over the next 10–15 years. They are based on the short- and long-term goals for the conservation targets. The strategic actions described here are general courses of action to achieve these objectives and not highly prescriptive courses of action. Specific prescriptions will be developed by Metro staff to address site-specific conditions encountered in the areas targeted for restoration action.

About 2 acres of the 24.3 acres of upland forest habitat are in need of restoration to restore plant species diversity to the stands and age structure. Though the site contains some bigleaf maple and Oregon white oaks, upland forests typically have more multi-layered canopies consisting of other trees like red alder and other species, as well as a significant shrub layer providing species diversity. The site is dominated by Douglas-firs, as is typical of low-elevation Pacific Northwest upland coniferous-hardwood forests, however other long-living conifers like western red cedar and western hemlock are currently missing from the site. The information below summarizes conservation targets’ key ecological attributes, significant threats to the habitat, and strategic restoration and stewardship actions that can be taken to keep or bring the KEAs into the desired range.

Conservation target: upland forest

Short-term goals 2020-2024

- Maintain native tree and shrub cover to greater than 75 percent canopy cover.
- Maintain diversity in the age and structure of young- and medium-aged conifer stands.

Long-term goal

The desired future condition is to have all key ecological attributes ranked as good to very good thereby maintaining and restoring habitat suitable for upland conifer forest-dependent wildlife species.

Summary of upland forest restoration work completed through 2020

Restoration to date has included planting of Douglas-fir, Oregon white oak, and native shrubs to meet Oregon Department of Forestry standards. Additionally, invasive weed treatments have been completed across the site multiple times since 2009 to reduce encroachment of weeds.

Key ecological attributes outside normal range of variation

- *Canopy cover vegetation structure:* promote multi-layer canopy, canopy gaps, and shrub growth.
- *Standing and downed dead trees:* most upland forest areas on the site lack dead wood. This is primarily due to historic logging and the age of the trees.
- *Number and size of mature trees:* Mature Douglas-fir, western red cedar, western hemlock, and grand fir trees are lacking.
- *Edge condition:* decrease edge effect and habitat fragmentation by increasing natural habitat and/or areas managed for conservation surrounding the site.

Critical threats

- *Altered native species composition:* non-native species out-compete native plant species.
- *Habitat conversion:* forest structure has been simplified due to historic logging. Replanting of these areas has resulted in single-aged tree stands dominated by Douglas-fir, with some gaps occupied by non-native species.
- *Human disturbance:* due to the site's proximity to Barton Park and the Cazadero State Trail, human use and off-leash dogs have the potential to affect habitat quality and cause stress to wildlife species.

Strategic restoration and stewardship actions

- Early detection and treatment of invasive species should target high priority species such as false brome (*Brachypodium sylvaticum*), meadow knapweed (*Centaurea nigrescens*), spurge laurel (*Daphne laureola*), and other EDRR species.

5.2 PRIORITIZING STRATEGIC RESTORATION AND STEWARDSHIP ACTIONS

It is important to prioritize restoration and stewardship activities by conservation targets for several reasons. Budgetary or time constraints are likely to limit how much work can be accomplished at a given site during a given time period. Specific actions may rise to the top due to the scarce or unique nature of a habitat type or because abating a certain threat now will save time and money in the future. Table 3 assigns a priority ranking to key actions by conservation target; this does not mean that the other actions are not important, simply that they are not the most important actions within the next 3-5 years.

Table 3: Priority status for Cazadero Natural Area conservation targets

CONSERVATION TARGET	PRIORITY
Upland forest	Medium to low

5.3 ONGOING STEWARDSHIP AND RESTORATION PROGRAMS

The following actions represent ongoing systems or programs that are in place and practices that will be continued and/or enhanced. These actions align with maintaining the conservation targets in good or very good condition.

Stewardship

Metro’s Natural Areas Program is committed to long-term stewardship of Cazadero Natural Area. Metro staff will conduct multiple site walks per year to monitor natural resource condition and public use of the natural area. As determined necessary by staff and consistent with this plan, specific treatments or actions will be implemented to ensure that the health and condition of the natural area is maintained. Some periodic stewardship actions that are implemented by Metro staff include invasive species management, visits to monitor for illegal use of the site, cleanup of illegal dumping, mowing of buffer and trailside areas for fire safety, replacing signage, and response to complaints. Table 4 describes high and medium priority maintenance action at the site. Additional details about the stewardship of the site can be found in the Cazadero Site Stewardship Plan.

Table 4: High and medium priority stewardship actions

ACTIVITY	FREQUENCY/DURATION	PRIORITY
Site walk	1 time per year	High
EDRR (weed invasion treatments)	1-2 times per year	High
Property line encroachments	1 time per year	Medium

Invasive species management

Invasive plant species can impact the habitat values for which land is conserved. Natural lands are not fully protected unless they also are managed for the features that first motivated preservation. Invasive species can change community structure, composition, and ecosystem processes on these lands in ways that may not be anticipated or desirable. Careful management can minimize these negative impacts. Metro has initiated an early detection and rapid response program (EDRR) for invasive species including false brome, meadow knapweed, knotweed, garlic mustard (*Alliaria petiolata*), and spurge laurel which have been documented in the area. Invasive species will be controlled by hand pulling or herbicide application as they are detected in the natural area. Other invasive plant species will be controlled as part of restoration projects or ongoing management of habitat areas. See Appendix A.4 for a list of invasive species.

5.4 LONG-TERM STRATEGIES

The following actions may be necessary to achieve the long-term goals of this site conservation plan but are not identified as priority actions during the time period of this plan.

- Work with Oregon State Parks and Clackamas County to remove or modify fence along the Cazadero State Trail and along the northern edge of Barton Park to promote wildlife connectivity.

- Conduct pre-commercial thinning in a 10–20-year timeline with an emphasis on creating gaps in the canopy to promote growth and establishment of shrub habitat and/or where young Douglas-firs are crowded. Thinning may be beneficial to complete prior to future trailhead development to reduce impacts to future trail users. Protect oak trees from overtopping by other species.
- Work with Oregon State Parks to manage invasive weeds along the Cazadero State Trail adjacent to Metro lands.

5.5 MONITORING FRAMEWORK

Monitoring at the Cazadero Natural Area is an integral part of an adaptive management approach to restoration and stewardship. Based on the monitoring plan developed by Metro, a feedback loop is created between monitoring and management decisions. Monitoring will be done to evaluate habitat, population responses to management action, as well as progress toward achieving habitat and population objectives.

The monitoring strategy is based on threats and key ecological attributes associated with conservation targets. Monitoring addresses threats directly and indirectly by tracking changes in certain ecological attributes. It implements techniques that are well-established and continues many monitoring efforts already in place.

Monitoring techniques

Some monitoring techniques are used to monitor more than one conservation target. This discussion is intended to provide a general introduction but not detailed methods.

Remote sensing/GIS

Several metrics for health of conservation targets relate to canopy cover and size of a habitat. Where a desired condition is a minimum canopy cover, it can be estimated with GIS software using current aerial photography. Similarly, important connections within the natural area and to off-site habitat can be inspected with aerial photographs.

Transects

These are lines or strips of ground along which measurements are made of plant species presence or absence. Permanent transects can be installed and tracked over the years to track progress toward goals. They are useful in tracking the cover and composition of native plants and invasive species in Oregon white oak savanna and riparian forest habitat areas.

Site walk

Ocular (visual) estimates can be used to determine the presence or absence of a species within a short timeline and at a very low cost. This method of monitoring is typically used to determine intervals for treatments or success of a planting when managing projects.

Photos

Permanent photo points are established to provide long term documentation of changes to habitats over time. Typically, photo points are marked by a permanent landscape feature or metal stakes and photos are taken at a landscape scale over long-term periods of time.

Conservation targets and monitoring techniques

Upland forest

Annual site walks and photos monitoring of site conditions will be used to monitor this conservation target. When large scale restoration work is implemented, the monitoring actions for this conservation target should be revisited.

