

# NEW RARE VASCULAR PLANTS FOR REDBERRY LAKE BIOSPHERE RESERVE

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## Introduction

Considering the challenges of managing rare plants, it is important that land managers rely on accurate data to make management decisions.<sup>1</sup> Different types of red lists have been curated to rank plants based on the type of rarity and the threats to those species within specific geographic areas. Rare species have been ranked at different spatial scales: globally, nationally, and regionally.<sup>2,3,4</sup> These lists can then be used to develop databases with the occurrence of rare plants to inform conservation planning.

Redberry Lake Biosphere Reserve (RLBR) was designated by UNESCO in 2000 as the only protected area of this type in Saskatchewan.<sup>5</sup> Unfortunately, basic knowledge of the flora and its distribution in the biosphere reserve remains incomplete.<sup>6</sup> The results of a recent study of rare vascular plants of RLBR have substantially enlarged the number of species and their occurrences. In total, 10 out of 18 rare plants were identified as new for the biosphere reserve.<sup>7</sup> This highlights the continued importance of exploration and floristic research for biodiversity conservation, especially in the remote and understudied areas of the biosphere reserve.

The territory of RLBR (lately the word “reserve” in the name of the organization was replaced with the “region”) was recently substantially enlarged (from 112,200 ha to around 707,450 ha) with addition of new areas in the Boreal Transition and Aspen Parkland ecoregions.<sup>5</sup> This study documents rare vascular plants of newly acquired areas of RLBR for which no floristic survey has yet been completed. This contribution aims to

support ongoing floristic inventory in the biosphere region by providing a complete list of rare vascular plants recorded on its territory.

## Methods

For a detailed description of the study area, as well as methods used for collecting data and quality assurance processes, and analyzing and mapping species distribution, please see my previous paper on rare vascular plants of Redberry Lake Biosphere Reserve.<sup>7</sup>

Key methodological points are provided below. Data on rare plants (local distribution, population features, and threats to survival) were collected during the field surveys conducted in 2021-22. All locations were georeferenced using a GPS unit Garmin Oregon 650t. Additional information on occurrences of rare plants was obtained through the Saskatchewan Conservation Data Centre (SKCDC)<sup>4</sup> and the HABISask database.<sup>8</sup>

Plants were identified *in situ* and a few photos for each species observed were taken. Herbarium vouchers of rare plants deposited at the W.P. Fraser Herbarium of the University of Saskatchewan (SASK)<sup>9</sup> were examined. Data relating to the geographical distribution and origin of the study plant species come from the following databases – the Virtual Herbarium of Plants at Risk in Saskatchewan at the W.P. Fraser Herbarium of the University of Saskatchewan (VHPRSK)<sup>10</sup> and Plants of the World Online (POWO).<sup>11</sup>

The nomenclature of the taxa follows the Database of Vascular Plants of Canada or VASCAN.<sup>12</sup> The species conservation ranks are given according to the NatureServe<sup>13</sup> and IUCN<sup>14</sup> categories as well as listing by SKCDC.<sup>4</sup>

## Results and Discussion

In addition to 18 vascular plants identified in the Redberry Lake Biosphere Reserve as being at risk at the global,

national, and subnational levels<sup>7</sup>, nine new rare plant species were recognized in the recently acquired areas of the biosphere region. Thus, the total list of rare vascular plants of RLBR include 27 taxa (Table 1). As mentioned earlier,<sup>7</sup> occurrence of *Lemna minor* L. previously reported from the region was not confirmed and as such this species is not included in the list.

Among 27 rare plants for the biosphere region, four species were listed based on the information retrieved from SKCDC<sup>4</sup> and the HABISask database.<sup>8</sup> Further field surveys are required to confirm the presence of these rare plants in the flora of RLBR, since some of them were recorded around 70 years ago or their occurrence data are missing (Table 1). Below is a short characterization of the newly identified rare vascular plants following the format used in my previous paper.<sup>7</sup>

### Asteraceae –

#### Aster (sunflower) family

*Nothocalais cuspidata* (Pursh) Greene (= *Agoseris cuspidata* (Pursh) Raf., *Microseris cuspidata* (Pursh) Sch.Bip.) – prairie false-dandelion

**Habit:** perennial plant to 30 cm in height with a rosette of linear leaves and a long flower stalk bearing a single flower head. Stems are sparingly hairy, woolly near the top. Leaves folded inwards, often crisped, having woolly margins, and a few hairs along leaf top and bottom. Flower heads bright yellow, consisting of all ray florets, with no disk florets. The ray florets have 5 teeth at the tip. Bracts overlap like shingles, in two series.

