Final Botanical Report for the Nason Creek Floodplain Enhancement Project

Overview of Nason Creek and surrounding conifer forest (Left) and Spotted knapweed (*Centaurea stoebe*) the most abundant noxious weed of the Nason Creek Project Area (Right).

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1. Introduction

Yakama Nation Fisheries, Upper Columbia Habitat Restoration Project, (UCHRP) is performing habitat restoration projects in the Upper Columbia Basin of Washington to restore aquatic and riparian habitats to support the recovery of Endangered Species Act (ESA) listed fish species. Preliminary plans for the Nason Creek Floodplain Enhancement Project (Project) includes placement of artificial log structures, development of side channels, promoting pool development, and increasing floodplain connectivity along Nason Creek.

A botanical inventory was conducted for the project in 2020 to identify and document any state or federal listed vascular plants (rare plants), state or county listed noxious weeds and document and describe the existing plant communities within the Project Area. The purpose of this document is to support review by the Yakama Nation and follows methods consistent with the Washington State Natural Heritage Program (WNHP). Botanical inventory surveys and associated wetland assessment and delineation were performed at the Nason Creek Project by Hamer Environmental for Yakama Nation Fisheries Program.

The Nason Creek Project is located in Chelan County, Washington on Nason Creek between River Mile 3.4 and 4.6. The proposed Project is 12.0 miles north of Leavenworth, Washington and accessed from State Highway 207 (T 26N, R 17E, S 9). The Project Area of Potential Effect, (APE) is less than 50 acres in size. The Project Area also includes APE for equipment staging and access routes to perform work located above the OHW.

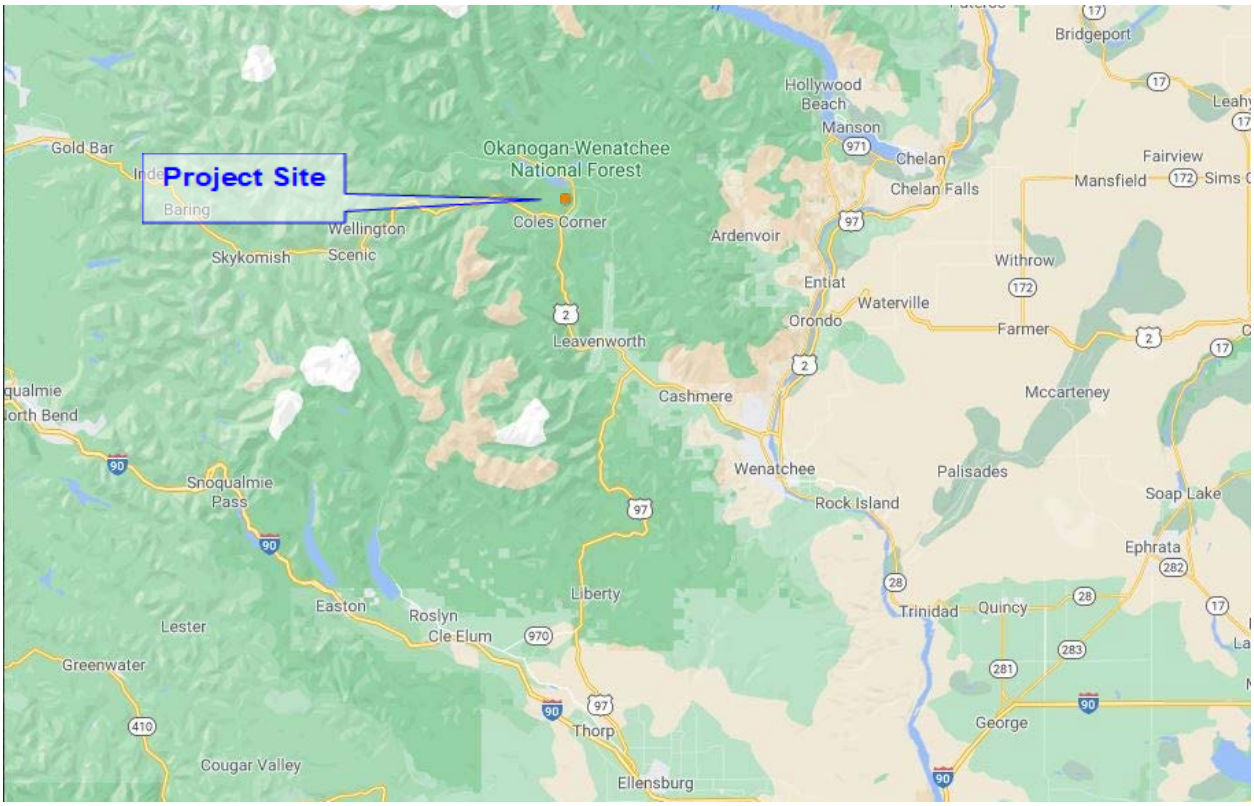

Figure 1. Nason Creek Project Vicinity Map, Chelan County, Washington.

2. Methods

2.1 Pre-field Review of Rare Plants with Potential to Occur in the Project Area

A pre-field desktop review was conducted to create a priority list of rare vascular plant species with potential to occur in the Nason Creek Project vicinity. This refined rare plant list was also used to determine best timing for field botanical surveys based on flowering times of those plant species. The WNHP of the Washington Department of Natural Resources, maintains records of all rare plants and the rare plant list for Chelan County, WA served as the baseline (WNHP 2020a). The WNHP rare plant list was refined to exclude those rare plants found only at high elevations or other habitats not found at the Nason Creek Project (Appendix A). Secondly, a GIS dataset of rare plants maintained by the WNHP was used to identify rare plants and high-quality ecosystems located within a 10-mile radius of the Project Area (WNHP 2020b). These plants and plant communities have a higher likelihood of occurrence due to their proximity to the Project but were similarly excluded if range or habitats had no potential for occurrence at Nason Creek (Table 1).

Table 1. Rare Plants and Plant Communities within 10-miles of the Nason Creek Project[1] (WNHP 2020b).

Common Name	Scientific Name	Approximate Distance from Site	State Status	NatureServe Status
Smoky Mountain sedge	Carex proposita	8.2 mi WSW	S	-
Thompson's chaenactis	Chaenactis thompsonii	9.5 mi S	S	-
bulb-bearing water-hemlock	Cicuta bulbifera	4.4 mi N	S	-
Wenatchee larkspur	Delphinium viridescens	3.2 mi SE	T	-
Salish fleabane	Erigeron salishii	9 mi SSW	S	-
Salish fleabane	Erigeron salishii	8 mi WSW	S	-
Taylor's stickseed	Hackelia taylorii	9 mi SSW	T	-
Rone's biscuitroot	Lomatium roneorum	8 mi NNE	E	-
Rone's biscuitroot	Lomatium roneorum	10 mi SSE	E	-
Rone's biscuitroot	Lomatium roneorum	4.2 mi ESE	E	-
false mountain willow	Salix pseudomonticola	9 mi SSW	S	-
strawberry saxifrage	Saxifragopsis fragarioides	7 mi S	T	-
strawberry saxifrage	Saxifragopsis fragarioides	7 mi SW	T	-
Seely's catchfly	Silene seelyi	8 mi S	S	-
Seely's catchfly	Silene seelyi	7 mi NNW	S	-

Common Name	Scientific Name	Approximate Distance from Site	State Status	NatureServe Status
Bog Willow / Beakrush / Sphagnum Shrub Fen	Salix pedicellaris / Rhynchospora alba / Sphagnum Shrub Fen	4.4 mi N	-	Vulnerable
Buxbaum's Sedge Fen	Carex buxbaumii Fen	4.4 mi N	-	Vulnerable
Lesser Panicled Sedge / Hamatocaulis Moss Fen	Carex diandra / Hamatocaulis vernicosus Fen	4.4 mi N	-	Not Ranked
Mud Sedge / Sphagnum spp. Fen	Carex limosa / Sphagnum spp. Fen	4.4 mi N	-	Not Ranked

[1]Rare Plants – Several high-elevation WNHP rare plant detections were excluded from table due to lack of habitat at Nason Creek.

To determine best timing to conduct field botanical surveys, further research was required to identify the flowering period (or best time of year) for field identification of each rare plant species. Three sources in order of preference were consulted for flowering period of rare plants: WNHP Rare Plant Field Guide, Burke Herbarium Image Collection and the Consortium of Pacific Northwest Herbaria Specimen Database (WNHP 2011, Burke Museum Herbarium 2020, Consortium of PNW Herbaria 2020).

The 35 plant species on this rare plant list were the focus of the botanical inventory surveys, and timing of surveys was determined based on the flowering period of these rare plants (Appendix A).

2.2 Field Botanical Surveys

The field botanical inventory surveys included two visits conducted in the early and late-summer of 2020, and included:

1. A full walk-through of all potential project APEs and access routes, including a 100-foot buffer surrounding all project APEs and access routes. Since the Nason Creek Project is still in preliminary phase, a larger buffer was applied to proposed APE corridors than a standard project site to ensure maximal coverage in case final site plans require adjustment.
2. A botanical inventory of the project was performed by conducting meandering transects throughout the site and associated buffers following an intuitive controlled approach accepted by WNHP. All vascular plant species observed were recorded, and extra time was spent in areas with habitats suitable for rare plants.
3. Plant communities comprising the site were documented and described, noting general conditions. Existing plant communities were identified in the field, using plant community associations from *Classification and Management of Aquatic, Riparian, and Wetland Sites on the National Forests of Eastern Washington* when possible (Kovalchik and Clausnitzer 2004).
4. When a rare plant or rare plant community was observed, a WNHP rare plant/plant community data form was completed, the location documented by GPS, and photos collected.
5. Any Washington state noxious weeds encountered during the surveys were documented, and all large Class A and B weed infestations were mapped (Washington State Noxious Weed Control Board 2020).

Any plants that could not be positively identified in the field were collected for later identification with a dissecting microscope and additional botanical references.

3. Results

Botanical inventories of the Nason Creek Project and associated buffers were conducted, by Hamer Environmental botanist, Erin Colclazier, on 13-14 July and 19-20 August 2020. A total of 250 plant species were identified at the site (Appendix B). Incidental wildlife observed during the botanical inventories were also documented (Appendix C).

