Linfield College

Barber Property Inventory and Assessment

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ENVS 470 Environmental Project

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INTRODUCTION

The Barber Property

In 1979, Paul A. Barber donated a 4.6 acre parcel and in 1993 an adjacent 7 acre area of land to the City of McMinnville, Oregon. This 11.6 acre plot of land located in McMinnville, Oregon is now known as the Barber Property. McMinnville is nestled on the west side of the Willamette Valley and on the eastern edge of the Oregon Coast Range. The Barber Property is located in the southwest corner of the city, and access to the property is easiest along Old Sheridan Road or from the housing development on Ash Creek Lane. This report provides a comprehensive inventory and assessment of the natural resources found on the property and considers the land use history, current management as well as stakeholder concerns and preferences The purpose of this document is to provide the City of McMinnville with a greater understanding of the location and condition of the various natural resources as well as the relationships to the surrounding properties and stakeholders. It is our hope that the City will use this information to conduct restoration and stewardship actions that will maintain and enhance the ecological values and social uses of this unique forested property bridging the urban area of the city with the surrounding agricultural land.

Cozine Creek

Cozine Creek, a tributary to the South Yamhill River, runs through the property and functions as a 'green corridor' for wildlife. Cozine Creek's headwaters originate approximately five miles west of McMinnville, OR in the hills along S.W. Peavine Road. The creek winds seven miles through a variety of land uses including forests, agricultural land, and urban development before flowing into the South Yamhill River at the eastern edge of the city limits. Since 2011, Environmental Studies Senior Capstone classes have measured the water quality variables of Cozine Creek on Linfield College's campus as well as other areas around the city. Historically, Cozine Creek has been designated as being water quality impaired due to issues relating to pollutants, warm stream temperatures, low dissolved oxygen levels, and *Escherichia coli* levels that exceed the allowed limits for human recreational purposes (GYWC, 2019). As of fall 2019, the Environmental Studies Senior Capstone class has found that *E. coli* levels in Cozine Creek have fallen to within permissible levels for human recreational activity (Allen et

al., 2019). For the purpose of this inventory and assessment, we measured water quality variables in Cozine Creek as it flows through the Barber Property to assess the health of the creek in this location.

Climate

The Willamette Valley has a mild Mediterranean-type climate that consists of wet, cool winters and dry, warm summers. Approximately 50 percent of the annual rainfall in the Willamette Valley occurs between the months of December and February, with lesser amounts occurring in the fall. Levels of rainfall vary, with the foothills of the Coast and Cascade Ranges accruing double the rainfall found in the Portland metropolitan area. Snowfall is common each year, although the amount of snowfall is typically low, with most locations throughout the valley only receiving 12-25 cm (5-10 inches) per year. Severe storms also are rare in the Willamette Valley, although there are occasional ice storms that occur throughout northern sections of the valley as a result of westward cold winds coming from the Columbia Gorge. (Taylor, 2010). Annual precipitation in McMinnville is 114.0 cm (44.9 inches) per year; the average high temperature is 18.6°C (65.5°F) occurs in August and the average low temperature of 4.0°C (39.2°F) occurs in January (Climate-data.org, 2020).

Vegetation, Wildlife and Water Quality

Since European settlement, the areas around Cozine Creek in the McMinnville area have changed drastically. The areas surrounding Cozine Creek historically were dominated by prairies and oak savanna and were managed by burning carried out by the Yamel tribe, which was a subset of the Kalapuya peoples of the lower Columbia (Redish, 2015). During this pre-European time period, riparian habitat surrounding Cozine Creek consisted primarily of deciduous trees including Oregon ash (*Fraxinus latifolia*) and black cottonwood (*Populus trichocarpa*) (GYWC, 2019). Some native vegetation we found remaining on the property include Indian plum (*Oemleria cerasiformis*), Pacific ninebark (*Physocarpus capitatus*), and Oregon ash, but there is now a greater prevalence of invasive species.

Within the Barber Property, there are two distinct habitat types consisting of an upland Douglas-fir (*Pseudotsuga menziesii*) stand and a riparian habitat. The two habitat types, along with the Barber Property's proximity alongside Cozine Creek, which serves as a wildlife

corridor, result in it having the potential to provide habitat for a variety of wildlife. A wildlife corridor is an area that serves as a connection between habitat patches that were previously connected (Evans, 2007). We documented use of the property by several species of mammals that are typically found at the interface of urban and rural environments. We also recorded the presence of 37 species of birds.

Cozine Creek as a whole acts as a link between the more rural agricultural lands surrounding McMinnville and the more urbanized city center. We took water samples on the Barber property and found that water quality was good by both biotic and abiotic metrics. It should be noted that we took these measurements in the winter, so water quality variables such as temperature and dissolved oxygen may have been quite different than they would be in the summer. Overall, compared to other sites along Cozine Creek that have been sampled in the fall, water quality at the sites within the Barber Property was better (Allen et al., 2019).

The Social Context

Paul Barber (1924-2007) was an active member of the community and donated other pieces of land that have since become well-known McMinnville locations. A retired U.S. Army Veteran (1943-1946), Barber grew up in Tacoma, Washington and graduated from the University of Washington with a forestry degree that he applied during his ownership of CGC Tree Farm Ltd. beginning in 1986. From 1969-1979, Barber was appointed by the Mayor of McMinnville to be on the McMinnville Water and Light Commission, and during the 1980s, Barber served on the Mayor's Blue-Ribbon Commission to evaluate long term management of the City's watershed. The remainder of Barber's achievements include being director and President of the McMinnville Elks Club, charter member of the Western Hardwood Association and the Oregon Community Association. He was also President of the Mid-Valley charitable fund and named an honorary director in 1995 of the Mid-Valley workshop Board of Directors. Barber donated a total of four plots of land to the City of McMinnville, the two Barber Property parcels, as well as a 6-acre parcel of land up Baker Creek that included remnants of McMinnville's first electric generating plant from a dam on the property. Barber is also the founder of Juliette's House, a 5,000 square foot building that is an assessment center and safehouse for victims of childhood abuse. Additionally, Mr. Barber was a member of the Oregon Small Woodlands Association and following his passing, the former parks and recreation director, Jay Pearson, met with friends of

Barber who had served alongside him on the association's board. From that meeting, Pearson noted that these colleagues wanted the site to become an interpretive park that highlighted forestry practices, as well as societal contributions of logging in the region (Fliszar, L., personal communication, 11 February, 2020).

Land Use History, Current Management and Stakeholders

Although little is known about the use of the land prior to its donation, based upon the 1992 timber cruise, the property has been forested since the mid-to-late 1800s and most likely never cultivated for agriculture (Cronk & Holmes, 1992). The surrounding properties began to be developed beginning in the 1950s with the McMinnville Grange. The residential subdivision and apartment complex abutting the southern boundary of the property were built just after the turn of the century.

Today the land is managed by the City of McMinnville's Public Works,Parks Maintenance Division. Due to funding and staffing constraints, the park is minimally managed mostly to address hazard tree removal, and illegal camping and the accumulation of trash. In the last two years the city has begun to address the issue of invasive species on the property in partnership with the Greater Yamhill Watershed Council (GYWC) and the Yamhill Soil and Water Conservation District (YSWCD) (Fliszar, L., personal communication, 11 February, 2020). Neighbors adjacent to the Barber property have taken action to control invasive species on their own properties and are very supportive of the control work being performed by the city. The property has many potential uses and the neighboring church is interested in using the property for service learning and environmental education projects for children in their school. All stakeholders interviewed for this report are hopeful that the invasive species can be controlled and that access to the property can be improved.

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VEGETATION, WILDLIFE, AND AQUATICS ASSESSMENT

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Chapter Editor: William McCuen

INTRODUCTION

Understanding the condition of the Barber property requires that we first understand what natural resources are present on the property; this means we must examine the area's vegetation, wildlife, and water quality. The property is located on a section of the Cozine Creek green belt corridor, which provides contiguous habitat along Cozine Creek throughout otherwise segmented habitats in McMinnville. This property contains a wide range of terrestrial and aquatic resources in two major habitat types – upland forest and riparian. The purpose of this study was to inventory the vegetation, wildlife, and aquatic characteristics of the Barber property. This inventory and assessment of the Barber property's natural resources will highlight current available resources, the species of plants and animal present, as well as the presence of various anthropogenic and natural threats to the property and to Cozine Creek. We also provide recommendations to guide restoration and management of the property.

METHODS

- Randomly located quadrats in both the upland Douglas-fir habitat and riparian habitat. Measured and recorded characteristics of tree, shrub, and herbaceous species in each quadrat.
- We also perused the site on a broader scale to get as complete a plant species list as possible.
- Birds in both upland forest and riparian were observed throughout the semester by Linfield students, faculty, and Harry Fuller, a local bird expert
- Wildlife cameras were placed in various locations to capture images of mammals using the property
- Located three sites to test for water quality in Cozine Creek and one at a side stream based on accessibility.

- DO, pH, water temperature, flow, and turbidity were all tested for on-site; BOD (biochemical oxygen demand) and nutrient and coliform bacterial levels were determined in the lab. Methods used are descriptive in the ENVS 460 Research Methods water quality report from 2019 (Allen et al., 2019)

SECTION 1: VEGETATION

INVENTORY AND ASSESSMENT

Trees, Shrubs, and Herbaceous Cover:

The Barber property has two habitats: an upland Douglas-fir (*Pseudotsuga menziesii*) stand and a riparian area bordering Cozine Creek. The upland Douglas-fir stand is located on the uphill portion of the property above the floodplain and is characterized by large Douglas-fir trees with a diverse understory of small grand fir (*Abies grandis*), filbert (*Corylus sp.*), red elderberry (*Sambucus racemosa)*, and snowberry (*Symphoricarpos albus*), all of which are capable of living under the shade of Douglas-fir (Breen, 2018; Chappell et al., 2001).

In the floodplain next to the creek, Douglas-fir is replaced by Oregon ash (*Fraxinus latifolia*). Healthy riparian habitat should be characterized by dense shrubs, vines, and grasses. The riparian zone acts as flood storage and helps improve water quality through the reduction of sediments and nutrients from runoff from upland areas. As a result, only flood-resistant species are able to survive in this habitat (Yamhill Basin Council 2001). Riparian habitat usually contains woody debris and dense vegetation that will accumulate along the creek bed or extend roots in the water, decreasing water flow, which allows sediment and gravel to accumulate and produce habitat for a range of aquatic organisms. Coverage provided by Oregon ash, filbert, Indian plum, and Pacific ninebark cools the water regulating temperature for aquatic species (Yamhill Basin Council 2001; ODEQ, 2009; Fischer and Martin, 1999). The upland Douglas-fir and riparian habitats serve as important habitat for many species of birds and mammals (Tinker, 2015). We observed a variety of both native and invasive vegetation inside and outside of our measuring quadrats to have a complete plant list for the property. We noted twelve species of trees (Table 1.1), twelve species of shrubs (Table 1.2), and 37 species of herbaceous cover (Table 1.3). Scientific and common plant names were from the Oregon Flora Project pages (OFP, 2017).

Table 1.1. Tree species observed on the Barber property (both in and out of quadrats) as well as the habitat where each was found. † The *Corylus* could not be identified to species; it is suspected to be a hybrid between the native *C. cornuta* var. *californica* and cultivated species *C. avellana*.

Scientific Name	Common Name	Found in Upland	Found in Riparian
Acer macrophyllum	Big leaf maple	x	
Abies grandis	Grand fir	x	
Alnus rubra	Red alder		x
Amelanchier alnifolia	Serviceberry	x	x
Cornus nuttallii	Pacific dogwood	x	
Corylus sp.†	Filbert†	x	x
Fraxinus latifolia	Oregon ash		x
Prunus virginiana	Cherry	x	x
Pseudotsuga menziesii	Douglas-fir	x	x
Quercus garryana	Oregon white oak		x
Rhamnus purshiana	Cascara	x	
Taxus brevifolia	Pacific yew	x	

Table 1.2. Shrub species observed on the Barber property (both in and out of quadrats) as well as the habitat where each was found. Non-native species are denoted with "+" and invasive species are denoted with "*".

Scientific Name	Common Name	Found in Upland	Found in Riparian
Acer circinatum	Vine maple	x	
*Ilex aquifolium**+	English holly*+	x	x
Mahonia nervosa	Oregon grape	x	
Oemleria cerasiformis	Indian plum	x	x
Physocarpus capitatus	Pacific ninebark		x
*Prunus laurocerasus**+	English laurel*+	x	
Ribes divaricatum	Straggly gooseberry	x	x
Rosa gymnocarpa	Wild rose	x	
*Rubus discolor**+	Himalayan blackberry*+		x
Sambucus racemosa	Red elderberry	x	x
Symphoricarpos albus	Snowberry	x	x
Toxicodendron diversilobum	Poison oak	x	

Table 1.3. Herbaceous species observed on the Barber property (both in and out of quadrats) as well as the habitat where each was found. Non-native species are denoted with "+" and invasive species are denoted with "*".

Scientific Name	**Common Name**	**Found in Upland**	**Found in Riparian**
Actaea rubra	Western baneberry	x	
Adenocaulon bicolor	Pathfinder	x	
*Arum italicum**+*	Italian arum*+		x
Athyrium filix-femina	Lady fern	x	x
Carex obnupta	Slough sedge+		x
Circaea alpine	Enchanter's nightshade	x	
Cirsium vulgare+	Bull thistle+		x
Claytonia sibirica	Candyflower	x	
Galium aparine+	Bedstraw or cleavers+		x
Gaultheria shallon	Salal	x	
*Geranium lucidum**+*	Shining geranium*+	x	
Geranium mole+	Dovefoot geranium+	x	
*Geranium robertianum**+*	Herb Robert*+	x	
*Hedera sp.**+*	English ivy*+	x	x
Heracleum lanatum	Cow parsnip		x
*Lapsana communis**+*	Nipplewort*+	x	
Luzula multiflora+	Common woodrush+	x	x
Maianthemum stellatum	Star flower Solomon's seal	x	
Melissa officinalis+	Lemon balm+	x	x
Nemophila parviflora	Small flowered nemophila	x	
Oenanthe sarmentosa	Water parsley		x
Osmorhiza occidentalis	Sweet cicely	x	
Polypodium glycyrrhiza	Licorice fern	x	
Polystichum munitum	Sword fern	x	x
Pteridium aquilinum	Bracken fern	x	
Prosartes hookeri	Hooker's fairybells	x	
Rubus ursinus	Trailing blackberry	x	x
Rumex obtusifolius+	Bitter dock+	x	x
Sanicula crassicaulus	Pacific snakeroot		x
Senecio sylvaticus+	Wood groundsel+	x	x
Tellima grandiflora	Fringe cup	x	x
Thalictrum polycarpum	Tall western meadowrue	x	
Trillium ovatum	Western trillium	x	x
Trillium albidum	Giant trillium	x	
Urtica dioica	Stinging nettle		x
Verbascum Thapsus+	Common mullein+		x
Viola glabella	Little yellow wood violet	x	

Vegetation measurements in our quadrats revealed the upland habitat was dominated by Douglas-fir, with 23 trees with a mean dbh of 67.8 cm (Table 1.4). Big leaf maple was the second most abundant tree with a mean dbh of 3.1 cm. However, all of the maple trees were small shoots that were sprouting from a single downed bigleaf maple trunk. In the understory we found seven filbert, three cherry, and three grand fir saplings with a mean dbh of 9.2 cm, 17.3

cm, and 10.0 cm respectively. The riparian habitat was dominated by ten Oregon ash trees with a mean dbh of 30.1 cm. Filbert also had ten individuals with an average basal area of 20.5 cm (basal areas were taken on trees too short to measure dbh). There was a single Oregon white oak growing at the boundary between the upland and riparian habitats. Serviceberry, filbert, cherry, and Douglas-fir were observed in both the upland habitat and the riparian habitat. The species of filbert is unknown. However we believe it is a hybrid between the native *Corylus cornuta* var. *californica* and the cultivated European *C. avellana* because the leaves had characteristics of both species. . In total, seven species of trees were measured in the upland habitat whereas six tree species were measured in the riparian habitat.

Table 1.4. Tree species abundance in quadrats and the mean dbh or basal area (standard deviation). Basal area of seedlings are noted with the letter "b".

Tree species	Total number of upland trees	Mean DBH in upland (cm)	Total number in Riparian	Mean DBH in riparian (cm)
Big leaf maple	14	3.1 (6.5)	0	-
Grand fir	3	10.0 (2.7)	0	-
Filbert	7	9.2 (12.0)	10	20.5b (27.4)
Oregon ash	0	-	10	30.1 (21.2)
Cherry	3	17.3 (2.6)	0	-
Douglas-fir	23	67.8 (31.4)	0	-
Oregon white oak	0	-	1	46.6 (-)
Cascara	2	1.6b (1.6)	0	-

The shrub with the greatest abundance in the upland Douglas-fir habitat was holly, an invasive species with 47 individuals and a mean basal area of 8.25mm (Table 1.5). Snowberry, a native species, was the second most abundant shrub with 30 individuals with a mean basal area of 4.10mm. There were 16 poison oak stems found in our quadrats, but we did not measure the diameter or height of the plants to ensure the safety of the students. In the riparian habitat, the most abundant shrub species measured was straggly gooseberry with 30 stalks and a mean basal area of 37.40mm. The second most abundant species was snowberry with 21 individuals with a mean basal area of 90.13mm. Nine species of shrubs were measured in the upland habitat, with vine maple, Oregon grape, wild rose, and poison oak being present only in the upland habitat. Seven species of shrubs were measured in the riparian habitat, with Pacific ninebark and Himalayan blackberry being found only in the riparian habitat.

Table 1.5. Shrub species abundance based on number of stems in quadrats and mean basal diameter (standard deviation). Non-native species are denoted with "+" and invasive species are denoted with "*"

Shrub species	Total Number Stems Upland	Mean Basal Upland (mm)	Total Number Stems Riparian	Mean Basal Area Riparian (mm)
Vine maple	4	11.93 (4.21)	0	-
English holly*+	47	8.25 (11.38)	13	100.81 (90.82)
Oregon grape	5	5.10 (0.97)	0	-
Indian plum	10	9.60 (14.00)	5	152.67 (142.28)
Pacific ninebark	0	-	8	19.19 (38.12)
Straggly gooseberry	3	2.93 (1.20)	30	37.40 (46.70)
Wild rose	4	3.25 (1.49)	0	-
Himalayan blackberry*+	0	-	1	68 (-)
Red elderberry	6	8.15 (6.25)	1	8 (-)
Snowberry	30	4.10 (1.67)	21	90.13 (116.68)
Poison oak	16	-	0	-

Many shrubs in the riparian habitat were measured in one large clump of the same species using a dbh tape. This was done to ensure we could finish our vegetation measurements before the COVID-19 shutdown but it resulted in large basal areas with large standard deviations. The number of stems in these clusters were not always precisely recorded. These factors decreased the accuracy of dominance and abundance data, but it still provided a fair idea of the species present and the relative frequency of each on the Barber property.

