

# Native plant diversity in the Redberry Lake Biosphere Region, Saskatchewan

## Introduction

Redberry Lake Biosphere Reserve (RLBR) is the only protected area of this kind in Saskatchewan. It was designated by UNESCO in 2000 and substantially expanded to become a biosphere region in 2019 (RLBR n.d.). Early biodiversity surveys in the region were incomplete and focused mainly on birds.

We began the systematic study of the regional flora in the past decade. It yielded the first inventory of native vascular plants, as well as rare and invasive alien species. The obtained data support biodiversity assessment and effective management planning for plant species conservation in the RLBR.

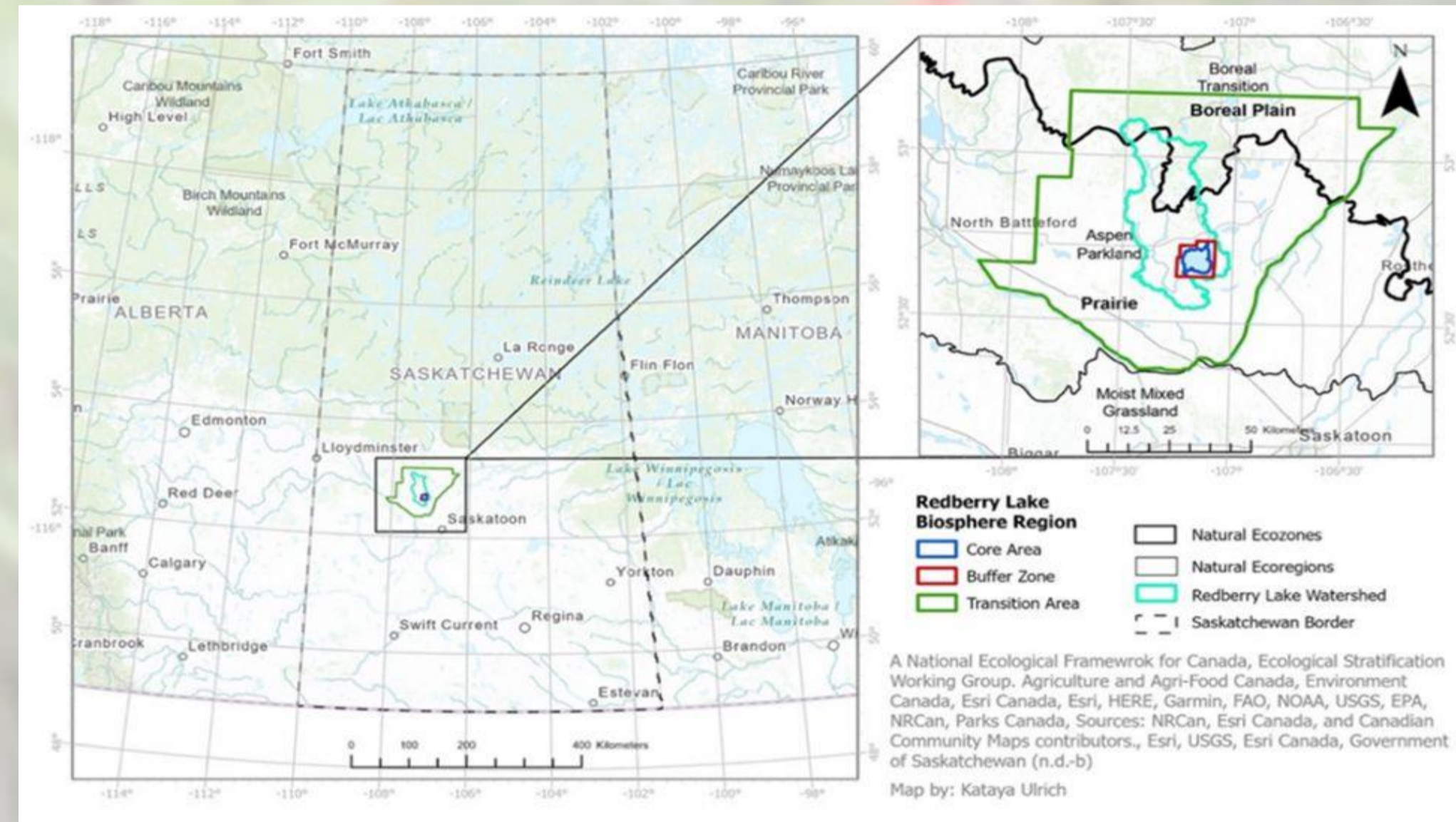


Fig. 1. Location of the Redberry Lake Biosphere Region.

