

Rare Vascular Plant and Rare Ecological Community Survey

Horse Creek Development Project NE-29 & SE-32-26-4 W5



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Executive Summary

Zanshin Environmental Networks Inc. (ZEN) was retained by Westhoff Engineering Resources, Inc. to conduct a rare vascular plant and rare ecological community survey, in support of Westhoff's Biophysical Impact Assessment for the Horse Creek Development Project, located at NE-29 & SE-32-26-4 W5 in Rocky View County, AB.

A rare vascular plant and rare ecological community survey was conducted in the Horse Creek Development survey area on June 21, 24 and August 31, 2018, following the Alberta Native Plant Council's *Guidelines for Rare Vascular Plant Surveys in Alberta – 2012 Update*. During the survey two rare plant species and no rare ecological communities were observed. The two rare plant species: sandhills cinquefoil and Macoun's cinquefoil, were found along the rock outcrop, which runs north/south through the west third of the survey area.

Avoidance is the preferred mitigation measure for these plants; however, depending on the development design further mitigations may be required. Furthermore, upon approval of this development, it is recommended that digital information on these observations is submitted to ACIMS.

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1.0 INTRODUCTION

Zanshin Environmental Networks Inc. (ZEN) was retained by Westhoff Engineering Resources, Inc. to conduct a rare vascular plant and rare ecological community survey at the Horse Creek Development site located in Rocky View County at NE-29 & SE-32-26-4 W5.

1.1 Scope and Purpose

The scope of this survey was to conduct a floristic rare vascular plant and rare ecological community (REC) survey, within the survey area in support of a Biophysical Impact Assessment (BIA) (Westhoff Project No. WER 118-18), following the Alberta Native Plant Council's (ANPC) *Guidelines for Rare Vascular Plant Surveys in Alberta – 2012 Update (Guidelines)* (ANPC 2012). The purpose of the survey was to document all vascular plant species observed within the survey area, to provide details of any rare plant species observed, and to provide recommendations as needed.

ANPC's *Guidelines* identify that the purpose of a floristic survey is not to develop a full list of the plant species in the survey area but rather to ensure that all species encountered are identified as being either rare or not rare (ANPC 2012). Furthermore, a rare plant survey can confirm the presence of a rare plant species but cannot confirm the absence of one, for a variety of reasons, such as detectability, response of species to climatic conditions, etc. (ANPC 2012).

1.2 Survey Area

The survey area is located in NE-29 & SE-32-26-4 W5, and is bounded along the west by Horse Creek Road, along the east by Range Road 44, along the south by the continuation of grasslands and rock outcrop, and to the north by a homestead, tame pasture land, including several wetlands, grasslands and the continuation of the rock outcrop.

Land use in the survey area consists of a homestead, tame pasture land, a couple of small wetlands, native grassland, a dry, rock outcrop along the west of the survey area, and a moist draw bisecting the rock outcrop (Figure 1).

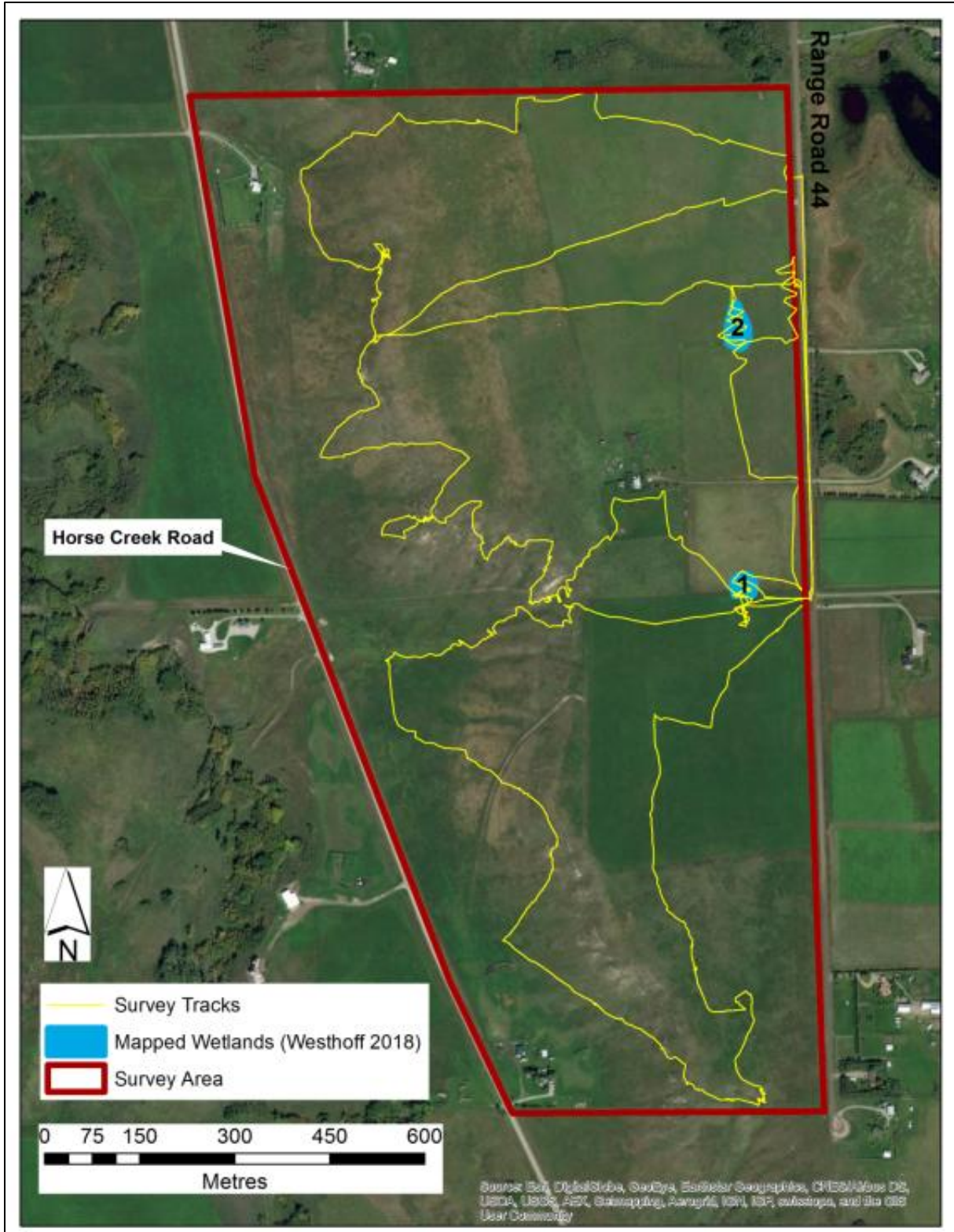


Figure 1. Survey area and survey tracks.