Herbaceous cover in both habitats was dominated by English ivy with 73% ivy cover in the upland Douglas-fir habitat and 63% ivy cover in the riparian habitat (Table 1.6). Nine species of herbaceous species were measured on our transects in the upland habitat. Herb Robert, star flower Soloman's seal, sweet cicely, sword fern, piggyback plant, trillium, and grass were recorded exclusively in the upland habitat. Many of these are desirable native wildflower species. Native trailing blackberry comprised 7.22% of the upland ground cover whereas non-native holly branches comprised 2.83% of the upland ground cover. Italian arum and stinging nettle coverage were exclusive to the riparian habitat with 0.16% and 1.43% cover respectively. Trailing blackberry was 5.60% of ground cover in the riparian habitat. Aside from ivy, trailing blackberry was the only herbaceous species found in both habitats.

Table 1.6. Mean percent cover (standard deviation) of herbaceous species in each habitat. Trees are denoted with a superscript "^" and shrubs are denoted with a superscript "+"; these were present as branches on the ground. Invasive species are marked with "*".

Herb species list	Percent cover Upland (%)	Percent Cover Riparian (%)
Italian arum*	0 (-)	0.16 (0.27)
Herb Robert*	0.06 (0.10)	0 (-)
English ivy*	73.00 (6.94)	63.96 (5.10)
Star flower Solomon's seal	0.61 (1.06)	0 (-)
Sweet cicely	0.17 (0.29)	0 (-)
Sword fern	0.17 (0.29)	0 (-)
Trailing blackberry	7.22 (3.47)	5.60 (2.27)
Piggyback plant	0.22 (0.19)	0 (-)
Trillium	0.11 (0.19)	0 (-)
Stinging nettle	0 (-)	1.43 (1.26)
Branch^{-}	1.00 (1.20)	5.44 (2.55)
Straggly gooseberry^{+}	0.11 (0.19)	1.94 (0.48)
Grass	0.22 (0.38)	0 (-)
Bare Ground	2.11 (2.83)	0.32 (0.55)
Himalayan blackberry^{+}*	0 (-)	6.70 (5.29)
Holly^{+}*	2.83 (1.88)	0.16 (0.27)
Indian plum^{+}	0.33 (0.58)	2.66 (4.20)
Log^{-}	1.00 (0.67)	0.79 (1.37)
Pacific ninebark^{+}	0 (-)	3.90 (2.31)
Oregon grape^{+}	0 (-)	2.46 (2.50)
Path^{-}	1.56 (1.35)	0.48 (0.82)
Snowberry^{+}	0.89 (1.02)	0.98 (1.00)

The abundance of English ivy is of particular concern as it diminishes nutrient availability, sunlight availability, and space for other herbaceous coverage and trees. It also increases the risk of breakage and tree fall in windstorms and can kill trees if the ivy covers the apical meristem. This reduces the diversity of forests and impedes growth (Dlugosch, 2005). In the upland habitat many informal foot paths criss-cross the area. These informal foot paths damage plants, compact the soil, cause fragmentation of habitats, and decrease plant regeneration. They also contribute to an increased presence of invasive species as many invasive species prefer disturbance and can easily grow along fragmented habitats (Godefriod and Koedam, 2004).

All trees (with the exception of filbert hybrids) measured in both the upland Douglas-fir and the riparian habitat were native. However, many species of shrubs and herbaceous vegetation, including holly, Himalayan blackberry, and English ivy were invasive species that

were dominant in both habitats on the Barber property. Himalayan blackberry was only measured in the riparian habitat but may have been present in areas of the upland forest where we did not have quadrats. Other invasive species found on the property included herb Robert (in the upland Douglas-fir area) and Italian arum (in the riparian habitat); both could be present in both habitats. Italian arum may become a major problem in both habitats because this plant is very difficult to control once it gains a foothold. Additionally, Italian arum is poisonous and can destroy sensitive habitats if left to invade (NWCB, 2013). Proper treatment of these invasive species would be a major step in restoration of the property to an ecologically healthy habitat. In addition, the creation of a set of walking trails throughout the property could help minimize off trail traffic, a move that could help reduce the spread of many invasive species (Hobbs and Huenneke, 1992; Jauni et al., 2014).

The invasive species on the Barber property are not limited to the Barber property, but could spread into neighboring properties and across McMinnville. Upon reaching maturity, English ivy will begin to produce berries that are consumed by birds; the seeds are then spread across wide areas through their excrement. Ivy may also spread as cuttings or root fragments when they come into contact with soil downstream and begin to regenerate (NWCB, 2004) By continually monitoring the presence and abundance of invasive species and controlling their populations on the Barber property, the likelihood of these invasive species spreading to local areas is decreased. Otherwise, invasive species will continue to spread and decrease the quality of habitat for native species (CIPC, 2012).

If invasive species are removed, we should see an increase in the number of native species as the competition for nutrients, space, and sunlight is removed. Invasive species removal will allow for regeneration of native species over a number of years given that invasive species removal is maintained. Continual removal of invasive species should be considered to ensure that invasive species do not return to the abundance in which they were found before their removal (Mulhollem, 2019).

A variety of native plant species are already present on the property. These include snowberry, western baneberry, Hooker's fairybells, western trillium, giant trillium, trailing blackberry, and star flower Solomon's seal. There also was a small Pacific yew, which indicates that the forest could develop into a more mature successional stage. In the riparian habitat, native trailing blackberry was found alongside native stinging nettle, western trillium, and fringe cup.

The presence of these native species provides hope that the Barber property can become rich in native plant life once invasive species have been controlled. If native species regenerate on their own or in areas with intense cover by invasives, native species planting should be considered to increase the density of native species in the ecosystem.

SECTION 2: WILDLIFE

INVENTORY AND ASSESSMENT

Introduction:

The Barber property is uniquely situated to provide important habitat to a variety of wildlife found in McMinnville, Oregon. This is because the property is located along a greenbelt, or wildlife corridor, and contains two distinct habitat types that are important for wildlife. Wildlife corridors are areas that connect habitat patches that were historically connected (Evans, 2007). Cozine Creek links the agricultural lands surrounding McMinnville with the urban center of the city; the Barber property serves as an important habitat patch on that greenbelt. Wildlife corridors benefit wildlife by allowing avoidance of predation, seasonal and daily migration, and the promotion of genetic exchange. Wildlife corridors that contain native vegetation or a riparian area are considered to be especially beneficial as they provide additional resources for wildlife (Aziz and Rasidi, 2014).

Birds:

It is important to study the bird species on the Barber property because they can be used as indicators of environmental quality (Finlayson et al., 2016). Birds are especially useful in analyzing environmental quality because they are sensitive to anthropogenic disturbances and have well documented migration patterns. (Gregory and Strien, 2010). Information used to inform decisions that promote a robust bird population will most likely result in an improvement of the overall ecosystem on the Barber property (Williams et al., 2018).

Of the 62 bird species expected in local habitat similar to the Barber property, 38 were observed at the site (Table 1.7) A full list of expected bird species on the Barber property can be found in the table in Appendix B (Harry Fuller, Personal Communication, March 3, 2020). The list was created by Harry Fuller, a local ornithologist at the beginning of the semester.

Table 1.7. Common and scientific names of avian species observed (names from Cornell Lab of Ornithology, 2020).

Cackling Goose (*Branta hutchinsii*)
Eurasian Collared-Dove (*Streptopelia decaocto*)
Anna's Hummingbird (*Calypte anna*)
Turkey Vulture (*Cathartes aura*)
Red-Tailed Hawk (*Buteo Jamaicensis*)
Downy Woodpecker (*Picoides pubescens*)
Northern Flicker (*Colaptes auratus)*
Hutton's Vireo (*Vireo huttoni*)
Steller's Jay (*Cyanocitta stelleri*)
California Scrub jay (*Aphelocoma californica*)
Crow (*Corvus brachyrhynchos*)
Raven (*Corvus corax*)
Violet Green Swallow (*Tachycineta thalassina*)
Barn Swallow (*Hirundo rustica*)
Black-capped Chickadee (*Poecile atricapillus*)
Chestnut-backed Chickadee (*Poecile rufescens*)
Bushtit (*Psaltriparus minimus*)
White-breasted Nuthatch (*Sitta Carolinensis*)
Red-Breasted Nuthatch (*Mergus serrator)*
Brown Creeper (*Certhia americana*)
Pacific Wren (*Troglodytes pacificus*)
Bewick's Wren (*Thryomanes bewickii*)
Ruby-crowned Kinglet (*Regulus calendula*)
Hermit Thrush (*Catharus guttatus*)
American Robin (*Turdus migratorius*)
Varied Thrush (*Ixoreus naevius*)
European Starling (*Sturnus vulgaris*)
Lesser Goldfinch (*Spinus psaltria)*
Brewer's Blackbird (*Euphagus cyanocephalus*)
Fox Sparrow (*Passerella iliaca*)
Dark-eyed Junco (*Junco hyemalis*)
Song Sparrow (*Melospiza melodia*)
Spotted Towhee (*Pipilo maculatus*)
Orange-crowned Warbler (*Leiothylpis peregrina)*
Yellow-rumped Warbler (*Setophaga coronata*)
Wilson's Warbler (*Cardellina pusilla*)
Western Tanager (*Piranga ludoviciana*)
Black Headed Grosbeak (*Pheucticus melanocephala*)

Of the observed bird species, 26 are permanent residents of the Barber property: red-breasted nuthatch, Eurasian collared-dove, Anna’s hummingbird, red-tailed hawk, downy woodpecker, northern flicker, Hutton’s vireo, Steller’s jay, California scrub-jay, crow, raven, black-capped chickadee, chestnut-backed chickadee, bushtit, white-breasted nuthatch, brown creeper, pacific wren, bewick’s wren, American robin, European starling, lesser goldfinch, Brewer’s blackbird, dark-eyed junco, song sparrow, spotted towhee, and orange-crowned warbler. Resident birds that prefer the riparian habitat such as Anna’s hummingbird, orange-crowned kinglet, and yellow-rumped warbler nest in low branches in deciduous trees and feed on nectar insects and honeydew; these resources that are common in this habitat. The other resident species prefer upland forest habitat. They use the trees and understory to nest and find food. Many are cavity nesters that should be plentiful in the large old Douglas-firs. The primary food sources for all the residents are insects and seeds except for the red-tailed hawk. The red-tailed hawk is a raptor that primarily eats small mammals (Cornell Lab of Ornithology, 2020).

Six bird species that were observed on the Barber property migrate to the area to breed during summer. Turkey vulture, violet-green swallow, barn swallow, Wilson’s warbler, western

tanager, and black-headed grosbeak. Wilson's warbler and black-headed grosbeak prefer the riparian habitat. Their main source of food is insects; these are abundant near the water. The other species prefer the upland forest habitat. Violet-green swallows and western tanagers eat seeds and insects and nest in the trees or underneath foliage in the understory. Barn swallows usually nest in buildings but utilize the Barber property as habitat to feed (Cornell Lab of Ornithology, 2020).

Three bird species observed on the Barber property were probably stop-overs during migration: ruby-crowned kinglet, hermit thrush and fox sparrow. Hermit thrushes use the Barber property in the winter before migrating to the mountains in Oregon and Washington. The fox sparrow has similar migration patterns; its primary breeding grounds are in eastern parts of Oregon and Washington state although they go as far north as Canada and Alaska. All three of these bird species prefer the upland habitat of the Barber property (Cornell Lab of Ornithology, 2020).

Although our findings suggest that many species of birds are using the Barber property, we are concerned about the potential impacts invasive plant species and destruction of habitat could be having on the avian community. The Barber property is dominated by invasive plant species (e.g., English ivy, holly, and Himalayan blackberry). Invasive plant species reduce the quality of bird habitat by replacing native plants that provide food and nesting opportunities for many bird species (Williams et al., 2018). Without the native plants, the Barber property could become unable to support some of the bird species we observed. This could be a factor in our observation of fewer avian species than expected. Human caused destruction of habitat also has a negative impact on the bird populations. Destroying habitat reduces its suitability for bird species which may reduce the size and biodiversity of bird populations on the Barber property (Saab, 1999).

Mammals:

The Barber property has the potential to be habitat for a variety of mammals, primarily because of its location. The greenbelt effect that the property provides allows for it to act as a wildlife corridor, allowing mammals in the area to travel through with reduced conflict. This is particularly important because of the proximity of the property to major roads. Wildlife corridors allow mammals to migrate in a relatively safe, contiguous habitat. (Fleury and Brown, 1997). The riparian area around Cozine Creek also gives an opportunity for aquatic mammals such as beavers, muskrat, otters, and mink to use the property.

The riparian area contains vegetation that is beneficial to many mammals. Many of the plants listed in the vegetation section are browse for large mammals such as deer (Figure 1.1) and other herbivores and omnivores such as rabbits, coyotes (Figure 1.2), Douglas and gray squirrels, and others. Raccoons are particularly associated with riparian areas (Figure 1.3), as they habitually wash their food on stream banks (ODFW, 2020a). The vegetation associated with the riparian area surrounding Cozine Creek may benefit aquatic mammals who use it for food or shelter.

Figure 1.1. Pair of deer in the upland Douglas fir habitat on the Barber Property. Photo from trail camera placed on the property; photo taken 4/7/2020.

Figure 1.2. Coyote near the side stream in the riparian area of the Barber Property. Photo from trail camera placed on the property; photo taken 3/13/2020.

Figure 1.3. Raccoon heading towards riparian zone on the Barber property. Photo from trail camera placed on the property; photo taken 6/7/2020.

At present, we have confirmed that at least four species of mammals use the Barber property in some capacity (Table 1.8). All species of mammals observed are common and are well adapted to both urban and rural settings (ODFW, 2020b). Three of the four species are native, with the Virginia opossum being the only non-native mammal. The presence of these species on the property suggests it is being used as a wildlife corridor between urban McMinnville and the surrounding agricultural areas. Areas of connectivity between mixed urban areas and natural or semi natural areas have been shown to be used by wildlife at higher rates than greenbelt areas that do connect distinct habitat types (Schiller and Horn, 1997). Cameras could only be set up on the property for a limited amount of time due to the Covid-19 shut down.

Table 1.8. Mammal species observed on the Barber property

Scientific Name	**Common Name**
Canis latrans	Coyote
Didelphis virginiana	Opossum
Odocoileus hemionus	Black-tailed Deer
Procyon lotor	Raccoon

Up to 42 species have the potential to use the Barber property. A previous inventory and assessment of Linfield College's Cozine Creek area recorded moles, bats, deer mice, striped skunks, beaver, nutria, and squirrels (Gernhart et al., 2016). At least one bobcat has also been observed on the Linfield College campus, and a cougar was recently filmed in a nearby neighborhood in McMinnville. All of these mammals could be present on the Barber property.

A full list of the 42 mammals that can be expected to be found on the Barber property is available in appendix C. Many of these animals may be present on the property, however due to their size, nocturnal activity, and the limitations of our field observations they are not in the current list of confirmed species.

SECTION 3: AQUATICS

INVENTORY AND ASSESSMENT

Introduction:

Freshwater is a crucial aspect of human life throughout the world, whether it be used for the irrigation of crops, drinking water, or the harvesting of organisms found in water. As human populations expand, so do the stresses they put on surrounding freshwater resources; Cozine Creek is no exception (Dodds et al., 2013). Low water quality is associated with detrimental effects to aquatic organisms whether that be through population declines, range reductions of freshwater species, or an overall reduction of biodiversity in the water system (Dudgeon et al., 2006). According to the DEQ, Cozine Creek has been designated as having the potential to be salmon and trout rearing and migration habitat, although there are abiotic factors that currently prevent that from happening, including a fish-blocking culvert under Davis Street (Allen et al., 2019; DEQ, 2003).

We examined water quality at four sites on the Barber Property (Figure 1.4) in February of 2020.

Figure 1.4. Aerial view of the Barber Property showing water quality sampling sites (map created by Barbara Van Ness).

Water Quality:

The water quality of Cozine Creek has been an important focus of Linfield's Environmental Studies senior capstone class since 2011 when collections of water quality data along Cozine Creek first began. Throughout the years of data collection from Cozine Creek, we have observed that some water quality variables have improved greatly, such as *E. coli* levels, whereas others have begun to decline in quality, such as water temperature (Allen et al., 2019). We examined the water quality in Cozine Creek as it passed through the Barber property to gain a better understanding of how its water quality compares to previously analyzed stretches of Cozine Creek.

Based on our results, water quality this spring was good in Cozine Creek at our sample sites running through the Barber Property. Overall, dissolved oxygen (DO) was high, and temperature and nutrient levels were low (Table 1.9). The *E. coli* levels we measured were much lower than recommended guidelines and only one site was found to have any *E. coli* (Table 1.10). However, our samples were taken during the winter so many of our measurements are likely better than they would be if we were to measure them in summer or fall due to the abundance of water flowing through the creek.

Table 1.9. Mean (standard deviation) of water quality variables found at each site at Cozine Creek and the side stream found within the Barber Property.

Variable	Site #1	Site #2	Site #3	Side Stream
DO%	99.20 (0.27)	94.68 (0.48)	99.36 (0.43)	97.40 (0.32)
DO (ppm)	11.91 (0.07)	11.50 (0.10)	11.34 (0.12)	11.47 (0.08)
Temp (°C)	7.42 (0.13)	6.96 (0.15)	9.54 (0.31)	8.22 (0.13)
pH	7.34 (0.04)	7.13 (0.04)	6.84 (0.03)	7.14 (0.06)
Flow (cm/s)	11.20 (2.05)	27.00 (0)	6.80 (1.64)	13.00 (0)
BOD%	21.46 (3.90)	9.66 (1.51)	18.00 (2.48)	13.84 (1.48)
Turbidity (FTU)	4.65 (0.34)	3.61 (0.37)	17.35 (0.41)	5.57 (0.81)
Nitrate (ppm)	8.80 (0)	0 (0)	8.80 (0)	1.76 (2.41)
Ammonia (ppm)	0.13 (0)	0.13 (0)	0.13 (0)	0.17 (0.09)
Phosphate (ppm)	0 (0)	0 (0)	0.10 (0)	0.04 (0.05)

Table 1.10. Mean (standard deviation) levels of bacterial colonies per 100 ml of water sample at each site at Cozine Creek and the side stream found within the Barber Property

Variable	Site #1	Site #2	Site #3	Side Stream
E. coli per 100 ml	0 (0)	6.67 (14.91)	0 (0)	0 (0)
Aeromonas per 100 ml	280.00 (76.74)	146.67 (50.55)	433.33 (146.06)	206.67 (101.11)
Salmonella per 100 ml	0 (0)	0 (0)	0 (0)	0 (0)
Other colonies per 100 ml	266.67 (74.54)	300.00 (192.93)	346.67 (119.26)	166.67 (78.17)

Water quality variables can be tested to determine the suitability of the stream for both organisms living in it and people who use it for recreation. For the Barber property, we compared water quality to water quality criteria determined by the Yamhill Basin Council and the EPA (Table 1.11) (Yamhill Basin Council, 2004; EPA, 2015).

Table 1.11. Recommended levels of freshwater quality variables. Recommended levels are from the Yamhill Basin Council and EPA (Yamhill Basin Council, 2004; EPA, 2015).