## Materials and Methods

RLBR spans 700,000 ha within the Prairie and Boreal Plain ecozones or biomes. The biosphere region's varied terrain and land use support diverse vegetation across natural and human-modified landscapes.

Intensive field surveys were conducted from 2010 to 2024. A total of 584 native plant species were documented, cross-referenced with the vouchers deposited in the W.P. Fraser Herbarium (SASK) at the University of Saskatchewan and key databases, such as VASCAN (Brouillet et al. 2010) and POWO (2024). Each taxon was verified, and a comprehensive database was created with detailed species information.

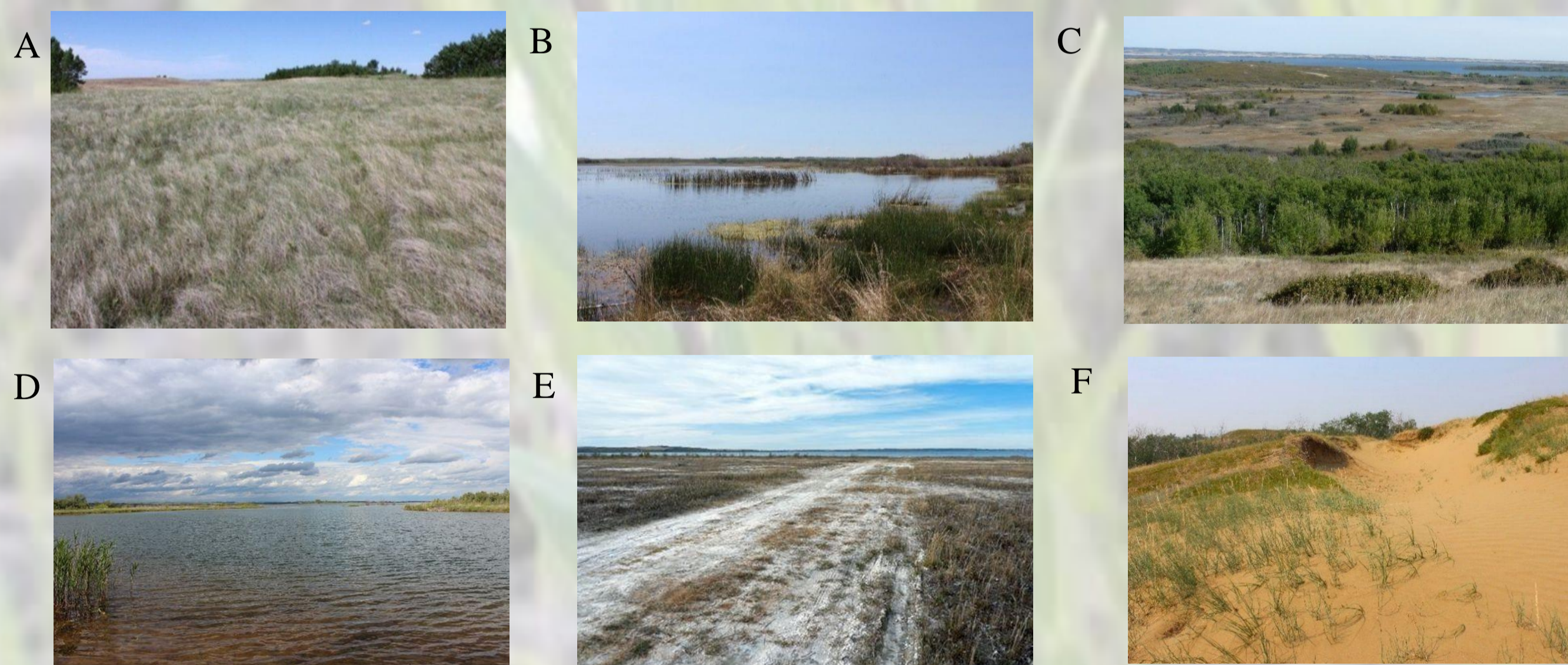


Fig. 2. Main habitat types within the RLBR: A- grassland, B- wetland, C- woodland, D- open water, E- saline, F- sandy.