1.3 Environmental Setting

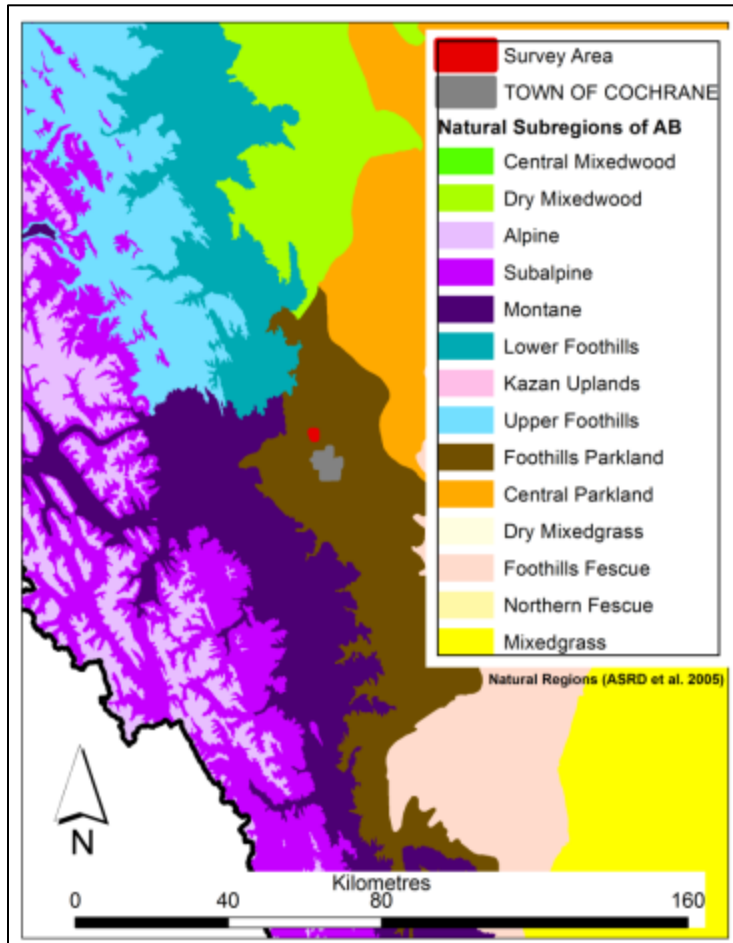


Figure 2. Survey area (red dot) in the Foothills Parkland Natural Subregion.

The Project area is located in the Parkland Natural Region, Foothills Parkland Natural Subregion of Alberta (ASRD *et al.* 2005) (Figure 2). The Foothills Parkland Natural Subregion is a discontinuous subregion along the foothills of the Rocky Mountains (Natural Regions Committee 2006). The southern portion extends from the Alberta–Montana border and the northern portion extends from approximately Willow Creek to about 50 km north of Calgary. Changes in elevation influence the climate, with marked changes in elevation creating a correspondingly rapid climate change in places. This subregion experiences cooler summers and shorter growing seasons, but warmer winters and more precipitation than other subregions in the Parkland Natural Region.

Black Chernozems and Dark Gray Chernozems are typical soils. The landscape consists of undulating to rolling terrain, with some hayland and cultivation. Vegetation on drier sites includes mountain rough fescue–bluebunch fescue grasslands. Vegetation on moister sites includes aspen forests or willow shrublands.

Open water occupies less than one percent of the land, with the Bow River being the largest watercourse. Very few small lakes occur, and wetlands are uncommon and occupy about four percent of the total area.

2.0 METHODS

The following methods include definitions, as well as desktop and field survey methods for identifying rare vascular plant species and rare ecological communities.

2.1 Rare Plants

For the purposes of this survey, rare plants were defined as vascular plant species that are:

- Listed in the current Alberta Conservation Information Management System’s (ACIMS) *List of Tracked Elements in Alberta by Natural Subregion* (ACIMS 2017a),
- Provincially regulated as ‘Endangered’, ‘Threatened’, or ‘Special Concern’ under the *Alberta Wildlife Act*, or
- Federally-listed species.

Tracked species listed by ACIMS are either considered rare or of conservation concern for other reasons, such as rapid population decline or habitat loss. Watch list species are those species that ACIMS is currently collecting information on population trends to determine their distribution within Alberta. Conservation ranks are assigned to track and watch listed species, with descriptions of the ranks summarized in Table 1 (ACIMS 2018a). If a species is assigned a combination of two ranks (e.g., S2S3), it reflects uncertainty between them. Some of these species may be further regulated under the *Alberta Wildlife Act* or the federal *Species at Risk Act*. If regulated rare plants were observed, details were included in the *Results* section of this report.

Table 1. Summary of provincial, national and global conservation ranks.