Table 5: Habitat monitoring actions

HABITAT	MONITORING ACTIVITY (TECHNIQUES)	FREQUENCY/DURATION	PRIORITY
Upland forest	Site walk (project management)	1 time per year	High
	Photo points	1 time per year	Medium

SECTION 6: RECREATION AND ACCESS

Presently, public access to Cazadero Natural Area is neither discouraged nor promoted by Metro. There is low to moderate level of public use of the northern and eastern borders of the site due to the Cazadero State Trail.

6.1 FUTURE PUBLIC ACCESS

Future public access to the Cazadero Natural Area and trailhead improvements to the adjacent segment of the Cazadero State Trail is being considered as part of the master plan being developed by Clackamas County. During the planning process, thoughtful consideration will go into the balance of access and conservation of the natural resource area. Some of the potential opportunities and constraints that will be discussed include the natural area experience, environmental education and stewardship, local recreational demand, resource impacts, patch fragmentation, wildlife corridor disruption, public right-of-way access, land use and development permit requirements, long-term operations and maintenance, as well as capital development and maintenance funding.

Cazadero State Trail

The Cazadero State Trail, owned by Oregon State Parks, follows the route of the historic Oregon Water Power and Railway Company rail line that connected Portland to the Cazadero Dam on the Clackamas River, two miles from Estacada. From its northern trailhead in Boring, the trail extends from the Springwater Corridor and drops into the lush North Fork Deep Creek canyon, continuing south towards Barton and Eagle Creek. In the future, the Cazadero State Trail could extend beyond Eagle Creek to Estacada and on up the Clackamas River corridor eventually connecting to Mt. Hood and the Pacific Crest Trail.

6.2 PROGRAMMATIC (EDUCATION AND VOLUNTEERS)

In addition to meeting conservation goals, Metro's regional parks and natural areas were created to give residents within our region opportunities to enjoy, experience, participate in and understand the natural world. Conservation education staff at Metro work with schools, civic organizations, underserved communities, and the general public to provide nature programs that thoughtfully connect people to Metro's parks and natural areas. Schools and civic groups who are interested in programs contact Metro to request a program. Public walks are advertised in Metro's quarterly "Big

Backyard” publication. Information about conservation education programming is also available on Metro’s website, www.oregonmetro.gov/parks/nature-education.

Education program

Cazadero Natural Area is not currently used for education programs that are open to the general public.

Volunteer program

The primary goal of the volunteer program is to provide a variety of high-quality, meaningful volunteer opportunities that help the community build connections to nature, learn about our program and add value and capacity to Metro’s work. Through these opportunities, community members can learn about and enjoy Cazadero Natural Area, work alongside fellow community members, learn new skills or polish existing ones and gain the satisfaction of contributing to the long-term health and livability of their communities.

Wildlife monitoring volunteers

Metro’s volunteer wildlife monitoring program provides valuable information about Metro’s natural areas while offering a unique and in-depth service opportunity for community members. By focusing on indicator species, such as amphibians and birds, volunteers provide data to help Metro’s science and stewardship team can gauge the progress of its restoration efforts and track the effects of public use on wildlife.

6.3 SITE MANAGEMENT

Metro’s management of the site will include enforcement of the posted rules to provide protection for wildlife and water quality, and to protect the safety and enjoyment of any person visiting these facilities.

Special use permits

Special use permits are required for certain regulated and non-traditional uses of parks and natural areas to ensure public health and safety and to protect natural resources, properties and facilities owned or managed by Metro. Special use permits are required for commercial film, video or photography; educational activities or educational events; festivals and organized sports activities; use of amplified sound; equipment or other elements potentially posing a safety threat or public nuisance; concession services; site restoration or alteration, biological research, scientific collection (soil, wildlife or vegetation disturbance of any kind); any organized activity, event or gathering involving 25 or more people.

Archeological resources

Cazadero Natural Area is steeped in history and may contain archeological resources. No archeological studies have been completed for this site. If, during any site investigation, alteration or improvement, an archaeological resource is discovered, Metro will work with the State Historic Preservation Office to evaluate and document the find. If any damage or unlawful use is identified, Metro would partner with the Clackamas County Sheriff to investigate.

Dogs

One of the most difficult management issues for public access is the introduction of dogs by visitors. Research shows that even if dogs stay on the trails, they are perceived as predators by wildlife. The zone of influence of a dog, even on leash, can be several hundred feet on either side of a trail. Because of the potential disturbance to wildlife and wildlife habitat, dogs are not allowed in the Cazadero Natural Area, with the exception of leashed dogs being allowed within the confines of the Cazadero State Trail that lies along the northern and eastern edges of the natural area. Educational signage, self-policing, and strict enforcement are all needed to effectively manage this sensitive issue.

Signage

If expanded public access is planned in the future, a sign plan would follow as part of the design and development process. In the interim, regulatory signs at known entry points should be installed to alert the public to the level of access currently provided at Cazadero Natural Area.

Any future signage developed for the natural area should utilize Metro's current brand and signage standards manual. The manual establishes a graphic standard that will be integrated into the entire signage plan. The manual addresses each of the three types of signs: regulatory, wayfinding and interpretive.

6.4 STRATEGIC ACTIONS (ACCESS AND SITE MANAGEMENT)

The following actions describe the proposed access and site management improvements over the life of this plan. The projects were established as part of the development of this plan and should be revisited every two to three years for additions and updates. Cost estimates for these actions are included in the "Coordination" section of this document.

Signage

Regulatory and information signs will be installed, including natural area rules, maintenance road/fire lane identification and sensitive habitat signs. Signs will be placed at strategic locations throughout the natural area.

6.5 BEYOND FIVE YEARS OR AS NEEDED

In the future there may be increased demand to access and recreate at Cazadero Natural Area. Future access improvements will need a more in-depth analysis of opportunities and constraints for trails and public access, including meetings with partners, neighbors and the public and developing a detailed master plan.

SECTION 7: COORDINATION

The conservation plan has laid out the history and context of Cazadero Natural Area, along with the conservation, management, and public access projects for the next five years. For those projects to be realized, coordination will be needed on a number of fronts. Important coordination points include:

- Balancing future public access with natural resource (habitat) improvements.
- Monitoring restoration efforts to track effectiveness and make changes to the priorities and goals as needed.
- Coordinating with neighbors and local stakeholders like Cazadero State Trail and Barton Park managers to implement projects.
- Funding to realize the strategic restoration and access actions identified in this plan.

7.1 FUNDING

Costs in Tables 6 and 7 are general estimates for the purpose of understanding the magnitude of costs to implement strategic actions at the site. The figures below are estimates of what it would cost for contractors to complete the work. In addition to these project implementation costs, we have included staff time and annual stewardship costs for Cazadero Natural Area in Table 8.

Table 6: Access and recreation strategic action cost estimates

STRATEGIC ACTION	COST
Signs (trailhead and regulatory signs)	<u>\$5,000</u>
Total	\$5,000