Variable	Recommended Levels of Freshwater Water Quality Variables
DO%	> 36.31
DO (ppm)	> 3.00
Temp (°C)	≤ 18.00
pH	6.50-8.50
Flow (cm/s)	> 20.00
BOD%	N/A
Turbidity (FTU)	≤ 20.00
Nitrate (ppm)	≤ 2.00
Ammonia (ppm)	≤ 0.20
Phosphate (ppm)	≤ 0.10
E. coli (# per 100 ml)	≤ 406
Aeromonas (# per 100 ml)	N/A
Salmonella (# per 100 ml)	N/A
Other coliforms (# per 100 ml)	N/A

CONCLUSIONS AND RECOMMENDATIONS

When assessing the condition of the Barber property, it is important to take into consideration the impact of the invasive species and the potential ecological damage they can cause in the future. The property (both upland and riparian habitats) is dominated by English ivy and holly. English ivy, which covers the majority of the ground in the upland Douglas-fir and the riparian habitats, should be removed to allow for increased species diversity and to prevent the death of trees (Dlugosch, 2005). Italian arum should be controlled with early action before it reproduces and spreads throughout the rest of the riparian habitat, along Cozine Creek, and into the upland areas. However, this invasive species is particularly difficult to remove as the seeds, which are spread by birds, and bulbs, which spread if dug or disturbed, could quickly overrun the property. It is important to properly remove Italian arum early as the poisonous and invasive nature of Italian arum will impact the native diversity of the Barber property (NWCB, 2013). Identifying invasive species, properly removing them, and continually managing their populations will prevent these species from spreading throughout the Barber property, to neighboring properties, and along Cozine Creek (CIPC, 2012).

We also are concerned by the presence of many informal footpaths, as they can facilitate the spread of invasive species such as herb Robert, English ivy, and Italian arum. Although we did not observe it in our limited surveys of the property, we are aware that garlic mustard (*Alliaria petiolate*) was present and being treated on the property and could take over if unmanaged (Hobbs and Huenneke, 1992; Jauni et al., 2014). There also is concern that the ecological edges created by the many informal foot trails in the upland Douglas-fir habitat could encourage recruitment of new non-native species (Holway, 2005). The total abundance of English ivy is important, as it will diminish species diversity on the forest floor and increase risk of damage to trees, impede the growth of other species, and degrade the quality of this section of the green corridor (Dlugosch, 2005).

To prevent increased spread of invasive species by informal foot traffic, authorized trails could be established in place of informal foot trails and shoe scrapping and seed removal stations could be installed at the heads of these trails to prevent the addition of further invasive species. Additionally, formal paths would decrease the likelihood of off-trail walking, which damages plant cover and compacts soil, damaging the habitat and decreasing the likelihood of native plant

return and increasing the chance of invasive species with a preference for disturbance (Godefriod and Koedam, 2004).

Once invasive species are removed and controlled, native species should be planted to establish a diverse and sustainable ecosystem. Native trees such as cascara, Pacific dogwood, and big leaf maple could be planted throughout the upland habitat, and red alder, Oregon ash, red twig dogwood, and Pacific ninebark could be planted in the riparian habitat. Native shrubs such as Oregon grape, snowberry, and Indian plum could be planted throughout the property. Supporting the growth of already present native wildflowers like trilliums, western baneberry, and Hooker's fairybells in the upland and riparian habitats would help increase the ecological quality of the property. If the current populations do not thrive in all areas after invasive removal, planting may be necessary to ensure healthy populations in the future.

Removal of invasive plant species is imperative to maintain bird and mammal populations as well as to keep the Barber property functioning in an ecologically sound manner. Adding nest boxes on property would be a good way to decrease competition for nesting sites and increase its value to avian species (Sutherland et al.., 2017). Mammals using the Barber property could benefit from many management practices as well. The most apparent problem to animals is the proliferation of invasive species. Invasive species outcompete native vegetation valuable to native animals. Loss of native vegetation often results in the loss of shelter and food sources for birds and mammals. Controlling invasive species with an emphasis on replanting native vegetation would be the best approach to help solve this problem. Human use of the property also impacts animals and birds. Inappropriate use frequently results in litter being left on the property which can endanger wildlife through ingestion, exposure, entrapment, etc. While efforts by the city to deal with inappropriate use and litter will likely be ongoing, it may be beneficial to install a trash can or similar infrastructure on the property near the entrances of trails. Appropriate uses also can unintentionally create conflict with wildlife. This is most likely to take place from people walking pets on the property. Dogs, cats, and other domestic predators are a potential danger to wildlife. Dogs are capable of injuring or killing even large mammals like deer. A leash policy for the property would limit the odds of conflict between domestic and wild mammals (Lenth et al., 2008).

We found better water quality in Cozine Creek along the Barber property than at any of the other sites we have tested. However, this is likely due to the fact that these tests were done in

the early spring whereas our other testing has taken place in fall. It is important to improve the riparian habitat along the creek throughout the Barber property. This can be done through the control of invasive plant species and the replanting of native species. Benefits of an improved riparian habitat include reduced nutrient contamination from nearby runoff, such as that from neighborhood lawns, and it would also shade the creek. (National Wildlife Federation, 2019). As public awareness of the importance of Cozine Creek's health increases, we also hope to see less pollution in the form of littering and other human activities.

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THE SOCIAL CONTEXT

Cameron Dole and Garrett Scales
Chapter Editor: Cameron Dole

INTRODUCTION

Scientists of the natural world as well as policy makers have noticed the legacies of land-use activities have a substantial influence on ecosystem structure and function for decades after those activities have been discontinued (Foster et al., 2003). It also is a widely held belief that commitment from different stakeholder groups is absolutely critical to the success of policies and mechanisms in the environmental field (United Nations, 2020). This chapter will discuss information about the land use history including the current management regime for the Barber property. In addition, we will present the results from our interviews and surveys that were sent to surrounding property owners. Lastly, we will provide recommendations for the future restoration and management of the Barber Property.

METHODS

- We searched for news articles, photographs, and other documents by performing keyword searches of “Barber Property”, “Paul A. Barber”, and other relevant topics on Linfield College, McMinnville City Library, News Register, and Yamhill County Historical Society databases.
- We used aerial photographs of the McMinnville area (1950-present) found online to determine the timeframe or residential development of the area around Old Sheridan Road.
- We conducted in person interviews with landowners directly adjacent to the Barber property. An introductory letter with a link to a SurveyMonkey questionnaire was mailed to residents in the neighborhood adjacent to the Barber property (Appendix G).
- We attempted to make contact with living Barber family members but were unsuccessful.

INVENTORY AND ASSESSMENT

Land Use History

Prior to 1855, the Yamel Indian Tribe lived in what is now known as Yamhill County alongside the banks of the Yamhill River. We presume that the Yamhelas- later changed to Yamhill- also resided along Cozine Creek due to the proximity and access to the river. In 1855, the remaining tribal members were temporarily ordered to the Grand Ronde Reservation, a move later made permanent by President James Buchannan (Yamhill County, 2020). Following the forced removal of the Native Yamhelas, the City of McMinnville began its development to what it has become today.

William T. Newby constructed a mill on what would become Third Street and platted the City of McMinnville in 1855. Named after his hometown of McMinnville, Tennessee, the original city boundary was less than three acres in area. Over 175 years later, the city limits of McMinnville have expanded to over 10.5 acres (City of McMinnville, 2020). West of McMinnville, the land is still mostly undeveloped. Land west of Old Sheridan Road is not included in McMinnville City limits and is still primarily used for agriculture. According to aerial photographs, construction on the McMinnville Grange (located on Old Sheridan Road and adjacent to the Barber Property) began in 1953 and finished in 1954 (Figure 2.1).

Figure 2.1. Construction of the McMinnville Grange in 1953. The Douglas-fir stand that characterizes the Barber Property is visible in the background (photo from News-Register, 1953).

Little changed in the area until the Willamette Educational School District Service Center located just east of the property was constructed in the late 1990s. The apartment complex adjacent to the property was constructed around the year 2000 and the subdivision off of Mitchell Street and Ash Creek Lane was built shortly after (Figure 2.2). These additions and developments around the Barber property have affected the activity and increased traffic in the area.

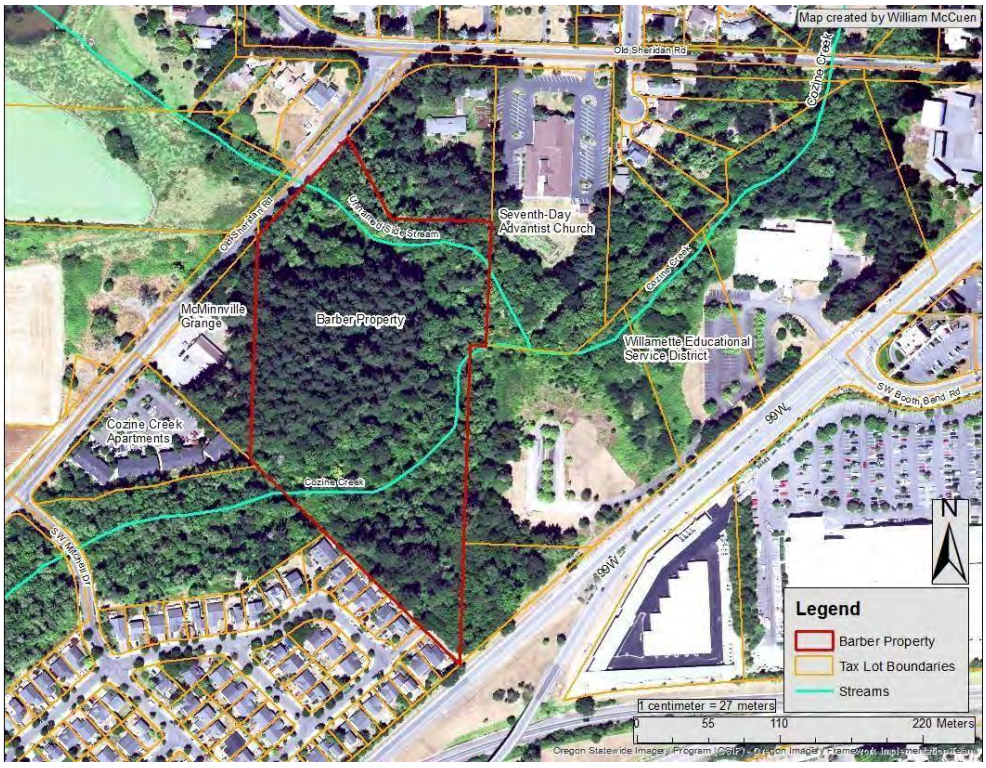

Figure 2.2. Aerial view of the Barber property and the surrounding tax lot boundaries (map by William McCuen)

1992 Barber Property Timber Cruise

In August of 1992, Alton Cronk of Cronk & Holmes conducted a timber cruise on the Barber Property. The timber cruise found the site was composed primarily of Douglas-fir trees ranging from 120-160 years old and of "good solid quality" (Cronk & Holmes, 1992). Thus, the age class of the existing stand suggests that the property has been forested since the area was settled and was probably never cultivated for agricultural purposes. The cruise also identified smaller amounts of merchantable western hemlock (*Tsuga heterophylla*), Oregon ash (*Fraxinus latifolia*), and Oregon white oak (*Quercus garryanna*) trees. The net value of timber on the Barber property was determined by the cruise to be $148,000 (Cronk & Holmes, 1992). Although the timber cruise was performed, Barber never had the trees logged and further requested that the woods be preserved and made available for the community to enjoy (Fliszar, L., personal communication, 11 February 2020).

Current Uses and Management Regime

Although a sign on the gate to the property alongside Old Sheridan Road declares this property is intended to be a future city park (Figure 2.3), due to current staffing and funding challenges the City of McMinnville is only able to conduct minimal maintenance on the Barber Property. Typically this involves cutting down hazard trees and removal of illegal campsites and trash.

Figure 2.3. Sign on gate to Barber Property located in the Ash Creek Lane subdivision (photo by Bill Fleeger).

Neighbors have claimed that illegal camping and inappropriate uses have increased in recent years. This correlates with the fact that, according to the Yamhill County Action Partnership (YCAP) which conducts transient counts each year, the homeless population in Yamhill County has grown by 34% in the last two years (YCAP, 2019). We also frequently saw litter, abandoned campsites, and disassembled bicycle parts while visiting the property.

In recent years, the city has taken action to address the numerous invasive species present on the parcel in partnership with the Greater Yamhill Watershed Council (GYWC) and Yamhill Soil and Water Conservation District (YSWCD). While all invasive species pose a threat to the

health of the environment, the recent rapid spread of garlic mustard (*Alliaria petiolata)* has concerned conservation groups, landowners, and the public works maintenance staff. Garlic mustard is a highly invasive herbaceous species that had been believed to not yet have infiltrated Yamhill County until spring 2015 when a small population was found on the roadside near Newberg. Prior to this discovery, Yamhill County was considered one of the last counties in the Willamette Valley without garlic mustard (Westphal, L. personal communication 29 April 2020). According to the Oregon Department of Agriculture, garlic mustard "displaces native forest understory species, reducing diversity and decreasing foraging availability for deer". The plant is especially difficult to control once it has become established due to seed longevity and seed number (each plant produces thousands of seeds) (ODA, 2020). In the spring of 2018, staff from the GYWC surveyed for garlic mustard upstream from Heather Hollow Park, where another infestation of garlic mustard had been discovered the previous year. These surveys identified that the infestation stretched 1.75 stream miles on both sides of the Cozine Creek floodplain from Fellows Street in urban McMinnville, upstream to Hill Road just outside of the city limits (Figure 2.4). Because of the high likelihood of the plant spreading, the City of McMinnville granted the Greater Yamhill Watershed Council and Yamhill SWCD permission to fully access the property for ongoing garlic mustard surveys and weed control treatments (Fliszar, L. personal communication, 27 April 2020). Since 2017, YSWCD has received three, 12-month grants to pay for spot-spraying known garlic mustard infestations along Cozine Creek (Westphal, L. personal communication 29 April 2020).

Figure 2.4. Map of Cozine Creek and Garlic Mustard Treatment area (Map provided by the Yamhill Soil and Water Conservation District; thanks to Luke Westphal of the Greater Yamhill Watershed Council).

Since treatment began the property has seen major improvements in vegetation cover and native species have begun to return. Large patches of Camas lily (*Camassia quamash*) has sprouted in the areas previously brush-mowed to clear Himilayan blackberry (Sapunar, K., personal communication, 5 March 2020) (Figure 2.5).

Figure 2.5. Vegetation recovery in mowed areas that were previously covered with Himalayan blackberry. Note the prevalence of Camas. Photo taken on Kim Sapunar's property looking south into the Barber Property (photo by Kim Sapunar, 5 May 2020).

Stakeholders

The Barber property is located in the southwestern portion of the City of McMinnville at the edge of the city limits (Figure 2.2). The property is bounded by Old Sheridan Road and agricultural land to the west; the McMinnville Grange, an apartment complex, and a small residential subdivision to the south; and the Willamette Educational Service District office to the east. To the north, the property abuts one large residential tax lot and the Seventh Day Adventist Church. To the northeast of the property there is a small cul-de-sac neighborhood off of Old Sheridan Road that, although it does not directly connect to the Barber property, has neighbors that have an interest in the property and who have been involved in working with the GYWC and conducting restoration work on their sections of Cozine Creek (Sapunar, K., Personal Communication, 5 March, 2020).

Interviews

We conducted in person interviews with three of the adjacent stakeholders: the owner of the large residential lot to the north of the property; a representative from the Seventh Day Adventist Church; and a property owner from the cul-de-sac off of Old Sheridan Road. There was substantial agreement among the interviewees regarding their perspectives of the property. The major findings from the interviews are described below:

- Stakeholders reported observing only limited use of the property except for instances of illegal camping that appears to have increased over the last two years.
- Stakeholders are highly supportive of the City's interest in controlling invasive species. Additionally, all interviewees reported that they had engaged in invasive species control on their own properties, and the church and neighbors in the cul-de-sac had obtained a grant and support for their control efforts from the GYWC.
- All interviewees were supportive of modest improvements including the development of walking paths on the property.
- The Seventh Day Adventist Church expressed an interest in using the property for the environmental education program at their school.

Questionnaire

We received five responses to our questionnaire (n=5), which was mailed to properties neighboring the Barber Property. Similar to the interviews, respondents identified illegal camping as the primary observed use of the property. Respondents also indicated that inappropriate use, litter, and invasive species were their greatest concerns about the property. Additionally, respondents expressed both a concern for the ecological health of the property, and a common desire to increase accessibility (Figure 2.6).

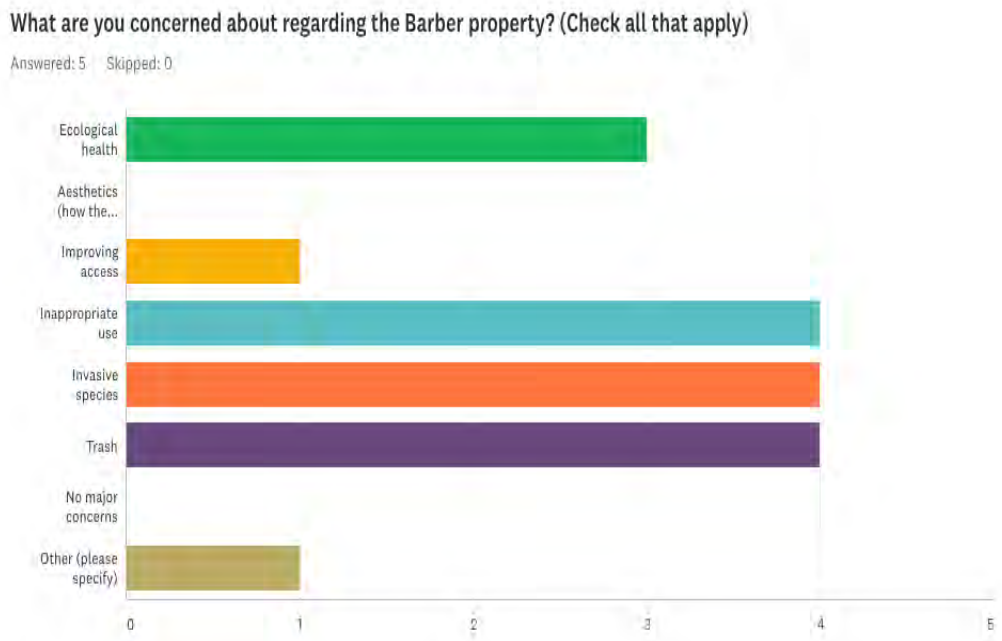

Figure 2.6. Number of stakeholder responses regarding concerns about the Barber property.

Respondents indicated they would most like to see the invasive species on the property controlled. Respondents also indicated they would like to see trash removed and walking paths established on the property (Figure 2.7).

