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Gary Shepherd, Senior Attorney

March 3, 2022

Multnomah County Planning Commission
c/o Kevin Cook
Land Use Planning Division
1600 SE 190th Avenue
Portland OR 97233-5910

RE: Metro's North Tualatin Mountains
Case #T4-2017-9166 – Comprehensive Plan Text Amendment
Case #T3-2017-9165 – Use Application
Response to issues raised during public hearing

Dear Planning Commission:

To aid review, Metro provides additional information to address issues presented during the February 6, 2023, public hearing; specifically, the "adversely affect" standard as applied to elk and red-legged frogs. Please include this submission and attachment in the record for these proceedings.

The "adversely affect" standard:

The proposed parking lot and trails at Burlington Creek Forest are a community service use. A community service use is a conditional use.

Conditional uses are subject to and reviewed for compliance with use compatibility standards, which includes the "adversely affect" standard.

County Code § 36.6010 provides: "In approving a Community Service use, the approval authority shall find that the proposal … (B) *Will not adversely affect natural resources*."

The adversely affect standard is a common standard, found in state, city, and county regulations throughout Oregon. It has been a part of the County code since the late 1970s.

Although the phrase "adversely affect" is not specifically defined by the County code, its meaning is understood.

Exhibit H.19

Webster's Ninth New Collegiate Dictionary (1988) defines "adverse" as: "*adj.* 1: acting against or in a contrary direction, 2: opposed to one's interests, 3: opposite in position." "Affect" is defined as "*vt.*: to produce an effect upon: as a: to produce a material influence upon or alteration in."

County staff determined the natural resources at issue are timber, soil, habitat, and ecosystem services.

As such, the phrase "adversely affect natural resources" means a use that materially influences or materially contradicts with timber, soil, habitat, or ecosystem services. The standard requires a determination of significance – not every affect (or impact) is adverse.

Of note, even if more-than-moderate adverse impacts are reasonably likely, an applicant can propose mitigation measures to reduce otherwise significant affects to an insignificant level and comply with the standard.

In conducting the analysis and making the required determination, County staff correctly considered: the context/area of the proposal; existing conditions; the resources; proposed conditions; the intensity of the proposal; the magnitude and duration of the potential impact; and mitigation measures to reduce affects.

Here, County staff agreed that the proposal was professional and carefully planned; the design was good; that Metro's science-based approach to site management and conservation incorporated information about site conditions, conversation targets, and habitat restoration goals, all guided by conservation biology, site knowledge, resources, and professional evaluation of the impact of access proposed. That process identified suitable locations and activities for recreation while seeking to stabilize and restore diversity and ecological health of the Burlington Creek Forest, as well as the three other forest units.

County staff found Metro's core habitat set asides and improvements, avoiding streams, minimal disturbance, riparian and drainage restoration and protection, placement of downed logs, forest thinning, snag creation, planting, invasive plant removal, trail design and maintenance, and monitoring and adaptive management will prevent the proposal from adversely impacting natural resources. County staff also found that continuing mitigation measures will mitigate any impacts, making them insignificant.

County planning and transportation staff made their findings, conclusions, and recommendation of approval after considering all the evidence and testimony presented. The testimony reviewed and considered by County staff is the same or similar testimony submitted to the Planning Commission.

Opposition Comments:

Individuals opposed to Metro's trail improvements suggested there would be impacts to elk and red-legged frogs. They did not specifically quantify the impacts to the elk or frogs, other than to suggest any impact is prohibited. Metro and County planning staff disagree with that code interpretation. As discussed above, the standard requires a determination of significance and prohibits adverse effects.

Additionally, the concepts of inventory and monitoring were raised.

Metro Response:

In response, **Metro provides the following additional information concerning red-legged frogs, elk, and the Burlington Creek Forest conditions and proposal.** The material provides a framework for understanding the choices Metro has made regarding inventory and monitoring of Northern red-legged frogs (*Rana aurora*, "RLF") and Roosevelt elk (*Cervus canadensis roosevelti*, "elk") in the Burlington Creek Forest Natural Area ("BCF"). The memo contains:

1. A general explanation of Metro's approach to inventory, monitoring, and adaptive management;
2. The basics of RLF and elk ecology; and
3. Specifics of frog and elk monitoring within Metro natural areas in the North Tualatin Mountains.

This material was assembled by Katy Weil and Jonathan Soll.[1]

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[1] Katy Weil has worked in wildlife conservation and environmental public policy for 37 years. She currently serves as a senior science analyst within Metro's Parks and Nature Conservation Program. She has been with Metro since 1998, and before that was the Oregon/Washington Coordinator for Partners in Flight, program director for the Audubon Society of Portland, and consultant for the United Nations Environment Programme, working with the Terrestrial Ecosystem and Programme Coordination Units, as well as working previously with the US Fish and Wildlife Service in the northeast. Katy has a background in wildlife biology, particularly effectiveness monitoring and management, and applies this within a restoration context. She is currently the senior co-chair of NW PARC. This working group consists of the western states and western Canada, and consists of scientists, academics, and land managers all working in reptile and amphibian research and conservation. Katy has a graduate certificate in international wildlife study from the UNGCP - United Nations Graduate Certificate Program through Long Island University - and a biology degree. She has completed amphibian monitoring techniques courses, and organized, presented, and moderated amphibian research talks at numerous conferences.

