

North Dakota Comprehensive Wildlife Strategy:
**Proposed Plant Species of Conservation Priority
Addendum**



By North Dakota Natural Heritage Program
For
NatureServe
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Cover photo: *Platanthera praeclara* (Western prairie fringed orchid)

EXECUTIVE SUMMARY

The purpose of this proposed Addendum to North Dakota Game and Fish Department's (NDGFD) *North Dakota's Comprehensive Wildlife Strategy* (NDCWCS) is to offer a statewide strategic direction for the conservation of North Dakota's plant species of conservation priority and their habitats, and to establish a coordinated approach for partners working to preserve the state's plant and wildlife species diversity.

One hundred plant species of conservation priority have been identified as species considered being a risk throughout their range. The primary identification process involved utilization of existing global and state ranks, updating state ranks using NatureServe's Rank Calculator, generation of vulnerability to climate change score using NatureServe's Climate Change Vulnerability Index. These factors were weighed and compared to other regional state ranks to assign the plant species as either a level I, II or III. A spatial analysis crosswalk between plant species and NDGFD Wildlife Action Plan ecoregions, landscape components and focus area was completed with the generation of corresponding spreadsheets and maps.

Plant species on conservation priority that of most at risk due to climate changes associated with warming climates were identified utilizing NatureServe's Climate Change Vulnerability Index. Three of the 100 plant species of conservation priority scored a rank of extremely vulnerable to climate change. Thirty eight species of the 100 were scored at being highly vulnerable to climate change.

Major habitat threats and conservation action were identified in general terms. General threats included habitat alterations, invasive species, climate change, grazing, habitat loss, hydrological alteration, recreational land use, human disturbance, groundwater extraction, and pollution. The problems and conservation actions are not directed as specific species, but rather at the landscape components and habitat types of the plant species of conservation priority depend on for survival.

Plant species of conservation priority were analyzed within ecoregions, landscape components and focus areas. Relationships between plant species and habitat based on climate change vulnerability scores were also analyzed. Extremely vulnerable plant species fell into four landscape components including Rivers, Streams, and Riparian areas, Tallgrass Prairie, Eastern Mixed-grass Prairie and Upland Deciduous Forests. Extremely vulnerable plant species were most prevalent in the Sand Deltas and Beach Ridges, and Sheyenne River focus areas.

Monitoring needs and strategies has also been identified for plant species of conservation priority, including monitoring guidelines and methods. Monitoring plant species of highest conservation priority continues to be a target goal for the North Dakota Natural Heritage Program.

Included in this report's appendix are plant accounts for all 100 plant species of conservation priority. Utilizing Maxent software plant habitat distribution maps were generated and included into the plant species accounts.

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Introduction

The purpose of this proposed Addendum to North Dakota Game and Fish Department's (NDGFD) *North Dakota's Comprehensive Wildlife Strategy* (NDCWCS) is to offer a statewide strategic direction for the conservation of North Dakota's plant species of conservation priority and their habitats, and to establish a coordinated approach for partners working to preserve the state's plant and wildlife species diversity.

This Addendum is based on the ND Game Fish Departments' NDCWCS and Colorado Wildlife Action Plan: Proposed Rare Plant Addendum. This Addendum identifies 100 plant species of greatest conservation need, provides species background information and habitat distribution maps, landscape components, focus areas, key habitats, conservation issues and monitoring strategies. If implemented, this Addendum will enable conservation partners to develop conservation strategies that not only preserve and protect critical habitat for animal species of conservation priority but associated plant plants of greatest conservation priority as well.

Hidden in Plain Sight the Role of Plants in State Wildlife Action Plans

"Plants have too long been hidden in plain sight. The prospect of continued threats to the nation's plant life, coupled with the large proportion of the flora already at risk, argues that now is the time to bring plants out from the background, and to put the conservation needs of our nation's flora squarely into view" *Hidden in Plain Sight – The Role of Plants in State Wildlife Action Plans*. *Hidden in Plain Sight* is a report by NatureServe supported by a grant from Doris Duke Charitable Foundation, offered the following recommendations for effectively addressing the needs of Plant Species of Conservation Priority.

- Promote implementation of actions and strategies for wildlife that would also benefit Plant Species of Conservation Priority.
- Avoid implementation actions that could be detrimental to sensitive plant species.
- Add plant-specific components to existing wildlife action plans.
- Develop state-level plant conservation strategies to complement wildlife action plans where necessary.
- Ensure that plants are fully represented in major new conservation funding opportunities, including those related to climate change adaptation.

Three years ago this plant species of concern effort was initiated with an agreement between NatureServe and North Dakota Natural Heritage Program through funding and support from Doris Duke Charitable Foundation. North Dakota Game and Fish offered support of this effort from the beginning. Over the past three years, the NDNHP has been working with NatureServe's species Ranking Calculator, Climate Change Vulnerability Index, Biotics conservation database and Maxent habitat distribution modeling software, and plant databases. Research and data analysis included but was not limited to the review of multi-state and providences plant species of concerns list, species profiles and ranks. The final compilation of data included the identification of 100 North Dakota's Plant Species of Conservation Priority, updated state ranks and most importantly identification of plant species vulnerability to climate change. In addition, plant species habitat distribution map were generated using Maxent.

Anticipated outcome of this effort is the integration of plant conservation, including climate change consideration, into the North Dakota's state wildlife conservation activities in North Dakota. In cooperation with the North Dakota Game and Fish, it is anticipated that plant species and information components will be included into the revision of the NDCWCS. All attempts have been made to create an Addendum that is fully compatible with the existing format of the NDCWS. Continued work with the ND Game and Fish Department will be necessary to integrate various plant components into the 2013 revision of the NDCWS.

Proposed Plant Species of Conservation Priority Addendum - Major Project Tasks

1. Develop spatial crosswalk between NDNHP Plant Species of Concern and the NDGFD SWG Wildlife Action Plan ecoregions, landscape components and focus areas.
2. Develop spatial crosswalk between NDNHP Plant Species of Concern and the NDGFD SWG Wildlife Action Plan key habitat types and community types.
3. Review and revise plant species of concern state ranks utilizing NatureServe's Rank Calculator.
4. Identify plant species that are most at risk due to changes associated with warming climates utilizing NatureServe's Climate Change Vulnerability index.
5. Develop conservation status matrix for potential Plant Species of Conservation Priority utilizing standard Natural Heritage ranking methodology, a variety of known conservation factors including climate change vulnerability index.
6. Develop list of plant species of highest conservation priority. Identify any potential indicator plant species of concern.
7. Improve natural heritage data for high priority species.
8. Develop plant species accounts for each priority plant species with habitat distribution maps utilizing Maxent modeling.
9. Develop plant species of conservation monitoring needs and strategies.
10. Incorporate plant species of conservation priority into landscape components and species accounts sections of existing SWG Action Plan.
11. Develop plant species of conservation priority identification guides with potential publication in NDGFD magazine.
12. Identify field inventory gaps and potential inventory and monitoring sites.

The Addendum process identified 100 Plant Species of Conservation Priority in North Dakota. The Plant species were prioritized into level I, II, II species. Information on distribution, population status, and trends was compiled from a variety of sources. This data was compiled into an Excel database and into Biotics. Plant species of conservation priority were amended to existing NDCWS components to reflect plant species that occur in NDGFD key habitat types, landscape components and focus areas.

Because climate change is a potentially significant issue for Plant Species of Conservation Priority, the NDNHP conducted a focused analysis using NatureServe's Climate Change Vulnerability Index. The Index is an Excel-based tool that uses a scoring system to integrate species' predicted exposure to climate change.

The Addendum identifies conservation actions that are needed on a species-by-species basis, as well as pressing threats to key habitats. This information is represented in table format including information on habitat and conservation issues. Strategies for monitoring plant species of conservation priority, their habitats have also been addressed.

Section 1

Plant Species of Conservation Priority

Introduction

The information on this section discusses the distribution and abundance of the 100 Plant Species of Conservation Priority for North Dakota. The following section includes low and declining populations of these species as the North Dakota Parks and Recreation Department deems necessary that are pertinent of the diversity and health of the state’s Plant Species of Conservation Priority. The Plant Species of Conservation Priority on our list are defined as species of highest conservation priority and are considered to be at risk throughout their range and vulnerable to extinction. These are not only globally rare species, but have state ranks of S1, S2, and S3 and other ranks discussed below.

The Overall Process

The 100 Plant Species of Conservation Priority is a subset of North Dakota Natural Heritage’s list of Plant Species of Conservation Priority which contains 189 Plant Species of Conservation Priority for North Dakota. Several factors were used to determine 100 plant species of greatest conservation priority. North Dakota plant species of concern state ranks were all updated using NatureServe’s Rank Calculator, which allows for agencies to upgrade their state ranks using a series of procedures (points and rules). It generates a calculated status rank, which is reviewed and then finalized. For programs without Biotics, the calculator may be used as a stand-alone application.

Biologists in our Department prioritized our sensitive plant species list into levels (I, II, and III) based on global rank, updated state ND state ranks along with their vulnerability to climate change score using NatureServe’s Climate Change Vulnerability Index (CCVI). These factors were weighed and compared to other regional state ranks to assign a plant species as either a level I, II or III (table 1a, 1b, 1c and figure 1). For example, some plant species are found in great numbers in North Dakota, but are designated as vulnerable, imperiled, or critically imperiled in other states and provinces, or have limited habitat that can easily be affected by future climate change. Table 2 lists North Dakota’s plant species of conservation priority.

Table 1a: Level 1 Plant Species of Conservation Priority

Level I	
<i>Platanthera praeclara</i>	Western Prairie Fringed Orchid
<i>Triantha glutinosa</i>	Sticky False-asphodel
<i>Allium canadense</i>	Meadow Onion
<i>Asclepias lanuginosa</i>	Woolly Milkweed
<i>Astragalus neglectus</i>	Cooper's Milkvetch
<i>Chenopodium subglabrum</i>	Smooth Goosefoot
<i>Cypripedium candidum</i>	White Lady's-slipper
<i>Helianthemum bicknellii</i>	Bicknell's Sunrose
<i>Polygonum leptocarpum</i>	Thin-fruited Knotweed
<i>Botrychium campestre</i>	Prairie Grapefern
<i>Carex formosa</i>	Handsome Sedge
<i>Eriogonum visherii</i>	Dakota Buckwheat
<i>Mentzelia pumila</i>	Dwarf Mentzelia

Table 1b: Level 2 Plant Species of Conservation Priority

Level II	
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid
<i>Carex echinata</i> ssp. <i>echinata</i>	Spiny Sedge
<i>Cheilanthes feei</i>	Slender Lip Fern
<i>Clematis columbiana</i> var. <i>tenuiloba</i>	Slender-lobed Clematis
<i>Cyperus bipartitus</i>	Brook Flatsedge
<i>Cypripedium reginae</i>	Showy Lady's-slipper
<i>Drosera rotundifolia</i>	Round-leaved Sundew
<i>Liparis loeselii</i>	Loesel's Twayblade
<i>Lipocarpha micrantha</i>	Small-flowered Lipocarpha
<i>Minuartia dawsonensis</i>	Stiff Sandwort
<i>Onoclea sensibilis</i>	Sensitive Fern
<i>Pogonia ophioglossoides</i>	Rose Pogonia
<i>Polygonum hydropiperoides</i>	Swamp Smartweed
<i>Rorippa calycina</i>	Hayden's Yellowcress
<i>Salix maccalliana</i>	Swamp Willow
<i>Scheuchzeria palustris</i>	Pod Grass
<i>Selaginella rupestris</i>	Ledge Spike-moss
<i>Sphagnum teres</i>	Round-leaved Sphagnum
<i>Botrychium minganense</i>	Moonwort
<i>Botrychium multifidum</i>	Leathery Grapefern
<i>Campanula aparinoides</i>	Marsh Bellflower
<i>Carex alopecoidea</i>	Foxtail Sedge
<i>Carex leptalea</i>	Delicate Sedge
<i>Carex sterilis</i>	Sterile Sedge
<i>Caulophyllum thalictroides</i>	Blue Cohosh
<i>Cryptantha torreyana</i>	Torrey's Cryptantha
<i>Dirca palustris</i>	Leatherwood
<i>Equisetum palustre</i>	Marsh Horsetail
<i>Equisetum pratense</i>	Meadow Horsetail
<i>Eriogonum cernuum</i>	Nodding Buckwheat
<i>Eriophorum gracile</i>	Slender Cottongrass
<i>Euonymus atropurpureus</i>	Wahoo
<i>Gymnocarpium dryopteris</i>	Oakfern

Level II	
<i>Carex sterilis</i>	Sterile Sedge
<i>Caulophyllum thalictroides</i>	Blue Cohosh
<i>Cryptantha torreyana</i>	Torrey's Cryptantha
<i>Dirca palustris</i>	Leatherwood
<i>Equisetum palustre</i>	Marsh Horsetail
<i>Equisetum pratense</i>	Meadow Horsetail
<i>Eriogonum cernuum</i>	Nodding Buckwheat
<i>Eriophorum gracile</i>	Slender Cottongrass
<i>Euonymus atropurpureus</i>	Wahoo
<i>Gymnocarpium dryopteris</i>	Oakfern
<i>Hudsonia tomentosa</i>	Wooly Beach-heather
<i>Lappula cenchrusoides</i>	Stickseed
<i>Lechea stricta</i>	Upright Pinweed
<i>Menyanthes trifoliata</i>	Buckbean
<i>Ophioglossum pusillum</i>	Adder's-tongue Fern
<i>Pinus flexilis</i>	Limber Pine
<i>Populus x acuminata</i>	Lanceleaf Cottonwood
<i>Primula incana</i>	American Primrose
<i>Ribes cynosbati</i>	Prickly Gooseberry
<i>Salix pedicellaris</i>	Bog Willow
<i>Talinum parviflorum</i>	Prairie Fameflower
<i>Botrychium simplex</i>	Least Grapeferen
<i>Collinsia parviflora</i>	Blue Lips
<i>Erigeron radicans</i>	Cushion Fleabane
<i>Galium labradoricum</i>	Bog Bedstraw
<i>Leucocrinum montanum</i>	Sand Lily
<i>Phlox alyssifolia</i>	Alyssum-leaved Phlox
<i>Solidago flexicaulis</i>	Zigzag Goldenrod
<i>Sporobolus airoides</i>	Alkali Sacaton
<i>Townsendia hookeri</i>	Hooker's Townsendia
<i>Triplasis purpurea</i>	Purple Sandgrass

Table 1c: Level 3 Plant Species of Conservation Priority

Level III	
<i>Astragalus vexilliflexus</i>	Bent-flowered Milkvetch
<i>Carex capillaris</i>	Hair-like Sedge
<i>Cypripedium parviflorum var. pubescens</i>	Large Yellow Lady's-slipper
<i>Eleocharis parvula</i>	Dwarf Spikerush
<i>Equisetum sylvaticum</i>	Wood Horsetail
<i>Eriophorum chamissonis</i>	Chamisson's Cottongrass
<i>Eriophorum viridicarinatum</i>	Green Keeled Cottongrass
<i>Geranium maculatum</i>	Wild Geranium
<i>Mitella nuda</i>	Naked Mitrewort
<i>Orobanche uniflora</i>	One-flowered Broomrape
<i>Petasites frigidus</i>	Sweet Coltsfoot
<i>Platanthera clavellata</i>	Green Woodland Orchid
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort
<i>Viola conspersa</i>	Bog Violet
<i>Botrychium matricariifolium</i>	Chamomile Grapefern
<i>Carex backii</i>	Back's Sedge
<i>Dalea enneandra</i>	Nine-anthered Dalea
<i>Dicentra cucullaria</i>	Dutchman's Breeches
<i>Eleocharis wolfii</i>	Wolf's Spikerush
<i>Mimulus guttatus</i>	Yellow Monkeyflower
<i>Oenothera rhombipetala</i>	Rhombic Evening-primrose
<i>Parnassia palustris var. parviflora</i>	Small-flowered Grass-of-Parnassus
<i>Penstemon procerus</i>	Small-flowered Penstemon
<i>Phlox pilosa</i>	Downy Phlox
<i>Rhynchospora capillacea</i>	Hair Beakrush
<i>Spiranthes cernua</i>	Nodding Ladies'-tresses
<i>Spiranthes romanzoffiana</i>	Hooded Ladies'-tresses
<i>Astragalus drummondii</i>	Drummond's Milkvetch
<i>Desmanthus illinoensis</i>	Prairie Mimosa
<i>Mahonia repens</i>	Creeping Barberry
<i>Potentilla diversifolia</i>	Mountain Meadow Cinquefoil
<i>Ranunculus cardiophyllus</i>	Heart-leaved Buttercup
<i>Veronicastrum virginicum</i>	Culver's-root

Interpretating Need of Conservation

- Plant Species of Conservation Priority are considered plants with low or declining populations, small distributions, or both. These species are considered to be at risk throughout their range and vulnerable to extinction.
- The list includes current federally threatened or endangered plant species, state listed plant species, and plant species of concern.
- Species on the list may be prioritized for directing conservation efforts, monitoring, or research and the list may be subject to change as new information becomes available and as the status and conservation need of species changes.

Key Habitats (landscapes)

North Dakota's sensitive plant species occur within eight major landscape (habitat) types (figure 2): *tall-grass prairie, eastern mixed-grass prairie, mixed-grass prairie, western mixed-grass/short-grass prairie, wetlands and lakes, rivers, streams, and riparian, badlands, and upland deciduous forest*. North Dakota's tall-grass prairie, rivers, streams, and riparian areas, and upland deciduous forests are especially rich habitats for sensitive plant species as shown in figure 1, followed by eastern mixed-grass prairie and mixed-grass prairie.

Table 2: Matrix of North Dakota plant species of conservation priority

State Scientific Name	State Common Name	State Rank	Global Rank	USFS Status	BLM Status	Climate Index Rank	Level
<i>Platanthera praeclara</i>	Western Prairie Fringed Orchid	S2	G3	S	S	EV	I
<i>Triantha glutinosa</i>	Sticky False-asphodel	S1	G5			EV	I
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	G5			EV	II
<i>Allium canadense</i>	Meadow Onion	S1	G5			HV	I
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?			HV	I
<i>Astragalus neglectus</i>	Cooper's Milkvetch	S1	G4			HV	I
<i>Chenopodium subglabrum</i>	Smooth Goosefoot	S1	G3G4	S		HV	I
<i>Cypripedium candidum</i>	White Lady's-slipper	S2	G4	S		HV	I
<i>Helianthemum bicknellii</i>	Bicknell's Sunrose	S1	G5	S		HV	I
<i>Polygonum leptocarpum</i>	Thin-fruited Knotweed	S1	G2G4Q			HV	I
<i>Carex echinata ssp. echinata</i>	Spiny Sedge	S1	G5T5			HV	II
<i>Cheilanthes feei</i>	Slender Lip Fern	S1	G5			HV	II
<i>Clematis columbiana var. tenuiloba</i>	Slender-lobed Clematis	S1	G5?T4 ?			HV	II
<i>Cyperus bipartitus</i>	Brook Flatsedge	S2	G5	S		HV	II
<i>Cypripedium reginae</i>	Showy Lady's-slipper	S2	G4	S		HV	II
<i>Drosera rotundifolia</i>	Round-leaved Sundew	S1	G5			HV	II
<i>Liparis loeselii</i>	Loesel's Twayblade	S2	G5	S		HV	II
<i>Lipocarpha micrantha</i>	Small-flowered Lipocarpha	S1	G5			HV	II
<i>Minuartia dawsonensis</i>	Stiff Sandwort	S1	G5			HV	II
<i>Onoclea sensibilis</i>	Sensitive Fern	S2	G5	S		HV	II
<i>Pogonia ophioglossoides</i>	Rose Pogonia	S1	G5			HV	II
<i>Polygonum hydropiperoides</i>	Swamp Smartweed	S1	G5			HV	II
<i>Rorippa calycina</i>	Hayden's Yellowcress	SH	G3		S	HV	II

State Scientific Name	State Common Name	State Rank	Global Rank	USFS Status	BLM Status	Climate Index Rank	Level
<i>Salix maccalliana</i>	Swamp Willow	S1	G5?			HV	II
<i>Scheuchzeria palustris</i>	Pod Grass	S1	G5			HV	II
<i>Selaginella rupestris</i>	Ledge Spike-moss	S1	G5			HV	II
<i>Sphagnum teres</i>	Round-leaved Sphagnum	S1	G5			HV	II
<i>Astragalus vexilliflexus</i>	Bent-flowered Milkvetch	S3	G4			HV	III
<i>Carex capillaris</i>	Hair-like Sedge	S2	G5			HV	III
<i>Cypripedium parviflorum var. pubescens</i>	Large Yellow Lady's-slipper	S2	G5T5			HV	III
<i>Eleocharis parvula</i>	Dwarf Spikerush	S2	G5			HV	III
<i>Equisetum sylvaticum</i>	Wood Horsetail	S2	G5			HV	III
<i>Eriophorum chamissonis</i>	Chamisson's Cottongrass	S2	G5			HV	III
<i>Eriophorum viridicarinatum</i>	Green Keeled Cottongrass	S2	G5			HV	III
<i>Geranium maculatum</i>	Wild Geranium	SH	G5			HV	III
<i>Mitella nuda</i>	Naked Mitrewort	S3	G5			HV	III
<i>Orobanche uniflora</i>	One-flowered Broomrape	SH	G5			HV	III
<i>Petasites frigidus</i>	Sweet Coltsfoot	S2	G5			HV	III
<i>Platanthera clavellata</i>	Green Woodland Orchid	SH	G5			HV	III
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort	S2	G5			HV	III
<i>Viola conspersa</i>	Bog Violet	S2	G5			HV	III
<i>Botrychium campestre</i>	Prairie Grapefern	S1	G3G4			MV	I
<i>Carex formosa</i>	Handsome Sedge	S1	G4	S		MV	I
<i>Eriogonum visherii</i>	Dakota Buckwheat	S2	G3	S	S	MV	I
<i>Botrychium minganense</i>	Moonwort	S1	G4			MV	II
<i>Botrychium multifidum</i>	Leathery Grapefern	S1	G5	S		MV	II
<i>Campanula aparinoides</i>	Marsh Bellflower	S2S 3	G5	S		MV	II
<i>Carex alopecoidea</i>	Foxtail Sedge	S2	G5	S		MV	II
<i>Carex leptalea</i>	Delicate Sedge	S3	G5	S		MV	II

State Scientific Name	State Common Name	State Rank	Global Rank	USFS Status	BLM Status	Climate Index Rank	Level
<i>Carex sterilis</i>	Sterile Sedge	S1	G4			MV	II
<i>Caulophyllum thalictroides</i>	Blue Cohosh	S1	G4G5			MV	II
<i>Cryptantha torreyana</i>	Torrey's Cryptantha	S1	G5	S		MV	II
<i>Dirca palustris</i>	Leatherwood	S1	G4			MV	II
<i>Equisetum palustre</i>	Marsh Horsetail	S2	G5	S		MV	II
<i>Equisetum pratense</i>	Meadow Horsetail	S2	G5	S		MV	II
<i>Eriogonum cernuum</i>	Nodding Buckwheat	S1	G5	S		MV	II
<i>Eriophorum gracile</i>	Slender Cottongrass	S1	G5	S		MV	II
<i>Euonymus atropurpureus</i>	Wahoo	S3	G5	S		MV	II
<i>Gymnocarpium dryopteris</i>	Oakfern	S2	G5	S		MV	II
<i>Hudsonia tomentosa</i>	Woolly Beach-heather	S1	G5	S		MV	II
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4			MV	II
<i>Lechea stricta</i>	Upright Pinweed	S2	G4?	S		MV	II
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	S		MV	II
<i>Ophioglossum pusillum</i>	Adder's-tongue Fern	S2	G5	S		MV	II
<i>Pinus flexilis</i>	Limber Pine	S1	G5	S		MV	II
<i>Populus x acuminata</i>	Lanceleaf Cottonwood	S2	GNA	S		MV	II
<i>Primula incana</i>	American Primrose	S2	G4G5		S	MV	II
<i>Ribes cynosbati</i>	Prickly Gooseberry	S3	G5	S		MV	II
<i>Salix pedicellaris</i>	Bog Willow	S3	G5	S		MV	II
<i>Talinum parviflorum</i>	Prairie Fameflower	S2	G5	S		MV	II
<i>Botrychium matricariifolium</i>	Chamomile Grapefern	S1	G5			MV	III
<i>Carex backii</i>	Back's Sedge	S3	G4			MV	III
<i>Dalea enneandra</i>	Nine-anthered Dalea	S3	G5			MV	III
<i>Dicentra cucullaria</i>	Dutchman's Breeches	S1	G5			MV	III
<i>Eleocharis wolfii</i>	Wolf's Spikerush	SH	G3?			MV	III
<i>Mimulus guttatus</i>	Yellow Monkeyflower	S1	G5			MV	III

State Scientific Name	State Common Name	State Rank	Global Rank	USFS Status	BLM Status	Climate Index Rank	Level
<i>Oenothera rhombipetala</i>	Rhombic Evening-primrose	S2	G4G5			MV	III
<i>Parnassia palustris var. parviflora</i>	Small-flowered Grass-of-Parnassus	S3	G4			MV	III
<i>Penstemon procerus</i>	Small-flowered Penstemon	S1	G5			MV	III
<i>Phlox pilosa</i>	Downy Phlox	S1	G5			MV	III
<i>Rhynchospora capillacea</i>	Hair Beakrush	S2	G4			MV	III
<i>Spiranthes cernua</i>	Nodding Ladies'-tresses	S1	G5			MV	III
<i>Spiranthes romanzoffiana</i>	Hooded Ladies'-tresses	S1	G5			MV	III
<i>Mentzelia pumila</i>	Dwarf Mentzelia	S1	G4	S	S	PS	I
<i>Botrychium simplex</i>	Least Grapeferen	S2	G5	S		PS	II
<i>Collinsia parviflora</i>	Blue Lips	S2	G5	S		PS	II
<i>Erigeron radicans</i>	Cushion Fleabane	S1	G3G4			PS	II
<i>Galium labradoricum</i>	Bog Bedstraw	S3	G5	S		PS	II
<i>Leucocrinum montanum</i>	Sand Lily	S2	G5	S		PS	II
<i>Phlox alyssifolia</i>	Alyssum-leaved Phlox	S2	G5	S		PS	II
<i>Solidago flexicaulis</i>	Zigzag Goldenrod	S2	G5	S		PS	II
<i>Sporobolus airoides</i>	Alkali Sacaton	S3	G5	S		PS	II
<i>Townsendia hookeri</i>	Hooker's Townsendia	S1	G5	S		PS	II
<i>Triplasis purpurea</i>	Purple Sandgrass	S1	G4G5	S		PS	II
<i>Astragalus drummondii</i>	Drummond's Milkvetch	S1	G5			PS	III
<i>Desmanthus illinoensis</i>	Prairie Mimosa	S1	G5			PS	III
<i>Mahonia repens</i>	Creeping Barberry	S2	G5			PS	III
<i>Potentilla diversifolia</i>	Mountain Meadow Cinquefoil	S1	G5			PS	III
<i>Ranunculus cardiophyllus</i>	Heart-leaved Buttercup	S1	G4G5			PS	III
<i>Veronicastrum virginicum</i>	Culver's-root	SH	G4			PS	III

Figure 1: North Dakota Map with Plant Species of Conservation Priority

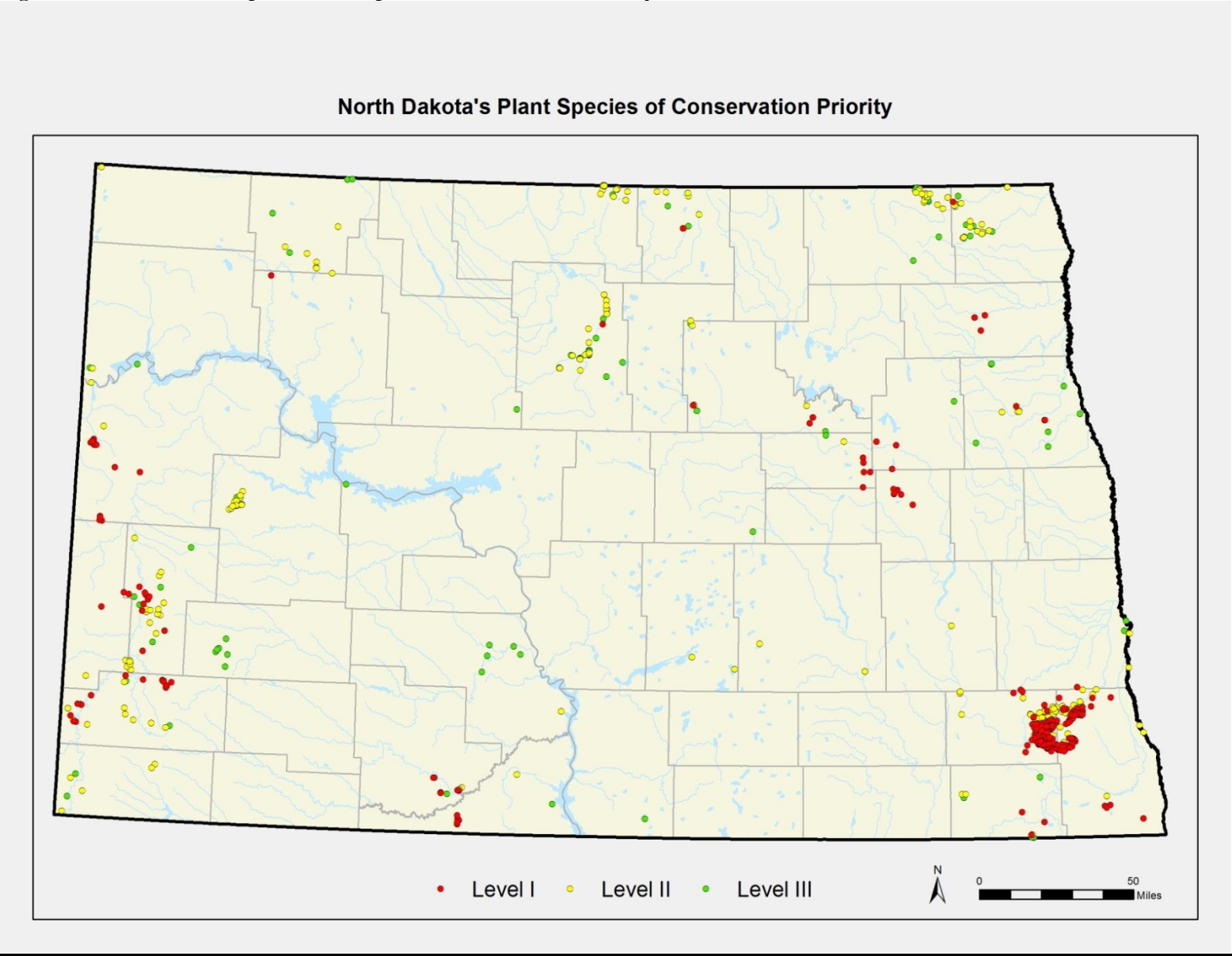
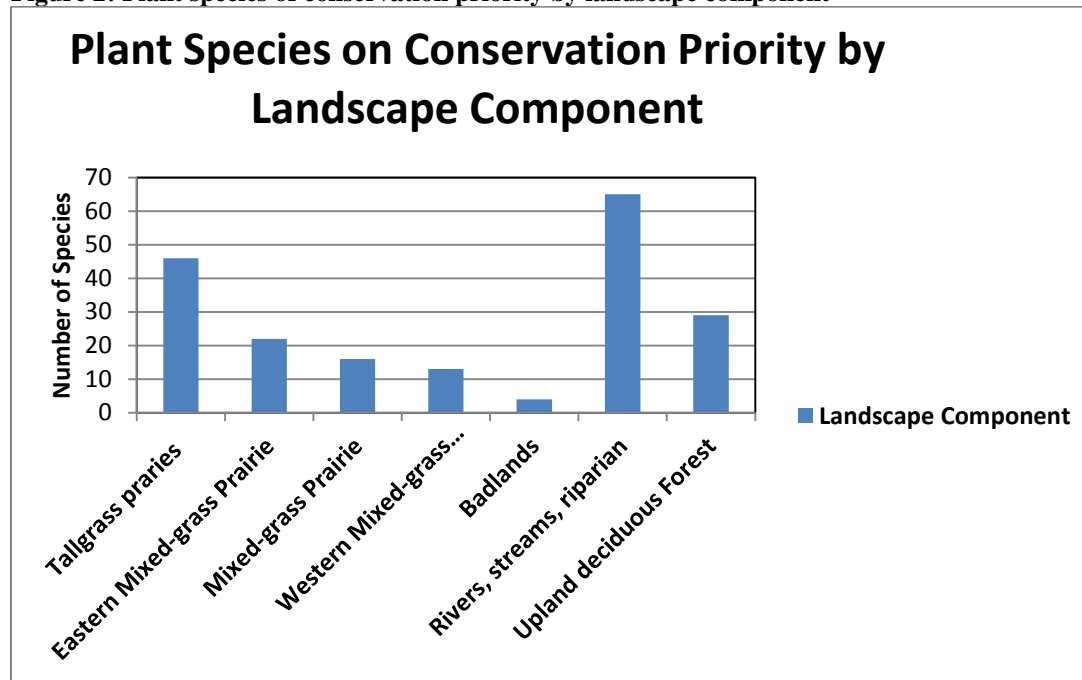


Figure 2: Plant species of conservation priority by landscape component



Conservation Actions

The following Objectives and Conservation Actions are statewide in scope, and are applicable to all plant species of concern. The following points prioritize species conservation actions on a species-by-species basis. The six statewide conservation objectives are:

1. ***Secure on-the-ground, site-specific habitat protection and/or management*** to achieve specific goals for all of North Dakota’s sensitive plants on public and private lands. Focus these activities in places that are likely to remain stable under predicted climate change scenarios, and on areas needed to maintain habitat connectivity (e.g., to facilitate climate-related distributional shifts).
2. ***Minimize threats*** from specific land uses that impact many of North Dakota’s sensitive plants statewide, and ***develop climate change adaptation strategies*** for vulnerable species based on the final score of Climate Change Vulnerability Index.
3. ***Improve scientific understanding*** of the distribution, natural history, response to climate change, and status of North Dakota’s most imperiled plants through inventory, research, and monitoring.
4. ***Develop and implement a state program and policies*** to enhance the conservation of North Dakota’s most imperiled plants in cooperation with public land managers, private landowners, and other interested stakeholders.
5. ***Facilitate the stewardship*** of North Dakota’s most imperiled plants through education, outreach, and coordination.

