

Vascular plants of conservation concern in the Redberry Lake Biosphere Region, Saskatchewan

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Introduction

The Redberry Lake Biosphere Region (RLBR) in Saskatchewan is a UNESCO-designated reserve that represents one of the most human-altered landscapes in Canada (RLBR n.d.). Over the last century, much of its native grassland and wetland ecosystems have been converted to agriculture, putting many species at risk. Only 1% of the biosphere region is protected (core area and buffer zone) where the most of its territory is often neglected in conservation efforts.

Despite its ecological significance, the RLBR has very limited information regarding rare vascular plant species. The overall objectives of this research were to provide information on rare vascular plants:

- taxonomic composition,
- distribution patterns,
- population size,
- habitat requirements, and
- threats to species survival.

This study is intended to support evidence-based conservation management in the biosphere region.



Fig. 1: Overlooking core area and buffer zone of the RLBR.

Study Area

The RLBR in central Saskatchewan spans ~700,000 ha at the junction of the Prairie and Boreal Plains ecozones. It features rolling prairies, saline lakes, fens, and woodlands, with elevations from 370 to 842 m. The cold-temperate climate averages 2.7°C annually with 463 mm precipitation. In this vast landscape dominated by croplands and pastures rare plants persist in scattered native habitat remnants, highlighting RLBR's importance for conservation research.

Materials & Methods

Time period: 2011-2024.

Field methods:

- In situ plant identification and photography
- Species mapping using GPS (± 2 m accuracy)
- Vegetation sampling (plots and transects)
- Soil sampling (incl. pH and EC)

Data verification:

- W.P. Fraser Herbarium (SASK), VHPRSK (SASK)
- SKCDC, HABISask, VASCAN, POWO

Data analysis:

- Vegetation classification using Ecological Land Classification (ELC)
- Species distribution using ArcGIS Pro (1 x1 km and 2x2 km grid cells)
- Conservation ranking using NatureServe and IUCN categories.