Table 7: Conservation target strategic restoration action cost estimates

STRATEGIC ACTION	COST
Upland forest	
No actions identified	\$0
Total	\$0

Table 8: Annual stewardship cost estimates

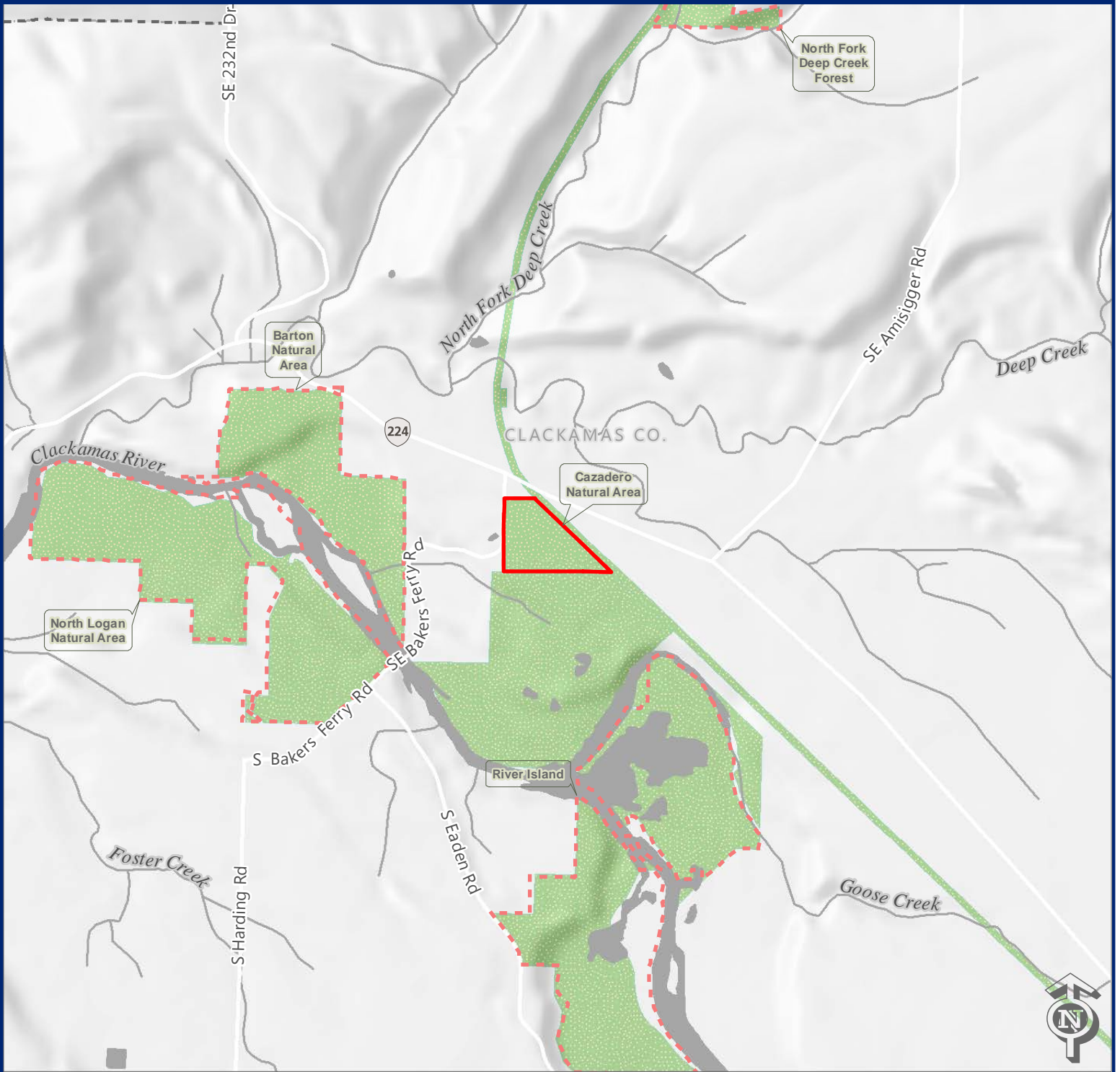
ANNUAL STEWARDSHIP*	COST
EDRR surveys and invasive weed treatments (entire site)	\$2,500
Maintenance of existing Infrastructure (average of multiple small actions)	<u>\$1,000</u>
Total (per year cost)	\$3,500





* Stewardship actions and costs are described in more detail in the Cazadero Stewardship Plan

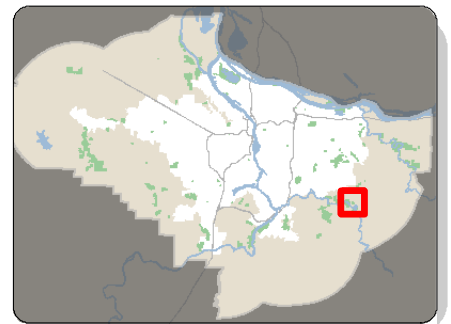
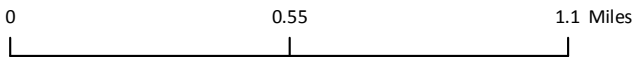
7.2 PUBLIC INVOLVEMENT

As projects are developed, Metro will provide local stakeholders and residents near Cazadero Natural Area with pertinent information about the work before it is implemented. Project information may include background on the project, timing, cost, materials types, and other information as necessary for interested parties to be aware of the project and its implications.

VICINITY MAP



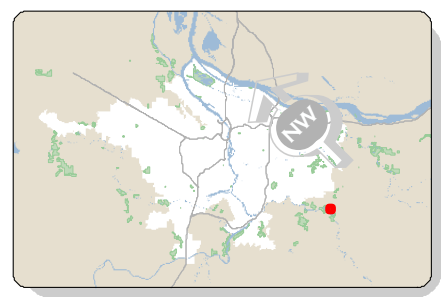
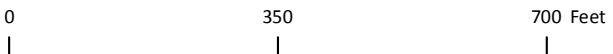
-  Cazadero Natural Area site
-  Other Metro sites
-  Parks and/or Natural Areas
-  ugb



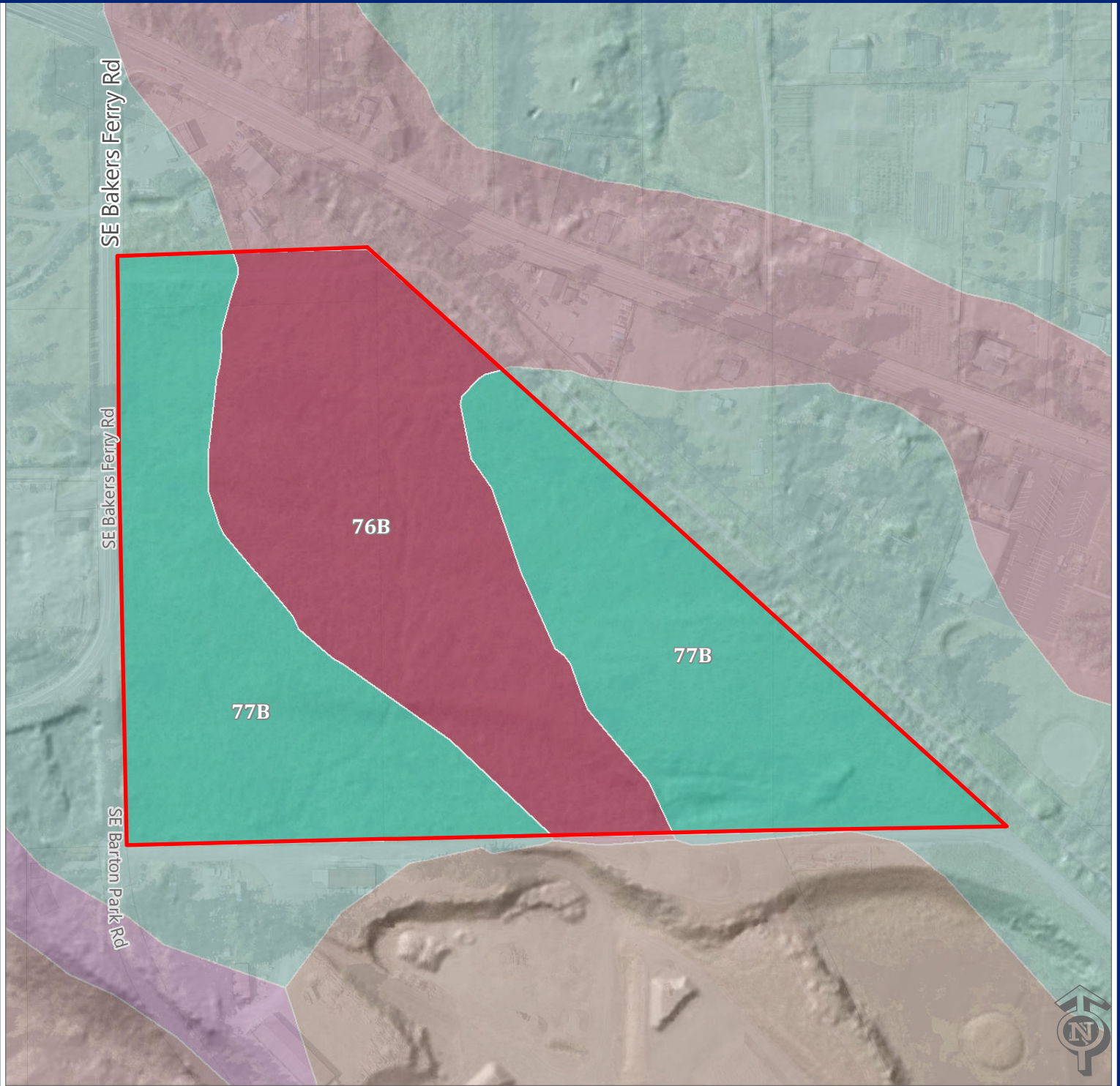
SITE MAP



- Cazadero Natural Area site
- Other Metro sites
- Existing Regional Multi-use Trail
- Planned Multi-use Trail