6. *Develop measures for off-site conservation* of North Dakota's most imperiled plants in case native populations are extirpated due to stochastic events, anthropogenic impacts, and/or climate change.

Addressing Plants in the Future

The conservation actions identified in the North Dakota CWCS will undoubtedly benefit Plant Species of Conservation Priority. Multiple species are likely to benefit from conservation actions applied. For example, protecting native tall-grass prairie for the western prairie fringed orchid will also protect swamp smartweed and the yellow lady's slipper, to name a few. In addition, placing species into levels of conservation priority allows us to focus on those species in the greatest need of conservation. Several species included on the list are considered common in North Dakota, or at least, not declining. These species were included because of the state's importance as a last stronghold for that particular population, or because of their contribution to species diversity in North Dakota.

Climate change has a great influence on species distribution, population, and overall survival and is an important factor to start addressing now for the future. The change in climate is driving plants out of their current geographic ranges and will likely result in regional extirpation and even extinction for some plant species. Warmer temperatures and changing precipitation patterns have shifted vegetation in several ecosystems; alteration of seasons has changed the timing of life-cycle events of plants and animals, potentially resulting in an asynchrony between plants, environmental cues, and interacting organisms such as pollinators. The United Nations Intergovernmental Panel on Climate Change (IPCC 2007) predicts that all of North America is likely to warm by 2 °C (3.6 °F) during this century, and there will likely be more droughts and other extreme weather events. North Dakota will likely become hotter and drier with shorter snow seasons, earlier snow melt, and longer fire seasons. These potential impacts will interact with the other stresses to sensitive and threatened plants, such as loss or fragmentation of habitat from development, mining, and introduction of invasive species. The full impacts of climate change on imperiled species are likely to significantly reduce habitat, which is particularly problematic for rare plants that demand very specific growing conditions.

North Dakota's plant of conservation priority list comprises the framework for much of the ND Comprehensive Wildlife Conservation Strategy. As such, it will be important to periodically assess changes in status of species on this list. Due to the time needed to survey population dynamics and detect changes in species range, distribution, and abundance trends, a review of plant species of conservation priority is conducted at four year intervals.

Section 2 Climate Change

Climate Change Vulnerability Assessment

Several tools have been developed to identify which species and habitats are most imperiled by the negative impacts of climate change. Species-level vulnerability assessments are typically based on intrinsic life history traits, species distribution models (SDMs), or both. The trait-based approach requires that a set of attributes relevant to avoiding or tolerating climate change are identified and scored. The sum of these scores represents the species' overall vulnerability to climate change and a list of species can then be ranked with regards to their predicted vulnerability.

A leading example of incorporating both species traits and SDMs comes from NatureServe, a non-profit organization whose mission is to provide the scientific basis for effective conservation action. NatureServe developed the Climate Change Vulnerability Index (CCVI) to serve as a standardized methodology to assess vulnerability to climate change at the species level. The CCVI is a Microsoft Excel document consisting of four main sections: Section A - Direct exposure to changing temperature and precipitation; Section B - Indirect exposure to climate change, including sea level rise, natural and human barriers, and land impacts from climate mitigation; Section C - Sensitivity factors (life history attributes) including dispersal ability, temperature and precipitation sensitivity, physical habitat specificity, interspecific interactions, genetic factors, and phenology, and Section D - modeled response to climate change (optional depending on available data).

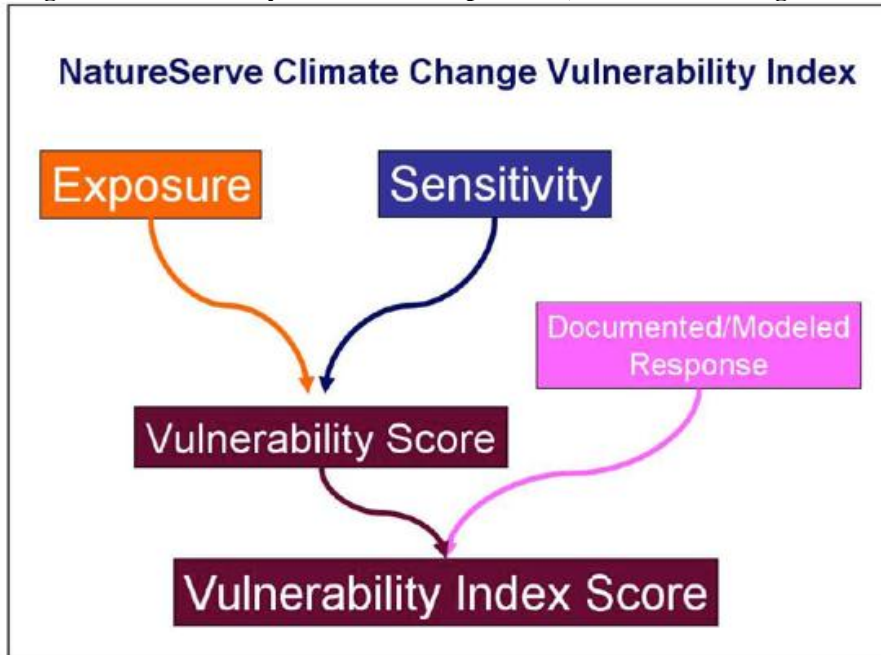
CCVI Overview

Assessing vulnerability involves determining the severity and scope of the exposure that plant species experience, combined with species' sensitivity and capacity to adapt to climate change (Young et al. 2010). The CCVI examines how changed climate in a species range will impact a species using exposure and plant characteristic factors known to be associated with vulnerability to climate change, including species-specific factors as well as external stressors imposed by human actions. The Index divides vulnerability into four main components (Fig. 3) including direct exposure, indirect exposure, sensitivity, and modeled response. Detailed information including the scientific references used to develop each factor and the limitations of the methodology are given in Young et al. (2010).

Exposure to climate change is measured by examining the magnitude of predicted temperature and moisture changes across the range of the species within the assessment area and the plant life history data is used to estimate adaptability to climate change. For example, a highly sensitive plant species is not predicted to suffer if the climate remains stable, and an adaptable species would presumably not decline with changes in temperature and/or precipitation.

Climate data (discussed below) was available for historic and predicted future temperature and precipitation. Climate modeling data and projections for the year 2050 was downloaded from NatureServe's Climate Wizard (www.climatewizard.org), and displayed in a GIS format.

Figure 3. Vulnerability assessment components (Taken from Young et al. 2011)



Assessment Process

We assessed the vulnerability of 100 sensitive plant species of North Dakota to climate change using NatureServe’s Climate Change Vulnerability Index (CCVI). Our work can be divided into three main parts. First (1), we assigned a climate change vulnerability score to each of 100 sensitive plant species. The vulnerability scores are based on the exposure to changes in climate and the adaptability to these changes based on life history attributes), as specified by the Climate Change Vulnerability Index (CCVI) of NatureServe. Second (2), we conducted a distribution analysis based on ecoregions level IV, landscape components, and focus areas, discussed in sections 3 and 4.

We scored vulnerability by the different ranks available for each category. The different options for ranking ranged from ‘Decreased Vulnerability’ up to ‘Greatly Increased Vulnerability’. All species were evaluated individually based on spatial relationships (viewed in GIS) among known Eos, their surrounding barriers (natural or anthropogenic), and available life history data to complete section C. After ranking plant species according to all factors mentioned above they were given a final climate change vulnerability score (table 5).

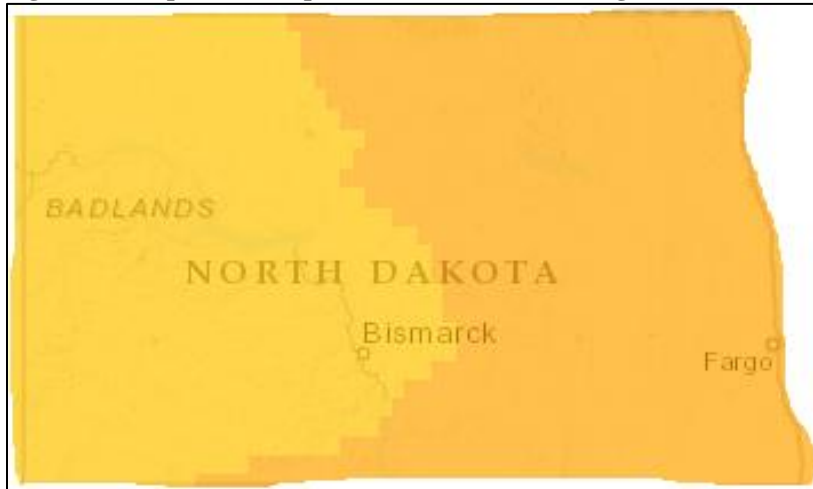
Table 3: CCVI Score Categories

Extremely vulnerable (EV)	Abundance and/or range extent within geographical area assessed extremely likely to substantially decrease or disappear by 2050.
Highly vulnerable (HV)	Abundance and/or range extent within geographical area assessed likely to decrease significantly by 2050.
Moderately vulnerable (MV)	Abundance and/or range extent within geographical area assessed likely to decrease by 2050.
Presumed Stable (PS)	Available evidence does not suggest that abundance and/or range extent within the geographical area assessed will change (increase/decrease) substantially by 2050. Actual range boundaries may change.
Increase likely (IL) (no plants)	Available evidence suggests that abundance and/or range extent within geographical area assessed is likely to increase by 2050.
Insufficient evidence (IE) (no plants)	Available information about a species' vulnerability is inadequate to calculate an Index score.

Section A: Exposure to Local Climate Change

Temperature: All of North Dakota’s sensitive plant species fall within the two categories (figure 4) >5 degrees warmer within the species distribution and 5.1-5.5 degrees warmer within the species distribution. Temperature change is the predicted change in annual temperature by 2080

Figure 4: Temperature Exposure; North Dakota changes, which fall into the top two highest exposure categories



AET: PET Moisture Metric: The CCVI integrates projected temperature and precipitation changes to indicate how much drying will take place. This metric (figure 5) was created by NatureServe as part of the CCVI and was created using the climate wizard on their website (<http://www.climatewizard.org/>). We used GIS to determine which species fall within each rating category, which were >-0.028 up to -0.096 . Precipitation change is the predicted change in annual precipitation by 2050

Figure 5: Precipitation Exposure for North Dakota



Section B: Indirect Exposure to Climate Change

1. **Exposure to sea level rise:** This factor does not pertain to North Dakota, so all species were rated 'Neutral'.
2. **Distribution relative to barriers:** This category assesses the degree to which a species' vulnerability is influenced by its ability to shift range in response to climate change. We scored plant species based on both natural barriers and anthropogenic barriers using the Wildland Urban Interface map (Figure 6).
3. **Land use changes resulting from human responses to climate change:** This category assesses mostly renewable energy project development such as wind farm projects, biofuel production, and ethanol plant development. We used a wind speed map, biofuel production map, and marked current wind farms and ethanol plants throughout the assessment area to log their proximity to current sensitive plant species (figures 7a and 7b).

Figure 6: Wildland Urban Interface for North Dakota. Shades of green are undisturbed lands, red orange and yellow are inhabited and tan is uninhabited-other.

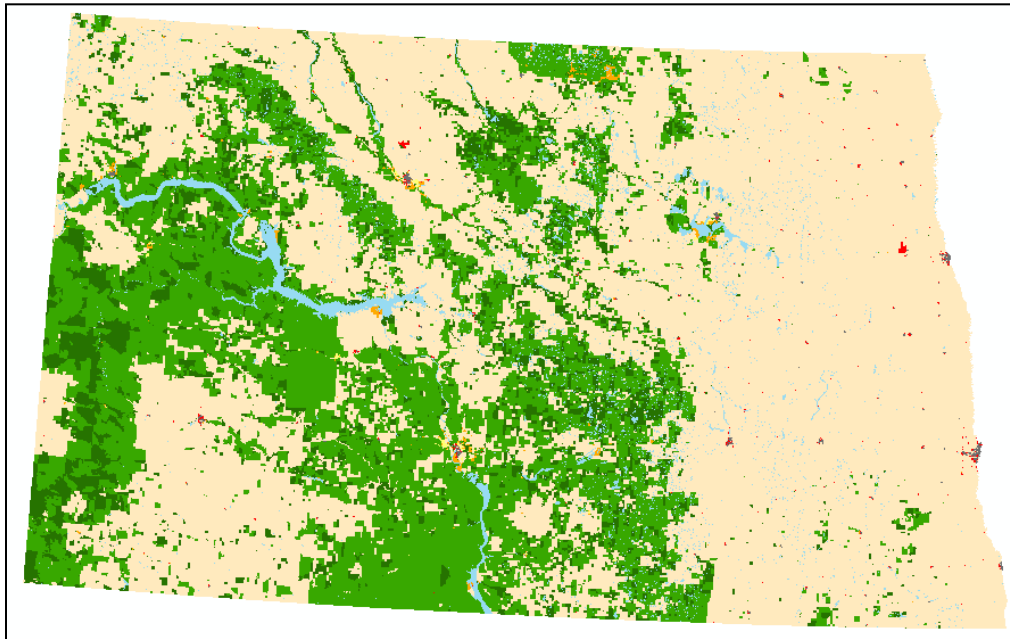


Figure 7: North Dakota Wind Resource Map. The map gives insight into areas with the potential to develop wind farms.

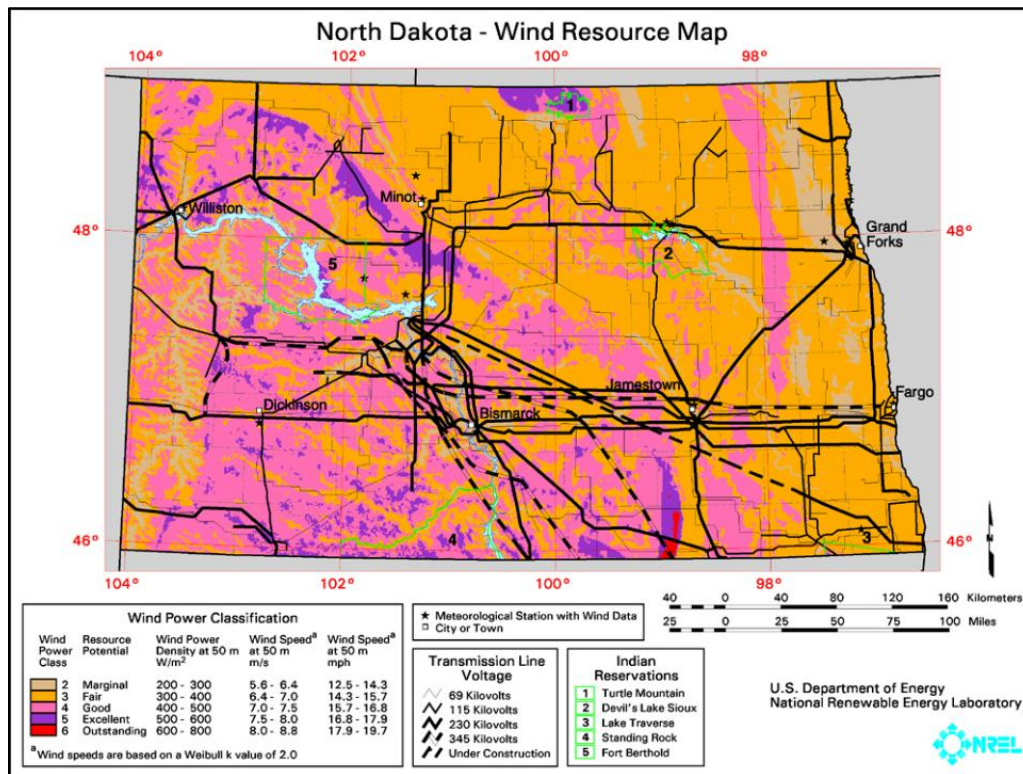
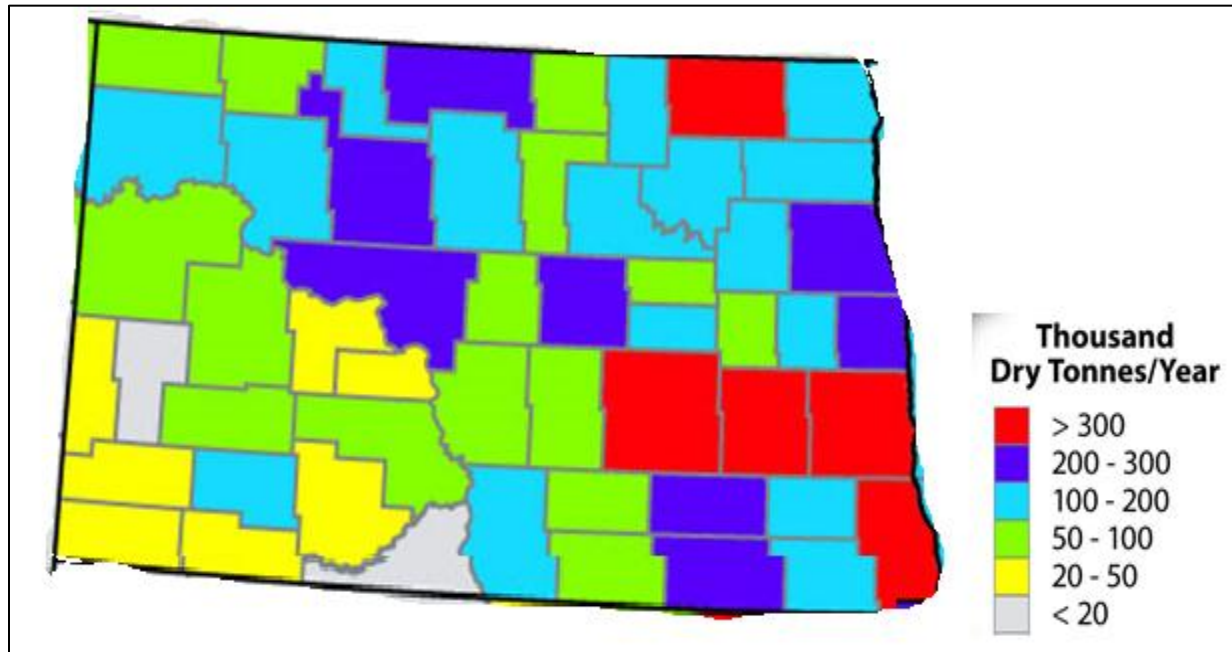


Figure 8: Biomass production map of North Dakota



Section C: Sensitivity

1. **Dispersal and movement:** Our list consisted of many species rated ‘greatly increased’ because of narrow, rare, and limited distributions throughout the assessment area. For example, we followed a guideline created based on dispersal type to assess all species based on the same table of dispersal (figure 8).

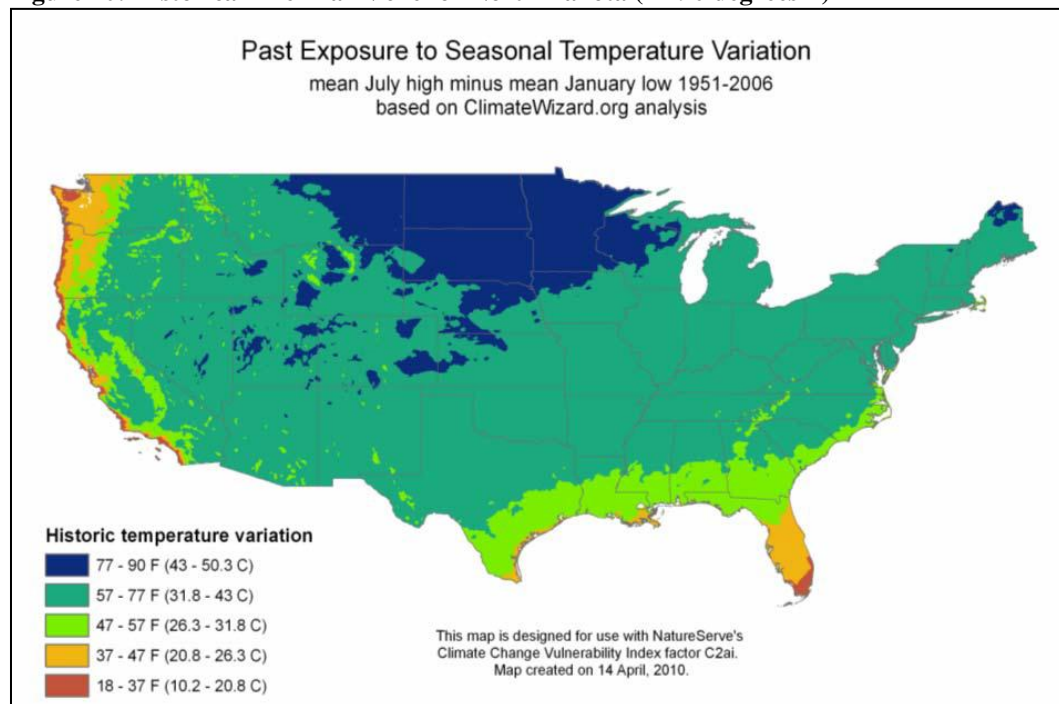
Figure 9: Plant dispersal guidelines

Ant	
Ant: Patchy	1
Ant: Continuous	2
Passive (gravity/no mode)- Autochory/Barochory	
Passive: Patchy	3
Passive: Continuous	4
Hydrochory (Water)	
Water: Patchy	5
Water: Continuous	6
Anemochory (Wind)	
Wind: Patchy	7
Wind: Continuous	8
Zoochory (Vertebrate)	
Vertebrate: Patchy	9
Vertebrate/Continuous	10
Low Vul. 8, 10 6 7 9, 5 4, 2 1, 3 High Vul.	

2. **Sensitivity to temperature and moisture changes:** This factor pertains to the span of temperature and precipitation conditions within which a species is known to be capable of reproducing, growing, or otherwise existing. Species with small habitat ranges and specific environmental requirements may be more vulnerable to habitat loss from climate change than widespread species.

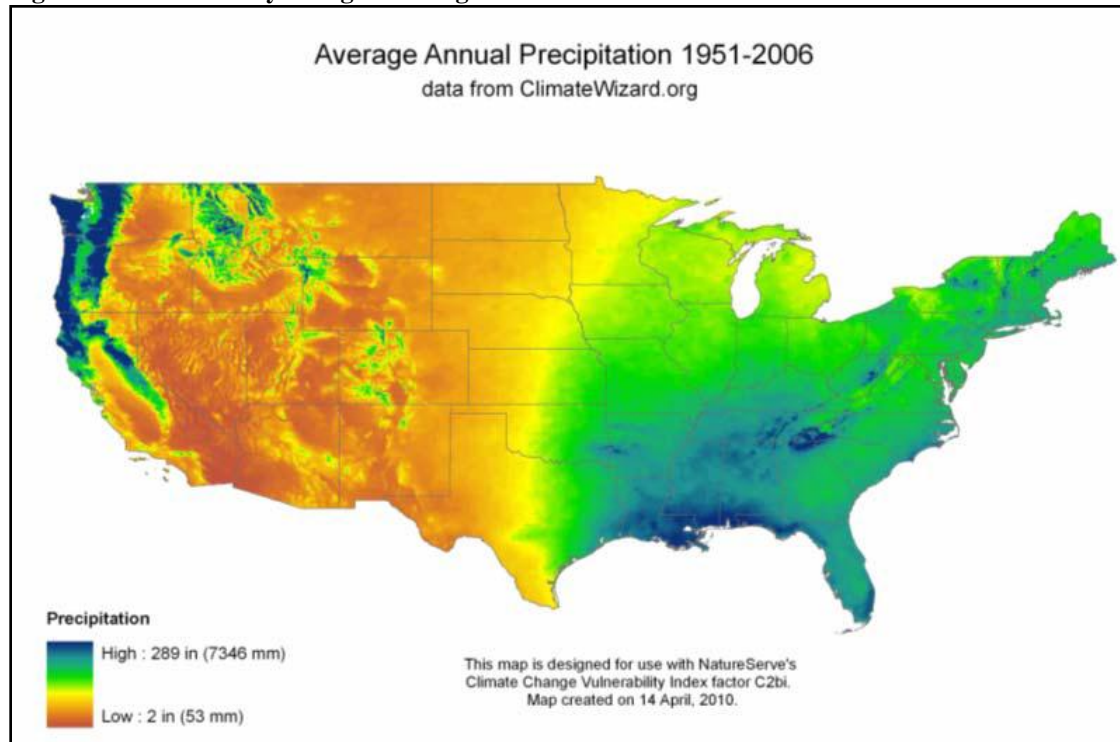
(a.i.) **Historical thermal niche:** This factor (figure 9) measures large-scale temperature variation that a species has experienced in recent historical times (i.e., the past 50 years), as approximated by mean seasonal temperature variation. It measures the difference between highest mean monthly maximum temperature and lowest mean monthly temperature. It is a stand-in for species' temperature tolerance at a broad scale. This factor was calculated in GIS by assessing the relationship between individual species distributions and associated historical temperature variation data downloaded from NatureServe. All of North Dakota fell into the highest category of 77-90 degrees F.

Figure 10: Historical Thermal Niche for North Dakota (77-90 degrees F)



(b.i.) **Historical hydrological niche:** This factor (figure 10) measures large-scale precipitation variation that a species has experienced in recent historical times (i.e., the past 50 years) as approximated by mean annual precipitation variation across the assessment area. This factor was calculated in GIS by overlaying the plant species' distributions on mean annual precipitation data (1951-2006) from NatureServe's Climate Wizard. Our assessment area fell into the lower (orange and yellow) range of predicted temperature changes.

Figure 11: Historical hydrological changes in the North Dakota assessment area.



(c.) **Dependence on specific disturbance regime:** This factor pertains to a species' response to specific disturbance regimes such as fires, floods, severe winds, pathogen outbreaks, or similar events. We assessed our plant species list mainly based on dependence on fire and flood regimes and other disturbances were taken into consideration if information was available. We put together a standard for scoring species based on their tolerance to fire and floods.

Fire regimes

If there is no dependence on a fire regime the species is scored as neutral. If there is dependence on fire then we look into a variety of factors including vegetative habitat, graminoid/herbaceous, annual/perennial and if fire is beneficial or detrimental (fire tolerable, fire colonizer, fire avoider) to a plant species

Flooding regimes

Flooding regimes were ranked based on frequency and intensity changes that may arise from climate change. We also used the interactive USDA, NRCS Wetland Indicator Status tool to look at the species dependency on wetlands and the affects changing water levels would have on wetland plant species. For example obligate or facultative, facultative upland, or obligate upland wetland species. A plant species that depends on an obligate wetland habitat would rank more vulnerable to changes in flooding patterns than a facultative upland species.

3. **Restriction to uncommon geological features or derivatives:** Restriction to uncommon geological features or derivatives considers species that require specific substrates, soils, or physical features, such as caves, cliffs, or sand dunes. To assess sensitive plant species, it was important to consider soil endemics, so SSURGO soil data from the NRCS (<http://soil-datamart.nrcs.usda.gov>) was layered in a GIS to aid literature in determining substrate restrictions. NDNHP records, USDA and NRCS databases, and NatureServe's Explorer were all considered here. Species with uncommon geological features are vulnerable because climate envelopes may shift away from the locations of fixed geological features, making species tied to these uncommon features potentially more vulnerable to habitat loss than species with general, common substrates.
4. **Reliance on specific interactions:** Reliance on interspecific interactions relates to species having any relationship with other species that are important in some part of their life cycle. Literature and research were the main source of data for this factor. The subsections are:
 - a. **Dependence on other species to generate habitat:** This factor was rated 'Neutral' unless research found sound evidence otherwise.
 - b. **Pollinator versatility:** Species were ranked 'greatly increased' (if a species had less than 3 main pollinators) or 'somewhat increased' (and lower, depending on the amount of pollinators).
 - c. **Dependence on other species for propagule dispersal:** Species were ranked 'Neutral' unless there was available data stating propagules cannot be dispersed on their own or propagules are not dispersed by more than one other species.
 - d. **Forms part of an interspecific interaction not covered above:** This factor relates to interactions unrelated to habitat, seed establishment, and diet, pollination, or propagule dispersal. An interspecific interaction can include mutualism, parasitism, commensalism, or predator-prey relationship. *Platanthera praeclara* and some of the *Astragalus* species were ranked 'Increased' or higher because of mycorrhizal relationships with soil fungus or bacteria.
5. **Genetic Factors:** Rated 'Unknown' for all plant species due to a lack of information.
6. **Phenological response:** Refers to some phylogenetic groups that are declining due to lack of response to changing annual temperature dynamics (e.g. earlier onset of spring, longer growing season), and some temperate zone plants are not moving their flowering times. This factor was rated as 'Neutral' because of lack of data. If there is available data the species was assessed for this factor.

Guidelines

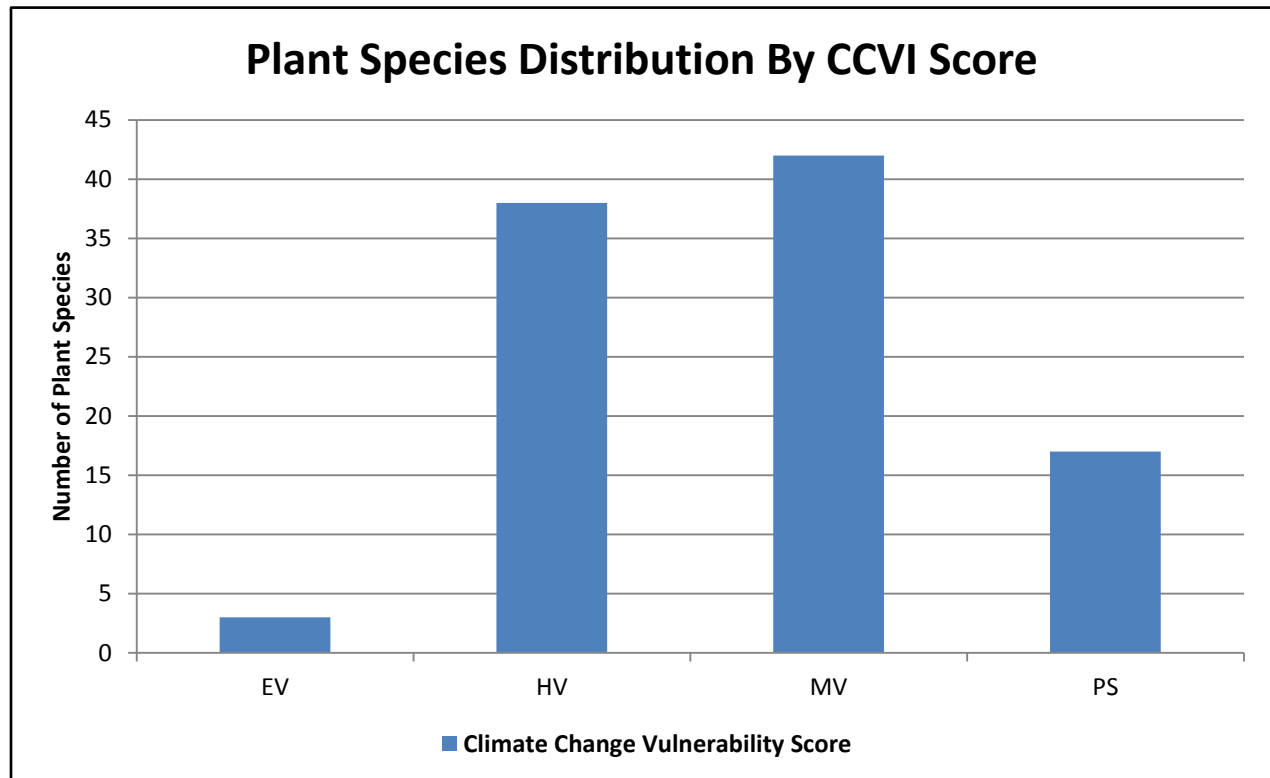
One suggestion for using the CCVI is to adapt the CCVI to specific needs, project objectives, and available data. The factor questions are easy to manipulate and rephrase to create factor questions based on available assessment area data. For example, we developed our own guidelines to tailor some questions to match available data for most of the species. Some of the factors we standardized based on available data are dispersal and disturbance regimes, and additional information was used for section B such as a Wildland Urban Interface, locations of current ethanol plants and wind farms, topography, and trails and roads.