3.1 Existing Plant Communities

The Project Area consists of a section of Nason Creek located immediately adjacent to State Highway 207, with gravel bar and large cobble banks, seasonal side channels and natural log structures surrounded by mixed conifer-deciduous and mature conifer riparian forest, dense riparian shrublands and some wetland areas. Most of the Project APE's (Areas of potential effect), are located within the Ordinary High Water (OHW) of Nason Creek channel and side-channels, with cobble-gravel dominated banks that contain sparse vegetative cover, but become dense with shrubs along the forest (inland) and water edges. The influence of State Highway 207, results in non-native plants, noxious weed infestations and trash along the highway shoulder and forest edge. An area surveyed east of State Highway 207, just north of a large powerline right-of-way (ROW) contains riverine forest and pond wetland habitat with hydrologic connection to Nason Creek through culverts. In the central portion of the Project Area, a cattail slough (emergent riverine wetland) was documented, with hydrologic connection to Nason Creek. Another unique habitat encountered, is a meadow surrounded by mid-succession conifer forest adjacent to (east of) an area recently logged and located in the north-central portion of the Project Area. Lastly, the northern extent of the Project Area, contains mature Ponderosa Pine forest with some areas of saturated soils. Existing plant communities can be generally subdivided into the following categories: meadow, emergent wetland, wetland forest pond, riparian shrub, floodplain forest, and sparsely vegetated bank.

Meadow

Native grasses and forbs were dominant in the forest meadow with patches of shrubs at meadow edges and located in the north-central portion of the Project Area. Dominant grasses included California brome (*Bromus carinatus*) and meadow fescue (*Schedonorus pratensis*), with Idaho fescue (*Festuca idahoensis*). Forbs were more varied, but included yarrow (*Achillea millefolium*), grand collomia (*Collomia grandiflora*), showy fleabane (*Erigeron speciosus*), western pearly-everlasting (*Anaphalis margaritacea*), arrowleaf balsamroot (*Balsamorhiza sagitata*), lupine (*Lupinus* sp.), Lyall's mariposa (*Calochortus lyalli*), field chickweed (*Cerastium arvense*), grand collomia (*Collomia grandiflora*), and others. Shrubs, Cascade barberry (*Mahonia nervosa*), common snowberry (*Symphoricarpos albus*) and white spirea (*Spirea betulifolia*) were at forest margins, with kinnikinnick (*Arctostaphylos uva-ursi*) common near the cleared forest-meadow margin. Although the plant community described below is based on existing, dominant plant species in the meadow, it could be classified based on the surrounding forested plant association if assuming the climax (or mature) vegetation condition if left undisturbed.

> Plant Community: California brome-Idaho fescue-yarrow meadow (*Bromus carinatus-Festuca idahoensis-Achillea millefolium* meadow)

Gravel bar areas at the Nason Creek waterline, or narrow bands of depositional banks with willows, frequently included an emergent vegetation component of lakeshore sedge (*Carex lenticularis*), water horsetail (*Equisetum fluviatile*), Coville's rush (*Juncus covillei*) and reed canarygrass (*Phalaris arundinacea*) with patches of purple monkeyflower (*Mimulus lewisii*), Canadian mint (*Mentha arvense*) and noxious weed common tansy (*Tanacetum vulgare*).

Plant Association: Lenticular Sedge meadow (Carex laeviculmis meadow)

Emergent Wetland Slough

A small emergent riverine wetland is located along a seasonal side channel north of the primary Nason Creek channel. Saturated soils and some standing water present during both survey visits (July and August 2020). Native broadleaf cattail (*Typha latifolia*) is dominant, with sparse shrub twinberry honeysuckle (*Lonicera involucrata*), and other emergents, water horsetail, panicled bulrush (*Scirpus microcarpus*) and stinging nettle (*Urtica dioica*). A small patch of noxious reed canarygrass (*Phalaris arundinacea*) was also identified.

Plant Association: Broadleaf cattail Association (*Typha latifolia* Association)

Riverine Forest-Pond Wetland

A forested wetland with a ponded area is located southeast of State Highway 207 and immediately north of a transmission corridor. The wetland forest area contains sparse black cottonwood trees, dense gray alders (*Alnus incana*), patches of shrubs, red osier dogwood (*Cornus sericeus* ssp. *stonolifera*) and vine maple. Understory was dominated by skunk cabbage (*Lysitchiton americanus*) with lady fern (*Athyrium filix-femina*). Standing water was present throughout the forest wetland when surveyed in mid-July, but half of the forest contained only saturated soils by mid-August 2020. The eastern extent of the area became an open pond with water depth of two or more feet, and ringed by Scouler's willow (*Salix scouleriana*) and red-osier dogwood. Several patches of noxious weed, reed canarygrass were at the highway edge and pond margin.

Plant Association: Black cottonwood/Mountain alder (*Populus balsamifera* ssp. *trichocarpa/ Alnus incana*

Riparian Shrub

Bands of willow-dominated shrub vegetation were located along the waterline edge and interior forest margin of many gravel bars and lower streambanks. Dominant willow species include Pacific willow (*S. lucida* ssp. *lasiandra*), MacKenzie's willow (*S. prolixa*) and sandbar willow (*Salix exigua*). Young black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), arroyo willow (*S. lasiolepis*), and understory plants were present and commonly included lakeshore sedge, horsetail, and creeping bentgrass (*Agrostis stolonifera*). Noxious weeds were particularly common in more sparsely vegetated gravel bars and remnant channels, and included tansy (*Tanacetum vulgare*), reed canarygrass, spotted knapweed (*Centaurea stoebe*), bouncing bet (*Saponaria officinalis*), oxeye daisy (*Leucanthemum vulgare*), and common St. Johnswort (*Hypericum perforatum*).

Plant Association: Willow/Alluvial bar (*Salix*/Alluvial bar)
Plant Association: Willow/Mesic forb (*Salix*/Mesic forb)

Floodplain Forests

Riparian forests along the mainstem of Nason Creek include a mix of mid-succession and mature conifers with patches of deciduous trees and a variable understory of shrubs and forbs, with drier understory species generally eight to ten feet from the forest and creek edge. Common conifers include grand fir (*Abies grandis*), Douglas fir (*Pseudotsuga menziesii*), and ponderosa pine (*Pinus ponderosa*) with western red cedar (*Thuja plicata*) and small patches of deciduous trees black cottonwood or bigleaf maple (*Acer*

macrophyllum). Understory species in wetter areas adjacent to Nason Creek included vine maple (A*cer circinatum*) or red-osier dogwood (*Cornus stolonifera*) with sparse Douglas spirea (*Spirea douglasii*), Saskatoon serviceberry (*Amelanchier alnifolia*), Oregon boxwood (*Paxistima myrsinites*) or Wood's rose (*Rosa woodsii*). Understory species were frequently sparse or absent but include drier areas with forbs: bride's bonnet (syn. queen's cup *Clintonia uniflora*), star-flowered Solomon's seal (Maianthemum stellatum), bunchberry dogwood (*Cornus canadensis*), and trillium (*Trillium ovatum*). The northeastern corridor, where Project plan will reconnect and deepen a seasonal side channel (some areas with saturated soils July 2020) contains mature conifer trees with patches of black cottonwood trees at the creek edge and dense vine maple throughout.

> Plant Association: Grand fir/vine maple-WEN (Abies grandis/Acer circinatum-WEN)
> Plant Community Type[1]: Grand fir/vine maple-bride's bonnet (Abies grandis/Acer circinatum-Clintonia unifoliata)
> [1]Lillybridge et al. 1995

A few forest patches, on the north-side of the Nason Creek mainstem, contained the same mix of overstory conifer species with sparse bigleaf maple in the deciduous overstory, but the understory varied with dominant shrubs common snowberry and hollyleaved barberry (*Mahonia aquifolium*) with vine maple and sparse understory of white hawkweed (*Hieracium albiflorum*), star-flowered Solomon's seal (Maianthemum stellatum) and noxious weed common St. Johnswort.

> Plant Association: Grand fir/common snowberry-floodplain (Abies grandis/Symphoricarpos albus-floodplain

Sparsely Vegetated Bank

Most Nason Creek lower banks are dominated by small cobbles and gravels and contain ten percent or less cover of vegetation. Therefor the habitat is categorized as unvegetated alluvium, despite sparsely present patches of forbs, grasses, and willow seedlings. Common plants include a variety of introduced forbs, graminoids and noxious weeds, including: yarrow, Canadian horseweed, bouncing bet, common sheep sorrel (*Rumex acetosella*) and noxious weeds common tansy, spotted knapweed (*Centaurea stoebe*), reed canarygrass, oxeye daisy, diffuse knapweed, and common St. Johnswort.

> Plant Community: Unvegetated Alluvium

3.2 Rare Plants and Noxious Weeds

No rare plants were documented during this study. Suitable habitat was not observed for any of the ten state listed plant species documented within 10 miles of the Project Area (Table 1).

No rare WNHP Ecological Communities were found, but one high quality WNHP community, Grand fir/Vine maple Forest (*Abies grandis/Acer circinatum* Forest) was documented within the Project Area. This riparian forest type has a conservation status rank by WNHP as S3/G4, Vulnerable (S3) in the State of Washington, but Apparently Secure (G4) globally (Rocchio and Crawford 2015).

Washington state noxious weed species documented in the Project Area included 11 state listed noxious weeds: 5 Class B, 6 Class C weeds and 2 Monitor weeds (Table 2, Figure 2). Eradication of noxious weeds is required for all Class A weeds and some Class B weeds by Washington State, but is recommended for

all noxious weed infestations (Washington State Noxious Weed Control Board 2020). In Chelan County, eight of the state listed weeds are designated for control. Spotted knapweed (*Centaurea stoebe*), diffuse knapweed (*C. diffusa*), Dalmatian toadflax (*Linaria dalmatica* ssp. *dalmatica*), Scotch thistle (*Onopordum acanthium*) and Scotchbroom (*Cytisus scoparius*) are Class B noxious weeds designated for control/eradication in Chelan County (Chelan County Weed Control Board 2020). Canada thistle (*Cirsium arvense*), common St. Johnswort (*Hypericum perforatum*), and oxeye daisy (*Leucanthemum vulgare*) are Class C noxious weeds also designated for control in Chelan County.