SOILS



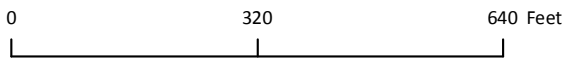
Cazadero Natural Area site



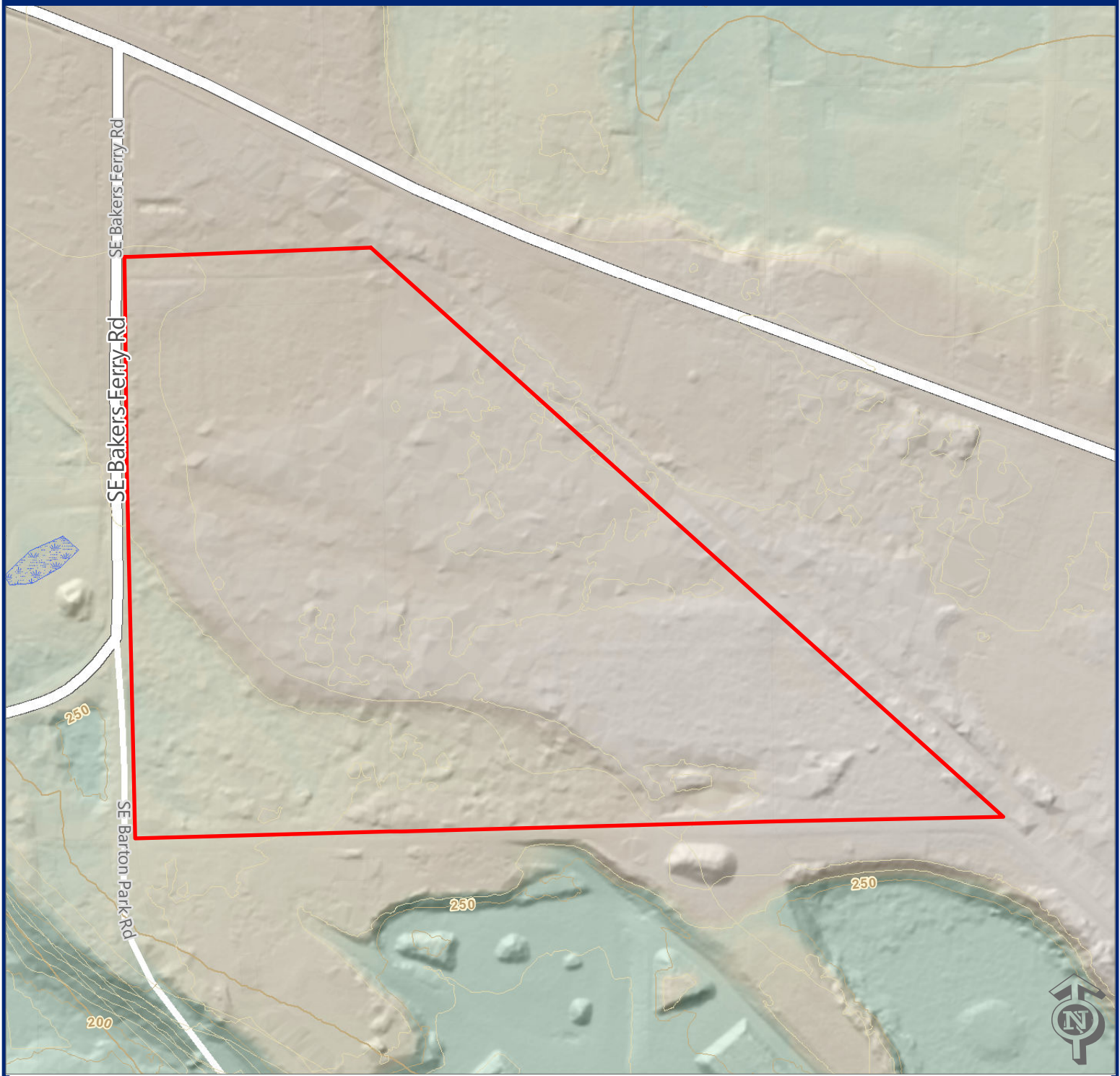
76B - Salem silt loam, 0 to 7 percent slopes





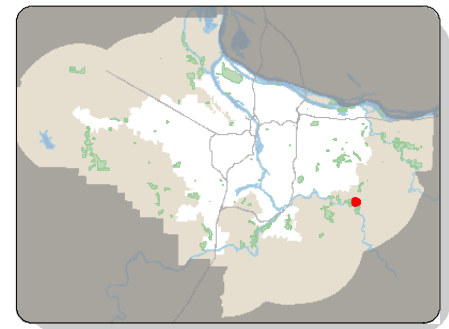
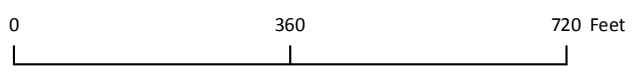
77B - Salem gravelly silt loam, 0 to 7 percent slopes