Section D: Modeled Response

This section is optional and allows for modeling change in range size and overlap of modeled future range with current range. We did not use this section of the Index for a final vulnerability score. We used the Maxent algorithm, which is a statistical model that uses machine learning to create potential distributions for all species.

The resulting CCVI scores for all species (figure 11) are extremely vulnerable (n = 3), highly vulnerable (n = 38), moderately vulnerable (n = 42), presumed stable (n = 17), increase likely (n = 0), and insufficient evidence (n = 0). The majority of our sensitive plant species have a score of HV or MV. In the sections to follow the plant species are broken down by their CCVI score (EV, HV, MV, PS) and linked to the ecoregion, landscape component, and focus area that supports the plant species.

Figure 12: Plant species distribution by climate change vulnerability



The top most vulnerable plant species on our list are listed in table 4 below. We included extremely and highly vulnerable plant species as our top most vulnerable plant species to climate change.

Table 4: The top plant species vulnerable to climate change in our subset. Confidence ranges are very high (VH), high (H), moderate (Mod), and low.

State Scientific Name	State Common Name	State Rank	Climate Index Rank	Confidence	Level
<i>Platanthera praeclara</i>	Western Prairie Fringed Orchid	S2	EV	VH	I
<i>Triantha glutinosa</i>	Sticky False-asphodel	S1	EV	VH	I
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	EV	VH	II
<i>Allium canadense</i>	Meadow Onion	S1	HV	VH	I
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	HV	Mod	I
<i>Astragalus neglectus</i>	Cooper's Milkvetch	S1	HV	VH	I
<i>Chenopodium subglabrum</i>	Smooth Goosefoot	S1	HV	Mod	I
<i>Cypripedium candidum</i>	White Lady's-slipper	S2	HV	VH	I
<i>Helianthemum bicknellii</i>	Bicknell's Sunrose	S1	HV	Low	I
<i>Polygonum leptocarpum</i>	Thin-fruited Knotweed	S1	HV	Mod	I
<i>Carex echinata</i> ssp. <i>echinata</i>	Spiny Sedge	S1	HV	Mod	II
<i>Cheilanthes feei</i>	Slender Lip Fern	S1	HV	VH	II
<i>Clematis columbiana</i> var. <i>tenuiloba</i>	Slender-lobed Clematis	S1	HV	VH	II
<i>Cyperus bipartitus</i>	Brook Flatsedge	S2	HV	Low	II
<i>Cypripedium reginae</i>	Showy Lady's-slipper	S2	HV	Low	II
<i>Drosera rotundifolia</i>	Round-leaved Sundew	S1	HV	Low	II
<i>Liparis loeselii</i>	Loesel's Twayblade	S2	HV	Mod	II
<i>Lipocarpha micrantha</i>	Small-flowered Lipocarpha	S1	HV	Mod	II
<i>Minuartia dawsonensis</i>	Stiff Sandwort	S1	HV	Mod	II
<i>Onoclea sensibilis</i>	Sensitive Fern	S2	HV	Low	II

<i>Pogonia ophioglossoides</i>	Rose Pogonia	S1	HV	VH	II
<i>Polygonum hydropiperoides</i>	Swamp Smartweed	S1	HV	VH	II
<i>Rorippa calycina</i>	Hayden's Yellowcress	SH	HV	VH	II
<i>Salix maccalliana</i>	Swamp Willow	S1	HV	Mod	II
<i>Scheuchzeria palustris</i>	Pod Grass	S1	HV	Mod	II
<i>Selaginella rupestris</i>	Ledge Spike-moss	S1	HV	VH	II
<i>Sphagnum teres</i>	Round-leaved Sphagnum	S1	HV	VH	II
<i>Astragalus vexilliflexus</i>	Bent-flowered Milkvetch	S3	HV	Low	III
<i>Carex capillaris</i>	Hair-like Sedge	S2	HV	Low	III
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	S2	HV	Low	III
<i>Eleocharis parvula</i>	Dwarf Spikerush	S2	HV	Low	III
<i>Equisetum sylvaticum</i>	Wood Horsetail	S2	HV	Low	III
<i>Eriophorum chamissonis</i>	Chamisson's Cottongrass	S2	HV	Low	III
<i>Eriophorum viridicarinatum</i>	Green Keeled Cottongrass	S2	HV	Low	III
<i>Geranium maculatum</i>	Wild Geranium	SH	HV	Low	III
<i>Mitella nuda</i>	Naked Mitrewort	S3	HV	Low	III
<i>Orobanche uniflora</i>	One-flowered Broomrape	SH	HV	VH	III
<i>Petasites frigidus</i>	Sweet Coltsfoot	S2	HV	Low	III
<i>Platanthera clavellata</i>	Green Woodland Orchid	SH	HV	VH	III
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort	S2	HV	Low	III
<i>Viola conspersa</i>	Bog Violet	S2	HV	Mod	III

Conclusion

NatureServe's CCVI is an excellent structure and transparent clearinghouse for information regarding climate change vulnerability. It considers a comprehensive list of extrinsic and intrinsic factors that may influence vulnerability, and also allows input of model-based results. It can also be used for both plant and animal species, and it can be used by many different groups of people. However, there are a few problems with the CCVI in terms of accurately scoring threatened, endangered, and other species of concern, because of a lack of data and population data.

Dealing with Plant Species of Conservation Priority, it is hard to find available life history data for each species; important plant vulnerabilities may be missing and may not be accurately ranked, which may not reflect true vulnerability. Some things that are hard to track for individual species include mating system (selfer vs. out crosser), pollinator specificity and efficiency, fire and flood tolerances, and microhabitat data.

When information was lacking, our standardized guidelines made it easier to accommodate species with a lack of available data. This is also convenient because some of the scoring guidelines are too intricate for the species we assessed that have very small distributions. Some species having only a few points on a map, but guidelines made the CCVI work just as well for these plant species.

Section 3

Habitat Threats and Conservation Actions

Introduction

Agencies and organizations are a main source of information general information with respect to threats and conservation actions but in depth information was lacking. In an attempt to gain additional insight into conservation actions is consulting with individuals having knowledge and expertise on specific taxa. It is necessary to frequently improve knowledge gaps of specific taxa. Information has been gathered and added to a matrix of threats and conservation actions, including ideas of forming a working practical framework for conservation implementation. For the most part, major problems affecting species and associated conservation actions were identified in general terms. Issues and actions have been identified for most sensitive plant species in North Dakota, but exact causes require more species specific research and monitoring.

Numerous agencies including the ND Game and Fish have implemented conservation actions in North Dakota, particularly with respect to waterfowl and grassland nesting birds. The Prairie Pothole Joint Venture has secured thousands of acres of grassland and wetland easements. The main goal of this project is to simply incorporate plant species into the current matrix of animal species that the ND Game and Fish have already built to increase awareness.

Problems Affecting Plant Species of Conservation Need

North Dakota is an agricultural state. It ranks number one in production of barley and sunflowers in the United States. The state ranks number two for wheat production, and interestingly, number four for bee and honey production. There are approximately 30,000 active farms averaging nearly 1,300 acres in size. At one time, in 1935, the state had nearly 85,000 individual farms. While the number of farms has declined, the average farm size is increasing. Cattle production ranks number 16 in the nation with nearly 1.9 million cattle raised in the state.

North Dakota's irreplaceable native plants, plant communities, and ecosystems are thus increasingly being threatened. Some of North Dakota's sensitive plants are naturally rare. They are rare because they are restricted to very specific, narrowly distributed habitats, and other sensitive plant species are threatened as a result of human actions, such as agricultural practices and wetland draining. The fact that most of plant species analyzed occupy such small areas or have small distributions, planning is necessary to avoid placing these species at further risk from human activities. Degradation, land conversion, fragmentation, and loss of habitat are major reasons plant species and their habitats are imperiled or vulnerable in North Dakota. The primary contributors to habitat degradation for imperiled plants are energy development in the western portion of North Dakota, motorized recreation, residential development, and road construction and maintenance. Other risk factors include altered hydrologic regime, invasive

species, agricultural development, loss of pollinators, incompatible grazing/trampling, and plant collecting, fire suppression, and urbanization of grassland habitat. Additionally, there is strong scientific consensus that human-induced climate change is affecting species and ecological systems, and this is likely to continue- making plant and habitat management a priority for future conservation.

One of the biggest issues is a lack of awareness and information regarding the presence, distribution, and precarious status of North Dakota's native and sensitive plant species. Many rare plants have specialized needs, and have unique habitat requirements that are often missed by other approaches to conservation (e.g., western prairie fringed orchid; a Tall-grass prairie specialists).

The Process for Identifying Threats and Conservation Actions

For the most part, major threats affecting species and associated conservation actions were identified in general terms (i.e. loss of habitat due to agricultural conversion, protect habitat with grassland easements). More specific information was often lacking. For example, although a substantial portion of sagebrush habitat in North Dakota has been converted to cropland or has been severely degraded by grazing or other land uses, a fair amount of habitat remains intact, some plant species can be sensitive to changes due to climate and continue to decline despite the intact habitat. The most common threats include continued habitat conversion, industrial development, grazing, noxious weeds, invasive plants, predation, disease and climatic change. While conservation issues and actions have been identified for all of these potential problems, the specific threats towards plant species decline are hard to pinpoint, but they continue to unfold with continuous research towards plant characteristics.

Some agencies have developed programs or software to better understand natural and anthropogenic threats. NatureServe created the Climate Change Vulnerability Index to aid in understanding climate vulnerability and associated declines for both plants and animals, and the Nature Conservancy addresses threats to conservation involving climate change, fresh water, and conservation of land.

Research Needs for Developing Conservation Actions

There is a clear need to collect baseline presence, absence and distribution data for many species of conservation priority. There is also a major need to conduct research or collect information on threats and conservation actions affecting many of these species. It is essential to strike a balance between initiating studies or research to improve understanding of the threats and/or conservations actions with those studies intended to provide a better understanding of the population status for Species of conservation priority. Some of the threats and conservation actions are fairly well researched and documented (e.g. loss of native prairie and wetlands to

cropland) while others have only been discussed or identified in a generic or anecdotal sense (e.g. pesticides, herbicides, road kills, disease, etc.). In those instances where little or nothing is known about the population status of a particular species, there is an overriding need to obtain this information prior to initiating action on generic or perceived threats.

As varying climatic conditions in North Dakota can mean substantial changes in many populations, it would be imprudent to begin studies or research on unsubstantiated threats or conservation actions without first knowing something about the population status or natural variability of a particular species or group of species. When the population status of a species is not in question, and conservation actions and/or threats are well defined, documented and understood, the intention is to initiate conservation actions that improve habitat conditions or reduce the impacts of threats. For species of conservation priority that have good population trend data but whose threats and conservation actions are not well understood, research is needed to identify relevant threats and the appropriate conservation measures which might be conducted. Table 5 summarizes the main threats and conservation actions of North Dakota's species of conservation priority.

Table 5: Overview of the main threats and conservation actions for North Dakota’s plant species of conservation priority.

Species Name	State Rank	Global Rank	Climate Index Rank	Level	Landscape Component	General Threat	Specific Threat	Conservation Action
<i>Allium canadense</i> (Meadow onion)	S1	G5	HV	I	Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Climate, limited habitat	Vulnerability due to movement and dispersal barriers, shifting precipitation patterns due to climate change	Model potential habitat/range shifts in response to projected climate changes and prepare management plans
<i>Asclepias lanuginosa</i> (Woolly Milkweed)	S1	G5	HV	I	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian	Climate change, habitat alterations/loss, poor dispersal	temperature and precipitation changes altering soil chemistry and crop production	Further research and monitoring of life history requirements
<i>Astragalus neglectus</i> (Cooper's Milkvetch)	S1	G4	HV	I	Tallgrass Prairie	Climate change, limited/rare habitat, natural factors	Restricted habitat of calcareous soils with a limestone base, encroachment	Further research and monitoring of life history and reproductive biology requirements
<i>Botrychium campestre</i> (Prairie Grapefern)	S1	G3G4	MV	I	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian	Anthropogenic disturbances (habitat loss and fragmentation)	greatly affected by disturbance, primarily only found on high quality prairie	Protect large tracts of grassland, prevent encroachment and overgrazing, and conduct further life history research
<i>Carex formosa</i> (Handsome Sedge)	S1	G4	MV	I	Tallgrass Prairie, Rivers, Streams, and Riparian	Habitat alterations/disturbances	residential development, grazing, timber harvest	Protect habitat, prevent encroachment from invasive species, and overgrazing
<i>Chenopodium subglabrum</i> (Smooth Goosefoot)	S1	G3G4	HV	I	Rivers, Streams, Riparian, Western Mixed-grass/Shortgrass Prairie, Badlands	Lack of data and climate change	lack of population and life cycle requirements necessary for survival	A combination of fire and grazing during the appropriate seasons ; controlling noxious weeds, especially leafy spurge
<i>Cypripedium candidum</i> (White Lady's Slipper)	S2	G4	HV	I	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Lack of data and climate change	lack of population and life cycle requirements	Monitor habitat condition and management on a periodic basis to ensure that optimal site management is being achieved.
<i>Eriogonum visheri</i> (Dakota Buckwheat)	S2	G3	MV	I	Western Mixed-grass/Shortgrass Prairie, Rivers, Steams, Riparian	habitat alterations, invasive species, and climate change	precipitation and temperature changes in the region altering soil chemistry that the plant needs; invasive Russian thistle and Kochia.	establish knowledge of population locations, extent, demographic characteristics, and changes in population characteristics over time.
<i>Helianthemum bicknellii</i> (Bicknell's Sunrose)	S1	G5	HV	I	Tallgrass Prairie	Climate change, lack of habitat	Has specific habitat and climate requirements	Further research and monitoring of life history requirements
<i>Mentzelia pumila</i> (Dwarf Menzelia)	S1	G4	PS	I	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Lack of habitat in the region	Historical records in North Dakota show that this species has been limited to one location in Slope County, near the Limber Pines Area.	Research critical life history/habitat components
<i>Platanthera praeclara</i> (Western Prairie Fringed Orchid)	S2	G3	EV	I	Tallgrass Prairie, Rivers, Streams, and Riparian	climate change, invasive species, over-grazing	Specific habitat requirements, loss of mesic wet prairie, land conversion for agriculture; hydrologic changes, fire suppression	Determine the role of disturbance in maintaining managing existing populations, monitor pesticide use in orchid habitat

Species Name	State Rank	Global Rank	Climate Index Rank	Level	Landscape Component	General Threat	Specific Threat	Conservation Action
<i>Polygonum leptocarpum</i> (Thin-fruited Knotweed)	S1	G2G4Q	HV	I	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Climate change, small habitat range	There is an insufficient amount of data relating to this species in North Dakota.	monitor populations, gain knowledge of population locations, extent, demographic characteristics, and changes in population characteristics over time.
<i>Triantha glutinosa</i> (Sticky False - asphodel)	S1	G5	EV	I	Eastern Mixed-Grass Prairie, Rivers, Streams, and Riparian	climate change, human activity	extremely vulnerable to climate change according to the CCV Index	Practice rotational burning, set aside large tracts of native prairie, prevent overgrazing, monitor encroachment
<i>Botrychium minganense</i> (Moonwort)	S1	G4	MV	II	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	habitat loss/degradation, human activity, moderately vulnerable to climate change	land use practices, maintaining shade and bog habitat	A paper that is currently being worked on is going to analyze the different plant communities where this Botrychium species occurs and to establish the best conservation and management strategies
<i>Botrychium multifidum</i> (Leathery Grapefern)	S1	G5	MV	II	Tallgrass Prairie, Upland Deciduous Forest	moderately vulnerable to climate change, specific habitat requirements, encroachment	habitat degradation, invasive species	Research critical life history/habitat components, control non-native species
<i>Botrychium simplex</i> (Least Grapefern)	S2	G5	PS	II	Tallgrass Prairie	habitat alterations, invasive species, and climate change	domestic livestock, recreational activities, logging, road maintenance, fire, woody plant encroachment, pollution, and development	Research critical life history/habitat components, threats and responses to changes are poorly understood
<i>Campanula aparinoides</i> (Marsh Bellflower)	S2S3	G5	MV	II	Tallgrass Prairie, Rivers, Streams, and Riparian	habitat alterations and climate change	habitat loss, previously undisturbed prairie being broken up to produce crops	Research critical life history/habitat components
<i>Carex alopecoidea</i> (Foxtail Sedge)	S2	G5	MV	II	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	habitat loss/degradation, human activity, moderately vulnerable to climate change	Decreased range extent due to climate change, invasive species, changes in hydrology	monitoring and inventory surveys; more life history research is needed
<i>Carex echinata</i> ssp. <i>Echinata</i> (Spiny Sedge)	S1	G5T5	HV	II	Upland Deciduous Forest	Climate change, habitat fragmentation	land use practices, invasive species, and trampling from overgrazing	research needed for population status and life cycle requirements necessary for survival
<i>Carex leptalea</i> (Delicate Sedge)	S3	G5	MV	II	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Climate change, habitat fragmentation	Peat extraction, fire, hydrolic changes, recreation, invasive species	Species and habitat inventory, establish protected areas, collect sediment data
<i>Carex sterilis</i> (Sterile Sedge)	S1	G4	MV	II	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian	specific habitat requirements, climate change, habitat alterations	Require calcareous fens; The habitat needed for sterile sedge to survive is considered one of the rarest types of wetlands in North America.	Protect habitat from overgrazing and trampling, Avoid any alteration in groundwater flow that feeds these fens
<i>Caulophyllum thalictroides</i> (Blue Cohosh)	S1	G4G5	MV	II	Rivers, Streams, and Riparian, Upland Deciduous Forest	Habitat alterations and climate change	Habitat loss, changes in the amount of precipitation and temperature in the region altering soil chemistry that the plant needs. The largest threat is habitat loss.	Research critical life history/habitat components; recreational use of vehicles, monitor grazing patterns and invasive species
<i>Cheilanthes feei</i> (Slender Lip Fern)	S1	G5	HV	II	Upland Deciduous Forest	Climate change, recreation, energy exploitation	mining and exploration for new wells sites and road construction	Implement best management practices for energy development and monitor species population changes

Species Name	State Rank	Global Rank	Climate Index Rank	Level	Landscape Component	General Threat	Specific Threat	Conservation Action
<i>Clematis columbiana</i> var. <i>tenuiloba</i> (Slender-lobed Clematis)	S1	G5?T4?	HV	II	Upland Deciduous Forest	Climate change, habitat loss	mining and oil exploration activity, recreation and other human activities, changes in temperature and precipitation	Research critical life history/habitat components, prevent or minimize disturbances, monitor for climate adaptations
<i>Collinsia parviflora</i> (Blue Lips)	S2	G5	PS	II	Tallgrass Prairie, Rivers, Streams, and Riparian, Western Mixed-grass/Shortgrass Prairie	Limited range, habitat alterations	Broken prairie due to crop production, specific Butte habitat	Research critical life history/habitat components; threats and conservation needs are poorly understood
<i>Cryptantha torreyana</i> (Torrey's Cryptantha)	S1	G5	MV	II	Western-Mixed Grass/Shortgrass Prairie, Badlands	Limited range, habitat alterations, climate change	Further research and monitoring of life history and reproductive biology requirements; temperature and precipitation changes	gain knowledge of population locations, extent, demographic characteristics, and changes in population characteristics over time
<i>Cyperus bipartitus</i> (Brook Flat Sedge)	S2	G5	HV	II	Tallgrass Prairie, Mixed-grass Prairie, Rivers, Streams, and Riparian	Climate change, habitat alterations, disturbance	Sand plain invasive species, changes in hydrology, temperature, and precipitation	Research critical life history/habitat components; threats and conservation needs are poorly understood; Determine disturbance regimes
<i>Cypripedium parviflorum</i> (Small Yellow Lady's-slipper Orchid)	S2	G5	EV	II	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest	Climate change, habitat fragmentation, human disturbance	Over collecting, fire regime, habitat requirements, changes in temperature and precipitation, exotic species	Protect or create large tracts of grasslands, prevent over-grazing, avoid burning during growing season, survey and map populations
<i>Cypripedium reginae</i> m (Showy Lady's slipper)	S2	G4	HV	II	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Climate change, habitat alterations, invasive species, human disturbance	Fire regime, habitat requirements, changes in temperature and precipitation, exotic species	Protect or create large tracts of grasslands, prevent over-grazing, avoid burning during growing season, survey and map populations
<i>Dirca palustris</i> (Leatherwood)	S1	G4	MV	II	Upland Deciduous Forest	Climate change, habitat fragmentation, human disturbance	Changes in temperature and precipitation, exotic species, changes in hydrology	Research critical life history/habitat components; recreational use of vehicles, monitor grazing patterns and eradicate exotic species
<i>Drosera rotundifolia</i> (Round-leaved Sundew)	S1	G5	HV	II	Upland Deciduous Forest	Climate change, limited range, habitat alterations	Changes in temperature and precipitation, changes in hydrology, drought, habitat loss, bog encroachment	More bog research and inventory, life history data is poorly understood
<i>Equisetum palustre</i> (Marsh Horsetail)	S2	G5	MV	II	Tallgrass Prairie, Rivers, Streams, and Riparian	Climate change, lack of habitat knowledge	Alterations of sandy boggy areas in the region, changes in hydrology regime due to climate change and human activities	Monitor populations in sufficient detail to determine whether viable populations are being maintained, assess the factors causing population fluctuations, and determine the conservation status of the populations.
<i>Equisetum pratense</i> (Meadow Horsetail)	S2	G5	MV	II	Tallgrass Prairie, Rivers, Streams, and Riparian	Climate change, habitat alterations, human activities	Changes in temperature and precipitation, road maintenance, human activity	and why this species prefer certain areas of extensive wetland habitat; monitor population status and control exotic species
<i>Erigeron radicans</i> (Cushion Fleebane)	S1	G3G4	PS	II	Upland Deciduous Forest	habitat loss, human activity	Habitat loss, changes in the amount of precipitation and temperature in the region altering soil chemistry that the plant needs. The largest threat is habitat loss.	Research critical life history/habitat components; recreational use of vehicles, monitor grazing patterns and eradicate exotic species
<i>Eriogonum cernuum</i> (Nodding Buckheat)	S1	G5	MV	II	Upland Deciduous Forest	Careful habitat management, human activity	Decreased range extent due to climate change, invasive species, changes in hydrology	gain knowledge of population locations, extent, demographic characteristics, and changes in population characteristics over time

Species Name	State Rank	Global Rank	Climate Index Rank	Level	Landscape Component	General Threat	Specific Threat	Conservation Action
<i>Eriophorum gracile</i> (Slender Cottongrass)	S1	G5	MV	II	Tallgrass Prairie, Rivers, Streams, and Riparian	habitat degradation, invasive species	Decreased range extent due to climate change, invasive species, changes in hydrology	locations, extent, demographic characteristics, and changes in population characteristics over time
<i>Euonymus atropurpureus</i> (Wahoo)	S3	G5	MV	II	Tallgrass Prairie, Rivers, Streams, and Riparian	Habitat alterations, invasive species, and climate change	threat because it could change the amount of precipitation and temperature in the region	Establish goals based on current conditions and land use; monitor population changes
<i>Galium labradoricum</i> (Bog Bedstraw)	S3	G5	PS	II	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Habitat loss and modification	Shading from native and exotic plants, flooding due to beaver activity, and anthropogenic changes to water quality or hydrologic regime	Aplan for vegetation control should be constructed; beaver activity should be noted and reported if habitat is in danger of being inundated
<i>Gymnocarpium dryopteris</i> (Oak Fern)	S2	G5	MV	II	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Habitat alterations and climate change	grazing, hydrologic alteration, and recreational land use	Monitor all populations in sufficient detail to determine whether viable populations are being maintained, assess the factors causing population fluctuations, and determine the conservation status of the populations.
<i>Hudsonia tomentosa</i> (Whooley Beach-heather)	S1	G5	MV	II	Tallgrass Prairie	Habitat alterations, invasive species, and climate change	threat because it could change the amount of precipitation and temperature in the region altering soil chemistry that the plant needs. The largest threat is habitat	Off-road vehicles, Avoid planting into the open sand dunes and blowouts; Since this plant is highly sensitive to trampling; management guidelines need to be developed to accommodate this.
<i>Lappula cenchrusoides</i>	S1	G4	MV	II	Western Mixed-Grass/Shortgrass Prairie, Mixed-Grass Prairie, Badlands, Rivers, Streams, and Riparian	habitat alterations and climate change	Rare habitat; only documented in Billings, Dunn, McKenzie, Sioux Slope, and Williams Counties.	based on the current conditions; Gaining knowledge of population locations, extent, demographic characteristics, and changes in populations
<i>Lechea stricta</i> (Upright Pinweed)	S2	G4?	MV	II	Tallgrass Prairie	Habitat alterations, invasive species, and climate change, grazing	Identify habitats as priority areas for noxious weed control; Avoid negatively impacting populations.	roads, trails, fences, salting and minerals and other developments in habitat; Identify habitats as priority areas for noxious weed control;
<i>Leucocrinum montanum</i> (Sand Lily)	S2	G5	PS	II	Western Mixed-grass/Shortgrass Prairie	Habitat alterations, loss of habitat	Habitat alterations, loss of habitat	shifts in response to projected climate changes and prepare management plans; conduct species inventory
<i>Liparis loeselii</i> (Loesel's T wayblade)	S2	G5	HV	II	Tallgrass Prairie, Rivers, Streams, and Riparian, Mixed-grass Prairie	Habitat alterations, invasive species, and climate change, grazing	Protection of bogs and fens and changes in hydrology regimes	Determine monitoring plans to fully understand what type of habitat any particular species prefers
<i>Lipocarpha micrantha</i> (Small-flowered Lipocarpha)	S1	G5	HV	II	Tallgrass Prairie, Rivers, Streams, and Riparian	Habitat alterations, invasive species, and climate change, grazing	Highly vulnerable to climate change and shoreline alterations	Protect shorelines, maintain hydrology in seasonally flooded areas
<i>Menyanthes trifoliata</i> (Buckbean)	S2	G5	MV	II	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Habitat alterations, invasive species, and climate change	specific to sphagnum bogs, rich fens, bog birch fens, calcareous fens; susceptible to hydrology changes	preserving habitat and restricting/limiting harvest would be beneficial
<i>Minuartia dawsonensis</i> (Stiff Sandwort)	S1	G5	HV	II	Upland Deciduous Forest	Habitat alterations, lack of knowledge, climate change	Lack of habitat and lack of knowledge	Monitor viable populations; conduct more research to understand life history characteristics
<i>Onoclea sensibilis</i> (Sensitive Fern)	S2	G5	HV	II	Tallgrass Prairie, Rivers, Streams, and Riparian	Habitat alterations, climate change	Groundwater extraction and pollution; oil production distractions	Protect groundwater, closely monitor the affects of oil and gas production; monitor wetland conditions where this species occurs
<i>Ophioglossum pusillum</i> (Adder's Tounge Fern)	S2	G5	MV	II	Tallgrass Prairie, Rivers, Streams, and Riparian	Climate change, limited/rare habitat, natural factors	Grazing, trampling, logging, and any activities which would alter the hydrology of the sites.	No systematic inventories have been undertaken for this species. Inventory efforts could be aided by training individuals to recognize the species and its habitat.