**Range:** from W. Central & Central Canada to W. Central & Central United States.

**Distribution in SK:** Mixed Grassland, Moist Mixed Grassland, Aspen Parkland. RLBR – may occur in the area (SKCDC<sup>4</sup>; HABISask<sup>8</sup>).

**Habitat:** dry, rock prairie bluffs and gravelly hillsides.

**Conservation Status:** S3 N3 G4.

**TABLE 1. Taxonomic and conservation status of rare vascular plants of Redberry Lake Biosphere Region.**

TAXA	SYNONYM	COMMON NAME	CONSERVATION RANK			YEAR LAST OBSERVED
			GLOBAL	NATIONAL	SUBNATIONAL	
<b>Amaranthaceae</b>						
<i>Corispermum pallasii</i> Steven	<i>C. hyssopifolium</i> var. <i>leptopterum</i> Ascherson	Pallas' bugseed	G4?	N4	<b>S2</b>	2022
<i>C. americanum</i> (Nutt.) Nutt. var. <i>americanum</i>	<i>C. hyssopifolium</i> var. <i>americanum</i> Nutt.	American bugseed	G5?T5?	N3N4	<b>S3</b>	2022
<b>Asteraceae</b>						
<i>Almutaster pauciflorus</i> (Nutt.) Á.Löve & D.Löve	<i>Aster pauciflorus</i> Nutt.	alkali marsh aster	G4	<b>N3N4</b>	<b>S3</b>	2022
<i>Bidens frondosa</i> L.		devil's beggarticks	G5	N5	<b>S3</b>	2021
<i>Nothocalais cuspidata</i> (Pursh) Greene	<i>Agoseris cuspidata</i> (Pursh) Raf., <i>Microseris cuspidata</i> (Pursh) Sch. Bip.	prairie false-dandelion	G5	<b>N3</b>	<b>S3</b>	absent data**
<b>Cyperaceae</b>						
<i>Amphiscirpus nevadensis</i> (S. Watson) Oteng-Yeboah	<i>Scirpus nevadensis</i> S.Watson	Nevada bulrush	G4	N4	<b>S3</b>	2021
<b>Fabaceae</b>						
<i>Astragalus australis</i> var. <i>glabriusculus</i> (Hooker) Isely	<i>A. aboriginorum</i> Richardson, <i>A. richardsonii</i> E.Sheldon	aboriginal milk-vetch	G5TNR	NNR	<b>S3</b>	1952**
<b>Gentianaceae</b>						
<i>Gentianopsis virgata</i> subsp. <i>macounii</i> (Holm) J.S.Pringle	<i>Gentiana macounii</i> (Holm) Ilitis	Macoun's fringed gentian	G5	N4N5	<b>S3</b>	2022
<i>Lomatogonium rotatum</i> var. <i>fontanum</i> (A. Nelson) J.S.Pringle		marsh felwort	G5TNR	NNR	<b>S3</b>	2022
<b>Hydrocharitaceae</b>						
<i>Elodea canadensis</i> Michaux		Canada waterweed	G5	N5	<b>S3</b>	2021
<i>Najas flexilis</i> (Willd.) Rostkovius & W.L.E.Schmidt		slender naiad	G5	N5	<b>S3</b>	2021
<b>Lentibulariaceae</b>						
<i>Pinguicula vulgaris</i> L. subsp. <i>vulgaris</i>	<i>P. vulgaris</i> var. <i>americana</i> A.Gray	common butterwort	G5	N5	<b>S3</b>	2022
<b>Ophioglossaceae</b>						
<i>Botrychium campestre</i> W.H.Wagner & Farrar		prairie moonwort	<b>G3G4</b>	<b>N3</b>	<b>S3</b>	2022
<b>Orchidaceae</b>						
<i>Cypripedium parviflorum</i> var. <i>pubescens</i> (Willd.) Knight	<i>C. calceolus</i> var. <i>pubescens</i> (Willd.) Correll	large yellow lady's slipper	G5T5	N5	<b>S2</b>	2021
<i>C. parviflorum</i> var. <i>makasin</i> (Farwell) Sheviak	<i>C. pubescens</i> var. <i>makasin</i> Farwell	small yellow lady's slipper	G5T4T5	N4N5	<b>S3</b>	2022
<i>C. passerinum</i> Richardson*		sparrow's-egg lady's slipper	G5	N5	<b>S3</b>	2022
<i>Corallorhiza striata</i> Lindley var. <i>striata</i>		striped coral root	G5T5	N5	<b>S3</b>	2021
<i>Liparis loeselii</i> (L.) Rich.		yellow twayblade	G5	N4N5	<b>S3</b>	2022
<b>Poaceae</b>						
<i>Elymus lanceolatus</i> subsp. <i>psammophilus</i> (J.M.Gillett & H.Senn) Á.Löve	<i>Agropyron psammophilum</i> J.M.Gillett & H.Senn	sand-dune wheatgrass	G5T3	NNR	<b>S2</b>	2022
<i>Danthonia californica</i> Bolander	<i>D. californica</i> var. <i>americana</i> (Scribner) Hitchcock	California oatgrass	G5	N5	<b>S3</b>	absent data**
<i>Festuca hallii</i> (Vasey) Piper	<i>F. altaica</i> var. <i>hallii</i> (Vasey) Harms	plains rough fescue	G5	N5	<b>S3</b>	2022
<i>Piptatheropsis canadensis</i> (Poir.) Romasch., P.M.Peterson & Soreng	<i>Oryzopsis canadensis</i> (Poir.) Torr. ex A.Gray	Canada ricegrass	G4G5	N4N5	<b>S3</b>	1958**
<b>Rosaceae</b>						
<i>Potentilla hudsonii</i> Ertter		Hudson's cinquefoil	GNR	NNR	<b>S2</b>	2022
<i>P. rubricaulis</i> Lehm.	<i>P. modesta</i> Rydb.	red-stemmed cinquefoil	GNR	NNR	<b>S3</b>	2021
<b>Ruppiaceae</b>						
<i>Ruppia cirrhosa</i> (Petagna) Grande	<i>R. occidentalis</i> S. Watson	western ditch-grass	G5	N5	<b>S3</b>	2021
<b>Scrophulariaceae</b>						
<i>Pedicularis groenlandica</i> Retzius	<i>Elephantella groenlandica</i> (Retzius) Rydb.	elephant's-head lousewort	G5	N5	<b>S2</b>	2022
<b>Violaceae</b>						
<i>Viola pedatifida</i> G.Don		crowfoot violet	G5	N4	<b>S3</b>	2022