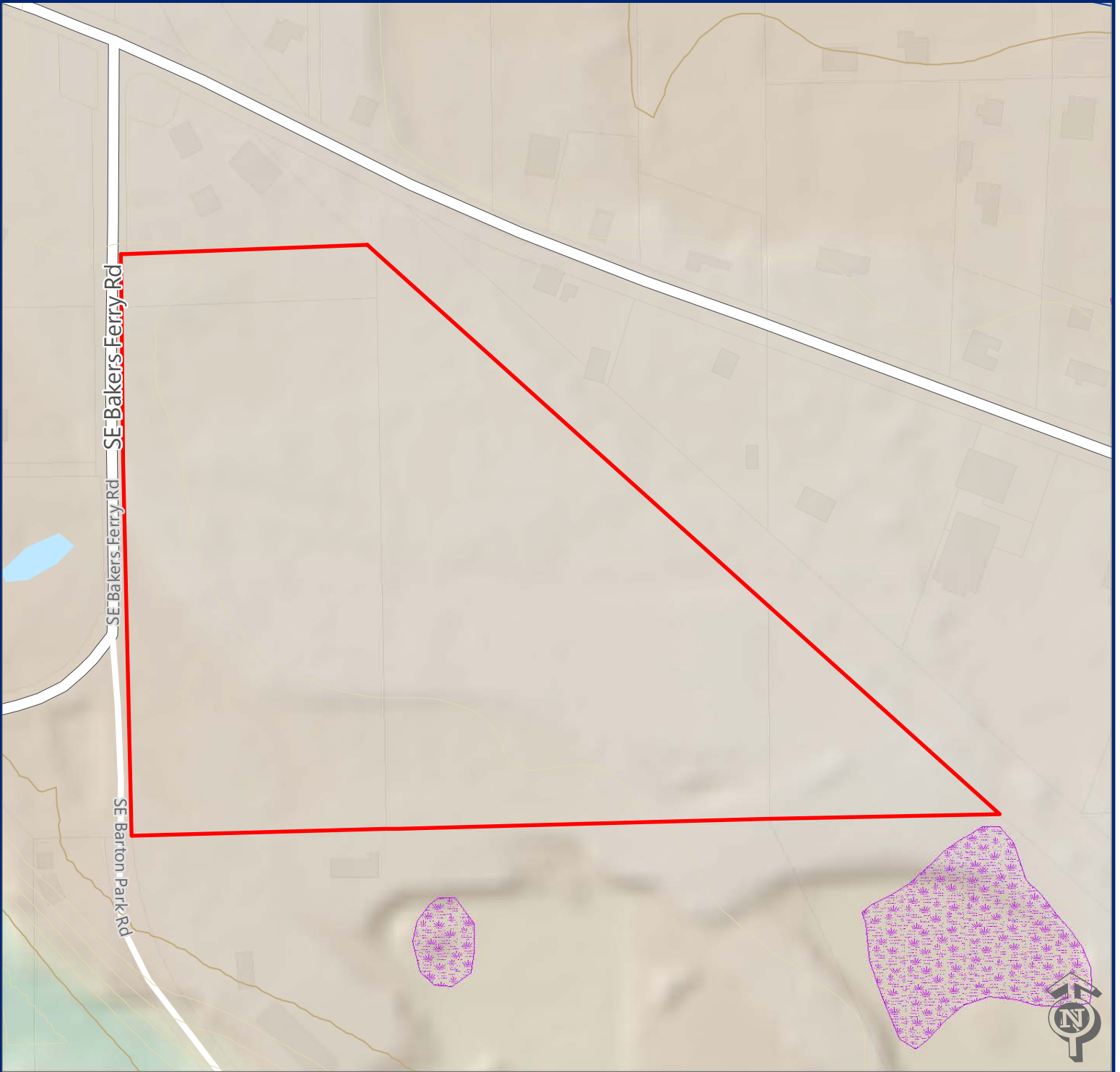
TOPOGRAPHY



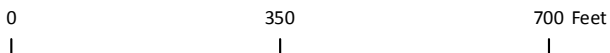
-  Cazadero Natural Area site
-  10 ft contour
-  50 ft contour
-  10 ft contour
-  50 ft contour



HYDROLOGY



-  Cazadero Natural Area site
-  Wetlands (Wetlands Conservancy data)



CURRENT COVER



Metro



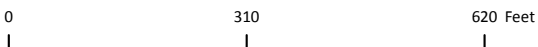
 Cazadero Natural Area site



Developed - (pervious/non ag)



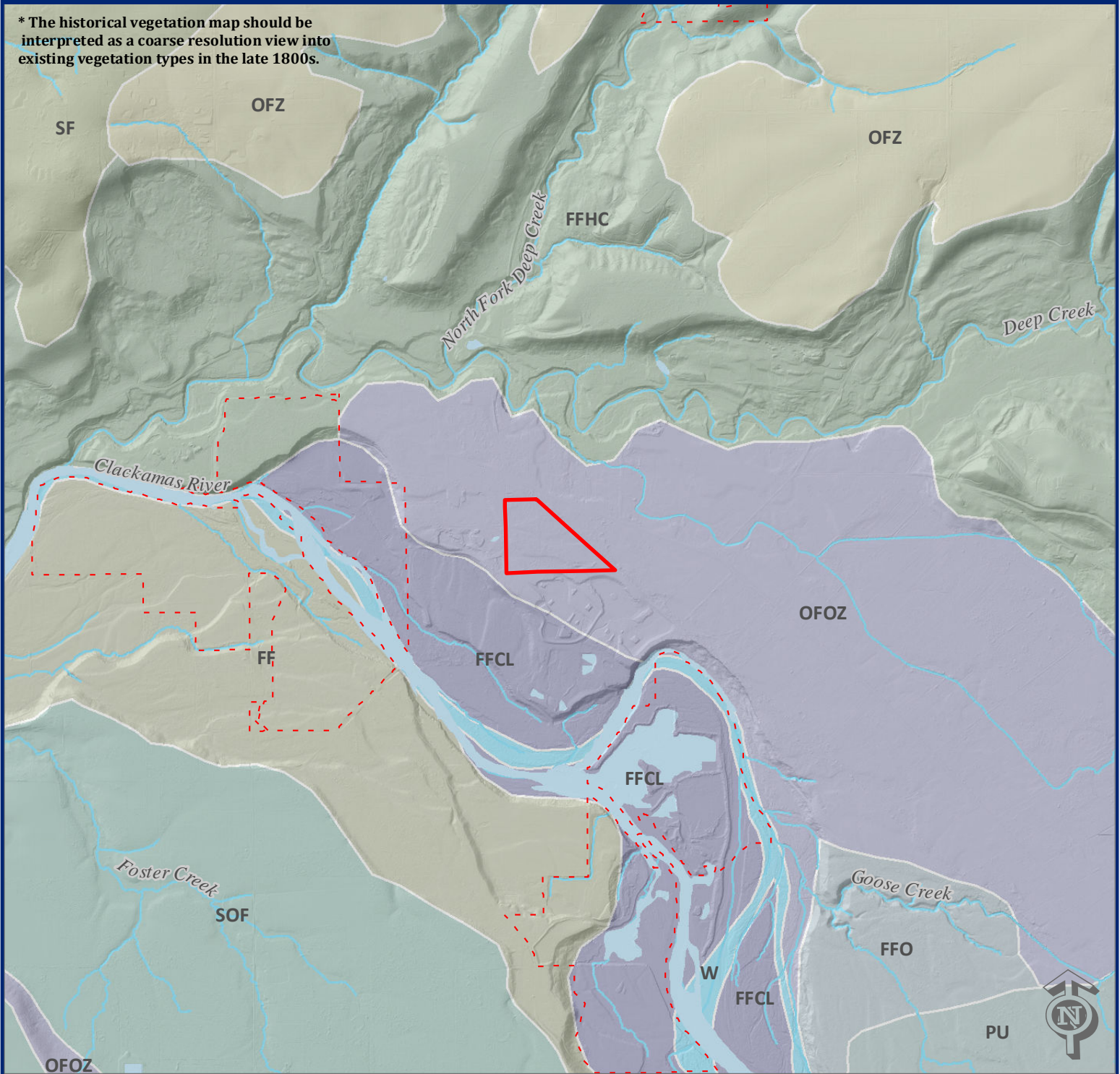
Upland forest - coniferous



HISTORICAL VEGETATION



* The historical vegetation map should be interpreted as a coarse resolution view into existing vegetation types in the late 1800s.



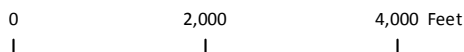
- Cazadero Natural Area site
- Other Metro sites

Historical vegetation

- FF - Closed forest; Upland
- FFCL - Closed forest; Riparian & Wetland
- FFHC - Closed forest; Upland
- FFO - Closed forest; Upland
- OFOZ - Woodland

- OFZ - Woodland
- PU - Prairie
- SF - Savanna
- SOF - Savanna
- W - Water

* Labels refer to vegetation subclasses.
Detailed descriptions can be found in
T:\OBMO\GIS\DATA_V\vegetation\Historical