Alberta (S) /National (N) /Global (G) Rank ¹	Description	Summary
S1/N1/G1	Critically Imperiled	<5 occurrences, or only a few remaining individuals in Alberta
S2/N2/G2	Imperiled	6-20 occurrences, or with many individuals but with fewer occurrences in Alberta
S3/N3/G3	Vulnerable	21-100 occurrences, or may be rare or local throughout its range, or in restricted range in Alberta
S4/N4/G4	Apparently Secure	>100 occurrences, but may be fewer with many large populations
S5/N5/G5	Secure	>100 occurrences, but may be rare in parts of its range

¹ Provincial, national and global ranks are not always the same

2.1.1 Desktop Review

The list of rare plant species potentially occurring in the survey area consisted of tracked and listed vascular plant elements identified as occurring in the Foothills Parkland Natural Subregion (ACIMS 2017a) and vascular plants that have been observed within 10 km of the survey area through a search of vascular plant element occurrences in the ACIMS database (ACIMS 2017b).

Descriptions of the morphology, phenology, and typical habitat of potential rare plants were reviewed, as well as photos and drawings of rare plants (www.E-floras.org 2018, Kershaw and Allen 2018, Kershaw et al. 2001, Moss 1983) prior to the field survey. Species nomenclature for scientific and common names of plants follows those listed by ACIMS (ACIMS 2018b).

2.1.2 Field Methods

The survey area was surveyed using a purposeful meander survey technique, while recording all plant species observed. Areas with higher rare plant potential, such as the wetlands, and rock outcrop were surveyed with greater effort. The rare plant survey followed the Alberta Native Plant Council's (ANPC) *Guidelines for Rare Vascular Plant Surveys in Alberta – 2012 Update* (ANPC 2012). Voucher specimen collection followed *ANPC's Plant Collection Guidelines for Researchers, Students and Consultants* (ANPC 2006).

2.2 Rare Ecological Communities

Rare ecological communities are defined as ecological communities listed on ACIMS' *Ecological Community Tracking List* (Allen 2014) for the purposes of this survey. These communities appear to have a restricted distribution in Alberta (Allen 2014). Information is being collected by ACIMS to establish trends in community dynamics. These communities are ranked similarly to rare plant species (Table 1).

2.2.1 Desktop Review

A list of rare ecological communities potentially occurring in the survey area was compiled through a review of tracked ecological communities listed to occur in the Foothills Parkland Natural Subregion (Allen 2014), and ecological communities that have been observed within 10 km of the survey area through a search of ecological community element occurrences in the ACIMS database (ACIMS 2018b).

Potentially occurring rare ecological community descriptions, detailed in ACIMS' *Ecological Community Tracking List* (Allen 2014), were reviewed prior to fieldwork.

2.2.2 Field Methods

Reference rare ecological community lists, as described above, were compared with observations of the vegetation communities during the rare plant survey.

3.0 RESULTS

A rare vascular plant and rare ecological community survey was conducted on June 21, 24 and August 31, 2018 within the survey area.

3.1 Rare Plants

A total of 54 potential rare vascular plant species were identified as potentially occurring within the survey area (Appendix A). Through a search of ACIMS' element occurrence database, eight rare plant species at 16 locations were identified within 10 km of the project, not within the survey area.

A list of observed plant species was compiled for the upland areas, the draw and wetland areas within the survey area and summarized below (Table 2, Appendix B). During the survey, two rare plants were observed in the upland area (Figure 3): sandhills cinquefoil and Macoun's cinquefoil.

Table 2. Summary of area surveyed and number of plant species observed.

Areas	Number of Plant Species Observed
Upland	141
Draw	19
Wetland 1	32
Wetland 2	32

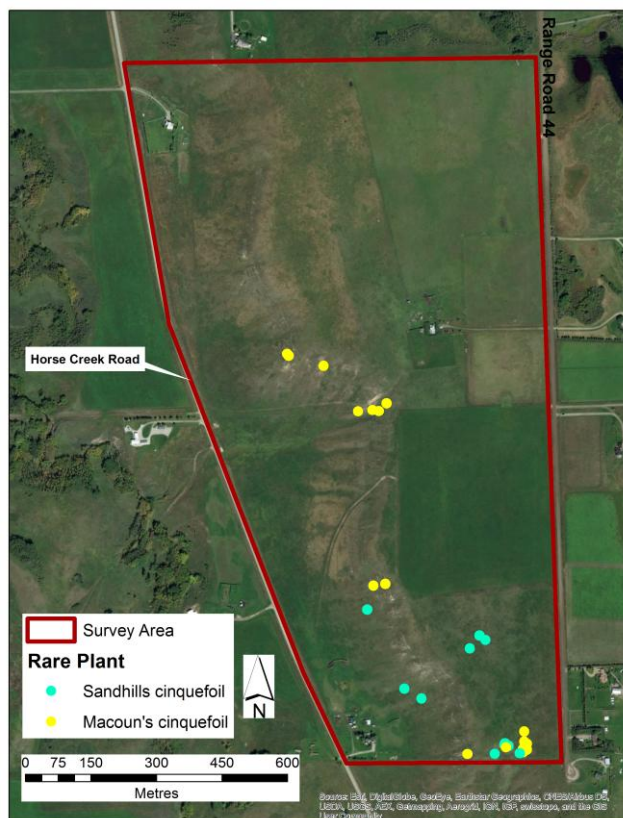


Figure 3. Location of rare plant observations.

Sandhills cinquefoil (*Potentilla lasiodonta* Rydberg)

Sandhills cinquefoil is a perennial herb in the rose family (Photo 1) that is currently being tracked by ACIMS. It is provincially ranked as S3 (vulnerable), nationally ranked as N3 (vulnerable), and globally ranked as G3 (vulnerable) (ACIMS 2018, NatureServe 2018).



Photo 1. Sandhills cinquefoil, showing cauline leaf and congested inflorescence, with inset showing the bractlets longer than the sepals.

During the survey, sandhills cinquefoil was found on slopes ranging from <2 to >15%, found along the crest and down the steep south and west facing slopes (Photo 2). Associated species include rough fescue (*Festuca campestris*), Kentucky bluegrass (*Poa pratensis*), Parry oat grass (*Danthonia parryi*), slender wheatgrass (*Elymus trachycaulus*) and pasture sagewort (*Artemisia frigida*). Twenty-four plants were counted within a 1500 m² area (Figure 3).



Photo 2. Sandhills cinquefoil habitat in the southeast corner of the study area, facing southwest.