**Conservation ranks**

NatureServe/SKCDC:

- G1 (N1, S1) Critically Imperiled/Extremely rare. At very high risk of extinction or extirpation due to extreme rarity, very steep declines, high threat level, or other factors.
- G2 (N2, S2) Imperiled/Very rare. At high risk of extinction or extirpation due to a very restricted range, very few populations, steep declines, threats or other factors.
- G3 (N3, S3) Vulnerable/Rare to uncommon. At moderate risk of extinction or extirpation due to a restricted range, relatively few populations, recent and widespread declines, threats, or other factors.
- G4 (N4, S4) Uncommon but not rare; some cause for long-term concern due to declines or other factors.

\*IUCN:

VU Vulnerable.

\*\*HABISask and SKCDC data.

**Hydrocharitaceae –  
Frog-bit family**

*Elodea canadensis* Michaux – Canada waterweed

**Habit:** a perennial aquatic plant, or submergent macrophyte. Slender creeping or erect, rooted in substrate, 30–100 cm long, simple or abundantly branched. Lower leaves opposite or whorled, middle leaves in whorls of 3, spreading or recurved, linear to ovate, flat; terminal leaves crowded, flaccid, minutely serrate. Inflorescence solitary, sessile, dioecious. Flowers unisexual, usually projected to surface of water by elongate floral tube, sessile; corolla 3-merous white; staminate flowers several, pedicels long, perianth floating, sepals dark striate; pistillate flowers with a unilocular ovary, strap-shaped staminodia 3, styles 3, hypanthium elongate and filiform. The fruit is dry and splits open when ripe.

**Range:** the native range of this species is S. Canada to the United States. It is an invasive species in Europe, Asia, Africa, and Oceania.

**Distribution in SK:** Mixed Grassland, Moist Mixed Grassland, Aspen Parkland, Boreal Transition, Mid-Boreal Lowland, Mid-Boreal Upland, Churchill River Upland. RLBR – one location.