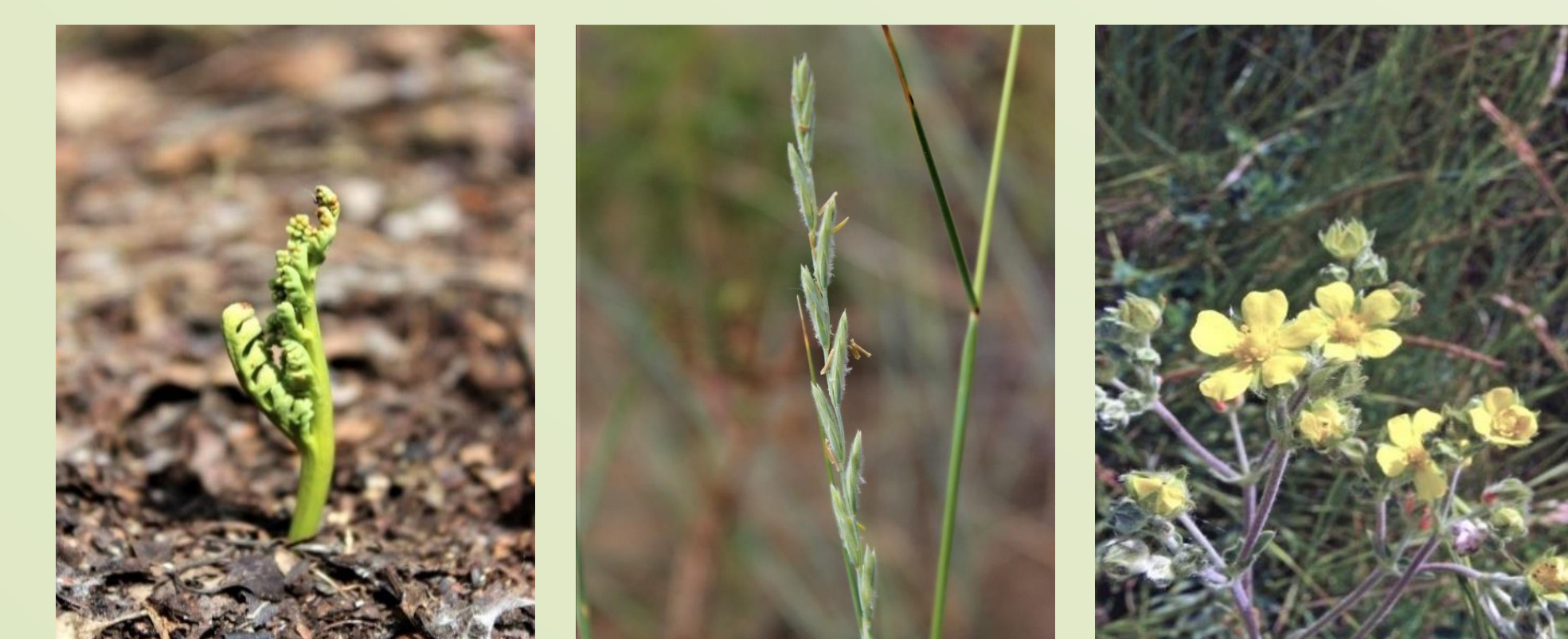


Fig. 2: Rare plant species of the NatureServe global conservation concern.

Results

Table 1: A list of rare plant species of conservation concern in the RLBR flora.

Species Name	Conservation Rank		
<i>Almutaster pauciflorus</i> (Nutt.) Á. Löve & D. Löve	G4	N3N4	S3
<i>Amphiscirpus nevadensis</i> (S. Watson) Oteng-Yeb.	G4	N4	S3
<i>Astragalus australis</i> var. <i>glabriusculus</i> (Hook.) Isely	G5TNR	NNR	S3
<i>Bidens frondosa</i> L.	G5	N5	S3
<i>Botrychium campestre</i> W.H. Wagner & Farrar	G3G4	N3	S3
<i>Carex concinna</i> R. Brown	G5	N5	S3
<i>Carex eburnea</i> Boott	G5	N5	S3
<i>Carex hystericina</i> Muhl. ex Willd.	G5	N5	S3
<i>Carex pseudocyperus</i> L.	G5	N5	S3
<i>Corallorhiza striata</i> Lindl. var. <i>striata</i>	G5T5	N5	S3
<i>Corispermum americanum</i> (Nutt.) Nutt. var. <i>americanum</i>	G5T5?	N3N4	S3
<i>Corispermum pallasii</i> Steven	G4?	N4	S2
<i>Cypripedium parviflorum</i> var. <i>makasin</i> (Farwell) Sheviak	G5T4T5	N4N5	S3
<i>Cypripedium parviflorum</i> var. <i>pubescens</i> (Willd.) Knight	G5T5	N5	S2
<i>Cypripedium passerinum</i> Richardson	G5	N5	S3
<i>Danthonia californica</i> Bolander	G5	N5	S3
<i>Elodea canadensis</i> Mich.	G5	N5	S3
<i>Elymus lanceolatus</i> subsp. <i>psammophilus</i> (J.M. Gillett & Senn) Á. Löve	G5T3	NNR	S2
<i>Festuca hallii</i> (Vasey) Piper	G5	N5	S3
<i>Gentianopsis virgata</i> (Raf.) Holub subsp. <i>virgata</i>	G5	N4N5	S3
<i>Gentianopsis virgata</i> subsp. <i>macounii</i> (Holm) J.S. Pringle	G5	N4N5	S3
