SURVEY OF RARE VASCULAR PLANTS IN LA BUTTE CREEK WILDLAND PROVINCIAL PARK

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INTRODUCTION

La Butte Creek Wildland Provincial Park (LBCWPP) is one of 81 recently designated protected areas, established in March 1998. It is located in the northeast corner of Alberta, north of Lake Athabasca, about 300 km north of Ft. McMurray (Figure 1).

LBCWPP is a remote site accessible in summer only by air or water. The character of the site changes significantly from west to east, as it straddles two natural subregions, the Peace River Lowlands (Boreal Forest Natural Region) and the Kazan Upland (Canadian Shield Natural Region) (Figure 1; see also Appendix 1 and Achuff 1994 for more details on natural regions/subregions in Alberta). The Slave River forms the western boundary of the Wildland Provincial Park. In this area the landscape is composed mainly of marshy lowlands, meander scars and forested river terraces. These have formed on the deposits of the Slave River and fall within the Peace River Lowlands Natural Subregion. Rounded, granite outliers of Precambrian Shield rocks occur sporadically along the Slave River. Moving east into the Kazan Upland Natural Subregion, the outcrops become increasingly more common until areas of bedrock outcrops become the predominant landform. Extensive outcrops of Precambrian granite and gneiss are typical of the Kazan Upland Subregion (Green et al. 1970). Rock outcrops often trap small areas of wet depressions between them.

Most background information relevant to the flora and vegetation of this site came from Raup's historic reports on the Athabasca-Great Slave Lake region (Raup 1928, 1935, 1936, 1946) and a more-recent report on the Kazan Upland by Wallis and Wershler (1984).

The forests of the Kazan Upland Subregion are generally described as predominantly coniferous, with *Pinus banksiana* and *Picea glauca* dominating in mesophytic areas, and *Picea mariana* with occasional *Larix laricina* growing in various wetland sites. *Betula neoalaskana* is noted as one of the typical associated species. Open forests of *Pinus banksiana* predominate over large areas north of Lake Athabasca, occupying both sandy sites and rocky hills of granite and hard metamorphic rock. *Betula neoalaskana* accompanies pine in some places. *Picea glauca* may be abundant in some stands on rocky ground, but it is replaced by *Picea mariana* in stands on sandy soils. *Carex* spp. marshes, swamps and *Picea mariana* forests occupy poorly drained depressions. Lichen-heath characterizes vast areas of bedrock outcrops, with extensive lichen cover over much of the rock, and vascular plant growth found only in spots where thin soils have developed in crevices and depressions in the rock. Raup (1928, 1946) and Wallis and Wershler (1984) provide more detailed descriptions of the above-listed habitats and the associated flora.

The western portion of LBCWPP that falls within the Peace River Lowlands Natural Subregion is shaped by the patterns of deposition and channel migration on the deposits of the Slave River. Raup (1935) discusses the vegetation of what he terms the "flood plain and delta lands" within Wood Buffalo National Park. He describes extensive areas dominated by *Carex atherodes* or *Calamagrostis canadensis*, separated by alluvial deposits such as levees. The levees are described as higher, better drained with *Salix* spp. shrublands or *Picea glauca* or *Populus balsamifera* woodlands on the larger terraces.

Wallis and Wershler (1984) report 239 vascular plant taxa for the Kazan Upland portion of the Canadian Shield north of Lake Athabasca. Their species list was partially based on the list reported in Raup's "Catalogue of the Vascular Plants" (Raup 1936) and supplemented by the information from 1983 studies conducted by the authors in the Wylie Lake and Colin-Woodman lakes areas. The list of species encountered by Wallis and Wershler in 1983 includes 14 vascular plant taxa that are on the Alberta Natural Heritage Information Centre (ANHIC)[1] Tracking List and two from the ANHIC Watch List (Vujnovic and Gould 2002). These are *Botrychium multifidum*, *Carex heleonastes*, *C. rostrata*, *Cardamine pratensis*, *Gymnocarpium jessoense*, *Hypericum majus*, *Juncus brevicaudatus*, *J. filiformis, Polypodium virginianum* (specimens recently revised to *P. sibiricum*), *Potentilla multifida*, *Sagina nodosa*, *Silene antirrhina*, *Potamogeton natans* and *Potentilla hookeriana* (Tracking List), and *Dryopteris fragrans* and *Woodsia ilvensis* (Watch List).

[1] The ANHIC collects, updates, analyzes and disseminates information about the location, condition, status, and trends of selected elements of Alberta's biological diversity, including vascular and non-vascular plants and plant communities. Visit the ANHIC website for more information (http://www.cd.gov.ab.ca/preserving/parks/anhic/flashindex.asp).

A search of the ANHIC database for additional rare vascular plant taxa found within the Peace River Lowlands or the Kazan Upland (including a buffer of 2.5 km around each region) revealed an additional 22 taxa that are on the 2002 Tracking List (see Appendix 3 for the full list of taxa based on the database query). Detailed review of all available background information showed that no rare vascular plant taxa were reported for LBCWPP prior to this study.

The two main objectives of this reconnaissance survey were: a) to document the location, habitat and population size information for tracked vascular plant taxa occurring within the study area; b) to develop a preliminary list of vascular plant species for LBCWPP.

METHODS

The logistics of this project can be divided into three separate components: pre-fieldwork, field data collection, and post-fieldwork data processing and analysis.

Pre-fieldwork

To develop a list of rare vascular plant species potentially occurring within the study area, a list of tracked vascular plants with one or more occurrences mapped within 2.5 km of the Kazan Uplands or Peace River Lowland natural subregions was developed by querying the ANHIC database (ANHIC 2001). General habitat descriptions for each species on the list were then extracted from Moss (1983) and supplemented by more detailed habitat descriptions stored in the ANHIC element occurrence files (ANHIC 2001). The list of potentially occurring rare vascular plants and the habitats they have been found in (including known habitats from outside the Kazan Upland and Peace River Lowland Subregions) is presented in Appendix 3.

Keys to more difficult vascular plant taxa were compiled and voucher specimens deposited at the University of Alberta herbarium were consulted to improve the surveyor's ability to recognize these taxa in the field.

Aerial photographs for LBCWPP were then reviewed to identify the locations of habitats with high potential for finding rare vascular plants. Identified locations were then considered target areas for the field survey. Locations of some of the habitats listed in Appendix 3 as supporting rare plants species (i.e., wet edges of lakes, creeks, streams and beaver ponds; marshes with open water; sandy and rocky shores; rock outcrops and cliff faces) were fairly easy to identify from 1:24,000 aerial photographs. Some of the rare species however are associated with microhabitats not easily identified on aerial photographs. These included various forest types. To increase the chances of finding some of these microhabitats, various deciduous (*Betula neoalaskana, Populus tremuloides* dominated), coniferous (*Picea mariana, P. glauca* or *Pinus banksiana* dominated) and mixed stands were identified as additional target areas. Inclusion of these additional target sites also aimed toward ensuring better documentatin of the overall site diversity (rare plus more common vascular plant taxa).

Field Data Collection

The survey was conducted between July 06 and 15, 2001, during which time as many target areas as possible were visited (given the size of the park, the limited accessibility of many areas, and limited time allocated for this inventory, it was not possible to visit all of them). Sites were mainly accessed on foot or by boat and limited helicopter time provided access to a few more remote sites. At least one location of each of the habitats expected to support rare plant taxa and each of the additional target areas (various forest types) were surveyed for rare vascular plants. The sites were searched in a meandering manner to increase the chance of finding rare taxa. When a rare taxon was encountered, the occurrence was marked with a Garmin 76 GPS unit. When time permitted, the extent of the area occupied by a particular rare taxon was captured by a number of points marked with the Garmin unit. The identified area was then considered a sub-population of this taxon and described in field books for later entry into the ANHIC element occurrence files (a complete list of relevant information is shown on the Rare Native Plant Report Form, Appendix 5). Photographs depicting rare taxa and their locations were taken whenever possible.

Because of time constraints, little emphasis was put on defining "an individual" for each rare taxon for the purpose of estimating its population size. Instead, different counting units were applied to simplify counting and make the best use of available time. For example, **individual plants** were counted/estimated for those taxa that do not grow from rhizomes and that have individual plants separated enough to allow for counting/estimating (i.e., *Botrychium crenulatum* and *B. "michiganense*"). The number of **"plants"** was counted/estimated for those taxa that do spread by rhizome, but above ground appear like they grow as individual plants (i.e., *Carex rostrata, Mimulus ringens, Nymphaea tetragona* and *Physostegia ledinghamii*). **Patches** were counted (and their size often provided) for low, densely growing taxa (i.e., *Carex umbellata*, *Polypodium sibiricum* and *Potentilla hookeriana*). *Carex capitata* does not generally fall in the category of "low, densely growing taxa", but in LBCWPP this rhizomatous species grew in more or less dense patches, which made a count of patches with the estimation of stem numbers more practical for the purpose of estimating the population size within the study area. **Stems** were estimated for densely growing *Juncus filiformis* because of its morphological characteristics (thread-like appearance of stems with reduced leaves). Finally, **clumps** were noted for those species that grow from a short rhizome and generally have a clumpy appearance above ground (e.g. *Carex pseudocyperus*). The counting unit for each of the species is provided in the

description section within each of the species write-ups. Population sizes reported by other surveyors in the past have been presented in their original form. This resulted in inconsistency in terminology within the population size description for a single taxon.

While attempts were made to document the actual size of a sub-population and the area of occupancy for each rare taxa encountered, available time was often insufficient to ensure the completeness of this information. Because of time and logistical constraints, vast areas of the park remain unsurveyed that potentially harbour rare vascular plant taxa, and many of the surveyed areas have not been investigated in enough detail to ensure that no rare taxa have been missed. Also, some vascular plants do not grow every year, so somewhat different results could be obtained if a similar study was conducted in another year. Finally, there may be some spring or fall flowering taxa that were missed during the survey in July.

A list of all noted vascular plant taxa found (as shown in Appendix 2) was updated daily by adding new taxa to the list whenever encountered in the field. Voucher specimens were collected for those rare taxa where it was estimated that the removal of an individual would not harm the long-term persistence of a sub-population. Collections were made for a number of non-rare vascular plant taxa (mainly specimens of difficult taxonomic groups and of unknown taxa). Specimens were then identified in the camp. Specimens of some non-rare taxa were disposed of after being identified. Others (including those of all rare taxa) were pressed for later identification and documentation.

The lead author of this report spent ten working days on the focused rare plant survey in the study area. Working hours ranged from 10 to 11, including about an hour every day for in-camp plant identification and preparation of voucher specimens. The co-authors Lorna Allen and Derek Johnson focused their work on the significant small patch communities and on rare non-vascular plants and lichens, respectively. Their encounters of rare vascular plant taxa were of a somewhat incidental nature so their time-share for finding rare vascular plant taxa would be hard to estimate. A few additional locations of rare vascular plants were reported by other crewmembers of the biophysical inventory team.

Post-fieldwork

All notes from field books have been typed and a digital file resides with ANHIC for future reference. Voucher specimens were annotated by Patsy Cotterill (ANHIC research assistant) and those of known taxa were mounted on herbarium sheets and labelled. Specimens of difficult taxonomic groups were sent to appropriate authorities for annotations. Once returned, annotated specimens were also mounted and labelled. Prior to depositing voucher specimens in various herbaria, label information for tracked species was entered into the ANHIC database for further element occurrence processing. All vouchers were finally deposited at the University of Alberta, Canadian Forest Service or ANHIC herbaria.

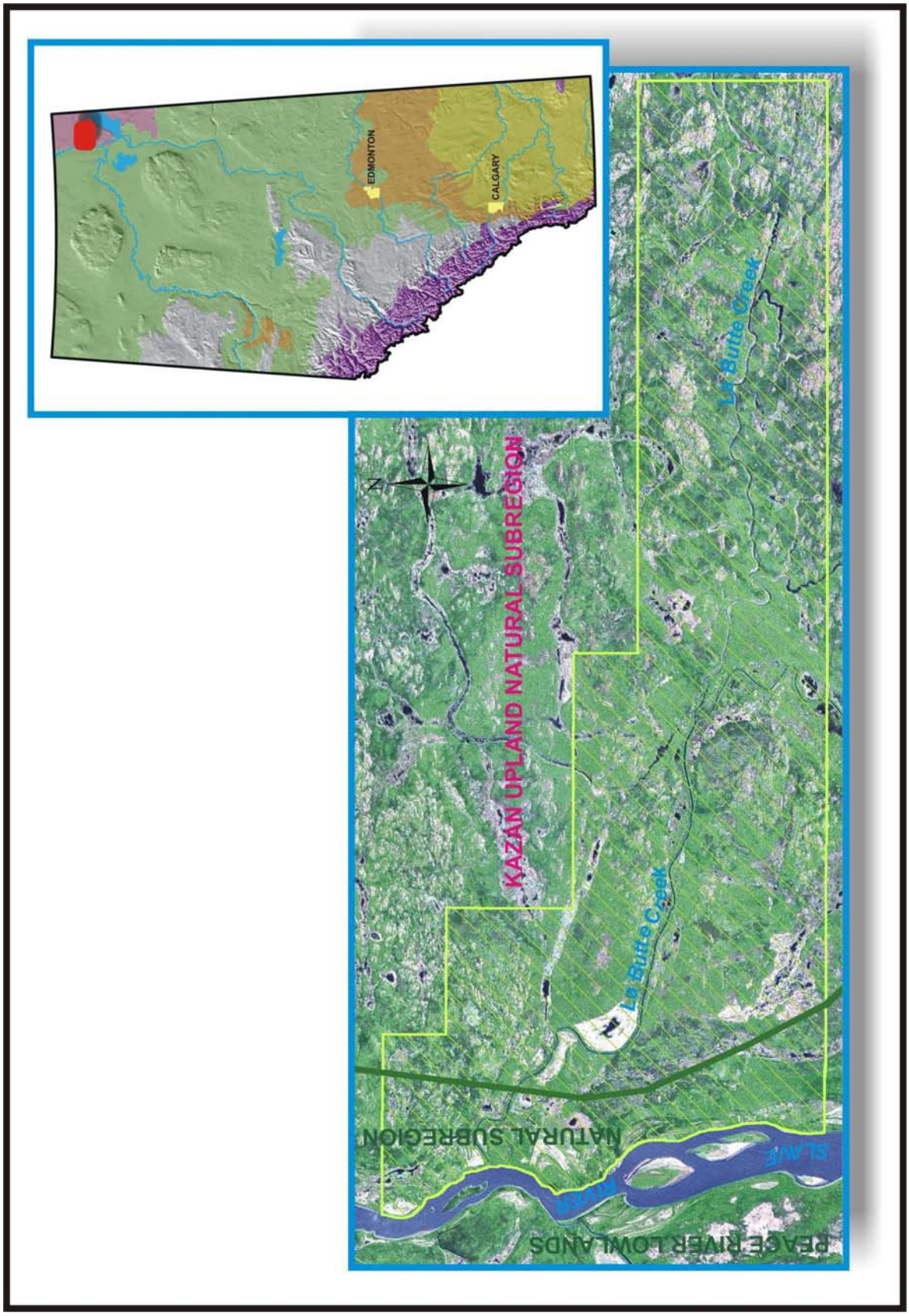
All locations where tracked vascular plant taxa were found, based on collected specimens and field notes, were mapped as either a point location or a polygon on 1:50,000 NTS NTS maps. To assist with the mapping process and for future reference, all point data from the GPS unit were downloaded into a computer and overlaid onto a digital orthophoto mosaic of the park. This facilitated decision-making on whether locations should be mapped as points or combined into a polygon, and assisted in creation of the site distribution maps for this report.

Once all locations for a taxon were mapped, those sites separated by a 1 km or less were assumed to belong to the same population (this is the separation distance recommended in the Element Occurrence Data Standard developed by the NatureServe - NatureServe 2004a); those separated by greater than a kilometre were considered separate populations, however, additional surveys are needed to be sure that these are in fact different populations.

Scientific names in this report follow Moss (1983) for the most part, but have been updated to be consistent with the taxonomy used in ANHIC. When taxonomy other than Moss (1983) is used, the name found in Moss is enclosed in parentheses. Common names follow Ealey (1993) for the most part, but also have been updated to be consistent with ANHIC and/or NatureServe (when a common name has not been not assigned by ANHIC).

Slides taken during this survey by K. Vujnovic have been digitised and both digital files and original slides reside with ANHIC. Original slides taken by L. Allen and D. Johnson reside with the photographers, but selected slides have been digitised and digital copies are available through ANHIC.

Figure 1 – La Butte Creek Wildland Provincial Park: Location and natural subregions.



RESULTS

One of the objectives of this inventory was to compile a preliminary list of vascular plant species for LBCWPP. This inventory resulted in the list of 329 taxa for LBCWPP (see Appendix 2 for a preliminary list of vascular plant taxa).

The primary focus of the fieldwork was placed on locating and documenting provincially rare vascular plant taxa. Fifteen (15) vascular plant taxa that are on the 2002 vascular plant Tracking List and three from the 2002 Watch List were recorded during this survey (Table 1). Five of these taxa are ranked S1 in Alberta, six are ranked S2, three are ranked S2S3, three are ranked S3 and one is considered unrankable (SU). One taxon has not been ranked yet globally (*Botrychium* "*michiganense*") and two of the tracked taxa are considered globally rare (*Botrychium crenulatum* ranked G3 and *Physostegia ledinghamii* ranked G3?) (for details on the provincial and global rankings used in this report please see Appendix 4). None of these rare or watched taxa have been reported previously from this park, and *Mimulus ringens* was a species new to the province.

Table 1 – List of all vascular plant taxa from Tracking and Watch Lists that were found in LBCWPP in 2001.

Scientific Name	Common Name	Provincial (S) and Global (G) ranks	
Tracking List			
Botrychium crenulatum	crenulate moonwort	S1	G3
Botrychium "*michiganense*"		SU	G?
Carex capitata	capitate sedge	S2	G5
Carex pseudocyperus	cyperus-like sedge	S2	G5
Carex retrorsa	turned sedge	S2S3	G5
Carex rostrata	beaked sedge	S2	G5
Carex umbellata	umbellate sedge	S1	G5
Juncus filiformis	thread rush	S2S3	G5
Mimulus ringens	square-stem monkeyflower	S1	G5
Nymphaea tetragona	white water-lily	S1	G5
Physostegia ledinghamii	false dragonhead	S2	G3?
Polypodium sibiricum	Siberian polypody	S2S3	G5?
Potamogeton natans	floating-leaf pondweed	S2	G5
Potentilla hookeriana	Hooker's cinquefoil	S2	G4
Silene antirrhina	sleepy catchfly	S1	G5
Watch list			
Cypripedium acaule	stemless lady's-slipper	S3	G5
Dryopteris fragrans	fragrant shield fern	S3	G5
Woodsia ilvensis	rusty woodsia	S3	G5

Six of the rare/watched taxa were found growing only on rock outcrops typical of the Kazan Upland Natural Subregion. These include *Botrychium* "*michiganense*", *Carex umbellata, Dryopteris fragrans, Silene antirrhina*, *Polypodium sibiricum* and *Woodsia ilvensis.* Three of the rare species, *Mimulus ringens, Physostegia ledinghamii* and *Juncus filiformis*, grew mainly along the edges of La Butte Creek, although *Mimulus ringens* was also found in one location in the deep silts beside the Slave River, along with *Carex retrorsa and C. pseudocyperus*. One birch-willow stand provided habitat for *Botrychium crenulatum*, while various wetlands provided suitable habitat for *Carex capitata*, *C. pseudocyperus*, *C. rostrata* and *Nymphaea tetragona*. The open water of La Butte Creek was home to at least one rare species, *Potamogeton natans,* while coarse sands of a very steep, sparsely vegetated, west-facing slope along the east side of Slave River supported another rare species, *Potentilla hookeriana*. Sandy soils in an open *Pinus banksiana* stand provided a home to a Watch List species, *Cypripedium acaule*.

The next section provides a summary for each of the species discussed above with an emphasis placed on the Tracking List species and fewer details provided for Watch List species. Each summary includes: scientific and common names; family name; brief description including photograph of the species; provincial (sub-national) and global ranks; distribution in La Butte Creek WPP, Alberta and globally; description of the habitat of the species in La Butte Creek WPP, Alberta and elsewhere; population size information; list of protected areas that include known locations; and notes (optional). Tracking List species are presented first, then Watch List species. Within each of

these groups, the taxa are ordered alphabetically by scientific name. [It is important to note here that habitat descriptions from areas outside the study site have been extracted from the ANHIC database and other sources of information such as published literature. These are presented in more or less their original form, and the authors of this report had limited control over the terminology used and the quality of the information. Reports on rare taxa from highly unlikely locations and habitats that are not supported by a specimen are labeled as questionable in the ANHIC database, and are not included in this report.]

SPECIES ON THE TRACKING LIST:

Botrychium crenulatum W.H. Wagner (crenulate moonwort) S1 G3

1. BRIEF DESCRIPTION

Botrychium crenulatum is a small perennial forb of the adder's-tongue (Ophioglossaceae) family. Like other members of the genus *Botrychium*, this species grows from a short erect rootstock and a cluster of fleshy roots (Moss 1983). Individual plant counts were used to estimate population size in LBCWPP.

2. DISTRIBUTION

LBCWPP – *Botrychium crenulatum* was found at only one location in LBCWPP, along the east shore of the Slave River, about 400 m north of the mouth of La Butte Creek and about 250 m east of the river's edge (see Figure 2 C).

AB – *Botrychium crenulatum* is known from only one additional location in Alberta, Standish Hump in the southern Rockies (ANHIC 2004) (Figure 2 B). Currently known locations of this species in Alberta fall within the Peace River Lowlands and Alpine natural subregions.

Global – *Botrychium crenulatum* seems to be restricted to western Canada and the western United States, reaching as far east as Montana, Wyoming and Arizona. This species is considered rare or possibly extirpated (SH) in most jurisdictions where it occurs (British Columbia (S1S3); Arizona (SH), California (S2), Idaho (S1), Montana (S2), Nevada (S1?), Oregon (S2) and Utah (S1)) (NatureServe 2004b).

3. HABITAT

LBCWPP – Plants were found in a birch-willow stand, growing in a small mossy patch. Associated species included *Botrychium virginianum, Linnaea borealis, Arctostaphylos uva-ursi* and *Fragaria virginiana*.

AB – There is no information on habitat for the Rocky Mountain population in the ANHIC database (ANHIC 2004). Kershaw et al. (2001) noted that *Botrychium crenulatum* grows with *B. ascendens* in grassy openings in mountain forests.

Elsewhere – *Botrychium crenulatum* grows in marshy meadows and springy places in the montane zone of British Columbia (Douglas et al. 2000). According to the Flora of North America (FNA 1993), this species grows in marshy and springy areas. Beatty et al. (2003) suggest that throughout its range in the western United States, *Botrychium crenulatum* grows in a variety of moist, open, montane habitats, including damp meadows, boggy areas, and marshes (see Beatty et al. (2003) for a more complete summary of habitats throughout the species' range).

4. POPULATION SIZE

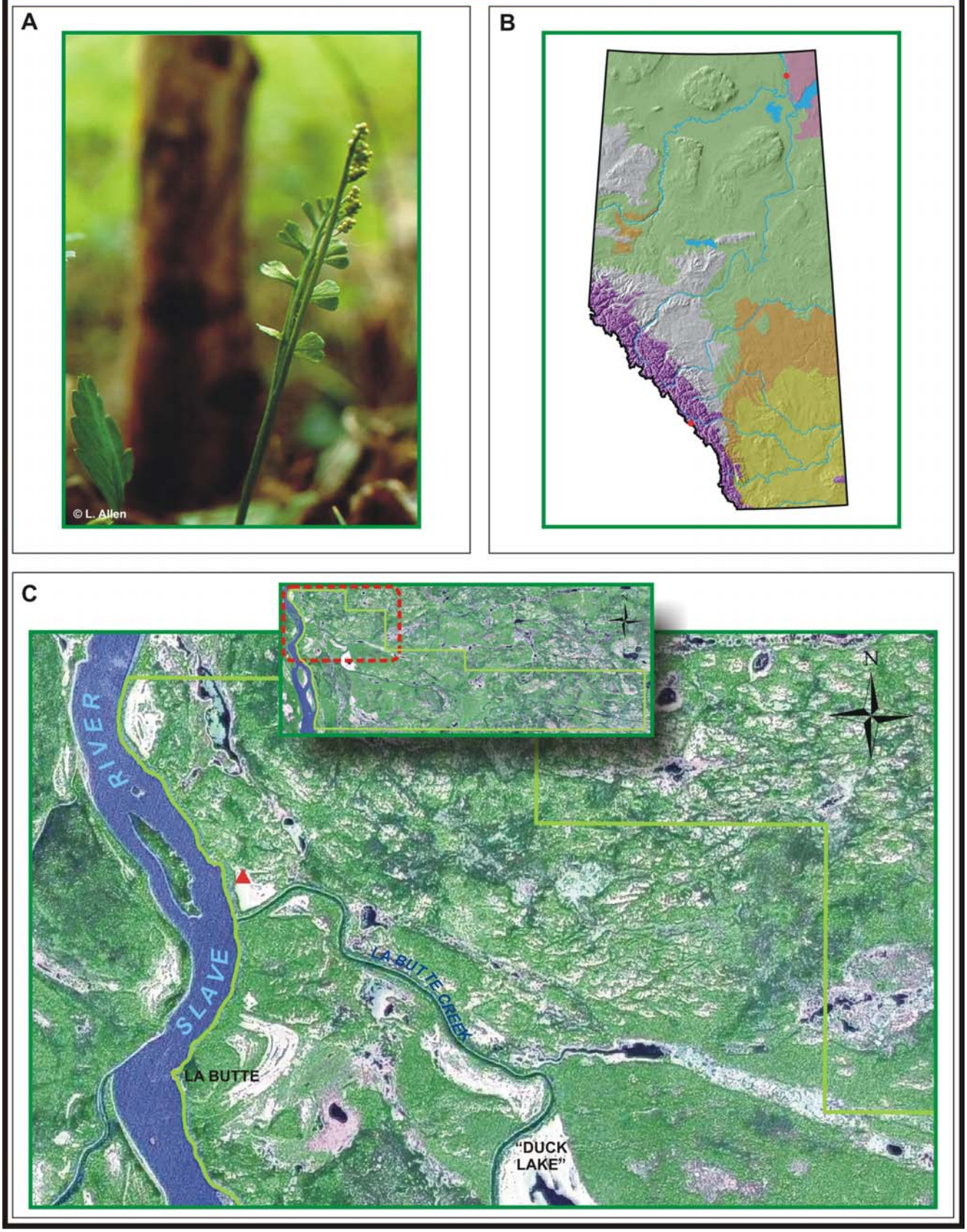
LBCWPP – Only seven plants of *Botrychium crenulatum* were counted at the location in LBCWPP.