Species Name	State Rank	Global Rank	Climate Index Rank	Level	Landscape Component	General Threat	Specific Threat	Conservation Action
<i>Phlox alyssifolia</i> (Alyssum-leaved Phlox)	S2	G5	PS	II	Rivers, Streams, and Riparian	Habitat alterations, invasive species, and climate change, grazing	Over grazing, habitat loss and alterations, trampling, lack of demographic information	Conduct research and field inventory to refine distribution and changes in hydrology
<i>Pinus flexilis</i> (Lumber Pine)	S1	G5	MV	II	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Climate change, habitat fragmentation, human disturbance	encroachment from other woody plants, changes in precipitation	assess the factors causing population fluctuations, and determine the conservation status of the populations
<i>Pogonia ophioglossoides</i> (Rose Pogonia)	S1	G5	HV	II	Tallgrass Prairie, Rivers, Streams, and Riparian	Climate change, habitat loss	Rare habitat; only documented in Grand Forks county; highly susceptible to climate changes	Continue to study drought tolerance and control non-native plant species
<i>Polygonum hydropiperoides</i> (Swamp Smartweed)	S1	G5	HV	II	Tallgrass Prairie	habitat loss/degradation, human activity, moderately vulnerable to climate change	Specific habitat requirements, loss of mesic wet prairie, land conversion for agriculture; hydrologic changes	Research critical life history/habitat components; recreational use of vehicles, monitor grazing patterns and eradicate exotic species
<i>Populus x acuminata</i> (Lanceleaf Cottonwood)	S2	GNA	MV	II	Western Mixed-grass/Shortgrass Prairie	habitat loss/degradation, human activity, moderately vulnerable to climate change	hydrologic changes, invasive shrubs like Russian Olive	Continue to monitor changes in water levels, erosion and monitor Russian Olive populations
<i>Primula incana</i> (American Primrose)	S2	G4G5	MV	II	Mixed-grass Prairie	habitat loss/degradation, human activity, moderately vulnerable to climate change	Water diversion, over-grazing	Conduct field inventory to refine known distribution, monitor population status
<i>Ribes cynosbati</i> (Prickly Gooseberry)	S3	G5	MV	II	Tallgrass Prairie, Rivers, Streams, and Riparian	Grazing, hydrologic alteration, and recreational land use.	habitat loss and alterations through previously undisturbed prairie being broken to	history/habitat components; recreational use of vehicles, monitor grazing patterns and eradicate exotic species
<i>Rorippa calycina</i> (Hayden's Yellowcress)	SH	G3	HV	II	Rivers, Streams, and Riparian	Climate change, limited/rare habitat, natural factors	The largest threat is habitat loss and alterations through previously undisturbed prairie being broken to produce crops.	viable populations are being maintained, assess the factors causing population fluctuations, and determine the conservation status of the populations. viable populations are being maintained, assess the factors causing population fluctuations, and determine the conservation status of the populations.
<i>Salix maccalliana</i> (Swamp Willow)	S1	G5?	HV	II	Upland Deciduous Forest	Climate change, changes in hydrological regimes	Peat mining could be a threat to this plant since it appears to be restricted to peat substrates	Model potential habitat/range shifts in response to projected climate changes and prepare management plans
<i>Salix pedicellaris</i> (Bog Willow)	S3	G5	MV	II	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Climate change, changes in hydrological regimes	Climate change, changes in hydrological regimes; determine specific hydrological adaptations and responses to drought	Model potential habitat/range shifts in response to projected climate changes and prepare management plans
<i>Scheuchzeria palustris</i> (Pod Grass)	S1	G5	HV	II	Upland Deciduous Forest	Habitat alterations, invasive species, and climate change	Threats to water quality and changes in hydrological cycles from climate change	Maintaining high water quality and natural, stable water levels. This may involve restricting use of road salt and fertilizers in adjacent areas, and regulating water drawdown if the wetland has a dam or is used for irrigation.
<i>Selaginella rupestris</i> (Ledge Spike-moss)	S1	G5	HV	II	Tallgrass Prairie	Climate change, habitat fragmentation, human disturbance	Rare habitat, survey, inventory, and map populations to monitor population status	Research critical life history/habitat components; recreational use of vehicles, monitor grazing patterns and invasive species

Species Name	State Rank	Global Rank	Climate Index Rank	Level	Landscape Component	General Threat	Specific Threat	Conservation Action
<i>Solidago flexicaulis</i> (Zigzag Goldenrod)	S2	G5	PS	II	Tallgrass Prairie, Rivers, Streams, and Riparian	Habitat alterations and human disturbance	Grazing, hydrologic alteration, and recreational land use	Monitor habitat condition and management on a periodic basis to ensure that optimal site management is being achieved.
<i>Sphagnum teres</i> (Round-leaved Sphagnum)	S1	G5	HV	II	Upland Deciduous Forest	Climate change, limited habitat range	Climate change poses a threat because it could change the amount of precipitation and temperature in the region altering soil chemistry that the plant needs.	gain knowledge of population locations, extent, demographic characteristics, and changes in population characteristics over time.
<i>Sporobolus airoides</i> (Alkali Sacaton)	S3	G5	PS	II	Rivers, Streams, and Riparian, Mixed-grass Prairie	habitat alterations and changes in hydrological regimes	Lack of information on plant life history data	Monitor all populations in sufficient detail to determine whether viable populations are being maintained, assess the factors causing population fluctuations, and determine the conservation status of the populations.
<i>Talinum parviflorum</i> (Prairie Fameflower)	S2	G5	MV	II	Rivers, Streams, and Riparian	Climate change, changes in hydrological regimes	Climate change, changes in hydrological regimes; determine specific hydrological adaptations, off-road vehicles and grazing on beaches	Population viability analysis can be used to estimate the minimum population size to sustain the taxon. While this information is being collected, preserving habitat and restricting/limiting harvest would be beneficial.
<i>Townsendia hookeri</i> (Hooker's Townsendia)	S1	G5	PS	II	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Human development and habitat alterations	habitat alterations. Conversion of grasslands to cropland pose a threat to this species. Oil and gas development also would negatively impact <i>Townsendia hookeri</i> .	More research in life cycle requirements and climatic conditions necessary for survival
<i>Triplasis purpurea</i> (Purple Sandgrass)	S1	G4G5	PS	II	Tallgrass Prairie	Climate change, changes in hydrological regimes; determine specific hydrological adaptations	Off road vehicles, human disturbances and grazing near shorelines	Survey, inventory, and map populations to monitor population status
<i>Astragalus drummondii</i> (Drummond's Milkvetch)	S1	G5	PS	III	Rivers, Streams, and Riparian	Habitat alterations, invasive species, and climate change, grazing	Highly vulnerable to climate change and shoreline alterations	Protect shorelines, maintain hydrology in seasonally flooded areas
<i>Astragalus vexilliflexus</i> (Bent-flowered Milkvetch)	S3	G4	HV	III	Upland Deciduous Forest	Habitat loss, climate change, invasive species encroachment	Lack of available data	Protect large tracts of grassland, prevent encroachment and overgrazing, and conduct further life history research
<i>Botrychium matricarifolium</i> (Chamomile Grapefern)	S1	G5	MV	III	Eastern-Mixed-grass Prairie, and Mixed-grass Prairie	lack of knowledge and/or complete North Dakota habitat range	Survey, inventory, and map populations to monitor population status	No systematic inventories have been undertaken for this species. Inventory efforts could be aided by training individuals to recognize the species and its habitat.
<i>Carex backii</i> (Back's Sedge)	S3	G4	MV	III	Mixed-grass Prairie, Upland Deciduous Forest	Habitat alterations, lack of knowledge, climate change	threats to limestone soils on hills and on dry calcareous bluffs and ledges and specific calcareous forests of mixed hardwoods or conifers	Model potential habitat/range shifts in response to projected climate changes and prepare management plans; conduct species inventory
<i>Carex capillaris</i> (Hair-like Sedge)	S2	G5	HV	III	Eastern-Mixed-grass Prairie	Climate change, habitat fragmentation, human disturbance	survey, inventory, and map populations to monitor population status	Prevent encroachment and overgrazing, research proper mowing and prescribed fire management

Species Name	State Rank	Global Rank	Climate Index Rank	Level	Landscape Component	General Threat	Specific Threat	Conservation Action
<i>Cypripedium parviflorum</i> var. <i>pubescens</i> (Large Yellow Lady's Slipper)	S2	G5T5	HV	III	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest	Climate change, lack of knowledge and/or complete North Dakota habitat range	Alteration of hydrological setting, Timber harvest, development, grazing, plant collecting, fire suppression, and prescribed burns during the growing season are possible threats	Further research is always needed as it helps us to better understand the species population dynamics and their life cycle requirements necessary for survival
<i>Dalea enneandra</i> (Nine-anthered Dalea)	S3	G5	MV	III	Rivers, Streams, and Riparian	habitat alterations and changes in hydrological regimes	it is often hard to find specific information regarding management because not a lot of research has been conducted	Research and monitoring
<i>Desmanthus illinoensis</i> (Prairie Mimosa)	S1	G5	PS	III	Tallgrass Prairie	climate change, invasive species, over-grazing	Specific habitat requirements, loss of mesic wet prairie, land conversion for agriculture; hydrologic changes, fire suppression	Protect large tracts of grassland, prevent encroachment and overgrazing, and conduct further life history research
<i>Dicentra cucullaria</i> (Dutchman's Breeches)	S1	G5	MV	III	Eastern-Mixed Grass Prairie, Rivers, Streams, and Riparian	The largest threat is habitat loss and alterations through previously undisturbed prairie being broken to produce crops.	Rabbits, rodents, grasshoppers, and leafhoppers selectively attack legumes, especially at the seedling stage.	Protect large tracts of grassland, prevent encroachment and overgrazing, and conduct further life history research
<i>Eleocharis parvula</i> (Dwarf Skipperush)	S2	G5	HV	III	Tallgrass Prairie, Mixed-Grass Prairie, Rivers, Streams, and Riparian	Climate change, habitat alterations	encroachment from other woody plants, changes in precipitation	Protect habitat and avoid altering natural hydrology, control invasive species
<i>Eleocharis wolfii</i> (Wolf's Skipperush)	SH	G3?	MV	III	Tallgrass Prairie, Rivers, Streams, and Riparian	Climate change, habitat alterations	Human interaction and manipulation of water flow, avoid draining wetlands and altering natural hydrologic regimes.	Protect habitat and avoid altering natural hydrology, control invasive species
<i>Equisetum sylvaticum</i> (Wood Horsetail)	S2	G5	HV	III	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Upland Deciduous Forest	Climate change, limited range in upland deciduous forests	Only two records of the species in North Dakota	Research and monitoring
<i>Eriophorum chamissonis</i> (Chamisson's Cottongrass)	S2	G5	HV	III	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Climate change and loss of habitat	Threats to habitats with peat soil, groundwater discharge, and areas susceptible to decreased snow melt	Conduct research and field inventory to refine distribution and changes in hydrology
<i>Eriophorum viridicarinatum</i>	S2	G5	HV	III	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Climate change and loss of habitat	Threats to habitats with peat soil, groundwater discharge, and areas susceptible to decreased snow melt	Conduct research and field inventory to refine distribution and changes in hydrology
<i>Geranium maculatum</i>	SH	G5	HV	III	Rivers, Streams, and Riparian	Habitat alterations, invasive species, and climate change, grazing	Highly vulnerable to climate change and shoreline alterations	Protect shorelines, maintain hydrology in seasonally flooded areas
<i>Mahonia repens</i> (Creeping Barberry)	S2	G5	PS	III	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	habitat alterations and changes in hydrological regimes	There is an insufficient amount of data relating to this species whereabouts in North Dakota	Research and monitoring
<i>Mimulus guttatus</i> (Yellow Monkeyflower)	S1	G5	MV	III	Tallgrass Prairie	climate change, invasive species, over-grazing	Specific habitat requirements, loss of mesic wet prairie, land conversion for agriculture; hydrologic changes, fire suppression	Determine the role of disturbance in maintaining existing populations, monitor pesticide use in orchid habitat
<i>Mitella nuda</i> (Naked Mitrewort)	S3	G5	HV	III	Tallgrass Prairie, Upland Deciduous Forest	Habitat alterations, lack of knowledge, climate change	Alterations to bogs and swamps, habitat loss	Research critical life history/habitat components

Species Name	State Rank	Global Rank	Climate Index Rank	Level	Landscape Component	General Threat	Specific Threat	Conservation Action
<i>Oenothera rhombipetala</i> (Rhombic Evening-primrose)	S2	G4G5	MV	III	Tallgrass Prairie, Rivers, Streams, and Riparian	climate change, invasive species, over-grazing	Specific habitat requirements, loss of mesic wet prairie, land conversion for agriculture; hydrologic changes, fire suppression	Determine the role of disturbance, managing existing populations, monitor pesticide use in orchid habitat
<i>Orobanche uniflora</i> (One-flowered Broomrape)	SH	G5	HV	III	Tallgrass Prairie	lack of knowledge and/or complete North Dakota habitat range	Climate change, habitat alterations	Protect large tracts of grassland, prevent encroachment and overgrazing, and conduct further life history research
<i>Parnassia palustris</i> var. <i>parviflora</i> (Small-flowered Grass-of-Parnassus)	S3	G4	MV	III	Eastern Mixed-Grass Prairie, Rivers, Streams, and Riparian	Habitat alterations, lack of knowledge, climate change	Limited range, habitat loss	Limit human disturbance of large tracts of natural prairie and monitor species populations
<i>Penstemon procerus</i> (Small-flowered Penstemon)	S1	G5	MV	III	Eastern Mixed-Grass Prairie, Rivers, Streams, and Riparian	Limited range	Lack of knowledge	Monitor all populations in sufficient detail to determine whether viable populations are being maintained, assess the factors causing population fluctuations, and determine the conservation status of the populations.
<i>Petasites frigidus</i> (Sweet Coltsfoot)	S2	G5	HV	III	Upland Deciduous Forest	Climate change, habitat alterations	Limited range and habitat loss	Model potential habitat/range shifts in response to projected climate changes and prepare management plans
<i>Phlox pilosa</i>	S1	G5	MV	III	Rivers, Streams, and Riparian	habitat alterations and changes in hydrological regimes	habitat alterations and changes in hydrological regimes	Protect large tracts of grassland, prevent encroachment and overgrazing, and conduct further life history research
<i>Platanthera clavellata</i> (Green Woodland Orchid)	SH	G5	HV	III	Tallgrass Prairie, Rivers, Streams, and Riparian	Climate change, habitat alterations	habitat alterations and changes in hydrological regimes	Protect riparian areas, maintain hydrology in seasonally flooded areas
<i>Potentilla diversifolia</i> (Mountain Meadow Cinquefoil)	S1	G5	PS	III	Western Mixed-Grass/Shortgrass Prairie, Badlands, Rivers, Streams, and Riparian	Habitat alterations	previously undisturbed prairie being broken to produce crops	Protect large tracts of grassland, prevent encroachment and overgrazing, and conduct further life history research
<i>Ranunculus cardiophyllus</i> (Heart-leaved Buttercup)	S1	G4G5	PS	III	Rivers, Streams, and Riparian	habitat alterations and changes in hydrological regimes	Changes in hydrology, over-grazing, loss of habitat	Protect riparian areas, maintain hydrology in seasonally flooded areas
<i>Rhynchospora capillacea</i> (Hair Beakrush)	S2	G4	MV	III	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian	Climate change, habitat alterations	habitat alterations and changes in hydrological regimes	Protect riparian areas, maintain hydrology in seasonally flooded areas
<i>Spiranthes cernua</i> (Nodding Ladies'-tresses)	S1	G5	MV	III	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian	Climate change, limited/rare habitat, natural factors	Lack of knowledge in reproductive and photosynthetic aspects	No systematic inventories have been undertaken for this species. Inventory efforts could be aided by training individuals to recognize the species and its habitat.
<i>Spiranthes romanzoffiana</i> (Hooded Ladies'-tresses)	S1	G5	MV	III	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Mixed-grass Prairie	Loss of habitat and habitat alterations	The largest threat is habitat loss and alterations through previously undisturbed prairie being broken to produce crops.	Protect large tracts of grassland, prevent encroachment and overgrazing, and conduct further life history research
<i>Utricularia intermedia</i> (Flat-leaved Bladderwort)	S2	G5	HV	III	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Climate change, limited/rare habitat, natural factors	Invasion of aquatic weeds, wetland draining, and herbicide application	Protect riparian areas, maintain hydrology in seasonally flooded areas
<i>Veronicastrum virginicum</i> (Culver's root)	SH	G4	PS	III	Tallgrass Prairie	climate change, invasive species, over-grazing	Specific habitat requirements, loss of mesic wet prairie, land conversion for agriculture; hydrologic changes, fire suppression	Protect large tracts of grassland, prevent encroachment and overgrazing, and conduct further life history research
<i>Viola conspersa</i> (Bog Violet)	S2	G5	HV	III	Tallgrass Prairie, Rivers, Streams, and Riparian	Climate change, limited/rare habitat, natural factors	This species has been recorded once in Richland County, in the southeastern part of the state.	Protect large tracts of grassland, conduct further life history research, maintain hydrology regime

Research priorities for species of conservation

The North Dakota CWCS identifies many research needs, survey efforts and necessary conservation actions. Since funds for all of these actions are not available, priority will be given to those species in the greatest need of conservation in order to stretch SWG dollars as far as possible. Level I species of conservation priority are those that are in decline and have little or no monetary support. These species will be given priority for SWG funding when opportunities for survey or monitoring efforts and conservation actions occur. However, this will not prevent the ND Department of Parks and Recreation the NDGF from using SWG funding on Level II and Level III species when project opportunities arise. This will ensure that all sensitive plant species in North Dakota will benefit from the CWCS and SWG funding.

Cropland, rangeland, hayland, and various other components (i.e. wetlands, wooded areas, and grass laden waterways) that make up a farm or ranch provide much of the state's habitat. Therefore, the quantity and quality of these components will influence how successful the CWCS is in conserving plant species in North Dakota.

Conservation easements are an effective tool for permanent conservation of plant species of conservation priority and are designed to protect the conservation value of existing habitat for both plants and animals. Conservation easements can and do provide a win-win situation. Voluntary incentive based programs, like conservation easements, have been well received by landowners and agriculture producers of the state and are endorsed wholeheartedly by farm groups. One goal to support the conservation implementation process is to find ways to utilize programs like these so all parties involve benefit in some way.

Conclusion

The problems and conservation actions are not directed at specific species, but rather at the landscape component (i.e. habitat) the Plant Species of Conservation Priority depend upon for survival. The list of threats and conservation actions is not intended to be a comprehensive list of all problems affecting plant resources or all possible conservation tools available, but rather those thought to be most important according to landscape location and known surrounding threats to plant species.

Determining relative priority of conservation actions is difficult to gauge as species vary in their habitat requirements, changing the relative priority of conservation or management needed from one species to another, as well as across the landscape. In this instance, the plant species are generally arranged with the highest priority level at the top (I) and those of lesser priority towards the bottom (III). Habitat loss, fragmentation, and degradation are identified by most conservation groups and partners as the biggest problem affecting plant species. However, the relative priority of conservation actions may depend on management plans that already exist.. For example, if a substantial area of native prairie has already been protected with easements or is held in state ownership, the highest priority conservation action may be to prevent woody invasion or to focus on another plant species of priority with less conservation measures in action. The priority of a conservation action is relative to the area in question when it comes to implementation.

Section 4 Ecoregions

Introduction

Ecoregions are large unit of land or water containing a geographically distinct assemblage of species, natural communities, and environmental conditions. They represent areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources; they are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and their components (in this case sensitive plant species). Due to their spatial framework they are directly applicable to GIS and were easy to work with for this project to help analyze and establishment conservation goals for Plant Species of Conservation Priority.

North Dakota’s imperiled plants occur within 24 major level IV Ecoregions (table 6 and figure 12) throughout the state. We analyzed ecoregions and habitats in two different ways. (1) We summed the number of plant species, on our list, that occur in each of the 24 ecoregions and (2) we examined the number of plant species that fall into each ecosystem based on their vulnerability to climate change.

Table 6:Level IV ecoregions in North Dakota

Tewaukon Dead Ice Moraine	TDM	Glacial Lake Deltas	GLD
Glacial Lake Basins	GLB	Prairie Coteau Escarpment,	PCE
Glacial Outwash	GO	Sand Deltas and Beach Ridges	SDBR
Glacial Lake Agassiz Basin	GLAB	Saline Areas	SA
Pembina Escarpment	PE	Northern Black Prairie	NBP
Turtle Mountains	TM	End Moraine Complex	EMC
Drift Plains	DP	Missouri Coteau	MC
Missouri Coteau Slope	MCS	Collapsed Glacial Outwash	CGO
Moreau Prairie	MoP	Missouri Plateau	MP
Northern Missouri Coteau	NMC	Glaciated Dark Brown Prairie	GDBP
Northern Dark Brown Prairie	NDBP	Little Missouri Badlands	LMB
Sagebrush Steppe	SS	River Breaks	RB

Relationship Between Ecoregions and Plant Species

We compared the concentrations of Plant Species of Conservation Priority associated with level IV Ecoregions (figure 12) in North Dakota for plants followed by table 6 of plant species listed by ecoregion; all habitat types discussed are considered priority habitats. They all support sensitive plant species in North Dakota according to climate change vulnerability, global rank, and state rank. Each individual plant species is listed in table 6 by ecoregion and associated landscape component and focus area.

Figure 13: Level IV Ecoregions of North Dakota with Plant Species Distributions

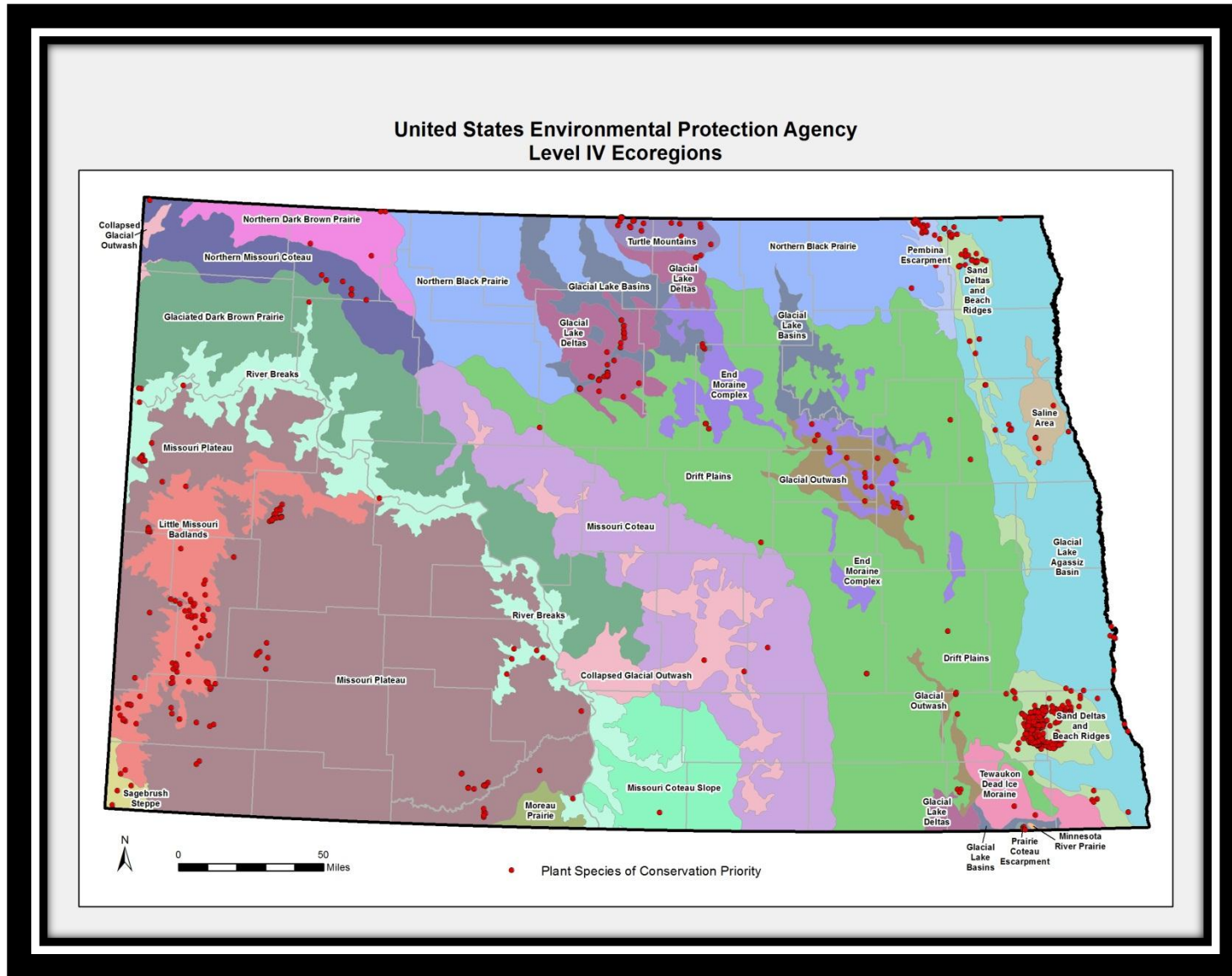


Table 7: Plant species distribution by Ecoregion

Tewauken Dead Ice Moraine

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Landscape Component	Focus Areas
Cypripedium candidum	White Lady's-slipper	S2S3	S2	G4	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Glacial Lake Deltas, Saline Areas, Saline Areasnd Delta and Beach Ridges, Sheyenne River, DLB
Platanthera praeclara	Western Prairie Fringed Orchid	S2	S2	G3	Tallgrass Prairie, Rivers, Streams, and Riparian	Saline Areas and Delta and Beach Ridges, Sheyenne River
Allium canadense	Meadow Onion	S1	S1	G5	Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Sand Deltas and Beach Ridges

Glacial Lake Deltas

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Landscape Component
<i>Galium labradoricum</i>	Bog Bedstraw	S3	S3	G5	Glacial Lake Deltas, Glacial Lake Basin, Turtle Mountains, Sand Deltas and Beach Ridges	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Cypripedium candidum</i>	White Lady's-slipper	S2S3	S2	G4	Glacial Lake Deltas, Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2S3	S2	G5	Glacial Lake Deltas, Killdeer Mountains, Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	SNR	S2	G5T5	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest
<i>Salix pedicellaris</i>	Bog Willow	S3	S3	G5	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest

Glacial Lake Deltas

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Landscape Component
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort	S2	S2	G5	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Carex sterilis</i>	Sterile Sedge	S1S2	S1	G4	Glacial Lake Deltas, Souris River	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian
<i>Spiranthes cernua</i>	Nodding Ladies'-tresses	S1	S1	G5	Glacial Lake Deltas, James River, Saline Areas and Delta and Beach Ridges, Souris River	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Spiranthes romanzoffiana</i>	Hooded Ladies'-tresses	S1	S1	G5	Glaciated Dark Brown Prairie, Glacial Lake Deltas, Glacial Lake Basins	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Mixed-grass Prairie
<i>Parnassia palustris</i> var. <i>parviflora</i>	Small-flowered Grass-of-Parnassus	SU	S3	G4	Glacial Lake Deltas, Sheyenne River	Eastern Mixed-Grass Prairie, Rivers, Streams, and Riparian
<i>Rhynchospora capillacea</i>	Hair Beakrush	S2	S2	G4	Glacial Lake Deltas, Glacial Lake Basins, Drift Plains	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian
<i>Eriphorum chamissonis</i>	Charmission's Cottongrass		S2	G5	Glacial Lake Deltas, Souris River, Turtle Mountains	Rivers, Streams, Riparian, Upland Decisuous Forest
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains

Glacial Lake Basins

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Botrychium matricariifolium</i>	Chamomile Grapefern	S1	G5	MV	Glacial Lake Deltas, Missouri Coteau Breaks	Eastern-Mixed-grass Prairie, and Mixed-grass Prairie
<i>Carex leptalea</i>	Delicate Sedge	S3	G5	MV	Glacial Lake Deltas, Saline Areasnd Delta and Beach Ridges, Sheyenne River, Souris River	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie
<i>Carex sterilis</i>	Sterile Sedge	S1	G4	MV	Glacial Lake Deltas, Souris River	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian
<i>Cypripedium candidum</i>	White Lady's-slipper	S2	G4	HV	Glacial Lake Deltas, Saline Areas, Saline Areasnd Delta and Beach Ridges, Sheyenne River, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Glacial Lake Deltas, Killdeer Mountains, Pembina Hills, Saline Areasnd Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest

Glacial Lake Basins

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	S2	G5T5	HV	Glacial Lake Deltas, Saline Areasnd Delta and Beach Ridges, Sheyenne River, Turtle Mountains, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest
<i>Equisetum sylvaticum</i>	Wood Horsetail	S2	G5	HV	Glacial Lake Deltas, Pembina Hills, Saline Areasnd Delta and Beach Ridges	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Upland Deciduous Forest
<i>Galium labradoricum</i>	Bog Bedstraw	S3	G5	PS	Glacial Lake Deltas, Saline Areasnd Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	MV	Glacial Lake Deltas, Saline Areasnd Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Parnassia palustris</i> var. <i>parviflora</i>	Small-flowered Grass-of-Parnassus	S3	G4	MV	Glacial Lake Deltas, Sheyenne River	Eastern Mixed-Grass Prairie, Rivers, Streams, and Riparian
<i>Rhynchospora capillacea</i>	Hair Beakrush	S2	G4	MV	Glacial Lake Deltas, James River, Souris River	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian
<i>Salix pedicellaris</i>	Bog Willow	S3	G5	MV	Glacial Lake Deltas, Saline Areasnd Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest

Glacial Lake Basins

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Spiranthes cernua</i>	Nodding Ladies'-tresses	S1	G5	MV	Glacial Lake Deltas, James River, Saline Areas and Delta and Beach Ridges, Souris River	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Spiranthes romanzoffiana</i>	Hooded Ladies'-tresses	S1	G5	MV	Glacial Lake Deltas, Missouri Coteau Breaks, Souris River	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Mixed-grass Prairie
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort	S2	G5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest

Prairie Coteau Escarpment

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Dicentra cucullaria</i>	Dutchman's Breeches	S1	G5	MV	Sand Deltas and Beach Ridges, Sheyenne River	Eastern-Mixed Grass Prairie, Rivers, Streams, and Riparian
<i>Onoclea sensibilis</i>	Sensitive Fern	S2	G5	HV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian

Glacial Outwash

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Cypripedium candidum</i>	White Lady's-slipper	S2	G4	HV	Glacial Lake Deltas, Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Glacial Lake Deltas, Killdeer Mountains, Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest
<i>Cypripedium reginae</i>	Showy Lady's-slipper	S2	G4	HV	DLM, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie
<i>Platanthera praeclara</i>	Western Prairie Fringed Orchid	S2	G3	EV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Erigeron divergens</i>	Spreading Fleabane	S1	S1	G5	Eastern-Mixed-grass Prairie	Glacial Outwash, Missouri Plateau

Sand Deltas and Beach Ridges

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Astragalus neglectus</i>	Cooper's Milkvetch	S1	G4	HV	Sand Deltas and Beach Ridges	Tallgrass Prairie
<i>Botrychium minganense</i>	Moonwort	S1	G4	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains,	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Botrychium multifidum</i>	Leathery Grapefern	S1	G5	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges	Tallgrass Prairie, Upland Deciduous Forest

Sand Deltas and Beach Ridges

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Botrychium simplex</i>	Least Grapeferen	S2	G5	PS	Saline Areas and Delta and Beach Ridges	Tallgrass Prairie
<i>Campanula aparinoides</i>	Marsh Bellflower	S2S3	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Carex alopecoidea</i>	Foxtail Sedge	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Carex formosa</i>	Handsome Sedge	S1	G4	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Carex leptalea</i>	Delicate Sedge	S3	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie
<i>Cypripedium candidum</i>	White Lady's-slipper	S2	G4	HV	Glacial Lake Deltas, Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Glacial Lake Deltas, Killdeer Mountains, Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	S2	G5T5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest
<i>Cypripedium reginae</i>	Showy Lady's-slipper	S2	G4	HV	DLM, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie
<i>Desmanthus illinoensis</i>	Prairie Mimosa	S1	G5	PS	Saline Areas and Delta and Beach Ridges	Tallgrass Prairie
<i>Equisetum palustre</i>	Marsh Horsetail	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian

Sand Deltas and Beach Ridges

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Equisetum pratense</i>	Meadow Horsetail	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Equisetum sylvaticum</i>	Wood Horsetail	S2	G5	HV	Glacial Lake Deltas, Pembina Hills, Saline Areas and Delta and Beach Ridges	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Upland Deciduous Forest
<i>Eriophorum gracile</i>	Slender Cottongrass	S1	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Eriophorum viridicarinatum</i>	Green Keeled Cottongrass	S2	G5	HV	Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Euonymus atropurpureus</i>	Wahoo	S3	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Galium labradoricum</i>	Bog Bedstraw	S3	G5	PS	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Gymnocarpium dryopteris</i>	Oakfern	S2	G5	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Helianthemum bicknellii</i>	Bicknell's Sunrose	S1	G5	HV	Saline Areas and Delta and Beach Ridges	Tallgrass Prairie
<i>Hudsonia tomentosa</i>	Woolly Beach-heather	S1	G5	MV	Saline Areas and Delta and Beach Ridges	Tallgrass Prairie
<i>Lechea stricta</i>	Upright Pinweed	S2	G4?	MV	Saline Areas and Delta and Beach Ridges	Tallgrass Prairie
<i>Liparis loeselii</i>	Loesel's Twayblade	S2	G5	HV	James River, Missouri Coteau Breaks, Saline Areas and Delta and Beach Ridges, Sheyenne River,	Tallgrass Prairie, Rivers, Streams, and Riparian, Mixed-grass Prairie
<i>Lipocarpa micrantha</i>	Small-flowered Lipocarpa	S1	G5	HV	Sand Deltas and Beach Ridges, Red River, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian

Sand Deltas and Beach Ridges

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Mimulus guttatus</i>	Yellow Monkeyflower	S1	G5	MV	Saline Areas and Delta and Beach Ridges	Tallgrass Prairie
<i>Oenothera rhombipetala</i>	Rhombic Evening-primrose	S2	G4G5	MV	Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Onoclea sensibilis</i>	Sensitive Fern	S2	G5	HV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Ophioglossum pusillum</i>	Adder's-tongue Fern	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Orobanche uniflora</i>	One-flowered Broomrape	SH	G5	HV	Sand Deltas and Beach Ridges, Red River, Sheyenne River	Tallgrass Prairie
<i>Platanthera clavellata</i>	Green Woodland Orchid	SH	G5	HV	Sand Deltas and Beach Ridges, Saline Area, Red River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Platanthera praeclara</i>	Western Prairie Fringed Orchid	S2	G3	EV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Pogonia ophioglossoides</i>	Rose Pogonia	S1	G5	HV	Sand Deltas and Beach Ridges, Saline Area, Red River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Polygonum hydropiperoides</i>	Swamp Smartweed	S1	G5	HV	Saline Areas and Delta and Beach Ridges	Tallgrass Prairie
<i>Selaginella rupestris</i>	Ledge Spike-moss	S1	G5	HV	Saline Areas and Delta and Beach Ridges	Tallgrass Prairie

Sand Deltas and Beach Ridges

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Spiranthes cernua</i>	Nodding Ladies'-tresses	S1	G5	MV	Glacial Lake Deltas, James River, Saline Areas and Delta and Beach Ridges, Souris River	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Triplasis purpurea</i>	Purple Sandgrass	S1	G4G5	PS	Saline Areas and Delta and Beach Ridges	Tallgrass Prairie
<i>Veronicastrum virginicum</i>	Culver's-root	SH	G4	PS	Saline Areas and Delta and Beach Ridges	Tallgrass Prairie
<i>Viola conspersa</i>	Bog Violet	S2	G5	HV	Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian

Glacial Lake Agassiz Basin

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Allium canadense</i>	Woolly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Asclepias lanuginosa</i>	Cooper's Milkvetch	S1	G4	HV	Sand Deltas and Beach Ridges	Tallgrass Prairie
<i>Astragalus drummondii</i>	Foxtail Sedge	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Astragalus neglectus</i>	Delicate Sedge	S3	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Astragalus vexilliflexus</i>	Blue Cohosh	S1	G4G5	MV	Red River, Sheyenne River, Turtle Mountains	Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Botrychium campestre</i>	White Lady's-slipper	S2	G4	HV	Glacial Lake Deltas, Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie
<i>Botrychium matricariifolium</i>	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Glacial Lake Deltas, Killdeer Mountains, Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest
<i>Botrychium minganense</i>	Showy Lady's-slipper	S2	G4	HV	DLM, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie
<i>Botrychium multifidum</i>	Dutchman's Breeches	S1	G5	MV	Sand Deltas and Beach Ridges, Sheyenne River	Eastern-Mixed Grass Prairie, Rivers, Streams, and Riparian
<i>Botrychium simplex</i>	Wolf's Spikerush	SH	G3?	MV	Sand Deltas and Beach Ridges, Red River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Campanula aparinoides</i>	Meadow Horsetail	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Carex alopecoidea</i>	Green Keeled Cottongrass	S2	G5	HV	Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Carex backii</i>	Wahoo	S3	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Carex capillaris</i>	Wild Geranium	SH	G5	HV	Red River	Rivers, Streams, and Riparian
<i>Carex echinata</i> ssp. <i>echinata</i>	Bicknell's Sunrose	S1	G5	HV	Saline Areas and Delta and Beach Ridges	Tallgrass Prairie
<i>Carex formosa</i>	Small-flowered Lipocarpa	S1	G5	HV	Sand Deltas and Beach Ridges, Red River, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Carex leptalea</i>	Rhombic Evening-primrose	S2	G4G5	MV	Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Carex sterilis</i>	One-flowered Broomrape	SH	G5	HV	Sand Deltas and Beach Ridges, Red River, Sheyenne River	Tallgrass Prairie
<i>Caulophyllum thalictroides</i>	Downy Phlox	S1	G5	MV	Red River	Rivers, Streams, and Riparian
<i>Cheilanthes feei</i>	Green Woodland Orchid	SH	G5	HV	Sand Deltas and Beach Ridges, Saline Area, Red River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Chenopodium subglabrum</i>	Western Prairie Fringed Orchid	S2	G3	EV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Clematis columbiana</i> var. <i>tenuiloba</i>	Rose Pogonia	S1	G5	HV	Sand Deltas and Beach Ridges, Saline Area, Red River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Collinsia parviflora</i>	Flat-leaved Bladderwort	S2	G5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Cryptantha torreyana</i>	Culver's-root	SH	G4	PS	Saline Areas and Delta and Beach Ridges	Tallgrass Prairie

Saline Areas

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Cypripedium candidum</i>	White Lady's-slipper	S2	G4	HV	Glacial Lake Deltas, Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie
<i>Platanthera clavellata</i>	Green Woodland Orchid	SH	G5	HV	Sand Deltas and Beach Ridges, Saline Area, Red River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Pogonia ophioglossoides</i>	Rose Pogonia	S1	G5	HV	Sand Deltas and Beach Ridges, Saline Area, Red River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Viola conspersa</i>	Bog Violet	S2	G5	HV	Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian

Pembina Escarpment

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Astragalus neglectus</i>	Cooper's Milkvetch	S1	G4	HV	Sand Deltas and Beach Ridges	Tallgrass Prairie
<i>Botrychium minganense</i>	Moonwort	S1	G4	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains,	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Botrychium multifidum</i>	Leathery Grapefern	S1	G5	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges	Tallgrass Prairie, Upland Deciduous Forest
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	S2	G5T5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest
<i>Dirca palustris</i>	Leatherwood	S1	G4	MV	Pembina Hills	Upland Deciduous Forest
<i>Equisetum sylvaticum</i>	Wood Horsetail	S2	G5	HV	Glacial Lake Deltas, Pembina Hills, Saline Areas and Delta and Beach Ridges	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Upland Deciduous Forest
<i>Gymnocarpium dryopteris</i>	Oakfern	S2	G5	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Minuartia dawsonensis</i>	Stiff Sandwort	S1	G5	HV	Pembina Hills	Upland Deciduous Forest
<i>Mitella nuda</i>	Naked Mitrewort	S3	G5	HV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Turtle Mountains	Tallgrass Prairie, Upland Deciduous Forest
<i>Petasites frigidus</i>	Sweet Coltsfoot	S2	G5	HV	Pembina Hills	Upland Deciduous Forest

Northern Black Prairie

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Carex backii</i>	Back's Sedge	S3	G4	MV	Missouri Coteau Breaks, Turtle Mountains	Mixed-grass Prairie, Upland Deciduous Forest
<i>Parnassia palustris</i> var. <i>parviflora</i>	Small-flowered Grass-of-Parnassus	S3	G4	MV	Glacial Lake Deltas, Sheyenne River	Eastern Mixed-Grass Prairie, Rivers, Streams, and Riparian

Turtle Mountains

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Botrychium minganense</i>	Moonwort	S1	G4	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains,	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Carex alopecoidea</i>	Foxtail Sedge	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Carex backii</i>	Back's Sedge	S3	G4	MV	Missouri Coteau Breaks, Turtle Mountains	Mixed-grass Prairie, Upland Deciduous Forest
<i>Caulophyllum thalictroides</i>	Blue Cohosh	S1	G4G5	MV	Red River, Sheyenne River, Turtle Mountains	Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	S2	G5T5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest
<i>Drosera rotundifolia</i>	Round-leaved Sundew	S1	G5	HV	Turtle Mountains	Upland Deciduous Forest

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Eriophorum chamissonis</i>	Chamisson's Cottongrass	S2	G5	HV	Glacial Lake Deltas, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Rivers, Strams, Riparian, Upland Deciduous Forest
<i>Eriophorum viridicarinatum</i>	Green Keeled Cottongrass	S2	G5	HV	Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Galium labradoricum</i>	Bog Bedstraw	S3	G5	PS	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Mitella nuda</i>	Naked Mitrewort	S3	G5	HV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Turtle Mountains	Tallgrass Prairie, Upland Deciduous Forest
<i>Parnassia palustris</i> var. <i>parviflora</i>	Small-flowered Grass-of-Parnassus	S3	G4	MV	Glacial Lake Deltas, Sheyenne River	Eastern Mixed-Grass Prairie, Rivers, Streams, and Riparian
<i>Salix maccalliana</i>	Swamp Willow	S1	G5?	HV	Turtle Mountains	Upland Deciduous Forest
<i>Salix pedicellaris</i>	Bog Willow	S3	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Scheuchzeria palustris</i>	Pod Grass	S1	G5	HV	Turtle Mountains	Upland Deciduous Forest
<i>Sphagnum teres</i>	Round-leaved Sphagnum	S1	G5	HV	Turtle Mountains	Upland Deciduous Forest
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort	S2	G5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest

End Moraine Complex

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Cypripedium candidum</i>	White Lady's-slipper	S2	G4	HV	Glacial Lake Deltas, Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Glacial Lake Deltas, Killdeer Mountains, Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest
<i>Cypripedium reginae</i>	Showy Lady's-slipper	S2	G4	HV	DLM, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie

Drift Plains

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian

State Scientific Name	State Common Name	State Rank_	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Caulophyllum thalictroides</i>	Blue Cohosh	S1	G4G5	MV	Red River, Sheyenne River, Turtle Mountains	Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Cypripedium candidum</i>	White Lady's-slipper	S2	G4	HV	Glacial Lake Deltas, Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie
<i>Eleocharis parvula</i>	Dwarf Spikerush	S2	G5	HV	Missouri Coteau Breaks, Saline Area, Sand Deltas and Beach Ridges	Tallgrass Prairie, Mixed-Grass Prairie, Rivers, Streams, and Riparian
<i>Liparis loeselii</i>	Loesel's Twayblade	S2	G5	HV	James River, Missouri Coteau Breaks, Saline Areas and Delta and Beach Ridges, Sheyenne River,	Tallgrass Prairie, Rivers, Streams, and Riparian, Mixed-grass Prairie
<i>Lipocarpha micrantha</i>	Small-flowered Lipocarpha	S1	G5	HV	Sand Deltas and Beach Ridges, Red River, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Oenothera rhombipetala</i>	Rhombic Evening-primrose	S2	G4G5	MV	Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Orobanche uniflora</i>	One-flowered Broomrape	SH	G5	HV	Sand Deltas and Beach Ridges, Red River, Sheyenne River	Tallgrass Prairie
<i>Platanthera clavellata</i>	Green Woodland Orchid	SH	G5	HV	Sand Deltas and Beach Ridges, Saline Area, Red River	Tallgrass Prairie, Rivers, Streams, and Riparian

State Scientific Name	State Common Name	State Rank_	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Platanthera praeclara</i>	Western Prairie Fringed Orchid	S2	G3	EV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Pogonia ophioglossoides</i>	Rose Pogonia	S1	G5	HV	Sand Deltas and Beach Ridges, Saline Area, Red River	Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Rhynchospora capillacea</i>	Hair Beakrush	S2	G4	MV	Glacial Lake Deltas, James River, Souris River	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian
<i>Spiranthes cernua</i>	Nodding Ladies'-tresses	S1	G5	MV	Glacial Lake Deltas, James River, Saline Areas and Delta and Beach Ridges, Souris River	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Triantha glutinosa</i>	Sticky False-asphodel	S1	G5	EV	Devils Lake Mountains	Eastern Mixed-Grass Prairie, Rivers, Streams, and Riparian
<i>Salix pedicellaris</i>	Bog Willow	S3	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basins, Turtle Mountains, Drift Plains, Sand Deltas and Beach Ridges
<i>Ribes cynosbati</i>	Prickly Gooseberry	S3	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges, Drift Plains
<i>Carex alopecoidea</i>	Foxtail Sedge	S2	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Turtle Mountains, Sand Deltas and Beach Ridges, Drift Plains, Glacial Lake Agassiz Basin

Missouri Coteau

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Cyperus bipartitus</i>	Brook Flatsedge	S2	G5	HV	Missouri Coteau Breaks, Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Mixed-grass Prairie, Rivers, Streams, and Riparian
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	S2	G5T5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains, DLB	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest
<i>Desmanthus illinoensis</i>	Prairie Mimosa	S1	G5	PS	Saline Areas and Delta and Beach Ridges	Tallgrass Prairie
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Missouri River System/Breaks, Little Missouri River, Knife River, Heart River, Cannonball River, Sagebrush Steppe, Ponderosa Pine, Killdeer Mountains	Western Mixed-Grass/Shortgrass Prairie, Mixed-Grass Prairie, Badlands, Rivers, Streams, and Riparian
<i>Phlox alyssifolia</i>	Alyssum-leaved Phlox	S2	G5	PS	Missouri River Breaks	Rivers, Streams, and Riparian

Collapsed Glacial Outwash

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
Lappula cenchrusoides	Stickseed	S1	G4	MV	Missouri River System/Breaks, Little Missouri River, Knife River, Heart River, Cannonball River, Sagebrush Steppe, Ponderosa Pine, Killdeer Mountains	Western Mixed-Grass/Shortgrass Prairie, Mixed-Grass Prairie, Badlands, Rivers, Streams, and Riparian

Moreau Prairie

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
Lappula cenchrusoides	Stickseed	S1	G4	MV	Missouri River System/Breaks, Little Missouri River, Knife River, Heart River, Cannonball River, Sagebrush Steppe, Ponderosa Pine, Killdeer Mountains	Western Mixed-Grass/Shortgrass Prairie, Mixed-Grass Prairie, Badlands, Rivers, Streams, and Riparian

Missouri Plateau

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
Asclepias lanuginosa	Woolly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian
Astragalus vexilliflexus	Bent-flowered Milkvetch	S3	G4	HV	Killdeer Mountains	Upland Deciduous Forest

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Botrychium campestre</i>	Prairie Grapefern	S1	G3G4	MV	Glacial Lake Deltas, Souris River	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian
<i>Cheilanthes feei</i>	Slender Lip Fern	S1	G5	HV	Killdeer Mountains	Upland Deciduous Forest
<i>Clematis columbiana</i> var. <i>tenuiloba</i>	Slender-lobed Clematis	S1	G5?T4?	HV	Killdeer Mountains	Upland Deciduous Forest
<i>Collinsia parviflora</i>	Blue Lips	S2	G5	PS	Killdeer Mountains, Little Missouri River, Saline Areas Sagebrush Steppe	Tallgrass Prairie, Rivers, Streams, and Riparian, Western Mixed-grass/Shortgrass Prairie
<i>Cryptantha torreyana</i>	Torrey's Cryptantha	S1	G5	MV	Sagebrush Steppe, Little Missouri River, Heart River, Knife River	Western-Mixed Grass/Shortgrass Prairie, Badlands
<i>Dalea enneandra</i>	Nine-anthered Dalea	S3	G5	MV	HR, Little Missouri River, Missouri River Breaks, Missouri River System	Rivers, Streams, and Riparian
<i>Erigeron radicans</i>	Cushion Fleabane	S1	G3G4	PS	Killdeer Mountains	Upland Deciduous Forest
<i>Eriogonum cernuum</i>	Nodding Buckwheat	S1	G5	MV	Killdeer Mountains	Upland Deciduous Forest
<i>Eriogonum visherii</i>	Dakota Buckwheat	S2	G3	MV	CR, Little Missouri River, Missouri River Breaks, Saline Areas Sagebrush Steppe	Western Mixed-grass/Shortgrass Prairie, Rivers, Steams, Riparian
<i>Leucocrinum montanum</i>	Sand Lily	S2	G5	PS	Saline Areas Sagebrush Steppe	Western Mixed-grass/Shortgrass Prairie

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Polygonum leptocarpum</i>	Thin-fruited Knotweed	S1	G2G4Q	HV	Cannonball River, Heart River	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian
<i>Populus x acuminata</i>	Lanceleaf Cottonwood	S2	GNA	MV	Saline Areas Sagebrush Steppe	Western Mixed-grass/Shortgrass Prairie
<i>Potentilla diversifolia</i>	Mountain Meadow Cinquefoil	S1	G5	PS	Sagebrush Steppe, Ponderosa Pine, Little Missouri River, Heart River	Western Mixed-Grass/Shortgrass Prairie, Badlands, Rivers, Streams, and Riparian
<i>Sporobolus airoides</i>	Alkali Sacaton	S3	G5	PS	Little Missouri River, Saline Areas Sagebrush Steppe, Saline Areas	Rivers, Streams, and Riparian, Mixed-grass Prairie
<i>Talinum parviflorum</i>	Prairie Fameflower	S2	G5	MV	Missouri River Breaks	Rivers, Streams, and Riparian
<i>Viola conspersa</i>	Bog Violet	S2	G5	HV	Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River	Tallgrass Prairie, Rivers, Streams, and Riparian

Missouri Coteau Slope

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Desmanthus illinoensis</i>	Prairie Mimosa	S1	G5	PS	Saline Areas and Delta and Beach Ridges	Tallgrass Prairie
<i>Phlox alyssifolia</i>	Alyssum-leaved Phlox	S2	G5	PS	Missouri River Breaks	Rivers, Streams, and Riparian

Northern Missouri Coteau

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Primula incana</i>	American Primrose	S2	G4G5	MV	Missouri Coteau Breaks	Mixed-grass Prairie

Northern Dark Brown Prairie

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Botrychium minganese</i>	Moonwort	S1	G4	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains,	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest
<i>Carex backii</i>	Back's Sedge	S3	G4	MV	Missouri Coteau Breaks, Turtle Mountains	Mixed-grass Prairie, Upland Deciduous Forest
<i>Pemstemon procures</i>	Small-flowered Penstemon	S1	G5	MV	Missouri Coteau Breaks	Eastern Mixed-Grass Prairie, Rivers, Streams, and Riparian

Glaciated Dark Brown Prairie

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Missouri River System/Breaks, Little Missouri River, Knife River, Heart River, Cannonball River, Sagebrush Steppe, Ponderosa Pine, Killdeer Mountains	Western Mixed-Grass/Shortgrass Prairie, Mixed-Grass Prairie, Badlands, Rivers, Streams, and Riparian
<i>Phlox alyssifolia</i>	Alyssum-leaved Phlox	S2	G5	PS	Missouri River Breaks	Rivers, Streams, and Riparian
<i>Spiranthes romanzoffiana</i>	Hooded Ladies'-tresses	S1	G5	MV	Glacial Lake Deltas, Missouri Coteau Breaks, Souris River	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Mixed-grass Prairie

Sagebrush Steppe

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Leucocrinum montanum</i>	Sand Lily	S2	G5	PS	Saline Areas Sagebrush Steppe	Western Mixed-grass/Shortgrass Prairie
<i>Mahonia repens</i>	Creeping Barberry	S2	G5	PS	Little Missouri River, Saline Areas Sagebrush Steppe	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian

Little Missouri Badlands

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Chenopodium subglabrum</i>	Smooth Goosefoot	S1	G3G4	HV	Little Missouri River, PonderoSaline Areas Pine Area, Saline Areas Sagebrush Steppe	Rivers, Streams, Riparian, Western Mixed-grass/ Shortgrass Prairie, Badlands
<i>Collinsia parviflora</i>	Blue Lips	S2	G5	PS	Killdeer Mountains, Little Missouri River, Saline Areas Sagebrush Steppe	Tallgrass Prairie, Rivers, Streams, and Riparian, Western Mixed-grass/Shortgrass Prairie
<i>Cryptantha torreyana</i>	Torrey's Cryptantha	S1	G5	MV	Sagebrush Steppe, Little Missouri River, Heart River, Knife River	Western-Mixed Grass/Shortgrass Prairie, Badlands
<i>Dalea enneandra</i>	Nine-anthered Dalea	S3	G5	MV	HR, Little Missouri River, Missouri River Breaks, Missouri River System	Rivers, Streams, and Riparian
<i>Eriogonum visherii</i>	Dakota Buckwheat	S2	G3	MV	CR, Little Missouri River, Missouri River Breaks, Saline Areas Sagebrush Steppe	Western Mixed-grass/Shortgrass Prairie, Rivers, Steams, Riparian
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Missouri River System/Breaks, Little Missouri River, Knife River, Heart River, Cannonball River, Sagebrush Steppe, Ponderosa Pine, Killdeer Mountains	Western Mixed-Grass/Shortgrass Prairie, Mixed-Grass Prairie, Badlands, Rivers, Streams, and Riparian
<i>Leucocrinum montanum</i>	Sand Lily	S2	G5	PS	Saline Areas sagebrush Steppe	Western Mixed-grass/Shortgrass Prairie

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Mahonia repens</i>	Creeping Barberry	S2	G5	PS	Little Missouri River, Saline Areas Sagebrush Steppe	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian
<i>Mentzelia pumila</i>	Dwarf Mentzelia	S1	G4	PS	Little Missouri River, Saline Areas Sagebrush Steppe	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian
<i>Pinus flexilis</i>	Limber Pine	S1	G5	MV	Little Missouri River, Saline Areas Sagebrush Steppe	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian
<i>Populus x acuminata</i>	Lanceleaf Cottonwood	S2	GNA	MV	Saline Areas Sagebrush Steppe	Western Mixed-grass/Shortgrass Prairie
<i>Potentilla diversifolia</i>	Mountain Meadow Cinquefoil	S1	G5	PS	Sagebrush Steppe, Ponderosa Pine, Little Missouri River, Heart River	Western Mixed-Grass/Shortgrass Prairie, Badlands, Rivers, Streams, and Riparian
<i>Townsendia hookeri</i>	Hooker's Townsendia	S1	G5	PS	Missouri River System/Breaks, Little Missouri River, Knife River, Heart River, Badlands	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian

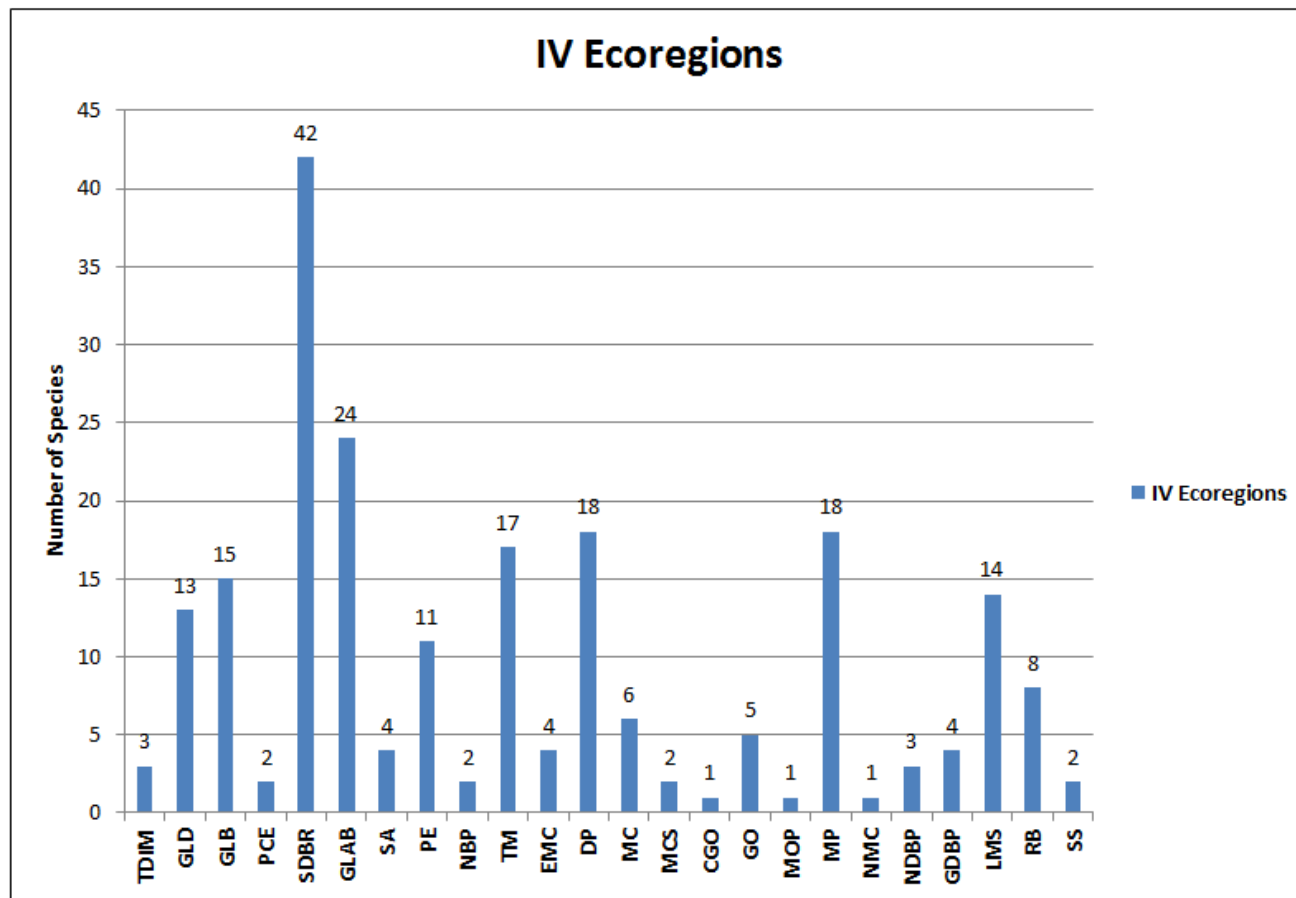
River Breaks

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Areas	Landscape Component
<i>Asclepias lanuginosa</i>	Wooly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian
<i>Astragalus drummondii</i>	Drummond's Milkvetch	S1	G5	PS	Missouri River Breaks	Rivers, Streams, and Riparian
<i>Dalea enneandra</i>	Nine-anthered Dalea	S3	G5	MV	HR, Little Missouri River, Missouri River Breaks, Missouri River System	Rivers, Streams, and Riparian
<i>Eriogonum visherii</i>	Dakota Buckwheat	S2	G3	MV	CR, Little Missouri River, Missouri River Breaks, Saline Areas Sagebrush Steppe	Western Mixed-grass/Shortgrass Prairie, Rivers, Steams, Riparian
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Missouri River System/Breaks, Little Missouri River, Knife River, Heart River, Cannonball River, Sagebrush Steppe, Ponderosa Pine, Killdeer Mountains	Western Mixed-Grass/Shortgrass Prairie, Mixed-Grass Prairie, Badlands, Rivers, Streams, and Riparian
<i>Phlox alyssifolia</i>	Alyssum-leaved Phlox	S2	G5	PS	Missouri River Breaks	Rivers, Streams, and Riparian
<i>Ranunculus cardiophyllus</i>	Heart-leaved Buttercup	S1	G4G5	PS	Missouri River Breaks, Missouri River System	Rivers, Streams, and Riparian
<i>Rorippa calycina</i>	Hayden's Yellowcress	SH	G3	HV	Missouri River Breaks, Missouri River System	Rivers, Streams, and Riparian

Plant Distribution by Ecoregion

Based on the concentration of sensitive plants in each ecoregion Sand Deltas and Beach Ridges support (19% of sensitive plant species analyzed) the most sensitive plant species in North Dakota. The following four ecoregions stand out as being critically important to the conservation of sensitive plant species; they include the glacial Lake Agassiz basin (GLAB) (supporting 11% of sensitive plant species analyzed), and drift plains (DP), the Turtle Mountains (TM), and the Missouri Plateau (MP) are also rich ecosystems, and each of these three ecoregions supports 8% of sensitive plant species in North Dakota. Figure 13 below reflects the percentage of plant species that fall into each ecoregion and many species are within several different ecoregions; the table shows the total occurrences of each plant species on our list.

Figure 14: Shows the number of plant species in each Ecoregion.



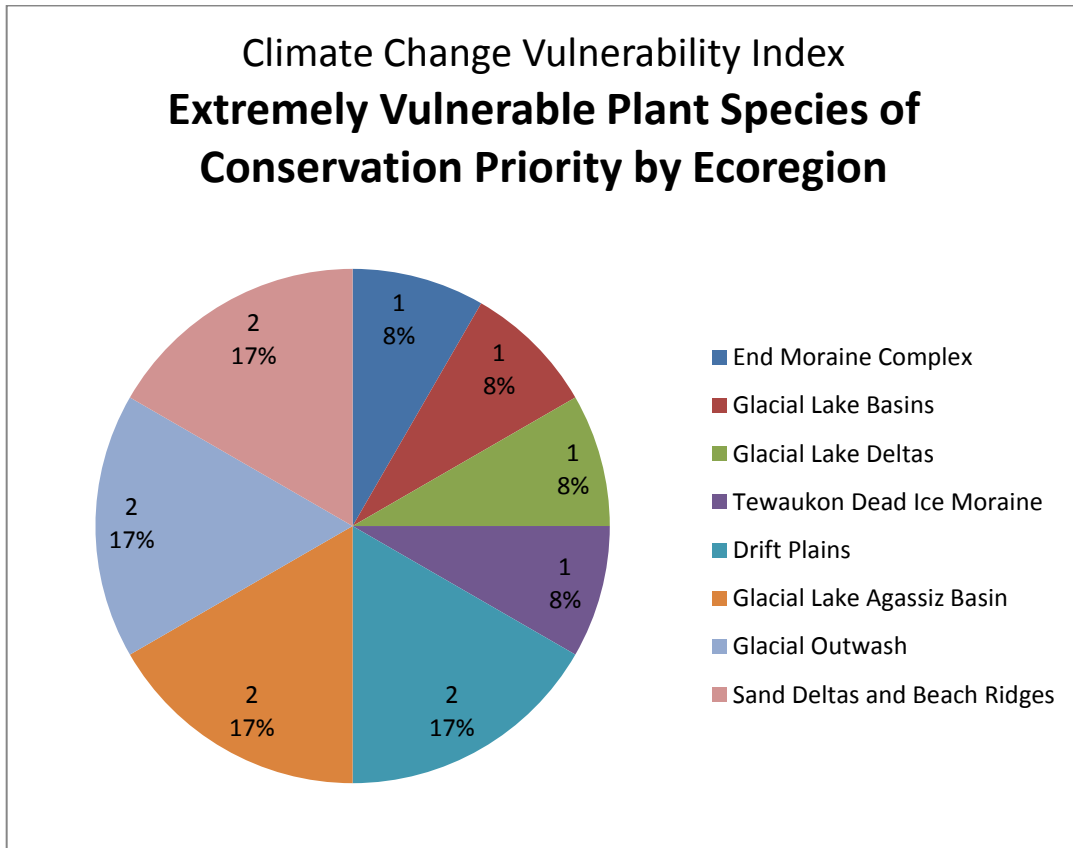
Plant Species Distribution by CCVI Score

Based on the 24 ecoregions, 3 plant species of the 100 on our list were predicted to be extremely vulnerable (EV), followed by 38 plant species with a CCVI score of highly vulnerable (HV), 42 species moderately vulnerable (MV), and 17 species with a CCVI score of presumed stable (PS).

- A. The top percentage (17%) of EV plant species (figure 14) reside in Drift Plains, the Glacial Lake Agassiz Basin, Glacial Outwash, and Sand Delta’s and Beach Ridges, and the remaining ecoregions with 8%. Again, the figure below reflects the percentage of plant species that fall into each ecoregion and many species are within several different ecoregions, so the table shows the total occurrences of each plant species on our list. All the listed ecoregions are considered high priority because they also harbor HV, MV, and PS plant species.

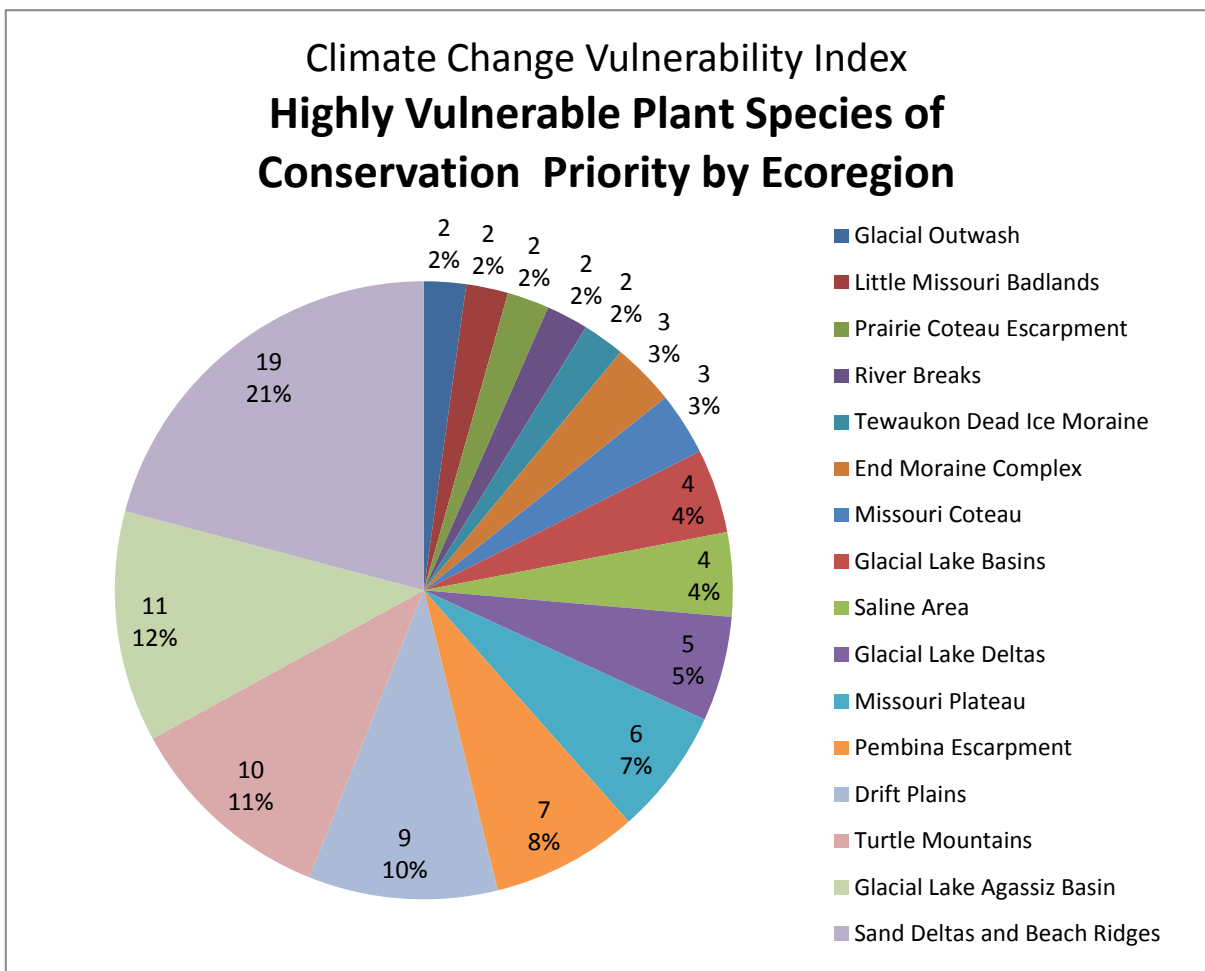
One factor that is contributing to the decline of these species is agricultural activity. The three EV plant species reside in the east/northeast portions of North Dakota and provide fertile soils for crop production. Cropland also causes fragmentation of large tracts of prairie and can affect wetlands within prairies. The three EV plant *species* *Cypripedium parviflorum*, *Platanthera praeclara*, and *Triantha glutinosa* all depend on some type of bog, wetland, or prairie habitat.