**Habitat:** ponds, ditches, streams, and lakes.

**Conservation Status:** S3 N5 G5.

*Najas flexilis* (Willd.) Rostkovius & W.L.E. Schmidt – slender naiad

**Habit:** it is an aquatic annual plant, 5–30 cm in height. Stems are densely tufted, branching, long, slender, anchored by roots. Leaves clustered at stem tips, 1–3 cm long, 0.2–0.8 mm wide, linear, apex attenuate, flaccid, pale green, margins minutely toothed. Staminate flowers with sepals connate into bilabiate tube, anthers 1 with 2 or 4 pollen sacs and enclosed in a membranous envelope; pistillate flowers sessile, with sepals absent, pistil single and 1-ovuled, stigmas 2–4. Fruits achenes olive-green to reddish; seeds 2.5–3 mm long, shiny, faintly reticulate.

**Range:** Temperate Northern Hemisphere. It is considered native throughout most of Canada, and the northern United States with disjunct populations in the southern states. RLBR – one location.

**Habitat:** shallow waters of ponds, protected lake bays, and quiet streams.

**Conservation Status:** S3 N5 G5.

**Lentibulariaceae –  
Bladderwort family**

*Pinguicula vulgaris* L. subsp. *vulgaris* (= *P. vulgaris* var. *americana* A. Gray) – common butterwort (Figure 1A)

**Habit:** small insectivorous plant with bright yellow-green leaves with rolled edges, leaves greasy to touch. The leaves are covered with small glands that trap small insects. Single bluish-purple flowers, nodding, with a 3-lobed lower lip, 2-lobed upper lip, and a white throat. Leaves all in a basal rosette, 2–5 cm long, 1–2 cm wide, oblanceolate to elliptic, yellowish-green, succulent, margin revolute. Fruits capsules erect, 4–6 mm long.

**Range:** the native range of this species is Europe to Siberia, Subarctic America to N. Central & NE United States.

**Distribution in SK:** . Aspen Parkland, Boreal Transition, Churchill River Upland, Athabasca Plain, Selwyn Lake Upland. RLBR – three locations.

**Habitat:** springy areas, marly fens, and northern lake shorelines.

**Conservation Status:** S3 N4 G5.

**Orchidaceae –  
Orchid family**

*Cypripedium passerinum* Richardson – sparrow's-egg lady's-slipper (Figure 1B)

**Habit:** it is a rhizomatous geophyte. Plants erect, up to 50 cm in height. Leaves 3–7, along length of stem, alternate, ascending to spreading; blade elliptic to elliptic-lanceolate or ovate-lanceolate. Flowers 1(–2); sepals white or green; petals spreading, white, oblong to linear-elliptic, flat; lip white, rarely pinkish, obovoid, 11–20 mm.

**Range:** Alaska to Canada, Montana.

**Distribution in SK:** Cypress Hills, Aspen Parkland, Boreal Transition, Mid-Boreal Lowland, Mid-Boreal Upland. RLBR – one location.

**Habitat:** moist forests, gravelly shores of lakes and rivers.

**Conservation Status:** S3 N5 G5; VU (this is the only rare plant in the RLBR designated by IUCN<sup>14</sup>).

**Poaceae (Gramineae) –  
Grass family**

*Elymus lanceolatus* subsp. *psammophilus* (J.M. Gillett & H. Senn) Á. Löve (= *Agropyron psammophilum* J. M. Gillett & H. Senn) – sand-dune wheatgrass (Figure 1C)

**Habit:** perennial grass from rhizomes; stems 20–75 cm tall, erect, the nodes exposed, smooth. Leaves 5–25 cm long, 1–4 mm wide, scabrous or pilose to glabrous, usually involute. Sheaths smooth; blades flat or in-rolled when dry, mostly basal; ligules 0.5 mm long, finely jagged-edged; ear-shaped lobes at the leaf-bases 0.5–1 mm long. Inflorescence a spike 4–10 cm long, erect; spikelets solitary at each node; glumes lanceolate, flat, tapered from middle to sharp point, 5–7 mm long, densely hairy; lemmas 8–11 mm long, densely hairy, tips sharply pointed; paleas keeled, with few to many hairs below, rough above; anthers 2.5–4 (5) mm long.