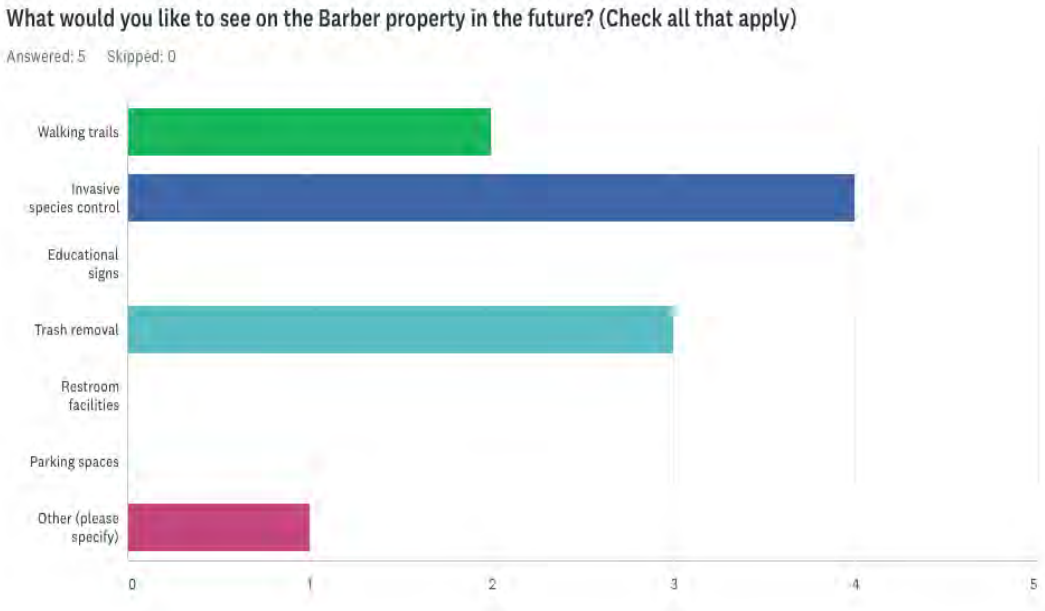

Figure 2.7. Stakeholder responses on future hopes for Barber Property

Conclusions and Recommendations:

Based upon what is known from our research of the land use history, the Barber property has been a forested island on the edge of cultivated agricultural land since the mid-1800s. As the City of McMinnville has grown, the parcel was eventually incorporated into the city limits and the surrounding properties developed starting in the 1950s with the McMinnville Grange. The adjacent subdivisions and commercial properties were added in the last three decades. The most significant finding from both interviews and the questionnaire is that neighbors and other stakeholders are most concerned about inappropriate uses, invasive species, and the ecological health of the Barber property. Neighbors have been working with the GYWC and the YSWCD to control invasive species on their own properties and are very supportive of the City's effort to do similar work on the Barber property.

Based upon our outreach to stakeholders and conversations with neighbors, we offer the following three recommendations to guide the city in the future management and restoration of the Barber property. First, we recommend maintaining good relationships and increasing communication with neighbors and other stakeholders. Neighbors help keep an eye on the property and are key to preventing and alerting the city to potential problems and inappropriate use. Second, we support continuing partnerships with the GYWC, the YSWCD and neighbors to control invasive species as well as to replant with native vegetation. Adding the Barber property to the existing restoration efforts occurring on neighboring properties creates a large "showcase" area where restoration efforts crossing land ownership boundaries can be highlighted. Third, because neighbors are supportive of modest improvements to the property, we suggest the city consider development of a walking trail to direct foot traffic and minimize the impact from informal trails.

The Barber Property is a uniquely forested property bridging the urban interface of the City of McMinnville with the surrounding agricultural land. Recent development of the area has allowed increased access and inappropriate use, but also has provided the opportunity for the city to reconsider the current management and future of the property. It is our belief that good communication with neighbors and stakeholders, control of invasive species and restoration of native plant communities, as well as considering modest improvements to the property, will enhance the ecological condition and strengthen the social relationships surrounding the Barber property.

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APPENDIX A.

Vegetation on the Barber Property

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INTRODUCTION

Green corridors provide habitat for plants, insects, amphibians, reptiles, birds, and small mammals, allowing them to survive and thrive in habitats with increased human activity (Beier and Loe, 1992; Beier and Noss, 1998). Additionally, they provide opportunities for increased mental health, community bonding, and hands-on education. Spending time in natural locations has been shown to lower blood pressure and stress hormone levels, enhance the immune system, increase self-esteem, reduce anxiety, and improve general mood in humans (Robins, 2020). Access to natural areas also encourages recreational activities such as walking or running along paths, bird watching, or observing plants or wildlife. Groups of individuals utilizing these activities strengthen bonds as a community, which further encourages community involvement. Neighbors who share a local natural resource often become more friendly with one another, often meeting while recreating or conversing about their aspirations for the property (Berman et al., 2008; Bowler et al., 2010; Kruger, 2010). Green corridors may also function as a site for hands-on learning for students and offer opportunities for improved academic achievement through first-hand experience. Students engaging directly with nature may develop additional self-confidence in the classroom as well as a deeper and more impactful understanding of subjects related to the natural world. The presence of a green corridor produces benefits throughout the community, offering comfort and opportunity to a wide range of individuals and groups (Seyedehzahra et al., 2011). However, in order for many of these benefits to be realized, the green corridor should be in a condition that is safe for people to utilize.

Cozine Creek, which flows through McMinnville, Oregon, functions as a green corridor for the city. The Barber property, located along SW Old Sheridan Road, provides upland Douglas-fir and riparian habitats for plants and animals. It provides a passage through the city along Cozine Creek,connecting agricultural lands outside of McMinnville to the urbanized lands of the city itself. As a green corridor, the Barber property also serves as a potential site for the

local community to engage in natural, recreational, and educational activities and potentially a place of community bonding while connecting ecosystems. Before this can happen, the land first must be analyzed, restored, and managed in a manner to ensure proper usage of the land by all visitors. Ideally, the property should undergo ecological restoration that includes control of invasive plant species to help the land recover from degradation and damage (Palmer et al., 2016). To begin this process, the Linfield College ENVS Capstone class of 2020 conducted research to determine what natural resources were present, the opinions of local stakeholders, and recommendations for action that could improve the ecosystem health of the property for visitors both human and animal. To accomplish these goals, this project examined the vegetation found on the property with regard to tree, shrub, and herbaceous species.

Background

The Barber property holds value to members of the local community as a potential location for nature based recreational and other activities. The property was a gift to the City of McMinnville, donated as two parcels of 4.6 acres in 1979 and 7 acres in 1993 by Paul Barber. Currently, the land is managed using reactive maintenance methods by the City of McMinnville to minimize hazards such as fallen trees, trash, and homeless camps. Apart from these measures, there is little other maintenance (Filszar, Personal Communication, February 11, 2020)

The Barber property is composed of two habitat types: an upland Douglas-fir stand and a riparian area bordering Cozine Creek. The upland Douglas-fir stand is located on the uphill portion of the property above the Cozine Creek floodplain and is inhabited by large Douglas-firs with a sparse understory of shade-tolerant species capable of living under the shade of Douglas-fir (Breen, 2018). This upland habitat should be characterized by the presence of dominant species such as Douglas-fir, abundant coarse woody debris, and a diverse understory containing evergreen shrubs, ferns, and a multistoried canopy (Chappell et al., 2001). As we go downhill, the Douglas-fir decrease in number and are replaced by flood-tolerant species. A healthy riparian habitat should be characterized by dense shrubs, vines, and grasses growing beneath Oregon ash, black cottonwood (*Populus trichocarpa*), red alder (*Alnus rubra*), big leaf maple, and pacific black willow (*Salix lucida*). The riparian zone serves as a zone for flood storage and helps to improve water quality by reducing sediments and nutrients in runoff. This habitat often provides woody debris from dense terrestrial vegetation as well as roots that decrease the flow of water,

allowing sediment and gravel to accumulate that produce habitat for aquatic organisms. The dense vegetation that characterizes the riparian habitat cools the water, improving the habitat for aquatic species (Yamhill Basin Council 2001; ODEQ, 2009; Fischer and Martin, 1999). These two vegetative locations act as important habitat for many species of birds and mammals (Tinker, 2015).

METHODS

To measure the plant diversity of the Barber property, we randomly located transects in both the upland Douglas-fir and riparian sections of the property. Three transects were located in each habitat type. In the upland Douglas-fir section, transects were 30-meters long and were run on the 3rd of March, 2020. Riparian section transects were limited to a length of 21-meters due to impassable barriers of Pacific ninebark (*Physocarpus capitatus*) and Himalayan blackberry (*Rubus discolor*) and were run on the 18th of March. Using a handheld GPS, we recorded the coordinates at the start of each transect (Table 1).

Table 1: Coordinates for the start and end of each vegetation transect.

Site – Transect #	Beginning of Transect	End of Transect
Upland – 1	45.19283°N, -123.21889°W	45.19299°N, -123.21848°W
Upland – 2	45.19259°N, -123.21882°W	45.19269°N, -123.21849°W
Upland – 3	45.19234°N, -123.21869°W	45.19243°N,- 123.21835°W
Riparian – 1	45.19199°N, -123.21823°W	45.19182°N,- 123.21831°W
Riparian – 2	45.19189°N, -123.21845°W	45.19174°N, -123.21854°W
Riparian – 3	45.19191°N, -123.21857°W	45.19176°N, -123.21855°W

Along each transect, we measured tree, shrub, and herbaceous community parameters. For trees, we established a 5-meter-wide quadrat along the transect ($150m^2$ in the upland habitat and $105m^2$ in the riparian zone). We identified each tree to species, noted whether it was dead or alive, and measured the diameter at breast height (dbh) of all trees in each quadrat; we measured the basal area for seedlings and saplings (tree species less than 2m tall). For shrubs, a 2-meter-wide quadrat was established along the transect ($60m^2$ for the upland and $42m^2$ for the riparian zone). We identified each shrub to species and measured the basal area. For herbaceous species we estimated the percent cover of each herbaceous species located directly under each meter along the transect line. We also noted every plant species we observed outside of the measured area to have a complete plant list for the property.

RESULTS

We observed twelve tree species on the Barber property, with nine species found in the upland Douglas-fir habitat and seven species found in the riparian habitat (Table 2). Scientific and common plant names were from the Oregon Flora Project pages (OFP, 2017).

Table 2. Tree species observed on the Barber property (both in and out of quadrats) as well as the habitat where each was found. † The *Corylus* could not be identified to species; it is suspected to be a hybrid between the native *C. cornuta* var. *californica* and cultivated species *C. avellana*

Scientific Name	Common Name	Found in Upland	Found in Riparian
Acer macrophyllum	Big leaf maple	x	
Abies grandis	Grand fir	x	
Alnus rubra	Red alder		x
Amelanchier alnifolia	Serviceberry	x	x
Cornus nuttallii	Pacific Dogwood	x	
Corylus sp.†	Filbert†	x	x
Fraxinus latifolia	Oregon ash		x
Prunus virginiana	Cherry	x	x
Pseudotsuga menziesii	Douglas-fir	x	x
Quercus garryana	Oregon White Oak		x
Rhamnus purshiana	Cascara	x	
Taxus brevifolia	Pacific yew	x	

We observed a total of twelve shrub species on the Barber property, with ten species in the upland Douglas-fir habitat and seven species in the riparian habitat (Table 3).

Table 3. Shrub species observed on the Barber property (both in and out of quadrats) as well as the habitat where each was found. Non-native species are denoted with "+" and invasive species are denoted with "*".

Scientific Name	Common Name	Found in Upland	Found in Riparian
Acer circinatum	Vine maple	x	
*Ilex aquifolium**+	English holly*+	x	x
Mahonia nervosa	Oregon grape	x	
Oemleria cerasiformis	Indian plum	x	x
Physocarpus capitatus	Pacific ninebark		x
*Prunus laurocerasus**+	English laurel*+	x	
Ribes divaricatum	Straggly gooseberry	x	x
Rosa gymnocarpa	Wild rose	x	
*Rubus discolor**+	Himalayan blackberry*+		x
Sambucus racemosa	Red elderberry	x	x
Symphoricarpos albus	Snowberry	x	x
Toxicodendron diversilobum	Poison oak	x	

We observed a total of 37 herbaceous species on the Barber property, with 28 species found in the upland Douglas-fir habitat and 19 species in the riparian habitat (Table 4).

Table 4. Herbaceous species observed on the Barber property (both in and out of quadrats) as well as the habitat where each was found. Non-native species are denoted with "+" and invasive species are denoted with "*".

Scientific Name	**Common Name**	**Found in Upland**	**Found in Riparian**
Actaea rubra	Western baneberry	x	
Adenocaulon bicolor	Pathfinder	x	
*Arum italicum**+*	Italian arum*+		x
Athyrium filix-femina	Lady fern	x	x
Carex obnupta	Slough sedge+		x
Circaea alpine	Enchanter's nightshade	x	
Cirsium vulgare+	Bull thistle+		x
Claytonia sibirica	Candy flower	x	
Galium aparine+	Bedstraw or cleavers+		x
Gaultheria shallon	Salal	x	
*Geranium lucidum**+*	Shining geranium*+	x	
Geranium mole+	Dovefoot geranium+	x	
*Geranium robertianum**+*	Herb Robert*+	x	
*Hedera sp.**+*	English ivy*+	x	x
Heracleum lanatum	Cow parsnip		x
*Lapsana communis**+*	Nipplewort*+	x	
Luzula multiflora+	Common woodrush+	x	x
Maianthemum stellatum	Star flower Solomon's seal	x	
*Melissa officinalis**+*	Lemon balm*+	x	x
Nemophila parviflora	Small flowered nemophila	x	
Oenanthe sarmentosa	Water parsley		x
Osmorhiza occidentalis	Sweet cicely	x	
Polypodium glycyrrhiza	Licorice fern	x	
Polystichum munitum	Sword fern	x	x
Pteridium aquilinum	Bracken fern	x	
Prosartes hookeri	Hooker's fairybells	x	
Rubus ursinus	Trailing blackberry	x	x
Rumex obtusifolius+	Bitter dock+	x	x
Sanicula crassicaulus	Pacific snakeroot		x
Senecio sylvaticus+	Wood groundsel+	x	x
Tellima grandiflora	Fringe cup	x	x
Thalictrum polycarpum	Tall western meadowrue	x	
Trillium ovatum	Western trillium	x	x
Trillium albidum	Giant trillium	x	
Urtica dioica	Stinging nettle		x
Verbascum Thapsus+	Common mullein		x
Viola glabella	Little yellow wood violet	x	

Our measured quadrats showed that Douglas-fir dominated the upland habitat with the largest mean dbh and the highest abundance (Table 5). The riparian habitat was dominated by

Oregon white ash based on dbh, however there was only one individual and it was located at the boundary of the riparian zone. There were 10 Oregon ash trees with a mean dbh or 30.1cm.

Table 5. Tree species abundance and mean dbh (standard deviation) in quadrats.. Basal diameters of seedlings are noted with the letter "b"

Tree species	Total number trees - Upland	dbh - Upland (cm)	Total number trees - Riparian	dbh in riparian (cm)
Big leaf maple	14	3.1 (6.5)	0	-
Grand fir	3	10.0 (2.7)	0	-
Filbert *	7	9.2 (12.0)	10	20.5b (27.4)
Oregon ash	0	-	10	30.1 (21.2)
Cherry	3	17.3 (2.6)	0	-
Douglas-fir	23	67.8 (31.4)	0	-
Oregon white oak	0	-	1	46.6 (-)
Cascara	2	1.6b (1.6)	0	-

The most abundant shrub, as determined by the number of stems, was holly followed by snowberry in the upland habitat; in the riparian area it was straggly gooseberry followed by snowberry in the riparian area (Table 6). The dominant shrubs, as determined by basal area, were vine maple and Indian plum in the upland habitat and Indian plum and holly in the riparian area.

Table 6. The number of shrub species' stems present in quadrats and each species' respective mean basal diameter (standard deviation).

Shrub species	Total Number Upland	Mean Basal Area Upland (mm)	Total Number in Riparian	Mean Basal Area Riparian (mm)
Vine maple	4	11.93 (4.21)	0	-
Holly*	47	8.25 (11.38)	13	100.81 (90.82)
Oregon grape	5	5.10 (0.97)	0	-
Indian plum	10	9.60 (14.00)	5	152.67 (142.28)
Pacific ninebark	0	-	8	19.19 (38.12)
Straggly gooseberry	3	2.93 (1.20)	30	37.40 (46.70)
Wild rose	4	3.25 (1.49)	0	-
Himalayan blackberry*	0	-	1	68 (-)
Red elderberry	6	8.15 (6.25)	1	8 (-)
Snowberry	30	4.10 (1.67)	21	90.13 (116.68)
Poison oak	16	-	0	-

The upland and riparian habitats were both dominated by English ivy, with 73 and 64 percent of the ground covered by that species (Table 7). However, we found some native wildflowers such as *Trillium* and star flowered Soloman's seal.

Table 7. Mean percent cover (standard deviation) of herbaceous species in each habitat. Branches on the ground of trees (denoted with a superscript "^") and shrubs (denoted with a superscript "+") Invasive species are marked with "*".

Herb species list	Percent cover Upland (%)	Percent Cover Riparian (%)
Italian arum*	0 (-)	0.16 (0.27)
Herb Robert*	0.06 (0.10)	0 (-)
English ivy*	73.00 (6.94)	63.96 (5.10)
Star flower Solomon's seal	0.61 (1.06)	0 (-)
Sweet cicely	0.17 (0.29)	0 (-)
Sword fern	0.17 (0.29)	0 (-)
Trailing blackberry	7.22 (3.47)	5.60 (2.27)
Piggyback plant	0.22 (0.19)	0 (-)
Trillium	0.11 (0.19)	0 (-)
Stinging nettle	0 (-)	1.43 (1.26)
Branch^{-}	1.00 (1.20)	5.44 (2.55)
Straggling gooseberry^{+}	0.11 (0.19)	1.94 (0.48)
Grass	0.22 (0.38)	0 (-)
Bare Ground	2.11 (2.83)	0.32 (0.55)
Himalayan blackberry^{+}*	0 (-)	6.70 (5.29)
Holly^{+}*	2.83 (1.88)	0.16 (0.27)
Indian plum^{+}	0.33 (0.58)	2.66 (4.20)
Log^{-}	1.00 (0.67)	0.79 (1.37)
Pacific ninebark^{+}	0 (-)	3.90 (2.31)
Oregon grape^{+}	0 (-)	2.46 (2.50)
Path^{-}	1.56 (1.35)	0.48 (0.82)
Snowberry^{+}	0.89 (1.02)	0.98 (1.00)

DISCUSSION

The Barber property hosts a variety of vegetation in the upland Douglas-fir and the riparian habitats. The upland area was dominated by large Douglas-firs, whereas the riparian habitat was dominated by flood-resistant vegetation such as Oregon white ash (Yamhill Basin Council 2001).

The dominant tree species in the upland area was Douglas-fir with 23 trees with a mean dbh of 67.8 cm. Big leaf maple was the second most abundant tree species with a mean dbh of 3.1 cm among 14 individuals. All of these maples were found on our first transect in a single cluster. They were all small shoots that were sprouting from a single downed big leaf maple trunk. In the understory we measured seven filbert, three cherry, and three grand fir saplings with a mean dbh of 9.2 cm, 17.3 cm, and 10.0 cm respectively. There were also two small cascara saplings in the understory with a mean basal area of 1.6 cm. A Pacific yew was observed on the property outside of a quadrat, which indicates the forest could develop into a more mature successional stage. Big leaf maple, grand fir, Pacific dogwood, cascara, and Pacific yew were

exclusive to the upland Douglas-fir habitat and were not found in the riparian habitat. One of the ash trees observed on the property was exceptionally large with an estimated dbh of over 1.5m (Figure 2).

Figure 2. Bill Fleeger standing next to the large Oregon ash in the upland habitat.