Table 2. Noxious Weed Species documented at Nason Creek Project, Chelan County, WA.

Scientific Name	Common Name	Plant Type	USDA Plants Code	State Weed Class[w]
Centaurea diffusa	diffuse knapweed	Forb	CEDI	B[w]
Centaurea stoebe	spotted knapweed	Forb	CEST8	B[w]
Cirsium arvense	Canada thistle	Forb	CIAR4	C[w]
Hypericum perforatum	common St. Johnswort	Forb	HYPE	C[w]
Leucanthemum vulgare	oxeye daisy	Forb	LEVU	C[w]
Linaria dalmatica ssp. dalmatica	Dalmatian toadflax	Forb	LIDAD	B[w]
Onopordum acanthium	Scotch thistle	Forb	ONAC	B[w]
Cytisus scoparius	Scotchbroom	Shrub	CYSC4	B[w]
Mycelis muralis	wall-lettuce	Forb	MYMU	Monitor
Phalaris arundinacea	reed canarygrass	Grass	PHAR3	C
Saponaria officinalis	bouncing bet	Forb	SAOF4	Monitor
Silene latifolia ssp. alba	white cockle	Forb	SILA21	C
Tanacetum vulgare	common tansy	Forb	TAVU	C

State Weed Class[w]: [w] indicates plant species designated for control in Chelan County.

Class A weeds = species with limited distribution and establishment in WA.

Class B weeds = species with distribution limited to some portions of WA.

Class C weeds = species with widespread distribution in WA or of special interest to the agricultural industry.

Monitor weeds = species where more information is needed of suspect weeds, but no regulatory requirement to control.

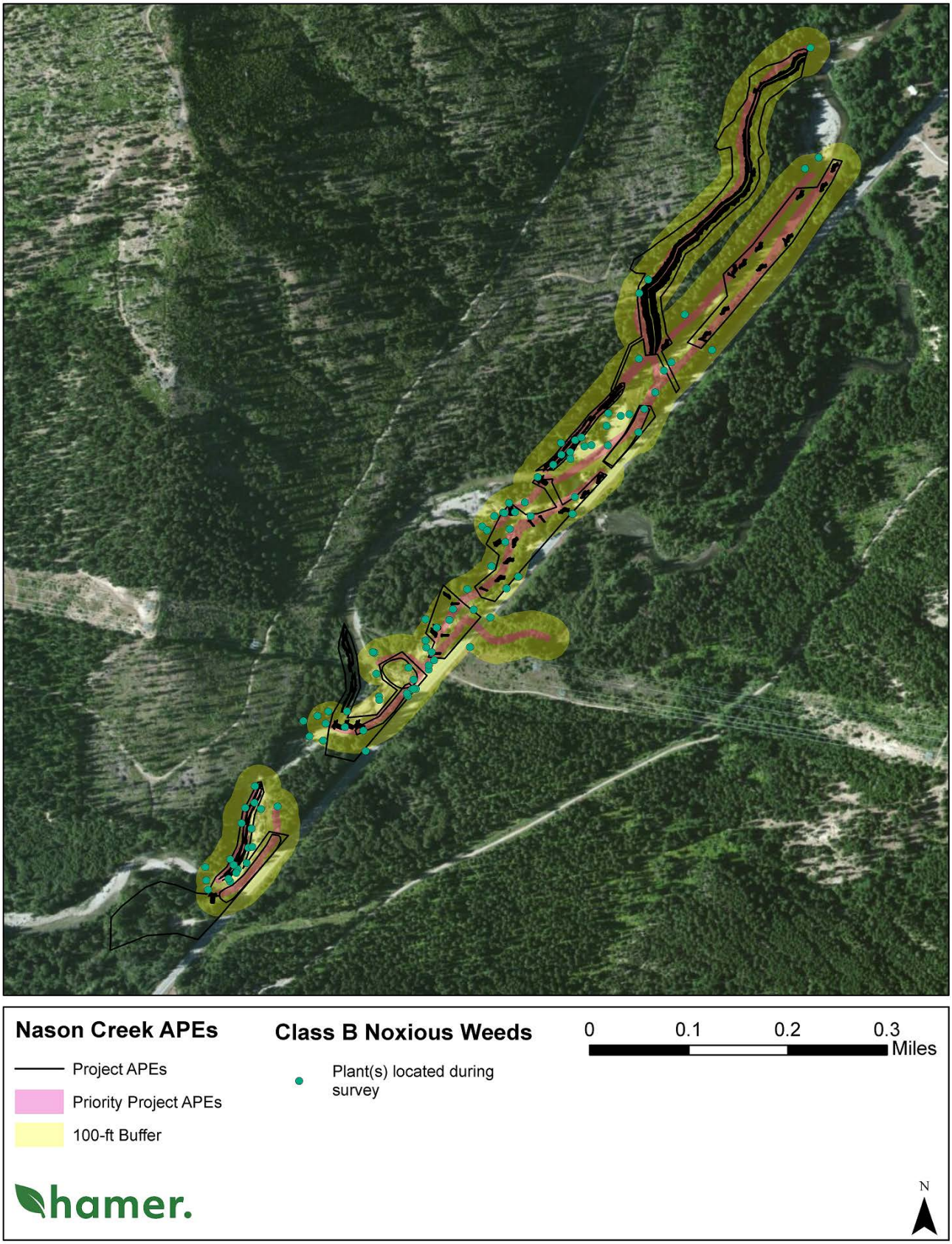

Figure 2. Overview of Class B Noxious Weeds documented at Nason Creek, Chelan County, WA.

Noxious weeds were found throughout the Project Area on gravel bars, overflow channels and disturbed areas along the Highway 207 road shoulder but were largely absent from forested areas (Figure 2; Appendix D). Spotted knapweed, a Class B weed, was the most abundant noxious weed in the Project Area, regularly observed along gravel bars and in dense patches along remnant and overflow channels with gravel substrate. Noxious weeds with infestations found along gravel bars co-occurring with spotted knapweed include, most commonly, Class C designates oxeye daisy and common St. Johnswort, and Class C non-designates common tansy and white cockle (Appendix D). Class B designates, Dalmatian toadflax and diffuse knapweed infestations were also found in gravel bar areas, but to a lesser extent. Class B designates, Scotch thistle and Scotchbroom minimally occurred, with Scotch thistle consisting of two plants found along Highway 207 west pull-out near a powerline right-of-way, and two Scotchbroom shrubs located just outside of the central Project Area along a northern streambank (Appendix C). Canada thistle, also a Class C designated weed, was found sparsely in streambank patches adjacent to mature forest, in small numbers and frequently in the same areas as Class C non-designate reed canarygrass. Monitor weed, bouncing bet was minimally present in some lower gravel bars of the southern Project Area. Monitor weed, wall-lettuce, was minimally present in the Project Area, found in the shady interface between disturbed overflow channels and forest as individual to several plants.

4. Discussion

4.1 Botanical Survey Coverage

Although most of the subject property is on Western Rivers Conservancy lands, US Forest Service and Washington Department of Transportation (WDOT) have ownership and interest in supporting the restoration project. A portion of the Project Area, which includes project APEs, was excluded from this botanical survey effort. US Forest Service will conduct rare plant surveys on the remaining portion of the Project Area in 2021, prior to the initiation of construction. Unfortunately, these botanical surveys were not conducted in coordination with US Forest Service botanical personnel.

4.2 Rare Plants and Plant Communities

No rare plants were documented during this survey effort. Although surveys were scheduled to coincide with the flowering period of rare plants with potential to occur in the Project Area; three State-listed species may have completed flowering before the initial survey visit on 13 July 2020: Palouse milkvetch (*Astragalus arrectus*), Suksdorf's monkeyflower (*Erythranthe suksdorfii*), and fuzzy-tongue penstemon (*Penstemon eriantherus* var. *whitedii*; Appendix A, WANHP 2020a). In addition, of the ten species of rare plants documented within 10-miles of the Project, only false mountain willow (*Salix pseudomonticola*), contained potentially suitable habitat within the Project Area (Table 1). Potentially suitable habitats for these four species were carefully surveyed for evidence of plants belonging to the same genus of the listed plants. All plants of the same genus as one of the four rare species were subsequently identified to verify that they were not the rare species.

A WNHP high quality plant community, Grand fir/Vine maple Forest (*Abies grandis/Acer circinatum*) was documented within the Project Area, with a conservation rating as S3/G4 (Rocchio and Crawford 2015). This ranking of S3/G4, means that in the State of Washington the ecological community is at moderate risk for extirpation, though it's considered secure globally. This forest area contains mature trees over 100 years in age, based on tree species composition and tree diameters observed. In Washington, numerous

potential threats to these forested plant communities include stand replacing fires due to fire suppression, timber harvest, introduced diseases, and land conversion, resulting in reduction and fragmentation of existing forest stands (Rocchio and Crawford 2015). Within the Nason Creek Project Area, this plant community roughly represents thirteen percent of the area surveyed.

4.3 Noxious Weeds

Eleven noxious weed species were documented during the 2020 botanical inventory, including zero Class A, five Class B, and six Class C designated species (Table 2). Of the eleven weed species, eight are Chelan County designates that require control to manage: spotted knapweed, diffuse knapweed, Canada thistle, common St. Johnswort, oxeye daisy, Dalmatian toadflax, Scotch thistle, and Scotch broom (Chelan County NWCB 2020). The NWCB recommends treatment of all listed noxious weeds (WNWCB 2020).