<i>Juncus stygius</i> subsp. <i>americanus</i> (Buchenau) Hultén	G5T5	N5	S3
<i>Lilium philadelphicum</i> var. <i>andinum</i> (Nutt.) Ker Gawler	G5TUQ	NU	S1
<i>Liparis loeselii</i> (L.) Rich.	G5	N4N5	S3
<i>Lomatogonium rotatum</i> var. <i>fontanum</i> (A. Nelson) J.S. Pringle	G5TNR	NNR	S3
<i>Malaxis monophyllus</i> var. <i>brachypoda</i> (A. Gray) F. Morris & E.A. Eames	G5T4T5	N4	S3
<i>Najas flexilis</i> (Willd.) Rostkovius & W.L.E. Schmidt	G5	N5	S3
<i>Nothocalais cuspidata</i> (Pursh) Greene	G5	N3	S3
<i>Parnassia glauca</i> Raf.	G5	N5	S3
<i>Pedicularis groenlandica</i> Retzius	G5	N5	S2
<i>Pedicularis parviflora</i> Smith.	G5	N5	S3
<i>Pinguicula vulgaris</i> L. subsp. <i>vulgaris</i>	G5	N5	S3
<i>Piptatheropsis canadensis</i> (Poir.) Romasch., P.M. Peterson & Soreng	G4G5	N4N5	S3
<i>Platanthera dilatata</i> (Pursh) Lindl. ex L.C. Beck var. <i>dilatata</i>	G5T5	N5	S3
<i>Platanthera orbiculata</i> (Pursh) Lindl.	G5T5	N5	S3
<i>Polygaloides paucifolia</i> (Willd.) J.R. Abbott	G5	N5	S3
<i>Potentilla hudsonii</i> Ertter	GNR	NNR	S2
<i>Potentilla lasiodonta</i> Rydb.	G3	N3	S2
<i>Potentilla rubricaulis</i> Lehm.	GNR	NNR	S3
<i>Ranunculus hyperboreus</i> Rottbøll	G5	N5	S2
<i>Rhynchospora alba</i> (L.) Vahl	G5	N5	S3
<i>Rhynchospora capillacea</i> Torr.	G4G5	N4	S3
<i>Ruppia cirrhosa</i> (Petagna) Grande	G5	N5	S3
<i>Spiranthes lacera</i> (Raf.) Raf. var. <i>lacera</i>	G5T5	N5	S3
<i>Trichophorum pumilum</i> (Vahl) Schinz & Thell.	G5	N4	S1
<i>Viola pedatifida</i> G. Don	G5	N4	S3