The riparian habitat was dominated by ten Oregon ash trees with a mean dbh of 30.1 cm. The understory was dominated by ten filbert saplings and seedlings with a mean basal area of 20.5 cm. The species of filbert is unknown, however we believe it is a hybrid between the native *Corylus cornuta* var. *californica* and the cultivated European *C. avellana* because the leaves had characteristics of both species. There was a single Oregon white oak growing at the boundary between the upland and riparian habitats and at the edge of the flood zone. This oak had a dbh of 46.6 cm and was the only oak we observed on the property. Seven species of trees were observed in the upland habitat. Serviceberry, filbert, cherry, and Douglas-fir were observed in both the upland habitat and the riparian habitat. Red alder, Oregon ash, and Oregon white oak were exclusive to the riparian habitat and were not found in the upland Douglas-fir habitat.

Holly was the shrub with the greatest abundance in the upland Douglas-fir habitat. This invasive species was present with 47 individuals and a mean basal area of 8.25 mm. Snowberry,

a native shrub, was the second most abundant species with 30 measured individuals and a mean basal area of 4.10 mm. Sixteen stems of poison oak were counted in our quadrats. However, we did not measure the diameter or height of the plants to ensure the safety of the students. Also present in our upland habitat quadrats were Indian plum, red elderberry, Oregon grape, vine maple, wild rose, and straggly gooseberry. Another invasive shrub, English laurel, was also observed on the property but was not measured in our quadrats. This invasive species can spread when the berries are eaten by birds; English laurel may also sucker and regenerate when cut (NWCP, 2018). A total of ten species of shrubs were observed in the upland habitat; vine maple, Oregon grape, wild rose, and poison oak were exclusive to the upland habitat and were not found in the riparian habitat.

In the riparian habitat, the most abundant shrub species measured was straggly gooseberry with 30 stalks and a mean basal area of 37.40 mm. The second most abundant scrub was snowberry with 21 individuals and a mean basal area of 90.13 mm. Thirteen individuals of invasive holly were measured in the riparian transects. One stalk of invasive Himalayan blackberry was measured although many more were observed. Indian plum, Pacific ninebark, and red elderberry were found in low abundance in the riparian habitat quadrats. Seven species of shrubs were observed in the riparian habitat; Pacific ninebark and Himaayan blackberry were exclusive to the riparian habitat and were not observed in the upland Douglas-fir habitat, although Himalayan blackberry is capable of growing in both locations.. Both the upland and riparian habitats had holly, Indian plum, straggly gooseberry, red elderberry and snowberry.

Many shrubs in the riparian habitat were measured in large clumps of the same species. This was done to ensure we could finish our vegetation measurements before the COVID-19 shutdown. However, this resulted in large basal areas with large standard deviations. In addition, the number of stems present in these clumps was not always recorded with precision. While these factors lead to a decrease in accuracy of dominance and abundance data, our data still provides an idea of species present and their relative frequency on the Barber property.

Herbaceous ground coverage varied between the upland and the riparian habitats. Both habitats, however, were dominated by English ivy. In our transects, the upland had eight different species of herbaceous cover, including the invasive herb Robert. Herb Robert, star flower Solomon’s seal, sweet cicely, sword fern, piggyback plant, and trillium were exclusive to the upland habitat. Four species of herbaceous cover were found in our riparian transects,

including the ivy. Italian arum and stinging nettle were not found in the upland habitat. A much larger diversity of species was observed in both habitats outside of transects however.In the upland habitat, 28 herbaceous species was observed with 18 exclusive to the upland habitat. Notable species include western baneberry, candy flower, western and giant trillium, and Hooker's fairy bell. In the riparian habitat, 19 species of herbaceous cover were observed with nine species exclusive including water parsley, Pacific snakeroot, and stinging nettle. The presence of many wildflower species on the barber property suggest that it can be restored with minimal replanting after the invasive species are controlled.

The abundance of English ivy is of concern because it can reduce nutrient availability and limit the growth of other herbaceous species and tree seedlings. It also is capable of increasing the risk of breakage and tree fall in windstorms and can kill trees if ivy covers the apical meristem and impedes growth (Dlugosch, 2005). However, trailing blackberry was the second most abundant herbaceous species in both habitats, representing potential for a healthy native population after the removal of ivy. The upland Douglas-fir habitat had more paths and bare ground than found in the riparian habitat. People using this area have created informal paths, compacting the soil and destroying vegetation (Godefroid and Koedam, 2004). Decreasing informal foot traffic will be important in the restoration of the property.

A major concern is the presence of invasive species on the Barber property. The foot traffic on the many informal paths creates continual disturbances on the forest floor that could facilitate the spread of invasive species such as herb Robert, English ivy, and Italian arum. English ivy also reduces species diversity on the forest floor by impeding the growth of other species and increases risk of damage to trees (Dlugosch, 2005). Another invasive species, garlic mustard (*Alliaria petiolate*), has been the focus of a herbicide treatment in the riparian area on the Barber and adjacent properties; garlic mustard has the potential to rapidly take over the area (Hobbs and Huenneke, 1992; Jauni et al., 2014). The many paths also create ecological edges that can lead to recruitment of additional invasive species (Holway, 2005).

Holly, Himalayan blackberry, and English ivy are invasive species that were prominent members of the vegetation on the Barber property. Holly and English ivy were abundant in both the upland and riparian habitats, and Himalayan blackberry was only measured in the riparian habitat although it could be present in both. English ivy was not the only invasive herb on the property; herb Robert was found in the upland Douglas-fir and Italian arum was found in the

riparian habitat. Shining geranium, dove foot geranium, and lemon balm all are invasive species that can spread rapidly across the property. Holly was already more abundant than any other shrub species in the upland habitat. With the production of tubers and large numbers of berries, Italian arum may become a major problem for the Barber property. This plant is very difficult to eradicate once it gains a foothold. Tubers detached from the arum can regenerate into a new plant when detached by human activity, moving water, or moles which allows for italian arum to spread quickly. Additionally, Italian arum is poisonous and can destroy sensitive habitats if left to invade (NWCB, 2013).

The spread of invasive species on the Barber property is not limited in extent to that property, but may spread into neighboring lots and across McMinnville. English Ivy produces berries that are consumed by birds and spread through excrement; it also can spread as cuttings or root fragments that regenerate when they come into contact with soil (NWCB, 2004). English laurel reproduces through the production of berries with seed being distributed by birds; it also produces suckers from roots and re-sprouts from cut stems (NWCB, 2018). English Holly also is spread by birds,suckering. and layering. This invasive species may form dense thickets and dominate the shrub layer of the forest, suppressing germination and growth of native species (NWCP, 2020). Many invasive species spread quickly and are easily carried from one plant to many other neighboring areas through the birds, waterflow, and other means. Decreasing the number of invasive species and controlling their populations on the Barber property will decrease the likelihood of these invasive species spreading to local areas. If not controlled, invasive species will continue to spread and decrease the quality of habitat for native species (CIPC, 2012).

Once invasive species are removed and controlled, native species should be planted to establish a diverse and sustainable ecosystem. Native trees such as cascara, Pacifice madrone (*Arbutus menziesii*), Pacific dogwood, vine maple, and big leaf maple could be planted throughout the upland habitat, whereas flood tolerant species such as black cottonwood (*Populus trichocarpa*), Oregon ash, red alder (*Alnus rubra*) and Pacific ninebark could be planted in the riparian habitat. Native shrubs such as Oregon grape, salal, snowberry, oceanspray (*Holodiscus discolor*), red-flowering currant (*Ribes sanquineum*), and Indian plum could be planted across the property with a focus on red twig dogwood (*Cornus sericea*), Douglas hawthorn (*Crataegus douglasii*), Douglas spirea *(Spiraea douglasii*), Oregon crabapple (*Malus fusca*), and

salmonberry (*Rubus spectabilis*) for the riparian habitat due to their tolerance of flooding. Supporting the growth of native wildflowers like trilliums, western baneberry, and Hooker's fairybells in the upland and riparian habitats could increase the ecological quality of the property (Withrow-Robinson et al., 2011; Albert, 2014). Additionally, establishing common camas (*Camassia quamash*) in the wet riparian habitat could provide a native ornamental appeal to the property while providing early spring grazing opportunities for deer, elk, and other native animals (USDA, 2017).

Many native plants are already present on the Barber property and represent the potential for a robust population of native plants after the removal of invasive species. Candy flower, star flower Solomon's seal, Hooker's fairybells, fringe cup, western trillium, giant trillium, and little yellow wood violet are already present on the Barber property; often surviving in the ivy. These flowering species provide grazing potential for herbivores utilizing the Cozine Creek green corridor, pollen for bees, and a visual aesthetic for visitors. These native species are in low abundance, however, due to the large number of invasives on the property. As mentioned above, decreasing and controlling the abundance of invasive species will allow for the natural spread of these native species to increase the diversity of the property's native plants (Albert, 2014). Planting of native species may be necessary after control of the invasives.

The dominance of the invasive species is one of the most important issues to the ecological health of the Barber property. English ivy should be removed from the tree boles and the ground. Its removal will allow many native species such a trillium to return and will increase species diversity on the forest floor and help prevent tree death (Dlugosch, 2005). Italian arum must be controlled with early action before it spreads across the property. Italian arum is currently limited to the riparian area but has the potential to spread across the property. Other invasive species such as herb Robert, English holly, English laurel, and Himalayan blackberry also should be controlled through appropriate removal.

We recommend that authorized trails be established in place of informal foot trails. This will minimize the anthropogenic spread of invasive species. The installation of shoe cleaning stations at trailheads would help prevent invasive species spread. Additionally, formal paths could reduce the incidence of off-trail walking, which damages plants and compacts soil, and increases the presence of invasive species that prefer disturbance (Godefroid and Koedam, 2004). Maintaining the integrity of the Barber property's ecology is important to the value of the

property and the surrounding community. The plants and animals that thrive in these habitats depend on a healthy ecosystem.

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APPENDIX B.

Birds Species on the Barber Property

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INTRODUCTION

The Barber property supports many species of birds both resident and migratory. Many studies have found the species of birds found in an area are a good indicator of environmental quality. Finlayson et al. (2016) examined climatic and ecological conditions in southern Iberia and found that the presence of certain birds differed greatly depending on the ecological quality of their sites (Finlayson et al., 2016). Gregory and Strien (2010) found that birds are a good indicator of environmental quality because of their sensitivity to anthropogenic disturbances in the environment, migrations are well documented, and humans feel connected to them. Michael Morrison found that animals are useful indicators of the physical processes and factors of an ecosystem, and that birds were a great indicator animal (Morrison, 1986). The goal of this bird survey was to record all bird species present on the Barber property. Data was used to determine the quality of the habitat and to develop recommendations for the restoration and management of the property that will improve the site for birds.

Background

The Barber property has two distinct habitat types, upland Douglas-fir forest and riparian. The upland forest is dominated by large Douglas-fir trees. The understory is composed of a number of shrub and herbaceous plant species. Holly and snowberry were the most dominant shrub species, and English ivy was the most common herbaceous plant. In the riparian habitat, the Douglas fir trees gave way to filbert and Oregon ash trees. Indian plum, holly and snowberry were the most common shrub species in the riparian section with English ivy again being the most common herbaceous ground cover species. Many of the most common species are invasive.

Both upland forest and riparian habitats have the potential to support many species of birds year round, during migration, and for breeding (Williams et al., 2018), however, invasive plants cover much of the Barber property. Williams et al. (2018) reported the presence of

invasive plant species was negatively correlated with bird population size and diversity. Saab (1999) found that smaller habitat patches in southeastern Idaho were correlated with lower diversity and smaller bird populations than larger habitat patches (Saab, 1999). Habitat degradation has negative effects on bird populations so preserving and improving the ecological state of the Barber property is needed (Herkert, 1994).

METHODS AND RESULTS

A list of the 61 bird species that we could expect to find on the property was provided by Harry Fuller, a local bird expert (Harry Fuller, personal comm, March 3, 2020) (Table 1). We went to the Barber property with Harry Fuller and observed birds present on the property in both upland and riparian habitats on March 3, 2020. As we walked through the property, we noted all the birds that we saw or heard. Due to Covid-19, Linfield College was closed on March 27, which prevented us from visiting the site after that date. Harry Fuller graciously offered to continue to collect bird data and returned to the property many times. Additional bird species also were noted by Dr. Nancy Broshot while she was on the property. From March through mid-May, 38 of the 62 possible bird species were observed on the Barber property.

Table 1. Full list of bird species common and scientific names that might be observed on the Barber property (Harry Fuller, personal comm, March 3, 2020). Species denoted with "*" were those that were observed on the property (common and scientific names from Cornell Lab of Ornithology, 2020).

Cackling Goose (*Branta hutchinsii*)*
California Quail (*Callipepla californica*)
Band-tailed Pigeon (*Patagioenas fasciata*)
Eurasian Collared-Dove (*Streptopelia decaocto*)*
Vaux's Swift (*Chaetura vauxi*)
Anna's Hummingbird (*Calypte anna*)*
Rufous Hummingbird (*Selasphorus rufus*)
Turkey Vulture (*Cathartes aura*)*
Bald Eagle (*Haliaeetus Leucocephalus*)
Red-Tailed Hawk (*Buteo Jamaicensis*)*
Red-Breasted Sapsucker (*Sitta canadensis*)
Downy Woodpecker (*Picoides pubescens*)*
Northern Flicker (*Colaptes auratus*)*
Western Wood-pewee (*Contopus sordidulus*)
Pacific-slope Flycatcher (*Empidonax difficilis*)
Hutton's Vireo (*Vireo huttoni*)*
Warbling Vireo (*Vireo gilvus*)
Steller's Jay (*Cyanocitta stelleri*)*
California Scrub jay (*Aphelocoma californica*)*
Crow (*Corvus brachyrhynchos*)*
Raven (*Corvus corax*)*
Tree Swallow (*Tachycineta bicolor*)
Violet Green Swallow (*Tachycineta thalassina*)*
Barn Swallow (*Hirundo rustica*)*
Black-capped Chickadee (*Poecile atricapillus*)*
Chestnut-backed Chickadee (*Poecile rufescens*)*
Bushtit (*Psaltriparus minimus*)*
White-breasted Nuthatch (*Sitta Carolinensis*)*
Red-breasted Nuthatch (*Mergus serrator)**
Brown Creeper (*Certhia americana*)*
House Wren (*Troglodytes aedon*)
Pacific Wren (*Troglodytes pacificus*)*
Bewick's Wren (*Thryomanes bewickii*)*
Golden-crowned Kinglet (*Regulus satrapa*)
Ruby-crowned Kinglet (*Regulus calendula*)*
Hermit Thrush (*Catharus guttatus*)*
Swainson's Thrush (*Catharus ustulatus*)
American Robin (*Turdus migratorius*)*
Varied Thrush (*Ixoreus naevius*)*
European Starling (*Sturnus vulgaris*)*
House Sparrow (*Passer domesticus*)
Evening Grosbeak (*Coccothraustes vespertinus*)
House Finch (*Haemorhous mexicanus*)
Purple Finch (*Haemorhous purpureus*)
Eurasian Siskin (*Spinus spinus*)
Lesser Goldfinch (*Spinus psaltria*)*
Brewer's Blackbird (*Euphagus cyanocephalus*)*
Fox Sparrow (*Passerella iliaca*)*
Dark-eyed Junco (*Junco hyemalis*)*
Golden-crowned Sparrow (*Zonotrichia atricapilla*)
Song Sparrow (*Melospiza melodia*)*
Spotted Towhee (*Pipilo maculatus*)*
Yellow-breasted Chat (*Icteria virens*)
Bullock's Oriole (*Icterus bullockii*)
Brown-headed CowBird (*Molothrus ater*)
Orange-crowned Warbler (*Leiothylpis peregrina*)*
Yellow-rumped Warbler (*Setophaga coronate*)*
Townsend's Warbler (*Setophaga townsendi*)
Wilson's Warbler (*Cardellina pusilla*)*
Western Tanager (*Piranga ludoviciana*)*
Black Headed Grosbeak (*Pheucticus melanocephala*)*

DISCUSSION

Of the observed bird species, 28 are considered to be residents of the Barber property. Eurasian collared-dove, Anna's hummingbird, red-tailed hawk, downy woodpecker, northern flicker, Hutton's vireo, Steller's jay, California scrub-jay, crow, raven, black-capped chickadee, chestnut-backed chickadee, bushtit, white-breasted nuthatch, red-breasted nuthatch, brown creeper, Pacific wren, bewick's wren, American robin, varied thrush, European starling, lesser goldfinch, Brewer's blackbird, dark-eyed junco, song sparrow, spotted towhee and orange-

crowned warbler are residents. Resident birds that prefer the riparian habitat include Anna's hummingbird, orange-crowned warbler and yellow-rumped warbler. These species nest in low branches in deciduous trees and feed on nectar insects and honeydew, which are plentiful in riparian areas. The other 24 species prefer the upland forest habitat. They use the trees and understory plants as places to nest and sites to find food. The primary food source for all the residents is insects and seeds except for the red-tailed hawk. The red-tailed hawk is a raptor that primarily eats small mammals (Cornell Lab of Ornithology, 2020).

Six bird species that were observed on the Barber property migrate to the area to breed during the summer. These include turkey vulture, violet-green swallow, barn swallow, Wilson's warbler, western tanager and black-headed grosbeak. Two of these, Wilson's warbler and black-headed grosbeak, prefer the riparian habitat. Wilson's warblers and black-headed grosbeaks spend the winter in Central America; their main food is insects. The other four species prefer the upland forest habitat. Turkey vultures spend most of their winter in the southern United States and Central America, but migrate to the United States to breed. Turkey vultures feed in urban areas to find food but nest away from humans. Violet-green swallows, barn swallows, and western tanagers also spend their winters in Central America; some of these species eat seeds and insects and nest in the trees or underneath foliage in the understory. Barn swallows nest in buildings but use the Barber property to feed. (Cornell Lab of Ornithology, 2020).

Three bird species observed were using the property during winter before migrating to their breeding grounds: ruby-crowned kinglet, hermit thrush, and fox sparrow. ruby-crowned kinglet breed in Canada and Alaska. Hermit thrushes use the Barber property as a place to stay in the winter before migrating to the mountains in Oregon and Washington, extending as far north as Canada and southern Alaska. The fox sparrow has similar migration patterns to the hermit thrush although its primary breeding grounds are in Eastern Oregon, Washington, Canada, and Alaska. All three of these birds prefer the upland habitat of the Barber property for foraging for insects (Cornell Lab of Ornithology, 2020).

Although our data suggest that many species of birds use the Barber property, we are concerned about the potential impacts of invasive plant species and destruction of habitat on the avian community. The Barber property is dominated by invasive plant species (e.g., English ivy and holly). Invasive plant species reduce the quality of bird habitat by replacing native plants that provide food and nesting places for many bird species (Williams et al., 2018). Without the native

plants, the Barber property could become unable to support some bird species; in fact we may have seen less species than expected due to the presence of invasive species. Human caused destruction of habitat also has a negative impact on the bird populations. Destroying habitat reduces its suitability for bird species possibly reducing the size and biodiversity of bird population on the Barber property (Saab, 1999).