When prioritizing control and management of weeds, an assessment of surrounding areas for additional noxious weed infestations and vectors for spread and reintroduction of noxious weeds like roads, waterways and construction equipment is important. Targeted treatment of weeds in small-isolated patches may also be a more effective use of limited resources over that of widespread treatment of weeds based solely on species. Lastly, prioritization of noxious weeds with only one or a very limited distribution, may dramatically reduce cost and effort of managing for these weeds in future years. In the Project Area, reintroduction of weed infestations from upstream areas of Nason Creek and along Highway 207 road shoulders are highly likely, particularly for spotted knapweed and other weeds found along gravel bars. Coordination of weed control efforts with neighboring landowners and Chelan County Noxious Weed Control Board will have a more impactful result.

Noxious Weed Infestations & Control Methods

Consult Chelan County Noxious Weed Control Board for further information regarding Best Management Practices for treating noxious weed infestations, and the Pacific Northwest Pest Management Handbook for herbicide use (Chelan NWCB 2020). The following recommendations are based on site-specific knowledge of weed infestation size and accessibility for treatment but are not intended to supersede Yakama or Chelan County guidelines for treatment.

Class B Designated Weeds:

- **Spotted knotweed** (*Centaurea stoebe*) was the most common noxious weed encountered during field surveys, with infestations widespread throughout the Project Area, particularly along gravel streambanks and overflow channels. Since spotted knapweed is common throughout the Project Area and frequently near Nason Creek, both mechanical and chemical treatments may not be practical or safe to apply near waterways, and reintroduction of spotted knapweed from upstream areas would be likely. Biocontrol agents are a better approach for widespread noxious weeds to contain infestations from further expansion, and with enough diffuse knapweeds in the vicinity to provide a continuing food supply to biocontrol agents. There are numerous biocontrol agents for spotted knapweed, with further information and biocontrol requests handled through the Washington State University Integrated Weed Control Project (IWCP; WSU Extension 2020).

- **Diffuse knapweed** (*Centaurea diffusa*) infestations were limited to small patches in the southern portion of the Project Area, along gravel bars and roadside edges (Appendix C). Since diffuse knapweed is closely related to spotted knapweed, some of the biocontrol agents used to control spotted knapweed would also effectively control diffuse knapweed. Spot chemical treatments of

individual infestations may also be practical only if treatments use chemicals safe to apply near waterways.

- **Dalmatian toadflax** (*Linaria dalmatica* ssp. *dalmatica*) infestations are small and patchy, and limited to the southern Project Area, mostly along the Highway 207 road edge and a gravel bar along Nason Creek. Mechanical removal of individual plants by hand pulling is possible, due to the small infestation sizes. However, hand pulling will need to be repeated annually. Chemical treatment is also possible, but proximity to water and reintroduction of the plants along the river corridor should be considered. A biological control agent is successfully used for infestations of this plant in Oregon but has not yet been successful at sites in Washington (WNWCB 2020).
- **Scotch thistle** (*Onopordum acanthium*) infestations are limited to two individual plants. Due to the small number of plants, manual control is feasible by digging out the vegetative rosette and cutting the taproot of the plant (WNWCB 2020). There are no insect biocontrol agents for Scotch thistle, but herbicide control is possible, especially if treating multiple weed species and larger infestations.
- **Scotchbroom** (*Cytisus scoparius*) infestation was limited to two individual shrubs documented just outside of the Project Area (within 20 feet of the survey buffer). While control of this infestation is not required since it lands outside of the Project Area, its recommended. Mechanical control of an infestation this size is the recommended method of treatment but will require multi-year management to eradicate resprouting shrubs and germination of weed seeds. Chemical control is possible using foliar and/or basal bark treatments. Biological control agent, Scotchbroom bruchid (*Bruchidius villosus*) has been shown to impact plant reproduction by feeding on the seeds of Scotch broom (WNWCB 2020).

Class C Designated Weeds:

- **Canada thistle** (*Cirsium arvense*) infestations were minimal, found sparsely in streambank patches adjacent to mature conifer and near reed canarygrass. Control of Canada thistle infestations are difficult, with mechanical treatments requiring repeated efforts and biological control agents having limited impacts. Chemical controls will also require multiple treatments for efficacy and any herbicides selected will need to be safe for use along waterways. Mechanical treatment is recommended based on the overall small size of infestations.
- **Common St. Johnswort** (*Hypericum perforatum*) infestations are common along gravel bars and other regularly disturbed areas within the Project Area including Highway 207 road pullouts. Infestations are sparse and widespread, making mechanical removal impractical. Several biocontrol agents may be effective at controlling the infestations and chemical controls can be effective using herbicides deemed safe for use along waterways.
- **Oxeye daisy** (*Leucanthemum vulgare*) infestations are common along gravel bars in the Project Area, frequently co-occurring with spotted knapweed and common St. Johnswort. Mechanical methods of treatment can be effective but are impractical for this site due to the abundant and widespread nature of the infestations. No biocontrol agents exist for this weed. Chemical control using herbicide deemed safe for use along waterways is recommended.

4.4 Recommendation

1. Review final site design plans against botanical survey coverage to ensure no additional areas require survey before construction. Also, ensure project manager is in coordination with US Forest Service botanical personnel regarding remaining botanical surveys to be conducted.

4.5 Next Steps

The following will be completed by UCHRP contractors at the Nason Creek Project:

1. Develop and implement a Weed Management Plan to control and prevent the spread of existing noxious weed infestations during and after project construction and prioritize treatment of Class B and C designated noxious weeds. Continued annual monitoring is strongly recommended to reduce risk of new weeds from establishing. Refer to previous section 4.2 for species-specific recommendations for best methods of control.

2. Develop and implement a Revegetation and Plant Survival Plan to restore areas of temporary project impacts, including staging areas and equipment access paths. The plant community descriptions and botanical species list should be referenced for revegetation planning. The Revegetation Plan should determine site specific revegetation goals, maintenance, adaptive management, and annual progress monitoring to ensure successful vegetation establishment and plant survival requirement rates are met.

3. If a federal or state-listed plant is found during project activities, immediately cease activity in vicinity of plant and contact the project manager, as required under UCHRP permits. To verify identification of the rare plant and determine best mitigation measures, consult with a qualified botanist.

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Appendix A. Rare Plants with Potential to Occur in the Project Area.

Scientific Name	Common Name	State Status	Federal Status	Habitat Description	Flowering Period	Plant Family
Agoseris elata	Tall agoseris	S		Meadow, open woods, rocky ridges, 500-7800 ft; Assoc spp. herbaceous but vary	June-Aug	Asteraceae
Anemone patens var. multifida	Pasqueflower	T	BS, FS	Prairies and grasslands, open alpine slopes and ridges in loose, sandy well-drained soil and open woods; 2300-6600 ft	late May-Aug	Ranunculaceae
Astragalus arrectus	Palouse milkvetch	T	BS, FS	Grassy hillsides, sagebrush flats, river bluffs and grassy or shrub-dominated openings; 1000-4000 ft	late Apr-early July	Fabaceae
Botrychium hesperium	Western moonwort	S	BS, FS	Sage shrubland, moist and dry meadows, forest edges; dry, gravelly or sandy loams; 2500-6300 ft	May-August	Ophioglossaceae
Botrychium paradoxum	Paradoxical moonwort	T	BS, FS	Forests, moist meadows, riparian areas, compacted old roadbeds	year round	Ophioglossaceae
Carex capillaris	Hair sedge	T	BS, FS	wet meadows, streambanks, wetlands; 2800-6500 ft	June-Aug	Cyperaceae
Carex rostrata	Northern beaked sedge	S	BS, FS	Fens, bogs, quaking or floating peat, lake and stream shores, wet meadows, often in shallow water/floating mats; 3200-5120 ft	July-Aug	Cyperaceae
Carex tenera	Slender broom sedge	S	BS, FS	Dry to moist meadows, open forests, shrub wetlands and lake shores; assoc. spp. paper birch, black cottonwood, willow, field horsetail	May-Sept	Cyperaceae
Cicuta bulbifera	Bulb-bearing water-hemlock	S	BS, FS	Obligate wetland species found at edges of marshes, slow moving streams, lake margins, bogs, wet meadows and shallow standing water; 240-3700 ft	Aug-Sept	Apiaceae
Cryptantha spiculifera	Bristly cryptantha	S	BS	Dry, open, flat or sloping areas in stable or stony soils, with low vegetative cover; 450-3500 ft	May-July	Boraginaceae

Scientific Name	Common Name	State Status	Federal Status	Habitat Description	Flowering Period	Plant Family
Delphinium viridescens	Wenatchee larkspur	T	BS, FS	Moist meadows, seasonally wet openings in aspen groves, hardwood thickets, with seasonal inundation; 1240-5700 ft	July	Ranunculaceae
Eleocharis atropurpurea	Purple spike-rush	X		Wetland species of pond and lake margins, canal banks, irrigation ditches, and maritime shores; 0-5900 ft, once found on lake Chelan	June-Sept	Cyperaceae
Erythranthe pulsiferae	Candelabrum monkeyflower	S	BS, FS	Seasonally wet or moist open areas; often in exposed mineral soil or in grass/forb openings in ponderosa pine, Douglas fir and oak forests; 1580-4000 ft	June-July	Scrophulariaceae
Erythranthe suksdorfii	Suksdorf's monkeyflower	S	BS, FS	Open, moist or dry places, from valleys and foothills to mod. or high elevations in the mountains; in seasonally moist swales, drainages or vernal pools within sage steppe habitat, with disturbed microhabitats; 430-7100 ft;	Apr-June	Scrophulariaceae
Hackelia cinerea	Gray stickseed	T	BS, FS	Open or sparsely forested areas, esp. on cliffs, talus or other exposed rock, often mossy cracks; 1040-2520 ft	May-July	Boraginaceae
Hackelia venusta	Showy stickseed	E	E	Dry, loose granitic sand and crevices in granite or talus; 1500-7400 ft	May-July	Boraginaceae
Juncus howellii	Howell's rush	T	BS, FS	Moist meadows and riparian zones at various montane elev; 2840-3500 ft	July-Aug	Juncaceae
Lathyrus torreyi	Torrey's peavine	T		Open areas, trail edges and open woods, usually at low-elev sites dominated by Doug fir; 320-2025 ft	May-July	Fabaceae
Lomatium roneorum	Leavenworth desert-parsley	E		Open, rocky slopes in ponderosa pine forest openings	Apr-June	Apiaceae