AB – Information on population size for the Rocky Mountain location is not known (ANHIC 2004).

5. PROTECTED AREAS

Jasper National Park (NP); La Butte Creek WPP.

Figure 2 – *Botrychium crenulatum* W.H. Wagner (crenulate moonwort). **A** - image of the plant; **B** - known locations of *Botrychium crenulatum* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.



Botrychium "michiganense" SU G?

1. BRIEF DESCRIPTION

Botrychium "*michiganense*" is a small perennial forb of the adder's-tongue (Ophioglossaceae) family. Like other members of the genus *Botrychium*, this species grows from a short erect rootstock and a cluster of fleshy roots (Moss 1983). Individual plant counts were used to estimate population size in LBCWPP.

2. DISTRIBUTION

LBCWPP – *Botrychium* "*michiganense*" was found at only one location in LBCWPP, along the east shore of the Slave River about 700 m north of the mouth of La Butte Creek and about 60 meters east of the river's edge (Figure 3 C).

AB – In addition to this new LBCWPP location, *Botrychium* "*michiganense*" is known from five other general locations in Alberta: two in the broad Waterton Lakes area, two in central Alberta, and one in the Cypress Hills (ANHIC 2004) (Figure 3 B). It should be noted here that one of the "locations" in central Alberta represents a cluster of nine patches scattered over an area of about 16 km^2 within Elk Island National Park. Currently known locations of this species in Alberta fall within the Dry Mixedwood, Peace River Lowlands, Sub-Alpine and Montane natural subregions.

Global – *Botrychium* "*michiganense*" is currently known from only Wyoming, Washington, northern Idaho, Alberta, and possibly Colorado (Anderson and Cariveau 2004).

3. HABITAT

LBCWPP – Plants were found in cracks of a rock outcrop dominated by lichens. Associated species included *Gentianella amarella, Polypodium sibiricum, Woodsia ilvensis, Danthonia intermedia, Cerastium arvense, Anemone patens* and *Galium boreale*.

AB – *Botrychium* "*michiganense*" was also found in an open field of *Festuca scabrella* in Waterton Lakes NP, on a south-facing slope with *Fragaria virginiana*, *Eriogonum flavum, Penstemon confertus, Potentilla gracilis, Botrychium lunaria* and *B. lanceolatum* in the South Drywood Creek area (north of Waterton Lakes NP), and in a submesic fescue grassland in an upland region of Cypress Hills Provincial Park, growing with *Botrychium paradoxum, B. pallidum, B. pedunculosum, B. lunaria* and *B. simplex* (ANHIC 2004). In Elk Island NP it was found in old road habitats and adjacent grassy clearings grazed by bison and often recolonized by species such as *Populus balsamifera, P. tremuloides, Rubus idaeus, Achillea millefolium, Fragaria virginiana* and *Taraxacum officinale*, and on disturbed sandy soil with *Solidago* sp., *Agrimonia striata, Aster laevis, Festuca saximontana, Agropyron* sp. and *Androsace septentrionalis*. *Botrychium pallidum* and *B. multifidum* were often found with *B.* "*michiganense*" in habitats within Elk Island NP (ANHIC 2004). At the location northeast of Athabasca Town, *Botrychium "michiganense*" was found on a sandy ridge at the edge of a clearing, with *Fragaria virginiana*, *Linnaea borealis* and other *Botrychium* spp., and on a deeply shaded trail among tall herbs and shrubs (ANHIC 2004).

Elsewhere – *Botrychium* "*michiganense*" is known from sand dunes in Michigan, tailings ponds, gravel pits, ditches, an old log landing, weedy roadside, herbaceous openings and moist to dry brush fields in Minnesota, and from a *Pinus ponderosa* forest with *Populus tremuloides* in Wyoming (Anderson and Cariveau 2004). In the Lake Superior area it often grows with *Botrychium acuminatum* and *B. matricariifolium* (Anderson and Cariveau 2004).

4. POPULATION SIZE

LBCWPP – Only eight plants were counted at the location in LBCWPP.

AB – Nineteen plants were counted at the Cypress Hills location, ten were counted at the location northeast of Athabasca Town and less than 200 plants were reported from nine patches in Elk Island NP (ANHIC 2004). Information on population size is not available for Waterton Lakes NP or from the South Drywood Creek location (ANHIC 2004).

5. PROTECTED AREAS

Waterton Lakes and Elk Island NPs, Cypress Hills Provincial Park (PP) and La Butte Creek WPP.

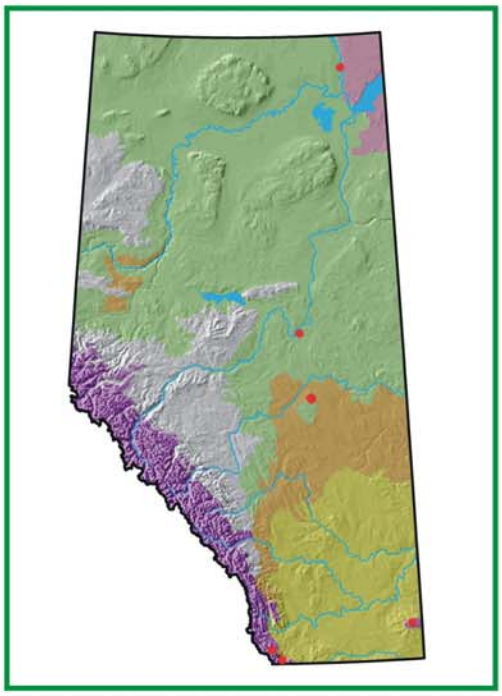
6. NOTES

B. "*michiganense*" was not recognized as a separate species from *B. hesperium* until recently. The late Dr. Herb Wagner recognized consistent morphological differences in specimens of *B. hesperium* and had planed to split this species into two different taxa: *B. hesperium* and *B.* "*michiganense*" (Anderson and Cariveau 2004). *B.* "*michiganense*" has not been officially described at the time of writing (thus we use quotation marks for its specific epithet), but, according to Anderson and Cariveau (2004), it is soon to be published by Drs. F. Wagner and D. Farrar.

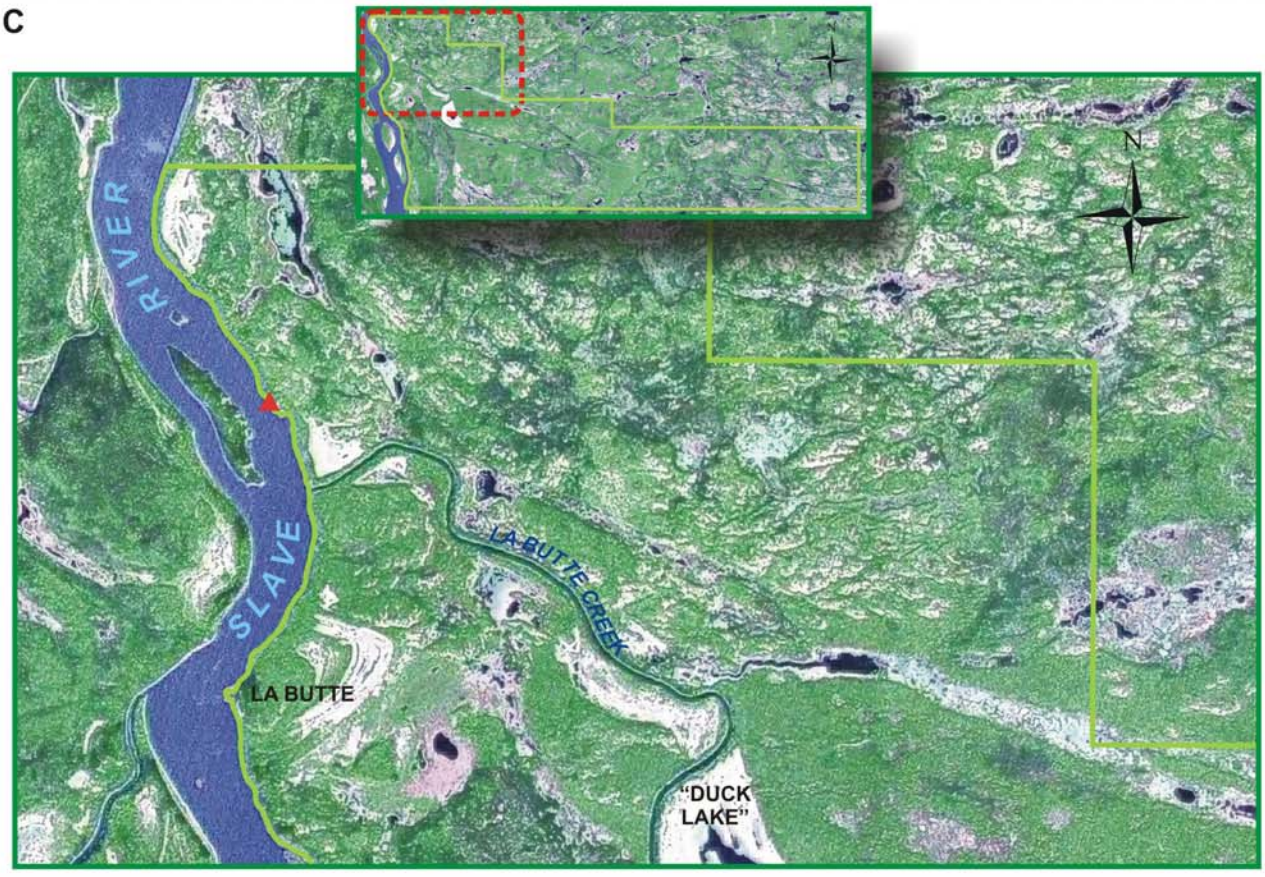
Figure 3 – *Botrychium "michiganense"*. **A** - image of the plant; **B** - known locations of *Botrychium "michiganense"* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.

A

B



C



Carex capitata L. (capitate sedge) S2 G5

1. BRIEF DESCRIPTION

Carex capitata is a tufted perennial herb of the sedge (Cyperaceae) family. It grows from a very short, ascending underground stem (Kershaw et al. 2001). In LBCWPP this species grew in patches, which might have represented individual plants. Count of patches with the estimation of flowering stem numbers was used to estimate the population size of this species within the study area.

2. DISTRIBUTION

LBCWPP – *Carex capitata* was discovered at only one location in LBCWPP, just north of the first fork of La Butte Creek (see Figure 4 C).

AB – Additional northern locations of this species in Alberta include Fidler Point in Fidler-Greywillow WPP (four locations, ca 300 to 900 m apart from each other), one location each in Richardson River Dunes WPP and the Bistcho Lake Indian Reserve, four locations in the Ft. Fitzgerald area and six locations at the Syncrude Aurora South Oil Sands Lease, ca 50 km north of Fort McMurray. *Carex capitata* is also known from 14 locations in the west-central part of Alberta (Figure 4 B). Known locations of *Carex capitata* in Alberta fall within the Athabasca Plain, Kazan Upland, Central Mixedwood, Sub-Arctic, Peace River Lowlands, Alpine, Sub-Alpine, Montane, Upper Foothills and Lower Foothills natural subregions.

Global – *Carex capitata* is present throughout Canada (except in New Brunswick, Nova Scotia and Prince Edward Island) and the western half of the United States. It ranges as far north as Alaska and as far south as California and New Mexico. It is common in most Canadian provinces. In addition to Alberta, it is considered rare in Newfoundland Island (Newfoundland) (S1S2) and Utah (S1) (NatureServe 2004). Subspecies *arctagena* has been reported as rare in Oregon (S2) and Wyoming (S2) (NatureServe 2004b) (see Notes regarding infra-specific categories for this taxon).

3. HABITAT

LBCWPP – Plants grew in an organic wetland dominated by *Picea mariana* and *Ledum groenlandicum*. Other species included *Spiranthes romanzoffiana, Castilleja raupii, Salix myrtillifolia, Arctostaphylos rubra, Vaccinium vitis-idaea, Oxycoccus microcarpus, Carex capillaris, C. disperma, C. vaginata, C. gynocrates,* etc.

AB – In Alberta, this species generally grows in calcareous fens and other wet sites (Kershaw et al. 2001). It has been reported from willow-sedge wetlands, sloping riverbanks, alpine tundra and hillsides, and from fairly dry black spruce-lodgepole, black spruce and lodgepole pine dominated forests (often in forests on organic or sandy grounds) (ANHIC 2004). In the Syncrude Aurora South Oil Sands Lease, it was found in *Pinus banksiana* / *Picea mariana*, *Populus tremuloides* / *Picea mariana* (*P. glauca*) and *Picea mariana* / *Larix laricina* dominated forests, as well as in moist sections of cutlines through peatland areas. Associated species in these various habitats included *Ledum groenlandicum, Rubus arcticus, Equisetum arvense, Selaginella selaginoides, Equisetum arvense, Carex vaginata* and *Drosera rotundifolia* (ANHIC 2004). In Richardson River Dunes WPP it grew in a wetland with *Campylium stellatum, Salix planifolia, Betula pumila, Potentilla palustris* and *Kalmia polifolia*. (ANHIC 2004). In Fidler-Greywillow WPP, *Carex capitata* grew in cracks on rock outcrops, a habitat that is more typical for the mountainous portions of its range in Alberta.

Elsewhere – Outside Alberta, it can be found in moist meadows and shrubby open woods, often above tree line (Kershaw et al. 2001). In British Columbia, it is found in bogs and on moist to dry, rocky slopes, stream banks and seepage slopes in the subalpine and alpine zones (Douglas et al. 2001a). It is described as growing on open tundra and slopes in Scoggan (1978-79). Flora of North America (FNA 2002) notes that this species grows in mires and heaths of the boreal forest, with disjunct occurrences southward in the alpine of eastern and western mountain ranges, mainly on calcareous substrates.

Carex capitata L. (capitate sedge) (cont.) S2 G5

4. POPULATION SIZE

LBCWPP – Five clumps with about 50 stems altogether were counted at the location within the study area.

AB – Several plants were observed in one location on Cardinal Divide and a dozen patches of various sizes (from 0.01 to 0.5 m^2) were observed in a few locations within Fidler-Greywillow WPP (ANHIC 2004, Vujnovic et al. 2005). Several 1000s of plants were estimated at three locations within the Syncrude Aurora South Oil Sands Lease, with an additional 75 plants and three "clumps" with ca 350 fruiting culms being reported for an additional three locations within the same general area (ANHIC 2004). Information on population size is not available for the rest of the known occurrences, most of which are based on historic records (older than 20 years).

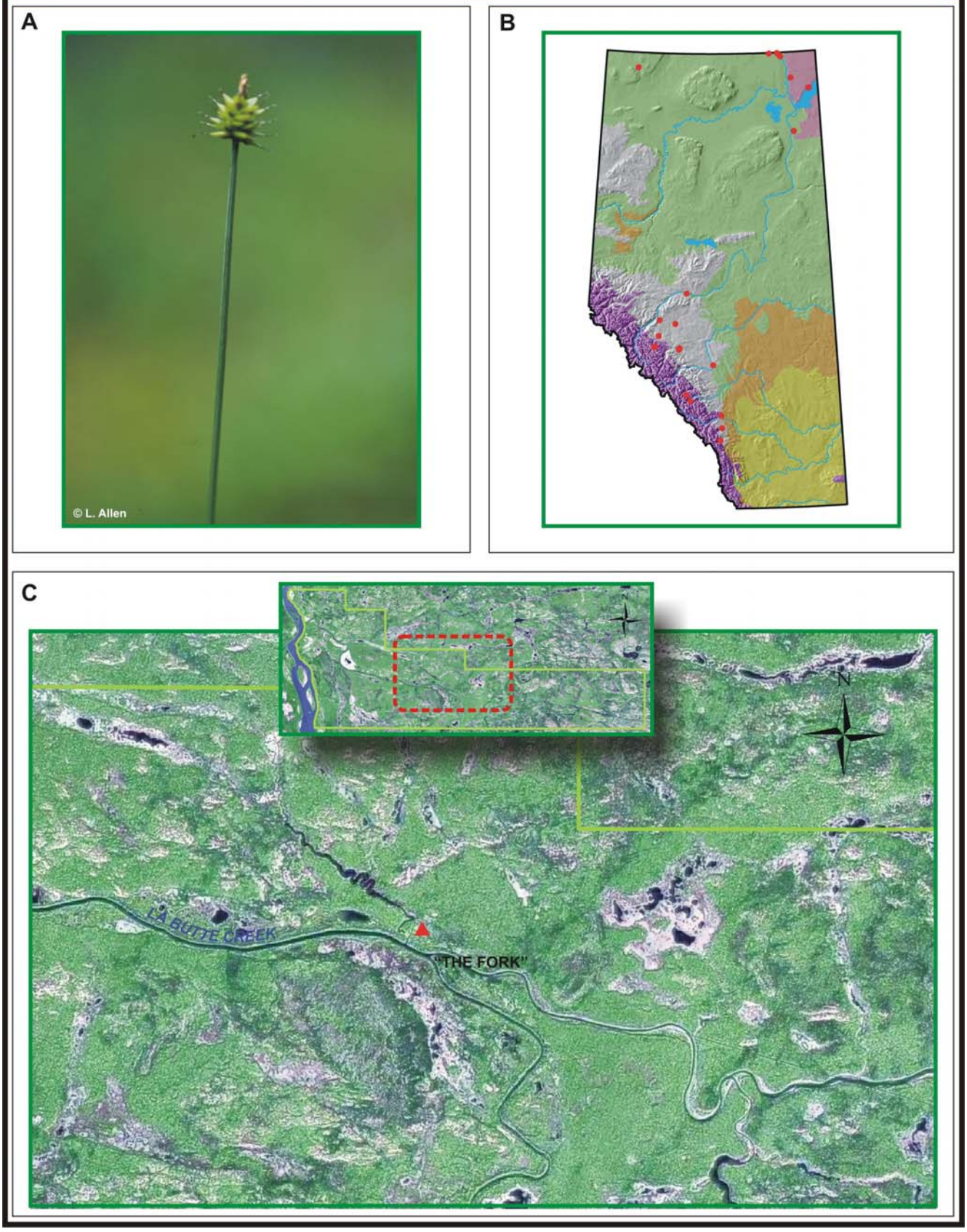
5. PROTECTED AREAS

Richardson River Dunes, La Butte Creek, Fidler-Greywillow and Whitehorse WPPs; Obed Lake and Sheep River PPs; Lasthill Creek Natural Area (NA); Banff NP.

6. NOTES

NatureServe (2004) recognizes two subspecies that are being tracked by different jurisdictions, ssp. *capitata* and ssp. *arctogena*. ANHIC is tracking C*arex capitata* only at the species level.

Figure 4 – *Carex capitata* L. (capitate sedge). **A** - image of the plant; **B** - known locations of *Carex capitata* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.



Carex pseudocyperus L. (cyperus-like sedge) S2 G5

1. BRIEF DESCRIPTION

Carex pseudocyperus is a perennial herb of the sedge (Cyperaceae) family. It forms large, dense clumps from short, stout rhizomes (Kershaw et al. 2001). Each clump found at LBCWPP was counted as one plant.

2. DISTRIBUTION

LBCWPP – *Carex pseudocyperus* was found at three locations along the east shore of the Slave River, one about 600 m north of and two at approximately 7 km south of the mouth of La Butte Creek. The last two were separated by about 250 meters (Figure 5 C).

AB – In northeastern Alberta, *Carex pseudocyperus* is also found at one location each in Maybelle River and Richardson River Dunes WPPs, as well as around Kearl and Ruth Lakes (situated about 60 km and 25 km north of Fort McMurray, respectively). Within central Alberta, it is found at 20 locations in the general Edmonton area and at two locations near Cold Lake (Figure 5 B). Currently known locations fall within the Central Mixedwood, Dry Mixedwood, Peace River Lowlands, Athabasca Plain and Central Parkland natural subregions.

Global – *Carex pseudocyperus* is known from most Canadian provinces (except British Columbia and Labrador) and from a number of northeastern states, extending as far south as North Dakota, Minnesota, Wisconsin, Indiana, Ohio and Pennsylvania. In addition to Alberta it is considered rare in Saskatchewan (S2S3), Connecticut (S1), Indiana (S1), New Jersey (S1) and Pennsylvania (S1) (NatureServe 2004b).

3. HABITAT

LBCWPP – At the location just north of La Butte Creek, *Carex pseudocyperus* was found on a silty shore near a willow stand (*Salix* sp.), with *Equisetum palustre*, *Salix exigua, Juncus tenuis, J. balticus, Carex diandra*, *Carex retrorsa* and *Mimulus ringens*. At two locations south of the creek, it grew with *Calla palustris* around the edge of open pools of water in an old meander channel, now made up of a series of wetlands. The *Carex pseudocyperus* - *Calla palustris* community has been recognized as a rare plant community in Alberta, and is currently ranked S1S2 (Allen 2004). Allen et al. (2002) provide more detail on the *Carex pseudocyperus* - *Calla palustris* community in LBCWPP.

AB – Kershaw et al. (2001) reported that *Carex pseudocyperus* grows in swamps and marshes in Alberta. The ANHIC database provides more detailed habitat information for this species in Alberta, including reports from marshy edges of lakeshores, quaking/floating sedge fens along shorelines, graminoid rich fens (or a graminoid rich fen), floodplain benches, small ponds, old stable beaver ponds, creek and stream channels, often growing in shallow water. Soils range from clay to moist sands, and frequently associated species include *Carex diandra, C. lacustris, Calla palustris*, *Typha latifolia, Myrica gale*, *Wolffia borealis* and *Scirpus microcarpus* (ANHIC 2004).

Elsewhere – Scoggan (1978-79) noted that it grows in swamps and shallow water. According to the Flora of North America (FNA 2002), it grows in swamps, wet thickets, streams, ponds, lakeshores, depressions in wet meadows and marshes, often in shallow water or on emergent stumps, floating logs and floating mats of vegetation.

4. POPULATION SIZE

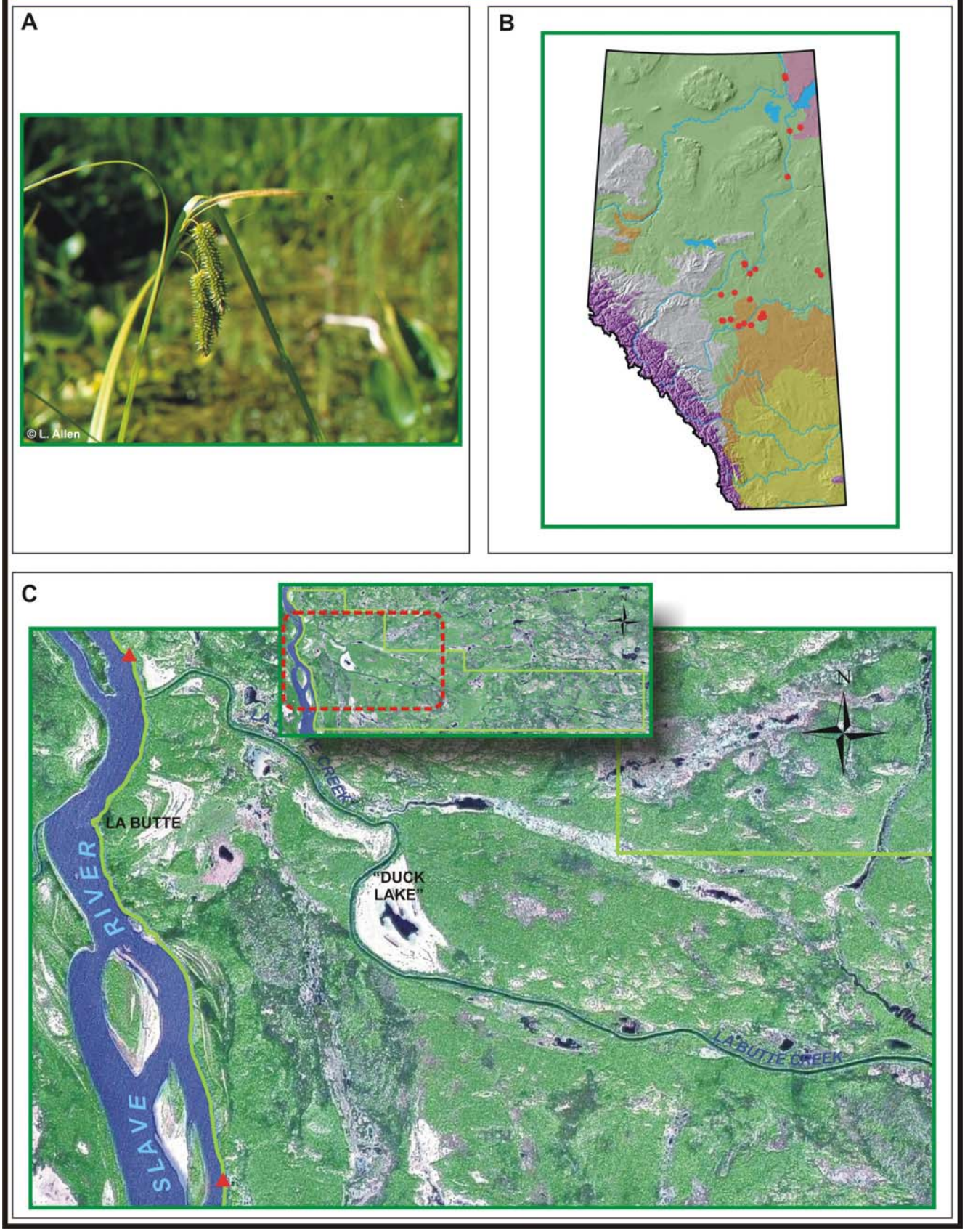
LBCWPP – The overall population size of *Carex pseudocyperus* within the surveyed area is estimated to be about 220 plants (clumps) (one plant north of the creek and ca 220 plants at two locations south of the creek).