## Results

### Taxonomic analysis

The RLBR flora includes 584 native vascular plants (433 species, 64 subspecies, 87 varieties) in 95 families and 300 genera. Angiosperms dominate (567), followed by ferns and allies (12), and gymnosperms (5). Among those plants, there are 369 taxa recorded for the first time. Floral diversity is shaped by location of the RLBR at the Prairie-Boreal Plain ecozone boundary.

Diversity is further enhanced by a wide range of ecological niches and microhabitats.

### Diversity analysis

Nine dominant families, led by Asteraceae, Cyperaceae, and Poaceae, account for over half of species diversity (Fig. 3A). In contrast, species richness among genera is more dispersed, with *Carex* being the most diverse (Fig. 3B). The most genus-rich families are Asteraceae (39 genera), Poaceae (34) and Rosaceae (15). Along with other eight families, they comprise over half of all genera (154 or 52%) in the flora (Fig. 3C).

When combining species richness with genus counts, a similar pattern emerges, with one exception—Salicaceae, which has 17 species just in two genera. The three most dominant families not only lead in species numbers but also in genus diversity, collectively accounting for 59.6% of total vascular plant richness.

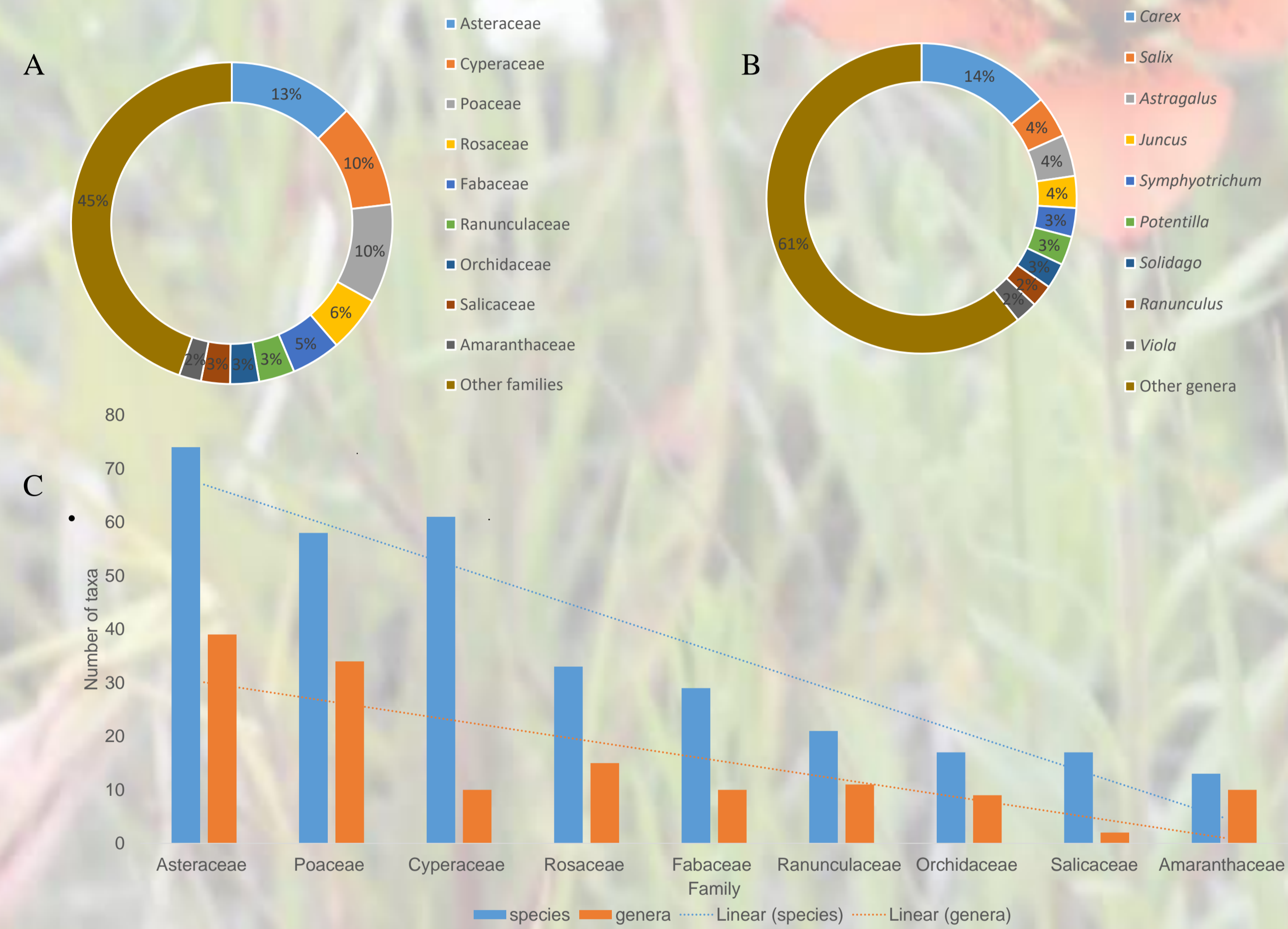


Fig. 3. The most represented plant families (A) and genera (B), and frequency distribution of plant species (C) in the flora of the RLBR.

### Ecological and biogeographical analysis

Environmental conditions across the Prairie and Boreal Plain ecozones shape regional flora, dominated by herbs, graminoids, and shrubs (Fig. 4A). Most species are found in grassland, wetland, woodland, and riparian habitats, making up over 80% of the flora (Fig. 4B).

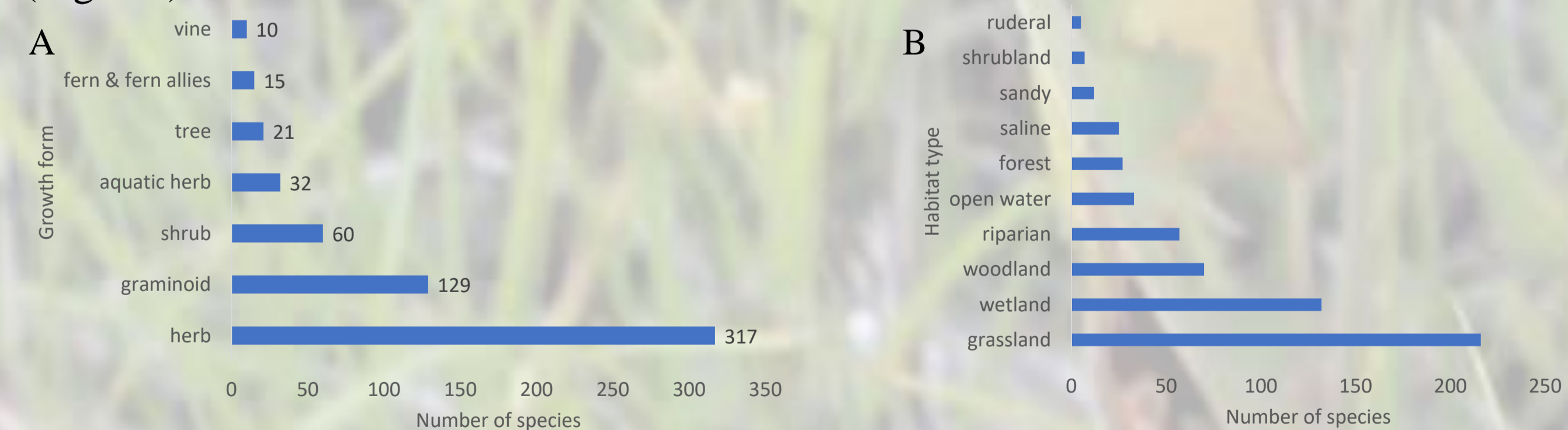


Fig. 4. Distribution of plant species per growth forms (A) and habitat types (B).

The majority of vascular plants are native to North America or shared with other continents, covering 94.7% of species (Fig. 5).