NatureServe/SKCDC conservation ranks: Global (G), National (N), Sub-national (S).

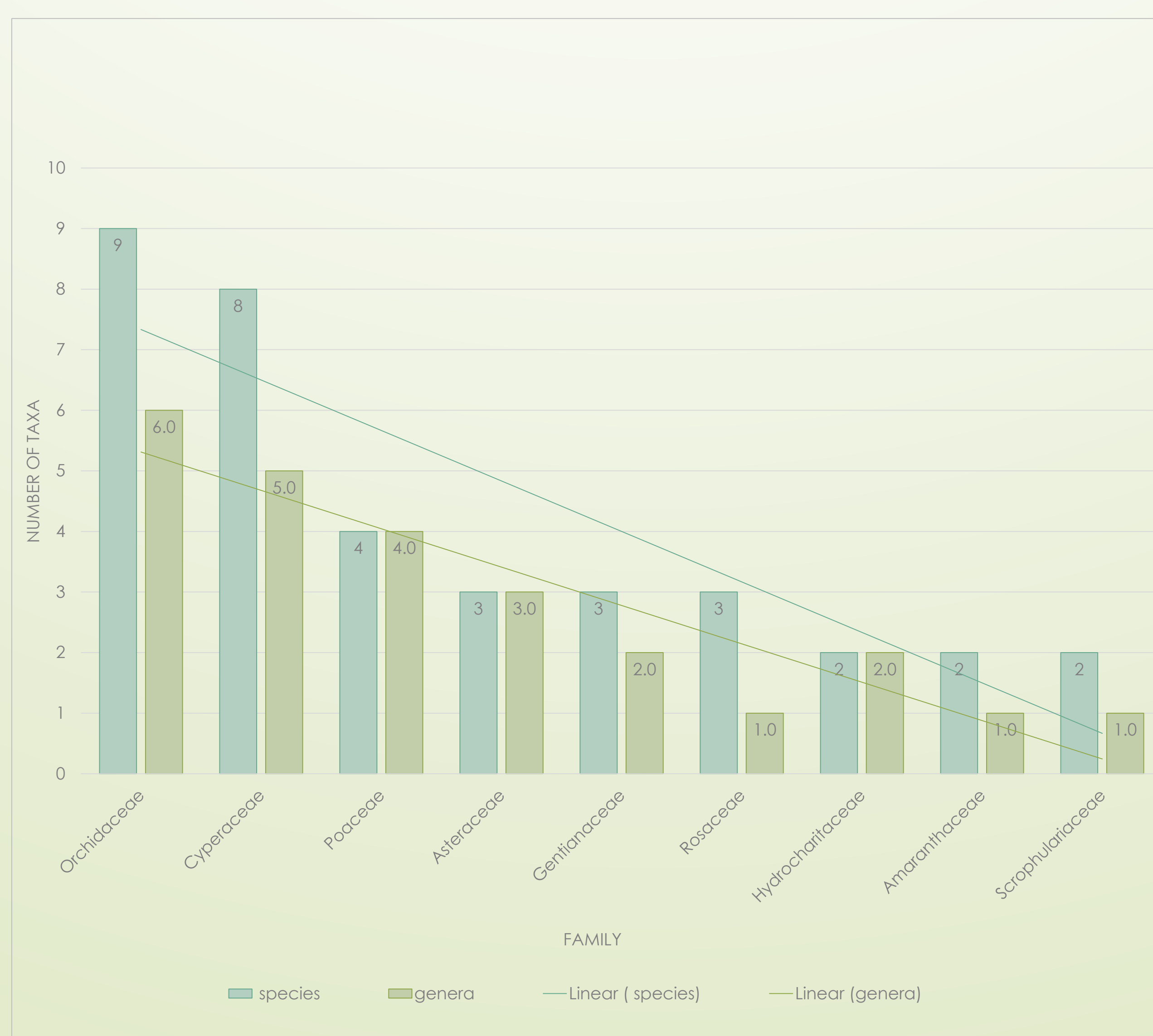


Fig. 3: Frequency distribution of rare plant species in families and genera of the RLBR flora.

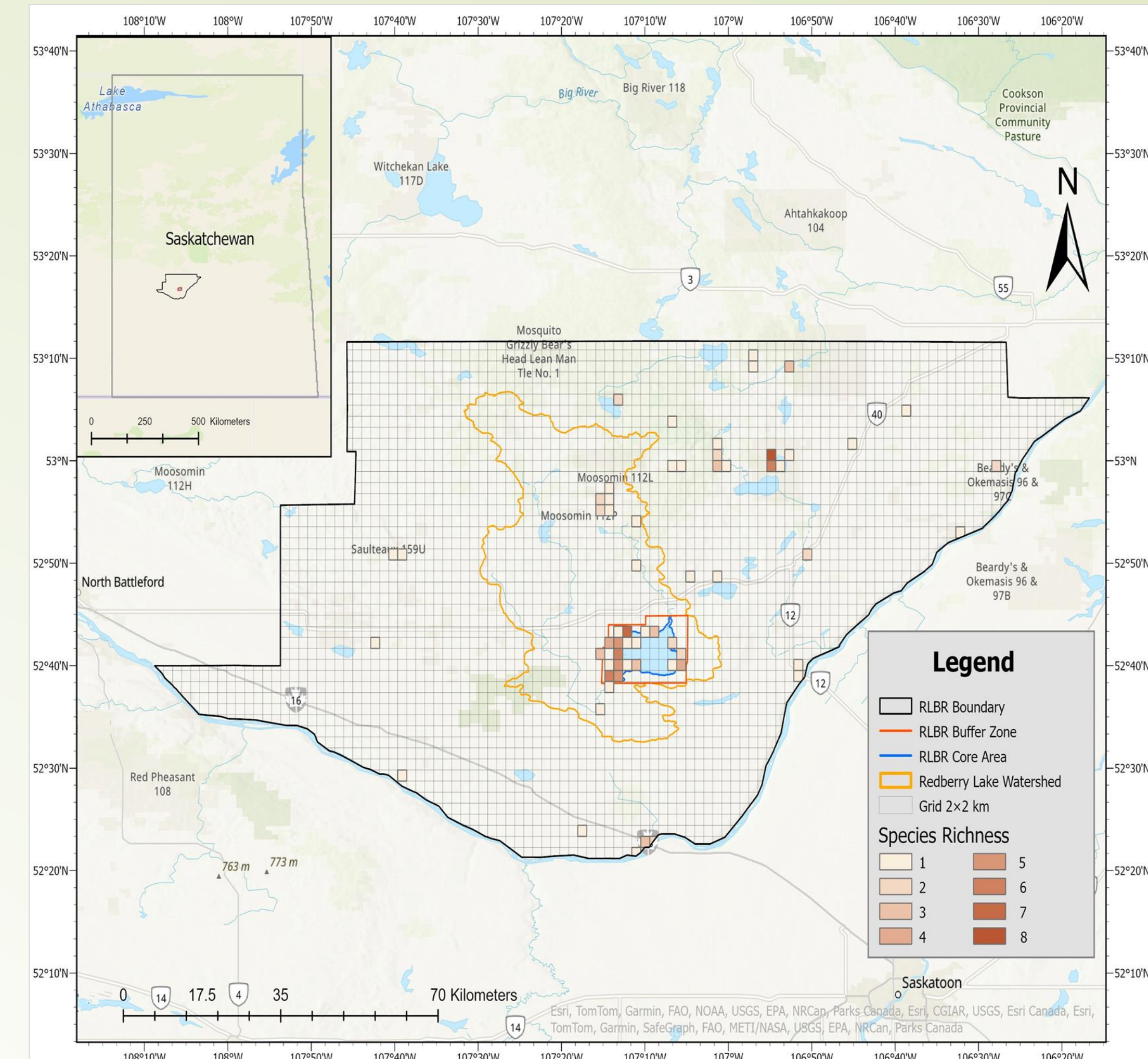


Fig. 4: A distribution map of rare plant species in the RLBR.