Scientific Name	Common Name	State Status	Federal Status	Habitat Description	Flowering Period	Plant Family
Nicotiana attenuata	Coyote tobacco	S	BS, FS	Dry sandy bottomlands, rocky washes and other dry open places; 320-2640 ft	June-Sept	Solanaceae
Ophioglossum pusillum	Adder's-tongue	S	BS, FS	Seasonally wet areas in pastures, old fields, roadside ditches, bogs, fens, wet meadows, flood plains, moist woods; assoc. spp. Lodgepole pine, spirea, sedges, grasses, strawberry, yarrow; 40-3200 ft	June-Sept	Ophioglossaceae
Parnassia cirrata var. intermedia	Cascade grass-of-Parnassus	T		Marshes, seeps, bogs, wet meadows and along streams from 6000 ft+	Aug-Sept	Parnassiaceae
Pediocactus nigrispinus	Dark-spine ball cactus	S	BS	Lowland to montane sage desert, grasslands and coniferous forests	May-July	Cactaceae
Pellaea brachyptera	Sierra cliffbrake	S	BS, FS	Arid sites with little vegetation, including open south & west-facing slopes in rocky soils; 1100-3500 ft	year round	Pteridaceae
Penstemon eriantherus var. whitedii	Fuzzy-tongue penstemon	T	BS, FS	West-facing slopes of small canyons, ridgetops, dry, rocky places in the Cascade foothills; 500-4000 ft elev	May-June	Scrophulariaceae
Rotala ramosior	Lowland toothcup	S	BS, FS	Damp areas in fine sand and silt, wet swampy mudflats, lake and pond margins and along free-flowing river reaches; 200-2260 ft	June-Aug	Lythraceae
Salix pseudomonticola	False mountain willow	S	BS, FS	Wet meadows, streambanks, lake edges, hummocks in fens, and floodplains; 2950-5500 ft	May-Sept	Salicaceae
Schizachyrium scoparium var. scoparium	Little bluestem	T	BS	Open places, in sand, silt, cobble and gravel, above and below highwater line; in high qual riparian habitat; 610-1320 ft	July-Sept	Poaceae

Scientific Name	Common Name	State Status	Federal Status	Habitat Description	Flowering Period	Plant Family
Sidalcea oregana var. calva	Wenatchee checkermallow	E	E	Moist meadows with surface water or saturated soil into early summer; in somewhat open coniferous stands with Doug fir, ponderosa pine; 1900-3200 ft	June-July	Malvaceae
Silene scouleri ssp. scouleri	Scouler's catchfly	S	BS, FS	Valley and foothill grassland; prairies and open timberland; low to moderate elev;	June-early Sept	Caryophyllaceae
Silene seelyi	Seely's catchfly	S	BS, FS	Shaded crevices in ultramafic, granitic, or basaltic cliffs and rock outcrops, and occ. Among boulders in talus; 1120-6300 ft	May-Aug	Caryophyllaceae
Spiranthes diluvialis	Ute ladies-tresses	E	T	Low elev wetland complexes and moist meadows; Assoc. spp. Ponderosa pine, sagebrush, bitterbrush, willows, and sedges; 720-1830 ft	mid July-Aug	Orchidaceae
Spiranthes porrifolia	Western ladies-tresses	S	BS, FS	Wet meadows, bogs, streams and seepage slopes; 10-6800 ft; sedges, white brodiaea and seep monkeyflower.	Jul-Sept	Orchidaceae
Sporobolus compositus var. compositus	Composite dropseed	S	BS	Riverbanks and lake sides	Aug-Sept	Poaceae
Trifolium thompsonii	Thompson's clover	T	BS, FS	Lower mountain slopes and ridges in grasslands dominated by bunchgrasses and herbs; 1140-3760 ft	May-July	Fabaceae

State Status of plant species is determined by the Washington Natural Heritage Program. Factors considered include abundance, occurrence patterns, vulnerability, threats, existing protection, and taxonomic distinctness. Values include:

E = Endangered. In danger of becoming extinct or extirpated from Washington.
S = Sensitive. Vulnerable or declining and could become Endangered or Threatened in the state.
T = Threatened. Likely to become Endangered in Washington.
X = Likely extirpated from Washington State.

Federal Status under the US Endangered Species Act (ESA):

LE = Listed Endangered. In danger of extinction.
LT = Listed Threatened. Likely to become endangered.
C = Candidate species. Sufficient information exists to support listing as Endangered or Threatened.
BS = Bureau of Land Management Agency Sensitive species.
FS = US Forest Service Agency Sensitive species.

Appendix B. Comprehensive Plant Species List

Scientific name	Common Name	Wetland Status	Native/ Introduced	Plant Form
Abies grandis	grand fir	FACU	N	TR
Acer circinatum	vine maple	FAC	N	SH
Acer macrophyllum	bigleaf maple	FACU	N	TR
Achillea millefolium	common yarrow	FACU	N	FB
Achnatherum nelsonii ssp. dorei	Dore's needlegrass	FACU	N	GR
Actaea rubra	red baneberry	FAC	N	FB
Adenocaulon bicolor	American trailplant	NI	N	FB
Agoseris retorsa	spearleaf agoseris	NI	N	FB
Agrostis gigantea	redtop, black bent	FACW	N	GR
Agrostis scabra	rough bentgrass	FAC	N	GR
Agrostis stolonifera	creeping bentgrass	FACW	I	GR
Aira caryophyllea	common silver-hair grass	FACU	I	GR
Alnus incana tenuifolia	mountain (thinleaf) alder	FACW	N	TR
Alnus rhombifolia	white alder	FACW	N	TR
Alnus viridis ssp. sinuata	Sitka alder	FACW	N	TR/SH
Alopecurus pratensis	meadow foxtail	FAC	I	GR
Ambrossia chammisonis	silver bur ragweed	FAC	N	FB
Amelanchier alnifolia	Saskatoon serviceberry	FACU	N	SH
Amsinckia menziesii	Menzies' fiddleneck	FACU	N	FB
Anaphalis margaritacea	western pearlyeverlasting	FACU	N	FB
Angelica arguta	Lyall's angelica	FACW	N	FB
Antennaria anaphaloides	pearly pussytoes, tall pussytoes	NI	N	FB
Antennaria microphylla	littleleaf pussytoes	NI	N	FB
Aquilegia formosa	western columbine	FAC	N	FB
Arctostaphylos uva-ursi	bearberry/kinnikinnick	FACU	N	SH
Arnica cordifolia	heartleaf arnica	NI	N	FB
Arnica lanceolata	lanceleaf arnica	FACW	N	FB
Artemisia ludoviciana	western mugwort	FACU	N, I	FB
Asarum caudatum	British Columbia wild ginger	FAC	N	FB
Athyrium filix-femina	common ladyfern	FAC	N	FE
Atriplex patula	spear saltbush	FACW	N	FB
Balsamorhiza sagittata	arrowleaf balsamroot	NI	N	FB
Berula erecta	cutleaf water parsnip	OBL	N	FB
Bromus arvensis	field brome	FACU	I	GR
Bromus briziformis	rattlesnake brome	UPL	I	GR
Bromus carinatus	California brome	NI	N	GR
Bromus inermis	smooth brome	FACU	N, I	GR
Bromus tectorum	cheat grass	UPL	I	GR
Calamagrostis canadensis	bluejoint reedgrass	FACW	N	GR
Calamagrostis rubescens	pinegrass	NI	N	GR

Scientific name	Common Name	Wetland Status	Native/ Introduced	Plant Form
Calamagrostis stricta	slimstem reedgrass	FACW	N	GR
Calochortus lyalli	Lyall's mariposa lily	NI	N	FB
Carex aquatilis	water sedge	OBL	N	GR
Carex bebbii	Bebb's sedge	OBL	N	GR
Carex bolanderi	Bolander's sedge	FAC	N	GR
Carex deweyana	Dewey sedge	FAC	N	GR
Carex geyeri	Geyer's sedge	NI	N	GR
Carex laeviculmis	smoothstem sedge	FACW	N	GR
Carex lenticularis	lakeshore sedge	FACW	N	GR
Carex pachystachya	chamisso sedge	FAC	N	GR
Carex praegracilis	clustered field sedge	FACW	N	GR
Carex utriculata	Northwest Territory sedge	OBL	N	GR
Carex vesicaria	blister sedge	OBL	N	GR
Castilleja hispidula	harsh Indian paintbrush	NI	N	FB
Centaurea diffusa^{w}	diffuse knapweed^{w}	UPL	I	FB
Centaurea stoebe^{w}	spotted knapweed^{w}	UPL	I	FB
Cephalanthera austiniae	phantom orchid	NI	N	FB
Cerastium arvense	field chickweed	FACU	N, I	FB
Cerastium nutans	nodding chickweed	FACU	N	FB
Chamaerion angustifolium ssp. circumvagum	fireweed	FACU	N	FB
Chimaphila umbellata	pipsissewa	NI	N	SH
Cicuta douglasii	western water-hemlock	OBL	N	FB
Cinna latifolia	drooping woodreed	FACW	N	GR
Circaea alpina	small enchanter's nightshade	FAC	N	FB
Cirsium arvense^{w}	Canada thistle^{w}	FACU	I	FB
Cirsium edule	edible thistle	FAC	N	FB
Claytonia parviflora	streambank springbeauty	FACU	N	FB
Claytonia sibirica var. sibirica	Siberian springbeauty	FAC	N	FB
Clematis columbiana	rock clematis	NI	N	VI
Clematis ligusticifolia	western white clematis	FAC	N	VI
Clintonia uniflora	bride's bonnet	NI	N	FB
Collomia grandiflora	grand collomia	NI	N	FB
Conyza canadensis	Canadian horseweed	FACU	N	FB
Corallorhiza striata	hooded coralroot	FACU	N	FB
Cornus canadensis	bunchberry dogwood	FAC	N	SH
Cornus sericea ssp. stolonifera	redosier dogwood	FACW	N	SH
Crataegus douglasii	Douglas' hawthorn	FAC	N	TR/SH
Crataegus suksdorfii	Suksdorf's hawthorn	FAC	N	TR/SH
Crepis atribarba	slender hawksbeard	NI	N	FB
Cytisus scoparius^{w}	Scotchbroom^{w}	NI	I	SH