**Range:** the native range of this subspecies is Alaska through Canada to N. United States.

**Distribution in SK:** Moist Grassland, Moist Mixed Grassland, Aspen Parkland. RLBR – one location.

**Habitat:** sand dunes.

**Conservation Status:** S2 NNR G5T3.

**Rosaceae –  
Rose family**

*Potentilla hudsonii* Ertter – Hudson's cinquefoil (Figure 2A)

The species has recently been described<sup>15</sup> using herbarium vouchers collected near Mennon, Saskatchewan in 1969. Named for the late J.H. Hudson, a dedicated amateur botanist who contributed much to floristic studies in the province.

**Habit:** Plants gray-green to silvery-white, tufted. Caudex simple or few-branched, not sheathed with marcescent whole leaves. Stems ascending to nearly erect, (7–)10–30 cm long. Basal leaves usually both ternate and palmate on same plant, rarely subpalmate; long hairs abundant to dense, 1.5–2 mm long; leaflets 3–5, not to somewhat overlapping, central leaflet oblanceolate to elliptic, nearly all of margin incised ¾ or more to midvein, revolute, abaxial surface white, long hairs dense on veins, cottony-crisped hairs

dense, short hairs and glands absent or obscured, adaxial surface grayish green to grayish, long hairs common to dense, 1.5–2 mm long, usually stiff, short and/or crisped hairs common to abundant. Cauline leaves (1)2(3). Inflorescences (3)–8–20(–25)-flowered. Pedicels 0.2–0.7 cm long, proximal ones to 1.2(–1.5) cm long. Flowers cup-shaped at anthesis; hypanthium 2–4(–5) mm diam.; sepals 3–4.5(–5.5) mm long, apex ± acute, glands absent or obscured; petals canary yellow, ± ascending at anthesis, scarcely overlapping,

equalling or slightly longer than sepals. Achenes about 1.3 mm long, smooth or lightly veined.

**Range:** The native range of this species is Yukon to Montana. The core range is the prairies of Saskatchewan and Alberta.

**Distribution in SK:** Moist Mixed Grassland, Aspen Parkland, Boreal Transition. RLBR – two locations.

**Habitat:** open spots in grasslands, often in sandy and/or heavily grazed sites, as well as gravelly slopes and roadsides.

**Conservation Status:** S2 NNR GNR.

**Scrophulariaceae – Figwort family**

*Pedicularis groenlandica* Retzius (= *Elephantella groenlandica* (Retzius) Rydb.) – elephant's-head lousewort (Figure 2B)

**Habit:** Plants 10–60 cm. Leaves petiolate or the upper ones sessile, 5–20 cm long, outline lanceolate, glabrous, deeply pinnatifid, divisions narrow and toothed. Racemes simple, 1 or 2, exceeding basal leaves, each 20–75-flowered; bracts linear to trullate, 5–10 x 2–10 mm, undivided to pinnatifid, margins entire, serrate, or



**FIGURE 1.** Rare plants of Redberry Lake Biosphere Region (Photo V. Kricsfalusy): A – common butterwort (*Pinguicula vulgaris* subsp. *vulgaris*), B – sparrow's-egg lady's-slipper (*Cypripedium passerinum*), C – sand-dune wheatgrass (*Elymus lanceolatus* subsp. *psammophilus*).



**FIGURE 2.** Rare plants of Redberry Lake Biosphere Region (Photo V. Kricsfalusy): A – Hudson's cinquefoil (*Potentilla hudsonii*), B – elephant's-head lousewort (*Pedicularis groenlandica*), C – crowfoot violet (*Viola pedatifida*).

2-serrate, surfaces glabrous. Flower calyx 5-lobed; corolla reddish purple or pinkish, rarely white; beak curved outward and upward, galea resembling an elephant head, lower lip 3-lobed; stamens 4. Fruits are glabrous capsules, flattened, curved.

**Range:** Subarctic America to W. & W. Central United States.

**Distribution in SK:** Boreal Transition, Churchill River Upland, Tazin Lake Upland, Selwyn Lake Upland. RLBR – one location.