Jonathan Soll has been the Science Division Manager for Metro since 2009. He leads a team of natural resources scientists responsible for setting natural area acquisition and restoration priorities and for implementing and tracking restoration projects on Metro's portfolio of nearly 17,000 acres. Jonathan and his team are also responsible for representing Metro regionally on conservation science issues and working with partners on conservation-oriented projects throughout the region. Jonathan's training includes a biology degree from Reed College with thesis work in Evolutionary Biology; and a Master's degree in Forest Ecosystem Analysis from the University of Washington, College of Forest Resources. He has since spent over 25 years doing practical conservation biology and natural resources management in the Pacific Northwest.

Inventory, Monitoring, and Adaptive Management:

During public testimony, the topics of monitoring and inventory were discussed. It was suggested that Metro's land management and approach to monitoring and inventorying resources is insufficient. What follows is a discussion of monitoring, inventory, and adaptive management.

Adaptive management is the practice of changing management strategy in response to changing conditions or new information. It is a bedrock principal of natural area management.

Monitoring is distinct from inventory or research.

Inventory provides information on what is present at a site at a given time and place. It can provide important information on the plants and animals present or using a site and help empower management. However, data collected in a single year or even a short-term study is subject to being influenced by current conditions, often conditions outside the geography of concern or the control of site managers. **Research** tests one or more hypotheses through controlled experiments that can isolate variables.

Done well, **monitoring** is a form of "research-lite" aimed at providing information about changes or trends, for example in population size, habitat use, or habitat condition over time. In a management context, monitoring is intended to provide the reasoning behind changing strategy and management approach. Monitoring is differentiated from research because controls are often necessarily lacking.

Said another way, the primary reason to monitor is to inform management and improve decision making.

Metro's management success is generally dependent on four things:

1. Crafting clear management goals.
2. Crafting clear monitoring goals.
3. Developing a model that can draw a clear connection between conditions on the ground and any changes.
4. Clarity around the value of the resource being monitored.

Developing this information in turn relies on knowledge of the species or habitat in question and understanding the limiting factors under control of site managers.

NORTHERN RED-LEGGED FROGS conservation status, biology, and life cycle:

Northern red-legged frogs are a federal species of concern and a state sensitive species. They are not legally protected under the Endangered Species Act. They are, however, a "strategy species" for the Willamette Valley and Coast Range eco-regions in the Oregon Department of Fish and Wildlife's ("ODFW") Oregon Conservation Strategy. As a result, they are a conservation priority for Metro.

The ODFW Conservation Strategy states:

> "Loss of egg-laying habitat is widely cited as a key limiting factor, though impacts to active-season habitat may have more direct effects on populations. Hydrologic modifications, fragmentation by roads, suburban development, and other land use changes are among these impacts. Predation and competition by invasive fish and bullfrogs present further threats." (https://oregonconservationstrategy.org/strategy-species/northern-red-legged-frog).

In NW Oregon, RLFs breed in ponds or other still water in mid to late winter. They move into these wetlands during rainy warm evenings in early winter and return to nearby uplands during late winter or early spring. They spend the dry season in upland habitats, often near water, returning to the ponds when rains return, to repeat the cycle.

At the ponds, female RLFs lay eggs in clusters called egg-masses, typically one egg-mass per female. These masses are easily recognized from those of other species. Within the Lower Willamette Valley the resulting tadpoles metamorphose into frogs in late June and spend a short time near the wetlands before moving to summer habitat.

<u>RLF habitat needs</u>:

Not a great deal is known about the Northern red-legged frog habitat needs during non-breeding season. In general, they require forested habitat, ideally with significant thermal protection and hiding cover available, such as from wood on the ground, ferns, shrubs, or clumps of grass. The ODFW Conservation Strategy summarizes this as follows:

> "They can be wide ranging in terrestrial habitats, and are associated with availability of coarse woody debris and medium canopy cover. In the non-breeding season, they are often found in damp brush or under forest debris adjacent to waterbodies." (https://oregonconservationstrategy.org/strategy-species/northern-red-legged-frog).