Scientific name	Common Name	Wetland Status	Native/ Introduced	Plant Form
Dactylis glomerata	orchardgrass	FACU	I	GR
Descurainia longepedicellata	western tansymustard	UPL	N	FB
Dianthus barbatus	sweet william	NI	I	FB
Dicentra formosa	bleeding-heart	FACU	N	FB
Dodecatheon dentatum	white shooting star	FACW	N	FB
Eleocharis palustris	common spikerush	OBL	N	GR
Eleocharis palustris	common spikerush	OBL	N	GR
Elymus lanceolatus	thickspike wheatgrass	UPL	N	GR
Elymus repens	quackgrass	FAC	I	GR
Epilobium ciliatum ssp. watsonii	fringed willowherb	FACW	N	FB
Epilobium lactiflorum	milk-flower willowherb	FACW	N	FB
Equisetum arvense	field horsetail	FAC	N	FB
Equisetum fluviatile	water horsetail	OBL	N	FB
Equisetum hyemale	scouringrush horsetail	FACW	N	FB
Equisetum laevigatum	smooth horsetail	FACW	N	FB
Erigeron linearis	desert yellow fleabane	FACU	N	FB
Erigeron peregrinus	subalpine fleabane	FACU	N	FB
Erigeron speciosus	showy fleabane	FACU	N	FB
Euthamia occidentalis	western goldentop	FACW	N	FB
Festuca idahoensis	Idaho fescue, blue bunchgrass	FACU	N	GR
Festuca rubra	red fescue	FAC	N, I	GR
Fragaria virginiana	Virginia strawberry	FACU	N	FB
Galium aparine	stickywilly	FACU	N	FB
Galium trifidum	threepetal bedstraw	FACW	N	FB
Glyceria grandis	American mannagrass	OBL	N	FB
Glyceria striata	fowl mannagrass	OBL	N	GR
Goodyera oblongifolia	western rattlesnake plantain	FACU	N	FB
Gymnocarpium disjunctum	Pacific oakfern	FAC	N	FE
Heracleum maximum	common cowparsnip	FAC	N	FB
Hieracium albiflorum	white hawkweed	NI	N	FB
Hieracium scouleri	Scouler's woollyweed	NI	N	FB
Holodiscus discolor	oceanspray	FACU	N	SH
Hordeum brachycantherum	meadow barley	FACW	N	GR
Hypericum perforatum^{wc}	common St. Johnswort^{wc}	FACU	I	FB
Ipomopsis aggregata	scarlet gilia	NI	N	FB
Juncus arcticus ssp. littoralis	mountain rush	FACW	N	GR
Juncus bufonis	toad rush	FACW	N	GR
Juncus covillei	Coville's rush	FACW	N	GR
Juncus effusus	common rush	FACW	N	GR
Juncus ensifolius	iris-leaf rush	FACW	N	GR

Scientific name	Common Name	Wetland Status	Native/ Introduced	Plant Form
Juncus filiformis	thread rush	FACW	N	GR
Juncus nodosus	knotted rush	OBL	N	GR
Juncus regelii	Regel rush, Regel's rush	FACW	N	GR
Juncus tenuis	poverty rush	FACW	N	GR
Juncus torreyi	Torrey's rush	FACW	N	GR
Koeleria macrantha	prairie Junegrass	NI	N	GR
Lactuca serriola	prickly lettuce	FACU	I	FB
Lapsana communis	common nipplewort	FACU	I	FB
Lathyrus bijugatus	drypark pea	NI	N	FB
Leucanthemum vulgare[w‹]	oxeye daisy[w‹]	FACU	I	FB
Lilium columbianum	Columbian lily	NI	N	FB
Limosella aquatica	water mudwort	OBL	N	FB
Linaria dalmatica ssp. dalmatica[w‹]	Dalmatian toadflax[w‹]	UPL	I	FB
Linnaea borealis	twinflower	FACU	N	SH
Lonicera ciliosa	orange honeysuckle	UPL	N	SH/VI
Lonicera involucrata	twinberry honeysuckle	FAC	N	SH
Lotus micranthus	desert deervetch	NI	N	FB
Lupinus sp.	lupine	NI	N, I	FB
Lycopus uniflorus	northern bugleweed	OBL	N	FB
Lysichiton americanus	American skunkcabbage	OBL	N	FB
Madia gracilis	grassy tarweed, slender tarweed	FACU	N	FB
Mahonia aquifolium	Hollyleaved barberry	FACU	N	SH
Mahonia nervosa	Cascade barberry	FACU	N	SH
Maianthemum dilatatum	false lily of the valley	FAC	N	FB
Maianthemum racemosum	starry false lily of the valley	FAC	N	FB
Maianthemum stellatum	star-flowered Solomon's seal	FACU	N	FB
Matricaria discoidea	disc mayweed	FACU	I	FB
Medicago lupulina	black medic	FACU	I	FB
Melilotus albus	white sweet clover	FACU	I	FB
Mentha arvensis	Canadian mint	FACW	I	FB
Mertensia platyphylla	broadleaf bluebells	NI	N	FB
Milmulus moschatus	muskflower	FACW	N	FB
Mimitanthe pilosa	false monkeyflower	FACW	N	FB
Mimulus guttatus	seep monkeyflower	OBL	N	FB
Mimulus lewisii	purple monkeyflower	FACW	N	FB
Mimulus moschatus	musk-flower, sticky monkey-flower	FACW	N	FB
Mycelis muralis	wall-lettuce	FACU	I	FB
Nasturtium officinale	watercress	OBL	I	FB
Onopordum acanthium[w‹]	Scotch thistle[w‹]	NI	I	FB
Oenathera villosa	hairy evening primrose	FAC	N	FB

Scientific name	Common Name	Wetland Status	Native/ Introduced	Plant Form
Osmorhiza berteroi	sweetcicely	FACU	N	FB
Panicum capillare	witchgrass	FACU	N	GR
Paxistima myrsinites	Oregon boxwood	FACU	N	SH
Penstemon attenuatus	sulphur penstemon	FACU	N	FB
Penstemon fruiticosus	bush penstemon	NI	N	FB
Phacelia hastata	silverleaf phacelia	UPL	N	FB
Phacelia leptosepala	narrowsepal phacelia	NI	N	FB
Phalaris arundinacea[w]	reed canarygrass[w]	FACW	I	GR
Philadelphus lewisii	Lewis' mockorange	UPL	N	SH
Pinus ponderosa	ponderosa pine	FACU	N	TR
Plantago lancoelata	narrowleaf plantain	FACU	I	FB
Plantago major	common plantain	FAC	I	FB
Poa bulbosa	bulbous bluegrass	FACU	I	GR
Poa compressa	Canada bluegrass	FACU	I	GR
Poa pratensis	Kentucky bluegrass	FAC	I	GR
Poa sp.	bluegrass	NI	N, I	GR
Polygonum amphibium v. emersum	longroot smartweed	OBL	N	FB
Polygonum aviculare	prostrate knotweed	FAC	N, I	FB
Polygonum douglasii	Douglas' knotweed	FACU	N	FB
Polystichum munitum	swordfern	FACU	N	FB
Populus balsamifera ssp. trichocarpa	black cottonwood	FACW	N	TR
Populus tremuloides	quaking aspen	FAC	N	TR
Prosartes hookeri	Hooker fairy-bell, Hooker's fairy bells	NI	N	FB
Prunella vulgaris	common selfheal	FACU	N	FB
Prunus emarginata	bitter cherry, Oregon cherry	FACU	N	TR/SH
Pseudognaphalium canescens	Wright's cudweed	FACU	N	FB
Pseudotsuga menziesii	Douglas-fir	FACU	N	TR
Pteridium aquilinum	western brackenfern	FACU	N	FE
Pterospora andromedea	woodland pinedrops	NI	N	FB
Pyrola picta	whiteveined wintergreen	NI	N	SH
Ranunculus acris	tall buttercup	FACW	N, I	FB
Ranunculus flammula	greater creeping spearwort	OBL	N	FB
Ranunculus macounii	Macoun's buttercup	OBL	N	FB
Ribes lacustre	prickly currant	FACW	N	SH
Rosa gymnocarpa	dwarf rose	FACU	N	SH
Rosa nutkana	Nootka rose	FAC	N	SH
Rosa woodsii	Woods' rose	FACU	N	SH
Rubus parviflorus v. parviflorus	western thimbleberry	FAC	N	SH
Rubus ursinus	dewberry	FACU	N	SH

Scientific name	Common Name	Wetland Status	Native/ Introduced	Plant Form
Rumex acetosella	common sheep sorrel	FACU	I	FB
Rumex crispus	curly dock	FAC	I	FB
Rumex occidentalis	western dock	FACW	N	FB
Salix exigua	narrowleaf willow	FACW	N	TR/SH
Salix lasiolepis	arroyo willow	FACW	N	TR/SH
Salix lucida ssp. lasiandra	Pacific willow	FACW	N	TR/SH
Salix prolixa	MacKenzie's willow	OBL	N	TR/SH
Salix scouleriana	Scouler's willow	FAC	N	TR/SH
Sambucus nigra ssp. cerulea	blue elderberry	FACU	N	SH
Saponaria officinalis	bouncing bet	FACU	I	FB
Schedonorus pratensis	meadow fescue	FACU	I	GR
Schoenoplectus subterminalis	swaying bulrush	OBL	N	GR
Scirpus microcarpus	panicled bulrush, red-tinge bulrush	OBL	N	GR
Scuttelaria galericulata	marsh skullcap	OBL	N	FB
Silene latifolia[w]	white campion, bladder campion[w]	UPL	I	FB
Solidago canadensis	Canada goldenrod	FACU	N	FB
Solidago gigantea	late goldenrod	FACW	N	FB
Sorbus sitchensis	western mountain ash	FAC	N	SH
Sparganium emersum	European bur-reed	OBL	N	FB
Spergularia rubra	red sandspurry	FAC	I	FB
Spiraea betulifolia	white spirea	FAC	N	SH
Spiraea douglasii	rose spirea	FACW	N	SH
Stachys chamissonis var. cooleyae	Coastal hedgenettle	FACW	N	FB
Stellaria calycantha	northern starwort	FACW	N	FB
Streptopus amplexifolius	claspleaf twistedstalk	FAC	N	FB
Symphoricarpos albus	common snowberry	FACU	N	SH
Symphoricarpos oreophilus	mountain snowberry	NI	N	SH
Symphyotrichum eatonii	Eaton's aster	FAC	N	FB
Symphyotrichum laeve	smooth blue aster	FACU	N	FB
Symphyotrichum spathulatum	western mountain aster	FAC	N	FB
Tanacetum vulgare[w]	common tansy, tansy[w]	FACU	I	FB
Thalictrum occidentale	western meadowrue	FACU	N	FB
Thinopyrum intermedium	intermediate wheatgrass	NI	I	GR
Thuja plicata	western redcedar	FAC	N	TR
Tiarella trifoliata v. unifoliata	oneleaf foamflower	FAC	N	FB
Tragopogon dubius	western salsify	UPL	I	FB
Tragopogon pratensis	meadow salsify	NI	I	FB
Trautvetteria carolinensis	Carolina bugbane	FACW	N	FB
Trientalis borealis ssp. latifolia	broadleaf starflower	FAC	N	FB