AB – Based on the occurrences reported to-date, the population size of *Carex pseudocyperus* in Alberta can be roughly estimated at 1000 individuals. Information on population size is not available for many occurrences, most of which are known from historic information.

5. PROTECTED AREAS

Maybelle River, Richardson River Dunes and La Butte Creek WPPs; Elk Island NP.

Figure 5 – *Carex pseudocyperus* L. (cyperus-like sedge). **A** - image of the plant; **B** - known locations of *Carex pseudocyperus* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.



Carex retrorsa Schwein. (turned sedge) S2 G5

1. BRIEF DESCRIPTION

Carex retrorsa is a tufted perennial herb of the sedge (Cyperaceae) family. It reproduces by short-creeping rhizomes. We considered the clump found at LBCWPP to be a single plant.

2. DISTRIBUTION

LBCWPP – *Carex retrorsa* was found at only one location in LBCWPP, along the east shore of the Slave River, ca 600 m north of the mouth of La Butte Creek (Figure 6 C).

AB – This species is known from a number of locations throughout central and northeastern Alberta, reaching as far west as Smoky River and as far south as Hutton (Figure 6 B). Currently known locations of this species in Alberta fall within the Central Mixedwood, Dry Mixedwood, Peace River Lowlands, Central Parkland, and Dry Mixedgrass natural subregions.

Global – It is known from most Canadian provinces and territories (except for the Yukon, Nunavut and Labrador) and from the majority of northern states, extending as far south as Utah, Colorado, Illinois, and Pennsylvania. In addition to Alberta, it is considered rare at the southern limits of its range: in Colorado (S1), Illinois (S1S2), Indiana (S1), New Jersey (S2), Ohio (S1), Pennsylvania (S1), Utah (S1) and Wyoming (S2) (NatureServe 2004b). *Carex retrorsa* was considered rare in the Northwest Territories by McJannet et al. (1995).

3. HABITAT

LBCWPP – *Carex retrorsa* was found on the silty shore of the Slave River, near a willow stand (*Salix* sp.), with *Equisetum palustre*, *Salix exigua, Juncus tenuis, J. balticus, Carex diandra*, *C. pseudocyperus* and *Mimulus ringens* (ANHIC 2004)

AB – Kershaw et al. (2001) noted that it grows in swampy woods and wet meadows. The ANHIC database (ANHIC 2004) provides more details on specific habitat conditions where this species has been found in Alberta. These include willow and sedge habitats on slough, creek and river margins, shallow backwaters, edges of beaver ponds, and roadside ditches, often growing in a couple of inches of standing water. It grows on clay, silt, sand or gravelly soils, often associated with species such as *Poa palustris, Scirpus microcarpus, Typha latifolia, Cicuta maculata, Glyceria grandis*, *Beckmannia syzigachne,* and various *Ranunculus, Carex* and *Salix* species (ANHIC 2004).

Elsewhere – In British Columbia this species is known from marshes, swamps, fens, shorelines, stream banks and wet meadows in lowland, steppe and montane zones (Douglas et al. 2001a). Scoggan (1978-79) noted that it grows in moist meadows, swamps, and alluvial woods in Canada. According to the Flora of North America (FNA 2002), it grows in swamps, wet thickets, along streams, marshes, sedge meadows, shores of streams, ponds and lakes.

4. POPULATION SIZE

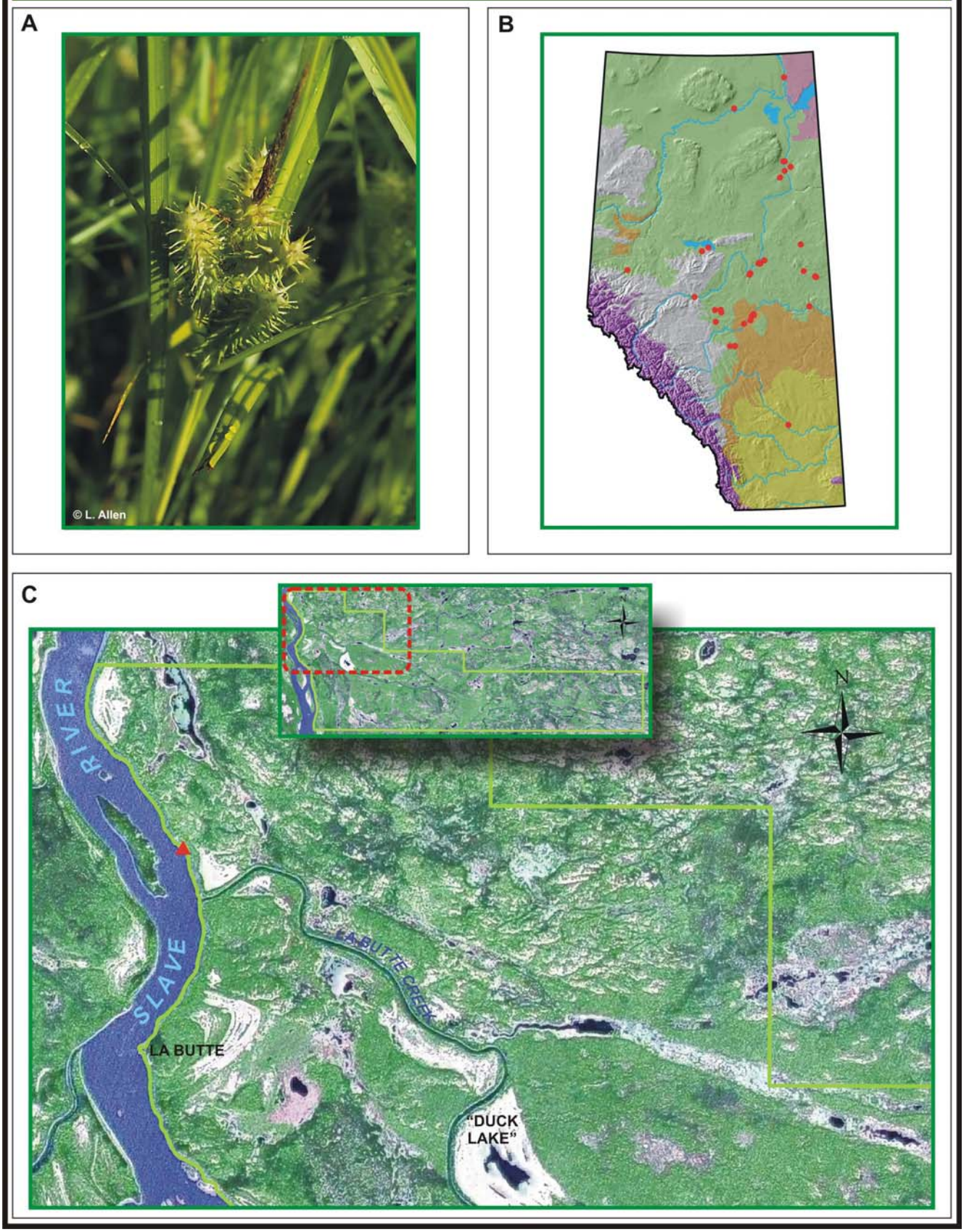
LBCWPP – Only one plant (clump) with a number of flowering stems with fruit was found at the location in LBCWPP.

AB – Approximately 100 individuals were reported from the location near Mildred Lake and an additional 42 plants were counted in La Biche River WPP and the adjacent Poacher's Landing Provincial Recreational Area (PRA). At least 55 tufts were counted at the location near the town of Athabasca, four clumps at the Edmonton location, a few patches at locations northeast of Lac La Biche (each about 100 m^2) and an additional 50 plants were estimated at another location within the same general area. Many individuals were reported along a 200m stretch of the creek east of Sangudo (ANHIC 2004). Information on population size is not available for the remaining locations outside the study area.

5. PROTECTED AREAS

Wood Buffalo NP, La Biche River and La Butte Creek WPPs, Poacher's Landing PRA.

Figure 6 – *Carex retrorsa* Schwein. (turned sedge). **A** - image of the plant; **B** - known locations of *Carex retrorsa* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.



Carex rostrata Stokes (beaked sedge) S2 G5

1. BRIEF DESCRIPTION

Carex rostrata is a stout, clumped perennial herb of the sedge (Cyperaceae) family. It grows from short creeping rhizomes (Douglas et al. 2001a). The reproduction from rhizomes made it difficult to estimate the number of individuals on sites, so the number of "plants" (for small populations) or an area occupied by this taxon (for larger populations) were estimated for approximation of population size within the study area

2. DISTRIBUTION

LBCWPP – *Carex rostrata* was found at one location within LBCWPP (approximately 3.5 km southeast of the mouth of La Butte Creek), and one along the east shore of the Slave River, just outside the park's northern boundary, about 3.2 km north of the mouth of La Butte Creek (Figure 7 C).

AB – *Carex rostrata* is reported from more than 20 areas in the northeastern and central parts of the province (some containing multiple locations); the southernmost location was found in the Rocky Mountain House area (Figure 7 B). known locations of this species in Alberta fall within the Central Mixedwood, Dry Mixedwood, Peace River Lowland, Sub-Arctic, Upper Foothills, Lower Foothills, Athabasca Plain and Kazan Upland natural subregions.

Global – This circumpolar species has been reported from all Canadian provinces and territories and numerous states. Its range extends northwest to Alaska, northeast to Newfoundland, south and southwest to California, Arizona and New Mexico, and southeast to Tennessee and Virginia. In addition to Alberta, it is considered rare in British Columbia (S2S3), New Brunswick (S1S2), Nova Scotia (S1?), Prince Edward Island (S1), Idaho (S2), Illinois (S2), Montana (S1), Ohio (S2), Tennessee (S1), Virginia (S1) and Washington (S1) (NatureServe 2004b).

3. HABITAT

LBCWPP – At the location within the park *Carex rostrata* grew in a wet, organic meadow with *Carex utriculata, C. chordorrhiza* and clumps of *Salix pedicellaris*. Outside the park's boundary it was found in a *Carex lasiocarpa* / *C. rostrata* wetland in an old channel of the Slave River.

AB – In Alberta, *Carex rostrata* generally grows in floating fens and at the edges of ponds and lakes (Kershaw et al. 2001). It is also found in shallow water at the edge of lakes and channels with a sandy bottom, in willow thickets, in poor to rich string fens, and in pockets of perched bogs in sub-arctic woodlands (ANHIC 2004). *Carex rostrata* is often reported as associated with *Carex lasiocarpa* (ANHIC 2004).

Elsewhere - In British Columbia it is found in bogs in the montane and subalpine zones (Douglas et al. 2001a). Scoggan (1978-79) noted that it grows in swamps, on wet shores and in shallow water. According to the Flora of North America (FNA 2002), it grows in flarks in bogs and bog pools, patterned fens, and lake and stream shores, often in shallow water or on floating mats.

4. POPULATION SIZE

LBCWPP – Only a few dozen "plants" were observed at the location north of the park's boundary. At the location within the park, *Carex rostrata* covered about 25 m^2 of the wetland.

AB – This species was described as locally abundant at the location in Elk Island National Park. About 100 plants have been reported from the Bennett Lake location, and in locations at Coyote Lake *Carex rostrata* cover ranged from less than 1% to up to 15% in 20 x 20 m sample plots. Thousands of plants have been estimated at locations within Colin-Cornwall Lakes WPP and the location just northeast of Fort McMurray, and a couple of hundreds were estimated within the Caribou Mountains and Fidler-Greywillow WPPs (ANHIC 2004, Vujnovic et al. 2004). Other reported locations within the province either had very few plants or were based on historic records that did not include information on population size.

5. PROTECTED AREAS

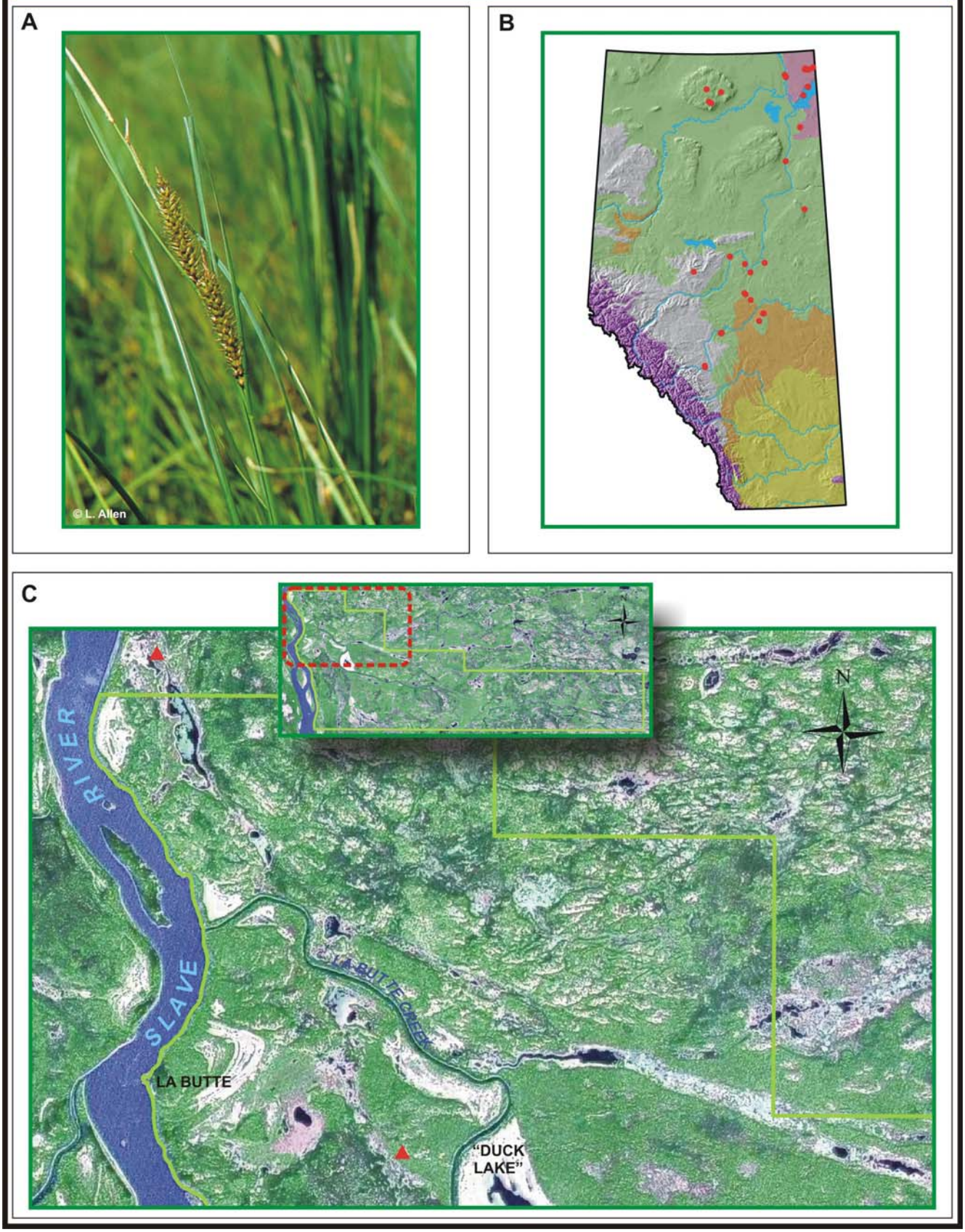
Colin-Cornwall Lakes, La Butte Creek, Caribou Mountains, La Biche River and Fidler-Greywillow WPPs; Athabasca Dunes Ecological Reserve (ER); Hondo, Clyde Fen, Coyote Lake and Halfmoon Lake NAs; Elk Island NP.

Carex rostrata Stokes (beaked sedge) (cont.) S2 G5

7. NOTES

Carex rostrata resembles bottle sedge (*Carex utriculata* Boott), one of the most common sedges in Alberta and the key in the current Flora of Alberta (Moss 1983) includes only *C. rostrata,* not *C. utriculata*. The co-existence of these two species in our province was not recognized until a paper on "The true *Carex rostrata* (Cyperaceae) in Alberta" was published in 1989 (Griffiths 1989). Many field botanists are not aware that the species called *C. rostrata* in the Flora of Alberta is actually *C. utriculata*, so reports of C*. rostrata* need to be reviewed carefully. Wetlands reported to be dominated by *C. rostrata* are potentially dominated by *C. utriculata* instead. Careful examination of plants needs to be done by the practitioners in the field to better assess the real abundance and distribution of *C. rostrata*.

Figure 7 – *Carex rostrata* Stokes (beaked sedge). **A** - image of the plant; **B** - known locations of *Carex rostrata* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.



Carex umbellata Schkuhr ex Willd. (umbellate sedge) S1 G5

1. BRIEF DESCRIPTION

Carex umbellata is a small, tufted, almost stemless perennial herb of the sedge (Cyperaceae) family. It grows from slender, scaly rhizomes (Douglas et al. 2001a). In LBCWPP this taxon exhibited low, dense growth in patches embedded in cracks of rock outcrops, which made a count of individual plants impractical, thus the number and size of patches were noted to estimate the population size of this species.

2. DISTRIBUTION

LBCWPP – During the 2001 survey, *Carex umbellata* was found growing in five locations along La Butte Creek, separated by about 1.2 to 6.5 km from each other along a stretch of about 15.5 km of air distance (see map 8 C).

AB – Prior to this study, *Carex umbellata* was known from only two locations within the Canadian Shield in Alberta: from Colin Lake (specimen collection by Cliff Wallis in 1983) and Andrew Lake (specimen collection by R. Hastings and R.A. Ellis in 1988). Subsequent to this study, the species was re-found at Colin Lake (five locations reported for Colin-Cornwall Lakes WPP) and six new locations were discovered within Fidler-Greywillow WPP (ANHIC 2004, Vujnovic et al. 2004). There are two known locations outside the Canadian Shield: at Gaetz Lake and in the Fox Creek Area (ANHIC 2004) (Figure 8 B). Currently known locations of this species in Alberta fall within the Lower Foothills, Athabasca Plain, Kazan Upland and Central Parkland natural subregions.

Global – *Carex umbellata* is known from all Canadian provinces and from Nunavut, as well as from most of the states within the eastern half of the continent. In addition to Alberta, this species is considered rare in Labrador (S1S2), Newfoundland Island (Newfoundland) (S1S2), Iowa (S1), Nebraska (S1) and North Carolina (S1S2) (NatureServe 2004b).

3. HABITAT

LBCWPP – It was typically found on rock outcrops situated along the creek or in open forest stands. It grew in cracks of rock where soil and moisture accumulate to provide a suitable microhabitat with associated species such as *Cryptogramma acrostichoides*, *Polypodium sibiricum*, *Woodsia ilvensis* and *Potentilla tridentata*.

AB – In other locations within the Canadian Shield, it occupies similar habitats as in La Butte Creek WPP, except at one area in Colin-Cornwall Lakes WPP where it grows on a steep, unstable graminoid slope (ANHIC 2004). Outside the Canadian Shield, this species was reported growing in a dry aspen stand at Gaetz Lake (collection by P. McIsaac and D. Mussell from 1979) and in *Pinus contorta–Ledum groenlandicum* woods in the Fox Creek area (collection by J.D. Johnson in 1977)(ANHIC 2004).

Elsewhere – As noted in Scoggan (1978-79), it is known from sandy ground, dry sterile fields, and open woods. Flora of North America (FNA 2002) notes a wide variety of habitats: open, dry to mesic, circumneutral to calcareous, rocky, sandy, and clayey fields, pastures, tall-grass prairies, glades, ridges, bluffs, slopes, barrens, dunes, open deciduous and mixed woodlands, and also on basalt and serpentine.

4. POPULATION SIZE

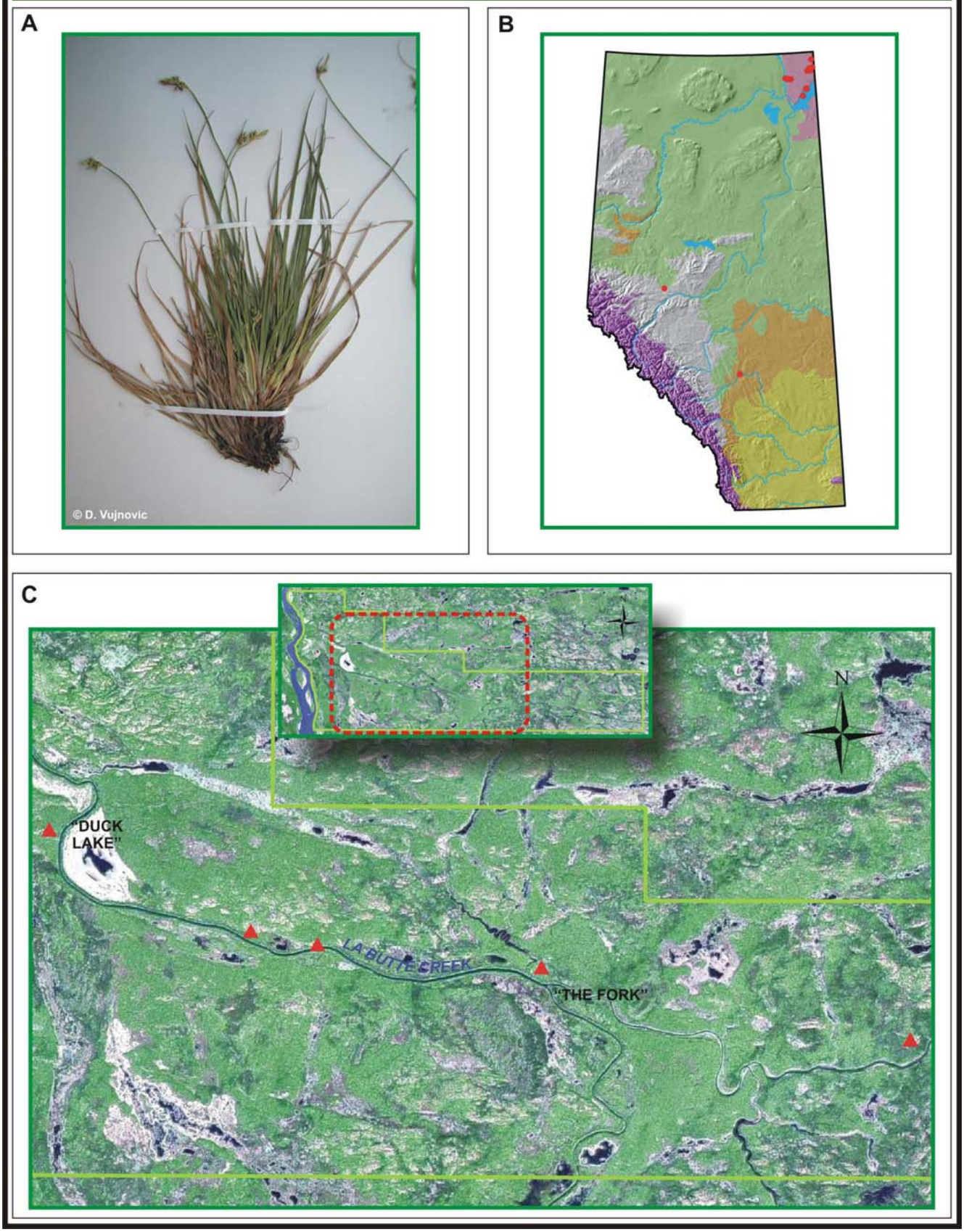
LBCWPP – Only a few patches of *Carex umbellata* were seen at each location within the study area.

AB – Only a few scattered clumps/patches of *Carex umbellata* have been observed at each of the locations within the Canadian Shield Natural Region (ANHIC 2004). Information on population size is not available for the two locations outside the Canadian Shield (historic records).

5. PROTECTED AREAS

La Butte Creek, Colin-Cornwall Lakes and Fidler-Greywillow WPPs.

Figure 8 – *Carex umbellata* Schkuhr ex Willd. (umbellate sedge). **A** - image of the plant; **B** - known locations of *Carex umbellata* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.



Juncus filiformis L. (thread rush) S2S3 G5

1. BRIEF DESCRIPTION

Juncus filiformis is a perennial herb of the rush (Juncaceae) family. It grows in rows or small clumps from slender, elongated underground stems (rhizomes) (Kershaw et al. 2001). Because of its morphological characteristics (thread-like appearance of stems, with reduced leaves) and the fact that it reproduces by rhizomes, the number of stems was counted/estimated to approximate the population size within the study area.

2. DISTRIBUTION

LBCWPP – During the 2001 survey, *Juncus filiformis* was found at only two locations along La Butte Creek, one about 1 km downstream from the first fork and the second one just downstream from the second fork (see Figure 9 C).

AB – *Juncus filiformis* also occurs in Colin-Cornwall Lakes (one location reported by C. Wallis in 1983) and Fidler-Greywillow WPPs (14 locations altogether). An additional three northern locations include the Moose Lake area in Wood Buffalo National Park (H.M. Raup's collection from 1929) and Caribou Mountains WPP (two locations). *Juncus filiformis* has also been reported from 22 other locations in northwestern Alberta, the Fort McMurray region, an area south of Lesser Slave Lake and in the Rocky Mountain House area (Figure 9 B). Locations of this species in Alberta fall within the Athabasca Plains, Kazan Upland, Central Mixedwood, Wetland Mixedwood, Sub-Arctic, Upper Foothills and Lower Foothills natural subregions.