RECOMMENDATIONS:

Based on this information keeping the Barber property intact is of the utmost importance for bird populations. Habitat destruction caused by urbanization and invasive species reduces the amount of suitable habitat and as a result will be detrimental to the bird species we observed on the Barber property (Williams et al., 2018). A likely result of successful preservation and improvement will be a more biodiverse and robust bird population (Herkert, 1994).

I recommend removing invasive plant species on the Barber property as it would be important in terms of improving the native bird habitat. Many studies have found that the presence of invasive plant species has a negative effect on avian habitat. A study done on the density of an invasive plant species, *Lantana camara* that is widespread in India, found that high densities of invasive plant species were correlated with a decrease in richness and abundance of avian species. These findings suggest that the removal of invasive plant species would help restore the diversity and richness of avian species on the Barber property (Aravind et al., 2010). Another study done on the impacts of invasive *Spartina alterniflora* on bird communities at Chongming Dongtan, a Chinese wetland, showed that invasive*Spartina* was detrimental to bird populations. This study also recommended that measures be taken to stop the spread of invasive species into bird habitat (Gan et al., 2009). Keeping the findings of these studies in mind, removing and controlling invasive plant species needs to be done on the Barber property. This will increase the value of the property for birds (Williams et al., 2018). This will most likely result in more robust avian populations on the Barber property. The community considers the Barber property valuable. Birds strike a chord with many people.

A meta-analysis of 128 North American studies found that removal of invasive plant species removal should be done in a way that optimizes bird habitat (Nelson et al., 2017). In order to do this, I recommend the construction of a habitat suitability model. This model could use the information we have gathered from our observations on the Barber property to help

decide future management strategies to encourage stronger bird populations. Habitat suitability models take into account the bird species present on the property and provide information about how to design an ecosystem that best suits the birds (Huth and Possingham, 2011).

Additionally, I would recommend installing nest boxes to increase the abundance and biodiversity of birds on the Barber property. These nest boxes will reduce competition between birds for limited nesting resources (Williams et al., 2018). Reducing competition by distributing nest boxes throughout both habitat types on the property would increase the amount of available nests, which will help strengthen the avian population on the Barber property.

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APPENDIX C.

Mammals on the Barber Property

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INTRODUCTION

Understanding the composition of mammals and their use of an area is integral to an environmental inventory and assessment. This is true not only to avoid disturbing wildlife that currently use the Barber property, but also to effectively understand what restoration approaches may be warranted to encourage other wildlife species to utilize the area. Mammals are perhaps more directly affected by any future management changes or restoration actions than other users of the property. The property is vital to the health of many mammals in the immediate area.

BACKGROUND

The Barber property is uniquely situated to provide important habitat and opportunities to a variety of wildlife surrounding McMinnville, Oregon. The geographic location of the property allows it to serve as a wildlife corridor. Wildlife corridors are areas that connect fragmented patches of habitat that were historically connected (Evans, 2007). The Barber property, because of its location along Cozine Creek, links agricultural lands surrounding McMinnville to the urban center of the city. The property is one of several habitat patches along Cozine Creek, that serve as important mammal habitat on the greenbelt.

Wildlife corridors benefit wildlife in numerous ways. One of the largest benefits of the Barber property is that it gives wildlife the ability to migrate with reduced chances of human conflict. One of the main human conflicts that affects migrating wildlife is roads and associated vehicle traffic. The property is near Old Sheridan Road and Highway 99 so it potentially allows wildlife to avoid crossing those roads to get to their destination unharmed. Because wildlife corridors allow animals to migrate with relative ease, they promote genetic exchange between populations. Genetic exchange allows isolated groups of animals to be more resilient to disturbance. Corridors also serve as resource reserves in otherwise barren urban landscapes, hosting easily accessible food and water. Wildlife corridors essentially allow wildlife that

encounter urban areas to function without major changes to their behavior, which in turn reduces conflict and increases survivorship (DeStefano, 2006).

The value of the Barber property to wildlife as a corridor is compounded by its two habitat types and their respective resources. The upland and riparian habitats contain a diverse array of vegetation that can be consumed by wild mammals. Both the riparian and upland habitats located on the property contain important food sources for mammals. For example, the upland habitat contains Douglas-fir, vine maple, and big leaf Maple. The riparian area contains sword fern, trailing blackberry, and salal. These plant species and many others present in the vegetative assessment are valuable at different times during the year, creating a more diverse resource for blacktailed deer (Bunnell, 1990).

METHODS

To determine what species of wildlife were present on the Barber property, we placed motion activated cameras near likely animal travel corridors. One camera was placed at water quality site 2, overlooking Cozine Creek and a suspected travel corridor that crossed the creek; we had observed blacktail deer and raccoon tracks on the muddy banks of the creek. Another camera was placed on a likely travel corridor on the east side of the property, near water collection site 3; this location had deer tracks and droppings. Cameras were checked every few days to minimize risk of equipment failure or theft. Because of the COVID-19 pandemic, Linfield College was shut down so camera placement was more infrequent than anticipated. Thanks to the help of Professor Bill Fleeger, cameras were reset several times after the college switched to online classes.

RESULTS

We documented blacktailed deer (Figure 1), coyotes, opossums (Figure 2), and raccoons on the Barber property. This accounts for only four of the 42 potential mammals that could be in this habitat (Table 1) The camera was reset on March 12th, and captured a deer crossing the creek (Figure 3).

Figure 1. Blacktailed deer with budding antler growth near the side stream. Photo taken March 12, 2020 at 7:26am.

Figure 2. Opossum on an informal trail. Date and time uncertain.

Table 1: Mammal species that could be expected on the Barber property (Gernhart et al., 2016). Mammals observed are denoted with "*".

Trowbridge shrew (Sorex trowbridgii)
Coast mole (Scapanus orarius)
Townsend's mole (Scapanus townsendii)
Hoary bat (Lasiurus cinereus)
Big brown bat (Eptesicus fuscus)
California myotis bat (Myotis californicus)
Townsend's big-eared bat (Corynorhinus townsendii)
Brush rabbit (Sylvilagus bachmani)
Mountain beaver (Aplodontia rufa)
Flying squirrel (Pteromyini)
Townsend's chipmunk (Tamias townsendii)
Douglas squirrel (Tamiasciurus douglasii)
Beechey's ground squirrel (Otospermophilus beecheyi)
Dusky-footed woodrat (Neotoma fuscipes)
Bushy-tailed woodrat (Neotoma cinerea)
Camas pocket gopher (Thomomys bulbivorus)
Mazama pocket gopher (Thomomys mazama)
Deer mouse (Peromyscus)
Gray-tailed vole (Microtus canicaudus)
Townsend's vole (Microtus oregoni)
Creeping vole (Microtus oregoni)
Red-backed vole (Myodes)
Pacific jumping mouse (Zapus trinotatus)
Porcupine (Erethizon dorsatum)
Coyote (Canis latrans)*
Raccoon (Procyon lotor)*
Striped Skunk (Mephitis mephitis)
Opossum (*Didelphis virginiana)**
Short-tailed weasel (Mustela ermine)
Bobcat (Lynx rufus)
Beaver (Castor Canadensis)
Nutria (Myocastor coypus)
Black tailed deer (Odocoileus hemionus)*
Roosevelt Elk (Cervus canadensis roosevelti)
House mouse (Mus musculus)
Black rat (Rattus rattus)
Eastern grey squirrel (Sciurus carolinensis)
Eastern Fox Squirrel (Sciurus niger)
Red squirrel (Tamiasciurs hudsonicus)
Western grey squirrel (Sciurus griseus
Squirrel species uncertain

Figure 3. Deer crossing creek near water quality site 2. Photo taken 05/13/2020 at 10:29 am.

DISCUSSION

The mammals observed on the Barber property are common species that are well adapted to both urban and rural environments. The property is most likely being used as a corridor for wildlife to migrate between the fragmented habitats in the urban areas of Mcminnville and the rural agricultural land that surrounds the city. The ability of mammals to migrate through different habitats is vital for the health of the mammals in the area. Conflict free migration encourages genetic exchange between populations, protects mammals from predation, and provides a place of relative sanctuary where they can act naturally (Beier et al., 2008). Mammals that do not have obstacle free migration routes can often come into conflict with humans or be preyed upon. A robust system of wildlife corridors in an urban area contributes to the resilience of the mammal populations that populate the area (Fleury and Brown, 1997)

The upland habitat contains a variety of vegetation that is useful to wild mammals. Because deer are frequently observed on the property, their food resources are of particular importance. Some species of vegetation are more beneficial to deer in certain seasons. The upland habitat is home to several species of plants that are particularly important for blacktailed deer in the winter. Important winter forage plants include Douglas-fir, salal, vine maple, deer fern, and wild rose (Bunnell, 1990). The remaining three species are omnivores that can eat just about any berry, fruit, or other digestible plant matter available. Opossums have been documented to eat grass, leaves, seeds, fruits, berries, and almost any other green vegetation (Gardner, 1982). Raccoons have been documented to eat fruits, berries, grains, acorns, and a wide variety of vegetation depending on availability and preference (Goldman, 1950). While coyotes eat primarily birds and small rodents, they have also been shown to eat fruit and various grasses when available (Fichter et al., 1955)

The riparian area contains vegetation that is eaten by mammals, especially deer. The riparian area has species that are important to deer throughout the year. Species prevalent in the riparian area that are important to deer include trailing blackberry, red alder, salal, Oregon white oak, and Himalayan blackberry (Bunnell, 1990). Similar to the upland portion, the omnivorous mammals present on the property will use riparian plants to some degree. More important to the omnivores than the vegetation are the resources that riparian areas attract. Riparian areas attract a

variety of birds, small mammals, and invertebrates that are prey species to all three of the omnivores we observed. Opossums are attracted to riparian areas with lots of downed woody debris, such as Cozine, because they forage for insects that live in the decaying organic matter (Gardner, 1982). Raccoons have the opportunity to take fish, amphibians, and crustaceans such as freshwater clams or crawfish from the creek. Raccoons are heavily associated with creeks and streams, relying on them for diverse food needs and specific habitat structure (Goldman, 1950)

RECOMMENDATIONS

The largest factor preventing the Barber property from reaching its ecological potential is the pervasive presence of invasive vegetation. As mentioned in other sections of this document, an organized effort to remove invasive species and ensure that native plant species are reestablished is needed to improve the habitat on the property (Mulhollem, 2019). A decrease in invasive plants would allow more native plants to flourish, and as a result provide more resources for the mammals that use the property. This is particularly true for the English ivy that is blanketing a large portion of the property.

Another constant issue on the Barber Property is trash associated with inappropriate use. Although the City of Mcminnville regularly removes trash from the property, there is still a considerable amount present; we noticed trash and piles of bicycle parts on our visits. Ideally, this issue could be alleviated with signage, education, and perhaps the installation of secure garbage cans near the entrances to the property. It is likely that these actions alone will not result in the property being spotless. Volunteer groups and supportive neighbors have been helpful at keeping Linfield College's section of Cozine creek relatively clean; a similar effort to clean up the Barber property could be organized.

Appropriate use also raises the likelihood of conflicts with mammals. The most likely conflict would be those with users and their domestic animals. This is especially true for people that walk dogs. Dogs that are unrestrained can be dangerous to wildlife. Even an adult deer can be killed by many breeds of domestic dog. Smaller mammals such as raccoons and opossums are at a greater danger of being harmed by a dog. Likewise, dogs can potentially be harmed by wildlife, especially coyotes. In order to avoid conflicts between wild and domestic animals, it would be beneficial for the Barber property to require pets be leashed and under control. Signage could help make a leash rule more effective.

It should be noted that not all mammals in the expected mammal list should be encouraged to use the property. Invasive mammals are already present on the property, and more species are likely to arrive at some point. The Virginia Opossum that we observed is considered to be an invasive species by ODFW, although they are naturalized across most of the country (ODFW, 2020). A larger threat to the property is colonization by nutria. Nutria are a small South American rodent that frequent rivers, creeks, and wetlands. Nutria have already been observed at Linfield College's portion of Cozine Creek. They burrow into stream banks, causing erosion and water quality issues. They also consume a large amount of native vegetation along the waterway, which has implications for native mammals and water quality (Meyer and Beatty, 2006). The property should be regularly monitored for nutria and mitigation actions should be taken as soon as possible if any are found.

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APPENDIX D.

Water Quality of Cozine Creek throughout the Barber Property

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INTRODUCTION

Freshwater is a crucial aspect of human life throughout the world, whether it is used for the irrigation of crops, drinking water, or the harvesting of aquatic organisms. As human populations expand, so do the stresses they put on surrounding freshwater resources; Cozine Creek is no exception to this (Dodds et al., 2013). Low water quality is associated with detrimental effects to creatures that call the water home, whether that be through population declines, range reductions of freshwater species, or an overall reduction of biodiversity within the water system (Dudgeon et al., 2006). The water quality of Cozine Creek has been an important focus of Linfield's environmental studies senior capstone class for many years now (Allen et al., 2019), which is why we are interested in analyzing it in this inventory and assessment of the Barber Property in McMinnville, Oregon. The goal of this project was to examine the water quality in Cozine Creek as it passes through the Barber Property to gain a better understanding of how it compares to other previously analyzed stretches of the creek in McMinnville.

Background:

Since European settlement, Cozine Creek has changed drastically. Previously, the areas surrounding Cozine Creek were dominated by prairie and oak savanna habitat that was managed by burns carried out by the Yamel tribe, a subset of the Kalapuya peoples of the lower Columbia (Anonymous, 2015). During the pre-European period, riparian habitat around Cozine Creek consisted primarily of deciduous trees, including Oregon ash (*Fraxinus latifolia*) and black cottonwood (*Populus trichocarpa*) (GYWC, 2019). Native vegetation such as Indian plum (*Oemleria cerasiformis*), Pacific ninebark (*Physocarpus capitatus*), and Oregon ash trees still are

found along the riparian area of Cozine Creek, although not at the levels at which they were once found.

Water quality has been examined at other locations along Cozine Creek by the Environmental Studies Senior Capstone Class since 2011; some qualities have improved over time, such as *E. coli* levels, whereas others have gotten worse, such as temperature (Allen et al., 2019). According to the most recent Oregon Department of Environmental Quality (ODEQ) assessment of Cozine Creek, which was carried out in 2014, it is designated as a category 5 stream. This categorizes the waterway as unfit for any type of use or recreation due to poor water quality; at the time of the assessment, the creek had experienced issues with *E. coli* levels and a petroleum spill (ODEQ, 2014). The Greater Yamhill Watershed Council (GYWC) has noted that *Escherichia coli* levels in Cozine Creek have gone beyond the legal limits for human recreational water use in the past (GYWC, 2019). We believe that it is in the community's best interest to improve water quality in Cozine Creek, including the section that runs through the Barber Property. Creating and maintaining a healthy riparian habitat filled with native vegetation can help with many water quality issues, such as preventing erosion and filtering nutrients from runoff, as well as reducing summer water temperatures (NRM South, 2014).

It is not just humans that benefit from increased water quality, but all species. With increased water quality comes increased presence and diversity of plants, insects, amphibians, and fish (Wentz et al., 1998). Ideally, better water quality in Cozine Creek could result in it one day serving as spawning and rearing habitat for many organisms including freshwater mussels, amphibians, and salmonids (ODFW, 2019).

METHODS

To begin testing the water quality of Cozine Creek at the Barber Property, we first determined where our sampling sites were going to be located. Due to restricted access to the creek as a result of overgrown vegetation (e.g., ninebark and Himalayan blackberry) as well as steep cut banks, we chose our sites based on accessibility. We selected three sites along Cozine Creek proper as it flows through the Barber Property and a fourth site on a side stream that feeds into Cozine Creek that was located on the Barber Property. Site 1 is the furthest upstream, and site 3 was located downstream from where the side stream flows into the creek (Figure 1). GPS coordinates of each site are listed in Table 1.

Figure 1. Location of water sampling test sites on the Barber property (map created by Barbara Van Ness).

Table 1. GPS coordinates for each of the sample sites at the Barber Property.

Site Name	Site Coordinates
Site 1	45.19105°N, -123.22040°W
Site 2	45.19157°N, -123.21799°W
Site 3	45.19263°N, -123.21584°W
Side Stream	45.19269°N, -123.21684°W

Water quality measurements and water samples were taken over the span of two weeks in spring 2020. Sampling at sites 1, 2, and the side stream was done on February 25th, 2020. Sampling at site 3 was done on March 3rd, 2020.

The water quality variables tested for on-site included pH, dissolved oxygen (DO), water temperature, and flow. The pH was taken by inserting the probe into the water, ensuring that it wasn't touching the bottom, until the reading stabilized. DO was measured using a dissolved oxygen meter by inserting the probe into an undisturbed area upstream and allowing the reading to stabilize before recording data; DO was recorded in both parts per million (ppm) and percentage relative to the surrounding air. The DO meter also was used to measure the water temperature. Flow was measured using a flow meter by inserting the probe into the creek in a manner so that the propeller was facing into the flow so it could spin freely with the current. We followed the same procedural methods we used in the fall for the Cozine Creek water quality assessment project in the senior capstone class; detailed methods can be found in that report (Allen et al., 2019).

We collected two water samples at each on the days we visited the sites – one in a BOD bottle and one in a sterile container. To determine biochemical oxygen demand (BOD), we wrapped the BOD bottles in foil and placed them in a dark container at room temperature in the lab. After five days, DO was measured in the samples. The BOD was calculated by subtracting the lab DO from the average field DO (Delzer and McKenzie, 2003). Turbidity, nitrogen, ammonia, phosphate, and bacterial levels were determined from the sterile water sample in the lab following the same procedural methods used in the fall for a water quality assessment project carried out by the senior capstone class (Allen et al., 2019).

RESULTS

We found acceptable levels of almost all abiotic water quality variables at all the sites tested (Table 2). Nitrate levels at sites 1 and 3 were above recommended levels, but were at acceptable levels for site 2 and the side stream.

Table 2. Mean (standard deviation) of water quality variables found at each site at Cozine Creek and the side stream on the Barber Property.

Variable	Site #1	Site #2	Site #3	Side Stream
DO%	99.20 (0.27)	94.68 (0.48)	99.36 (0.43)	97.40 (0.32)
DO (ppm)	11.91 (0.07)	11.50 (0.10)	11.34 (0.12)	11.47 (0.08)
Temp (°C)	7.42 (0.13)	6.96 (0.15)	9.54 (0.31)	8.22 (0.13)
pH	7.34 (0.04)	7.13 (0.04)	6.84 (0.03)	7.14 (0.06)
Flow (cm/s)	11.20 (2.05)	27.00 (0)	6.80 (1.64)	13.00 (0)
BOD%	21.46 (3.90)	9.66 (1.51)	18.00 (2.48)	13.84 (1.48)
Turbidity (FTU)	4.65 (0.34)	3.61 (0.37)	17.35 (0.41)	5.57 (0.81)
Nitrate (ppm)	8.80 (0)	0 (0)	8.80 (0)	1.76 (2.41)
Ammonia (ppm)	0.13 (0)	0.13 (0)	0.13 (0)	0.17 (0.09)
Phosphate (ppm)	0 (0)	0 (0)	0.10 (0)	0.04 (0.05)

We found acceptable levels of all bacteria tested for at each of the sites (Table 3). There were almost no *E. coli* found, with the exception of less than seven colonies per 100 ml of water at site 2, and no *Salmonella* found at any of the sites.