**Habitat:** open black and white spruce woods, forested swamps and treed bogs.

**Conservation Status:** Status: **S2** G5 N5.

**Violaceae – Violet family**

*Viola pedatifida* G. Don – crowfoot violet (Figure 2C)

**Habit:** perennial plant with leafless flowering stems, 5–30 cm in height. The basal leaves, 2–11, ascending to erect, having blades deeply cleft, surfaces pubescent, hairs sometimes concentrated on veins. Flowers solitary, on leafless stalks, are purple-blue with a white throat, lateral petals heavily bearded. Flower measured to 18 mm diameter. Sepals lanceolate to ovate, margins ciliate or eciliate, auricles 1–2 mm; petals light to

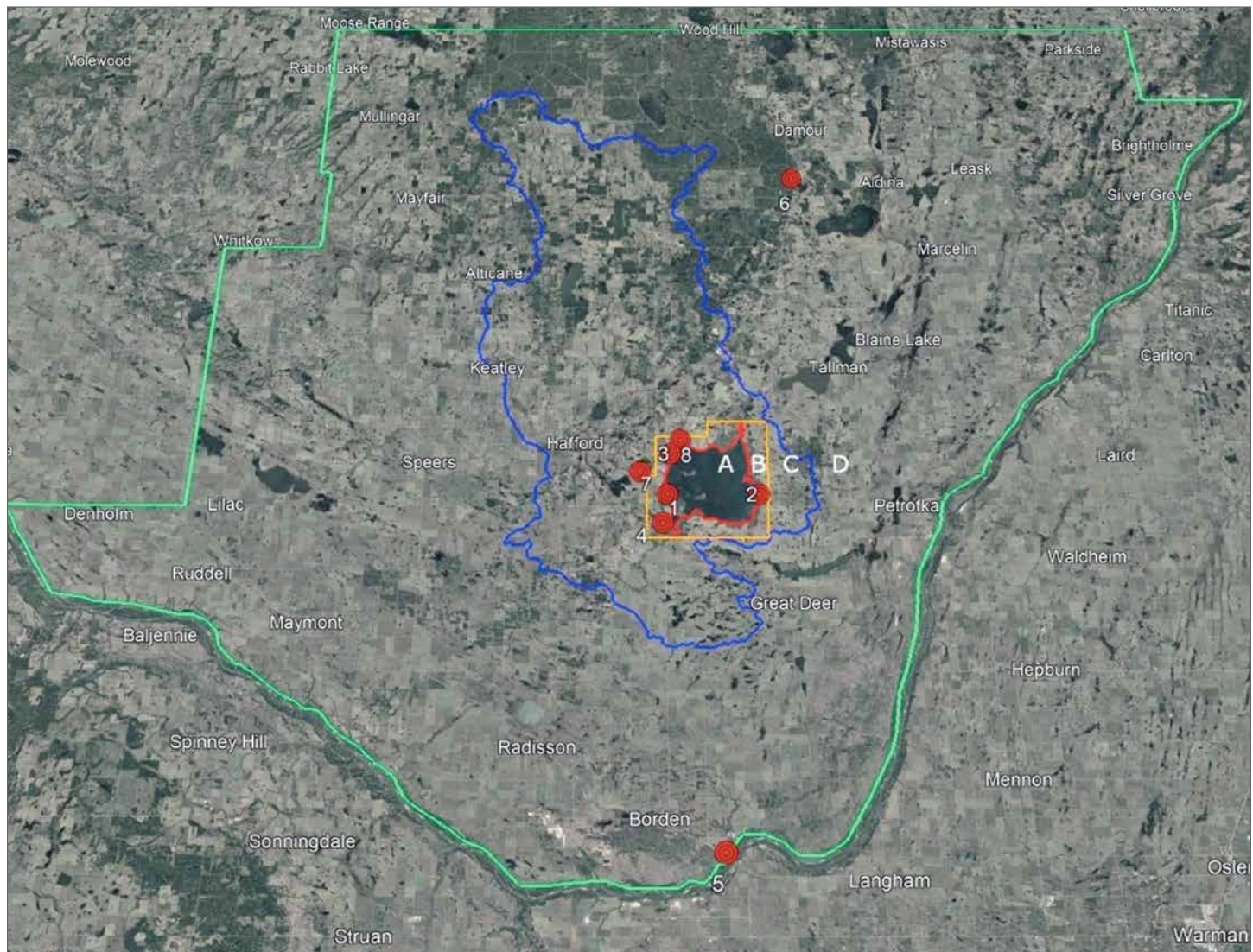
soft reddish violet on both surfaces, lower 3 white basally, dark violet-veined, lateral 2 and lowest usually bearded, lowest 10–25 mm, spur same color as petals, gibbous, 2–3 mm; style head beardless. Fruit, in an ovoid capsule up to about 9–12 mm long, initially green, erect when mature and drying tan.