Global – *Juncus filiformis* is known from all Canadian provinces and territories and numerous states, reaching as far north as Alaska and as far south as Oregon, Utah, New Mexico, Minnesota, Michigan and West Virginia. In addition to being considered rare in Alberta, it is considered rare at the southern limits of its range: in Colorado (S2?), Massachusetts (S1), Utah (S2S3), West Virginia (S2) and Wyoming (S1) (NatureServe 2004b).

3. HABITAT

LBCWPP – Plants grew on silty substrates along the intermittently flooded edge of La Butte Creek. Associated species included *Polygonum amphibium, Sagittaria cuneata, Ranunculus aquatilis, Carex utriculata, Anemone canadensis, Mimulus ringens* and *Physostegia ledinghamii* at the location closer to the creek mouth and *Achillea sibirica, Geum aleppicum, Cicuta maculata*, and *Sium suave* at the other site.

AB – Kershaw et al. (2001) suggested that this species grows in fens and marshes in Alberta. It also grows among emergent vegetation on river and lakeshores, on gravelly roadsides, on cutlines through mesic forests, and in sinkholes and small wooded pools (ANHIC 2004). The *Juncus filiformis / Sphagnum* spp. community that has been recognized as a rare plant community in Alberta is currently ranked S1S2 (Allen 2004).

Elsewhere – Kershaw et al. (2001) noted that outside Alberta *Juncus filiformis* grows on lakeshores and stream banks. It grows in moist meadows and wet sandy lakeshores from the lowland and steppe to subalpine zones in British Columbia (Douglas et al. 2001a). Swampy ground, bogs and shores are listed as habitats of *J. filiformis* in Scoggan (1978-79). According to the Flora of North America (FNA 2000), this species usually grows on moist to wet, sandy soil along lakes, pools, stream banks, or in meadow depressions, but is occasionally found in bogs.

4. POPULATION SIZE

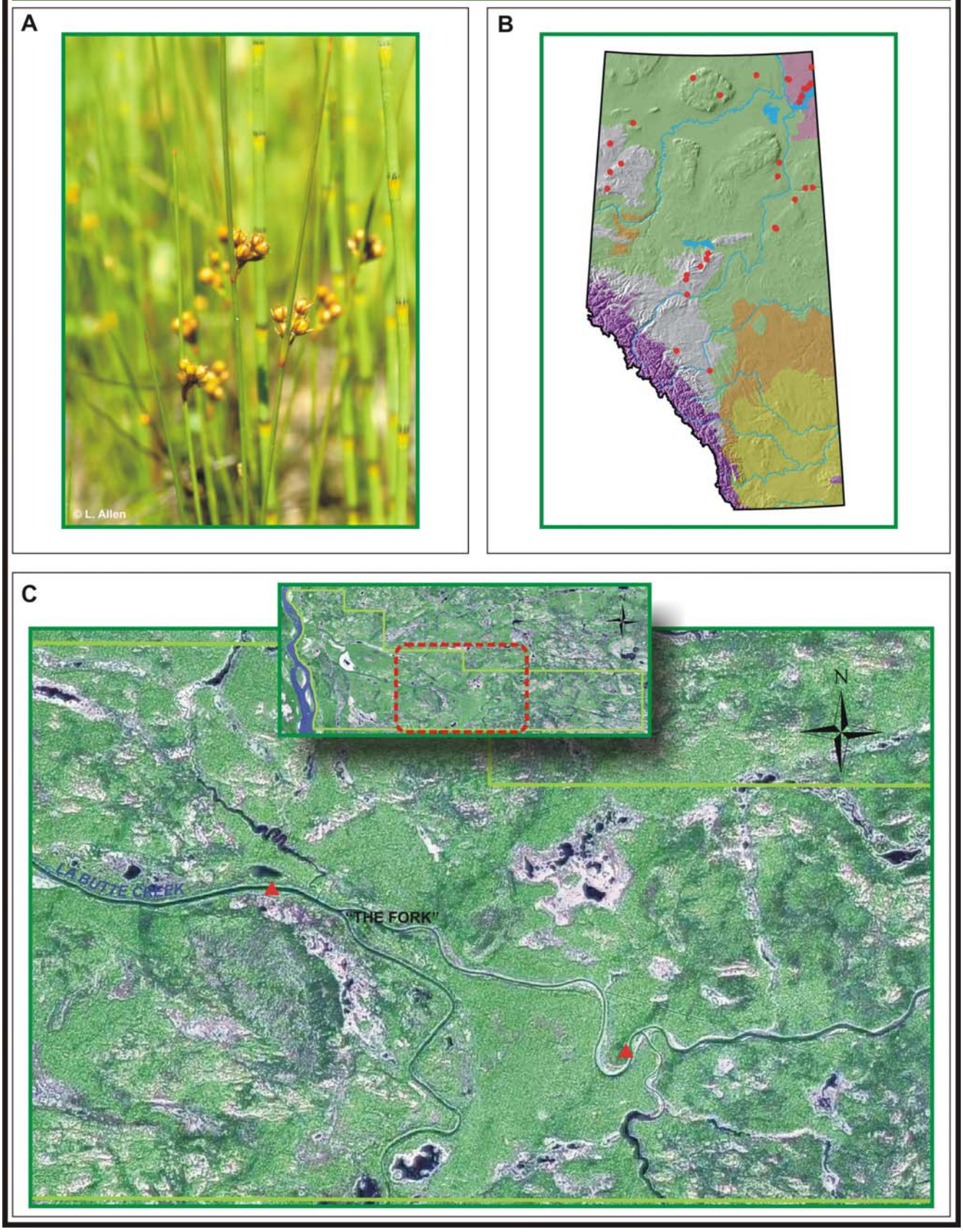
LBCWPP – Numerous stems were observed within a small area at each visited location.

AB – Information on population size is available for only nine known locations, where population sizes range from "very scarce" at Clear Hills and " three tussocks" at Baseline Lake, to "few 1000s of stems" on the Caribou Mountains and in Fidler-Greywillow WPP, or even "10 000 plants" at one Grizzly Ridge location.

5. PROTECTED AREAS

Colin-Cornwall Lakes, La Butte Creek, Caribou Mountains, Fidler-Greywillow and Grizzly Ridge WPPs; Wood Buffalo NP; Crow Lake PP.

Figure 9 – *Juncus filiformis* L. (thread rush). **A** - image of the plant; **B** - known locations of *Juncus filiformis* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.



Mimulus ringens L. (square-stem monkeyflower) S1 G5

1. BRIEF DESCRIPTION

Mimulus ringens is a perennial forb of the figwort (Scrophulariaceae) family. It grows from stout rhizomes and is sometimes stoloniferous at the base (USGS 2004), which makes a count of individual plants difficult. Because of the lack of a suitable method for determining what represents a true individual (genetically different plant), a count of "plants" (what looked like individual plants aboveground) was used as a surrogate to estimate population size in LBCWPP.

2. DISTRIBUTION

LBCWPP – *Mimulus ringens* was found at two locations in LBCWPP: one along the east shore of the Slave River, ca 600 m north of the mouth of La Butte Creek, and the other one stretching along La Butte Creek from its mouth all the way to the first fork (see Figure 10 C).

AB – The discovery of *Mimulus ringens* during this field study was the first time the species has been found in Alberta. Hence it is known only from LBCWPP in Alberta (Figure 10 B) within the Kazan Upland and Peace River Lowlands natural subregions.

Global – *Mimulus ringens* is known from most North American jurisdictions, except for eight states (including Alaska), and British Columbia, Labrador, Newfoundland Island and the territories in Canada (NatureServe 2004b). In addition to Alberta, it is considered rare or potentially extirpated in Arkansas (S1S2), Idaho (S1), Louisiana (S2), Mississippi (S1S2) and Montana (S1) (NatureServe 2004). Variety *ringens* has been reported as rare in Saskatchewan (S1) and variety *colpophilus* has been treated as rare in Maine (S2) (NatureServe 2004b) (see NOTES regarding infra-specific categories for this taxon).

3. HABITAT

LBCWPP – At the location along the Slave River, *Mimulus ringens* grew on the silty shore with *Equisetum palustre* and *Salix exigua.* Other species in the general area included *Juncus tenuis, J. balticus, Carex diandra*, *C. pseudocyperus* and *C. retrorsa*. Along La Butte Creek, it grew in the zone affected by fluctuating water levels, often in shallow standing water, next to a "band" of *Physostegia ledinghamii*. It tended to either dominate an area just above the frequent flood zone or grow interspersed with a "band" of *Eleocharis palustris* in shallow water along the creek's sides. Other associated species included *Mentha arvensis, Stachys palustris, Ranunculus macounii* and *Anemone canadensis*.

AB – This species is not known outside LBCWPP in Alberta.

Elsewhere – Scoggan (1978-79) noted that it grows in wet places, on shores and in meadows.

4. POPULATION SIZE

LBCWPP – *Mimulus ringens* was growing sporadically along both shorelines of La Butte Creek, from the creek's mouth to the first fork (ca 15 km in length). Estimation of population size was however difficult because flower buds had just started to open at the end of the fieldwork, so it wasn't easy to distinguish this species from associated vegetation while traveling by boat. Hundreds of "plants" are expected to be found along La Butte Creek, but it needs to be confirmed by a more detailed survey at the time when this species is in its flowering stage (late July – early August). Only one clump with ca 10 stems was found at the location along the Slave River.

AB – Same as for LBCWPP

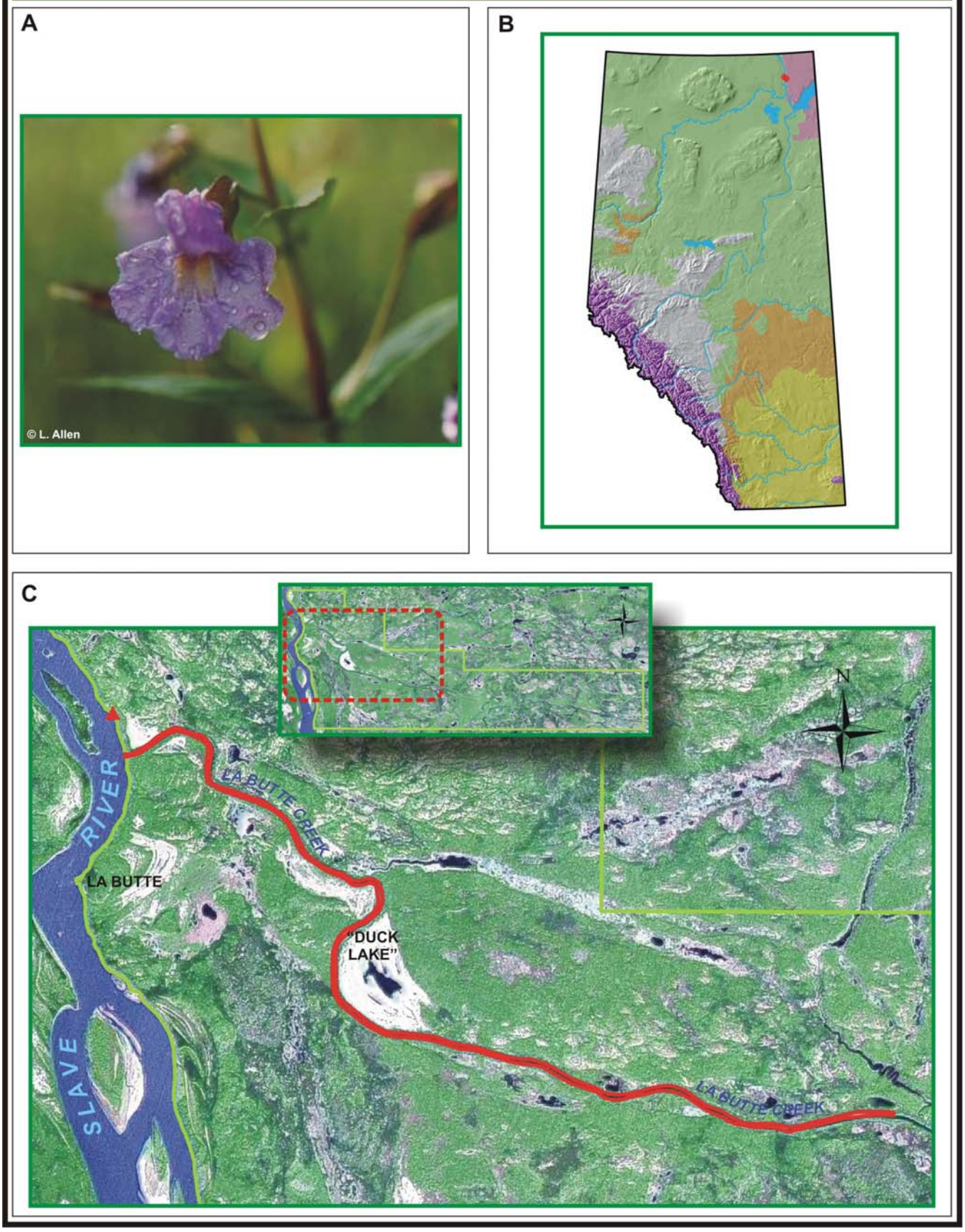
5. PROTECTED AREAS

La Butte Creek WPP.

6. NOTES

NatureServe (2004b) recognizes two varieties that are being tracked by different jurisdictions. They are namely var. *ringens* and var. *colpophilus*. Only var. *ringens* grows in Alberta, but ANHIC tracks *Mimulus ringens* only at the species level at present.

Figure 10 – *Mimulus ringens* L. (square-stem monkeyflower). **A** - image of the plant; **B** - known locations of *Mimulus ringens* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.



Nymphaea tetragona Georgi (white water-lily) S1 G5

1. BRIEF DESCRIPTION

Nymphaea tetragona is a floating-leaved aquatic forb of the water-lily (Nymphaeaceae) family. It reproduces by rhizomes (FNA 1997), which made a count of individual plants difficult. Because of a lack of suitable method for determining what represents a true individual (genetically different plant), a count of "plants" (what looked like individual plants aboveground) was used as a surrogate to estimate population size in LBCWPP.

2. DISTRIBUTION

LBCWPP – During this survey *Nymphaea tetragona* was found only once, in a wetland situated just outside the park's northern boundary, about 3.5 km north of the mouth of La Butte Creek, not far from the east shore of the Slave River (Figure 11 C).

AB – This species is known from four additional locations: two just northeast of Wood Buffalo NP, and two from the Kearl Lake area (Figure 11 B). Known locations of this species in Alberta fall within the Peace River Lowlands and Central Mixedwood natural subregions.

Global – This species is known from only seven jurisdictions in North America: Alberta (S1), British Columbia (S1S3), Manitoba (S2), Northwest Territories (SNR), Alaska (S5), Idaho (SH), Rhode Island (SNR) and Washington (SH) (NatureServe 2004b). *Nymphaea tetragona* was considered rare in the Northwest Territories by McJannet et al. (1995).

3. HABITAT

LBCWPP – At the location just north of LBCWPP, it grew in open water, in the centre of a sedge wetland dominated by *Carex lasiocarpa*.

AB – Kershaw et al. (2001) reported that *Nymphaea tetragona* grows in ponds, lakes and quiet streams. ANHIC (2004) provides more details on specific habitat. At two locations northeast of Wood Buffalo NP, *Nymphaea tetragona* was found in the ooze of a small lake and in shallow water of a small pond. At the Kearl Lake locations, plants were found on the margins of the lake and in the adjacent marsh, growing with *Nuphar lutea* ssp. *variegata, Potamogeton natans, P. praelongus, Utricularia intermedia* and *Sagittaria cuneata*, and in the area of a beaver lodge near the outflow creek from Kearl Lake, growing with *Typha latifolia, Potentilla palustris, Lemna minor, Carex diandra, C. aquatilis, Calamagrostis canadensis* and *Sparganium angustifolium*.

Elsewhere – In British Columbia, this species grows in ponds, lakes and slow-moving streams in the lowland and montane zones (Douglas et al. 1999). Scoggan (1978-79) noted that *Nymphaea tetragona* grows in ponds and quiet waters. According to the Flora of North America (FNA 1997), it has been found in ponds, lakes and quiet streams.

4. POPULATION SIZE

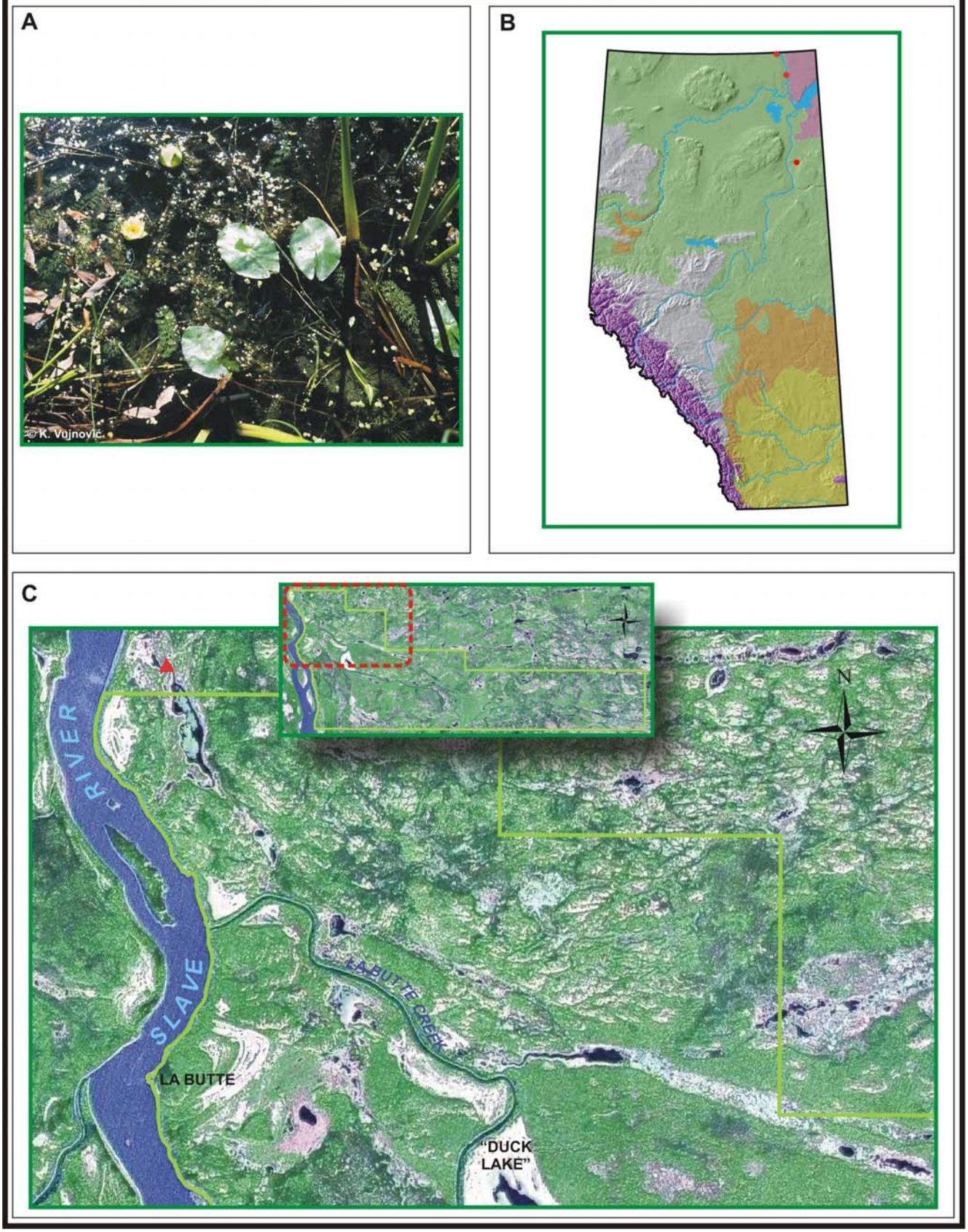
LBCWPP – Overall population size was estimated to be a couple dozen "plants".

AB – Hundreds (100s) of individuals were estimated for the Kearl Lake area. Information on population size is not available for the locations northeast of Wood Buffalo NP (ANHIC 2004).

5. PROTECTED AREAS

None.

Figure 11 – *Nymphaea tetragona* Georgi (white water lily). **A** - image of the plant; **B** - known locations of *Nymphaea tetragona* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.



Physostegia ledinghamii (Boivin) Cantino (false dragonhead) S2 G3?

1. BRIEF DESCRIPTION

Physostegia ledinghamii is a perennial herb of the mint (Lamiaceae [Labiatae]) family. It grows from an underground rhizome or rhizome-like base (Kershaw et al. 2001), which makes a count of individual plants difficult. Because of the lack of a suitable method for determining what represents a true individual (genetically different plant), a count of "plants" (what looked like individual plants aboveground) was used as a surrogate to estimate population size in LBCWPP.

2. DISTRIBUTION

LBCWPP – *Physostegia ledinghamii* was found at three locations in LBCWPP: one stretching along La Butte Creek from its mouth all the way to the first fork (for about 15 km); the other two were found about 1.5 km downstream and about 700 m upstream of the second fork (Figure 12 C).

AB – It is known from three additional locations in northeastern Alberta (all in Wood Buffalo NP) and 15 locations in central Alberta (from Poachers' Landing PRA to the north, to the Wainwright area to the south and the Lloydminster area to the east) (Figure 12 B). In Alberta, locations of *P. ledinghamii* fall into the Central Mixedwood, Dry Mixedwood, Peace River Lowlands, Kazan Upland and Central Parkland natural subregions.

Global – This species is known from only five jurisdictions in North America: Alberta (S2), Manitoba (SU), Northwest Territories (SNR), Saskatchewan (SNR) and North Dakota (SNR) (NatureServe 2004b). *Physostegia ledinghamii* was considered rare in the Northwest Territories by McJannet et al. (1995).

3. HABITAT

LBCWPP – Along the stretch of La Butte Creek up to the first fork, *Physostegia ledinghamii* grew just above the frequent flood zone, next to a "band" of *Mimulus ringens* that occupied slightly lower and wetter ground. Finally, the last one in the series of bands along the shores of La Butte Creek was a "band" of *Eleocharis palustris* that occupied shallow water just bellow a "band" of *Mimulus ringens*. Other associated species included *Mentha arvensis, Stachys palustris, Ranunculus macounii* and *Anemone canadensis*. At the location upstream from the second fork, *Physostegia ledinghamii* was found at the creek's edge with *Poa palustris, Geum aleppicum, Veronica scutellata, Polygonum amphibium,* and *Ranunculus macounii*. No habitat information was noted for the third location along the creek.

AB – Kershaw et al. (2001) reported that it grows in moist woods and on streambanks. ANHIC (2004) provides more details on habitats where this species has been found to date in Alberta. They include a mesic to subhygric mixed forb meadow along the edge of an alluvial creek floodplain, a wet meadow marsh in a riparian zone, wet grass meadows adjacent to a creek, the transition between wet meadow and drier Precambrian outcrop, pond, slough and ditch margins, river flats, and a recently inundated muddy river shore with *Calamagrostis canadensis, Mentha arvensis* and *Cicuta maculata*. Habitats are often subject to intermittent flooding.

Elsewhere - Outside Alberta it grows on lakeshores and in marshes (Kershaw et al. 2001).

4. POPULATION SIZE

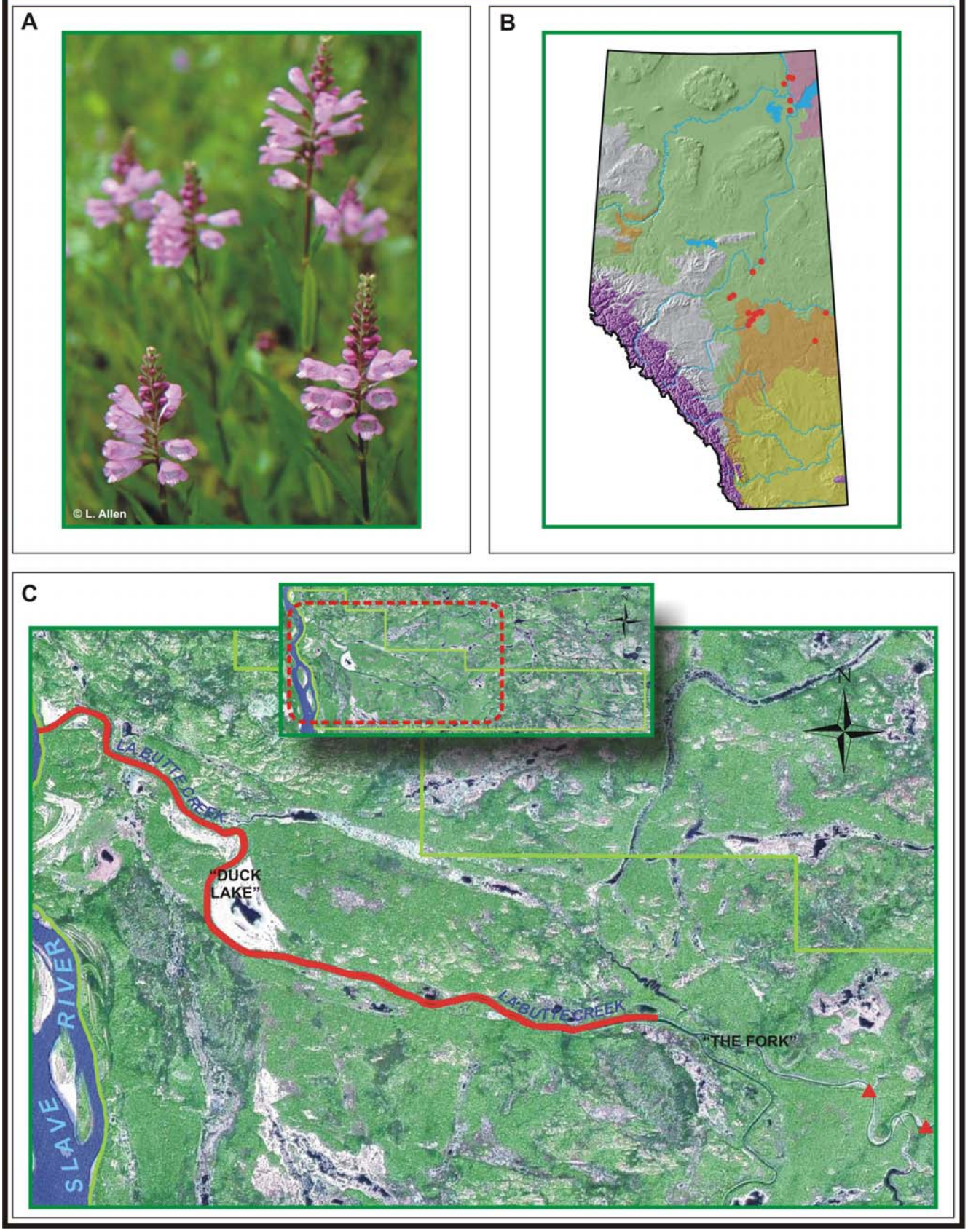
LBCWPP – It seemed to be growing frequently along both shorelines of La Butte Creek, from the creek's mouth to the first fork (ca 15 km in length). Estimation of population size was, however, difficult because flower buds had just started to open at the end of the fieldwork, so it wasn't easy to distinguish this species from associated vegetation while traveling by boat. Hundreds of "plants" are expected to be found along La Butte Creek, but it needs to be confirmed by a more detailed survey at the time when this species is in its flowering stage (late July – early August). Only a few "plants" were noted at each of the two additional locations along the creek in LBCWPP.