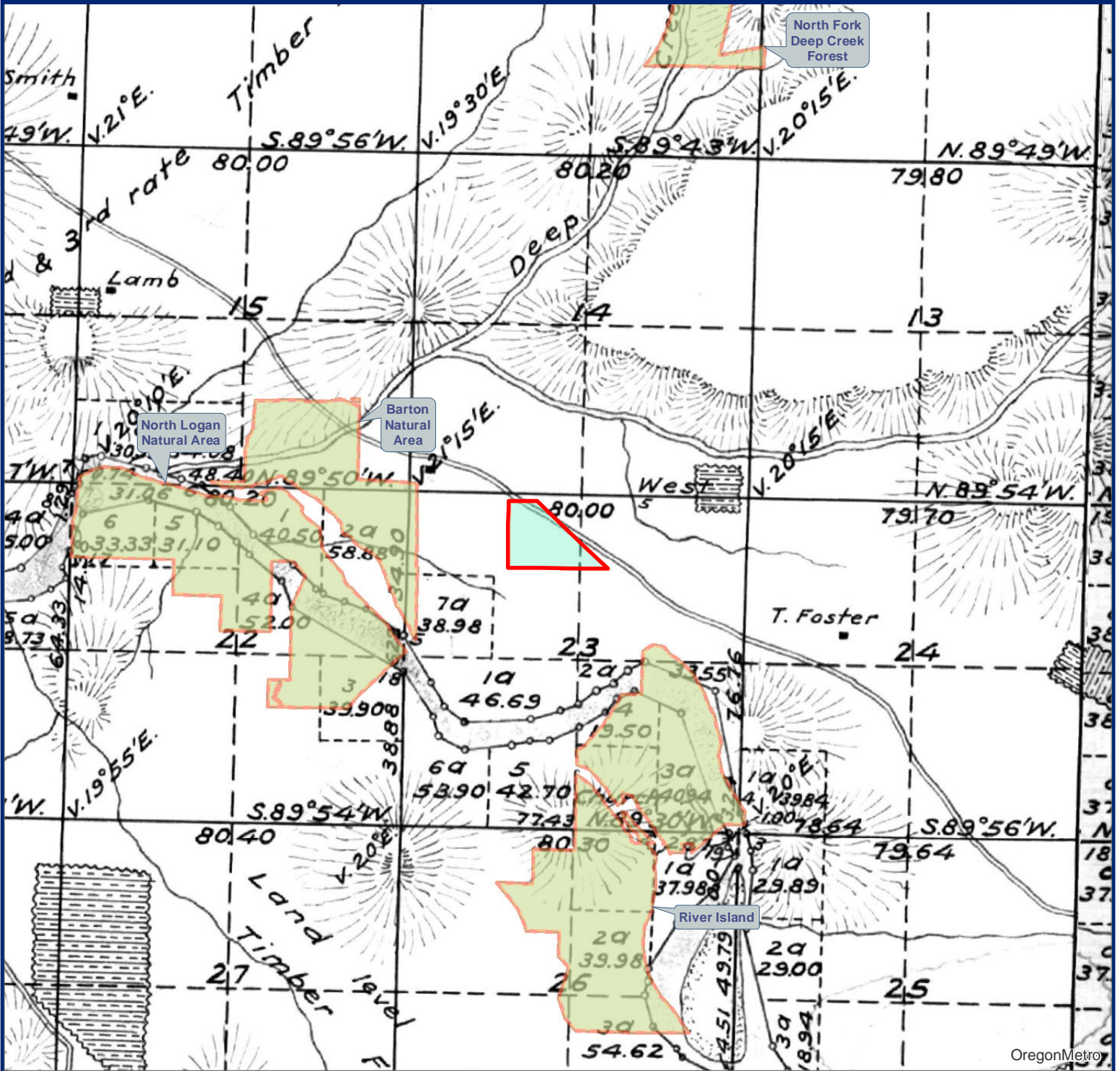


GENERAL LAND OFFICE (GLO) MAP





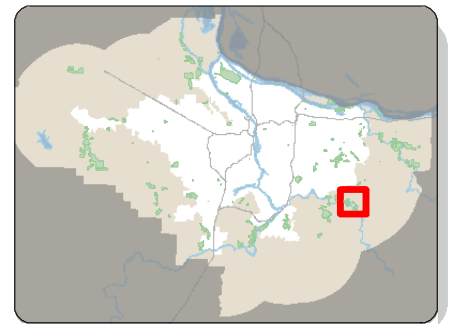
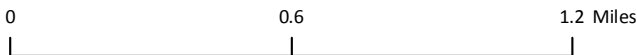
Metro

This map is the 1852 public land survey of the Portland, OR region.






OregonMetro

-  Cazadero Natural Area site
-  Other Metro site



CONSERVATION TARGETS



-  Cazadero Natural Area site
-  No targets
-  Upland forest

0 310 620 Feet

APPENDIX A-1 | CONSERVATION TARGETS

INTRODUCTION

Conservation targets are composed of a suite of species, communities and ecological systems that represent and encompass the full array of native biodiversity of the site, reflect local and regional conservation goals, and are viable or at least feasibly restorable (The Nature Conservancy 2007). Priority conservation targets represent species or habitats that are the conservation focus for a given area or management unit.

Conservation targets establish the basis for setting goals, carrying out conservation actions, and measuring conservation effectiveness. They are the foundation of conservation planning. Key ecological attributes (KEAs) for each conservation target will be evaluated. KEAs are aspects of a conservation target's biology or ecology that, if missing or altered, would lead to the loss of that target over time (The Nature Conservancy 2007). Viability of the conservation target is inferred by the condition of the KEAs. Analysis of threats affecting conservation targets inform the development of action plans to abate serious threats and monitoring plans to gauge success of the action plans. Conservation targets then should consist of species or communities that will provide the focus of management actions and monitoring. Species or communities that for whatever reason are too expensive to manage or monitor are not good candidates for conservation targets.

BACKGROUND

Historically, the Willamette Valley was dominated by extensive prairie, oak savanna and woodland habitats totaling approximately two million acres that supported a wide diversity of plant and animal species, including several endemic to the Willamette Basin (Floburg et al 2004). These habitats were primarily maintained by Native American-ignited fires. Agricultural and residential development in the Willamette Subbasin and the cessation of widespread prescribed fires has resulted in a substantial loss of native habitat especially at the lowest elevations, leaving less than two percent of all historic prairies and seven percent of oak habitat extant today.

METHODS

Regional conservation plans were referenced to align the conservation goals of the Cazadero Site Conservation Plan (see Table 1). These plans included the Oregon Department of Fish and Wildlife's Oregon Conservation Strategy (ODFW 2006), The Nature Conservancy's Ecoregional Assessment of the Willamette Valley – Puget Trough-Georgia Basin (Floburg et al 2004), the Northwest Power and Conservation Council's Willamette Subbasin Plan (NWPCC 2005), and Partners in Flight's Conservation Strategy for Landbirds in Lowlands and Valleys of Western Oregon and Washington (Altman 2000). These plans identify both focal habitats and focal species as conservation targets.

RESULTS

Using onsite habitat types and regional conservation planning efforts as guides, conservation targets were selected that encompass the site’s most threatened biodiversity values as well as regional conservation targets (Table 1). The site’s conservation target is represented in the regional conservation plans listed in Table 1.

Table 1: Cazadero site conservation target and relationships to other conservation strategies

CAZADERO NATURAL AREA CONSERVATION TARGET	OREGON CONSERVATION STRATEGY (ODFW 2006)	WILLAMETTE BASIN SUBBASIN PLAN (Primozech 2004)	LANDBIRD CONSERVATION STRATEGY (Altman 1999, 2000)	ECOREGIONAL ASSESSMENT (Floburg et al 2004)
Upland forest	Late successional conifer forests	Old growth conifer forest	Low elevation western hemlock/western red cedar	Douglas fir-western hemlock-western red cedar forests

While not elevated to the level of “conservation targets,” certain wildlife species that depend on upland forest are integrated into the habitat’s Key Ecological Attributes. These species are rare or declining, and implementing specific management practices may aid their conservation. No state and federally listed species have been identified or are anticipated to be in the Cazadero Natural Area.

APPENDIX A-2 | KEY ECOLOGICAL ATTRIBUTES

Key ecological attributes (KEAs) are aspects of a conservation target's biology or ecology that, if missing or altered, would lead to the loss of that target over time (The Nature Conservancy 2007). KEAs define the conservation target's viability. They are the biological or ecological components that most clearly define or characterize the conservation target, limit its distribution or determine its variation over space and time. They are the most critical components of biological composition, structure, interactions and processes, and landscape configuration that sustain a target's viability or ecological integrity. For each KEA, one or more indicators were selected to assess the health of the KEA.

Indicators are measurable entities related to the condition of the KEA (The Nature Conservancy 2007). A good indicator should be:

- **Biologically relevant:** The indicator should represent an accurate assessment of target health.
- **Sensitive to anthropogenic stress:** The indicator should be reflective of changes in stress.
- **Measurable:** The indicator should be capable of being measured using standard procedures.
- **Cost-effective:** The indicator should be inexpensive to measure using standard procedures.
- **Anticipatory:** The indicator should indicate degradation before serious harm has occurred.
- **Socially relevant:** The indicator's value should be easily recognizable by stakeholders.