Macoun’s cinquefoil (*Potentilla macounii* Rydberg)

Macoun’s cinquefoil is a perennial herb in the rose family (Photo 3) that is currently being tracked by ACIMS. It is provincially ranked as S1 (critically imperiled), nationally ranked as N1 (critically imperiled), and globally ranked as G3? (vulnerable with some level of uncertainty) (ACIMS 2018, Natureserve 2018).



Photo 3. Macoun’s cinquefoil.

During the survey, Macoun’s cinquefoil was found along the rock outcrop along the dry, south-, west- and southwest-facing upper to mid slopes (Photo 4). Locally, the plant was observed in abundance in the eroded areas (10 to 50% bare) above or near the exposed rock faces, and was associated with species such as early cinquefoil (*Potentilla concinna*), shrubby cinquefoil (*Dasiphora fruticosa*), Rocky Mountain fescue (*Festuca saximontana*), woodland strawberry (*Fragaria vesca*), pasture sage, slender wheatgrass, goldenbean (*Thermopsis rhombifolia*) and hay sedge (*Carex siccata*). One hundred and fifty-four plants were counted within a 2500 m² area (Figure 3).



Photo 4. Macoun’s cinquefoil habitat along the southern portion of the rock outcrop in the survey area.

3.2 Rare Ecological Communities

A total of eight potential rare ecological communities (RECs) were identified in the Foothills Parkland Natural Subregion (Appendix C). Through a search of ACIMS' element occurrence database, four rare ecological communities at seven locations were identified within 10 km of the project, not within the survey area.

During the survey, no rare ecological communities were observed.

4.0 RECOMMENDATIONS

Generally, when an impact to a rare plant population is identified, recommended mitigation measures are based on those identified by the California Native Plant Society Rare Plant Scientific Advisory Committee (1998), and implementation of mitigations are in following order of preference:

- (a) Avoiding the impact.
- (b) Minimizing impacts by limiting the spatial or temporal extent of the impact.
- (c) Creating a temporary impact and inevitably rehabilitating or restoring the impacted habitat and re-introducing the plant.
- (d) Compensating for the impact by introducing the plant via seed collection, seed bank salvage, transplant or other propagule techniques into a suitable habitat nearby.

Avoidance of the rock outcrop, where rare plants were observed, is the preferred mitigation measure. Depending on the concept design of the development plan, further mitigations may be required.

Recommendations further focus on preserving the information obtained during this survey by digitally submitting spatial location and observation details to the provincial conservation data centre, ACIMS. This allows ACIMS staff to continuously review and revise rarity status of plant species as part of the provincial land management strategy.

5.0 CONCLUSIONS

A rare vascular plant and rare ecological community survey was conducted in the Horse Creek Development survey area on June 21, 24 and August 31, 2018, during which two rare plant species and no rare ecological communities were observed.

The two rare plant species were found along the rock outcrop, which runs north/south through the west third of the survey area. Avoidance is the preferred mitigation measure for these plants; however, depending on the development design further mitigations may be required. Furthermore, upon approval of this development, it is recommended that digital information on these observations is submitted to ACIMS.

6.0 QUALITY ASSURANCE

This survey and report were conducted by a qualified rare plant biologist (Appendix D), as recommended in the Alberta Native Plant Council's *Guidelines for Rare Vascular Plant Surveys in Alberta – 2012 Update* (ANPC 2012). Conclusions and recommendations presented in this report are based on observations, discussion with relevant personnel, and review of relevant information available at the time of the survey. The contents of this report are deemed appropriate for decision-making purposes for up to two years from the date of the report.

This report has been prepared for use by Westhoff Engineering Resources, Inc., and distribution as required for planning purposes. Should you have any questions or comments, please contact Laurie Hamilton via cell phone (403) 483-2476.

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Appendix A. List of Potential Rare Vascular Plant Species in the Survey Area

Scientific Name	Common Name
<i>Arnica longifolia</i>	long-leaved arnica
<i>Artemisia borealis</i> ssp. <i>borealis</i>	northern wormwood
<i>Brickellia grandiflora</i>	large-flowered brickellia
<i>Bupleurum americanum</i>	thorough-wax
<i>Camassia quamash</i> var. <i>quamash</i>	blue camas
<i>Carex aperta</i>	open sedge
<i>Carex crawei</i>	Crawe's sedge
<i>Carex flava</i>	yellow sedge
<i>Carex vesicaria</i>	blister sedge
<i>Cirsium scariosum</i>	meadow thistle
<i>Conimitella williamsii</i>	conimitella
<i>Corispermum pallasii</i>	Pallas' bugseed
<i>Corispermum villosum</i>	hairy bugseed
<i>Cypripedium montanum</i>	mountain lady's-slipper
<i>Erigeron flagellaris</i>	creeping fleabane
<i>Festuca subulata</i>	bearded fescue
<i>Gentiana calycosa</i>	mountain gentian
<i>Gentiana fremontii</i>	marsh gentian
<i>Iliamna rivularis</i>	mountain hollyhock
<i>Iris missouriensis</i>	western blue flag
<i>Lithophragma parviflorum</i>	small-flowered rockstar
<i>Lithospermum occidentale</i>	Western false gromwell
<i>Lupinus minimus</i>	least lupine
<i>Machaeranthera tanacetifolia</i>	tansy aster
<i>Melica smithii</i>	Smith's oniongrass
<i>Melica spectabilis</i>	onion grass
<i>Mertensia lanceolata</i>	lance-leaved lungwort
<i>Montia linearis</i>	linear-leaved montia
<i>Nemophila breviflora</i>	small baby-blue-eyes
<i>Oenothera flava</i>	low yellow evening-primrose
<i>Pellaea gastonyi</i>	Gaston's cliff brake
<i>Pellaea glabella</i> ssp. <i>simplex</i>	smooth cliff brake
<i>Phlox alyssifolia</i>	blue phlox
<i>Pinus flexilis</i>	limber pine
<i>Polygonum bistortoides</i>	western bistort
<i>Polygonum engelmannii</i>	Engelmann's knotweed
<i>Polypodium hesperium</i>	western polypody
<i>Potamogeton nodosus</i>	longleaf pondweed
<i>Potentilla lasiodonta</i>	sandhills cinquefoil