Figure 15. Ecoregions that harbor extremely vulnerable plant species in terms of climate change



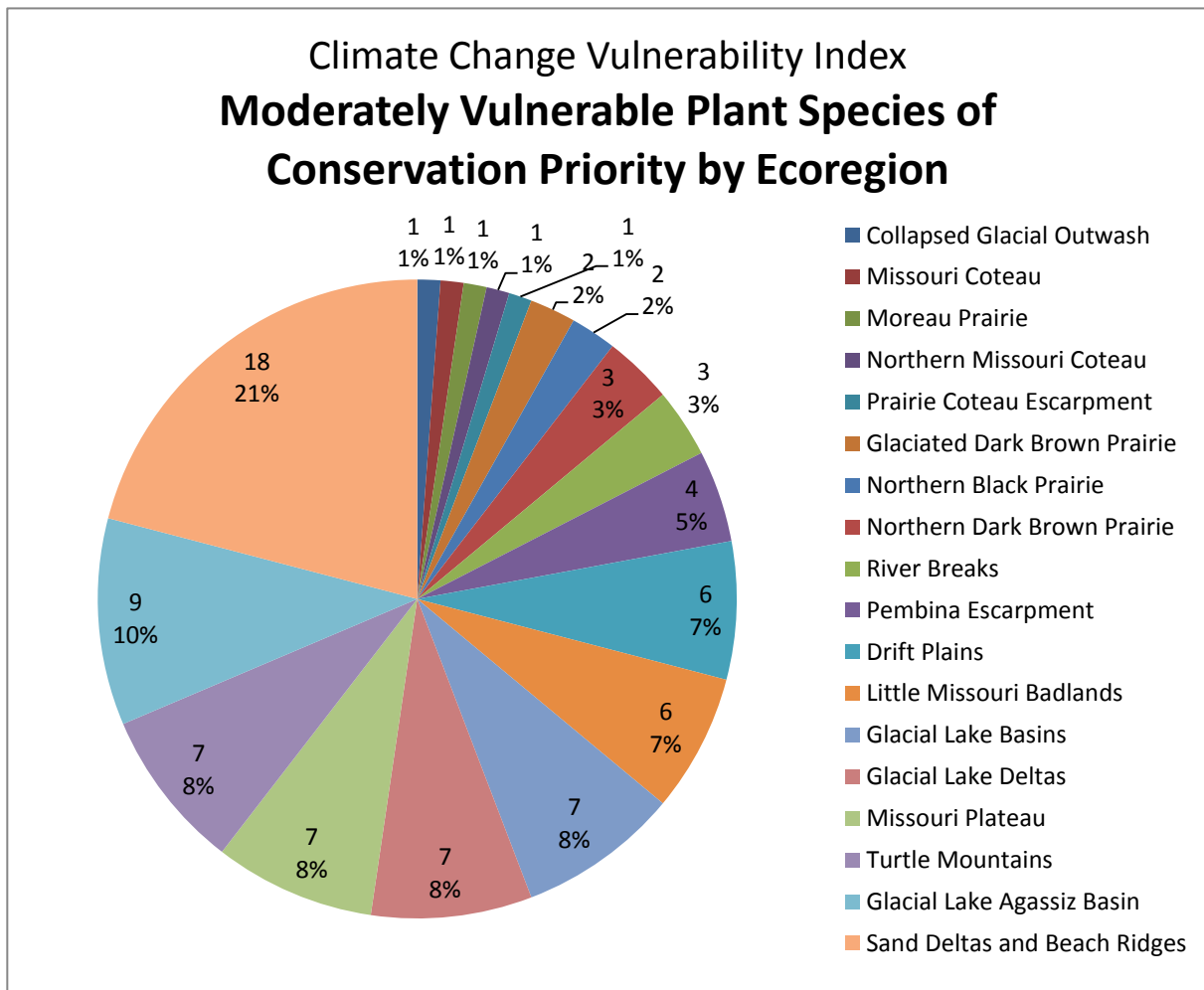
B. Plant species scored as highly vulnerable (HV) to climate change occur in a wide range of ecoregions (figure 13), and there are more plant species in this category with 38 plant species. The greatest amount of HV species occur in the Sand Deltas and Beach Ridges (21%), Glacial Lake Agassiz Basin (12%), Turtle Mountains (11%), and Drift Plains (10%), followed by the remaining ecoregions in figure 15. All ecoregions listed are considered high priority because they each harbor at least 8% of highly vulnerable plant species. The primary contribution to the number of plant species needing conservation in Sand Deltas and Beach Rides is because there is a high erosion risk that affects the quality of habitat for those plant species, and over time coupled with climate change the risk of habitat degradation has potential to increase. The climate change vulnerability scores also reflects species specific traits and their adaptability to climate change, so the CCVI does provide a confidence rank as a means of certainty. This will help provide adequate information in order to arrange for more suitable conservation measures.

Figure 16. Ecoregions that harbor highly vulnerable plant species in terms of climate change



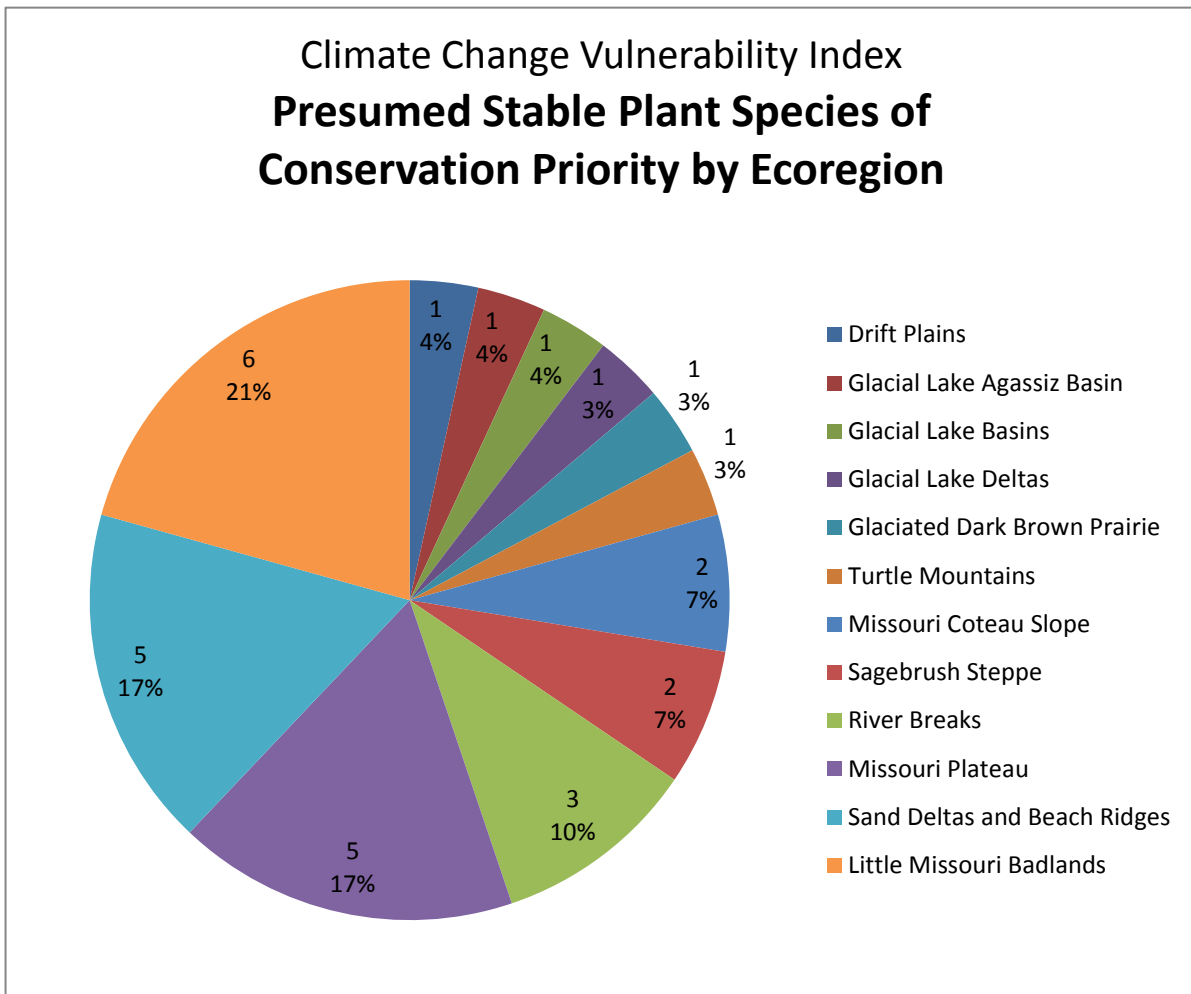
C. Moderately vulnerable (MV) category is where the majority of sensitive plant species reside (figure 16) with 42 plant species scored as MV (16 out of the 24 ecoregions). The majority of MV plant species occur within the Sand Deltas and Beach Ridge ecoregion with 21% (same as HV scored species), followed by the Glacial Lake Agassiz Basin ecoregion with 10% of sensitive plant species. MV plant species have slightly different distributions among ecoregions than EV and HV scored plant species. Drift Plains are in the top ecoregions that harbor EV and HV plant species, but Drift Plains support only 7% of MV plant species. The Turtle Mountains and the Missouri Plateau ecoregions support more MV species than the Drift Plains. One subjective explanation may be because the Missouri Plateau and Turtle Mountains are relatively undisturbed compared to the other ecoregions that occur in the eastern part of the state. The Missouri Plateau is west of the Missouri River and is mostly unaffected by glaciation, and retains its original soils and complex drainage pattern (Bailey, et al., 1994) and the Turtle Mountains are in the northern part of the state and are less susceptible to agricultural activity because of the terrain. More research needs to be conducted before any specific conclusions can be made.

Figure 17. Ecoregions that harbor moderately vulnerable plant species in terms of climate change



D. The plant species that are scored as presumed stable (PS) to climate change (figure 17) occur in 12 of the 24 ecoregions. The majority of PS plant species occur in the Little Missouri Badlands ecoregion (supporting 21% of plant species), followed by Sand Deltas and Beach Ridges and the Missouri Plateau (both individually supporting 17% of the plant species). Although these ecoregions harbor the most sensitive plant species, they are ranked PS by the CCVI. The plant species are still sensitive and threatened and may be susceptible and threatened by other factors such as agricultural and human activities, but they are presumed stable in terms of vulnerability to climate change.

Figure 18. Ecoregions that harbor plant species that are presumed stable in terms of climate change



Conclusion

Plant distributions seem to be similar between extremely vulnerable plant species and highly vulnerable plant species with most occurring in Drift Plains, the Glacial Lake Agassiz Basin, Glacial Outwash, and Sand Deltas and Beach Ridge ecoregions. Moderately vulnerable and presumed stable species have fewer occurrences in Drift Plains (only 7%) and the majority of the presumed stable species reside in the Little Missouri Badlands with 21%, whereas none of the extremely vulnerable species occurred in the Little Missouri Badlands, and the other ranks (HV (2%), and MV (7%)) have low concentrations of plant species within the Little Missouri Badlands.

Section 5 Landscape Components and Focus Areas

Introduction

Landscape components (figure 18) are defined as the key habitats (landscape components) and community types for North Dakota’s plant species of conservation need; these are the principal habitats in North Dakota. Three primary tools were used to identify landscape components: land cover information, existing spatial frameworks (i.e. ecoregions) and statistical models built from biological data. Level III ecoregions were further defined into finer level IV ecoregions by the EPA and were utilized to further define primary landscape components. It is important to recognize that species often require a combination of habitat types or landscape components for survival.

North Dakota is predominately a grassland state with a variety of grassland types, but it does have a number of vegetation types unique to the Upper Midwest. Where these changes in grassland communities occur is an important factor in identifying different landscapes. This section describes the primary landscapes found in North Dakota. The EPA’s level III ecoregions provides a good framework for identifying the boundaries of different grassland landscapes in North Dakota. These grassland types are Tallgrass Prairie (Red River Valley), Eastern Mixed-grass Prairie (Drift Prairie), Mixed-grass Prairie (Missouri Coteau), and Western Mixed-grass/short-grass Prairie (Missouri Slope). Each of these is considered as a separate landscape component. In addition to native grassland communities, there are several other major landscape components in North Dakota, including wetlands/lakes, rivers/streams/riparian, badlands and upland deciduous forest. These landscape components are embedded within the various grassland communities. They are typically rather large geographic areas that have fairly specific vegetative communities, topography, land uses, etc. Using this approach, 8 landscape components were identified.

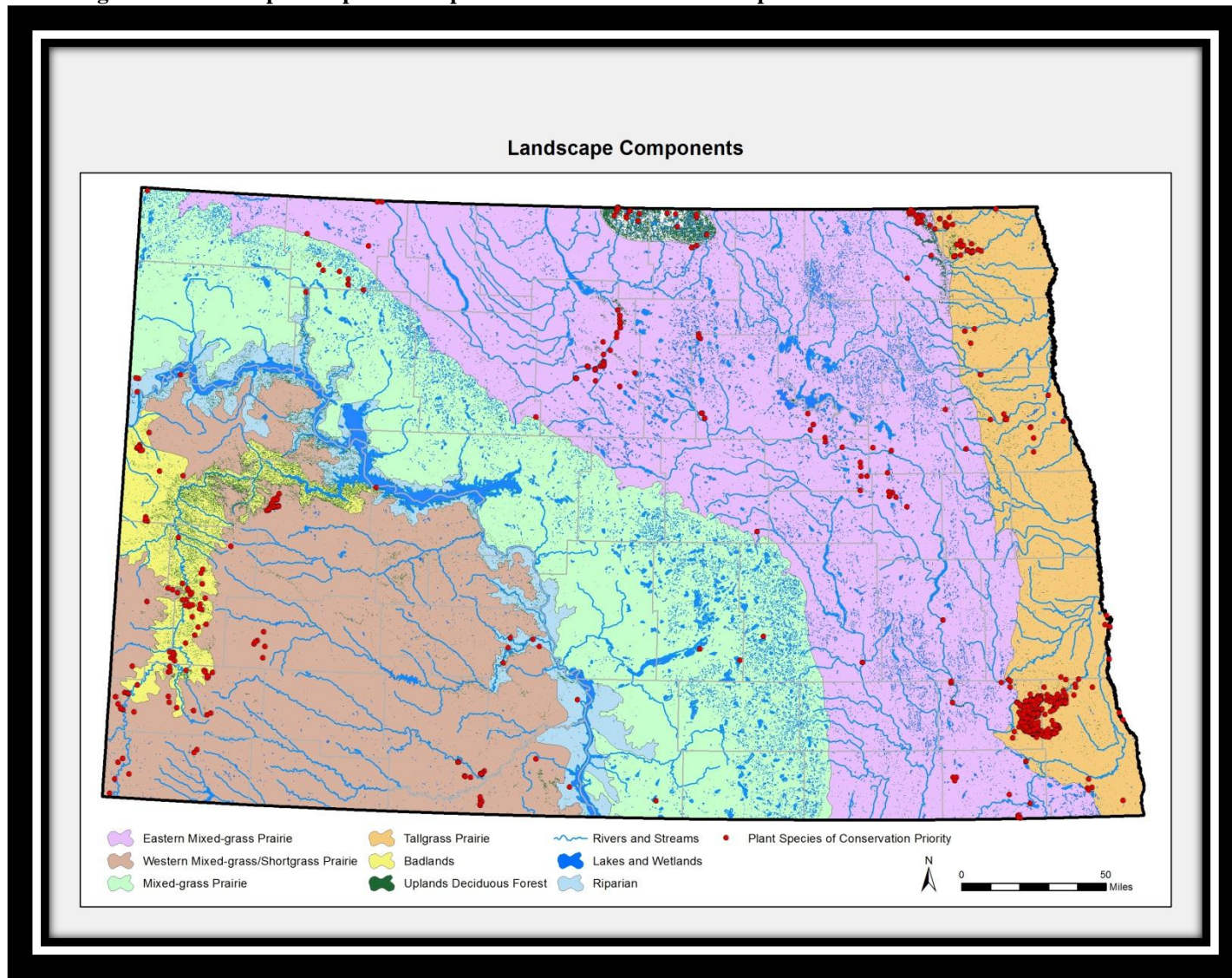
These designations and the more detailed level IV ecoregions formed the framework for delineating geographic areas of similar habitat. This section is devoted to the 8 primary landscape components as key landscapes essential to plant species of conservation priority. The Wetlands and Lakes landscape component was excluded from further discussion other than table 7 below because no plant species on our list fell within this focus area.

Table 8. Landscape components

Landscape Components
Tallgrass Prairie (Red River Valley)
Eastern Mixed-grass Prairie (Drift Prairie)
Mixed-grass Prairie (Missouri Coteau)
Wetlands and Lakes
Western Mixed-grass/Shortgrass Prairie (Missouri Slope)

Landscape Components
Rivers, Streams, and Riparian
Badlands
Upland Deciduous Forest

Figure 19. Landscape Component Map of North Dakota with Plant Species Distributions



Process for Developing Sensitive Plant Species Landscape Components

It is important to recognize that species often require a combination of habitat types or landscape components for survival. The key to ensuring their long-term survival is to maintain a diverse landscape including a mosaic of grasslands, woodlands, rivers etc. This cannot be reduced to a few specific small sites, but requires instead a much broader landscape scale or view. It should also be noted that although cropland constitutes a large portion of North Dakota, it was not historically a habitat component of the Northern Great Plains. Consequently, many species do not depend solely upon cropland for their survival, so it is not identified as a key habitat type or landscape component. However, agricultural production is a major part of North Dakota's past, present, and future and it can provide benefits such as nesting cover, migration stopover, and winter food sources if managed properly. Although North Dakota is generally characterized by different prairie types Rivers, Streams, and Riparian, Badlands, and Upland Deciduous Forest landscapes are also important. Table 8 describes each plant species and landscape component including associated focus areas and overall ecoregions that correspond with the individual plant species.

Table 9: Plant species distribution by landscape component

Tallgrass Prairie

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregions-Level IV
Allium canadense	Meadow Onion	S1	G5	HV	Sand Deltas and Beach Ridges	Tewaukon Dead Ice Moraine, Prairie Coteau Escarpment
Asclepias lanuginosa	Wooly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Glacial Dark Brown Prairie, Missouri Cateau, Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, End Moraine Complex, Missouri Plateau, River Breaks, Little Missouri Badlands, Pembina Escarpment
Astragalus neglectus	Cooper's Milkvetch	S1	G4	HV	Sand Deltas and Beach Ridges	Sand Deltas and Beach Ridges, Pembina Escarpment, Glacial Lake Agassiz Basin
Botrychium minganense	Moonwort	S1	G4	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains,	Northern Dark Brown Prairie, Turtle Mountains, Pembina Escarpment, Sand Deltas and Beach Ridges
Botrychium multifidum	Leathery Grapefern	S1	G5	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges	Pembina Escarpment, Sand Deltas and Beach Ridges

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregions-Level IV
<i>Botrychium simplex</i>	Least Grapeferen	S2	G5	PS	Saline Areas and Delta and Beach Ridges	Sand Deltas and Beach Ridges
<i>Campanula aparinoides</i>	Marsh Bellflower	S2S3	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Sand Deltas and Beach Ridges
<i>Carex alopecoidea</i>	Foxtail Sedge	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Turtle Mountains, Sand Deltas and Beach Ridges, Drift Plains, Glacial Lake Agassiz Basin
<i>Carex formosa</i>	Handsome Sedge	S1	G4	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Sand Deltas and Beach Ridges
<i>Carex leptalea</i>	Delicate Sedge	S3	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River	Glacial Lake Basin, Glacial Lake Agassiz Basin, Sand Deltas and Beach Ridges
<i>Collinsia parviflora</i>	Blue Lips	S2	G5	PS	Killdeer Mountains, Little Missouri River, Saline Areas Sagebrush Steppe	Little Missouri Badlands, Missouri Plateau

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregions-Level IV
Cyperus bipartitus	Brook Flatsedge	S2	G5	HV	Missouri Coteau Breaks, Saline Areas and Delta and Beach Ridges, Sheyenne River	Missouri Cateau, Sand Deltas and Beach Ridges
Cypripedium candidum	White Lady's-slipper	S2	G4	HV	Glacial Lake Deltas, Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Glacial Lake Basin, Glacial Lake Agassiz Basin, Saline Area, Drift plains, Sand Deltas and Beach Ridges, Tewaikon Dead Ice Moraine
Cypripedium parviflorum	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Glacial Lake Deltas, Killdeer Mountains, Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Basins, Glacial Lake Agassiz Basin
Cypripedium parviflorum var. pubescens	Large Yellow Lady's-slipper	S2	G5T5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains, DLB	Glacial Lake Deltas, Glacial Lake Basin, Sand Deltas and Beach Ridges, Turtle Mountains, Missouri Cateau, Pembina Escarpment, Drift Plains

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregions-Level IV
<i>Cypripedium reginae</i>	Showy Lady's-slipper	S2	G4	HV	DLM, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
<i>Desmanthus illinoensis</i>	Prairie Mimosa	S1	G5	PS	Saline Areas and Delta and Beach Ridges	Missouri Coteau Slope, Sand Deltas and Beach Ridges
<i>Eleocharis parvula</i>	Dwarf Spikerush	S2	G5	HV	Missouri Coteau Breaks, Saline Area, Sand Deltas and Beach Ridges	Drift Plains
<i>Eleocharis wolfii</i>	Wolf's Spikerush	SH	G3?	MV	Sand Deltas and Beach Ridges, Red River	Glacial Lake Agassiz Basin
<i>Equisetum palustre</i>	Marsh Horsetail	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Sand Deltas and Beach Ridges
<i>Equisetum pratense</i>	Meadow Horsetail	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
<i>Equisetum sylvaticum</i>	Wood Horsetail	S2	G5	HV	Glacial Lake Deltas, Pembina Hills, Saline Areas and Delta and Beach Ridges	Glacial Lake Basins, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Eriophorum gracile</i>	Slender Cottongrass	S1	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Sand Deltas and Beach Ridges

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregions-Level IV
<i>Eriophorum viridicarinatum</i>	Green Keeled Cottongrass	S2	G5	HV	Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Glacial Lake Agassiz Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Euonymus atropurpureus</i>	Wahoo	S3	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Glacial Lake Agassiz Basin, Sand Delta and Beach Ridges
<i>Galium labradoricum</i>	Bog Bedstraw	S3	G5	PS	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Glacial Lake Deltas, Glacial Lake Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Gymnocarpium dryopteris</i>	Oakfern	S2	G5	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River	Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Helianthemum bicknellii</i>	Bicknell's Sunrose	S1	G5	HV	Saline Areas and Delta and Beach Ridges	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
<i>Hudsonia tomentosa</i>	Wooly Beach-heather	S1	G5	MV	Saline Areas and Delta and Beach Ridges	Sand Deltas and Beach Ridges
<i>Lechea stricta</i>	Upright Pinweed	S2	G4?	MV	Saline Areas and Delta and Beach Ridges	Sand Deltas and Beach Ridges
<i>Liparis loeselii</i>	Loesel's Twayblade	S2	G5	HV	James River, Missouri Coteau Breaks, Saline Areas and Delta and Beach Ridges, Sheyenne River,	Drift Plains, Sand Deltas and Beach Ridges

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregions-Level IV
<i>Lipocarpha micrantha</i>	Small-flowered Lipocarpha	S1	G5	HV	Sand Deltas and Beach Ridges, Red River, Sheyenne River	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Glacial Lake Deltas, Glacial Lake Basins, Turtle Mountains, Drift Plains, Sand Deltas and Beach Ridges
<i>Mimulus guttatus</i>	Yellow Monkeyflower	S1	G5	MV	Saline Areas and Delta and Beach Ridges	Sand Deltas and Beach Ridges
<i>Mitella nuda</i>	Naked Mitrewort	S3	G5	HV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Turtle Mountains	Turtle Mountains, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Oenothera rhombipetala</i>	Rhombic Evening-primrose	S2	G4G5	MV	Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River	Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
<i>Onoclea sensibilis</i>	Sensitive Fern	S2	G5	HV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Prairie Cateau Escarpment, Sand Deltas and Beach Ridges
<i>Ophioglossum pusillum</i>	Adder's-tongue Fern	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Sand Deltas and Beach Ridges
<i>Orobanche uniflora</i>	One-flowered Broomrape	SH	G5	HV	Sand Deltas and Beach Ridges, Red River, Sheyenne River	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregions-Level IV
<i>Platanthera clavellata</i>	Green Woodland Orchid	SH	G5	HV	Sand Deltas and Beach Ridges, Saline Area, Red River	Saline Areas, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Platanthera praeclara</i>	Western Prairie Fringed Orchid	S2	G3	EV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains, Tewaikon Dead Ice Moraine, Glacial Outwash
<i>Pogonia ophioglossoides</i>	Rose Pogonia	S1	G5	HV	Sand Deltas and Beach Ridges, Saline Area, Red River	Saline Areas, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Polygonum hydropiperoides</i>	Swamp Smartweed	S1	G5	HV	Saline Areas and Delta and Beach Ridges	Sand Deltas and Beach Ridges
<i>Ribes cynosbati</i>	Prickly Gooseberry	S3	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Drift Prairie
<i>Salix pedicellaris</i>	Bog Willow	S3	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Turtle Mountains, Glacial Lake Deltas, Glacial Lake Basins
<i>Selaginella rupestris</i>	Ledge Spike-moss	S1	G5	HV	Saline Areas and Delta and Beach Ridges	Sand Deltas and Beach Ridges
<i>Solidago flexicaulis</i>	Zigzag Goldenrod	S2	G5	PS	Red River, Saline Areas and Delta and Beach Ridges, Sheyenne River	Drift Prairie

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregions-Level IV
<i>Spiranthes cernua</i>	Nodding Ladies'-tresses	S1	G5	MV	Glacial Lake Deltas, James River, Saline Areas and Delta and Beach Ridges, Souris River	Glacial Lake Deltas, Glacial Lake Basins, Drift Plains, Sand Deltas and Beach Ridges
<i>Triplasis purpurea</i>	Purple Sandgrass	S1	G4G5	PS	Saline Areas and Delta and Beach Ridges	Sand Deltas and Beach Ridges
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort	S2	G5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Souris River, Turtle Mountains	Glacial Lake Deltas, Glacial Lake Basins, Glacial Lake Agassiz Basin, Turtle Mountains
<i>Veronicastrum virginicum</i>	Culver's-root	SH	G4	PS	Saline Areas and Delta and Beach Ridges	Glacial Lake Agassiz Basin, Sand Deltas and Beach Ridges
<i>Viola conspersa</i>	Bog Violet	S2	G5	HV	Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River	Saline Area, Missouri Plateau, Sand Deltas and Beach Ridges

Eastern Mixed-grass Prairie

State Scientific Name	State Common Name	Srank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Botrychium campestre</i>	Prairie Grapefern	S1	G3G4	MV	Glacial Lake Deltas, Souris River	Missouri Plateau
<i>Botrychium matricariifolium</i>	Chamomile Grapefern	S1	G5	MV	Glacial Lake Deltas, Missouri Coteau Breaks	Glacial Lake Basin

State Scientific Name	State Common Name	Srank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Carex capillaris</i>	Hair-like Sedge	S2	G5	HV	Glacial Lake Deltas	Glacial Lake Deltas
<i>Carex leptalea</i>	Delicate Sedge	S3	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River	Glacial Lake Basin, Glacial Lake Agassiz Basin, Sand Deltas and Beach Ridges
<i>Carex sterilis</i>	Sterile Sedge	S1	G4	MV	Glacial Lake Deltas, Souris River	Glacial Lake Basins, Glacial Lake Deltas
<i>Cypripedium candidum</i>	White Lady's-slipper	S2	G4	HV	Glacial Lake Deltas, Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Glacial Lake Basin, Glacial Lake Agassiz Basin, Saline Area, Drift plains, Sand Deltas and Beach Ridges, Tewaukon Dead Ice Moraine
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Glacial Lake Deltas, Killdeer Mountains, Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Basins, Glacial Lake Agassiz Basin
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	S2	G5T5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains, DLB	Glacial Lake Deltas, Glacial Lake Basin, Sand Deltas and Beach Ridges, Turtle Mountains, Missouri Cateau, Pembina Escarpment, Drift Plains
<i>Cypripedium reginae</i>	Showy Lady's-slipper	S2	G4	HV	DLM, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
<i>Dicentra cucullaria</i>	Dutchman's Breeches	S1	G5	MV	Sand Deltas and Beach Ridges, Sheyenne River	Prairie Cateau Escarpment, Glacial Lake Agassiz Basin
<i>Equisetum sylvaticum</i>	Wood Horsetail	S2	G5	HV	Glacial Lake Deltas, Pembina Hills, Saline Areas and Delta and Beach Ridges	Glacial Lake Basins, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Eriophorum chamissonis</i>	Chamisson's Cottongrass	S2	G5	HV	Glacial Lake Deltas, Souris River, Turtle Mountains	Glacial Lake Deltas, Turtle Mountains

State Scientific Name	State Common Name	Srank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Galium labradoricum</i>	Bog Bedstraw	S3	G5	PS	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Glacial Lake Deltas, Glacial Lake Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Glacial Lake Deltas, Glacial Lake Basins, Turtle Mountains, Drift Plains, Sand Deltas and Beach Ridges
<i>Parnassia palustris</i> var. <i>parviflora</i>	Small-flowered Grass-of-Parnassus	S3	G4	MV	Glacial Lake Deltas, Sheyenne River	Northern Black Prairie, Turtle Mountains, Glacial Lake Deltas, Glacial Lake Basins
<i>Penstemon procerus</i>	Small-flowered Penstemon	S1	G5	MV	Missouri Coteau Breaks	Northern Dark Brown Prairie
<i>Rhynchospora capillacea</i>	Hair Beakrush	S2	G4	MV	Glacial Lake Deltas, James River, Souris River	Glacial Lake Deltas, Glacial Lake Basins, Drift Plains
<i>Salix pedicellaris</i>	Bog Willow	S3	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Turtle Mountains, Glacial Lake Deltas, Glacial Lake Basins
<i>Spiranthes cernua</i>	Nodding Ladies'-tresses	S1	G5	MV	Glacial Lake Deltas, James River, Saline Areas and Delta and Beach Ridges, Souris River	Glacial Lake Deltas, Glacial Lake Basins, Drift Plains, Sand Deltas and Beach Ridges
<i>Spiranthes romanzoffiana</i>	Hooded Ladies'-tresses	S1	G5	MV	Glacial Lake Deltas, Missouri Coteau Breaks, Souris River	Glaciated Dark Brown Prairie, Glacial Lake Deltas, Glacial Lake Basins
<i>Triantha glutinosa</i>	Sticky False-asphodel	S1	G5	EV	Devils Lake Mountains	Drift Plains
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort	S2	G5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Souris River, Turtle Mountains	Glacial Lake Deltas, Glacial Lake Basins, Glacial Lake Agassiz Basin, Turtle Mountains

Mixed-Grass Prairie (Missouri Coteau)

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
Asclepias lanuginosa	Wooly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Glacial Dark Brown Prairie, Missouri Coteau, Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, End Moraine Complex, Missouri Plateau, River Breaks, Little Missouri Badlands, Pembina Escarpment
Botrychium matricariifolium	Chamomile Grapefern	S1	G5	MV	Glacial Lake Deltas, Missouri Coteau Breaks	Glacial Lake Basin
Carex backii	Back's Sedge	S3	G4	MV	Missouri Coteau Breaks, Turtle Mountains	Turtle Mountains, Northern Black Prairie, Northern Dark Brown Prairie
Lappula cenchrusoides	Stickseed	S1	G4	MV	Missouri River System/Breaks, Little Missouri River, Knife River, Heart River, Cannonball River, Sagebrush Steppe, Ponderosa Pine, Killdeer Mountains	Little Missouri Badlands, Missouri Coteau, River Breaks, Glaciated Dark Brown Prairie, Collapsed Glacial Outwash, Moreau Prairie
Liparis loeselii	Loesel's Twayblade	S2	G5	HV	James River, Missouri Coteau Breaks, Saline Areas and Delta and Beach Ridges, Sheyenne River,	Drift Plains, Sand Deltas and Beach Ridges
Primula incana	American Primrose	S2	G4G5	MV	Missouri Coteau Breaks	Northern Missouri Coteau
Spiranthes romanzoffiana	Hooded Ladies'-tresses	S1	G5	MV	Glacial Lake Deltas, Missouri Coteau Breaks, Souris River	Glaciated Dark Brown Prairie, Glacial Lake Deltas, Glacial Lake Basins
Sporobolus airoides	Alkali Sacaton	S3	G5	PS	Little Missouri River, Saline Areas Sagebrush Steppe, Saline Areas	Missouri Plateau