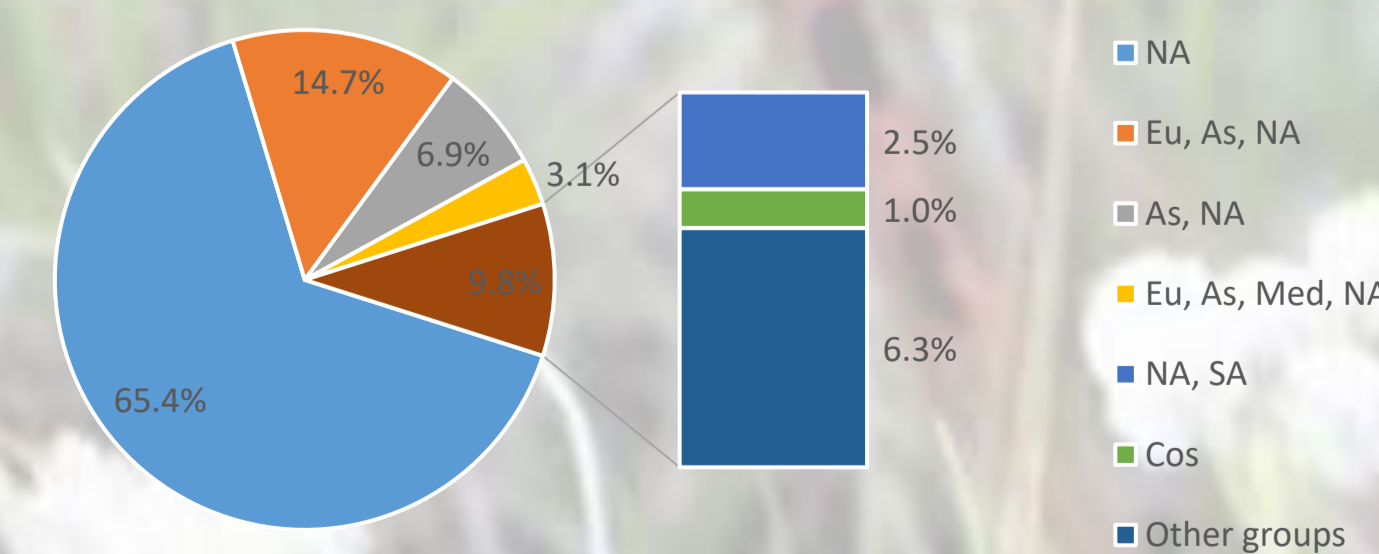


Fig. 5. Distribution of plant species per chorotypes (A): NA- North America, Eu- Europe, As- Asia, Med- Mediterranean, SA- South America, Cos- Cosmopolitan.

### Biocultural conservation

RLBR's flora includes culturally significant plant species valued by local and Indigenous communities (Fig. 6). In addition to their use as food, these traditional native plants hold medicinal, ceremonial, and material value. Medicinal plants fits well the concept of "cultural keystone species" (CKS) which combines ecological and socioeconomic aspects and has a great potential for improving the overall success of conservation and restoration of ecosystems.