Scientific Name	Common Name
Potentilla macounii	Macoun's cinquefoil
<i>Potentilla villosa</i>	hairy cinquefoil
<i>Prenanthes sagittata</i>	purple rattlesnakeroot
<i>Pseudognaphalium thermale</i>	white cudweed
<i>Pteridium aquilinum</i> var. <i>pubescens</i>	bracken fern
<i>Ribes inerme</i> var. <i>inerme</i>	mountain gooseberry
Ruppia cirrhosa	widgeon-grass
<i>Selaginella wallacei</i>	Wallace's little club-moss
<i>Senecio megacephalus</i>	large-flowered ragwort
<i>Suckleya suckleyana</i>	poison suckleya
<i>Torreyochloa pallida</i> var. <i>pauciflora</i>	few-flowered salt-meadow grass
<i>Trisetum canescens</i>	tall trisetum
<i>Trisetum cernuum</i>	nodding trisetum
<i>Trisetum wolfii</i>	awnless trisetum
<i>Viola glabella</i>	yellow wood violet

Note: **Bolded** species are those found within 10km of the survey area

Appendix B. Lists of Plant Species Observed During the Rare Plant Survey

Upland

Scientific Name*	Common Name	S Rank	G Rank
Forbs			
<i>Achillea millefolium</i>	common yarrow	S5	G5
<i>Agoseris glauca</i>	yellow false dandelion	S5	G5
<i>Anemone cylindrica</i>	long-fruited anemone	S5	G5
<i>Anemone multifida</i>	cut-leaved anemone	S5	G5
<i>Anemone patens</i>	prairie crocus	S5	G5
<i>Antennaria parvifolia</i>	small-leaved everlasting	S5	G5
<i>Apocynum androsaemifolium</i>	spreading dogbane	S5	G5
<i>Artemisia campestris</i>	plains wormwood	S5	G5
<i>Artemisia frigida</i>	pasture sagewort	S5	G5
<i>Artemisia ludoviciana</i>	prairie sagewort	S5	G5
<i>Astragalus agrestis</i>	purple milk vetch	S5	G5
<i>Astragalus cicer</i>	cicer milk vetch	SNA	G5
<i>Astragalus laxmannii</i> var. <i>robustior</i>	ascending purple milk-vetch	S5	G5T5
<i>Astragalus pectinatus</i>	narrow-leaved milk vetch	S5	G5
<i>Campanula rotundifolia</i>	harebell	S5	G5
<i>Cerastium arvense</i>	field mouse-ear chickweed	S5	G5
<i>Cerastium vulgatum</i>	common mouse-ear chickweed	SNA	GNR
<i>Chamaerhodos erecta</i>	chamaerhodos	S4	G5
<i>Chenopodium album</i>	lamb's-quarters	SNA	G5
<i>Cirsium arvense</i>	creeping thistle	SNA	GNR
<i>Comandra umbellata</i>	common comandra	S5	G5
<i>Cystopteris fragilis</i>	fragile bladder fern	S5	G5
<i>Dalea purpurea</i> var. <i>purpurea</i>	purple prairie-clover	S3	G5T5
<i>Descurainia sophia</i>	flixweed	SNA	GNR
<i>Dodecatheon conjugens</i>	mountain shooting star	S3	G5
<i>Drymocallis arguta</i>	white cinquefoil	S4	G5
<i>Erigeron compositus</i>	compound-leaved fleabane	S5	G5
<i>Erigeron glabellus</i>	smooth fleabane	S5	G5
<i>Eriogonum flavum</i>	yellow umbrella-plant	S5	G5
<i>Erysimum inconspicuum</i>	small-flowered rocket	S5	G5

Scientific Name*	Common Name	S Rank	G Rank
<i>Fragaria vesca</i>	woodland strawberry	S4	G5
<i>Gaillardia aristata</i>	gaillardia	S5	G5
<i>Galeopsis tetrahit</i>	hemp-nettle	SNA	GNR
<i>Galium boreale</i>	northern bedstraw	S5	G5
<i>Geranium bicknellii</i>	Bicknell's geranium	S5	G5
<i>Geum triflorum</i>	three-flowered avens	S5	G5
<i>Hedysarum alpinum</i>	alpine hedysarum	S5	G5
<i>Hedysarum boreale</i>	northern hedysarum	S5	G5
<i>Helianthus petiolaris</i> ssp. <i>petiolaris</i>	prairie sunflower	S3	G5T5
<i>Heterotheca villosa</i>	golden aster	S5	G5
<i>Lepidium densiflorum</i>	common pepper-grass	S5	G5
<i>Lilium philadelphicum</i>	western wood lily	S5	G5
<i>Linaria vulgaris</i>	common toadflax	SNA	GNR
<i>Linum lewisii</i>	wild blue flax	S5	G5
<i>Linum rigidum</i>	yellow flax	S4	G4G5
<i>Lithospermum ruderales</i>	woolly gromwell	S5	G5
<i>Lupinus pusillus</i>	annual lupine	S3	G5
<i>Maianthemum stellatum</i>	star-flowered Solomon's-seal	S5	G5
<i>Medicago sativa</i>	alfalfa	SNA	GNR
<i>Monarda fistulosa</i>	wild bergamot	S5	G5
<i>Mulgedium pulchellum</i>	common blue lettuce	S5	G5T5
<i>Musineon divaricatum</i>	leafy musineon	S3	G5
<i>Oenothera suffrutescens</i>	scarlet butterflyweed	S4	G5
<i>Oxytropis borealis</i>	boreal locoweed	S3	G5
<i>Oxytropis borealis</i> var. <i>viscida</i>	boreal locoweed	S3	G5T4?
<i>Oxytropis sericea</i>	early yellow locoweed	S5	G5
<i>Oxytropis splendens</i>	showy locoweed	S5	G5
<i>Packera cana</i>	prairie groundsel	S5	G5
<i>Paronychia sessiliflora</i>	creeping nailwort	S3	G5
<i>Penstemon nitidus</i>	smooth blue beardtongue	S5	G5
<i>Phlox hoodii</i>	moss phlox	S5	G5
<i>Physaria arenosa</i>	great plains bladderpod	S3	G5