Table 3. Mean (standard deviation) levels of bacterial colonies per 100 ml of water sample at each site at Cozine Creek and the side stream found within the Barber Property

# Bacteria per 100 ml	Site #1	Site #2	Site #3	Side Stream
E. coli	0 (0)	6.67 (14.91)	0 (0)	0 (0)
Aeromonas	280.00 (76.74)	146.67 (50.55)	433.33 (146.06)	206.67 (101.11)
Salmonella	0 (0)	0 (0)	0 (0)	0 (0)
Other Coliforms	266.67 (74.54)	300.00 (192.93)	346.67 (119.26)	166.67 (78.17)

CONCLUSIONS AND RECOMMENDATIONS

Water quality variables can help determine the suitability of a waterway for organisms living within it as well as people who use it for recreation. For the Barber Property, we felt it was best to look at water quality based upon recommended freshwater quality levels as determined by the Yamhill Basin Council and the EPA (Table 4) (Yamhill Basin Council, 2004; EPA, 2015).

Table 4. Recommended levels of freshwater quality variables (Yamhill Basin Council, 2004; EPA, 2015).

Variable	Recommended Levels of Freshwater Water Quality Variables
DO%	> 36.31
DO (ppm)	> 3.00
Temp (℃)	<= 18.00
pH	6.50-8.50
Flow (cm/s)	> 20.00
BOD%	N/A
Turbidity (FTU)	<= 20.00
Nitrate (ppm)	<= 2.00
Ammonia (ppm)	<= 0.20
Phosphate (ppm)	<= 0.10
E. coli (# per 100 ml)	<= 406
Aeromonas (# per 100 ml)	N/A
Salmonella (# per 100 ml)	N/A
Other coliforms (# per 100 ml)	N/A

Comparing our results to the recommended levels (Table 4), water quality appears to be fairly good in Cozine Creek as it runs through the Barber Property. *E. coli* levels were much lower than recommended guidelines; only one site had any *E. coli* and it was low. *Salmonella* wasn't present at any of the sites.

In regards to water quality, most of the results we found were much better than what has been measured at other sites along Cozine Creek by previous Environmental Studies Senior Capstone classes; specifically, DO, turbidity, and temperature levels were all better than what we found at other parts of Cozine Creek in fall 2019. However, our samples were taken during the winter, so our results are very different from what our class has measured at the end of summer and in the fall (Allen et al., 2019). Temperature results are likely much lower than they would have been if they were measured in the middle of summer. Regardless, improvements could be made. Improving the riparian habitat along the creek throughout the Barber Property would reduce nutrient contamination from nearby runoff (e.g., from neighborhood lawns) and would provide shade to the creek, helping reduce summer temperature (National Wildlife Federation, 2019). This is important because as water temperatures increase, the capacity to hold DO is decreased, which can prove detrimental to the health of organisms inhabiting the water (Connolly et al., 2004). As public awareness of the importance of Cozine Creek's health increases, we would also hope to see less pollution in the form of littering and other activities directly caused by people.

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APPENDIX E.

Barber Property Land Use History

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INTRODUCTION

Human activity and its effects are so varied, ranging from direct physical impacts such as logging to indirect consequences such as global climate change, that a consideration of land-use legacies could be boundless (Foster et al., 2003). Varying consequences to the land result from these human activities, and future management must consider land use history. This chapter will discuss information about land use history including the current management regime for the property.

METHODS

To better understand the history of the land, we performed searches both online, as well as in physical library archives. Staff of the McMinnville Public Works Maintenance Department provided original deed and land donation documents, a timber cruise, as well as recollections about the property from the former Parks Maintenance Director, Jay Pearson. Keyword searches were performed on topics such as “McMinnville Grange", “Barber Property", and “Paul A. Barber" on Linfield College and McMinnville Library databases. We also searched for historical documents and photographs of the parcel on the Yamhill Valley Historical Society website and Yamhill Valley News-Register archives. Additionally, aerial photographs of the McMinnville area beginning in the 1950s were found online through a commercial site. We also interviewed neighboring residents and asked about their knowledge and perceptions of the property.

Land Use History:

Prior to 1855, the Yamhelas Indian Tribe lived in what is now known as Yamhill County alongside the banks of the Yamhill River. We presume that the Yamhelas- later adapted to Yamhill- also resided along Cozine Creek due to the proximity and access to the river. In 1855, tribe members were temporarily ordered to the Grand Ronde Reservation, later made permanent

by President James Buchananan (Marschner 2013). Following the forced removal of the Native Yamhelas, the City of McMinnville began its journey to what it has become today.

William T. Newby constructed a mill on what would become Third Street and platted the City of McMinnville in 1855. Named after his hometown of McMinnville Tennessee, the original city boundary did not cover more than three acres in area. Over 175 years later, the city limits of McMinnville have expanded to over 10.5 acres (City of McMinnville, 2020). West of McMinnville, the land is undeveloped. Land located west of Old Sheridan Road is not included in McMinnville City limits and is still primarily used for crops and agriculture. According to aerial photographs,construction on the McMinnville Grange began in 1953 and finished in 1954 (Figure 1).

Figure 1. Construction of the McMinnville Grange in 1953. The Douglas-fir stand that characterizes the Barber Property is visible in the background (photo from Yamhill County News Register 1953).

Little changed in the area until the Willamette Educational School District Service Center located just East of the property was constructed in the late 1990s . The apartment complex adjacent to the property was constructed around the year 2000 and the subdivision off of Mitchell Street and Ash Creek Lane was built shortly after (Figure 2). These additions and developments around the Barber property have affected the activity and increased traffic in the area.

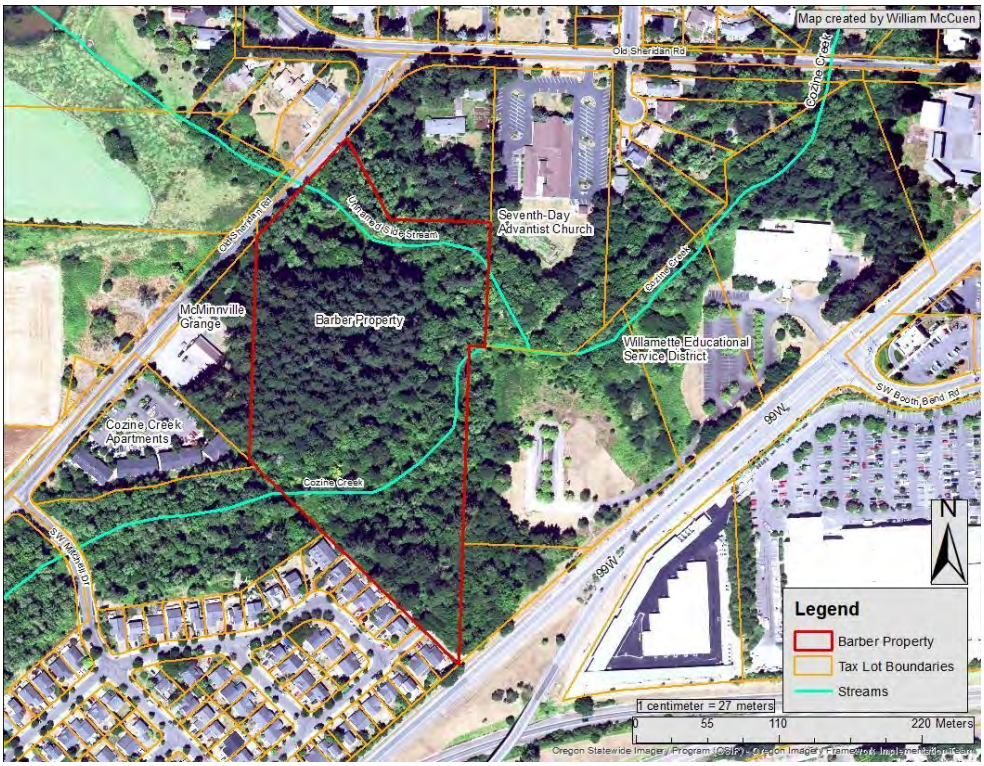

Figure 2. Aerial view of the Barber property and the surrounding tax lot boundaries

Paul Barber:

The Barber property was donated to the City of McMinnville by former owner Paul A. Barber. The south parcel donated in 1979 was 4.6 acres and an adjoining 7 acre plot to the north was donated in 1993. The Cronk & Holmes timber cruise (1992) states that, "Mr. Barber has owned this tract for many years" (Cronk & Holmes, 1992). Barber (1924-2007) was an incredibly active member of the community and donated other pieces of land that have since become well-known McMinnville locations Adding to his service in the City of McMinnville, Barber was a member of a plethora of city boards and groups including the Mayor's Blue Ribbon Commission to evaluate long term management of the City's watershed, Donating an 11.6 acre plot of land in Southwest McMinnville was the least of Paul Barber's contributions to the city of McMinnville. A retired U.S. Army Veteran (1943-1946), Barber grew up in Tacoma, Washington and graduated from the University of Washington with a forestry degree that he applied during his ownership of CGC Tree Farm Ltd. beginning in 1986. From 1969-1979, Barber was appointed by the Mayor of McMinnville to serve on the McMinnville Water and

Light Commission, and during the 1980s, Barber evaluated long term management of the City's watershed while on the Mayor's Blue-Ribbon Commission. Other surfacing results of Barber's achievements include acting as both director and President of the McMinnville Elks Club in separate years, as well as achieving standing membership as a charter member of the Western Hardwood Association. In addition to his service, Barber donated four total plots of land to the City. Two Barber property parcels as well as a 6-acre parcel of land up Baker Creek that included remnants of McMinnville's first electric generating plant from a dam on the property. Barber is also the founder of Juliette's House, a 5,000 square foot building that is a safehouse for victims of childhood abuse and an assessment center (Yamhill County, 2000). This donation was given to the city just before his wife, Juliette, passed (Fliszar, L. personal communication, February, 11, 2020). Alongside donating the parcel of land later known as the Barber Property, Mr. Paul Barber left the City of McMinnville a legacy of generosity, servitude, and stewardship.

1992 Barber Property Timber Cruise:

In August of 1992, Alton Cronk and Richard Holmes of 'Cronk & Holmes Consulting Foresters' conducted a Timber Cruise on the Barber Property. The timber cruise found the site was composed primarily of Douglas-fir trees ranging from 120-160 years old and of good solid quality. The age class of the existing stand suggests that the property has been forested since the mid-1800s and was most likely never cultivated for agricultural purposes. The cruise also identified smaller amounts of merchantable western hemlock (*Tsuga heterophylla*), Oregon ash (*Fraxinus latifolia*), and Oregon white oak (*Quercus garryanna*) trees. The total net value of timber on the Barber property was determined by the cruise to be $148,000 (Cronk & Holmes, 1992). Although the timber cruise was performed and the Douglas-fir stand deemed to be valuable, Barber never had the trees logged and further requested that the woods be preserved and available for the community to enjoy (Fliszar, L., personal communication, 11 February, 2020).

Additionally, Mr. Barber was a member of the Oregon Small Woodlands Association- an extension of Oregon State University programming. Following Paul's passing, the former parks and recreation director, Jay Pearson, met with friends of Barber who served alongside him on the association's board. From the meeting, it is noted that Pearson was under the impression that these colleagues wanted the site to become an interpretive park that highlighted forestry practices

and history of woodsmen in the area. This park would be an example of historical and present forestry practices, as well as societal contributions through logging (Fliszar, L., personal communication, 11 February, 2020).

Current Uses and Management Regime:

Although a sign on the gate to the property alongside Old Sheridan Road declares this property is intended to be a future city park, due to current staffing and funding challenges the City of McMinnville is only able to conduct minimal maintenance on the Barber Property (Figure 3). Typically this involves cutting down hazard trees and removal of illegal campsites.

Figure 3. Sign on gate to Barber Property located in the Ash Creek Lane subdivision (photo by Bill Fleeger).

Neighbors have claimed that illegal camping and inappropriate uses have increased in recent years, and we frequently saw litter and abandoned campsites while visiting the property early in the inventory and assessment process. In fact, according to the Yamhill County Action Partnership (YCAP), which conducts transient counts each year, the homeless population in Yamhill County has grown by 34% in the last two years (YCAP, 2019).

The city has recently begun addressing the issue of invasive species on the Barber property. This was driven in part due to the recent discovery of an infestation of garlic mustard (*Alliaria petiolata)* along sections of Cozine Creek. While all invasive species pose a threat to the health of the environment, the recent rapid spread of garlic mustard has concerned conservation groups, landowners, and the City of McMinnville. Garlic mustard is a highly invasive herb species that had been believed to not yet have infiltrated Yamhill County borders until Spring 2019. Prior to this discovery, Yamhill County was considered one of the last counties in the Willamette Valley without the presence of garlic mustard. According to the Oregon Department of Agriculture, garlic mustard "displaces native forest understory species, reducing diversity and decreasing foraging availability for deer". The plant is especially difficult to control once it has established territory due to seed longevity and seed number (each plant produces thousands of seeds) (Oregon Department of Agriculture, 2020). In fall of 2019, Riedman Land Stewardship LLC was contracted by the City of McMinnville to brush-mow areas that were dense with blackberry and ivy. During this time, they spotted the invasive herb and notified the City. Because of the high danger of the plant spreading, and in the interest of upholding Yamhill County's "garlic mustard free" title, the City of McMinnville gave Luke Westphal and the Greater Yamhill Watershed Council the green light to fully access the property and treat for the species at the 'most effective times of the year' (Fliszar, L. personal communication, 27 April, 2020). Since 2017, Yamhill Soil and Water Conservation District has received three 12-month grants to pay for spot-spraying of known garlic mustard infestations along Cozine Creek (Figure 4).

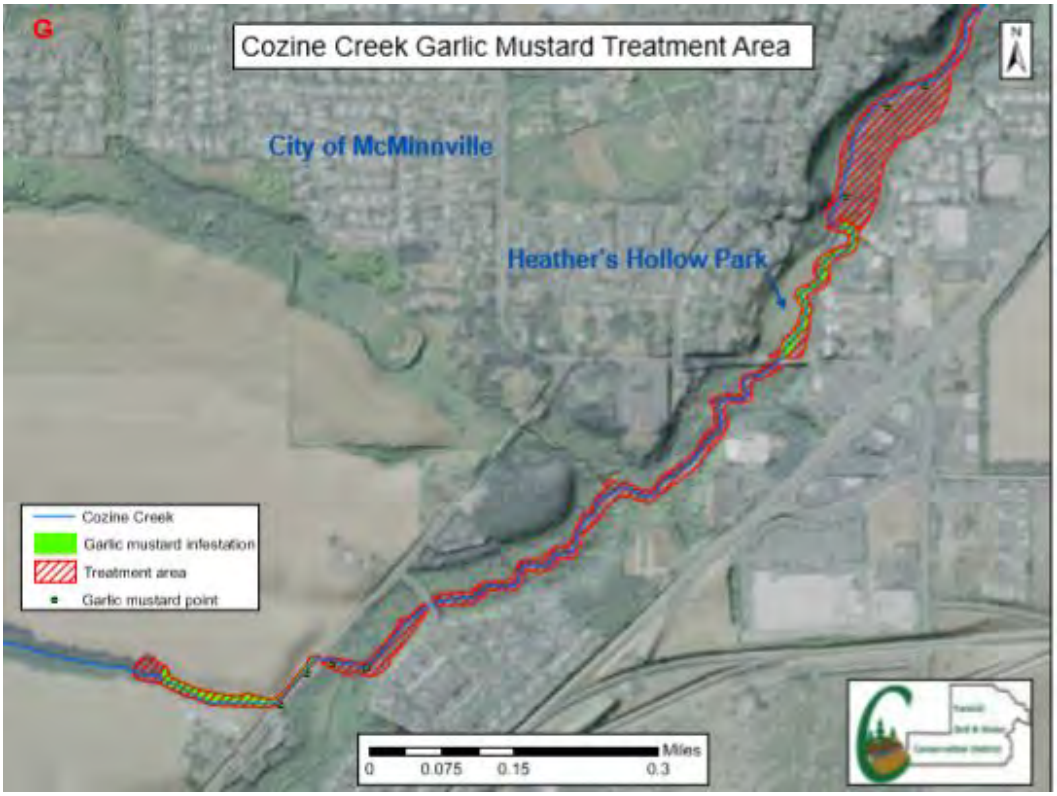

Figure 4. Map of Cozine Creek and Garlic Mustard Treatment (Map provided by the Yamhill Soil and Water Conservation District; thanks to Luke Westphal of the Greater Yamhill Watershed Council).

Since treatment has begun, the property has seen improvements in the vegetation cover and native species that have returned. An impressive amount of Camas (*Camassia*) has sprouted in the areas previously brush-mowed to clear himilayan blackberry (Sapunar, K., personal communication, 5 May, 2020) (Figure 5).

Figure 5. Vegetation recovery on mowed areas that were previously covered in Himilayan blackberry. Note the prevalence of new Camas growth. Photo taken on Kim Sapunar's property looking south into the Barber Property (photo by Kim Sapunar, 5 May, 2020).

CONCLUSION AND RECOMMENDATIONS

Based upon what is known from our research of the land use history, the Barber property has been a forested island on the edge of cultivated agricultural land since the mid 1800s. As the City of McMinnville has grown,the parcel was eventually incorporated into the city limits and the surrounding properties developed starting in the 1950s with the Mcminnville Grange. The adjacent subdivisions and commercial properties were added in the last three decades. This recent development of the area has allowed increased access and inappropriate use of the property, but has also provided the opportunity to provide future access points to the property for appropriate use. Currently on the Barber property, the city and partnering organizations are taking action to control the spread of currently-present invasive species, especially garlic mustard and English ivy. Increased maintenance and surveillance of the property along with continual control of invasive species will improve the ecological condition and address issues of inappropriate uses of the Barber Property.

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APPENDIX F.

Stakeholders around the Barber Property

Garrett Scales
Garrettscales11@gmail.com

INTRODUCTION

Stakeholders are defined as individuals, groups, or organizations that are involved in or impacted by an action or policy that a governmental organization might take. Additionally, stakeholders are typically consulted or involved in the decision making processes for these organizations, because they can hold a tremendous amount of weight in the decision making process, so getting them involved locally could potentially be very effective (Vogler et al., 2017). In addition, stakeholders have the ability to assist in formulating policy and can help issues receive more recognition. It also is believed that commitment from different stakeholder groups is absolutely critical to the success of policies and projects in the environmental field (United Nations, 2020). This project focused on our effort to better understand the concerns and preference of local stakeholders in relationship to Barber property. We present the results of in-person interviews with neighbors of the property and the findings of short questionnaires distributed to neighboring properties. We also provide recommendations for maintaining positive stakeholder relationships and engaging cooperatively with neighbors of the property to further the restoration and enhancement of Barber property as well as the greater Cozine Creek corridor.

Background

The Barber property is located in the southwestern portion of the City of McMinnville at the edge of the city limits (Figure 1). The property is bounded by Old Sheridan Road and agricultural land to the west; the McMinnville Grange, an apartment complex and a small residential subdivision to the south; and the Willamette Educational Service District office to the east. To the north, the property abuts one large residential tax lot and the Seventh Day Adventist Church. To the northeast of the property there is a small cul-de-sac neighborhood off Old Sheridan Road (Figure 1). Although it does not directly connect to the Barber property, it has neighbors that have an interest in the property and have been involved in working with the

Greater Yamhill Watershed Council (GYWC) and conducting restoration work on their section of Cozine Creek.