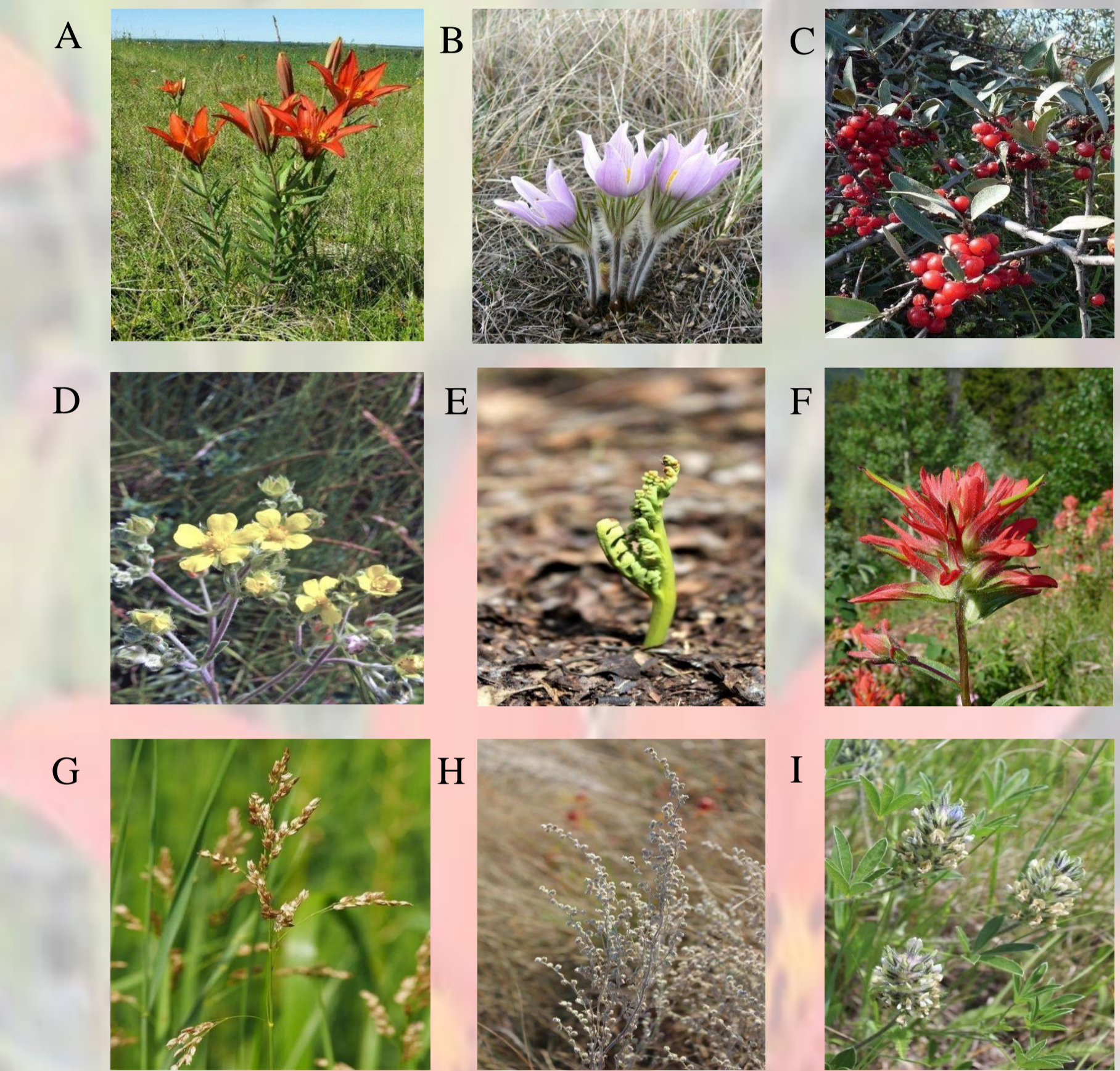


Fig. 6. Iconic plant species of the flora: A- *Lilium philadelphicum*, provincial flower of Saskatchewan. B- *Pulsatilla nuttalliana*, provincial flower of Manitoba. C- *Shepherdia argentea*, plant the biosphere region is named after. D- *Potentilla hudsonii*, new plant species recently described from the region. E- *Botrychium campestre*, the rarest plant in the region. F- *Castilleja miniata*, ornamental plant. G- *Hierochloa odorata*, ritual plant. H- *Artemisia frigida*, spiritual plant. I- *Pedicularis esculentum*, staple foodplant.

## Conclusions

The high floristic diversity of the biosphere region attests for 42.1% of the native flora of Saskatchewan. The RLBR's flora falls into the category of a widespread mid-continental floras having low mean genus size and absence of endemism. It has a high level of monotypism (35 families and 190 genera) with just three genera having more than 10 species. Monotypic families and genera include 36.8% and 63.3% of all vascular plants, respectively. Means of 6.1 taxa per family and 1.9 taxa per genus were observed.

The extent of speciation is likely to have been strongly influenced by complex geological and climatic history, and topographic and edaphic conditions. The RLBR's flora includes high number of intraspecific taxa. More than quarter of all the taxa (154 or 25.9%) are presented by subspecies and varieties. It is likely due to young age of the flora and perhaps the fact that new taxa have not diversified yet. This reflects low rates of local production of new taxa and absence of endemic species.

## References

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