**Range:** Canada to W. Central & E. Central United States.

**Distribution in SK:** Boreal Transition, Churchill River Upland, Tazin Lake Upland, Selwyn Lake Upland. RLBR – one location.

**Habitat:** dry, hilly prairie and exposed banks.

**Conservation Status:** **S3** N5 G5.



**FIGURE 3.** Zonation and biodiversity hotspots of Redberry Lake Biosphere Region (RLBR).

Three zones of the biosphere region: **A** (red outline) – core area, **B** (orange outline) – buffer zone, **C** (blue outline) – former transition area (Redberry Lake Watershed), **D** (green outline) – new transition area.

Hotspots of rare plant species: **1** – *Almutaster pauciflorus*, *Botrychium campestre*, *Corallorhiza striata* var. *striata*, *Corispermum americanum* var. *americanum*, *Corispermum pallasii*, *Cypripedium parviflorum* var. *pubescens*; **2** – *Almutaster pauciflorus*, *Amphiscirpus nevadensis*, *Corispermum americanum* var. *americanum*, *Corispermum pallasii*, *Ruppia cirrhosa*; **3** – *Almutaster pauciflorus*, *Gentianopsis virgata* subsp. *macounii*, *Cypripedium parviflorum* var. *pubescens*, *Liparis loeselii*; **4** – *Almutaster pauciflorus*, *Gentianopsis virgata* subsp. *macounii*, *Cypripedium parviflorum* var. *pubescens*, *Liparis loeselii*; **5** – *Astragalus australis* var. *glabriusculus*, *Corispermum pallasii*, *Elymus lanceolatus* subsp. *psammophilus*; **6** – *Cypripedium passerinum*, *Pedicularis groenlandica*, *Pinguicula vulgaris* subsp. *vulgaris*; **7** – *Almutaster pauciflorus*, *Gentianopsis virgata* subsp. *macounii*, *Pinguicula vulgaris* subsp. *vulgaris*; **8** – *Almutaster pauciflorus*, *Gentianopsis virgata* subsp. *macounii*, *Pinguicula vulgaris* subsp. *vulgaris*.

This study allowed the identification of nine new rare vascular plants in the recently acquired areas of Redberry Lake Biosphere Region. The obtained results indicate that the habitat preferences of newly discovered rare plants are as follows: grasslands (2 taxa), sand dunes (2), moist forests/swamps (2), aquatics (2), and fens (1). Overall, based on this and my previous study<sup>7</sup> eight species-rich sites that possess more than two rare plants are delineated (Figure 3): 6 taxa (1 site), 5 taxa (1 site), 4 taxa (2 sites), and 3 taxa (4 sites).

Most of newly identified occurrences of rare plants are located outside of the core and buffer zone of RLBR. These locations are vulnerable to threats, such as habitat fragmentation and an increased disturbance regime due to agricultural intensification, resource extraction and recreational activities. The realization of conservation goals requires strategies for managing whole landscapes including areas allocated to both production and protection.<sup>1</sup> Therefore, land managers have to employ rare plants occurrence data to assess species distribution across multiple scales within the biosphere region to prioritize their population monitoring and adopt existing beneficial management practices.<sup>17</sup> As suggested earlier, the rare plant occurrence data should be continually updated, and long-term monitoring plots must be established for the rarest species.<sup>16</sup>

## Conclusions

Conducted surveys of rare vascular plants in the newly acquired areas of Redberry Lake Biosphere Region revealed several new geographic locations, habitat types and rare species. Populations of these rare plants are located in the transition zone of RLBR, which is intended for sustainable use of natural resources and not biodiversity conservation. Land management needs to include new areas for biodiversity conservation in addition to areas where resource extraction may continue (under restrictions and improved standards). It could be achieved through extending the buffer zone of RLBR and establishing Important Plant Areas (IPAs) within the biosphere region.

## Acknowledgements

I am grateful to John Kindrachuk, Executive Director of Redberry Lake Biosphere Reserve, for giving access to the newly acquired areas of the biosphere region and for helping to organize my field visits. I thank Denver Falconer for guiding through plant collections at the W.P. Fraser Herbarium of the University of Saskatchewan. I also thank Kataya Ulrich, a student in the School of Environment and Sustainability at the University of Saskatchewan, for the fieldwork assistance.

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## POETRY

turtles  
 carapace-plastron  
 basquing-feeding-socializing  
 green-yellow-black-painted  
 swimming-diving-hunting  
 hibernating-emerging  
 turtles

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