AB – More than 600 plants were reported from six locations within the broader Edmonton region, twelve (12) plants were counted in the La Biche River WPP, and more than 200 plants were reported from the location near the town of Athabasca (ANHIC 2004). Information on population size is not available for the remaining locations outside the study area, most of which are known from historic information.

5. PROTECTED AREAS

Wood Buffalo NP, La Butte Creek WPP; Poachers' Landing PRA.

Figure 12 – *Physostegia ledinghamii* (Boivin) Cantino (false dragonhead). **A** - image of the plant; **B** - known locations of *Physostegia ledinghamii* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.



Polypodium sibiricum Sipl. (Siberian polypody) S2S3 G5?

1. BRIEF DESCRIPTION

Polypodium sibiricum is an evergreen herb of the polypody family (Polypodiaceae). It grows from thick creeping underground stems (rhizomes) (Kershaw et al. 2001). In LBCWPP it exhibited a low, dense growth in patches, which made a count of individual plants impractical, thus the number and size of patches was noted to estimate the population size of this species within the study area.

2. DISTRIBUTION

LBCWPP – Twelve locations of *Polypodium sibiricum* were noted inside the study area boundary and two more just outside the park (see Figure 13 C). Based on the amount of unexplored suitable habitat, it is highly probable that there are numerous other locations occupied by this species within the study area.

AB – This species was first documented as occurring on the north shore of Lake Athabasca in 1930 when an early explorer, Revell, collected a specimen near Fort Chipewyan. The species was found again in the same general area in 1950, 1969 and 2001 (four locations to-date). Most other known locations of *P. sibiricum* in our province are clustered in two general areas, north of Lake Athabasca (altogether 39 locations) and in an outlier of the Canadian Shield known as the Marguerite River Crag and Tail south of Lake Athabasca, about 130 km north of Fort McMurray (two locations). The sites north of Lake Athabasca include La Butte Creek and Colin-Cornwall Lakes WPPs and the Andrew Lake and Wylie Lake areas. The westernmost location of *Polypodium sibiricum* is found west of Sergeant Creek in northwestern Alberta (a disjunct location), and a location at Whitemud Falls represents the southernmost known location of this species in the province (Figure 13 B). In Alberta, locations of *P. sibiricum* fall into the Kazan Upland, Athabasca Plain and Central Mixedwood subregions.

Global – According to NatureServe (2004b), this species is restricted to Canadian provinces and territories and to Alaska in North America (but it is not known from the maritime provinces in Canada). It is considered rare in Quebec (S1), and possibly extirpated (SH) in British Columbia and Ontario (NatureServe 2004b).

3. HABITAT

LBCWPP – Within the study area *Polypodium sibiricum* was found on rock outcrops along La Butte Creek or on rock in open forest stands away from the creek. It grew in cracks of rock where soil and moisture accumulate to provide a suitable microhabitat and was associated with species such as *Woodsia ilvensis*, *Festuca saximontana*, *Cryptogramma acrostichoides*, *Potentilla tridentata*, *Carex umbellata* and *Saxifraga tricuspidata*.

AB – *Polypodium sibiricum* is known from moist cliffs and rocky sites in northern Alberta, growing on a variety of rocky substrates, including granite and limestone (Kershaw et al. 2001). The ANHIC database indicates that in most other locations within the Canadian Shield, it occupied similar habitats to those in La Butte Creek WPP, but at a few locations, habitats have been described only generally as a moss meadow, *Pinus banksiana – Betula neoalaskana* forest and *Picea mariana - Pinus* spp. stand (ANHIC 2004).

Elsewhere – It grows on dry to moist rocks in the montane zone of BC (Douglas et al. 2002). According to the Flora of North America (FNA 1993), this species grows on a variety of substrates, including granite and dolomite, and is found in cracks and on ledges on rock outcrops.

4. POPULATION

LBCWPP – A number of scattered patches of various sizes (usually not exceeding 0.16 m^2 in size) were observed at each of the locations found during the 2001 survey (about 50 patches altogether). Because of the amount of unexplored suitable habitat within the study area, the overall population of *P. sibiricum* within LBCWPP is expected to be much higher than that shown.

AB – More than 100 patches of *Polypodium sibiricum* were estimated at locations within Fidler-Greywillow WPP and about 50 patches were reported from Colin-Cornwall Lakes WPP, however, the overall population size of *P. sibiricum* in each of these sites is expected to be much higher for the same reasons as discussed above. One of the two known locations within Marguerite River WPP contained 100s of plants. About two dozen plants were counted at a location north of Fort McMurray (ANHIC 2004). Information on the approximate population size for the remaining locations is not available.

Polypodium sibiricum Sipl. (Siberian polypody) (cont.) S2S3 G5?

5. PROTECTED AREAS

Whitemud Falls ER; Marguerite River, Colin -Cornwall Lakes, La Butte Creek and Fidler-Greywillow WPPs; Wood Buffalo NP.

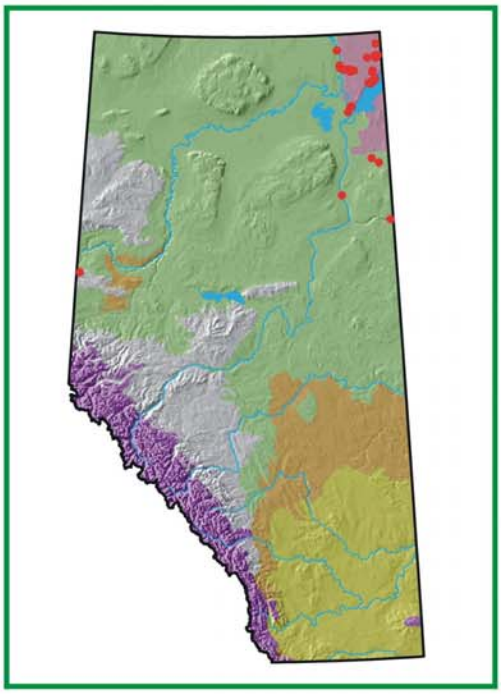
6. NOTES

Specimens of *P. sibiricum* used to be identified as *P. virginianum* until recent research indicated that they belong to the same species as the Eurasian *P. sibiricum* (FNA 1993). *Polypodium sibiricum* is now considered a separate species, which is distinguished from the closely related *P. virginianum* based on its smaller spores (less than 52 µm) (FNA 1993). Flora of North America (FNA 1993) also suggests that *P. sibiricum* and *P. virginianum* hybridize where these species overlap in Canada (this includes northeastern Alberta). All specimens of *Polypodium* spp. from northeastern Alberta were annotated by Dr. D. M. Britton in 2002. He identified most of them as *P. sibiricum*, but noted that some specimens exhibit intermittent characteristics with *Polypodium virginianum*, therefore suggesting possible hybrids of these two species (Britton, D.M., personal comm.). According to Dr. Britton, a good *P. virginianum* specimen has not yet been found in Alberta.

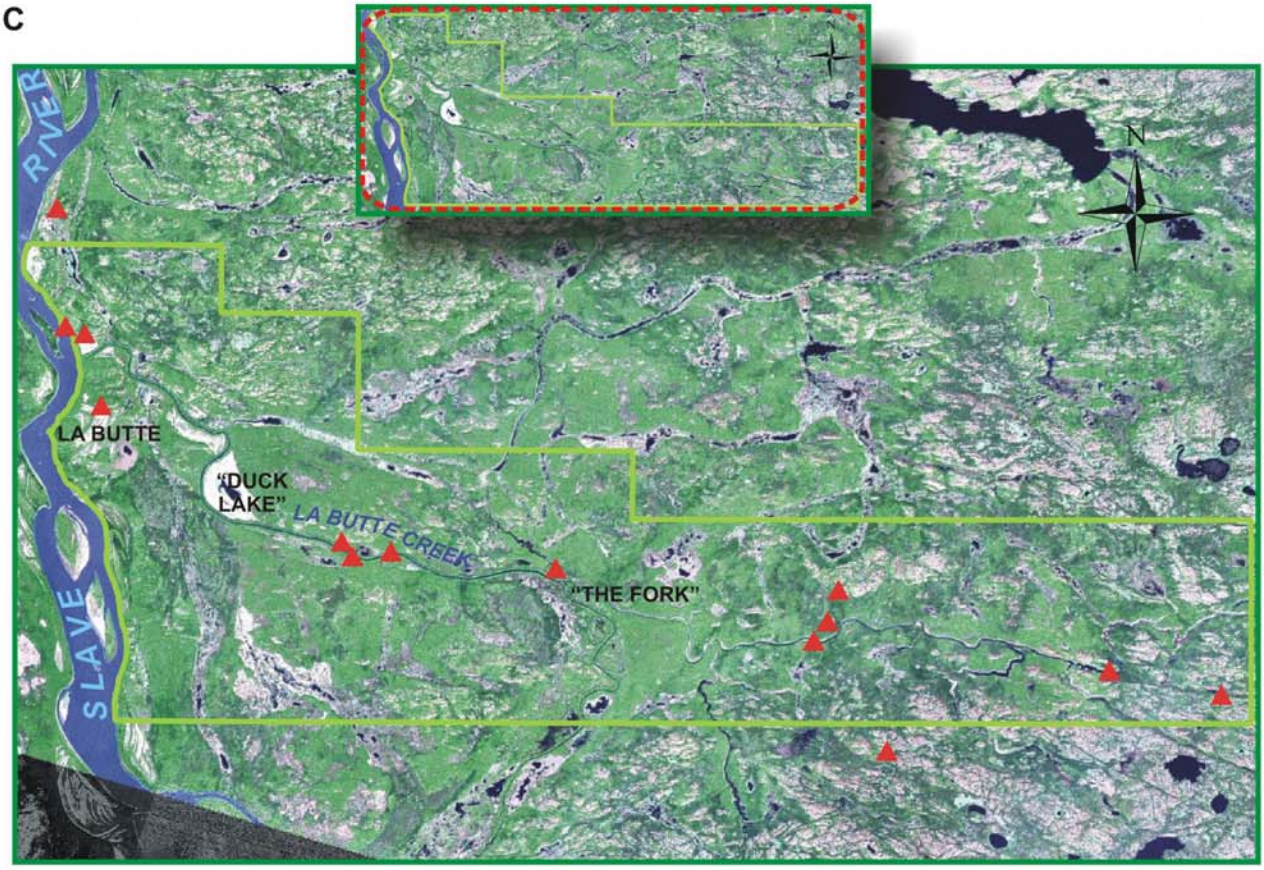
Figure 13 – *Polypodium sibiricum* Sipl. (Siberian polypody). **A** - image of the plant; **B** - known locations of *Polypodium sibiricum* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.

A

B



C



Potamogeton natans L. (floating-leaf pondweed) S2 G5

1. BRIEF DESCRIPTION

Potamogeton natans is a floating-leaved aquatic perennial herb of the pondweed (Potamogetonaceae) family. It grows from extensive, slender rhizomes (Kershaw et al. 2001).

2. DISTRIBUTION

LBCWPP – *Potamogeton natans* was found only once, in La Butte Creek, at the east end of the park, approximately 9.5 km upstream from the second fork (Figure 14 B).

AB – *Potamogeton natans* is known from a number of locations in northeastern and central Alberta, reaching as far north as Colin-Cornwall Lakes (northeastern Alberta) and La Crete (northwestern Alberta) and as far south as Bow Pass (Banff NP) (Figure 14 C). Locations of this species in Alberta fall within the Central Mixedwood, Sub-Alpine, Montane, Upper Foothills, Lower Foothills, Kazan Upland, and Central Parkland natural subregions.

Global – *Potamogeton natans* has been reported from most Canadian provinces and territories (except Yukon and Nunavut) and from most of the United States (except the southeast) (NatureServe 2004b). In addition to Alberta, it has been considered rare or possibly extirpated in Delaware (SH), Kansas (S1), North Carolina (S1), North Dakota (S2), Ohio (S2), Oklahoma (S1), Utah (S1), and Wyoming (S2) (NatureServe 2004b). *Potamogeton natans* was considered rare in the Northwest Territories by McJannet et al. (1995).

3. HABITAT

LBCWPP – Plants were found among the floating vegetation of a slow-moving portion of La Butte Creek (in an area of old beaver ponds and oxbows).

AB – Kershaw et al. (2001) reported that it grows in still or slow-moving, shallow water. The ANHIC database provides the following detailed habitat information for this species: shallow edge of lakes, ponds, sloughs, rivers, oxbow along river and watercourse in *Picea – Pinus contorta* forest, creek in open graminoid marsh and open shrubby swamp, and water-filled borrow pit (often associated with other *Potamogeton* spp. and other floating submerged and emergent aquatic vegetation, such as *Typha latifolia*, *Carex* spp., *Nuphar lutea* ssp. *variegata, Lemna minor*, *Utricularia* spp., *Eleocharis palustris* and *Scirpus microcarpus*) (ANHIC 2004).

Elsewhere – In British Columbia, it is found in lakes and ponds from the lowland and steppe to subalpine zones (Douglas et al. 2001b), often growing where the bottom of the waterbody incorporates organic matter (Brayshaw 1985). Scoggan (1978-79) noted that it grows in lakes and quiet streams. According to the Flora of North America (FNA 1993), this species grows in quiet and slow-flowing waters of ponds, lakes and streams. Crow and Hellquist (2000) suggest that it grows in acid to alkaline waters in northeastern North America.

4. POPULATION SIZE

LBCWPP – Information is not available on the population size at the location within LBCWPP.

AB – Up to three hundred individuals (stems) have been reported at the location near Eta Lake (about 125 km west of Edmonton). Many thousands of plants were estimated at St. Albert's location and two patches (about a dozen plants in each) were reported from the location south of the town of Athabasca. At Colin-Cornwall Lakes WPP, about 100 plants were observed in an area of 20 x 20m and an additional few 100s were estimated from the surrounding area. Only one individual was observed at each of the two locations west of Winifred Lake and about 130 individuals were counted at two locations west of Cold Lake. Finally, hundreds of plants have been reported from a number of locations north of Fort McMurray (numbers ranged from a single individual to hundreds of plants per site)(ANHIC 2004). Information on population size is not available for other locations, many of which are known from historic information.

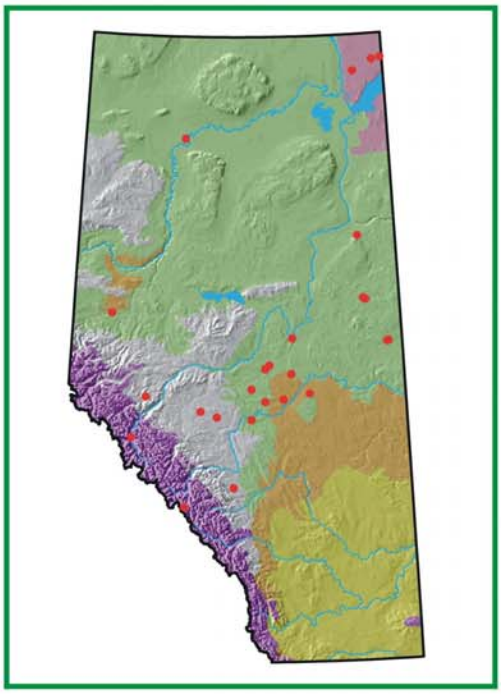
5. PROTECTED AREAS

La Butte Creek and Colin-Cornwall Lakes WPPs, Jasper, Banff and Elk Island NPs, Coyote Lake NA.

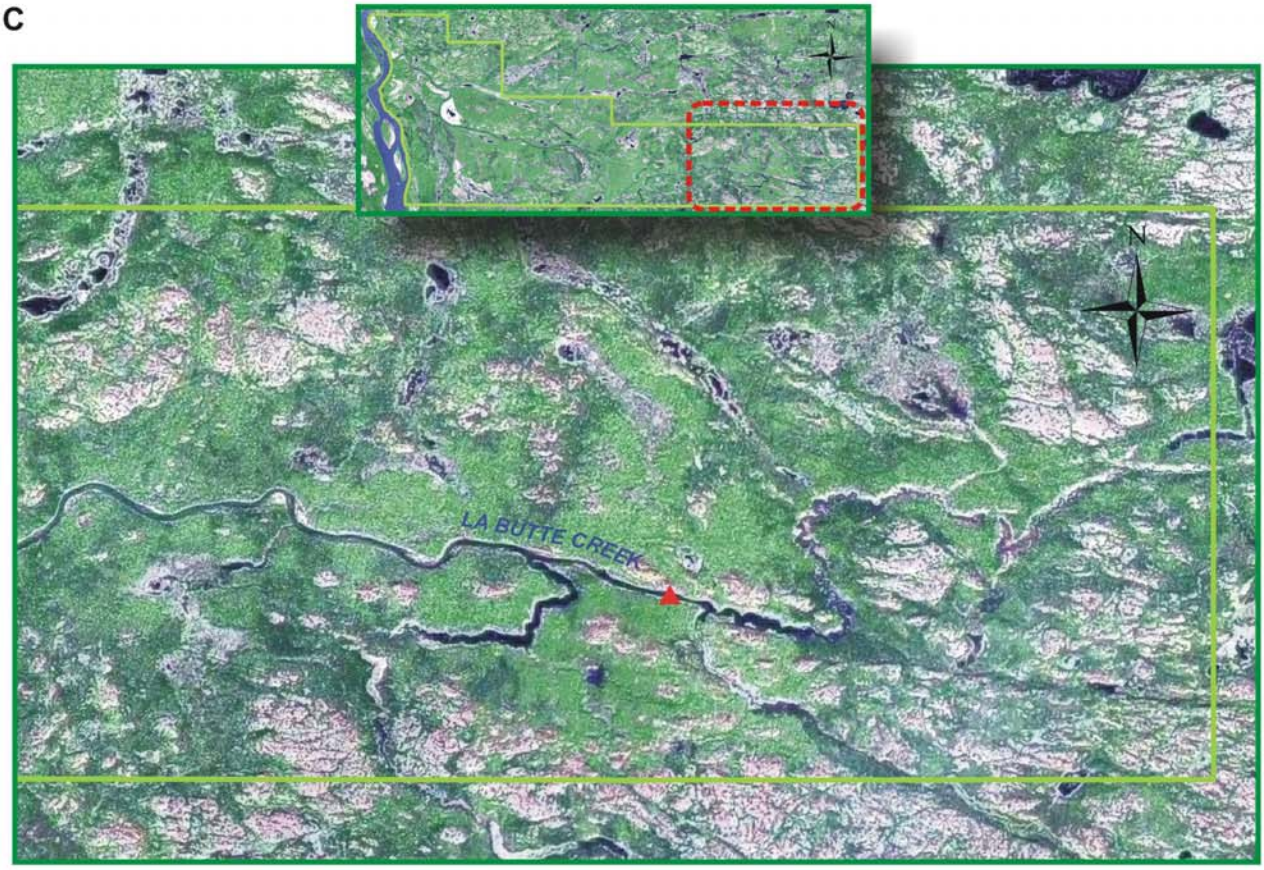
Figure 14 – *Potamogeton natans* L. (floating-leaf pondweed). **A** - image of the plant; **B** - known locations of *Potamogeton natans* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.

A

B



C



Potentilla hookeriana Lehm. (Hooker's cinquefoil) S2 G4

1. BRIEF DESCRIPTION

Potentilla hookeriana is a tufted perennial herb of the rose (Rosaceae) family. It grows from a stout, branched root crown on thick, ascending underground rhizomes. We used number of patches to estimate population size in LBCWPP.

2. DISTRIBUTION

LBCWPP – *Potentilla hookeriana* was discovered at only one location in LBCWPP, along the east side of the Slave River, ca 2 km south-southwest of the mouth of La Butte Creek (Figure 15 C).

AB – In Alberta, this species is found in two widely separated regions: in the Rocky Mountains and in the northeastern corner of the province (Figure 15 B). In northeastern Alberta, it was found in Wood Buffalo NP, in Colin-Cornwall Lakes WPP, and near Johnson Lake (ca 50 km north of Lake Athabasca along the Saskatchewan border). In the Rocky Mountains, known locations of *Potentilla hookeriana* extend from the Athabasca River in Jasper NP all the way south to Waterton Lakes NP. Locations of this species in Alberta fall within the Peace River Lowlands, Alpine, Sub-Alpine, Montane, Lower Foothills and Kazan Upland natural subregions.

Global – This taxon is known from all Canadian Territories and western provinces, but has not been reported from Ontario, Quebec or from any of the Maritime Provinces (NatureServe 2004b). *P. hookeriana* is also known from four states, namely Montana, Wyoming, Utah and Colorado (NatureServe 2004b). In addition to Alberta, *P. hookeriana* has been treated as rare in Manitoba (S1) and Wyoming (S2). Variety *chamissonis* has been reported as rare in Saskatchewan (S1), Manitoba (S1) and Quebec (S1) and ssp. *hookeriana* has been treated as rare in Saskatchewan (S1) (see Notes regarding infra-specific categories for this taxon).

3. HABITAT

LBCWPP – *Potentilla hookeriana* was growing on a coarse sandy substrate of a very steep, sparsely vegetated, west-facing slope, just bellow the top of a moraine ridge dominated by an *Arctostaphylos uva-ursi – Elymus trachycaulus* community. Other species found in the vicinity of *Potentilla hookeriana* included *Apocynum androsaemifolium*, *Equisetum hyemale* and *Solidago spathulata*.

AB – Kershaw et al. (2001) reported that it grows on alpine slopes and ridges. ANHIC (2004) provides more details on specific habitats supporting this species: open ground among scattered pines; cliff face near lake; shaded rocky mountain slope; rocky bank and rocky limestone slope; dry *Pseudotsuga* woodland; xerophytic mountain grassland; stabilized rock slide area on steep south-facing slope; rock crevices on river bank; dry, sparsely vegetated soil around margins of limestone outcroppings in *Pseudotsuga - Pinus* forest; dry grassland on airstrip; montane community with *Dryas integrifolia*, *Polygonum viviparum* and *Oxytropis cusickii*; dry *Calamagrostis montanensis* / *purpurascens - Koeleria macrantha - Antennaria parviflora* grassland; with *Dryas integrifolia, Potentilla hookeriana, Polygonum viviparum, Oxytropis cusickii, Tolmachevia integrifolia, Silene acaulis* and *Carex* spp; and small grassy opening in the forest, with *Geum triflorum, Anemone patens, Astragalus alpinus* and *Oxytropis splendens* (ANHIC 2004).

Elsewhere - Kershaw et al. (2001) noted that outside Alberta it grows on rocky slopes and ridges, coastal bluffs and in arctic tundra. In British Columbia it grows on dry to mesic, open rocky slopes and outcrops, gravel bars and tundra in the montane and alpine zones (Douglas et al. 1999).

4. POPULATION SIZE

LBCWPP – Only a few scattered patches were found at the location within La Butte Creek WPP.

AB – One plant was reported from the airstrip in Jasper National Park and a few patches were reported from the location in the northeastern corner of Wood Buffalo NP. Information on population size is not available for the remaining locations outside the study area, which are mostly known from historic information.