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Glacial Dark Brown Prairie, Missouri Cateau, Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, End Moraine Complex, Missouri Plateau, River Breaks, Little Missouri Badlands, Pembina Escarpment
<i>Botrychium matricariifolium</i>	Chamomile Grapefern	S1	G5	MV	Glacial Lake Deltas, Missouri Coteau Breaks	Glacial Lake Basin
<i>Carex backii</i>	Back's Sedge	S3	G4	MV	Missouri Coteau Breaks, Turtle Mountains	Turtle Mountains, Northern Black Prairie, Northern Dark Brown Prairie
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Missouri River System/Breaks, Little Missouri River, Knife River, Heart River, Cannonball River, Sagebrush Steppe, Ponderosa Pine, Killdeer Mountains	Little Missouri Badlands, Missouri Cateau, River Breaks, Glaciated Dark Brown Prairie, Collapsed Glacial Outwash, Moreau Prairie
<i>Liparis loeselii</i>	Loesel's Twayblade	S2	G5	HV	James River, Missouri Coteau Breaks, Saline Areas and Delta and Beach Ridges, Sheyenne River,	Drift Plains, Sand Deltas and Beach Ridges
<i>Primula incana</i>	American Primrose	S2	G4G5	MV	Missouri Coteau Breaks	Northern Missouri Cateau
<i>Spiranthes romanzoffiana</i>	Hooded Ladies'-tresses	S1	G5	MV	Glacial Lake Deltas, Missouri Coteau Breaks, Souris River	Glaciated Dark Brown Prairie, Glacial Lake Deltas, Glacial Lake Basins
<i>Sporobolus airoides</i>	Alkali Sacaton	S3	G5	PS	Little Missouri River, Saline Areas Sagebrush Steppe, Saline Areas	Missouri Plateau

Western Mixed-grass Prairie/Shortgrass Prairie

State Scientific Name	State Common Name	Srank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Asclepias lanuginosa</i>	Wooly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Glacial Dark Brown Prairie, Missouri Cateau, Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, End Moraine Complex, Missouri Plateau, River Breaks, Little Missouri Badlands, Pembina Escarpment
<i>Chenopodium subglabrum</i>	Smooth Goosefoot	S1	G3G4	HV	Little Missouri River, PonderoSaline Areas Pine Area, Saline Areas Sagebrush Steppe	Little Missouri Badlands
<i>Collinsia parviflora</i>	Blue Lips	S2	G5	PS	Killdeer Mountains, Little Missouri River, Saline Areas Sagebrush Steppe	Little Missouri Badlands, Missouri Plateau
<i>Cryptantha torreyana</i>	Torrey's Cryptantha	S1	G5	MV	Sagebrush Steppe, Little Missouri River, Heart River, Knife River	Little Missouri Badlands, Missouri Plateau
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Missouri River System/Breaks, Little Missouri River, Knife River, Heart River, Cannonball River, Sagebrush Steppe, Ponderosa Pine, Killdeer Mountains	Little Missouri Badlands, Missouri Cateau, River Breaks, Glaciated Dark Brown Prairie, Collapsed Glacial Outwash, Moreau Prairie
<i>Leucocrinum montanum</i>	Sand Lily	S2	G5	PS	Saline Areas Sagebrush Steppe	Missouri Plateau, Little Missouri Badlands, Sagebrush Steppe
<i>Mahonia repens</i>	Creeping Barberry	S2	G5	PS	Little Missouri River, Saline Areas Sagebrush Steppe	Little Missouri Badlands, Sagebrush Steppe

State Scientific Name	State Common Name	Srank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
Mentzelia pumila	Dwarf Mentzelia	S1	G4	PS	Little Missouri River, Saline Areas Sagebrush Steppe	Little Missouri Badlands
Pinus flexilis	Limber Pine	S1	G5	MV	Little Missouri River, Saline Areas Sagebrush Steppe	Little Missouri Badlands
Polygonum leptocarpum	Thin-fruited Knotweed	S1	G2G4Q	HV	Cannonball River, Heart River	Missouri Plateau
Populus x acuminata	Lanceleaf Cottonwood	S2	GNA	MV	Saline Areas Sagebrush Steppe	Little Missouri Badlands, Missouri Plateau
Potentilla diversifolia	Mountain Meadow Cinquefoil	S1	G5	PS	Sagebrush Steppe, Ponderosa Pine, Little Missouri River, Heart River	Missouri Plateau, Little Missouri Badlands
Townsendia hookeri	Hooker's Townsendia	S1	G5	PS	Missouri River System/Breaks, Little Missouri River, Knife River, Heart River, Badlands	Little Missouri Badlands

Rivers, Streams, and Riparian

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Allium canadense</i>	Meadow Onion	S1	G5	HV	Sand Deltas and Beach Ridges	Tewaukon Dead Ice Moraine, Prairie Coteau Escarpment
<i>Asclepias lanuginosa</i>	Wooly Milkweed	S1	G4?	HV	Sand Deltas and Beach Ridges, Cannonball River, Heart River, Knife River, Killdeer Mountains, James River, Souris River	Glacial Dark Brown Prairie, Missouri Cateau, Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, End Moraine Complex, Missouri Plateau, River Breaks, Little Missouri Badlands, Pembina Escarpment
<i>Astragalus drummondii</i>	Drummond's Milkvetch	S1	G5	PS	Missouri River Breaks	River Breaks
<i>Botrychium campestre</i>	Prairie Grapefern	S1	G3G4	MV	Glacial Lake Deltas, Souris River	Missouri Plateau
<i>Botrychium minganense</i>	Moonwort	S1	G4	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains,	Northern Dark Brown Prairie, Turtle Mountains, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Campanula aparinoides</i>	Marsh Bellflower	S2S3	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Sand Deltas and Beach Ridges
<i>Carex alopecoidea</i>	Foxtail Sedge	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Turtle Mountains, Sand Deltas and Beach Ridges, Drift Plains, Glacial Lake Agassiz Basin
<i>Carex formosa</i>	Handsome Sedge	S1	G4	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Sand Deltas and Beach Ridges
<i>Carex leptalea</i>	Delicate Sedge	S3	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River	Glacial Lake Basin, Glacial Lake Agassiz Basin, Sand Deltas and Beach Ridges

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
Carex sterilis	Sterile Sedge	S1	G4	MV	Glacial Lake Deltas, Souris River	Glacial Lake Basins, Glacial Lake Deltas
Caulophyllum thalictroides	Blue Cohosh	S1	G4G5	MV	Red River, Sheyenne River, Turtle Mountains	Glacial Lake Agassiz Basin, Drift Plains, Turtle Mountains
Chenopodium subglabrum	Smooth Goosefoot	S1	G3G4	HV	Little Missouri River, PonderoSaline Areas Pine Area, Saline Areas Sagebrush Steppe	Little Missouri Badlands
Collinsia parviflora	Blue Lips	S2	G5	PS	Killdeer Mountains, Little Missouri River, Saline Areas Sagebrush Steppe	Little Missouri Badlands, Missouri Plateau
Cyperus bipartitus	Brook Flatsedge	S2	G5	HV	Missouri Coteau Breaks, Saline Areas and Delta and Beach Ridges, Sheyenne River	Missouri Coteau, Sand Deltas and Beach Ridges
Cypripedium candidum	White Lady's-slipper	S2	G4	HV	Glacial Lake Deltas, Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Glacial Lake Basin, Glacial Lake Agassiz Basin, Saline Area, Drift plains, Sand Deltas and Beach Ridges, Tewaikon Dead Ice Moraine
Cypripedium parviflorum	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Glacial Lake Deltas, Killdeer Mountains, Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Basins, Glacial Lake Agassiz Basin
Cypripedium parviflorum var. pubescens	Large Yellow Lady's-slipper	S2	G5T5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains, DLB	Glacial Lake Deltas, Glacial Lake Basin, Sand Deltas and Beach Ridges, Turtle Mountains, Missouri Coteau, Pembina Escarpment, Drift Plains

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Cypripedium reginae</i>	Showy Lady's-slipper	S2	G4	HV	DLM, Saline Areas and Delta and Beach Ridges, Sheyenne River, DLB	Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
<i>Dalea enneandra</i>	Nine-anthered Dalea	S3	G5	MV	HR, Little Missouri River, Missouri River Breaks, Missouri River System	Little Missouri Badlands, Missouri Plateau, River Breaks
<i>Dicentra cucullaria</i>	Dutchman's Breeches	S1	G5	MV	Sand Deltas and Beach Ridges, Sheyenne River	Prairie Cateau Escarpment, Glacial Lake Agassiz Basin
<i>Eleocharis parvula</i>	Dwarf Spikerush	S2	G5	HV	Missouri Coteau Breaks, Saline Area, Sand Deltas and Beach Ridges	Drift Plains
<i>Eleocharis wolfii</i>	Wolf's Spikerush	SH	G3?	MV	Sand Deltas and Beach Ridges, Red River	Glacial Lake Agassiz Basin
<i>Equisetum palustre</i>	Marsh Horsetail	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Sand Deltas and Beach Ridges
<i>Equisetum pratense</i>	Meadow Horsetail	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
<i>Eriogonum visherii</i>	Dakota Buckwheat	S2	G3	MV	CR, Little Missouri River, Missouri River Breaks, Saline Areas Sagebrush Steppe	Missouri Plateau, Little Missouri Badlands, River Breaks
<i>Eriophorum chamissonis</i>	Chamisson's Cottongrass	S2	G5	HV	Glacial Lake Deltas, Souris River, Turtle Mountains	Glacial Lake Deltas, Turtle Mountains

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Eriophorum gracile</i>	Slender Cottongrass	S1	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Sand Deltas and Beach Ridges
<i>Eriophorum viridicarinatum</i>	Green Keeled Cottongrass	S2	G5	HV	Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Glacial Lake Agassiz Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Euonymus atropurpureus</i>	Wahoo	S3	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Glacial Lake Agassiz Basin, Sand Delta and Beach Ridges
<i>Galium labradoricum</i>	Bog Bedstraw	S3	G5	PS	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Glacial Lake Deltas, Glacial Lake Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Geranium maculatum</i>	Wild Geranium	SH	G5	HV	Red River	Glacial Lake Agassiz Basin
<i>Gymnocarpium dryopteris</i>	Oakfern	S2	G5	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River	Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Missouri River System/Breaks, Little Missouri River, Knife River, Heart River, Cannonball River, Sagebrush Steppe, Ponderosa Pine, Killdeer Mountains	Little Missouri Badlands, Missouri Cateau, River Breaks, Glaciated Dark Brown Prairie, Collapsed Glacial Outwash, Moreau Prairie

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
Liparis loeselii	Loesel's Twayblade	S2	G5	HV	James River, Missouri Coteau Breaks, Saline Areas and Delta and Beach Ridges, Sheyenne River,	Drift Plains, Sand Deltas and Beach Ridges
Lipocarpha micrantha	Small-flowered Lipocarpha	S1	G5	HV	Sand Deltas and Beach Ridges, Red River, Sheyenne River	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
Mahonia repens	Creeping Barberry	S2	G5	PS	Little Missouri River, Saline Areas Sagebrush Steppe	Little Missouri Badlands, Sagebrush Steppe
Mentzelia pumila	Dwarf Mentzelia	S1	G4	PS	Little Missouri River, Saline Areas Sagebrush Steppe	Little Missouri Badlands
Menyanthes trifoliata	Buckbean	S2	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Glacial Lake Deltas, Glacial Lake Basins, Turtle Mountains, Drift Plains, Sand Deltas and Beach Ridges
Oenothera rhombipetala	Rhombic Evening-primrose	S2	G4G5	MV	Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River	Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
Onoclea sensibilis	Sensitive Fern	S2	G5	HV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Prairie Cateau Escarpment, Sand Deltas and Beach Ridges
Ophioglossum pusillum	Adder's-tongue Fern	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Sand Deltas and Beach Ridges

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Parnassia palustris</i> var. <i>parviflora</i>	Small-flowered Grass-of-Parnassus	S3	G4	MV	Glacial Lake Deltas, Sheyenne River	Northern Black Prairie, Turtle Mountains, Glacial Lake Deltas, Glacial Lake Basins
<i>Penstemon procerus</i>	Small-flowered Penstemon	S1	G5	MV	Missouri Coteau Breaks	Northern Dark Brown Prairie
<i>Phlox alysseifolia</i>	Alyssum-leaved Phlox	S2	G5	PS	Missouri River Breaks	Glaciated Dark Brown Prairie, Missouri Coteau Slope, River Breaks
<i>Phlox pilosa</i>	Downy Phlox	S1	G5	MV	Red River	Glacial Lake Agassiz Basin
<i>Pinus flexilis</i>	Limber Pine	S1	G5	MV	Little Missouri River, Saline Areas Sagebrush Steppe	Little Missouri Badlands
<i>Platanthera clavellata</i>	Green Woodland Orchid	SH	G5	HV	Sand Deltas and Beach Ridges, Saline Area, Red River	Saline Areas, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Platanthera praeclara</i>	Western Prairie Fringed Orchid	S2	G3	EV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains, Tewaukon Dead Ice Moraine, Glacial Outwash
<i>Pogonia ophioglossoides</i>	Rose Pogonia	S1	G5	HV	Sand Deltas and Beach Ridges, Saline Area, Red River	Saline Areas, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Polygonum leptocarpum</i>	Thin-fruited Knotweed	S1	G2G4Q	HV	Cannonball River, Heart River	Missouri Plateau
<i>Potentilla diversifolia</i>	Mountain Meadow Cinquefoil	S1	G5	PS	Sagebrush Steppe, Ponderosa Pine, Little Missouri River, Heart River	Missouri Plateau, Little Missouri Badlands

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
Ranunculus cardiophyllus	Heart-leaved Buttercup	S1	G4G5	PS	Missouri River Breaks, Missouri River System	River Breaks
Rhynchospora capillacea	Hair Beakrush	S2	G4	MV	Glacial Lake Deltas, James River, Souris River	Glacial Lake Deltas, Glacial Lake Basins, Drift Plains
Ribes cynosbati	Prickly Gooseberry	S3	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River	Drift Prairie
Rorippa calycina	Hayden's Yellowcress	SH	G3	HV	Missouri River Breaks, Missouri River System	River Breaks
Salix pedicellaris	Bog Willow	S3	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Turtle Mountains, Glacial Lake Deltas, Glacial Lake Basins
Solidago flexicaulis	Zigzag Goldenrod	S2	G5	PS	Red River, Saline Areas and Delta and Beach Ridges, Sheyenne River	Drift Prairie
Spiranthes cernua	Nodding Ladies'-tresses	S1	G5	MV	Glacial Lake Deltas, James River, Saline Areas and Delta and Beach Ridges, Souris River	Glacial Lake Deltas, Glacial Lake Basins, Drift Plains, Sand Deltas and Beach Ridges
Spiranthes romanzoffiana	Hooded Ladies'-tresses	S1	G5	MV	Glacial Lake Deltas, Missouri Coteau Breaks, Souris River	Glaciated Dark Brown Prairie, Glacial Lake Deltas, Glacial Lake Basins
Sporobolus airoides	Alkali Sacaton	S3	G5	PS	Little Missouri River, Saline Areas Sagebrush Steppe, Saline Areas	Missouri Plateau
Talinum parviflorum	Prairie Fameflower	S2	G5	MV	Missouri River Breaks	Missouri Plateau

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Townsendia hookeri</i>	Hooker's Townsendia	S1	G5	PS	Missouri River System/Breaks, Little Missouri River, Knife River, Heart River, Badlands	Little Missouri Badlands
<i>Triantha glutinosa</i>	Sticky False-asphodel	S1	G5	EV	Devils Lake Mountains	Drift Plains
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort	S2	G5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Souris River, Turtle Mountains	Glacial Lake Deltas, Glacial Lake Basins, Glacial Lake Aggasiz Basin, Turtle Mountains
<i>Viola conspersa</i>	Bog Violet	S2	G5	HV	Saline Areas, Saline Areas and Delta and Beach Ridges, Sheyenne River	Saline Area, Missouri Plateau, Sand Deltas and Beach Ridges

Badlands

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Chenopodium subglabrum</i>	Smooth Goosefoot	S1	G3G4	HV	Little Missouri River, PonderoSaline Areas Pine Area, Saline Areas Sagebrush Steppe	Little Missouri Badlands
<i>Cryptantha torreyana</i>	Torrey's Cryptantha	S1	G5	MV	Sagebrush Steppe, Little Missouri River, Heart River, Knife River	Little Missouri Badlands, Missouri Plateau

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Missouri River System/Breaks, Little Missouri River, Knife River, Heart River, Cannonball River, Sagebrush Steppe, Ponderosa Pine, Killdeer Mountains	Little Missouri Badlands, Missouri Cateau, River Breaks, Glaciated Dark Brown Prairie, Collapsed Glacial Outwash, Moreau Prairie
<i>Potentilla diversifolia</i>	Mountain Meadow Cinquefoil	S1	G5	PS	Sagebrush Steppe, Ponderosa Pine, Little Missouri River, Heart River	Missouri Plateau, Little Missouri Badlands

Upland Deciduous Forest

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Allium canadense</i>	Meadow Onion	S1	G5	HV	Sand Deltas and Beach Ridges	Tewaukon Dead Ice Moraine, Prairie Cotaue Escarpment
<i>Astragalus vexilliflexus</i>	Bent-flowered Milkvetch	S3	G4	HV	Killdeer Mountains	Missouri Plateau
<i>Botrychium minganense</i>	Moonwort	S1	G4	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains,	Northern Dark Brown Prairie, Turtle Mountains, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Botrychium multifidum</i>	Leathery Grapefern	S1	G5	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges	Pembina Escarpment, Sand Deltas and Beach Ridges

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Carex alopecoidea</i>	Foxtail Sedge	S2	G5	MV	Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Turtle Mountains, Sand Deltas and Beach Ridges, Drift Plains, Glacial Lake Agassiz Basin
<i>Carex backii</i>	Back's Sedge	S3	G4	MV	Missouri Coteau Breaks, Turtle Mountains	Turtle Mountains, Northern Black Prairie, Northern Dark Brown Prairie
<i>Carex echinata</i> ssp. <i>echinata</i>	Spiny Sedge	S1	G5T5	HV	Turtle Mountains	TurtleMountains
<i>Cheilanthes feei</i>	Slender Lip Fern	S1	G5	HV	Killdeer Mountains	Missouri Plateau
<i>Clematis columbiana</i> var. <i>tenuiloba</i>	Slender-lobed Clematis	S1	G5?T4?	HV	Killdeer Mountains	Missouri Plateau
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Glacial Lake Deltas, Killdeer Mountains, Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Basins, Glacial Lake Agassiz Basin
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	S2	G5T5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains, DLB	Glacial Lake Deltas, Glacial Lake Basin, Sand Deltas and Beach Ridges, Turtle Mountains, Missouri Cateau, Pembina Escarpment, Drift Plains
<i>Dirca palustris</i>	Leatherwood	S1	G4	MV	Pembina Hills	Pembina Escarpment
<i>Drosera rotundifolia</i>	Round-leaved Sundew	S1	G5	HV	Turtle Mountains	Turtle Mountains
<i>Equisetum sylvaticum</i>	Wood Horsetail	S2	G5	HV	Glacial Lake Deltas, Pembina Hills, Saline Areas and Delta and Beach Ridges	Glacial Lake Basins, Pembina Escarpment, Sand Deltas and Beach Ridges

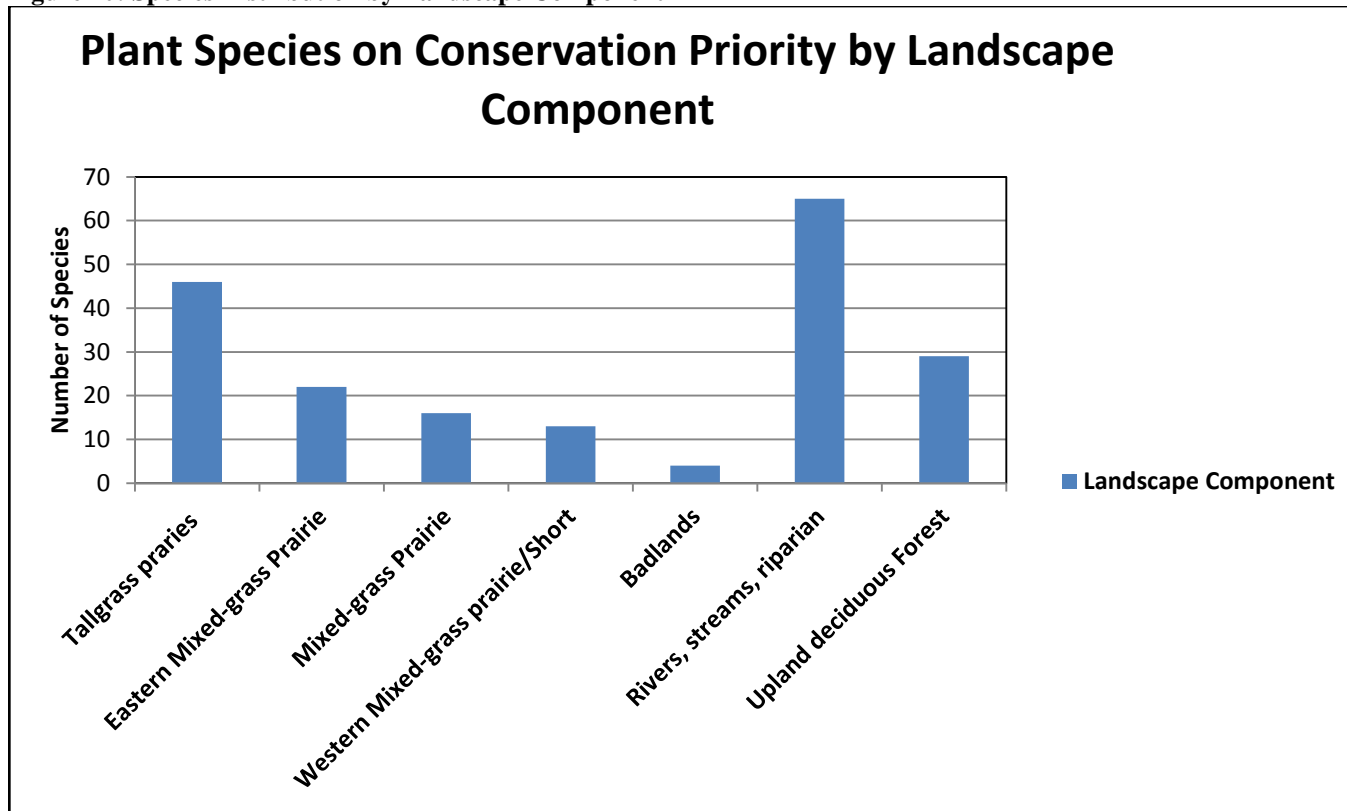
State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Erigeron radicans</i>	Cushion Fleabane	S1	G3G4	PS	Killdeer Mountains	Missouri Plateau
<i>Eriogonum cernuum</i>	Nodding Buckwheat	S1	G5	MV	Killdeer Mountains	Missouri Plateau
<i>Eriophorum chamissonis</i>	Chamisson's Cottongrass	S2	G5	HV	Glacial Lake Deltas, Souris River, Turtle Mountains	Glacial Lake Deltas, Turtle Mountains
<i>Eriophorum viridicarinatum</i>	Green Keeled Cottongrass	S2	G5	HV	Saline Areas and Delta and Beach Ridges, Sheyenne River, Turtle Mountains	Glacial Lake Agassiz Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Galium labradoricum</i>	Bog Bedstraw	S3	G5	PS	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Glacial Lake Deltas, Glacial Lake Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Gymnocarpium dryopteris</i>	Oakfern	S2	G5	MV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Sheyenne River	Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Glacial Lake Deltas, Glacial Lake Basins, Turtle Mountains, Drift Plains, Sand Deltas and Beach Ridges
<i>Minuartia dawsonensis</i>	Stiff Sandwort	S1	G5	HV	Pembina Hills	Pembina Escarpment
<i>Mitella nuda</i>	Naked Mitrewort	S3	G5	HV	Pembina Hills, Saline Areas and Delta and Beach Ridges, Turtle Mountains	Turtle Mountains, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Petasites frigidus</i>	Sweet Coltsfoot	S2	G5	HV	Pembina Hills	Pembina Escarpment
<i>Salix maccalliana</i>	Swamp Willow	S1	G5?	HV	Turtle Mountains	Turtle Mountains

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	Focus Area	Ecoregion-EPA Level IV
<i>Salix pedicellaris</i>	Bog Willow	S3	G5	MV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Sheyenne River, Souris River, Turtle Mountains	Turtle Mountains, Glacial Lake Deltas, Glacial Lake Basins
<i>Scheuchzeria palustris</i>	Pod Grass	S1	G5	HV	Turtle Mountains	Turtle Mountains
<i>Sphagnum teres</i>	Round-leaved Sphagnum	S1	G5	HV	Turtle Mountains	Turtle Mountains
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort	S2	G5	HV	Glacial Lake Deltas, Saline Areas and Delta and Beach Ridges, Souris River, Turtle Mountains	Glacial Lake Deltas, Glacial Lake Basins, Glacial Lake Aggasiz Basin, Turtle Mountains

Species Distribution by Landscape Component

Overall, solely based on species distribution within the each landscape component (figure 19), Rivers, Streams, and Riparian landscapes harbor the most Plant Species of Conservation Priority; containing 65 plant species or 33% of the plant species on our list. The next landscape components harboring the most plant species are Tallgrass Prairie (46 plant species, 24%), Upland Deciduous Forest (29 plant species, 15%), and Eastern Mixed-grass Prairie (22 plant species, 11%). The Badlands landscape component harbors the least amount of plant species with only 4 plants making up 7% of sensitive plant habitat.

Figure 20: Species Distribution by Landscape Component

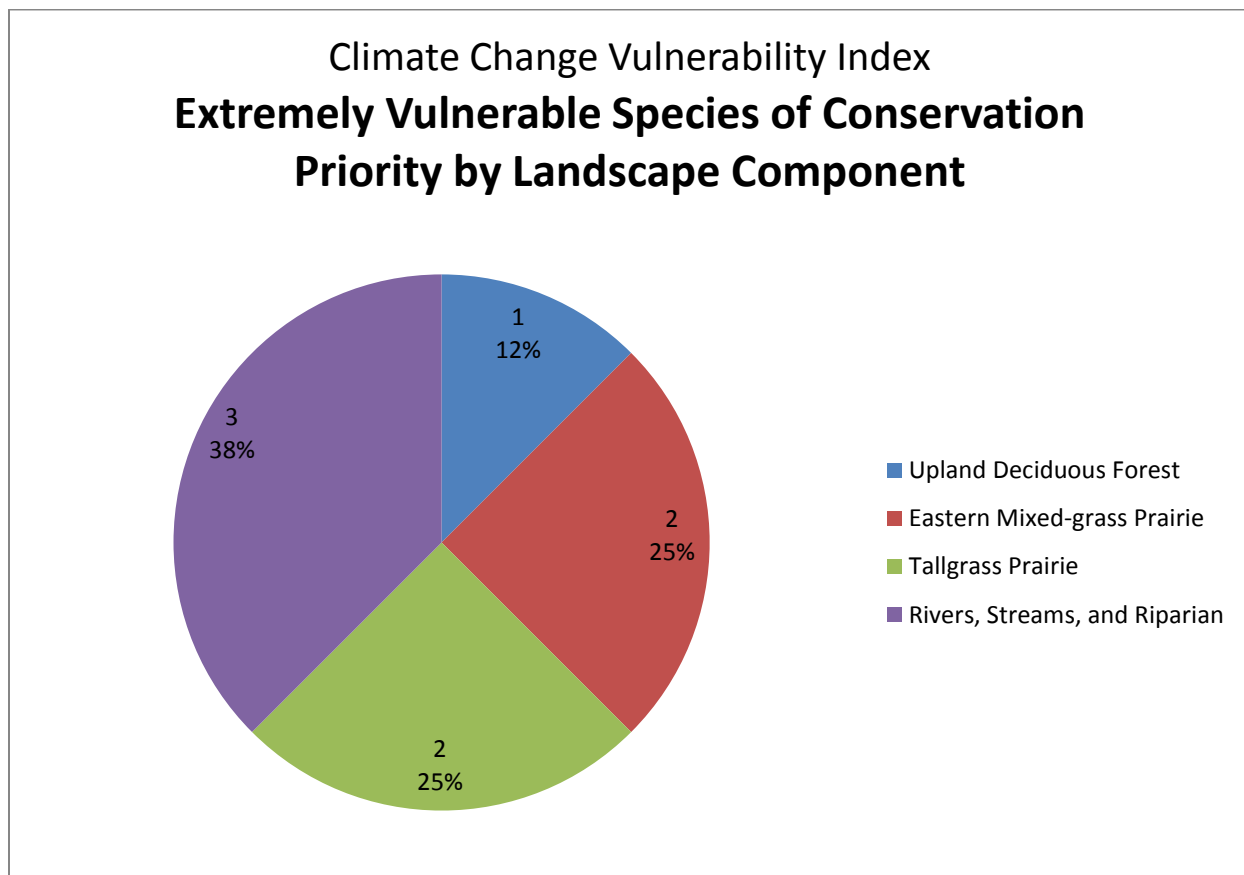


Relationship between plants and Habitat based on CCVI scores

The plant species were further broken down by their final CCVI score (EV, HV, MV, and PS), and tallied to determine which landscape components harbor the most EV and HV plant species. We also looked at where the most MV and PS plant species were located compared to the EV and HV plant species. Analyzing landscapes and associated plant species vulnerable to climate change can help link plant species with opportunities for range shifts. For example, 46 plant species occur in Tallgrass Prairies, which is a relatively flat landscapes (low topographic diversity) and other sensitive plant species (29) occur in topographically diverse landscapes (high topographic diversity) like Upland Deciduous Forests. It is possible that species that occur in topographically complex landscape will be less vulnerable to climate change because they can find suitable climates in reasonably close surrounding areas.

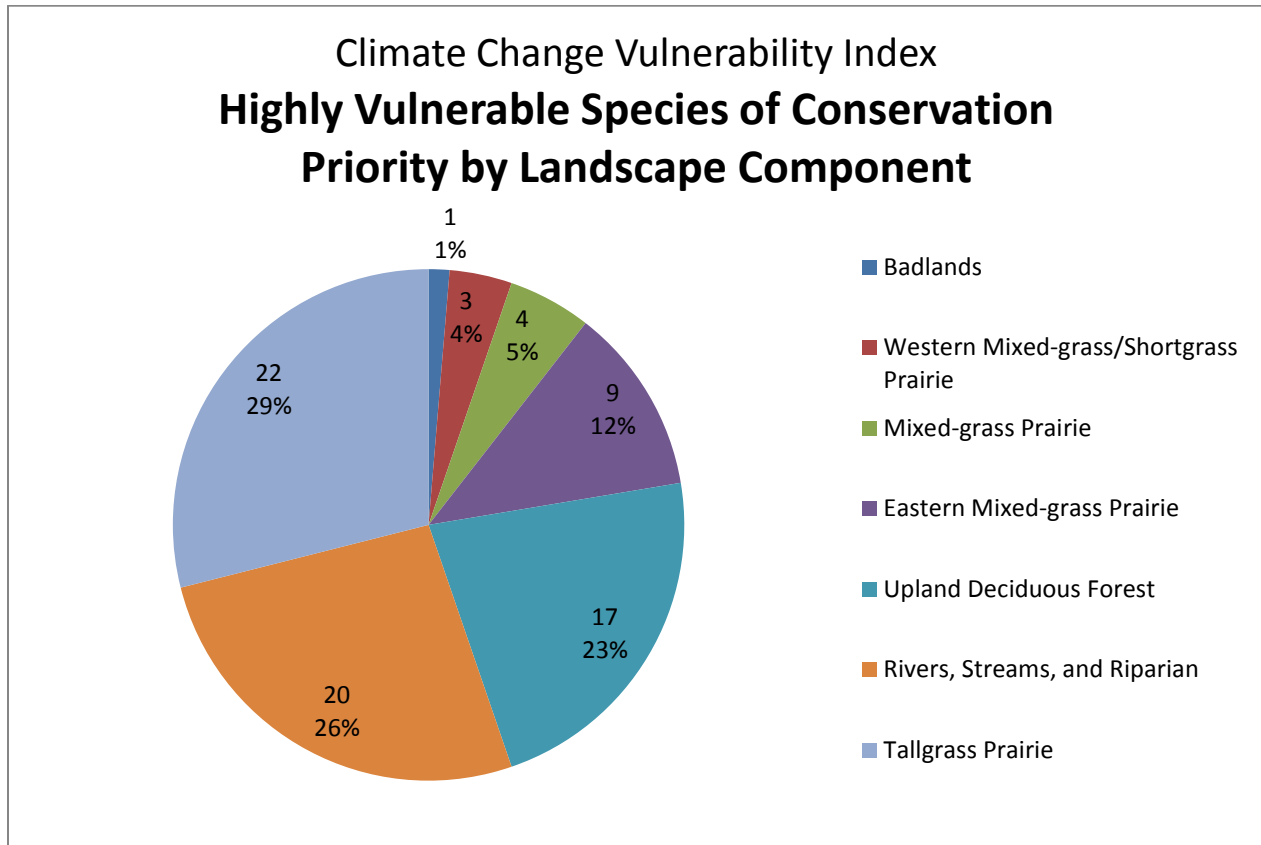
The extremely vulnerable plant species fall into four landscape components (figure 20), with Rivers, Streams, and Riparian areas supporting 38% of sensitive plant species, Tallgrass Prairie and Eastern Mixed-grass Prairie supporting 25% of plant species, and Upland Deciduous Forests supporting 12% of plant species.