Scientific Name*	Common Name	S Rank	G Rank
<i>Potentilla anserina</i>	silverweed	S5	G5
<i>Potentilla bipinnatifida</i>	plains cinquefoil	S4	G5?
<i>Potentilla concinna</i>	early cinquefoil	S4	G5?
<i>Potentilla gracilis</i>	graceful cinquefoil	S5	G5
<i>Potentilla hippiana</i>	woolly cinquefoil	S5	G5
<i>Potentilla</i> species	cinquefoil species	-	-
<i>Potentilla lasiodonta</i>	sandhills cinquefoil	S3	G2G4Q
<i>Potentilla macounii</i>	Macoun's cinquefoil	S1	G1G2
<i>Potentilla norvegica</i>	rough cinquefoil	S5	G5
<i>Potentilla ovina</i>	sheep cinquefoil	S3	G5?
<i>Potentilla pensylvanica</i>	prairie cinquefoil	S5	G5
<i>Ranunculus abortivus</i>	small-flowered buttercup	S4	G5
<i>Ranunculus pedatifidus</i>	northern buttercup	S4	G5
<i>Selaginella densa</i>	prairie selaginella	S5	G5
<i>Sisyrinchium montanum</i>	common blue-eyed grass	S5	G5
<i>Solidago altissima</i>	tall goldenrod	S5	GNR
<i>Solidago missouriensis</i>	low goldenrod	S5	G5
<i>Solidago simplex</i>	sticky goldenrod	S5	G5
<i>Sonchus arvensis</i>	perennial sow-thistle	SNA	GNR
<i>Stellaria longipes</i>	long-stalked chickweed	S5	G5
<i>Symphyotrichum falcatum</i>	creeping white prairie aster	S5	G5
<i>Symphyotrichum laeve</i>	smooth aster	S5	G5
<i>Taraxacum officinale</i>	common dandelion	SNA	G5
<i>Thalictrum venulosum</i>	veiny meadow rue	S5	G5
<i>Thermopsis rhombifolia</i>	golden bean	S5	G5
<i>Thlaspi arvense</i>	stinkweed	SNA	GNR
<i>Townsendia exscapa</i>	low townsendia	S3	G5
<i>Tragopogon dubius</i>	common goat's-beard	SNA	GNR
<i>Trifolium hybridum</i>	alsike clover	SNA	GNR
<i>Trifolium pratense</i>	red clover	SNA	GNR
<i>Vicia americana</i>	wild vetch	S5	G5
<i>Viola nuttallii</i>	yellow prairie violet	S3	G5

Scientific Name*	Common Name	S Rank	G Rank
<i>Viola species</i>	violet species		
<i>Zigadenus elegans</i>	white camas	S5	G5
<i>Zizia aptera</i>	heart-leaved Alexanders	S5	G5
Grasses and Grass-like Plants			
<i>Bromus inermis</i>	smooth brome	SNA	G5TNR
<i>Calamovilfa longifolia</i>	sand grass	S5	G5
<i>Carex filifolia</i>	thread-leaved sedge	S5	G5
<i>Carex inops</i>	sun-loving sedge	S5	GNR
<i>Carex siccata</i>	hay sedge	S5	G5
<i>Dactylis glomerata</i>	orchard grass	SNA	GNR
<i>Danthonia californica</i>	California oat grass	S5	G5
<i>Danthonia parryi</i>	Parry oat grass	S5	G5
<i>Elymus lanceolatus</i>	northern wheat grass	S5	G5
<i>Elymus trachycaulus</i>	slender wheatgrass	S5	G5
<i>Festuca campestris</i>	mountain rough fescue	S5	G5?
<i>Festuca ovina</i>	sheep fescue	SNA	GNR
<i>Festuca saximontana</i>	Rocky Mountain fescue	S5	G5
<i>Koeleria macrantha</i>	June grass	S5	G5
<i>Nassella viridula</i>	green needle grass	S5	G5
<i>Pascopyrum smithii</i>	western wheat grass	S5	G5
<i>Phleum pratense</i>	timothy	SNA	GNR
<i>Poa annua</i>	annual bluegrass	SNA	GNR
<i>Poa arida</i>	plains bluegrass	S4	G5
<i>Poa compressa</i>	Canada bluegrass	SNA	GNR
<i>Poa pratensis</i>	Kentucky bluegrass	S5	G5
<i>Poa secunda</i>	Sandberg bluegrass	S5	G5
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	S4	G5
Shrubs			
<i>Amelanchier alnifolia</i>	saskatoon	S5	G5
<i>Caragana arborescens</i>	common caragana	SNA	GNR
<i>Cotoneaster lucidus</i>	Peking cotoneaster	SNA	GNR
<i>Dasiphora fruticosa</i>	shrubby cinquefoil	S5	G5

Scientific Name*	Common Name	S Rank	G Rank
<i>Elaeagnus commutata</i>	silverberry	S5	G5
<i>Juniperus communis</i>	ground juniper	S5	G5
<i>Juniperus horizontalis</i>	creeping juniper	S5	G5
<i>Ribes oxycanthoides</i>	northern gooseberry	S5	G5
<i>Rosa acicularis</i>	prickly rose	S5	G5
<i>Rosa arkansana</i>	prairie rose	S5	G5
<i>Rosa woodsii</i>	common wild rose	S5	G5
<i>Rubus idaeus</i>	wild red raspberry	S5	G5
<i>Shepherdia canadensis</i>	Canada buffaloberry	S5	G5
<i>Symphoricarpos occidentalis</i>	buckbrush	S5	G5
Trees			
<i>Acer negundo</i>	Manitoba maple	SU	G5
<i>Picea glauca</i>	white spruce	S5	G5
<i>Populus tremuloides</i>	aspen	S5	G5
Lichens			
<i>Cladonia mitis</i>	reindeer lichen	S3S5	G5
<i>Usnea hirta</i>	bristly beard lichen	S3S5	G5
<i>Xanthomendoza fallax</i>	hooded sunburst lichen	S3S5	G5
Mosses			
<i>Abietinella abietina</i>	wiry fern moss	S4	G4G5