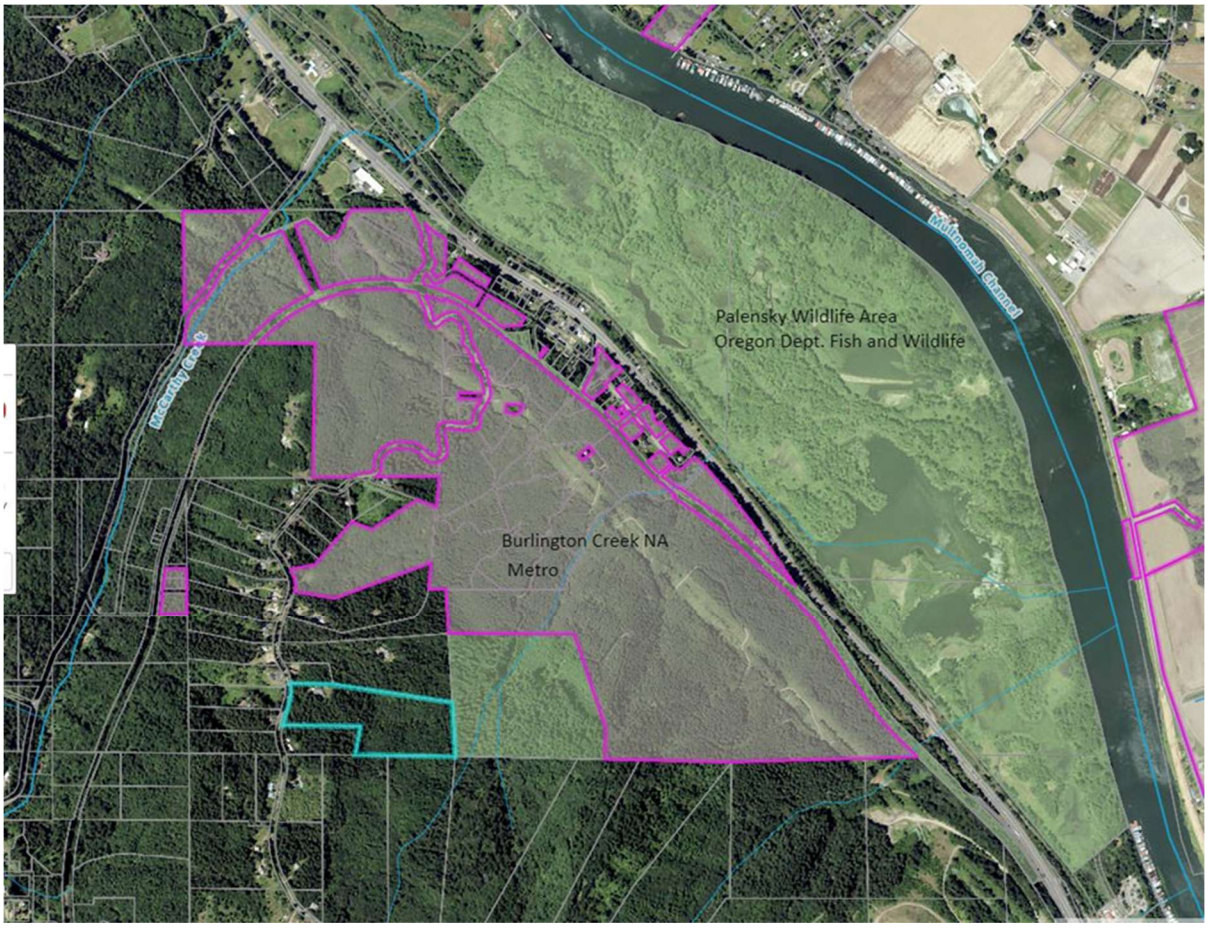
The Washington Department of Fish and Wildlife report that:

> "This species can persist in areas of low-density development and landscapes managed for timber. Transformed northern red-legged frogs are the most terrestrial of our native True Frogs. It is not unusual to find them in moist forested habitats far from water bodies. However, most individuals are found in the vicinity of standing or flowing water, even during the non-breeding terrestrial phase of the seasonal life cycle." (https://wdfw.wa.gov/species-habitats/species/rana-aurora#desc-range).

Although they may travel significant distances, RLFs do not require large habitat patches.

RLF population status at Burlington Creek Forest:

RLFs at Burlington Creek Forest almost certainly come from ponds at the Palensky Wildlife Area (PWA, also commonly known as Burlington Bottoms), northeast of BCF and managed by the ODFW (*see* map below). RLFs and other pond breeding amphibians move to BCF in late winter-spring, spend the "dry season" in the forest, and return to the ponds in the late fall or early winter when rains create favorable conditions. To reach BCF and to return to PWA, the frogs cross Hwy. 30, local roads, railroad tracks, and in some cases navigate residential lots. To be clear, this is not the area in which the Harborton frog shuttle volunteers move animals across the road by hand. That area is at the southeast corner of BCF, near the stream corridor.



ODFW has not made their data available to Metro, so the number of RLFs occupying BCF is not known. Nor is it known what percentage of those animals from Burlington Bottoms that move onto and through Metro property.

Monitoring Red-legged frogs:

Data on RLF population size is typically gathered from breeding ponds through egg-mass monitoring, rather than population surveys in uplands during the non-breeding season. Females normally lay a single egg-mass in open water, providing an efficient means to determine population size and over time, population trends in many cases. By contrast, surveys in the uplands are difficult, expensive, and create significant habitat disturbance.

In the case of BCF, as noted above, the breeding ponds are not on BCF, but instead in Burlington Bottoms managed by ODFW. Should a passage structure be successfully constructed under Hwy. 30, it would provide an opportunity to efficiently measure the size of the population moving between sites at that location twice a year. Until that time, sampling is not practicable, being extremely cost prohibitive, inefficient, and ineffective.