KEA indicators were categorized by type: size, condition or landscape context:

- **Size:** A measure of the area or abundance of the conservation target's occurrence.
- **Condition:** A measure of the biological composition, structure and biotic interactions that characterize the occurrence.
- **Landscape context:** An assessment of the target's environment including ecological processes and regimes that maintain the target occurrence such as flooding, fire regimes and many other kinds of natural disturbance, and connectivity such as species targets having access to habitats and resources or the ability to respond to environmental change through dispersal or migration.

The status of an indicator will vary over time either within an acceptable range of variation that sustains the conservation target or beyond a critical threshold that threatens the viability of the conservation target. The range is described as very good, good, fair or poor. The very good and good ratings mean that the indicator is functioning within its acceptable range of variation. Fair and poor ratings mean an indicator is outside its acceptable range of variation. When information was lacking to define all four categories then only a subset of the four categories was defined.

Definitions for the four categories follow those used by The Nature Conservancy:

- **Very Good:** The indicator is functioning within an ecologically desirable status, requiring little human intervention for maintenance within the natural range of variation (i.e., is as close to "natural" as possible and has little chance of being degraded by some random event).

- **Good:** The indicator is functioning within its range of acceptable variation, although it may require some human intervention for maintenance.
- **Fair:** The indicator lies outside of its range of acceptable variation and requires human intervention for maintenance. If unchecked, the target will be vulnerable to serious degradation.
- **Poor:** Allowing the indicator to remain in this condition for an extended period will make restoration or prevention of extirpation of the target practically impossible (e.g., too complicated, costly and/or uncertain to reverse the alteration).

KEAs and their indicators for Cazadero Natural Area's conservation targets are provided in the following tables.

Table 1: Key ecological attributes for upland forests – Cazadero Natural Area

CATEGORY	KEA	INDICATOR	----- INDICATOR RATING -----				CURRENT STATUS	DFC* FOR THIS SCP	LONG TERM DFC	COMMENTS
			POOR	FAIR	GOOD	VERY GOOD				
Size	Forested habitat patch size	Patch size (includes native shrub patches or natural clearings)	< 12 ha (30 ac)	12-40 ha (30-100 ac)	40-61 ha (100-150 ac)	>61 ha (150 ac)	Poor	Poor	Poor	Calculate by delineating forest patch in GIS. If more than one patch present, rank based on a composite. In the Puget Sound, most native forest birds were present in patches ≥ 42 ha (104 ac). Local studies suggest a lowest threshold for birds and mammals of about 12 ha (30 ac) (Environmental Law Institute 2003; Donnelly and Marzluff 2004; Soll and Hennings 2010).
Condition	Native tree and shrub richness	Number of native tree and shrub species per ac	< 5 species per 0.4 ha (1 ac)	5-8 species 0.4 ha (1 ac)	8-12 species per 0.4 ha (1 ac)	>12 species per 0.4 ha (1 ac)	Good	Good	Very Good	Estimate overall via site walk. Native wildlife species diversity is associated with native vegetation. A diversity of shrubs is more likely to provide food and shelter for species over the seasons. Shrub diversity is particularly important to pollinators and songbirds. (Hagar 2003; Hennings 2006; Burghardt et al. 2009).
Condition	Vegetative structure: native tree and shrub layer	% native tree and shrub canopy cover (combined)	< 25% cover	25-50% cover	50-75% cover	>75% cover	Good	Good	Very Good	Estimate overall via site walk. Native bird species richness is associated with the amount of native shrub cover. (Hagar 2003; Hennings 2006). Numbers based on data analysis from local studies at 54 riparian study sites (Hennings 2001). Native shrub cover was as high as ~60%, with highest native shrub cover in the 50-60% tree canopy cover range.
Condition	Mature trees	Number and size (dbh) of species such as Douglas fir, western red cedar, western hemlock and grand fir	Mature trees lacking	< 3 per ac with dbh >24 in	3-5 per ac with dbh >24 in	>5 per ac with dbh >24 in	Poor	Fair	Very Good	Recruitment of native trees necessary for long-term health of upland forests. Saplings are < 2m tall. Based on PIF (2000) biological objective for WV large-canopy trees in riparian deciduous woodland.
Condition	Standing and downed dead trees	Average # snags and large wood (> 50 cm, or 20 in, DBH) per acre	< 5 snags and < 5% down wood	5-11 snags and 5-10% down wood	12-18 snags and 10-20% down wood with moderate variety of size and age classes	>18 snags and >20% cover down wood in a good variety of size and age classes	Poor	Poor	Good	Estimate via site walk. Rankings distilled from multiple references and particularly from <i>Habitat Conservation for Landbirds in Lowlands and Valleys of Western Oregon and Washington</i> (Altman and Alexander 2012) and DecAID results for species' use of dead wood in Westside Lowland Conifer-hardwood forests.
Landscape context	Edge condition	% of edge bordered by natural habitats and/or managed for conservation	Patch surrounded by non-natural habitats (0-25% natural habitat)	25%+ of patch bordered by natural habitats	50-75% of patch bordered by natural habitats or managed for conservation	75-100% of patch bordered by natural habitats or managed for conservation	Fair	Good	Good	Assess via aerial photographs. The intactness of the edge can be important to biotic and abiotic aspects of the site. Derived from <i>Ecological integrity assessment: North Pacific dry Douglas-fir forest and woodland</i> (Crawford/WDNR 2011).

*Desired future condition.

APPENDIX A-3 | THREATS AND SOURCES

INTRODUCTION

A stress is the “impairment or degradation of the size, condition and landscape context of a conservation target, and results in reduced viability of the target,” (The Nature Conservancy 2007) or, in other words, a degraded key ecological attribute (KEA) that is outside its acceptable range of variation. Stresses may also reduce the viability of nested conservation targets such as grassland birds. A source of stress is an extraneous factor, either human (e.g., policies, land use) or biological (e.g., non-native species) that infringes upon a habitat or species target in a way that results in stress. Put together, stresses and their sources constitute a threat.

Analysis of threats to conservation targets at Cazadero Natural Area involves three parts:

- Identify stresses and apply stress-rating criteria.
- Identify sources of stress, rank and assign threat-to-system rank.
- Assign overall threat rank.

BACKGROUND ON METHODS

Identify stresses and apply stress-rating criteria

In identifying stresses, we applied the concept that a stress is any alteration of a KEA that can result or has resulted in a KEA declining below a “good” rating. For each conservation target, KEA indicators with ratings of “poor” or “fair” were analyzed by asking the question “*What types of destruction, degradation or impairment are responsible for the ‘poor’ or ‘fair’ rating?*” We also considered those KEA indicators with “good” and “very good” ratings but likely to degrade to “poor” or “fair” if no management actions are taken.

Stresses are ranked according to two criteria: **severity** and **scope** of the anticipated damage.

Severity

The level of damage to the conservation target that can reasonably be expected within 10 years under current circumstances (i.e., given the continuation of the existing situation).

- **Very high:** The threat is likely to destroy or eliminate the conservation target over some portion of the target’s occurrence at the site.
- **High:** The threat is likely to seriously degrade the conservation target over some portion of the target's occurrence at the site.
- **Medium:** The threat is likely to moderately degrade the conservation target over some portion of the target's occurrence at the site.
- **Low:** The threat is likely to only slightly impair the conservation target over some portion of the target's occurrence at the site.

Scope

The geographic extent of impact on the conservation target at the site that can reasonably be expected within 10 years under current circumstances (i.e., given the continuation of the existing situation).

- **Very high:** The threat is likely to be widespread or pervasive in its scope and affect the conservation target throughout the target's occurrences at the site.
- **High:** The threat is likely to be widespread in its scope and affect the conservation target at many of its locations at the site.
- **Medium:** The threat is likely to be localized in its scope and affect the conservation target at some of the target's locations at the site.
- **Low:** The threat is likely to be very localized in its scope and affect the conservation target at a limited portion of the target's location at the site.

Once severity and scope ratings are determined, they are combined to develop a stress ranking using the following stress ranking table (The Nature Conservancy 2007).