5. PROTECTED AREAS

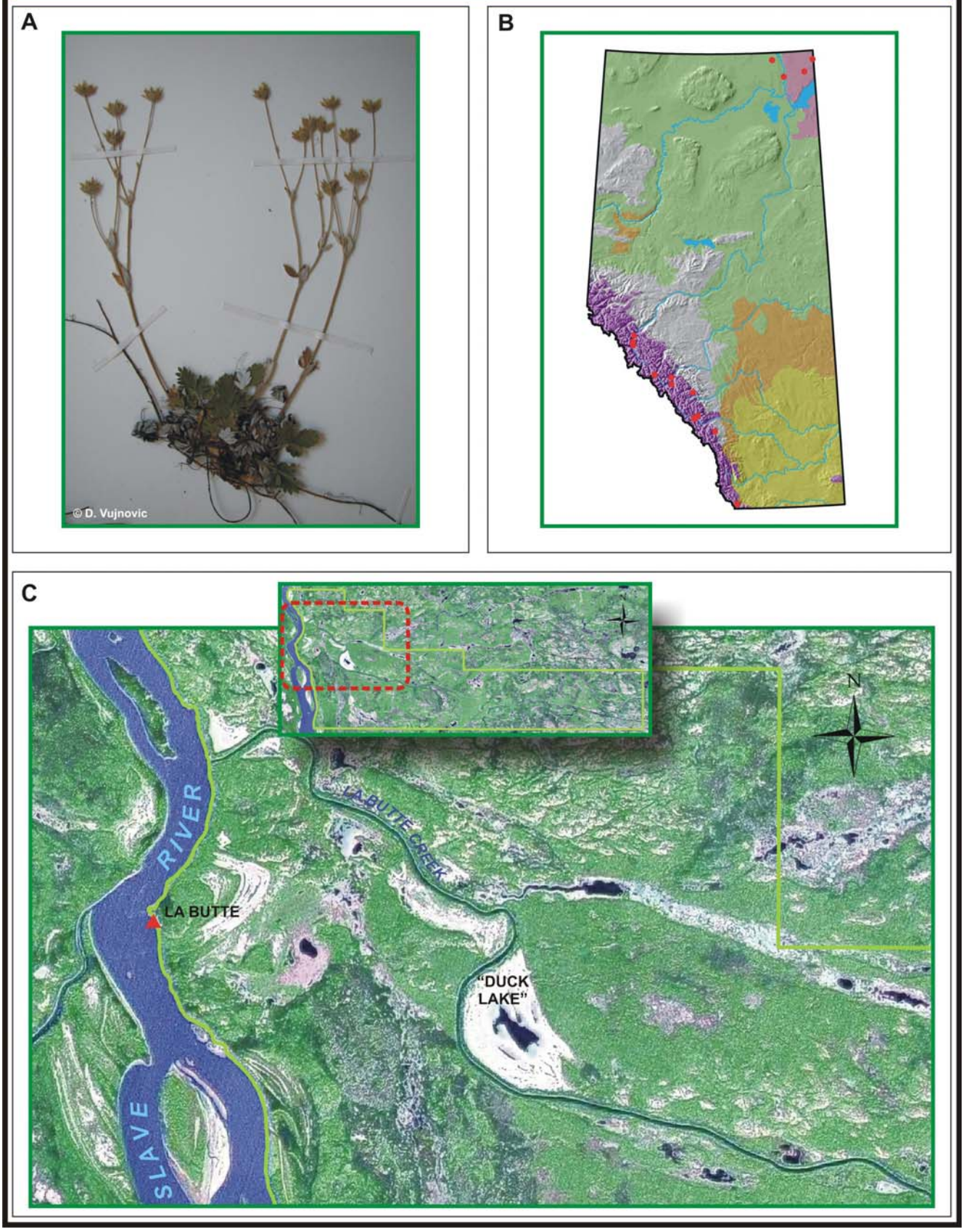
Jasper, Banff and Waterton Lakes NPs; La Butte Creek and Colin-Cornwall Lakes WPPs; Kootenay Plains ER; Scalp Creek NA; Elbow Falls PRA.

Potentilla hookeriana Lehm. (Hooker's cinquefoil) (cont.) S2 G4

6. NOTES

There are taxonomic problems with this species (ANHIC 2004). NatureServe (2004b) recognizes a number of subspecies and varieties that are being tracked by different jurisdictions. They are namely ssp./var. *hookeriana*, ssp. *chamissonis* and var. *furcata*. According to Natureserve (2004b) all listed infra-specific categories are represented in Alberta, but ANHIC is tracking *Potentilla hookeriana* only at the species level.

Figure 15 – *Potentilla hookeriana* Lehm. (Hooker's cinquefoil). **A** - image of the plant; **B** - known locations of *Potentilla hookeriana* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.



Silene antirrhina L. (sleepy catchfly) S1 G5

1. BRIEF DESCRIPTION

Silene antirrhina is an annual herb of the pink (Caryophyllaceae) family. It grows from a taproot (Douglas et al. 1998).

2. DISTRIBUTION

LBCWPP – *Silene antirrhina* was found only once during the 2001 survey of LBCWPP, along the north shore of La Butte Creek, about 4 km downstream of the first fork (Figure 16 C).

AB – This species is known only from the northeastern corner of Alberta, north of Lake Athabasca (Figure 16 B). In addition to the location within the study area, it has been found on the north shore of Lake Athabasca (ca 4.5 km east of Fort Chipewyan), near Dog River (ca 25 km south-southeast of Fort Smith), and in the Colin Lake area (ca 3 km northwest of Colin Lake cabin). In Alberta, locations of *Silene antirrhina* fall into the Kazan Upland and Athabasca Plain natural subregions.

Global – This widespread species occurs throughout North America, with the exception of Alaska, Yukon, Northwest Territories, Nunavut, Newfoundland Island, Labrador, Nova Scotia and Prince Edward Island. In addition to Alberta, it is considered rare only in Saskatchewan (S1S2) (NatureServe 2004b).

3. HABITAT

LBCWPP – Plants were growing on a south-facing rock outcrop along La Butte Creek. They grew in the cracks of rock where soil and moisture accumulate to provide a suitable microhabitat with associated species such as *Saxifraga tricuspidata*, *Dracocephalum parviflorum, Agrostis scabra, Chenopodium gigantospermum* and *Artemisia campestris*.

AB – Outside the study area, this species was found on a steep bank along a lakeshore, on the exposed dry slope of a Precambrian outcrop, and on gravelly eroding till on a steep grassy, south-facing slope (ANHIC 2004).

Elsewhere – In British Columbia, this species is known from mesic to dry roadsides, open forests and fields in the lowland, steppe and montane zones (Douglas et al. 1998). Scoggan (1978-79) noted that it grows on sandy soil in dry open woods, fields and waste places.

4. POPULATION SIZE

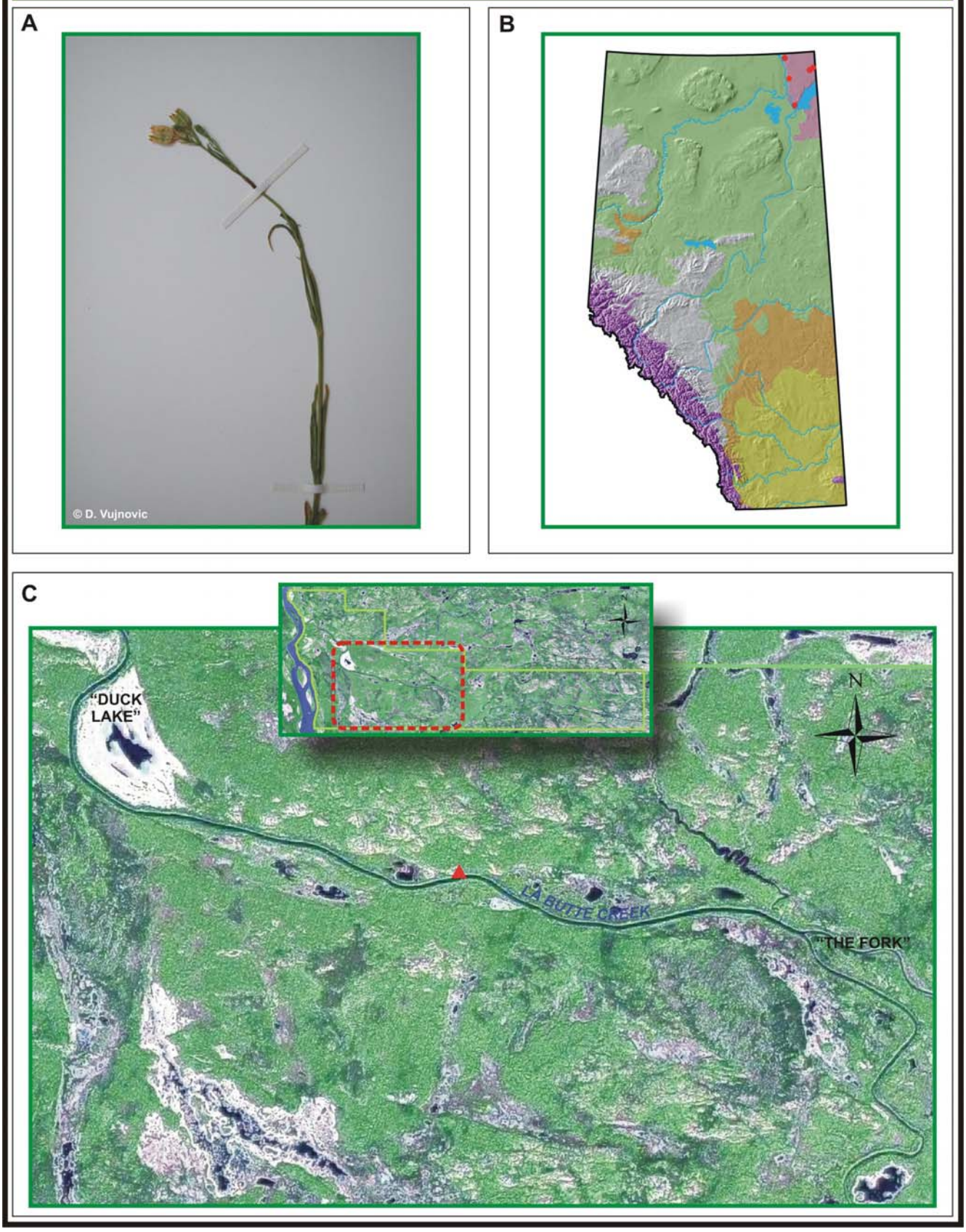
LBCWPP – Only six plants were counted at the location in LBCWPP.

AB – Information on population size is not available for any of the locations outside the study area, which are all known from historic information.

5. PROTECTED AREAS

La Butte Creek and Colin-Cornwall Lakes WPPs.

Figure 16 – *Silene antirrhina* L. (sleepy catchfly). **A** - image of the plant; **B** - known locations of *Silene antirrhina* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.



SPECIES ON THE WATCH LIST:

Cypripedium acaule Ait. (stemless lady's-slipper) S3 G5

Cypripedium acaule is a perennial herb of the orchid family (Orchidaceae). It has a wide range in eastern Canada and the eastern United States (but is not known from any states west of Minnesota or from Yukon, Nunavut or British Columbia. *Cypripedium acaule* is common in many areas of its range and is considered rare only in Illinois (S1) (NatureServe 2004b).

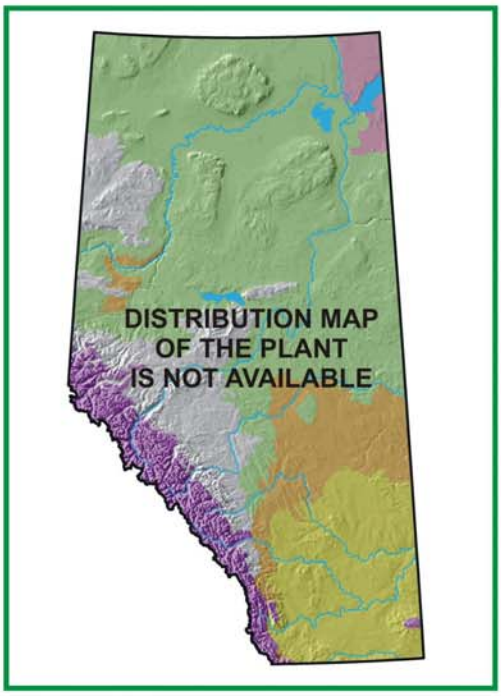
Generally known from sterile, acidic soil and light shaded sites (including sand ridges, jack pine woods and sphagnum bogs), this species grows in wetlands, woods and sand dunes of northeastern Alberta (Kershaw et al. 2001). Its known sites largely fall within the Athabasca Plain natural subregion with a few locations found in the Kazan Upland and Central Mixedwood natural subregions (ANHIC 2004). It was found only once (only one plant noted) during the 2001 inventory of the study area, about 5 km downstream of the first fork (see Figure 17 C). It grew on sandy soil in an open *Pinus banksiana* stand, not far from the creek edge.

Once considered rare in Alberta (ranked S2 in 1995), this species was re-ranked to S3 in 2000 and moved to the Watch List, because large populations were found during the biophysical inventory of the Maybelle River WPP and the Athabasca Dunes ER (thousands of plants were found growing within two extensive landscape units: the sand-plain complex and the ice contact complex, Allen et al. 2003) and additional locations were expected to be found both in the Athabasca Plain and the Kazan Upland natural subregions in the future. However, subsequent surveys of the three protected areas north of Lake Athabasca (Colin-Cornwall Lakes, La Butte Creek and Fidler-Greywillow WPPs) suggest that this species is far less common in the Kazan Upland than originally predicted. Since the range of the species appears to be smaller than predicted, a review should be done to determine if the rank should be changed and the species put back on the Tracking List.

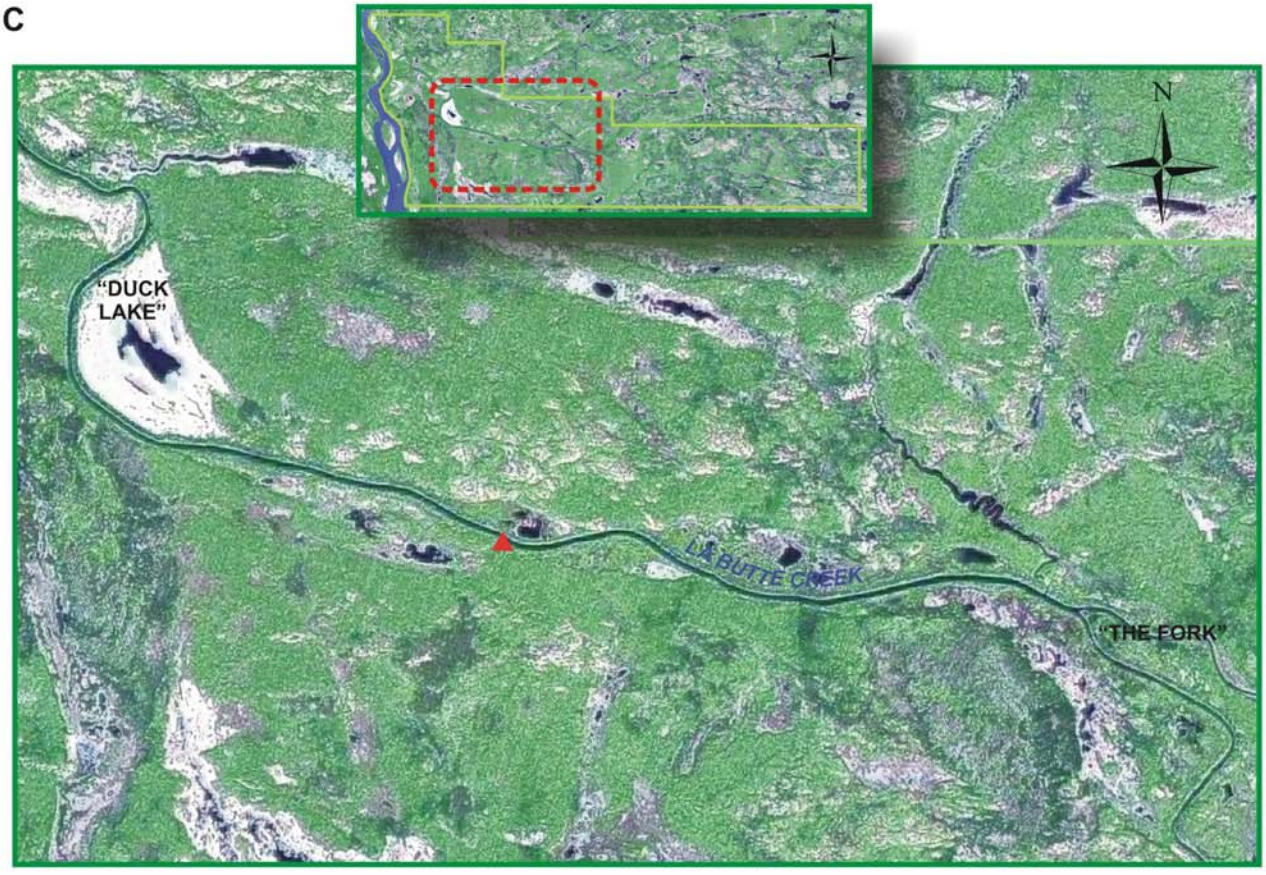
Figure 17 – *Cypripedium acaule* Ait.. (stemless lady's slipper). **A** - image of the plant; **B** - known locations of *Cypripedium acaule* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.

A

B



C

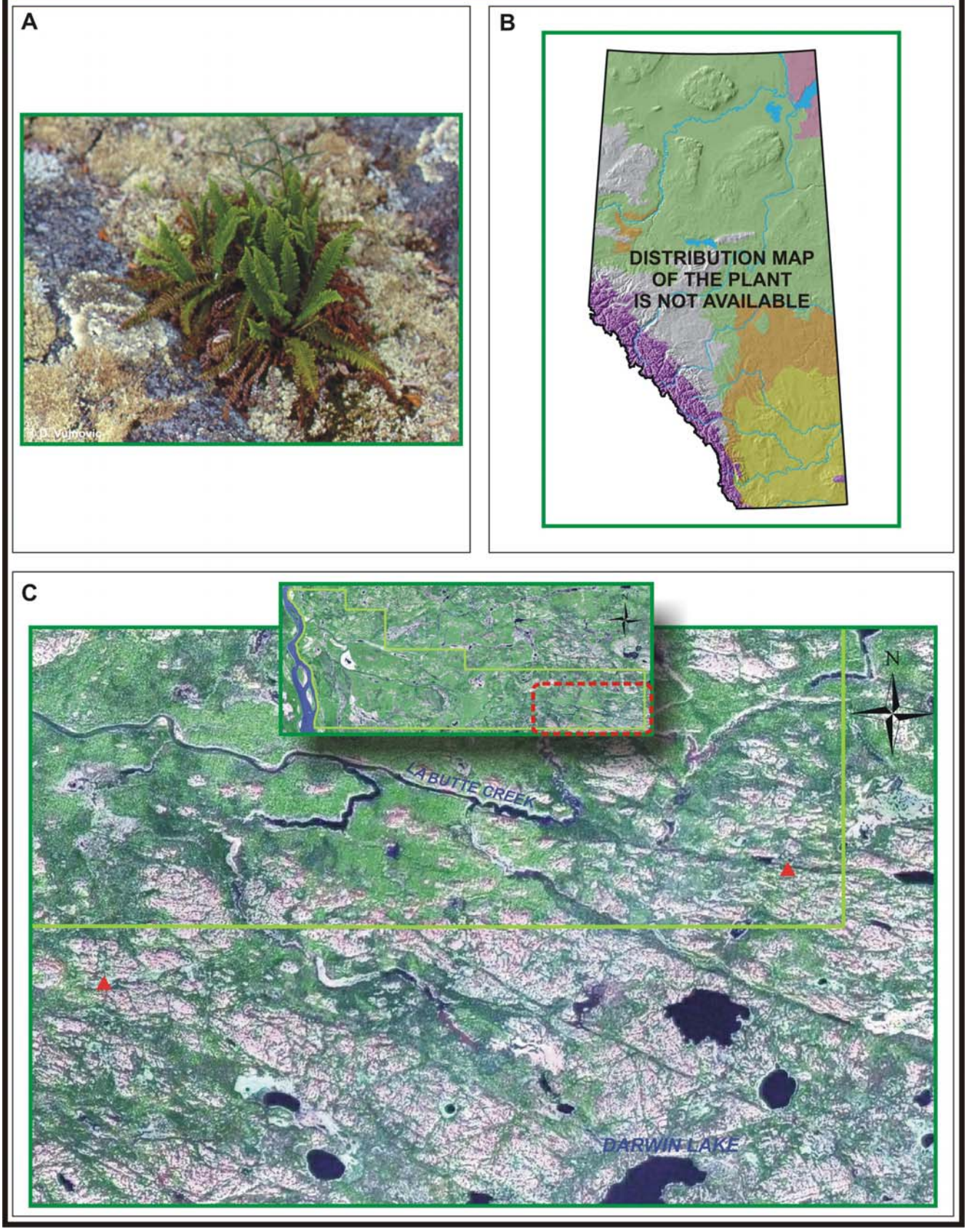


Dryopteris fragrans (L.) Schott (fragrant shield fern) S3 G5

Dryopteris fragrans is a small evergreen forb of the woodfern family (Dryopteridaceae [Polypodiaceae]). It is known from all Canadian provinces and territories, Alaska, and a few northeastern states: Maine, Michigan, Minnesota, New Hampshire, New York, Vermont and Wisconsin. *Dryopteris fragrans* seems to be uncommon in many areas of its range, but is considered rare only in Newfoundland Island (Newfoundland) (S2S3), Nova Scotia (S2), Maine (S2), New Hampshire (S1), New York (S1), Vermont (S2) and Wisconsin (S2) (NatureServe 2004b). In Alberta it is known from the Rocky Mountain and Canadian Shield natural regions (Moss 1983).

This more or less circumpolar species is known from cliffs and talus slopes across its range (Cody and Britton 1989). It grows on siliceous rocks (Moss 1983), on cliffs, ledges and rock slopes in Alberta (Johnson et al. 1995). During the 2001 survey of La Butte Creek WPP, *Dryopteris fragrans* was found at only two locations at the east end of the park, one about 5 km northwest of Darwin Lake (just outside the park's boundary) and the other one about 3.5 km north-northeast of Darwin Lake (only one plant was observed at each location) (see Figure 18 C). At both locations, plants were growing on a rock outcrop. At the location within the park, *Dryopteris fragrans* grew in the vicinity of *Polypodium sibiricum, Cystopteris fragilis, Festuca saximontana* and *Carex rossii*.

Figure 18 – *Dryopteris fragrans* (L.) Schott (fragrant shield fern). **A** - image of the plant; **B** - known locations of *Dryopteris fragrans* within Alberta; **C** - known locations of the species in La Butte Wildland Provincial Park.

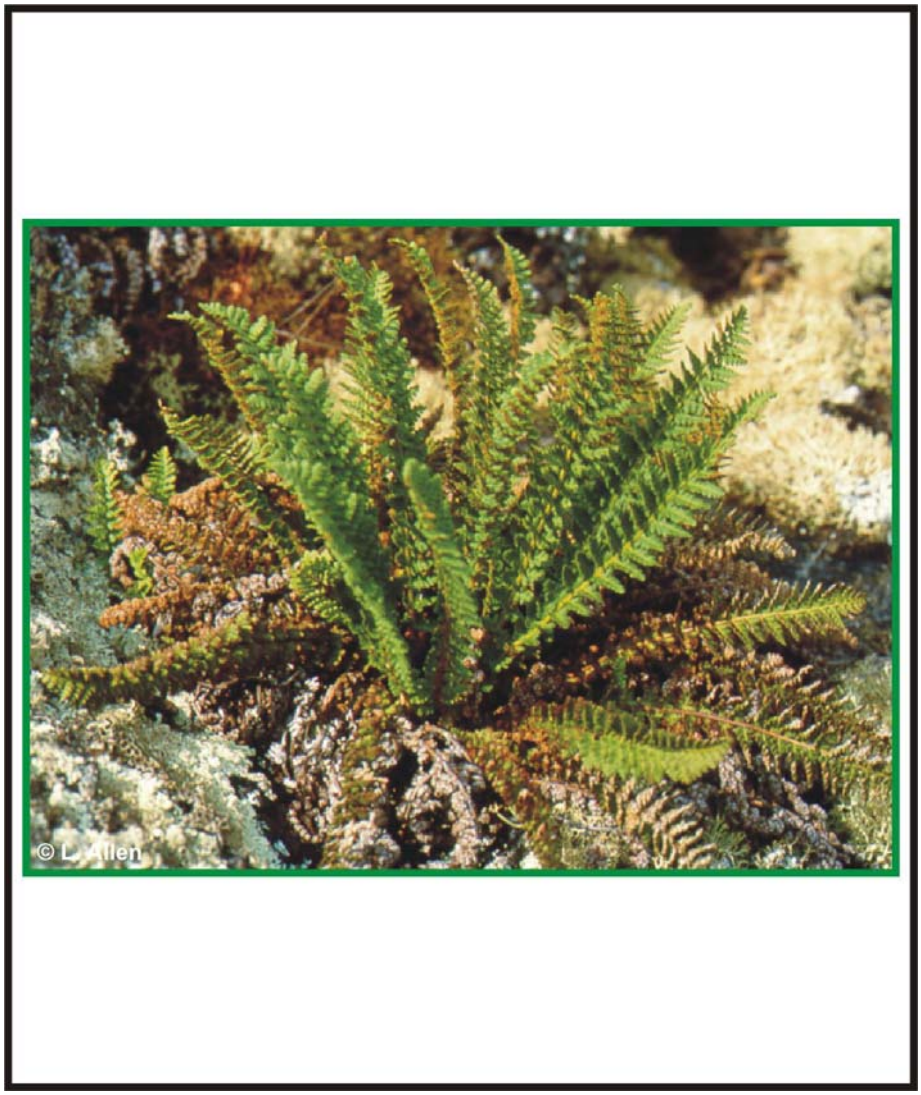


Woodsia ilvensis (L.) R. Br. (rusty woodsia) S3 G5

Woodsia ilvensis is a delicate perennial herb of the woodfern family (Dryopteridaceae [Polypodiaceae]). Its North American range includes all Canadian provinces and territories, Alaska, and a number of eastern states (reaching as far west as Michigan and Iowa, and as far south as Illinois and North Carolina). It is considered rare, extirpated (SX) or potentially extirpated (SH) in Illinois (S1), Iowa (S1), Maryland (S1), North Carolina (S1), Ohio (SX), Rhode Island (SH) and West Virginia (S2) (NatureServe 2004b). Douglas et al. (1981) noted that it is rare in the Yukon Territory.

In North America, *Woodsia ilvensis* generally grows on cliffs and rocky slopes, and on a variety of substrates, including serpentine (FNA 1993). It is restricted to the Canadian Shield in Alberta where it grows in crevices of rock outcrops, most commonly associated with *Polypodium sibiricum*, *Festuca saximontana*, *Carex deflexa*, *Cryptogramma acrostichoides*, *Poa glauca* and *Potentilla tridentata*. It frequented most of the rock outcrops within La Butte Creek WPP that were visited in 2001. Based on the amount of unexplored suitable habitat, it is highly probable that there are numerous other locations occupied by this species within the study area.

Figure 19 – Image of the *Woodsia ilvensis* (L.) R. Br. (rusty woodsia).