Managing Red-legged frogs at Burlington Creek Forest Natural Area:

Metro's management goal:

At BCF, Metro's goal is to support a healthy population of Red-legged frogs that breed at Burlington Bottoms by minimizing the mortality of frogs through actions under our control. Our model assumes that RLFs can access any portion of the BCF site but are most likely to be concentrated close to creeks or drainage bottoms. This is consistent with both Oregon and Washington Conservation Strategies.

To further RLF management goals, the proposed project ensures that all trails are located far from Burlington Creek, with no new creek crossing. Where trails cross upland drainages, small bridges are proposed to ensure no impact on the riparian habit. Along those drainages, Metro is improving habitat by planting and downing wood. In short, our management and trail project goals are compatible and consistent. Our current forest management approach is fully aligned with ODFW RLF recommendations. Our actions and proposed plan are supporting RLFs, not adversely affecting them.

We will continue to track the literature and adjust our management accordingly.

Frog mortality from trail users is highly unlikely. While we are confident that our trail system and management is sensitive to RLFs, there is always the potential for direct mortality wherever humans and frogs interact. As a result, we will monitor for trail impacts, and make management adjustments if needs dictate, thereby ensuring no adverse impact. For example, if unacceptable levels of direct mortality are detected,

Metro has tools at our disposal, including closing trails seasonally or permanently, or limiting specific trail user groups.

Metro's specific management goal related to the eventual trail system is to minimize frog deaths due to trails, with an initial goal of having fewer than five RLFs killed per year due to trails.

Please understand, that RLF's move above and beyond Metro's BCF, across McNamee Road, and throughout the upland forest. The success or positive impact of Metro's management is greatly influenced by factors including climate change, development, residential and other uses beyond Metro's property.

Metro's monitoring goal:

Our monitoring goal is to determine if trails under our management are leading to mortality of frogs due to direct trampling. The objective is to:

a. Determine with high certainty the number of frogs being killed per year on trails, if any, and identify any potential problem areas; and
b. To have high certainty in our results.

Our proposed approach is to:

1. Initially, walk trails three times per week during migration season, on various days per week, various times of day, and during dry and wet conditions. Walk trails once per week alternating first light and last light during other times RLFs are present onsite and monthly when animals are presumably at PWA;
2. If dead animals are found on the trail, try and determine if animals were killed by human feet, bicycle tires, or another cause;
3. Refine sampling approach over time depending on detecting mortality more or less frequently under different conditions and locations; and
4. Most importantly, if warranted, to adapt management and use of the trail system to reduce any impacts.

ROOSEVELT ELK conservation status and threats, biology and life cycle:

Roosevelt elk are a game species in Oregon, with an estimated population of 59,000. Hunting is regulated by the Oregon Department of Fish and Wildlife. The Roosevelt elk in the North Tualatin Mountains ("NTM elk") are recognized as a distinct sub-population of the Willamette Unit by ODFW. ODFW considers the NTM elk population to be a de-emphasis population. This means that more tags are awarded for hunting, and that conservation, research, and monitoring of the population are de-emphasized. This population spends much of their life cycle in areas with significant human influence (roads, homes, pets, agriculture), and as a result they are less sensitive to human disturbance than populations in more remote areas.

Elk occupy areas that provide adequate food and cover. From late spring to early fall, Roosevelt elk feed on herbaceous plants, such as grasses and sedges. During winter months, they utilize woody plants and newly planted seedlings. Roosevelt elk are also known to eat blueberries, mushrooms, lichens, and salmonberries. Historically, it is likely that elk favored patchy habitats with significant open ground over large areas of dense forest. Conversion of much of the historic savanna and open woodland has pushed elk towards a more forest-dependent life cycle. Predicted use by elk closely tracks increasing levels of dietary digestible energy (DDE, food), especially requirements for lactating females. The regional model that best predicts habitat use revealed that elk prefer habitats that are relatively high in food, far from roads open to motorized use, close to cover-forage edges, and on gentle slopes. As a result, forest management as practiced by Metro, that favors complex forests with a lush understory, is preferable for elk compared to management as a tree plantation with sparse under-growth.

Cows (females), calves, and yearlings live in loose herds or groups. Bulls (males) live in bachelor groups or alone. Elk breed in the fall. Calves are born in the spring and hide for the first few weeks. The fall breeding and spring calving period are likely the most sensitive in terms of human disturbance and dietary needs.

Elk may move 50 miles or more within a range. The NTM elk are part of a wide-ranging herd that moves in various groups between Forest Park and the Coast Range, utilizing public and private lands. Elk use of the North Tualatin Mountains has changed dramatically during the last two decades as widespread, but patchy clear-cuts, which favor elk, have grown back into dense forest and large-scale development for housing has occurred. Those changes will continue as the landscape continues to change over time. What Metro does or does not do on our properties is not the only and, most likely, not the principal determinant of how elk fare in this area. New home construction, timber harvests, clearing, changes in farm or forestry practices by private landowners, and even fencing all influence elk behavior.