*Species in **bold** are deemed being tracked by ACIMS

Draw

Scientific Name	Common Name	S Rank	G Rank
Forbs			
<i>Anemone cylindrica</i>	long-fruited anemone	S5	G5
<i>Cirsium arvense</i>	creeping thistle	SNA	GNR
<i>Drymocallis arguta</i>	white cinquefoil	S4	G5
<i>Geranium viscosissimum</i>	sticky purple geranium	S3	G5
<i>Geum aleppicum</i>	yellow avens	S5	G5
<i>Geum triflorum</i>	three-flowered avens	S5	G5
<i>Heuchera richardsonii</i>	Richardson's alumroot	S5	G5
<i>Potentilla anserina</i>	silverweed	S5	G5
<i>Potentilla bipinnatifida</i>	plains cinquefoil	S4	G5?
<i>Rumex triangulivalvis</i>	narrow-leaved dock	S5	G5
<i>Taraxacum officinale</i>	common dandelion	SNA	G5
<i>Thalictrum venulosum</i>	veiny meadow rue	S5	G5
<i>Thlaspi arvense</i>	stinkweed	SNA	GNR
Grasses and Grass-like Plants			
<i>Bromus inermis</i>	smooth brome	SNA	G5TNR
<i>Phleum pratense</i>	timothy	SNA	GNR
<i>Poa pratensis</i>	Kentucky bluegrass	S5	G5
Shrubs			
<i>Dasiphora fruticosa</i>	shrubby cinquefoil	S5	G5
<i>Ribes oxycanthoides</i>	northern gooseberry	S5	G5
<i>Symphoricarpos occidentalis</i>	buckbrush	S5	G5

Wetland 1

Scientific Name	Common Name	S Rank	G Rank
Forbs			
<i>Artemisia biennis</i>	biennial sagewort	S5	G5
<i>Astragalus cicer</i>	cicer milk vetch	SNA	G5
<i>Callitriche verna</i>	vernal water-starwort	S5	G5
<i>Chenopodium rubrum</i>	red goosefoot	S4	G5
<i>Collomia linearis</i>	narrow-leaved collomia	S5	G5
<i>Crepis runcinata</i>	scapose hawk's-beard	S5	G5
<i>Galeopsis tetrahit</i>	hemp-nettle	SNA	GNR
<i>Limosella aquatica</i>	mudwort	S4	G5
<i>Linaria vulgaris</i>	common toadflax	SNA	GNR
<i>Persicaria lapathifolia</i>	pale persicaria	S5	G5
<i>Potentilla anserina</i>	silverweed	S5	G5
<i>Potentilla norvegica</i>	rough cinquefoil	S5	G5
<i>Ranunculus macounii</i>	Macoun's buttercup	S5	G5
<i>Stachys palustris</i>	marsh hedge-nettle	S5	G5
<i>Taraxacum officinale</i>	common dandelion	SNA	G5
<i>Thlaspi arvense</i>	stinkweed	SNA	GNR
<i>Trifolium hybridum</i>	alsike clover	SNA	GNR
<i>Veronica peregrina</i>	hairy speedwell	S5	G5
Grasses and Grass-like Plants			
<i>Agropyron cristatum</i>	crested wheatgrass	SNA	G5
<i>Alopecurus aequalis</i>	short-awned foxtail	S5	G5
<i>Beckmannia syzigachne</i>	slough grass	S5	G5
<i>Bromus inermis</i>	smooth brome	SNA	G5TNR
<i>Carex atherodes</i>	awned sedge	S5	G5
<i>Carex utriculata</i>	small bottle sedge	S5	G5
<i>Elymus repens</i>	quackgrass	SNA	GNR
<i>Phleum pratense</i>	timothy	SNA	GNR
<i>Poa palustris</i>	fowl bluegrass	S5	G5
<i>Poa pratensis</i>	Kentucky bluegrass	S5	G5
<i>Poa secunda</i>	Sandberg bluegrass	S5	G5
<i>Puccinellia nuttalliana</i>	Nuttall's salt-meadow grass	S5	G5

Wetland 2

Scientific Name	Common Name	S Rank	G Rank
Forbs			
<i>Achillea millefolium</i>	common yarrow	S5	G5
<i>Alisma triviale</i>	broad-leaved water-plantain	S5?	G5
<i>Artemisia biennis</i>	biennial sagewort	S5	G5
<i>Astragalus agrestis</i>	purple milk vetch	S5	G5
<i>Cirsium arvense</i>	creeping thistle	SNA	GNR
<i>Melilotus officinalis</i>	yellow sweet-clover	SNA	GNR
<i>Persicaria amphibia</i>	water smartweed	S5	G5
<i>Persicaria amphibia var. emersa</i>	water smartweed	S4	G5T5
<i>Plagiobothrys scouleri</i>	Scouler's allocarya	S3	G5
<i>Plantago major</i>	common plantain	SNA	G5
<i>Polygonum aviculare</i>	prostrate knotweed	SNA	GNR
<i>Potentilla anserina</i>	silverweed	S5	G5
<i>Ranunculus macounii</i>	Macoun's buttercup	S5	G5
<i>Taraxacum officinale</i>	common dandelion	SNA	G5
<i>Thlaspi arvense</i>	stinkweed	SNA	GNR
<i>Trifolium hybridum</i>	alsike clover	SNA	GNR
<i>Trifolium repens</i>	white clover	SNA	GNR
<i>Vicia americana</i>	wild vetch	S5	G5
Grasses and Grass-like Plants			
<i>Alopecurus aequalis</i>	short-awned foxtail	S5	G5
<i>Beckmannia syzigachne</i>	slough grass	S5	G5
<i>Bromus inermis</i>	smooth brome	SNA	G5TNR
<i>Carex pellita</i>	woolly sedge	S5	G5
<i>Carex utriculata</i>	small bottle sedge	S5	G5
<i>Deschampsia cespitosa</i>	tufted hair grass	S5	G5
<i>Elymus repens</i>	quackgrass	SNA	GNR
<i>Hordeum jubatum</i>	foxtail barley	S5	G5
<i>Juncus balticus</i>	wire rush	S5	G5
<i>Koeleria macrantha</i>	June grass	S5	G5
<i>Phleum pratense</i>	timothy	SNA	GNR