DISCUSSION

Site significance

La Butte Creek Wildland Provincial Park supports at least 329 vascular plant taxa which represents roughly 20% of the overall native vascular plant diversity in Alberta. Fifteen (15) of these taxa are considered provincially rare. This number represents roughly three percent of all rare vascular plant taxa (480) in the province (Vujnovic and Gould 2002). Rarity is generally considered a factor that makes species more vulnerable to both natural (caused by systematic pressures and stochastic events) and human induced extinction (Mittermeier and Forsyth 1994, Master et al. 2000). Populations of provincially rare vascular plant taxa in LBCWPP are all significant because they fall within the protected area that aims to preserve Alberta's natural heritage, including the diversity of native plants (Parks and Protected Areas 2004). Although wildland provincial parks are designed to provide opportunities for backcountry recreation (Parks and Protected Areas 2004), the remoteness of the site and careful management planning by parks should ensure long-term protection of the populations of rare vascular plants that it supports.

Protective status of the study area is particularly significant for populations of those taxa that are ranked S1 in the province. These taxa are considered to be at potentially high risk of extinction either because they are known from only five or fewer locations in the province or because of some other factors influencing their long term survival, such as restricted geographic range, small population sizes, threats to populations and/or habitat, etc. (see NatureServe 2004 for a more complete list of factors considered in assessing conservation status). The Natural Heritage Network has developed a system for approximating a species' risk of extinction, and species ranked S1 are considered to be at potentially higher risk compared to those rare taxa ranked S2 and higher. Five taxa out of 15 found in LBCWPP fall into that group: *Botrychium crenulatum, Carex umbellata, Mimulus ringens, Nymphaea tetragona* and *Silene antirrhina*. In addition to this, the population of *Mimulus ringens* in LBCWPP is the only known population of this species in the province.

The protective status of LBCWPP is significant for a number of additional reasons related to rare vascular plant taxa in the province. For example, LBCWPP is one of three Alberta protected areas known to have a population of *Physostegia ledinghamii*. Furthermore, the LBCWPP population is the largest reported population of this species within the province (recognizing that the information on population sizes for most historical and some newer records is not available). *Nymphaea tetragona*, now known from just outside the park's boundary, may also be found within LBCWPP in the future. This species has not been reported from any protected area in Alberta to-date. Finally, populations of *Botrychium crenulatum*, *B.* "*michiganense*" and *Potentilla hookeriana* found in LBCWPP seem to be widely separated and may be genetically different from plants of the same taxa found at other known locations further south within the province, but research would be required to confirm this.

It must be noted here that none of the rare vascular plant taxa found within LBCWPP have been assessed for listing under the federal *Species at Risk Act* (SARA) or the provincial *Alberta Wildlife Act*. For details on the assessment process for listing under these two acts, visit the websites of Alberta Fish and Wildlife (http://www3.gov.ab.ca/srd/fw/riskspecies/index.html) and Environment Canada (http://www.speciesatrisk.gc.ca/default_e.cfm).

Conservation concerns

A number of rare species seem to be dependent on the intermittently flooded habitat along the edges of La Butte Creek (*Mimulus ringens*, *Physostegia ledinghamii* and *Juncus filiformis*). Periodic drying, flooding and/or ice scouring events along the banks of the creek are inevitable and are important in shaping the habitat and the species found there. The dynamics of the lower La Butte Creek are unusual in that back flooding happens periodically with water flowing up the creek from the Slave River. Upstream activities that affect the flow of the Slave River, such as a dam, could negatively impact this dynamic habitat permanently.

This park is relatively inaccessible and fairly distant from all major urban centers, and its flora (including rare taxa) generally does not seem to be negatively influenced by human factors at present.
Although vegetation health was not among the key data collected during this survey, no obvious threats from pests or diseases were observed on any of the rare plant taxa. Non-native plant species seem to be scarce at present and are mainly found near the trapper's cabin at the mouth of La Butte Creek and along the Slave River (examples include *Chenopodium album, Descurainia sophia, Medicago sativa, Melilotus alba, Crepis tectorum* and *Taraxacum officinale*). However, if visitation by people significantly increased, it could potentially result in the further introduction and spread of invasive non-native plants, which could pose a threat to the rare taxa and the overall species diversity within the park.

Recommendations for future studies

While the areas nearest to La Butte Creek and along the Slave River received significant attention during this rare vascular plant survey, other parts of LBCWPP were only partially surveyed because of the difficult access and limited time. Rare taxa such as *Carex rostrata*, *Nymphaea tetragona* (found just outside the park's boundary) and *Carex pseudocyperus* that were found in some inland wetlands potentially occur in other wetlands within the park, so additional suitable habitat should be surveyed for their occurrence in the future. Based on the abundance of suitable habitat for those rare and watch list taxa that were often found growing on rock outcrops, such as *Carex umbellata, Polypodium sibiricum* and *Woodsia ilvensis*, it is highly probable that these taxa grow in numerous additional locations within the park. This needs to be confirmed during some future visits to the area.

Two of the rare species that seemed to grow abundantly along La Butte Creek, *Mimulus ringens* and *Physostegia ledinghamii*, were just starting to bloom at the time of the survey, so it was difficult to distinguish them from the adjacent vegetation while traveling by boat along the creek. This made it difficult to properly estimate their true distribution and population sizes, so future surveys for these species should be conducted at the time of the year when plants are in full bloom and easier to spot.

Known occurrences of all rare vascular plant taxa within the park boundary should be monitored periodically to detect any significant changes in population size and health. More thorough examination of the suitable habitat within the park needs to be done to check for additional locations of some of the more sporadically occurring rare taxa, as they could have been missed even in some inspected areas during this survey because of the reconnaissance nature of the project. These would include taxa such as *Juncus filiformis, Nymphaea tetragona* and *Silene antirrhina*.

Many of the rare vascular plant taxa found within LBCWPP have known occurrences outside the park boundaries. Our knowledge about these occurrences (especially on population size) is often limited, because many of them are based on historic reports or old voucher specimens (generally older than 20 years). These historically known occurrences need to be revisited to more accurately estimate the provincial significance of the occurrences found within LBCWPP. In addition, some focused genetic studies may be needed to determine whether the populations of some rare plant taxa growing within LBCWPP are genetically different from populations of the same species outside the study area. In particular, the LBCWPP populations of *Botrychium crenulatum*, *B.* "*michiganense*" and *Potentilla hookeriana* seem to be widely separated from other populations and may merit investigation.

Study limitations

Target areas were mainly accessed by foot or by boat, with a few locations reached by helicopter. This significantly limited the authors' ability to cover extensive areas of the park and reach most of the remote sites. The lead author of this report spent only ten working days on the focused rare plant survey within LBCWPP. The co-authors Lorna Allen and Derek Johnson focused their work on the significant small patch communities and on rare non-vascular plants and lichens, respectively. Their encounters with rare vascular plant taxa were of somewhat incidental nature so their time-share for finding rare vascular plant taxa would be hard to estimate. A few additional locations of rare vascular plants were reported by other crewmembers of the biophysical inventory team.

Because of time and logistical constraints, vast areas of the park that potentially harbour rare vascular plant taxa remain unsurveyed (most areas away from the creek but also some areas along La Butte Creek), and some rare taxa may have been missed even within the surveyed areas, especially along the creek edges. Also, some vascular plants do not grow every year, therefore somewhat different results could be obtained if a similar study was conducted in another year. There may also be some spring or fall flowering taxa that were missed during the survey in July. Finally, only limited time was available for documenting the actual size of each sub-population and the area of occupancy for each rare taxa encountered.

CONCLUSION

This study focused on documenting location, habitat and population size information for tracked vascular plant taxa occurring in selected areas within La Butte Creek Wildland Provincial Park and compiling a preliminary vascular plant species list for LBCWPP. It resulted in the creation of the list of 329 taxa for LBCWPP. Fifteen (15) vascular plant taxa that are on the 2002 Vascular Plant Tracking List and three from the 2002 Watch List were recorded during this survey. None of them were known previously from this park and one of them is a new addition to the flora of Alberta.

This study shows that La Butte Creek WPP is a highly significant site for a number of reasons:

- it supports populations of at least 15 provincially rare vascular plant taxa;
- it supports the only known location in the province for at least one vascular plant taxon;
- it supports one of the largest known populations within the province for at least one of the rare taxon;
- it supports some populations that appear to be of a disjunct nature with the potential to be genetically different from populations of the same species elsewhere in the province.

In addition to supporting a number of provincially rare vascular plant taxa, this site provides habitat to roughly 20% of all native vascular plant taxa in the province. Future management plans should ensure that the site's special features (including provincially rare vascular plants) and its overall biodiversity are maintained.

ACKNOWLEDGEMENTS

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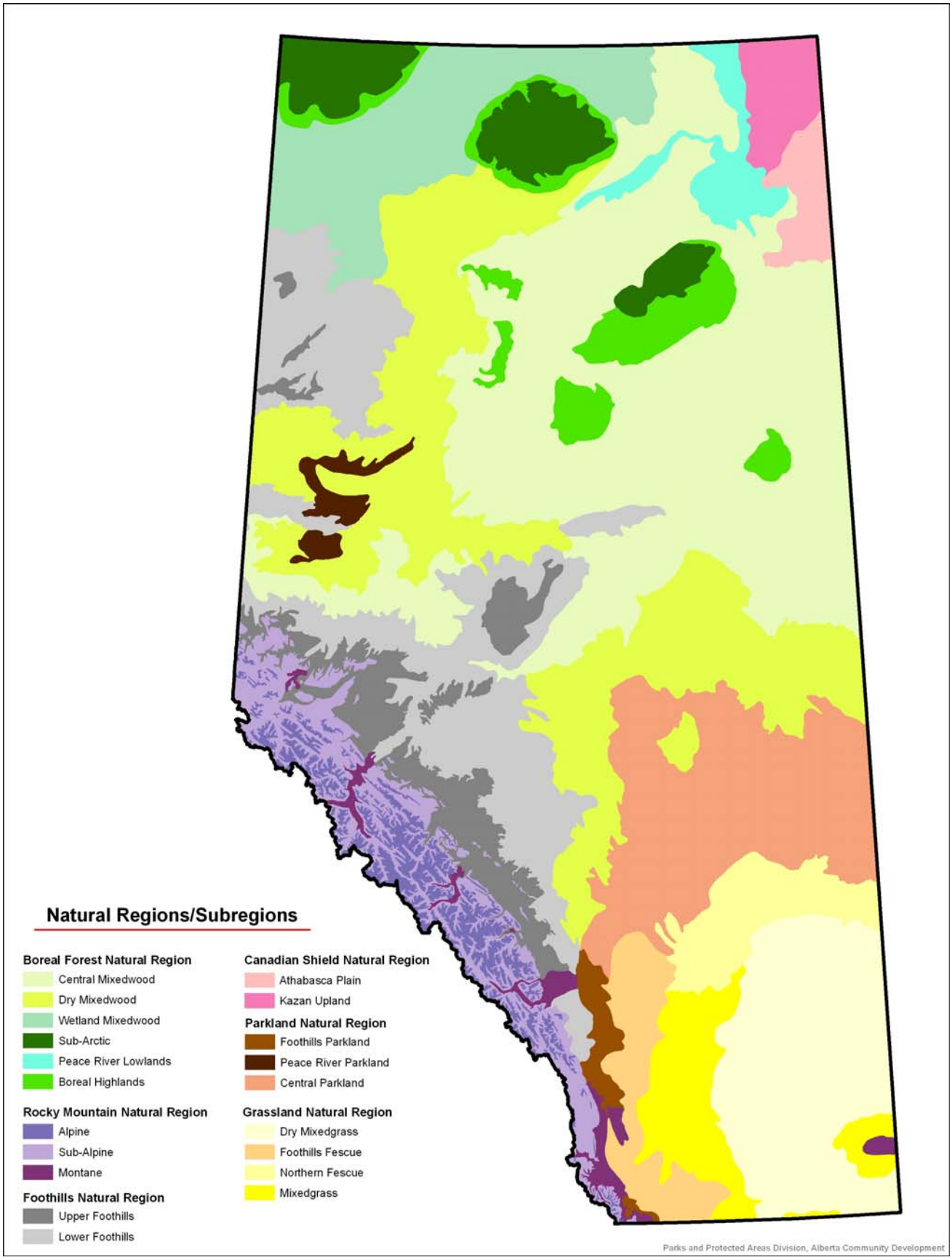
APPENDIX 1 – Map of Natural Regions and Subregions of Alberta.



APPENDIX 2 – Vascular Plants of La Butte Creek Wildland Provincial Park.

Complete list of vascular plant species found within La Butte Creek Wildland Provincial Park

- "#" indicates those taxa for which there is at least one voucher specimen deposited in a herbarium.
- listed in square brackets [ ] are the herbaria where specimens of the rare and watched taxa collected in 2001 are deposited (ALTA=University of Alberta; CAFB= Northern Forestry Centre, Canadian Forest Service; PP=Parks and Protected Areas) and the associated accession numbers, when available.
- grey fill indicates species on Tracking or Watch Lists.
- orange fill indicates those taxa that are not native to Alberta.

Scientific Name	Common Name
Lycopodiaceae – Club Moss Family	
Diphasiastrum (*Lycopodium*) *complanatum*	ground cedar
Lycopodium annotinum	stiff club-moss
Lycopodium clavatum	running club-moss
Lycopodium obscurum	ground pine
Selaginellaceae – Little Club-moss Family	
Selaginella rupestris#	rock little club-moss
Equisetaceae – Horsetail Family	
Equisetum arvense	common horsetail
Equisetum fluviatile	swamp horsetail
Equisetum hyemale#	common scouring-rush
Equisetum palustre	marsh horsetail
Equisetum pratense	meadow horsetail
Equisetum scirpoides	dwarf scouring rush
Equisetum sylvaticum	woodland horsetail
Ophioglossaceae – Adder's-tongue Family	
Botrychium crenulatum# [ALTA: Acc. No.?]]	dainty moonwort
Botrychium "michiganense"# [ALTA: Acc No. 109350]	Michigan moonwort
Botrychium virginianum	Virginia grape fern
Dryopteridaceae – Wood Fern Family	
Cryptogramma acrostichoides	parsley fern
Cystopteris fragilis#	fragile bladder fern
Dryopteris cf. *carthusiana*	narrow spinulose shield fern
Dryopteris fragrans#	fragrant shield fern
Woodsia ilvensis#	rusty woodsia

Scientific Name	Common Name
Polypodiaceae – Fern Family	
Polypodium sibiricum# [ALTA: Acc. No. 109553, 109554, 109555, 109760, 109761, 109762, 109756, 109757, 109758, 109759; CAFB: Acc. No. 980400]	rock polypody
Pinaceae – Pine Family	
Larix laricina	tamarack
Picea glauca	white spruce
Picea mariana	black spruce
Pinus banksiana	jack pine
Cupressaceae – Cypress Family	
Juniperus communis	ground juniper
Typhaceae – Cattail Family	
Typha latifolia	common cattail
Sparganiaceae – Bur-Reed Family	
Sparganium angustifolium#	narrow-leaved bur-reed
Sparganium eurycarpum	giant bur-reed
Sparganium minimum#	slender bur-reed
Potamogetonaceae – Pondweed Family	
Potamogeton alpinus#	alpine pondweed
Potamogeton gramineus#	various-leaved pondweed
Potamogeton natans# [PP: Acc. No. 4480; ALTA: Acc. No. 109433]	floating-leaf pondweed
Potamogeton pectinatus#	sago pondweed
Potamogeton pusillus#	small-leaf pondweed
Potamogeton richardsonii#	clasping-leaf pondweed
Potamogeton zosteriformis#	flat-stemmed pondweed
Potamogeton vaginatus	large-sheath pondweed
Juncaginaceae – Arrow-Grass Family	
Triglochin maritima#	seaside arrow-grass
Alismataceae – Water-Plantain Family	
Sagittaria cuneata#	arum-leaved arrowhead

Scientific Name	Common Name
Gramineae/ Poaceae – Grass Family	
Agrostis scabra#	rough hair grass
Alopecurus aequalis	short-awned foxtail
Beckmannia syzigachne	slough grass
Bromus inermis ssp. pumpellianus#	
Calamagrostis canadensis	bluejoint
Calamagrostis inexpansa#	northern reed grass
Calamagrostis purpurascens#	purple reed grass
Calamagrostis stricta#	narrow reed grass
Cinna latifolia	drooping wood-reed
Danthonia intermedia#	intermediate oat grass
Elymus trachycaulus (Agropyron trachycaulum)#	slender wheat grass
Elytrigia (Agropyron) repens	quack grass
Festuca saximontana#	Rocky Mountain fescue
Glyceria borealis#	northern manna grass
Glyceria grandis	common tall manna grass
Hierochloe odorata	sweet grass
Hordeum jubatum#	foxtail barley
Koeleria macrantha	June grass
Leymus innovatus	hairy wild rye
Muhlenbergia richardsonis#	mat muhly
Oryzopsis pungens#	northern rice grass
Phalaris arundinacea	reed canary grass
Poa glauca#	timberline bluegrass
Poa interior#	inland bluegrass
Poa palustris#	fowl bluegrass
Poa pratensis	Kentucy bluegrass
Puccinellia nuttalliana#	Nuttall's salt-meadow-grass
Schizachne purpurascens#	purple oat grass
Scolochloa festucacea#	spangletop
Stipa comata	needle-and-thread
Cyperaceae – Sedge Family	
Carex aenea#	silvery-flowered sedge
Carex aquatilis#	water sedge
Carex atherodes	awned sedge
Carex aurea	golden sedge
Carex brunnescens#	brownish sedge
Carex capillaris	hair-like sedge
Carex capitata# [PP: Acc. No. 4522; CAFB: Acc. No. 980365]	capitate sedge
Carex chordorrhiza#	prostrate sedge
Carex concinna#	beautiful sedge
Carex crawfordii#	Crawford's sedge
Carex (curta) canescens #	short sedge

Scientific Name	Common Name
Carex deflexa	bent sedge
Carex diandra#	two-stamened sedge
Carex disperma	two-seeded sedge
Carex gynocrates	northern bog sedge
Carex lasiocarpa#	hairy-fruited sedge
Carex limosa#	mud sedge
Carex norvegica#	Norway sedge
Carex obtusata#	blunt sedge
Carex paupercula#	bog sedge
Carex praegracilis#	graceful sedge
Carex pseudocyperus# [ALTA: Acc. No. 109399; CAFB Acc. No. 980414]	cyperus-like sedge
Carex retrorsa# [ALTA: Acc. No. 109400; CAFB: Acc. No. 980412]	turned sedge
Carex richardsonii#	Richardson's sedge
Carex rossii#	Ross' sedge
Carex rostrata# [PP: Acc. No. 4534, 4528; CAFB: Acc. No. 980421	beaked sedge
Carex sartwellii#	Sartwell's sedge
Carex saxatilis#	rocky ground sedge
Carex siccata#	hay sedge
Carex tenuiflora#	thin-flowered sedge
*Carex umbellata#** [PP: Acc. No. 4723, 4725 4728 4729; ALTA: Acc. No. 109760; CAFB: Acc. No. 980423]	umbellate sedge
Carex utriculata#	small bottle sedge
Carex vaginata	sheathed sedge
Eleocharis acicularis#	needle spike-rush
Eleocharis palustris#	creeping spike-rush
Eriophorum brachyantherum	close-sheathed cotton grass
Eriophorum chamissonis	russett cotton grass
Eriophorum gracile	slender cotton grass
Eriophorum polystachion (*E. angustifolium*)#	tall cotton grass
Scirpus microcarpus	small fruited bulrush
Scirpus validus	common great bulrush

Araceae – Arum Family

Acorus americanus#	sweet flag
Calla palustris	water arum

Lemnaceae – Duckweed Family

Lemna minor	common duckweed
Spirodela polyrhiza#	larger duckweed

Scientific Name	Common Name
Juncaceae – Rush Family	
Juncus alpinoarticulatus	alpine rush
Juncus balticus#	wire rush
Juncus filiformis# [ALTA: Acc. No. 109401, 109402]	thread rush
Juncus nodosus#	knotted rush
Juncus tenuis#	slender rush
Liliaceae – Lily Family	
Maianthemum canadense	wild Lily-of-the-valley
Smilacina stellata	star-flowered Solomon's-seal
Smilacina trifolia	three-leaved Solomon's-seal
Tofieldia glutinosa	sticky false asphodel
Iridaceae – Iris Family	
Sisyrinchium montanum	common blue-eyed grass
Orchidaceae – Orchid Family	
Amerorchis (*Orchis*) *rotundifolia*	round-leaved orchid
Calypso bulbosa#	Venus'-slipper
Corallorhiza trifida	pale coralroot
Coeloglossum viride (*Habenaria viridis*)	bracted bog orchid
Cypripedium acaule	stemless Lady's-slipper
Cypripedium cf. *passerinum#*	sparrow's-egg Lady's-slipper
Goodyera repens	lesser rattlesnake plantain
Platanthera (*Habenaria*) *hyperborea*	northern green bog orchid
Platanthera (*Habenaria*) *obtusata*	blunt-leaved bog orchid
Platanthera (*Habenaria*) *orbiculata#*	round-leaved bog orchid
Spiranthes romanzoffiana	hooded ladies'-tresses
Salicaceae – Willow Family	
Populus balsamifera	balsam poplar
Populus tremuloides	aspen
Salix arbusculoides#	shrubby willow
Salix bebbiana#	beaked willow
Salix brachycarpa#	short-capsuled willow
Salix candida	hoary willow
Salix exigua	sandbar willow
Salix glauca#	smooth willow
Salix lucida#	shining willow
Salix lutea#	yellow willow
Salix myrtillifolia	Myrtle-leaved willow
Salix pedicellaris	bog willow

Scientific Name	Common Name
Salix petiolaris	basket willow
Salix planifolia	flat-leaved willow
Salix pseudomonticola	false Mountain willow
Salix scouleriana#	Scouler's willow

Betulaceae – Birch Family	
Alnus crispa	green alder
Alnus tenuifolia	river alder
Betula neoalaskana	Alaska birch
Betula papyrifera	white birch
Betula pumila	dwarf birch
Betula X uliginosa#	dwarf birch hybrid

Urticaceae – Nettle Family	
Urtica dioica	common nettle

Santalaceae – Sandalwood Family	
Geocaulon lividum	northern bastard toadflax

Polygonaceae – Buckwheat Family	
Polygonum amphibium#	water smartweed
Polygonum coccineum	water smartweed
Polygonum douglasii#	Douglas knotweed
Polygonum lapathifolium#	pale persicaria
Rumex occidentalis#	western dock
Rumex triangulivalvis#	narrow-leaved dock

Chenopodiaceae – Goosefoot Family	
Chenopodium album	lamb's-quarters
Chenopodium gigantospermum#	maple-leaved goosefoot

Caryophyllaceae – Pink Family	
Cerastium arvense	field mouse-ear chickweed
Moehringia lateriflora	blunt-leaved sandwort
Silene antirrhina# [PP: Acc. No. 4479; CAFB: Acc. No. 980418]	sleepy catchfly
Stellaria longifolia	Long-leaved chickweed

Scientific Name	Common Name
Nymphaeaceae – Water-Lily Family	
Nuphar lutea ssp *variegata* (*N. variegatum*)	yellow pond-lily
Nymphaea tetragona# [PP: Acc. No. 4889; CAFB: Acc. No. 980395]	white water-lily
Ceratophyllaceae – Hornwort Family	
Ceratophyllum demersum#	hornwort
Ranunculaceae – Crowfoot Family	
Actaea rubra	red and white baneberry
Anemone canadensis	Canada anemone
Anemone multifida	cut-leaved anemone
Anemone patens	prairie crocus
Aquilegia brevistyla	blue columbine
Caltha natans	floating marsh-marigold
Ranunculus aquatilis#	large-leaved white water crowfoot
Ranunculus gmelinii	yellow water crowfoot
Ranunculus macounii#	Macoun's buttercup
Ranunculus pensylvanicus#	bristly buttercup
Ranunculus reptans#	creeping spearwort
Ranunculus sceleratus	celery-leaved buttercup
Thalictrum venulosum	veiny meadow rue
Fumariaceae – Fumitory Family	
Corydalis sempervirens	pink corydalis
Brassicaceae/Cruciferae – Mustard Family	
Arabis divaricarpa#	purple rock cress
Descurainia sophia	flixweed
Erysimum cheiranthoides	wormseed mustard
Rorippa palustris	marsh yellow cress
Droseraceae – Sundew Family	
Drosera rotundifolia	round-leaved sundew
Saxifragaceae – Saxifrage Family	
Heuchera richardsonii	Richardson's alumroot
Mitella nuda	bishop's-cap
Saxifraga tricuspidata	three-toothed saxifrage

Scientific Name	Common Name
Parnassiaceae – Grass-of-Parnassus Family	
Parnassia palustris	northern grass-of-parnassus
Grossulariaceae – Currant and Gooseberry Family	
Ribes hudsonianum	northern black currant
Ribes lacustre	bristly black currant
Ribes oxyacanthoides	northern gooseberry
Ribes triste	wild red currant
Rosaceae – Rose Family	
Amelanchier alnifolia	saskatoon
Fragaria virginiana	wild strawberry
Geum aleppicum	yellow avens
Geum macrophyllum	large-leaved yellow avens
Geum triflorum	three-flowered avens
Potentilla anserina	silverweed
Potentilla arguta	white cinquefoil
Potentilla bipinnatifida#	plains cinquefoil
Potentilla fruticosa	shrubby cinquefoil
Potentilla hookeriana# [PP: Acc. No. 4474; CAFB: Acc. No. 980422]	Hooker's cinquefoil
Potentilla norvegica	rough cinquefoil
Potentilla palustris	marsh cinquefoil
Potentilla tridentata	three-toothed cinquefoil
Prunus pensylvanica	pin cherry
Rosa acicularis	prickly rose
Rubus arcticus#	dwarf raspberry
Rubus chamaemorus	cloudberry
Rubus idaeus	wild red raspberry
Rubus pubescens	dewberry
Fabaceae/Leguminosae – Pea Family	
Astragalus alpinus	alpine milk vetch
Astragalus americanus	American milk vetch
Hedysarum alpinum	alpine hedysarum
Lathyrus ochroleucus	cream-colored vetchling
Medicago sativa	alfalfa
Melilotus alba	white sweet-clover
Oxytropis splendens	showy Locoweed
Vicia americana	wild vetch