Table 1: Stress ranking

SEVERITY	SCOPE			
	VERY HIGH	HIGH	MEDIUM	LOW
Very high	Very high	High	Medium	Low
High	High	High	Medium	Low
Medium	Medium	Medium	Medium	Low
Low	Low	Low	Low	Low

Identify sources of stress and apply threat to system rank

Sources of stresses are the proximate cause of the stress. A source of stress may be either human activities or biological (e.g., non-native species). Sources of the stress are rated in terms of **contribution** and **irreversibility** as defined below:

CONTRIBUTION

The expected contribution of the source, acting alone, under current circumstances (i.e., given the continuation of the existing management/conservation situation).

- **Very high:** The source is a very large contributor of the particular stress.
- **High:** The source is a large contributor of the particular stress.
- **Medium:** The source is a moderate contributor of the particular stress.
- **Low:** The source is a low contributor of the particular stress.

IRREVERSIBILITY

The degree to which the effects of a source of stress can be restored.

- **Very high:** The source produces a stress that is irreversible (e.g., wetlands converted to a shopping center).

- **High:** The source produces a stress that is reversible, but not practically affordable (e.g., wetland converted to agriculture).
- **Medium:** The source produces a stress that is reversible with a reasonable commitment of resources (e.g., ditching and draining of wetland).
- **Low:** The source produces a stress that is easily reversible at relatively low cost (e.g., off-road vehicles trespassing in wetland).

The contribution and irreversibility of each source across all the stresses to each conservation target is ranked using Table 2, resulting in a source of stress rank for each contribution/irreversibility combination.

Table 2: Source ranking

IRREVERSIBILITY	CONTRIBUTION			
	VERY HIGH	HIGH	MEDIUM	LOW
Very high	Very high	High	High	Medium
High	Very high	High	Medium	Medium
Medium	High	Medium	Medium	Low
Low	High	Medium	Low	Low

In a similar fashion stress and source rankings are combined to develop a threat ranking specific to that conservation target (Table 3).

Table 3: Threat ranking

STRESS	CONTRIBUTION			
	VERY HIGH	HIGH	MEDIUM	LOW
Very high	Very high	Very high	High	Medium
High	High	High	Medium	Low
Medium	Medium	Medium	Low	Low
Low	Low	Low	Low	low

THREAT-TO-SYSTEM RANK

A threat-to-system rank is a summary ranking for all threats associated with a particular source of stress to a conservation target. Where multiple threats related to the same source of stress occurred, the threat-to-system rank is adjusted by using the “3-5-7” rule as follows:

- Three high rankings equal a very high.
- Five medium rankings equal a high.
- Seven low rankings equal a medium.

Table 4 illustrates the threat-to-system ranking.

Table 4: Conservation target A

	STRESS 1	STRESS 2	STRESS 3	THREAT TO SYSTEM RANK
Stress rank	High	Medium	Medium	
Source A rank	High	Medium	N/A	High*
Source B rank	Low	N/A	Medium	Medium**

N/A = Not applicable: stress/source combination does not affect conservation target

*, ** - See Table 4

OVERALL THREAT RANK

The last step in the process is to summarize threats across the system and apply an overall threat rank to each threat (source/stress combination). Overall threat ranks are determined by combining threat-to-system ranks across all system/targets affected by that threat. For each threat, DEA will combine the threat-to-system ranks across all conservation targets into an overall threat rank of very high, high, medium or low as determined by the “2 Prime” rule which is as follows:

- Two very high threat rankings yield an overall threat rank of very high.
- One very high or two high threat rankings yield an overall threat rank of high.
- One high or two medium threat rankings yield an overall threat rank of medium.
- Less than two medium threat rankings yield an overall threat rank of low.

The overall threat rank represents the degree to which a particular source causes stress to the conservation target.

Table 5: Overall threat rank

	TARGET 1	TARGET 2	TARGET 3	OVERALL THREAT RANK
Threat A	High*	Very high	High	High
Threat B	Medium**	Medium	High	Medium
Threat C	N/A	Medium	Low	Low

** , ** from Tables 5, 6*

Threats and source analysis for the Cazadero Natural Area

Threats for the Cazadero Natural Area conservation targets are listed in Table 6 below.

Table 6: Summary of threats to upland forest at Cazadero Natural Area

STRESS	STRESS RANK	SOURCE	SOURCE RANK	THREAT RANK	COMMENTS
Increased competition from invasive species	High	Encroachment of non-native invasive species	High	High	Extensive invasive grasses and broadleaf weeds, esp. false brome, Canada thistle, and teasel and invasive shrubs such as spurge laurel, Scotch broom, and Himalayan blackberry. Tied to native species KEAs.
Habitat conversion	High	Conversion from natural forest to single age young forest	High	High	Complete canopy closure stunts trees and prevents development of native herbaceous and shrub layers. Tied to native plant and vegetative structure KEAs.
Altered fire regime	Medium	Suppression of fire frequency outside natural range of variation	Medium	Low	Increased risk of stand-replacing fires in Douglas-fir forest, where a buildup of fuels would increase risk of a high intensity fire. Tied to all KEAs.
Human disturbance (recreational activities)	Medium	Demand trails, camping, and dogs	Low	Low	Stress to wildlife species utilizing this habitat. Potential loss of habitat and vegetation structure by escaped fire. Disturbance reduces habitat value. Tied to structure/patch size (interior habitat) KEAs.

APPENDIX A-4 | INVASIVE SPECIES

The table below summarizes a preliminary list of invasive plants requiring control in all or parts of Cazadero Natural Area, including focus areas and timing for control. Invasive species, with the exception of Early Detection Rapid Response (EDRR) species, will be controlled as part of restoration projects or ongoing management of habitat areas. Photos of EDRR species for identification are listed below. A list of noxious weeds for Oregon, including descriptions and photos, can be found at: www.oregon.gov/ODA/PLANT/WEEDS/statelist2.shtml.

Table 1: Working list of priority non-native species for control at Cazadero Natural Area (EDRR species common names are bolded in red)

GENUS	SPECIES	COMMON NAME	FOCUS AREA FOR DETECTION/CONTROL	CONTROL TIMING
<i>Allarium</i>	<i>petiolata</i>	Garlic Mustard	All	Spring
<i>Brachypodium</i>	<i>sylvaticum</i>	False Brome*	All	Spring/Fall
<i>Centaurea</i>	<i>pratensis</i>	Meadow knapweed*	Site edges	Summer
<i>Cirsium</i>	<i>arvense</i>	Canada thistle*	All	Spring
<i>Clematis</i>	<i>vitalba</i>	Old man's beard	Upland forest	Spring/Fall
<i>Conium</i>	<i>maculatum</i>	Poison hemlock	Upland forest, site edges	Spring
<i>Crataegus</i>	<i>monogyna</i>	Common hawthorn	Upland forest, site edges	Fall
<i>Cytisus</i>	<i>scoparius</i>	Scotch broom*	Upland forest, site edges	Fall
<i>Daphne</i>	<i>laureola</i>	Spurge Laurel*	All	Spring/Fall
<i>Dipsacus</i>	<i>fullonum</i>	Teasel*	All	Spring
<i>Hedera</i>	<i>Helix</i>	English Ivy	All	Winter
<i>Ilex</i>	<i>aquifolium</i>	Holly	Upland forest	Fall
<i>Lunaria</i>	<i>Annua</i>	Money Plant	Upland forest	Spring
<i>Phalaris</i>	<i>arundinacea</i>	Reed canarygrass*	All	Fall
<i>Polygonum</i>	<i>cuspidatum</i>	Japanese knotweed	All	Summer
<i>Robinia</i>	<i>pseudoacacia</i>	Black locust	Upland forest	Fall
<i>Rubus</i>	<i>armeniacus</i>	Himalayan blackberry*	All	Fall
<i>Solanum</i>	<i>dulcamara</i>	Bittersweet nightshade	All	Spring

* Detected onsite

APPENDIX B | REFERENCES AND ADDITIONAL RESOURCES

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