Scientific name	Common Name	Wetland Status	Native/ Introduced	Plant Form
Trifolium hybridum	alsike clover	FAC	I	FB
Trifolium pratense	red clover	FACU	I	FB
Trifolium wormskioldii	cows clover, coast clover	FACW	N	FB
Trillium ovatum	Pacific trillium	FACU	N	FB
Typha latifolia	broadleaf cattail	OBL	N	FB
Urtica dioica	stinging nettle	FAC	N	FB
Vaccaria hispanica	cow soapwort	FACU	I	FB
Verbascum thapsus	common mullein	FACU	I	FB
Verbena bracteata	bigbract verbena	FAC	N	FB
Veronica americana	American speedwell	OBL	N	FB
Vicia americana	American vetch	FAC	N	FB
Vicia sativa	garden vetch	FACU	I	FB
Viola glabella	pioneer violet	FACW	N	FB

ʷ = Washington State Noxious Weed species
ᶜ = Chelan County Noxious Weed designated for control
Wetland Status: US Army Corps of Engineers (USACE) status for Arid West Region
OBL = Obligate (always occurs in wetlands)
FAC = Facultative (equally likely in wetlands or non-wetlands)
FACW = Facultative Wetland (usually occurs in wetlands)
FACU = Facultative Upland (usually occurs in non-wetlands)
UPL = Upland Obligate (always occurs in non-wetlands)
NI = No indicator (no wetland indicator for this plant species)

Plant Form = Plant Type based on type classification by USDA NRCS Plants Database (2020).
TR = Tree
TR/SH = Tree/Shrub
SH = Shrub
FB = Forb (Herb)
FE = Fern
GR = Gramminoid (Grasses, Sedges, Rushes)

Appendix C. Incidental Wildlife Observations

Beaver Use:
Fresh beaver sign and a lodge were observed throughout the southern third of the Project Area, with the beaver lodge located between two of the large log structures. Older beaver sign was observed on willows and tree saplings along Nason Creek intermittently throughout the remaining portion of the Project Area.

Photo 1 – Beaver chewed tree in southern project area.

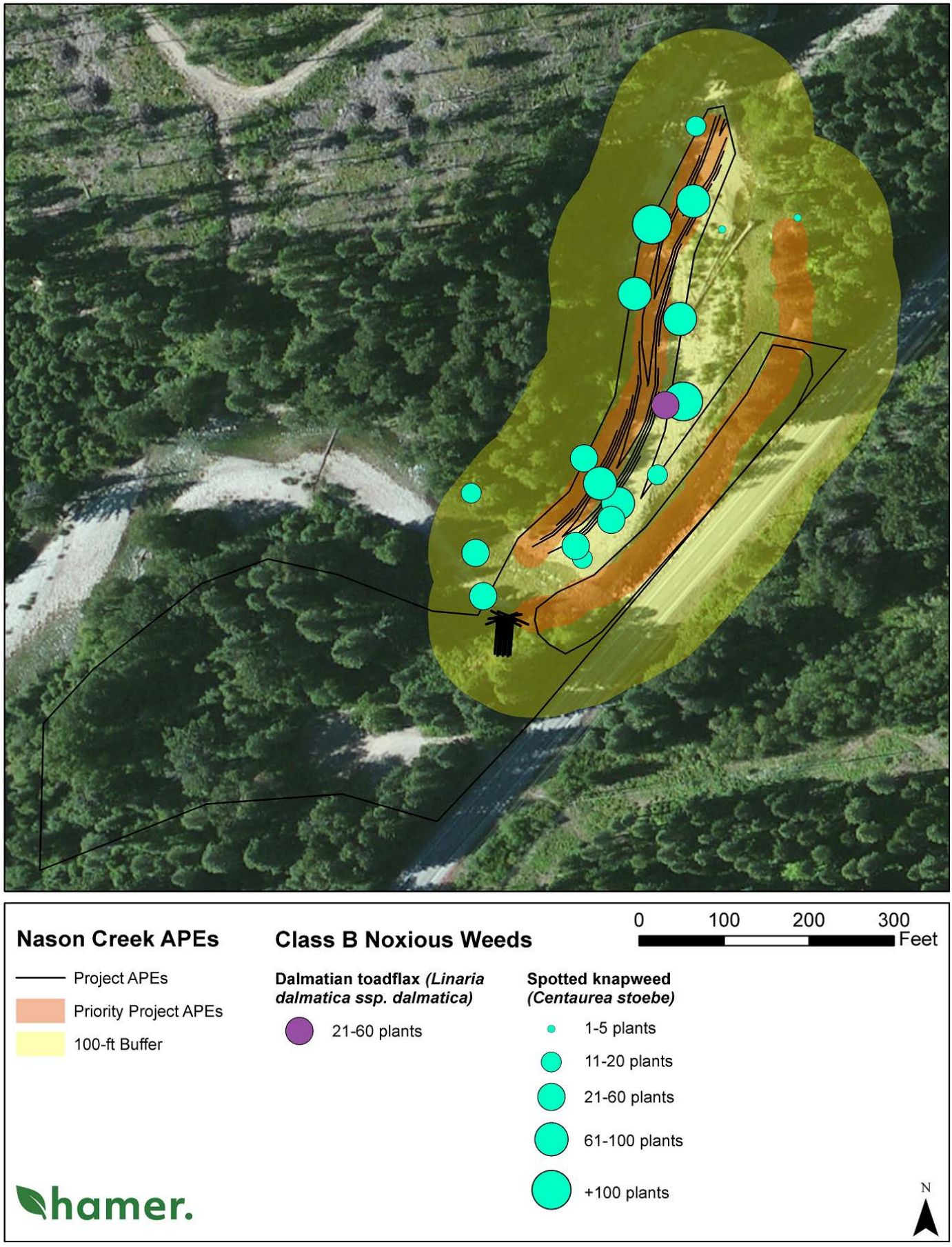
Elk:
Sign of elk was observed, both with scat and a deciduous tree stripped of bark with large tooth marks and vertical stripping.

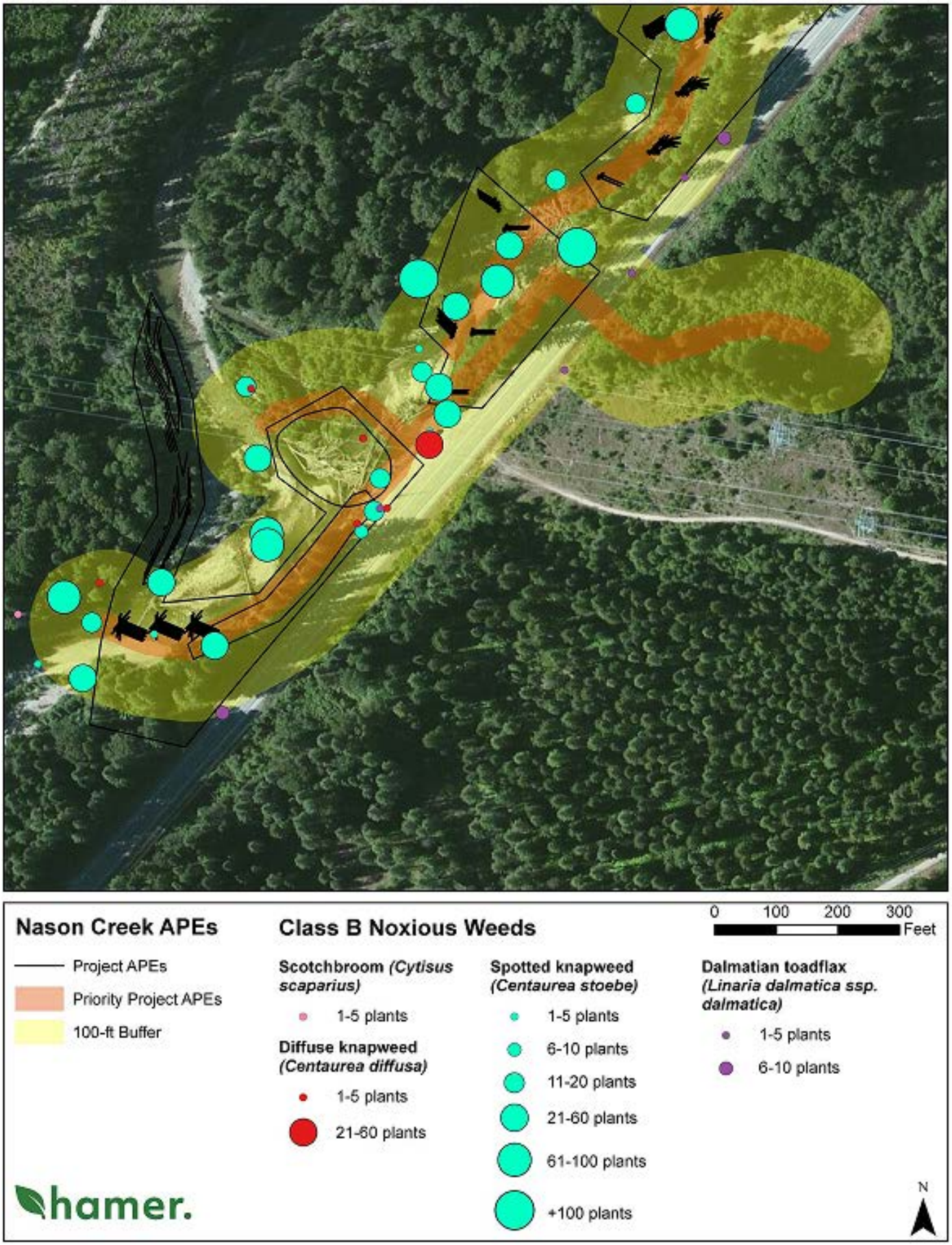
Photo 2 – Alder tree with bark stripped by elk.