Elk populations at BCF:

Based on years of observations by Metro staff and contracted field reconnaissance by consultants, elk use of the subject Burlington Creek Forest is limited, especially in the area proposed for trail development. Turnstone Environmental Consultants, Inc. (Turnstone), conducted a desktop review and field reconnaissance for an initial assessment of use by Roosevelt elk in two of Metro's natural areas in the North Tualatin Mountains area: Burlington Creek Forest and McCarthy Creek Forest. Turnstone biologists recorded significant elk usage of McCarthy Creek and light usage of Burlington Creek. A copy of the report is attached.

At Burlington Creek, in the area proposed for access, there is no evidence of regular or intensive use by elk. There are few tracks and other signs of use. Expanses of western red cedar, a highly preferred food plant for elk, appear un-browsed. This can be compared to a fair amount of black-tailed deer tracks and scat observed throughout the study area.

Managing and monitoring elk in the NTMs:

Elk are not a specific conservation target for Metro at the North Tualatin Mountains sites. The properties are managed for healthy upland forest, riparian forest, and stream health. Although we do not have specific management targets or population goals for elk, the animals are valued and encouraged on our properties through management strategies. We recognize their beauty, importance to the community, and their value as a symbol of the coexistence of people and wildlife. Management actions we have completed and will continue that support elk include a prohibition on hunting, forest thinning, invasive species treatment, and planting native grasses and shrubs to improve habitat conditions. Additionally, our structure removal and road retirement efforts create larger habitat cores, especially in areas of known heavy elk use, and especially for breeding and calving.

Management Goal:

At the four North Tualatin Mountains sites, Metro's general goal is to support the North Tualatin Mountains population of elk by providing healthy forest habitat and maintaining microhabitats favorable to elk as recommended by the literature and the Oregon Department of Fish and Wildlife. Ennis Creek, McCarthy Creek, and North Abbey Creek are focal areas for elk habitat protection and dominated with core habitat with few or no trails. Burlington Creek Forest is divided between core habitat areas and a zone with multi-use trails.

Our current forest habitat management approach is aligned with ODFW recommendations for elk management. Through forest-health based thinning and planting, we are managing for diverse native vegetation in the understory that includes shrubs and grasses, primary food sources for elk. Protecting approximately 75% of the North Tualatin Mountains natural areas as core habitat ensures areas with minimal human disturbance and avoids areas heavily used by elk. Metro's management is favorable to elk.

Monitoring goal:

Metro's goal is to maintain an understanding of elk use patterns of the NTM properties. We do this by understanding general use patterns and identifying microhabitats of high value.

Because of the high likelihood that changes outside the natural areas will impact elk more than activities within the NTM natural areas, and the alignment of our landscape and forest management strategies with elk life needs, it is unlikely that comprehensive population monitoring on Metro property will lead to meaningful changes in management strategy. As a result, Metro will work with ODFW and other partners to develop a more comprehensive landscape assessment and monitoring approach that places the value of the Metro sites in the appropriate landscape context. In the meantime, Metro will use periodic walking surveys to map the distribution and

use patterns of elk, potentially supplemented by "camera trap" studies approximately every 10-20 years.

In conclusion, Metro and its team of scientists, planners, managers, and consultants are confident that they have presented a balanced approach to managing habitat and landscape needs, while providing recreational opportunities in a way that will not adversely affect natural resources.

Sincerely,

Gary Shepherd
Senior Attorney
Office of Metro Attorney

Burlington and McCarthy Creek Preliminary Elk Use Assessment

PREPARED FOR: Portland Metro

PREPARED BY: Turnstone Environmental Consultants, Inc.

DATE: March 31, 2016

Introduction

Turnstone Environmental Consultants, Inc. (Turnstone) conducted desktop review and field reconnaissance for an initial assessment of use by Roosevelt elk (*Cervus canadensis roosevelti,* "elk") in two of Portland Metro's properties in the Tualatin Mountains area: Burlington Creek and McCarthy Creek. This technical memo outlines methodology, results, and recommendations.

Methodology

Under the guidance of Tom Williamson, Project Manager, desktop and field work was conducted by Turnstone wildlife biologists Daphne Swope, Devin Sahl, and Joe Bettis. Field work was conducted on March 24 and 25, 2016.

Desktop Review

A target search area for the field reconnaissance was delineated based on preferred habitat features for the species, including distance to major roads, percent slope, and slope aspect. All known and encountered waterways and roads within the property boundaries, including decommissioned and driveable roads and any foot trails, were also included in the target search area. The target search areas were approximately 120 acres and 250 acres for Burlington Creek and McCarthy Creek, respectively.

Field Reconnaissance

The field reconnaissance included two components: early morning searches in safely-accessible areas for foraging elk, and daytime sign surveys throughout the target search area while any elk present would be resting and ruminating.