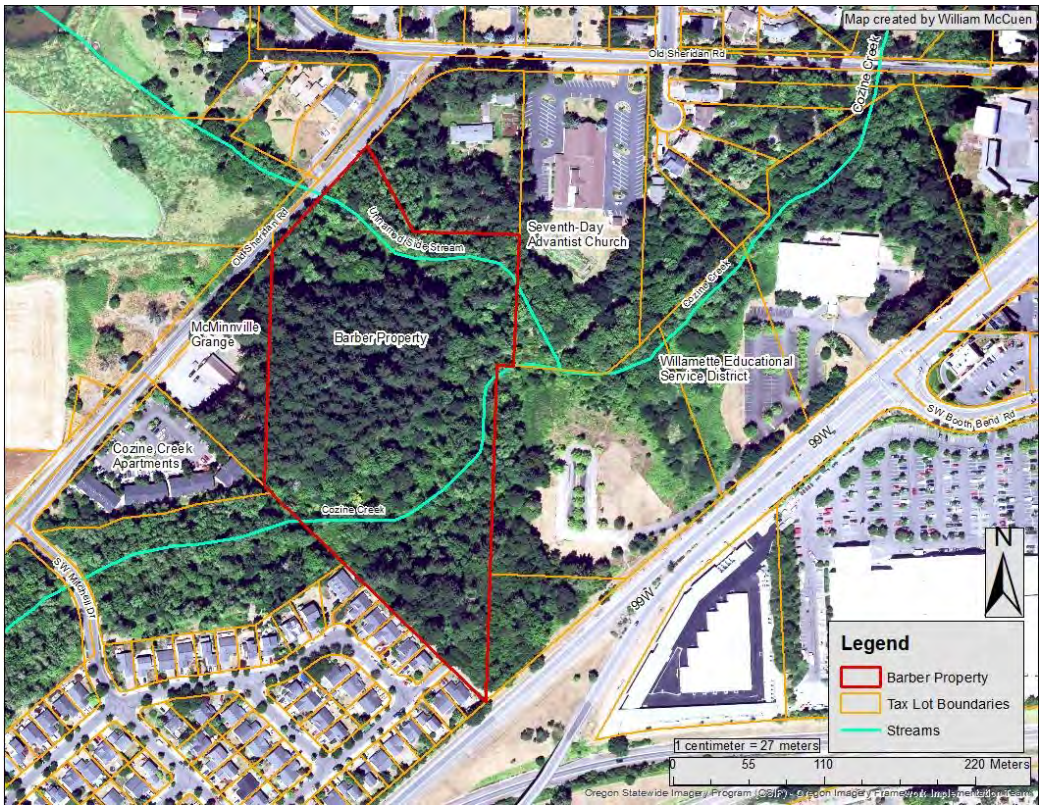

Figure 1. Aerial view of the Barber property and the surrounding tax lots. (Map by William McCuen).

Due to budget and staffing issues, the City of McMinnville Public Works Department currently provides only minimal management and upkeep for the property. This often involves a crisis response dealing with hazard trees, picking up trash, and removing illegal campsites that arise on the property. The property contains significant populations of invasive plant species, particularly English ivy and holly. Because the property is not high on the city's priority list, issues such controlling invasive species or improving walking trails are unlikely to be addressed in the near future (Fliszar, personal communication, 27 April, 2020)

METHODS

We attempted to conduct in person interviews with the stakeholders that own land directly adjacent or close to the Barber property. We also mailed an introductory letter that included a QR code and link to a SurveyMonkey questionnaire to residents in the neighborhood adjacent to the Barber property. We also intended to place posters with links and a QR code to the questionnaire in public places around McMinnville. However, this effort was not completed due to the early dismissal of students from campus due to the COVID-19 crisis.

RESULTS

Interviews

We conducted in person interviews with three of the adjacent stakeholders: the owner of the large residential lot to the north of the property; a representative from the Seventh Day Adventist Church; and a property owner in the cul-de-sac off of Old Sheridan Road. There was substantial agreement among the interviewees regarding their perspectives of the property. The major finding from the interviews are described below:

- Stakeholders reported observing only limited use of the property except for instances of illegal camping, which from their perspective has increased over the last two years.
- Stakeholders are highly supportive of the city's interest in controlling invasive species and would be willing to volunteer with the city to help the Barber property. Additionally, all interviewees reported that they had engaged in invasive species control on their own properties and the church and the neighbors in the cul-de-sac had obtained a grant and support for their control efforts from the Greater Yamhill Watershed Council (GYWC).
- All interviewees were supportive of modest improvements including the development of walking paths on the property.
- The Seventh Day Adventist church expressed an interest in using the property for the environmental education program at their school.

Questionnaire

We received five responses to our questionnaire (n=5). Similar to the interviews, respondents identified illegal camping as the primary observed use of the property. However, viewing nature and recreational and dog walking were also mentioned (Figure 2).

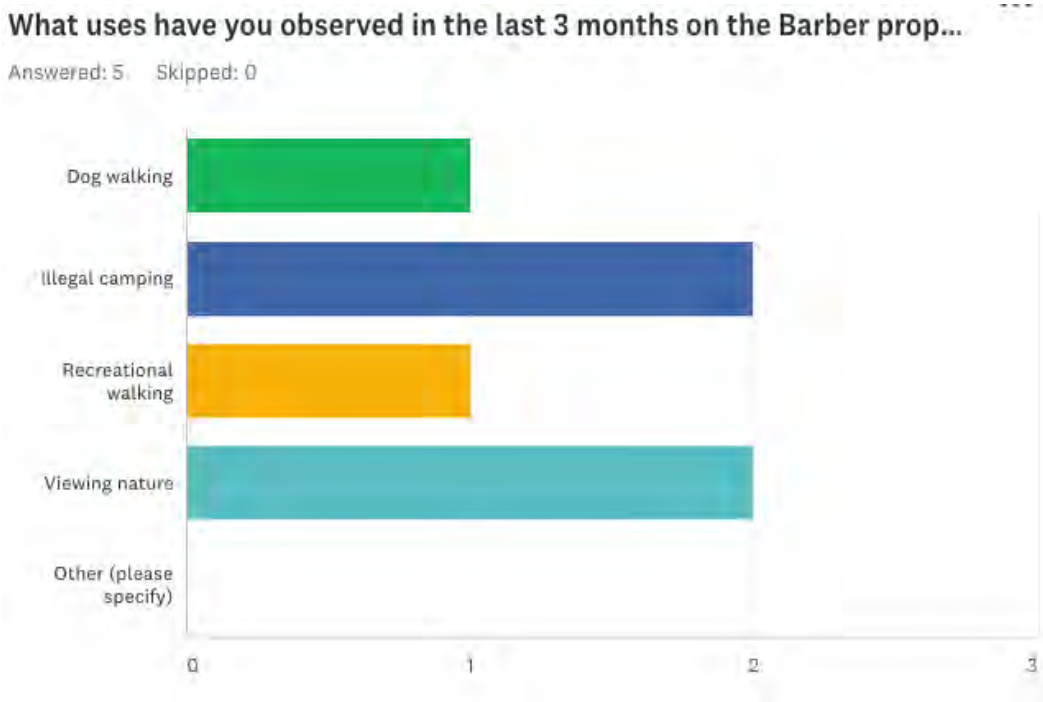

Figure 2. Observed uses of the Barber property in the last 3 months.

Respondents indicated that inappropriate use, litter, and invasive species were their greatest concerns about the property. Three respondents also expressed a concern for the ecological health of the property. (Figure 3).

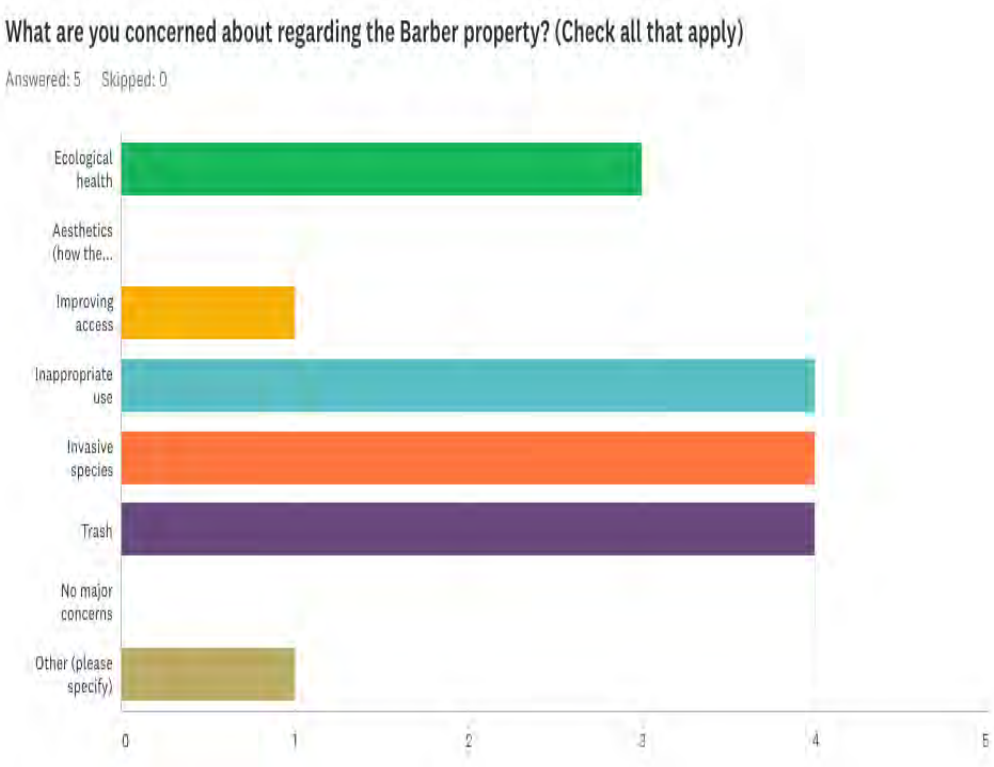

Figure 3. Respondents concerns regarding Barber property.

Four respondents indicated they would most like to see the invasive species on the property controlled. Three respondents also indicated they would like to see trash removed and walking paths established on the property (Figure 4).

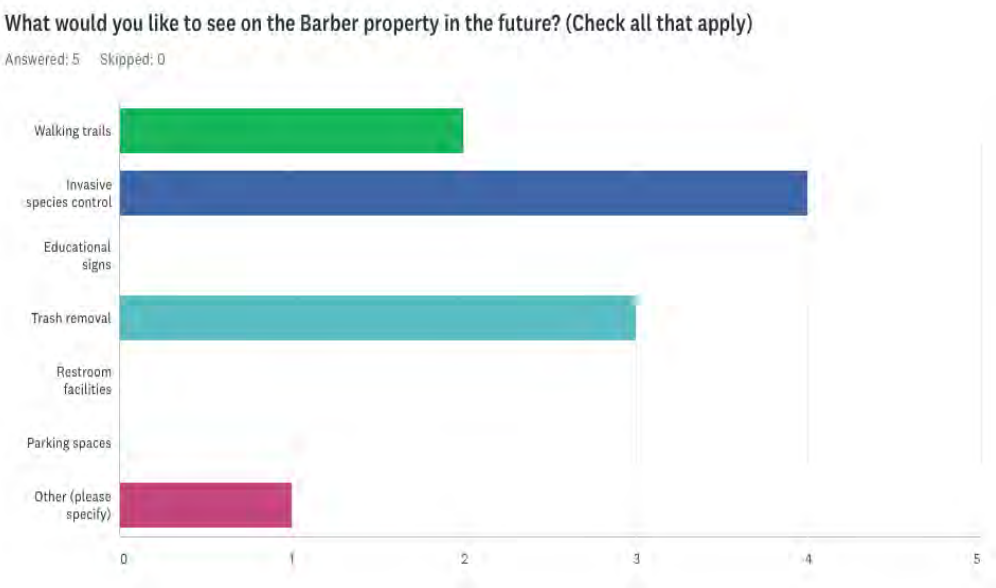

Figure 4. Respondent preferences for future actions on the Barber property.

CONCLUSIONS AND RECOMMENDATIONS

Throughout the course of our research, it became clear the stakeholders with immediate proximity to the Barber property are committed to cleaning up the area. One local stakeholder, Kim Sapunar, got involved with the GYWC to remove invasive species on her land that is adjacent to the Barber property. Through her actions, Kim was able to get support from her neighbors and the Seventh Day Adventist church. With help they were able to clear large swaths of invasive species north of the Barber property. Robin Russell, another landowner near the Barber property, has contracted someone to come and spray/remove invasive species as well. Much like the stakeholders that were interviewed, the survey respondents indicated that their concerns about illegal use of the property, invasive species removal and general clean up of the area. There was also substantial agreement between the interviewed stakeholders and the survey respondents that these three issues were important in considering what should be done on the property in the future.

In terms of recommendations for what to do next with the Barber property, there were a couple of things that the City of McMinnville could do to improve the condition of the property. First, the city should follow up with the neighbors who have been performing restoration work on their properties. These neighbors have made an impact on their portion of the land and the

city has the opportunity to complement their effort by also controlling invasive species on the Barber property. Second, the city should communicate and stay in touch with the Seventh Day Adventist church that has large parcels north of the Barber property. The church has shown a considerable interest in using the property for environmental education and service-learning projects for their school. This potential partnership may be able to provide some assistance with litter pick-up, invasive weed control and planting of native species.

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Poster:

Barber Property Survey

Who: Linfield College's Environmental Studies Senior Capstone Class, the City of McMinnville and the Greater Yamhill Watershed Council.

What: Conducting a natural resources inventory and assessment of the Barber Property, and advising the City of McMinnville on future management options.

Where: The Barber Property is the heavily wooded plot of land behind the McMinnville Grange and stretching across Cozine Creek (see below).

Why: Students have created a survey in order to learn more about your ideas and perspectives on the future management of the property. This survey will help students better understand the uses as well as the issues and concerns stakeholders have about the Barber property.

Questions:? Contact:

William (Bill) Fleeger Ph.D. (faculty)
wfleeger@linfield.edu
(503)-883-2341

Cameron Dole
(student)
cdole@linfield.edu

Garrett Scales
(student)
gscales@linfield.edu

SURVEY LINK:
www.surveymonkey.com/r/GYJDYM3

Letter:
March 10, 2020

Environmental Studies
Linfield College
900 SE Baker Street
McMinnville, Oregon 97128

Dear Neighbor,

Linfield College's Environmental Studies Senior Capstone Class, in partnership with the City of McMinnville and the Greater Yamhill Watershed Council, are conducting a natural resources inventory and assessment of the Barber Property- the heavily wooded plot of land located behind the McMinnville Grange and stretching across Cozine Creek (see enclosed map). The purpose of this project is to develop a better understanding of the ecological health and habitat quality of this property and its relationship to the Greater Yamhill Watershed. We envision that this will occur in two phases. The first phase involves conducting the natural resource inventory and assessment. The second phase involves the development of a restoration plan for the property and potentially seeking granting funding to control invasive plants and re-establish native vegetation on the property. As part of the first phase, we are reaching out to stakeholders and neighbors to inform you about this project and to notify you that students will be frequenting the property to measure trees, map native and non-native plant populations, sample water quality and document overall site condition.

Students are also interested in learning more about your ideas and perspectives on the future management of this property. To accomplish this, we have developed a short questionnaire that you can access by entering this link (https://www.surveymonkey.com/r/GYJDYM3) in your internet browser or by following the QR code included below. We anticipate it will require 5 minutes to of your time to answer these questions and your responses will help students better understand the uses as well as the issues and concerns stakeholders have about this property. We are also willing to set up a time to meet with you if you prefer to answer these questions in person. If you would like to learn more about this project or get involved by talking to us about the Barber property, please feel free to reach us at the contact information below. We would look forward to talking with you.

Sincerely,
William (Bill) Fleeger Ph.D. (faculty)
wfleeger@linfield.edu
(503)-883-2431
-or-
Cameron Dole (student)
cdole@linfield.edu
-or-
Garrett Scales (student)
gscales@linfield.edu

Survey:

Barber Property Stakeholders Survey:

Linfield College's Environmental Studies Senior Capstone Class, in partnership with the City of McMinnville and the Greater Yamhill Watershed Council, are conducting a natural resources inventory and assessment of the Barber Property – the wooded plot of land located behind the McMinnville Grange and adjacent to Cozine Creek. The purpose of this project is to develop a better understanding of the ecological health and habitat quality of this property and its relationship to the Greater Yamhill Watershed. We are reaching out to stakeholders and neighbors to inform you about this project and to notify you that students will be frequenting the property to document overall site condition.

Students are interested in learning more about your ideas and perspectives on the management and future of this property. To accomplish this, we have developed a short questionnaire. We anticipate it will require approximately 10 minutes to answer these questions. Your responses will help us better understand the uses as well as the issues and concerns stakeholders have about this property. Your responses to this survey are voluntary, and all individual information will remain confidential.

We also are willing to set up a time to meet with you if you prefer to answer these questions in person. If you would like to learn more about this project or get involved, please feel free to reach us at the contact information below. We would look forward to talking with you.

1. How often do you personally access or use the Barber Property?

___ 1-2 times per year
___ 1-2 times every 6 months
___ 1-2 times per month
___ 1-2 times per week
___ Never

2. What uses have you observed in the last 3 months on the Barber Property? (Check all that apply)

___ Illegal Camping
___ Recreational Walking
___ Viewing Nature
___ Dog Walking
___ Other (Provide further detail in space below)

3. How satisfied are you with the current management of the Barber Property?

___ Not Satisfied
___ Somewhat Satisfied
___ Neither Satisfied or dissatisfied
___ Satisfied
___ Very Satisfied
___ Other (Provide further detail in space below)

4. What are you concerned about regarding the Barber Property? (Check all that apply)

___ Ecological Health
___ Aesthetics (How the property looks)
___ Improving Access
___ Inappropriate Use
___ Invasive Species
___ Trash
___ No Major Concerns
___ Other (Provide further detail in the space below)

5. What would you like to see on the Barber Property in the future? (Check all that apply)

___ Walking trails
___ Invasive species control
___ Educational signs
___ Trash removal
___ Restroom facilities
___ Parking spaces
___ Other (Provide further detail in space below)

6. How would you like the City of McMinnville to manage the Barber Property?

___ No Management (stay the same)
___ Little Management (i.e. invasive species control)
___ Some Management (i.e. walking paths in addition to invasive species removal)
___ Full Management (i.e. creating a natural park)

7. Do you think control of invasive species on the property would affect you negatively?

___ Yes (Please explain in the space below)
___ No
___ I am unsure

8. How close do you live to the Barber Property?

___ Directly adjacent
___ ¼ Mile – ½ Mile
___ ½ Mile – 1 Mile
___ More than a mile

9. Do you own or rent the property where you live?

___ Rent
___ Own
___ Other (Provide further detail in space below)

10. Would you be interested in volunteering at the Barber property?

___ Yes (If yes, please provide contact information below)
___ No

Name_____

E-mail_____

Phone_____

The ENVS 470 Capstone Environmental Project Team during our weekly Zoom meeting.