Scientific Name	Common Name	S Rank	G Rank
<i>Poa palustris</i>	fowl bluegrass	S5	G5
<i>Poa pratensis</i>	Kentucky bluegrass	S5	G5
Shrubs			
<i>Salix bebbiana</i>	beaked willow	S5	G5

Appendix C. List of Potential Rare Ecological Communities in the Foothills Parkland Natural Subregion

Scientific Name	Common Name
<i>Betula occidentalis</i> grassland riparian shrubland	water birch grassland riparian shrubland
<i>Elymus lanceolatus</i> - <i>Hesperostipa comata</i> grassland	northern wheat grass - needle-and-thread grassland
<i>Festuca idahoensis</i> - <i>Pseudoroegneria spicata</i> grassland	Idaho fescue - bluebunch wheat grass grassland
<i>Populus tremuloides</i> / <i>Rubus parviflorus</i> forest	aspen / thimbleberry forest
<i>Pseudotsuga menziesii</i> - <i>Pinus flexilis</i> / <i>Juniperus communis</i> / <i>Festuca campestris</i> woodland	Douglas-fir - limber pine / ground juniper / mountain rough fescue woodland
<i>Salix bebbiana</i> / <i>Cornus stolonifera</i> shrubland	beaked willow / red-osier dogwood shrubland
<i>Salix bebbiana</i> / <i>Rubus idaeus</i> / <i>Geranium richardsonii</i> shrubland	beaked willow / wild red raspberry / wild white geranium shrubland
<i>Schizachyrium scoparium</i> - <i>Calamovilfa longifolia</i> grassland	little bluestem - sand grass grassland

Note: **Bolded** RECs are those found within 10km of the survey area

Appendix D. Laurie Hamilton – Rare Plant Specialist Summary

Laurie Hamilton, M.Sc. CET, PWS, PBIOL, RPBIO

PERSONAL INFO

Address:
509 8th St. NE
Calgary, AB T2E 4H1
Email: laurie@zanshinenv.com
Phone: (403) 483-2476

RARE PLANT SPECIALITIES

- Rare Plant Species Surveys
- Rare Ecological Community Surveys
- Habitat Mapping
- Rare Species Distribution Modelling
- Rare Plant Management Plans
- Rare Plant Monitoring
- Bryophyte and Lichen Collection
- Plant Identification Training

EDUCATION

2015 Master of Science
Department of Geography,
University of Calgary

2004 Bachelor of Science
Biological Sciences,
University of Calgary

2000 Environmental
Technology Certificate
Mount Royal University, Calgary

1994 Environmental
Technology Diploma
Camosun College, Victoria, BC

AFFILIATIONS

- Alberta Society of Professional Biologists (Professional Biologist)
- Society of Wetland Scientists (Professional Wetland Scientist)
- Association of Science & Engineering Technology Professionals of Alberta (Certified Engineering Technologist)

RARE PLANT SPECIALIST OVERVIEW

Laurie Hamilton holds a M.Sc. in rare plant distribution modeling, and has over 24 years of experience conducting vegetation studies throughout western Canada. Laurie has participated in the production of several Alberta Species at Risk Recovery Plans, including whitebark pine, limber pine, slender mouse-ear-cress, tiny crypthanthe and small-flowered sand-verbena. She was the primary editor for the Alberta Native Plant Council's (ANPC) Guidelines for Rare Vascular Plant Surveys in Alberta – 2012 Update and currently sits on the ANPC Board in the role of Vice President. Laurie has over 15 years of rare plant survey, impact assessment and mitigation experience, with over 1250 days conducting rare plant surveys during which she has discovered several rare ecological communities in Alberta not previously listed.

RELEVANT PROFESSIONAL ROLES

Terrestrial & Wetland Ecologist, Geomatics Specialist Zanshin Environmental Networks Inc.	2007 to present
Sessional Instructor of Ecology Department of Earth and Environmental Science, Mount Royal University	2016 to present
Director and Instructor SALMTEC	2014 to present
Manager of Terrestrial Ecology IRIS Environmental Systems Inc.	2006 to 2007
Vegetation Ecologist AXYS Environmental Consulting Ltd.	2003 to 2006

SELECT PROJECTS

- Numerous Rare Plant and Rare Ecological Community Surveys for various projects in Alberta, Saskatchewan, NWT and BC. (2003-2018)
Performed +1250 days of rare plant and rare ecological community surveys in Western Canada on many types of projects, from international pipelines to small rural developments.
- Limber Pine Management for activity on Public Lands. (2018)
Surveyed baseline conditions and created limber pine management plan in support of disposition application.
- Teck Coal Mine Rare Plant Modelling. (2015)
Modelled rare plant and lichen distribution within project area in east-central BC.
- Bellatrix Resources, Rare Plant Management Plans. (2014)
Created three rare plant management plans (wood anemone, hairy wood-rush, and a habitat based approach [for managing golden saxifrage, snakeskin liverwort and Macloskey's violet]), to support land management within the project area.
- Alberta Society of Professional Biologists, Introduction to Plant Identification Workshop. (2004-2012, 2015)
Course development and instruction for numerous plant identification workshops.