At Burlington Creek, biologists conducted road-based spotlight surveys following the main access road that runs through the majority of the property. Vehicle headlights, along with bright headlamps, were used to search for eye shine, and if detected, would be examined with binoculars for identification. During this time potential game trails were marked for later daylight search. At McCarthy Creek, one biologist surveyed the meadow and adjacent areas for a little over two hours around dawn in order to document any individuals present.

In both study areas, biologists began daytime sign surveys from accessible roads, walking slowly to take note of any potential sign, including well-worn trails and crisscrossing elk tracks, elk "rubs" and gnawed deciduous tree trunks and downed woody debris, and scat (pellets). Plants browsed by Cervidae species have a characteristic appearance, when vegetation is grasped between the lower incisors and the upper palate and ripped or torn, resulting in splintered and fragmented plant parts. Special attention was given

to known preferred food plants for elk. Biologists also searched for elk birth beds and wallow sites, which are mud wallows scented with urine, usually located near water and always secluded. Trails were followed until they became considerably less distinct or until they were no longer safely accessible. Elk browse observed along well-worn trail routes was not mapped.

Data collected included area searched (polygons), well-worn elk trails (linear feature), elk trail crossings of foot trails (points), elk browse (points), and any calving areas or wallows (points).

Results

Burlington Creek

Vegetation within Burlington Creek is varied; much of the northern area features second-growth forest of Douglas-fir. Tall, woody plants are managed in the BPA right of way where Himalayan blackberry, Scouler's willow, and vine maple grow above a weedy herbaceous layer dominated by non-native grasses and herbs. Big-leaf maple and red alder are also present. Mature coniferous forests are present on the southern edge of the study area where Douglas-fir is dominant with moderate numbers of western hemlock. Riparian areas in the mature forest feature salmonberry, stink currant and western wahoo. Himalayan blackberry is common in the second-growth portions of Burlington Creek Canyon.

Limited evidence of elk use was observed within Burlington Creek (Figure 6). No trails were identified that would indicate regular use by elk. Sign observed included a few tracks in the SE portion of the study area as well as in the roadbed on spurs just south of the Metro gate, and one rub that was in excess of 6' up tree bole in a clearing area adjacent to McNamee Rd. Several other rubs were present on alders along the roadside but they could not be positively definitely identified as elk or deer. Browse of planted native shrubs and trees was also apparent in this area, and probable elk browse was observed on western wahoo shrub in the Burlington Creek canyon. Expanses of western red cedar, a highly preferred food plant for elk, appeared un-browsed. A fair amount of black-tailed deer tracks and scat was observed throughout the study area.

The upper half of an elk skull was found within the study area approximately 20 yards from McNamee Rd (Figure 1). The antlers had been removed with a saw and it appeared to be a few seasons old. A limited effort was spent to search for the remainder of the skeleton with no success. It is possible that the elk may have been road kill, legally or illegally killed within the area or dragged there by a coyote.

McCarthy Creek

Vegetation within McCarthy Creek is varied; much of the study area is second growth Douglas-fir. Understory of the second growth vegetation is often sparse, with patchy coverage of sword fern, red huckleberry and dull Oregon-grape. Large swaths of dead Himalayan blackberry are present here; evidently treated with herbicide or killed by the closing canopy of the developing second-growth. Some remnant Douglas-fir and western hemlock are present; some in canyons while others were apparently left due to damage that would make them unsuitable saw logs. Big-leaf maple, red alder and black cottonwood are present in riparian areas, above salmonberry, water parsley, and coastal hedge nettle. Moist areas (slope wetlands) poorly suited to Douglas-fir feature soft rush, tarweed, grasses, willows and black cottonwood. Rocky south facing slopes are present; oceanspray, poison-oak, creeping snowberry and occasional snowbrush are found here. The meadow within the study area is dominated by Eurasian pasture grasses and has recently been planted in a grid with native trees and shrubs. Several conifers are present here exhibiting an "open-grown" form indicating that the site has been largely treeless for a significant period of time.

Regular use of the area by elk are indicated by the presence of major trail networks, tree rubs, browse of shrubs, scat, hair and bedding areas (Figures 2-5). Significant browse and some rub damage was observed on the restoration meadow plantings. Elk trails become difficult to identify and follow in the areas where thinning treatments have recently occurred; it is unclear whether elk are not heavily utilizing these areas or whether trails are simply obscured by the downed vegetation. This was especially true of the area just north of the main-stem of the creek and south of the drivable road (after the creek crossing). This area has had a recent conifer release cut and the ground is littered with fallen trees and debris. Foot travel in the area was difficult. It appears the habitat would have resembled the area north of the road prior to the release cut. The area north of the road was littered with active elk trails and sign. Biologists did not observe elk individuals in McCarthy Creek, but heard probable elk groups moving through woods each field day and observed fresh scat and tracks that were made the same day.

Biologists mapped five major trails and several additional short trails (Figure 7). Major trails generally led to meadow areas including both the larger Metro-owned meadow and the western meadow on private land. Several of the shorter trails led to private land (large open yard areas resembling small meadows) from an old road bed on the eastern edge of the study area.