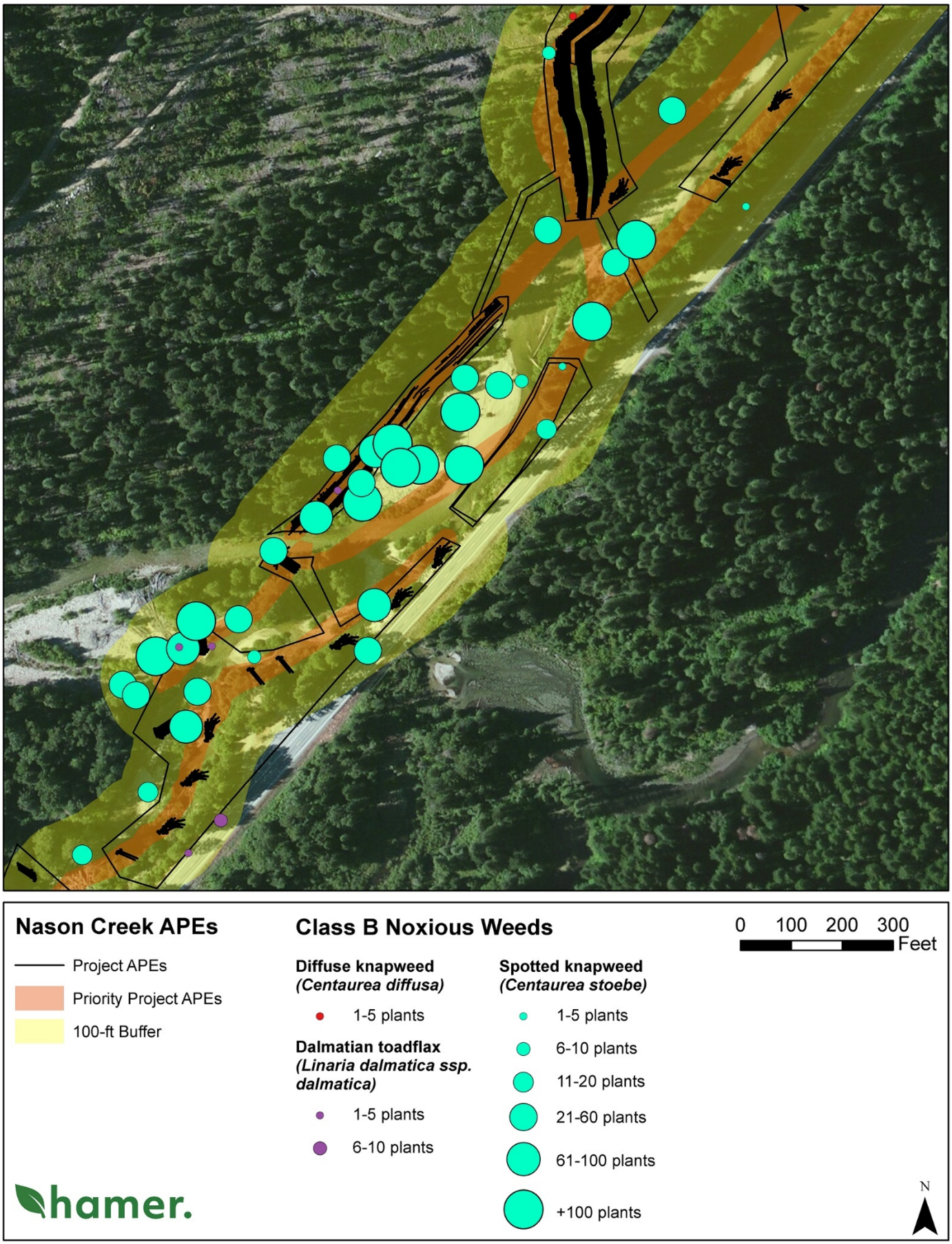
Amphibians:
Cascades frog (*Rana cascadae*) were observed multiple times along the shoreline.

Photo 3 – Cascades frog in Nason Creek.

Appendix D. Nason Creek Noxious Weeds


Nason Creek APEs
Project APEs
Priority Project APEs
100-ft Buffer
Class B Noxious Weeds
Dalmatian toadflax (Linaria dalmatica ssp. dalmatica)
21-60 plants
Spotted knapweed (Centaurea stoebe)
1-5 plants
11-20 plants
21-60 plants
61-100 plants
+100 plants
0 100 200 300 Feet
hamer.
N


Nason Creek APEs
Project APEs
Priority Project APEs
100-ft Buffer
Class B Noxious Weeds
Scotchbroom (Cytisus scaparius)
1-5 plants
Diffuse knapweed (Centaurea diffusa)
1-5 plants
21-60 plants
Spotted knapweed (Centaurea stoebe)
1-5 plants
6-10 plants
11-20 plants
21-60 plants
61-100 plants
+100 plants
Dalmatian toadflax (Linaria dalmatica ssp. dalmatica)
1-5 plants
6-10 plants
0 100 200 300
Feet
hamer.
N


Nason Creek APEs
Project APEs
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100-ft Buffer
Class B Noxious Weeds
Diffuse knapweed
(Centaurea diffusa)
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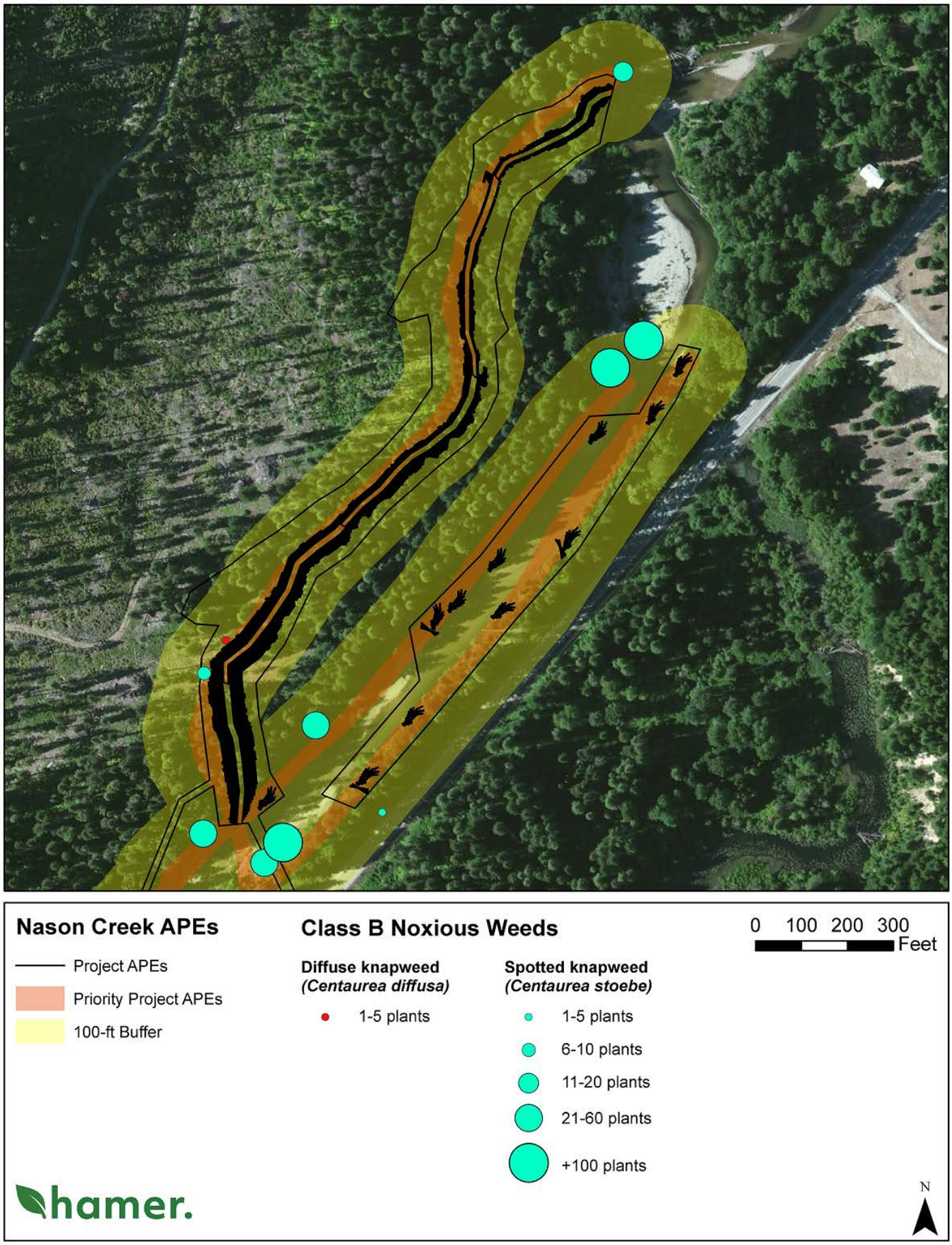
+100 plants
0 100 200 300
Feet
hamer.
N


Nason Creek APEs
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hamer.
N