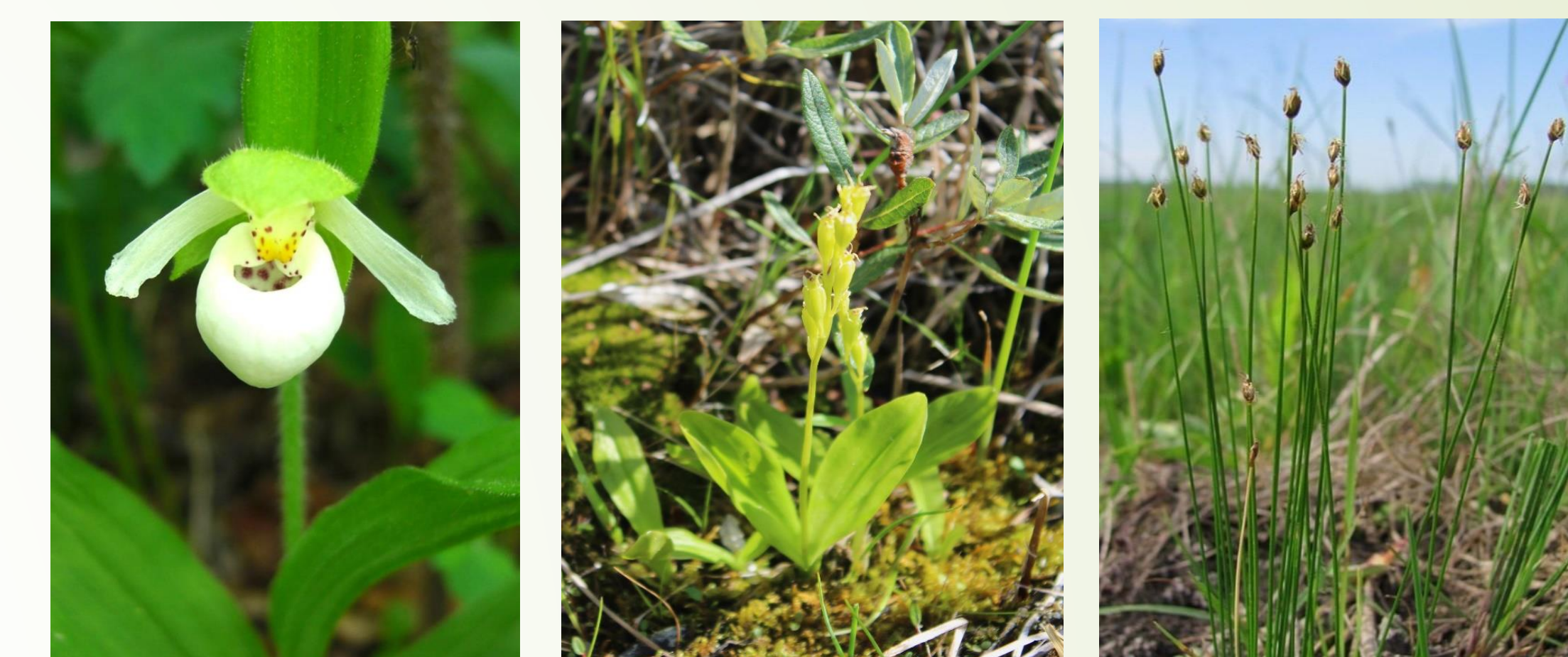


Fig. 5: Rare plant species of the IUCN conservation concern.

Significance

This study presents the first systematic assessment of rare vascular plants in the RLBR, documenting 46 taxa (31 species, five subspecies and ten varieties) of conservation concern in 19 families and 34 genera. These rare plants are categorized under provincial, national and global ranks using NatureServe and IUCN criteria. Wetlands host the highest concentrations of rare species, with Orchidaceae and Cyperaceae families most represented. Many species are restricted to a single locality with small, fragmented populations highly vulnerable to habitat loss, invasive species, succession, and recreational disturbance. Findings emphasize that habitat-based conservation—particularly the protection of fens, meadow marshes and remnant prairies—is more critical than species-based strategies. Active management such as shrub clearing, controlled grazing, and invasive species control is urgently needed. This research provides a foundational baseline for long-term monitoring, threat mitigation, and conservation planning in the RLBR.

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