Conclusions & Recommendations

Turnstone biologists recorded significant usage of McCarthy Creek and light usage of Burlington Creek by Roosevelt elk. As a limited field effort was proposed for this initial assessment, additional studies, such as a telemetry study, would be highly beneficial to further understand elk usage of the properties. This would be especially helpful in an attempt to determine calving areas, which may be largely inaccessible to on-the-ground surveyors due to their propensity to occur in areas of dense understory.

Appendix A: General Site Characterization Plant List

Common name	Scientific name	Common name	Scientific name
Himalayan blackberry	*Rubus armeniacus*	Tarweed spp.	*Madia* spp.
Scouler's willow	*Salix scouleriana*	Willow spp.	*Salix* spp.
Vine maple	*Acer circinatum*	Oceanspray	*Holodiscus discolor*
Douglas-fir	*Pseudotsuga menziesii*	Poison-oak	*Toxicodendron diversiloba*
Big-leaf maple	*Acer macrophyllum*	Creeping snowberry	*Symphoricarpos mollis*
Red alder	*Alnus rubra*	Snowbrush	*Ceanothus velutinus*
Western hemlock	*Tsuga heterophylla*		
Salmonberry	*Rubus spectabilis*		
Stink currant	*Ribes bracteosum*		
Western wahoo	*Euonymus occidentalis*		
Sword fern	*Polystichum munitum*		
Red huckleberry	*Vaccinium parvifolium*		
Dull Oregon-grape	*Mahonia nervosa*		
Black cottonwood	*Populus balsamifera*		
Water parsley	*Oenanthe sarmentosa*		
Coastal hedge nettle	*Stachys chamissonis*		
Soft rush	*Juncus effusus*		

Appendix B: Figures

Figure 1. Elk Skull found in Burlington Creek

Figure 2. Fresh, high density tracks near McCarthy meadow.

Figure 3. Elk scat adjacent to meadow in McCarthy Creek.

Figure 4. Bedding area with hair adjacent to McCarthy meadow.

Figure 5. Recent rub in McCarthy Creek.