Scientific Name	Common Name
Geraniaceae – Geranium Family	
Geranium bicknellii	Bicknell's geranium
Callitrichaceae – Water-Starwort Family	
Callitriche verna#	vernal water-starwort
Empetraceae – Crowberry Family	
Empetrum nigrum	crowberry
Violaceae – Violet Family	
Viola adunca	early blue violet
Viola canadensis	western Canada violet
Viola renifolia	kidney-leaved violet
Elaeagnaceae – Oleaster Family	
Elaeagnus commutata	sliverberry
Shepherdia canadensis	Canada buffalo-berry
Onagraceae – Evening Primrose Family	
Epilobium angustifolium	common fireweed
Epilobium ciliatum#	northern willowherb
Epilobium palustre	marsh willowherb
Gentianaceae – Gentian Family	
Gentianella amarella	felwort
Haloragaceae – Water-Milfoil Family	
Myriophyllum exalbescens#	spiked water-milfoil
Hippuridaceae – Mare's-tail Family	
Hippuris vulgaris	common mare's-tail
Araliaceae – Ginseng Family	
Aralia nudicaulis	wild sarsaparilla
Apiaceae/Umbelliferae – Carrot Family	
Cicuta bulbifera	bulb-bearing water hemlock

Scientific Name	Common Name
Cicuta maculata	water hemlock
Cicuta virosa	narrow-leaved water hemlock
Sium suave	water parsnip

Cornaceae – Dogwood Family

Cornus canadensis	bunchberry
Cornus stolonifera	red osier dogwood

Pyrolaceae – Wintergreen Family

Moneses uniflora	one-flowered wintergreen
Orthilia secunda	one-sided wintergreen
Pyrola asarifolia	common pink wintergreen
Pyrola chlorantha	greenish-flowered wintergreen

Monotropaceae – Indian-pipe Family

Monotropa uniflora	indian pipe

Ericaceae – Heath Family

Andromeda polifolia#	bog rosemary
Arctostaphylos rubra	alpine bearberry
Arctostaphylos uva-ursi	common bearberry
Chamaedaphne calyculata	leatherleaf
Kalmia polifolia#	northern laurel
Ledum groenlandicum	common Labrador tea
Oxycoccus microcarpus	small bog cranberry
Vaccinium myrtilloides	common blueberry
Vaccinium vitis-idaea	bog cranberry

Primulaceae – Primrose Family

Androsace septentrionalis	northern fairy candelabra
Dodecatheon pulchellum	saline shooting star
Glaux maritima#	sea milkwort
Lysimachia thyrsiflora	tufted loosestrife

Menyanthaceae – Buck-Bean Family

Menyanthes trifoliata	buck bean

Apocynaceae – Dogbane Family

Apocynum androsaemifolium	spreading dogbane

Scientific Name	Common Name
Polemoniaceae – Phlox Family	
Collomia linearis	narrow-leaved collomia
Hydrophyllaceae – Waterleaf Family	
Phacelia franklinii#	Franklin's scorpionweed
Boraginaceae – Borage Family	
Mertensia paniculata	tall lungwort
Lamiaceae/Labiatae – Mint Family	
Dracocephalum parviflorum#	American dragonhead
Lycopus uniflorus#	northern water-horehound
Mentha arvensis	wild Mint
Physostegia ledinghamii# [CAFB: Acc. No. 980428]	false dragonhead
Scutellaria galericulata	marsh skullcap
Stachys palustris	marsh hedge-nettle
Scrophulariaceae – Figwort Family	
Castilleja raupii	purple paintbrush
*Mimulus ringens#** [PP: Acc. No. 4899; ALTA: Acc. No. 109938, 109937; CAFB: Acc. No. 980375]	square-stemmed monkeyflower
Orthocarpus luteus	owl-clover
Veronica scutellata#	marsh speedwell
Lentibulariaceae	**Bladderwort Family**
Utricularia intermedia#	flat-leaved bladderwort
Utricularia minor	small bladderwort
Utricularia vulgaris#	common bladderwort
Plantaginaceae – Plantain Family	
Plantago elongata#	linear-leaved plantain
Plantago major#	common plantain
Rubiaceae – Madder Family	
Galium boreale	northern bedstraw
Galium trifidum	small bedstraw
Galium triflorum	sweet-scented bedstraw

Scientific Name	Common Name
Caprifoliaceae – Honeysuckle Family	
Linnaea borealis	twin-flower
Lonicera dioica	twining honeysuckle
Symphoricarpos albus	snowberry
Symphoricarpos occidentalis	buckbrush
Viburnum edule	low-bush cranberry
Campanulaceae – Bluebell Family	
Campanula rotundifolia	harebell
Asteraceae/Compositae – Aster/Composite Family	
Achillea millefolium	common yarrow
Achillea sibirica	many-flowered yarrow
Antennaria neglecta#	broad-leaved everlasting
Antennaria parvifolia#	small-leaved everlasting
Antennaria rosea#	rosy everlasting
Arnica chamissonis	leafy arnica
Arnica lonchophylla#	spear-leaved arnica
Artemisia biennis	biennial sagewort
Artemisia campestris	plains wormwood
Artemisia frigida	pasture sagewort
Aster borealis#	marsh aster
Aster ciliolatus	Lindely's aster
Aster conspicuus	showy aster
Aster ericoides#	tufted white prairie aster
Aster falcatus#	creeping white prairie aster
Aster cf. *hesperius#*	western willow aster
Aster puniceus	purple-stemmed aster
Bidens cernua#	nodding beggarticks
Crepis tectorum	annual hawk's-beard
Erigeron acris#	northern daisy fleabane
Erigeron annuus#	whitetop
Erigeron lonchophyllus#	hirsute fleabane
Hieracium umbellatum	narrow-leaved hawkweed
Petasites palmatus	palmate-leaved coltsfoot
Petasites sagittatus	arrow-leaved coltsfoot
Petasites vitifolius	vine-leaved coltsfoot
Senecio congestus	marsh ragwort
Senecio pauperculus#	balsam groundsel
Solidago canadensis#	Canada goldenrod
Solidago multiradiata	alpine goldenrod
Solidago spathulata	mountain goldenrod
Taraxacum officinale#	common dandelion

APENDIX 3 − List of tracked vascular plants with one or more occurrences mapped within 2.5 km of the Kazan Uplands and Peace River Lowlands Natural Subregions (ANHIC 2001).

Element Scientific Name	Common Name	S and G Ranks*	Habitat as described in Moss (1983)	Detailed habitat description from ANHIC files**
Artemisia tilesii	Herriot's sagewort	S2 G5	open woods, river flats	narrow dry channel, in deep shade of willows; disturbed soil of railway embankment; top of bank; denuded slope of valley; actively eroding, steep, W-facing slope; along riverbank, with *Alnus tenuifolia* and *Salix exigua*; along riverbank among *Rosa acicularis* and *Cornus stolonifera*; along roadside in poplar bushes; dry bluff; cleared grassy ground, with *Artemisia absinthium* and *A. ludoviciana*; clay banks
Barbarea orthoceras	American winter cress	S2 G5	stream banks, moist woods	moist depressions and seepages in meadows and woods (poplar, pine dominated); gravel bars on river sides; wet edges of lakes, creeks, streams and beaver ponds; sandy lake beaches
Botrychium multifidum var. *intermedium*	leather grape fern	S2 G5T4?	moist, sandy areas	low-lying forest close to lake shore; open shrub thicket and forb meadow; dry upland *Populus balsamifera* forest; native prairie; *Populus tremuloides* woods; sandy thickets; *Carex – Poa* meadow on coarse sands; dry sandy ground in *Pinus banksiana* woods; along trails at edge of *Picea glauca – Populus tremuloides* stand and through grassy openings; willowy pool in sand dunes; moist edge of *Abies lasiocarpa – Picea engelmannii* stand
Cardamine pratensis	meadow bitter cress	S1S2 G5	moist meadows	low, wet depression in conifer woods; *Larix laricina* wetland; springy places; sheltered bay with *Equisetum fluviatile*; wobbly seepage area on lake shore; peat area
Carex capitata	capitate sedge	S2 G5	boggy, often calcareous areas	calcareous fens; willow-sedge wetlands; sloping river banks; alpine tundra and hillsides; dry *Picea mariana, Picea mariana – Pinus contorta* and *Pinus contorta* dominated forests (often on sandy grounds); in crevices of rock outcrops
Carex heleonastes	Hudson Bay sedge	S2 G4	bogs and marshes, often calcareous	shallow marsh water; fen; patterned fen; open bog; *Picea mariana* / *Ledum groenlandicum – Sphagnum* bog; *Menyanthes trifoliata – Carex* community; *Betula – Kalmia polifolia – Carex* fen; *Picea engelmannii* / *Salix* forest; valley wetland; willow meadow along creek
Carex houghtoniana	sand sedge	S2 G5	dry, sandy, or gravelly places	dry muskeg, stripped woods, gravelly; coal spoils; abandoned strip-mined land; sandhills; bare slump slope; dry, rocky clearing by edge of woods; on slope of existing reclaimed pipeline corridor seeded with introduced grasses and *Astragalus cicer*; disturbed area along airstrip; open slope in dry sandy aspen stand; moist sandy ground on burned site; reseeded right-of-way through mature subhygric *Pinus contorta – Picea mariana* forest
Carex lenticularis var. *dolia*	lens-fruited sedge	S1 G5T3Q	clay-gravel shores of mountain lakes (includes *C. enanderi*)	sandy shorelines; dry alpine and subalpine slopes and screes; swamps

Element Scientific Name	Common Name	S and G Ranks*	Habitat as described in Moss (1983)	Detailed habitat description from ANHIC files**
Carex oligosperma	few-fruited sedge	S1 G4	wet meadows and bogs	sedge-fens; *Picea mariana* wetlands; channel fens enclosed in parabolic dune, and sedge meadow; heath-lichen areas
Carex retrorsa	turned sedge	S2 G5	swampy woods, wet meadows	river shore; low open ground along the river; low, wet, sandy open ground; shallow backwater; willow/sedge habitat; roadside ditch; wooded ravine, in poorly drained soil along stream; clay-silt bank of creek; in 2-3" of water in slough, among tall grasses (e.g. *Beckmannia syzigachne*); road ditch, in 6" water; slough margin; moist soil; lagoon (pool), now dry; low place in virgin spruce-poplar woods; swampy woods and wet meadows, wet ditch or stream margin; riparian site - some *Populus balsamifera* and *Salix bebbiana*, but primarily sedge/grass community on banks (*Scirpus microcarpus, Carex atherodes, Ranunculus gmelinii, Cicuta maculata, Glyceria grandis*, *Beckmannia syzigachne*); marsh area; with *Carex* spp., *Typha latifolia* and *Lemna minor*
Carex supina	weak sedge	S1 G5	[not included]	steep, dry, southerly facing slope
Erigeron hyssopifolius	wild daisy fleabane	S1 G5	banks, ledges, shores	burnt over muskeg
Gymnocarpium jessoense	northern oak fern	S1 G5	rock crevices	shaded cliff overhanging lake
Hypericum majus	large Canada St. John's-wort	S2 G5	shores and marshes	moist depressions in sand dunes; drying lake beds and beaver ponds; wet shores of lakes and sinkholes; sandy lakeshores with beach cobbles; *Eleocharis* wetland
Isoetes echinospora	northern quillwort	S1 G5?	ponds and lakes	shallow water near lake shores, on sandy bottom
Juncus brevicaudatus	short-tail rush	S2 G5	shores and marshes	wet roadside ditches; margins of open pools and ponds; on sandy lakeshores; in dune slacks
Juncus filiformis	thread rush	S2S3 G5	bogs and marshes	emergent vegetation at river and lake margins; roadside ditches on gravelly or till substrates; bogs and marshes; cutlines through *Populus tremuloides – Picea glauca – Pinus contorta* and *Picea mariana – Cladina* – feather moss stands; sink holes and small woodland pools; shrubby rich fen
Leymus (Elymus) mollis	American dune grass	S1 G5	sand-dunes	sandy lake beaches
Lomatogonium rotatum	marsh felwort	S2 G5	saline flats, wet meadows	wet meadow; brackish marsh; boggy ground in river valley; low, wet, calcareous area near tote road; low, moist and open area, with *Juncus* sp., hairgrass, sedges, gentians, wheat grasses; grassy depression on edge of a temporary slough; along rail line; birch musky; alkali flat
Luzula groenlandica	wood-rush	S1 G4	[not included]	moist crevices on rocky shores
Physostegia ledinghamii	false dragonhead	S2 G3?	[not included]	wet meadow marsh in riparian zone; transition between wet meadow and drier Precambrian outcrop; pond, slough and ditch margins; river flats; (habitats often subject to intermittent flooding)

Element Scientific Name	Common Name	S and G Ranks*	Habitat as described in Moss (1983)	Detailed habitat description from ANHIC files**
Pinguicula villosa	small butterwort	S1 G4	sphagnum bogs	*Picea mariana* / *Sphagnum* bog, on *Sphagnum fuscum* hummocks
Polypodium sibiricum (misidentified/reported in the past as *Polypodium virginianum*)	rock polypody	S2? G5	moist rocky outcrops	mossy areas along exposed rock cliffs; crevices of rocky hillsides; moist crevices in granitic rock outcrop; moss meadow; *Pinus banksiana – Betula neoalaskana* forest; *Picea mariana – Pinus* spp. area; rocky ledges of island
Potamogeton natans	floating-leaf pondweed	S2 G5	no specific habitat info	lakes**;** ponds; rivers; oxbow along river; watercourse in *Picea – Pinus contorta* forest; (often associated with other *Potamogeton* spp.)
Potamogeton robbinsii	Robbins' pondweed	S1 G5	no specific habitat info	lakes; slow moving water of sandy-bottomed river; (found in shallow waters)
Potentilla hookeriana	Hooker's cinquefoil	S2 G4	dry rocky slopes	open ground among scattered pines; cliff face near lake; shaded rocky mountain slope; rocky bank and rocky limestone slope; dry *Pseudotsuga* woodland; xerophytic mountain grassland; steep, S-facing slope, stabilized rock slide area; dry, rocky slope; rock crevices on river bank; dry, sparsely vegetated soil around margins of limestone outcroppings in *Pseudotsuga – Pinus* forest; dry grassland on airstrip; in montane community with *Dryas integrifolia*, *Polygonum viviparum* and *Oxytropis cusickii*
Potentilla multifida	branched cinquefoil	S1 G5	gravel bars and open slopes	rock outcrops; till plain dry open meadow; *Pinus banksiana* forest
Pyrola grandiflora	Arctic wintergreen	S2 G5	Slopes, tundra	flat to south-facing meadows with occasional scattered conifers; deep moss in spruce forest on south slop; moist mossy layer at edge of spruce wood; *Picea* and *Populus* forest with *Salix* in openings and on river bank; under spruce on creek bank; foot of steep slope; dry, windward slope in alpine zone; alpine meadow; exposed area in mossy open alpine spruce; heathy area; upper slopes in pass; alpine habitats: *Dryas integrifolia* stone stripe and alpine meadow; valley bottom; sedge-*Sphagnum* meadow; all-aged subalpine forest; dryish tops and sides of rolling ridge; *Dryas octopetala* tundra with stone nets; hill covered with *Picea, Populus* and *Betula*; on edge of bush near *Salix* swamp
Sagina nodosa	pearlwort	S1 G5	moist gravel	sandy lakeshore
Silene antirrhina	sleepy catchfly	SE? G5	dry open areas	steep grassy, S-facing slope, gravelly eroding till; exposed dry slope of Precambrian outcrop; steep bank along lake shore

Element Scientific Name	Common Name	S and G Ranks*	Habitat as described in Moss (1983)	Detailed habitat description from ANHIC files**
Sisyrinchium septentrionale	pale blue-eyed grass	S2S3 G3G4	moist grassy areas	sparsely vegetated, eroded depressional site on clay soil; on the edge of depressional wetland; dry sandy soil in open *Pinus flexilis* forest; grassy calcareous flat; dry sandy soil in open *Populus tremuloides – Picea glauca* – (few) *Pinus contorta* / *Shepherdia canadensis – Juniperus communis* forest; transition area between riparian area and slopes and occasional upland sites; grassy flat by roadside; large sand pit; stony lake shore; *Symphoricarpos occidentalis – Artemisia* sp. shrubland; dry to moist prairie grasslands, sometimes disturbed
Sparganium fluctuans	bur-reed	S1 G5	lakes and streams	no detailed habitat info
Spergularia salina	salt-marsh sand spurry	S2 G5	saline areas	xeric tufa dune, salt spring with *Arabidopsis salsuginea* and *Aster ericoides*; roadside, sand flat, sandy outwash; saline springs; saline depression; growing with *Plantago elongata, Navarretia minima, Carex athrostachya, Alopecurus carolinianus*, *Polygonum watsonii* and *Veronica persica*; edge of lake, on somewhat saline soil; low meadows; muck of creek bed; edge of mud flats adjacent to sulphur spring, with *Salicornia europaea*; sandy to muddy alkali shore of hypersaline lake; successive bands of halophytic vegetation along shore of hypersaline (unvegetated) ponds
Spiranthes lacera	northern slender ladies'-tresses	S1 G5	[not included]	small disturbed zone within moist *Populus tremuloides - Picea* woods
Tanacetum (huronense) bipinnatum ssp. *huronense*	Indian tansy	S1 G4G5Q	shores, sand dunes, gravel bars	sand dunes; dry areas on sandy lakeshores
Utricularia cornuta	horned bladderwort	S1 G5	bogs, muddy shores	in water near lakeshore; with *Veronica* sp., *Stellaria* sp. and *Drosera* sp. in parabolic sand dune system
Vaccinium uliginosum	bog bilberry	S2 G5	alpine slopes	muskeg in *Populus tremuloides* woods; open *Picea mariana* / *Sphagnum* bog; burned-over bog; boggy *Betula pumila* – feather moss community; rock outcrop; quartzite terrace on mountain top and quartzite lateral moraine; perched bog in permafrost in subarctic woodland; *Picea mariana* / lichen forest; in *Abies bifolia –Picea engelmannii* forest; wet *Picea – Salix* community; *Dryas octopetala* tundra

* – GRank and SRank at the time of original data query [for detailed explanation of S and G ranks and for more complete list of codes, please see Appendix 4];

** – Habitat description is presented in its more or less original form, and the authors have limited control over the terminology used and over the quality of the information contained in ANHIC files. Reports on rare taxa from highly unlikely habitats that are not supported by a specimen are taken with caution, so this kind of information is not included in this table;

BOLD – indicates species found in LBCW in 2001.

APPENDIX 4 – An explanation of sub-national/provincial (S) and global (G) ranks.

[modified from Vujnovic and Gould 2002 - on-line edition of a complete document available at: http://www.cd.gov.ab.ca/preserving/parks/anhic/index.asp**]**

Elements are evaluated and ranked on their status (globally and state/provincially) using a system developed by NatureServe which is in use throughout North America. Ranking is usually based primarily on the number of occurrences*, since that is frequently the only information available. Information, such as population size and trend, life history and reproductive strategies, range and current threats is used when available. The ranks in Alberta are defined as:

RANK (G=global; S=Alberta)

G1	S1:	≤ 5 occurrences or only a few remaining individuals.
G2	S2:	6-20 occurrences or with many individuals in fewer occurrences.
G3	S3:	21-100 occurrences may be rare and local throughout its range, or in a restricted range (may be abundant in some locations or may be vulnerable to extirpation because of some factor of its biology).
G4	S4:	apparently secure under present conditions, typically >100 occurrences but may be fewer with many large populations; may be rare in parts of its range, especially peripherally.
G5	S5:	demonstrably secure under present conditions, > 100 occurrences, may be rare in parts of its range, especially peripherally.
GU	SU:	status uncertain often because of low search effort or cryptic nature of the element; possibly in peril, unrankable, more information needed.
GH	SH:	historically known, may be relocated in the future.

Other codes include:

R**	reported but lacking sufficient documentation to accept or reject
Q	taxonomic questions or problems
T_	rank for a subspecific taxon
G? or S?	not yet ranked
_?	rank questionable

*Occurrence: The definition of what constitutes an occurrence is specified in an Element Occurrence Specifications record and may vary from element to element but generally constitutes an area occupied by the element. Element Occurrence Specifications may specify minimum separation distances between locations of the element before they can be considered as separate occurrences.

**caution should be taken in interpreting SR ranks from jurisdictions other than Alberta; NatureServe 2003 often included not-yet-ranked taxa in this category.

APPENDIX 5 − Rare Native Plant Report Form.

RARE NATIVE PLANT REPORT FORM

Please enter all information available to you and attach a detailed sketch or map showing the location of the population.

SCIENTIFIC NAME: _____

COMMON NAME: _____

OBSERVER NAME, ADDRESS AND TELEPHONE NUMBER: _____

_____

_____

_____

OBSERVATION DATE(S): _____

PHOTOGRAPH TAKEN: Y / N

SPECIMEN COLLECTED: Y / N **COLLECTION NUMBER**:_____

IF YES, NAME HERBARIUM WHERE DEPOSITED: _____

LOCATION INFORMATION:

SITE NAME: _____

_____

TOPOGRAPHIC MAP NUMBER: _____

DIRECTIONS TO POPULATION (*include descriptions of landmarks and distances if possible*):

_____

_____

_____

ELEVATION (*Please do not use elevation from GPS unit*): _____ ft/m (*circle one*)

(*Complete one of the following and accompany with map or sketch*)

UTM EASTING: _____ UTM NORTHING: _____ GRID ZONE: _____

NORTH AMERICAN DATUM: 27 / 83 (*circle one*)

LEGAL: TWP: _____ RGE: _____ W: _____ M SECTION: _____LSD: _____

LATITUDE: _____ LONGITUDE: _____

Was the location determined using a GPS? Y / N

POPULATION INFORMATION (*include information on extent in cm^2/m^2 (circle one), number of individuals*):

_____

_____

_____

PHENOLOGY (*based on average development phase of population--see over*):

____ vegetative; _____ reproductive (*E.G. V6. R7 for a species with leaves fully unfolded and in full bloom*)

_____

_____

SITE/HABITAT DESCRIPTION *(include information on habitat [alpine, aquatic, cliff, forest, grassland, peatland], plant communities / dominant species / associated species / other rare species / substrate / soils / phenology of dominant species):*

_____

_____

_____

ASPECT: _____ SLOPE: _____ MOISTURE: _____

OWNERSHIP (*if known. Include name/address/phone number*): _____

_____

_____

CURRENT LAND USE: _____

_____

_____

HABITAT THREATS/MANAGEMENT CONCERNS: _____

_____

_____

_____

Return to: *Alberta Natural Heritage Information Centre, 2nd Floor, 9820 106 Street, Edmonton, AB T5K 2J6 (780) 427-5209. Thank You.*

Phenology Codes (after Dierschke, 1972)

VEGETATIVE		*REPRODUCTIVE*
Deciduous Tree or Shrub	*Conifer*	
0 Closed Bud	0 Closed Bud	0 Without blossom buds
1 Buds with green tips	1 Swollen bud	1 Blossom buds recognizable
2 Green leaf out but not unfolded	2 Split bud	2 Blossom buds strongly swollen
3 Leaf unfolding up to 25%	3 Shoot capped	3 Shortly before flowering
4 Leaf unfolding up to 50%	4 Shoot elongate	4 Beginning flowering
5 Leaf unfolding up to 75%	5 Shoot full length, lighter green	5 In bloom up to 25%
6 Full leaf unfolding	6 Shoot mature, equally green	6 In bloom up to 50%
7 First leaves turned yellow		7 Full bloom
8 Leaf yellowing up to 50%		8 Fading
9 Leaf yellowing over 50%		9 Completely faded
10 Bare		10 Bearing green fruit
		11 Bearing ripe fruit
		12 Bearing overripe fruit
		13 Fruit or seed dispersal
Herbs		
0 Without shoots above ground		0 Without blossom buds
1 Shoots without unfolded leaves		1 Blossom buds recognizable
2 First leaf unfolds		2 Blossom buds strongly swollen
3 2 or 3 leaves unfolded		3 Shortly before flowering
4 Several leaves unfolded		4 Beginning bloom
5 Almost all leaves unfolded		5 Up to 25% in blossom
6 Plant fully developed		6 Up to 50% in blossom
7 Stem and/or first leaves fading		7 Full bloom
8 Yellowing up to 50%		8 Fading
9 Yellowing over 50%		9 Completely faded
10 Dead		10 Bearing green fruit
		11 Bearing ripe fruit
		12 Bearing overripe fruit
		13 Fruit or seed dispersal
Grasses		
0 Without shoots above ground		0 Without recognizable inflorescence
1 Shoots without unfolded leaves		1 Inflorescence recognizable, closed
2 First leaf unfolded		2 Inflorescence partly visible
3 2 or 3 leaves unfolded		3 Inflorescence fully visible, not unfolded
4 Beginning development of blades of grass		4 Inflorescence unfolded
5 Blades partly formed		5 First blooms pollenizing
6 Plant fully developed		6 Up to 50% pollenized
7 Blades and/or first leaves turning yellow		7 Full bloom
8 Yellowing up to 50%		8 Fading
9 Yellowing over 50%		9 Fully faded
10 Dead		10 Bearing fruit
		11 Fruit or seed dispersal
Ferns		
0 Without shoots above ground		0 sori absent
1 Rolled fronds above ground		1 sori green, forming
2 First frond unfolds		2 sori mature, darker, drier
3 2 or 3 fronds unfold		3 sori depressing, strobili forming in lycopodium
4 Several fronds unfolded		
5 Almost all fronds unfolded		
6 Plant fully developed		
7 First fronds fading		
8 Yellowing up to 50%		
9 Yellowing over 50%		
10 Dead