Figure 6. Burlington Creek

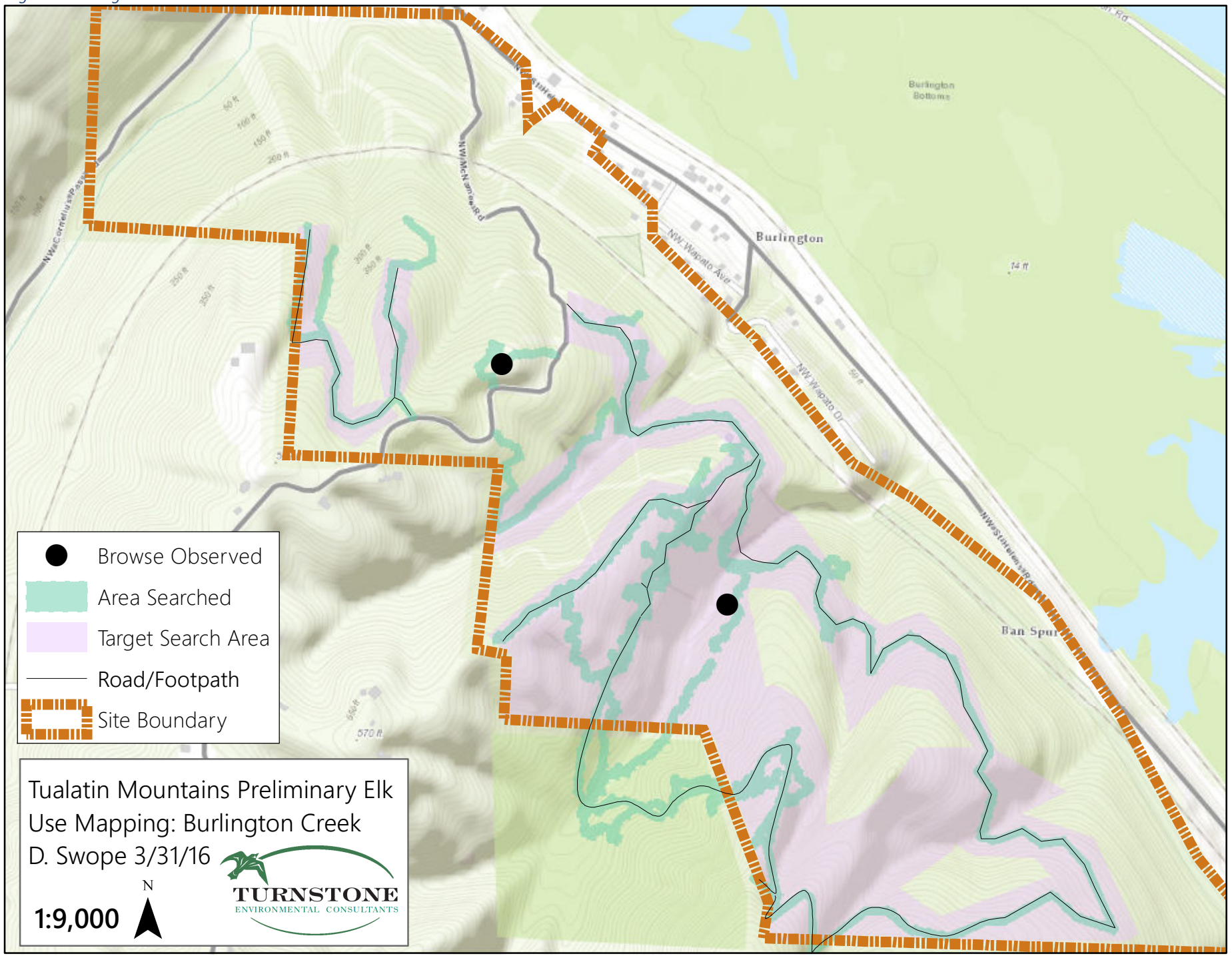
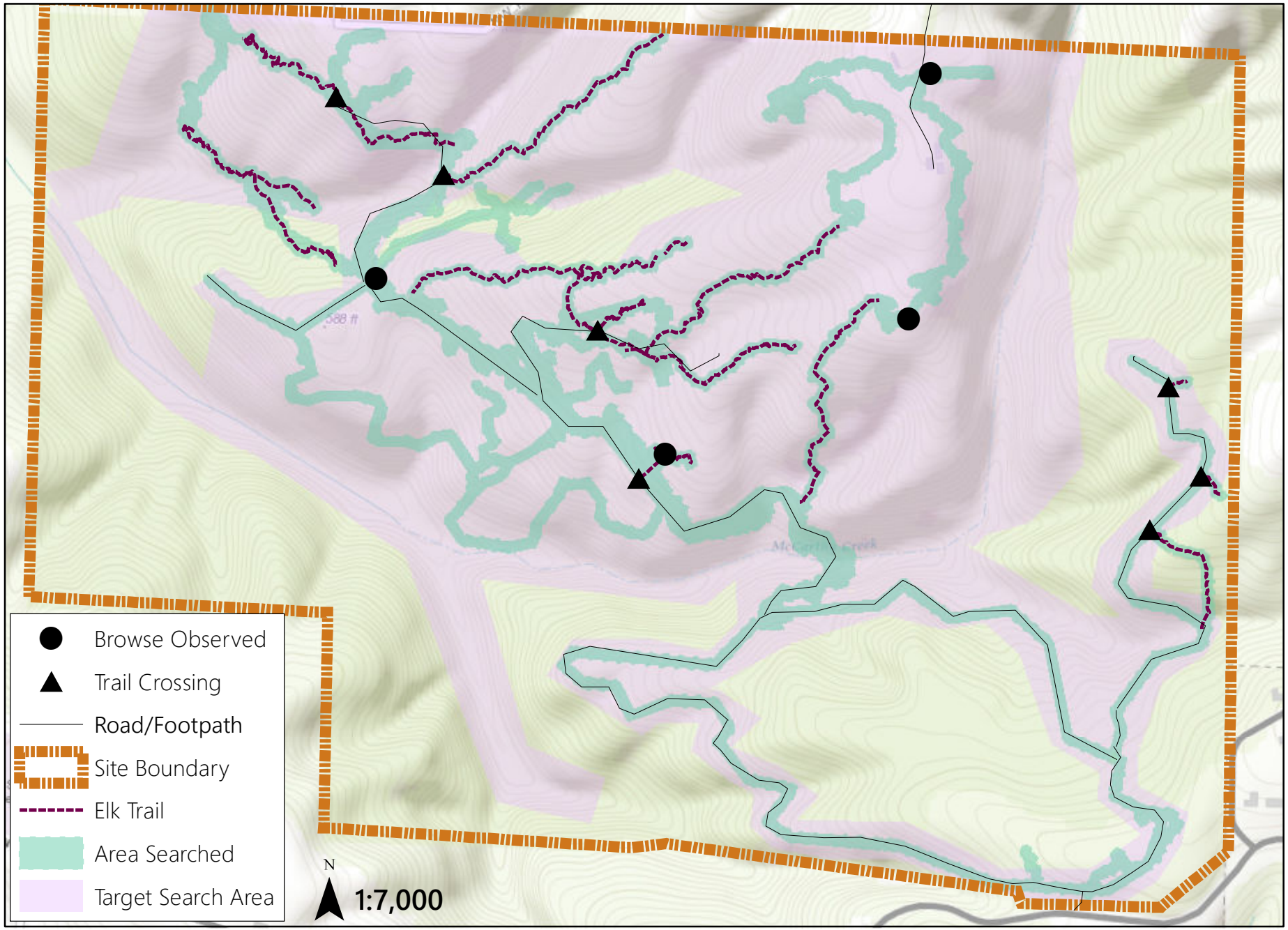


Figure 7. McCarthy Creek



Tualatin Mountains Preliminary Elk Use Mapping: McCarthy Creek

D. Swope 3/31/16

TURNSTONE
ENVIRONMENTAL CONSULTANTS