Figure 21: Extremely vulnerable species by climate change vulnerability score.



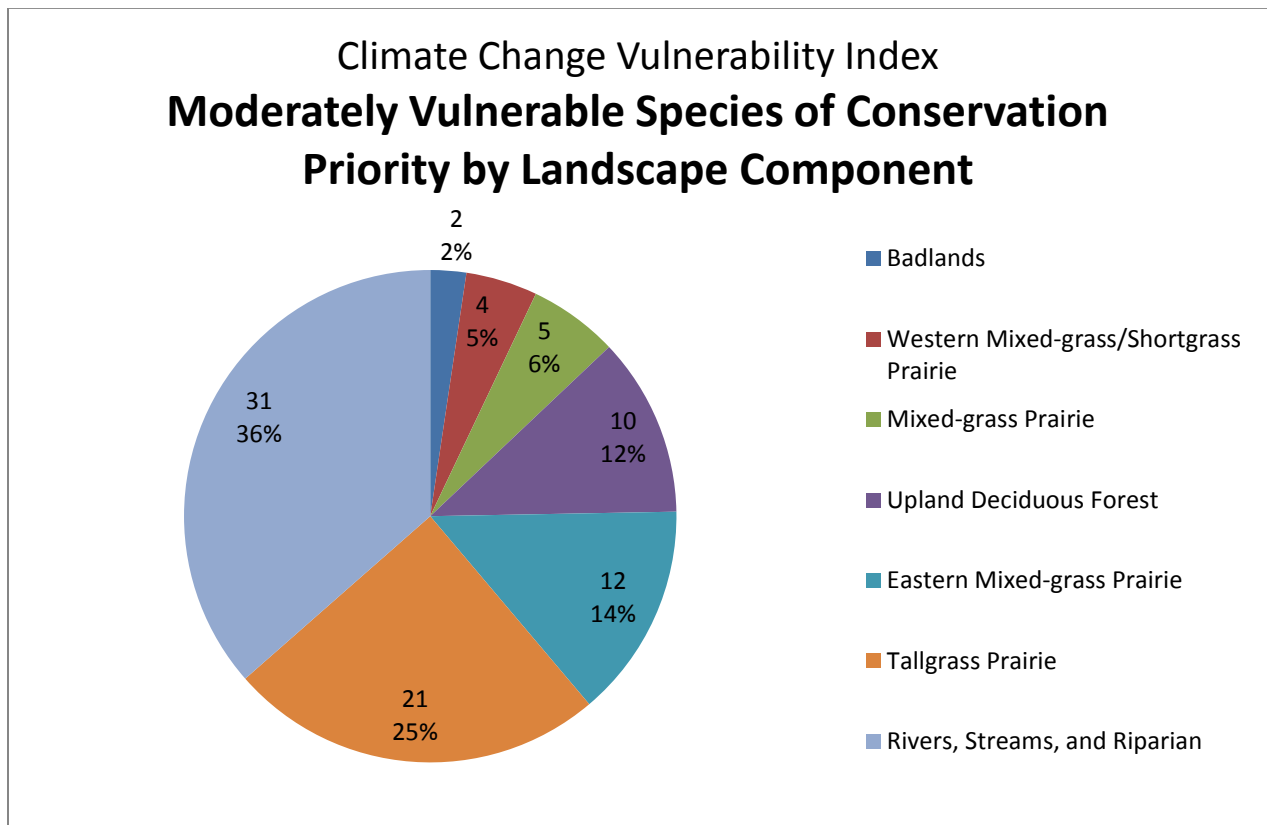
Highly vulnerable species have similar, but slightly different distributions; falling into 7 landscape components (figure 21), with the highest percentages in Tallgrass Prairie (29%), Rivers, Streams, and Riparian (26%), Upland Deciduous Forest (23%), and Eastern Mixed-grass Prairie (12%). The other landscape components (Mixed-grass Prairie, Western/shortgrass Prairie, and Badlands) support 5% or less sensitive plant species.

Figure 22: Highly vulnerable species by climate change vulnerability score.



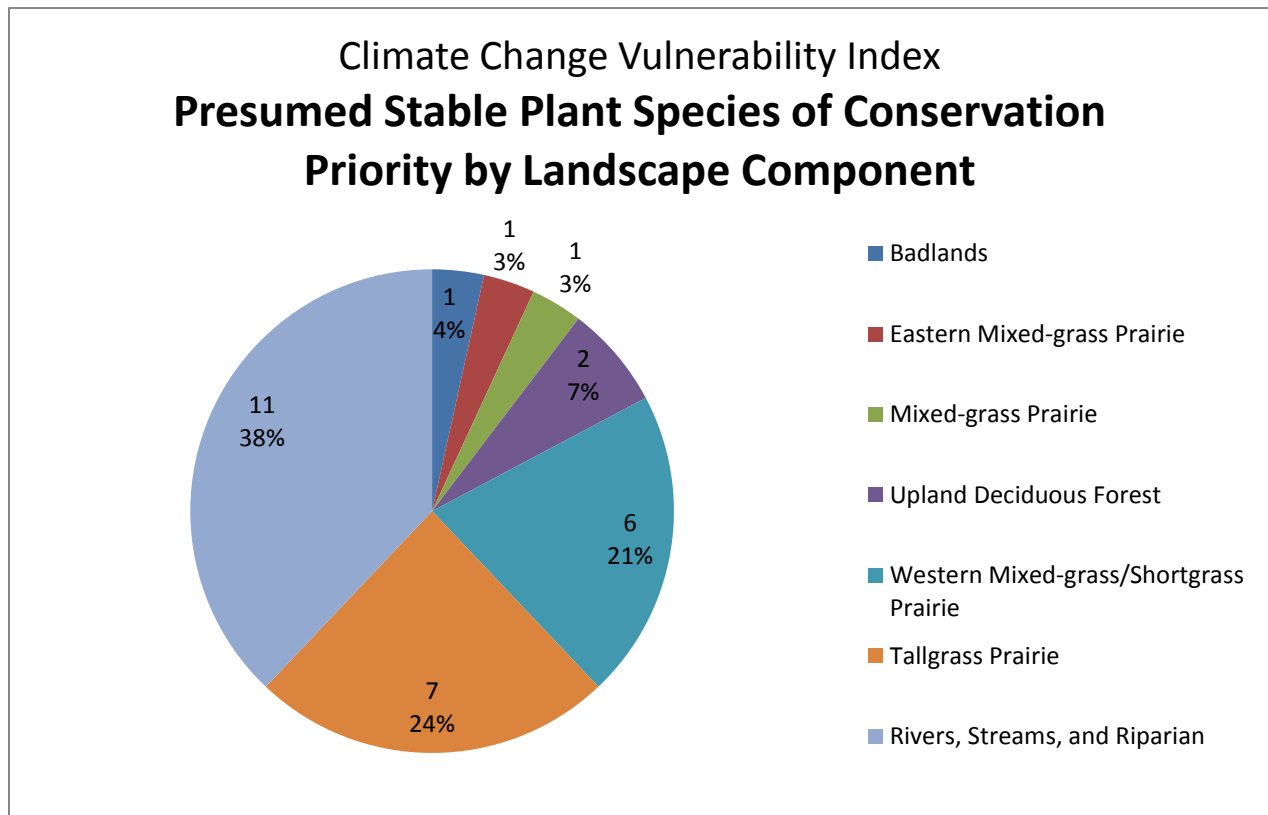
Moderately vulnerable plant species fall into 7 main landscape components (figure 22). The majority of moderately vulnerable plant species fall within Rivers, Streams, and Riparian (36%), Tallgrass Prairie (25%), and Eastern Mixed-grass Prairie (14%) landscapes. The plant species scored as MV to climate change vary slightly in supporting landscapes. Upland Deciduous Forests rank lower as a priority habitat, and Tallgrass Prairie is an important landscape for MV plant species, but does not support any highly vulnerable plant species.

Figure 23: Moderately vulnerable plant species by climate change vulnerability score



Presumed stable sensitive plant species (figure 23) are distributed within Rivers, Streams, Riparian, and Tallgrass Prairie landscapes supporting the most plant species. The difference in presumed stable plant species is the third highest supporting landscape.occurs in Western Mixed-grass/Shortgrass Prairie (21%). Plant species within the presumed stable category are the only plant species with dominant habitats in the western portion of the assessment area (North Dakota); no other category includes high percentages of species in Western Mixed-grass/Shortgrass Prairie, and the extremely vulnerable plant species are absent from Western Mixed-grass/Shortgrass Prairie and Badland landscapes.

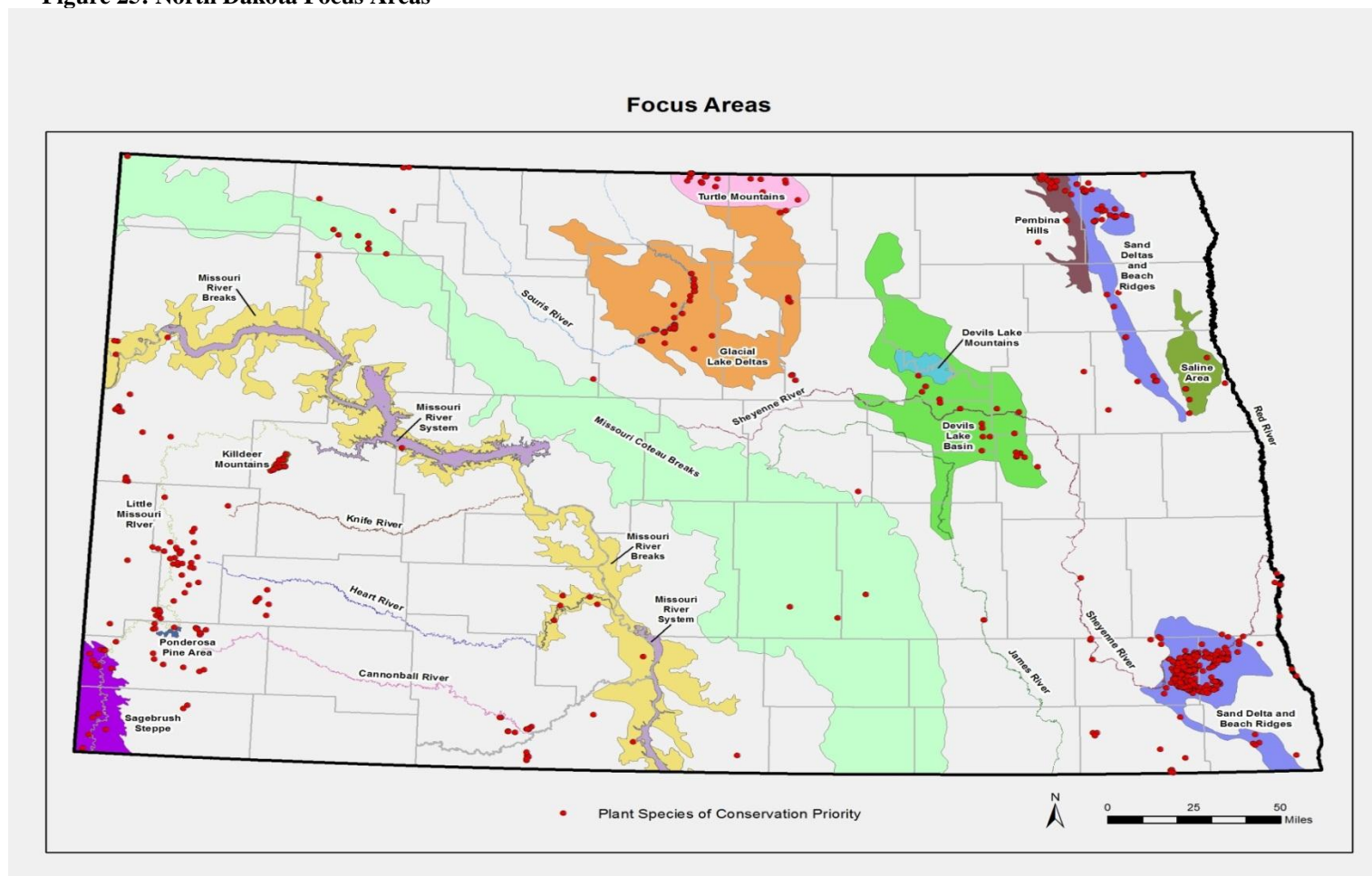
Figure 24: Presumed stable plant species by climate change vulnerability score



Focus Areas

Within landscape components are smaller more specific Focus Areas (figure 24) that further break down landscape components into smaller habitats that potentially harbor the majority of sensitive plant species and provide a more specific location within the larger landscape components which is the main reason to identify focus areas within a particular landscape component. These were developed using a GIS (i.e. ArcMap) that overlaid the Level IV ecoregions on the land cover layer.

Figure 25: North Dakota Focus Areas



In order to define the focus areas some of the Level IV ecoregions boundaries were modified based on vegetation information provided by the CWCS landcover, and statistical models aided in further refining focus area boundaries. Focus areas typically exhibited unique or easily identifiable differences in vegetation, soils, topography, hydrology or land use. Focus areas are highly variable in size and often represent an area of native vegetation or a natural community type rare to North Dakota. Table X reflects plant distribution by focus area.

**Table 10: Plant species distribution by focus area:
Cannonball River**

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion - EPA Level IV
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian	Glacial Dark Brown Prairie, Missouri Cateau, Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, End Moraine Complex, Missouri Plateau, River Breaks, Little Missouri Badlands, Pembina Escarpment
<i>Polygonum leptocarpum</i>	Thin-fruited Knotweed	S1	G2G4Q	HV	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Missouri Plateau
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4?	MV	Western Mixed-Grass/Shortgrass Prairie, Mixed-Grass Prairie, Badlands, Rivers, Streams, and Riparian	Little Missouri Badlands, Missouri Cateau, River Breaks, Glaciated Dark Brown Prairie, Collapsed Glacial Outwash, Moreau Prairie
<i>Eriogonum visherii</i>	Dakota Buckwheat	S2	G3	MV	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Missouri Plateau, Little Missouri Badlands, River Breaks

Devils Lake Mountains

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion - EPA Level IV
<i>Triantha glutinosa</i>	Sticky False-asphodel	S1	G5	EV	Eastern Mixed-Grass Prairie, Rivers, Streams, and Riparian	Drift Plains
<i>Cypripedium reginae</i>	Showy Lady's-slipper	S2	G4	HV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin

Devils Lake Basin

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Cypripedium candidum</i>	White Lady's-slipper	S2	G4	HV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Glacial Lake Basin, Glacial Lake Agassiz Basin, Saline Area, Drift plains, Sand Deltas and Beach Ridges, Tewauckon Dead Ice Moraine
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Basins, Glacial Lake Agassiz Basin
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	S2	G5T5	HV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basin, Sand Deltas and Beach Ridges, Turtle Mountains, Missouri Cateau, Pembina Escarpment, Drift Plains

Glacial Lake Deltas

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Basins, Glacial Lake Agassiz Basin
<i>Carex capillaris</i>	Hair-like Sedge	S2	G5	HV	Eastern-Mixed-grass Prairie	Glacial Lake Deltas
<i>Cypripedium candidum</i>	White Lady's-slipper	S2	G4	HV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Glacial Lake Basin, Glacial Lake Agassiz Basin, Saline Area, Drift plains, Sand Deltas and Beach Ridges, Tewauckon Dead Ice Moraine
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	S2	G5T5	HV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basin, Sand Deltas and Beach Ridges, Turtle Mountains, Missouri Cateau, Pembina Escarpment, Drift Plains
<i>Equisetum sylvaticum</i>	Wood Horsetail	S2	G5	HV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Basins, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Eriophorum chamissonis</i>	Chamisson's Cottongrass	S2	G5	HV	Eastern-Mixed-grass Prairie, Rivers, Strams, Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Turtle Mountains
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort	S2	G5	HV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basins, Glacial Lake Aggasiz Basin, Turtle Mountains
<i>Botrychium campestre</i>	Prairie Grapefern	S1	G3G4	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian	Missouri Plateau

Glacial Lake Deltas

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Botrychium matricariifolium</i>	Chamomile Grapefern	S1	G5	MV	Eastern-Mixed-grass Prairie, and Mixed-grass Prairie	Glacial Lake Basin
<i>Carex leptalea</i>	Delicate Sedge	S3	G5	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Glacial Lake Basin, Glacial Lake Agassiz Basin, Sand Deltas and Beach Ridges
<i>Carex sterilis</i>	Sterile Sedge	S1	G4	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian	Glacial Lake Basins, Glacial Lake Deltas
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basins, Turtle Mountains, Drift Plains, Sand Deltas and Beach Ridges
<i>Parnassia palustris</i> var. <i>parviflora</i>	Small-flowered Grass-of-Parnassus	S3	G4	MV	Eastern Mixed-Grass Prairie, Rivers, Streams, and Riparian	Northern Black Prairie, Turtle Mountains, Glacial Lake Deltas, Glacial Lake Basins
<i>Rhynchospora capillacea</i>	Hair Beakrush	S2	G4	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian	Glacial Lake Deltas, Glacial Lake Basins, Drift Plains
<i>Salix pedicellaris</i>	Bog Willow	S3	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Turtle Mountains, Glacial Lake Deltas, Glacial Lake Basins
<i>Spiranthes cernua</i>	Nodding Ladies'-tresses	S1	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian	Glacial Lake Deltas, Glacial Lake Basins, Drift Plains, Sand Deltas and Beach Ridges
<i>Spiranthes romanzoffiana</i>	Hooded Ladies'-tresses	S1	G5	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Mixed-grass Prairie	Glaciated Dark Brown Prairie, Glacial Lake Deltas, Glacial Lake Basins
<i>Galium labradoricum</i>	Bog Bedstraw	S3	G5	PS	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basin, Turtle Mountains, Sand Deltas and Beach Ridges

Heart River

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian	Glacial Dark Brown Prairie, Missouri Cateau, Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, End Moraine Complex, Missouri Plateau, River Breaks, Little Missouri Badlands, Pembina Escarpment
<i>Polygonum leptocarpum</i>	Thin-fruited Knotweed	S1	G2G4Q	HV	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Missouri Plateau
<i>Cryptantha torreyana</i>	Torrey's Cryptantha	S1	G5	MV	Western-Mixed Grass/Shortgrass Prairie, Badlands	Little Missouri Badlands, Missouri Plateau
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Western Mixed-Grass/Shortgrass Prairie, Mixed-Grass Prairie, Badlands, Rivers, Streams, and Riparian	Little Missouri Badlands, Missouri Cateau, River Breaks, Glaciated Dark Brown Prairie, Collapsed Glacial Outwash, Moreau Prairie
<i>Dalea enneandra</i>	Nine-anthered Dalea	S3	G5	MV	Rivers, Streams, and Riparian	Little Missouri Badlands, Missouri Plateau, River Breaks
<i>Potentilla diversifolia</i>	Mountain Meadow Cinquefoil	S1	G5	PS	Western Mixed-Grass/Shortgrass Prairie, Badlands, Rivers, Streams, and Riparian	Missouri Plateau, Little Missouri Badlands
<i>Townsendia hookeri</i>	Hooker's Townsendia	S1	G5	PS	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Little Missouri Badlands

James River

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian	Glacial Dark Brown Prairie, Missouri Cateau, Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, End Moraine Complex, Missouri Plateau, River Breaks, Little Missouri Badlands, Pembina Escarpment
<i>Cryptantha torreyana</i>	Torrey's Cryptantha	S1	G5	MV	Western-Mixed Grass/Shortgrass Prairie, Badlands	Little Missouri Badlands, Missouri Plateau
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Western Mixed-Grass/Shortgrass Prairie, Mixed-Grass Prairie, Badlands, Rivers, Streams, and Riparian	Little Missouri Badlands, Missouri Cateau, River Breaks, Glaciated Dark Brown Prairie, Collapsed Glacial Outwash, Moreau Prairie
<i>Polygonum leptocarpum</i>	Thin-fruited Knotweed	S1	G2G4Q	HV	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Missouri Plateau
<i>Potentilla diversifolia</i>	Mountain Meadow Cinquefoil	S1	G5	PS	Western Mixed-Grass/Shortgrass Prairie, Badlands, Rivers, Streams, and Riparian	Missouri Plateau, Little Missouri Badlands
<i>Townsendia hookeri</i>	Hooker's Townsendia	S1	G5	PS	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Little Missouri Badlands

Kildeer Mountains

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian	Prairie, Missouri Cateau, Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, End Moraine Complex, Missouri Plateau, River
<i>Astragalus vexilliflexus</i>	Bent-flowered Milkvetch	S3	G4	HV	Upland Deciduous Forest	Missouri Plateau
<i>Cheilanthes feei</i>	Slender Lip Fern	S1	G5	HV	Upland Deciduous Forest	Missouri Plateau
<i>Clematis columbiana</i> var. <i>tenuiloba</i>	Slender-lobed Clematis	S1	G5?T4?	HV	Upland Deciduous Forest	Missouri Plateau
<i>Collinsia parviflora</i>	Blue Lips	S2	G5	PS	Tallgrass Prairie, Rivers, Streams, and Riparian, Western Mixed-grass/Shortgrass Prairie	Little Missouri Badlands, Missouri Plateau
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Basins, Glacial Lake Agassiz Basin
<i>Erigeron radicans</i>	Cushion Fleabane	S1	G3G4	PS	Upland Deciduous Forest	Missouri Plateau
<i>Eriogonum cernuum</i>	Nodding Buckwheat	S1	G5	MV	Upland Deciduous Forest	Missouri Plateau
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Western Mixed-Grass/Shortgrass Prairie, Mixed-Grass Prairie, Badlands, Rivers, Streams, and Riparian	Little Missouri Badlands, Missouri Cateau, River Breaks, Glaciated Dark Brown Prairie, Collapsed Glacial Outwash, Moreau Prairie

Little Missouri River

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Chenopodium subglabrum</i>	Smooth Goosefoot	S1	G3G4	HV	Rivers, Streams, Riparian, Western Mixed-grass/	Little Missouri Badlands
<i>Collinsia parviflora</i>	Blue Lips	S2	G5	PS	Tallgrass Prairie, Rivers, Streams, and Riparian, Western	Little Missouri Badlands, Missouri Plateau
<i>Cryptantha torreyana</i>	Torrey's Cryptantha	S1	G5	MV	Western-Mixed Grass/Shortgrass Prairie,	Little Missouri Badlands, Missouri Plateau
<i>Dalea enneandra</i>	Nine-anthered Dalea	S3	G5	MV	Rivers, Streams, and Riparian	Little Missouri Badlands, Missouri Plateau, River
<i>Eriogonum visheri</i>	Dakota Buckwheat	S2	G3	MV	Western Mixed-grass/Shortgrass Prairie, Rivers,	Missouri Plateau, Little Missouri Badlands, River
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Western Mixed-Grass/Shortgrass Prairie, Mixed-	Little Missouri Badlands, Missouri Cateau, River
<i>Mahonia repens</i>	Creeping Barberry	S2	G5	PS	Western Mixed-grass/Shortgrass Prairie, Rivers,	Little Missouri Badlands, Sagebrush Steppe
<i>Mentzelia pumila</i>	Dwarf Mentzelia	S1	G4	PS	Western Mixed-grass/Shortgrass Prairie, Rivers,	Little Missouri Badlands
<i>Pinus flexilis</i>	Limber Pine	S1	G5	MV	Western Mixed-grass/Shortgrass Prairie, Rivers,	Little Missouri Badlands
<i>Potentilla diversifolia</i>	Mountain Meadow Cinquefoil	S1	G5	PS	Western Mixed-Grass/Shortgrass Prairie,	Missouri Plateau, Little Missouri Badlands
<i>Sporobolus airoides</i>	Alkali Sacaton	S3	G5	PS	Rivers, Streams, and Riparian, Mixed-grass Prairie	Missouri Plateau
<i>Townsendia hookeri</i>	Hooker's Townsendia	S1	G5	PS	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Little Missouri Badlands

Missouri Coteau Breaks

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Botrychium matricariifolium</i>	Chamomile Grapefern	S1	G5	MV	Eastern-Mixed-grass Prairie, and Mixed-grass Prairie	Glacial Lake Basin
<i>Carex backii</i>	Back's Sedge	S3	G4	MV	Mixed-grass Prairie, Upland Deciduous Forest	Turtle Mountains, Northern Black Prairie, Northern Dark Brown Prairie
<i>Cyperus bipartitus</i>	Brook Flatsedge	S2	G5	HV	Tallgrass Prairie, Mixed-grass Prairie, Rivers, Streams, and Riparian	Missouri Cateau, Sand Deltas and Beach Ridges
<i>Eleocharis parvula</i>	Dwarf Spikerush	S2	G5	HV	Prairie, Rivers, Streams, and Riparian	Drift Plains
<i>Liparis loeselii</i>	Loesel's Twayblade	S2	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian, Mixed-grass Prairie	Drift Plains, Sand Deltas and Beach Ridges
<i>Penstemon procerus</i>	Small-flowered Penstemon	S1	G5	MV	Eastern Mixed-Grass Prairie, Rivers, Streams, and Riparian	Northern Dark Brown Prairie
<i>Primula incana</i>	American Primrose	S2	G4G5	MV	Mixed-grass Prairie	Northern Missouri Cateau
<i>Spiranthes romanzoffiana</i>	Hooded Ladies'-tresses	S1	G5	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Mixed-grass Prairie	Glaciated Dark Brown Prairie, Glacial Lake Deltas, Glacial Lake Basins

Missouri River Breaks

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Astragalus drummondii</i>	Drummond's Milkvetch	S1	G5	PS	Rivers, Streams, and Riparian	River Breaks
<i>Dalea enneandra</i>	Nine-anthered Dalea	S3	G5	MV	Rivers, Streams, and Riparian	Missouri Plateau, River Breaks
<i>Eriogonum visherii</i>	Dakota Buckwheat	S2	G3	MV	Western Mixed-grass/Shortgrass Prairie, Rivers, Steams, Riparian	Missouri Plateau, Little Missouri Badlands, River Breaks
<i>Phlox alyssefolia</i>	Alyssum-leaved Phlox	S2	G5	PS	Rivers, Streams, and Riparian	Glaciated Dark Brown Prairie, Missouri Coteau Slope, River Breaks
<i>Ranunculus cardiophyllus</i>	Heart-leaved Buttercup	S1	G4G5	PS	Rivers, Streams, and Riparian	River Breaks
<i>Rorippa calycina</i>	Hayden's Yellowcress	SH	G3	HV	Rivers, Streams, and Riparian	River Breaks
<i>Talinum parviflorum</i>	Prairie Fameflower	S2	G5	MV	Rivers, Streams, and Riparian	Missouri Plateau

Missouri River System

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Dalea enneandra</i>	Nine-anthered Dalea	S3	G5	MV	Rivers, Streams, and Riparian	Little Missouri Badlands, Missouri Plateau, River Breaks
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Western Mixed-Grass/Shortgrass Prairie, Mixed-Grass Prairie, Badlands, Rivers, Streams, and Riparian	Little Missouri Badlands, Missouri Cateau, River Breaks,
<i>Ranunculus cardiophyllus</i>	Heart-leaved Buttercup	S1	G4G5	PS	Rivers, Streams, and Riparian	River Breaks
<i>Rorippa calycina</i>	Hayden's Yellowcress	SH	G3	HV	Rivers, Streams, and Riparian	River Breaks
<i>Townsendia hookeri</i>	Hooker's Townsendia	S1	G5	PS	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Little Missouri Badlands

Ponderosa Pine Area

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Chenopodium subglabrum</i>	Smooth Goosefoot	S1	G3G4	HV	Rivers, Streams, Riparian, Western Mixed-grass/ Shortgrass Prairie, Badlands	Little Missouri Badlands
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Western Mixed-Grass/Shortgrass Prairie, Mixed-Grass Prairie, Badlands, Rivers, Streams, and Riparian	Little Missouri Badlands, Missouri Cateau, River Breaks, Glaciated Dark Brown Prairie, Collapsed Glacial Outwash, Moreau Prairie
<i>Potentilla diversifolia</i>	Mountain Meadow Cinquefoil	S1	G5	PS	Western Mixed-Grass/Shortgrass Prairie, Badlands, Rivers, Streams, and Riparian	Missouri Plateau, Little Missouri Badlands

Pembina Hills

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion - EPA Level IV
<i>Botrychium minganense</i>	Moonwort	S1	G4	MV	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Northern Dark Brown Prairie, Turtle Mountains, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Botrychium multifidum</i>	Leathery Grapefern	S1	G5	MV	Tallgrass Prairie, Upland Deciduous Forest	Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Basins, Glacial Lake Agassiz Basin
<i>Dirca palustris</i>	Leatherwood	S1	G4	MV	Upland Deciduous Forest	Pembina Escarpment
<i>Equisetum sylvaticum</i>	Wood Horsetail	S2	G5	HV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Basins, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Gymnocarpium dryopteris</i>	Oakfern	S2	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Minuartia dawsonensis</i>	Stiff Sandwort	S1	G5	HV	Upland Deciduous Forest	Pembina Escarpment
<i>Mitella nuda</i>	Naked Mitrewort	S3	G5	HV	Tallgrass Prairie, Upland Deciduous Forest	Turtle Mountains, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Petasites frigidus</i>	Sweet Coltsfoot	S2	G5	HV	Upland Deciduous Forest	Pembina Escarpment

Red River

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion - EPA Level IV
<i>Caulophyllum thalictroides</i>	Blue Cohosh	S1	G4G5	MV	Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Agassiz Basin, Drift Plains, Turtle Mountains
<i>Eleocharis wolfii</i>	Wolf's Spikerush	SH	G3?	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Glacial Lake Agassiz Basin
<i>Geranium maculatum</i>	Wild Geranium	SH	G5	HV	Rivers, Streams, and Riparian	Glacial Lake Agassiz Basin
<i>Lipocarpa micrantha</i>	Small-flowered Lipocarpa	S1	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Orobanche uniflora</i>	One-flowered Broomrape	SH	G5	HV	Tallgrass Prairie	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Phlox pilosa</i>	Downy Phlox	S1	G5	MV	Rivers, Streams, and Riparian	Glacial Lake Agassiz Basin
<i>Platanthera clavellata</i>	Green Woodland Orchid	SH	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian	Saline Areas, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Pogonia ophioglossoides</i>	Rose Pogonia	S1	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian	Saline Areas, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Solidago flexicaulis</i>	Zigzag Goldenrod	S2	G5	PS	Tallgrass Prairie, Rivers, Streams, and Riparian	Drift Prairie

Sagebrush Steppe

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Chenopodium subglabrum</i>	Smooth Goosefoot	S1	G3G4	HV	Rivers, Streams, Riparian, Western Mixed-grass/ Shortgrass Prairie, Badlands	Little Missouri Badlands
<i>Collinsia parviflora</i>	Blue Lips	S2	G5	PS	Tallgrass Prairie, Rivers, Streams, and Riparian, Western Mixed-grass/Shortgrass Prairie	Little Missouri Badlands, Missouri Plateau
<i>Cryptantha torreyana</i>	Torrey's Cryptantha	S1	G5	MV	Western-Mixed Grass/Shortgrass Prairie, Badlands	Little Missouri Badlands, Missouri Plateau
<i>Eriogonum visherii</i>	Dakota Buckwheat	S2	G3	MV	Western Mixed-grass/Shortgrass Prairie, Rivers, Steams, Riparian	Missouri Plateau, Little Missouri Badlands, River Breaks
<i>Lappula cenchrusoides</i>	Stickseed	S1	G4	MV	Western Mixed-Grass/Shortgrass Prairie, Mixed-Grass Prairie, Badlands, Rivers, Streams, and Riparian	Little Missouri Badlands, Missouri Plateau, River Breaks, Glaciated Dark Brown Prairie, Collapsed Glacial Outwash, Moreau Prairie
<i>Leucocrocinum montanum</i>	Sand Lily	S2	G5	PS	Western Mixed-grass/Shortgrass Prairie	Missouri Plateau, Little Missouri Badlands, Sagebrush Steppe
<i>Mahonia repens</i>	Creeping Barberry	S2	G5	PS	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Little Missouri Badlands, Sagebrush Steppe
<i>Mentzelia pumila</i>	Dwarf Mentzelia	S1	G4	PS	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Little Missouri Badlands
<i>Pinus flexilis</i>	Limber Pine	S1	G5	MV	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Little Missouri Badlands
<i>Populus x acuminata</i>	Lanceleaf Cottonwood	S2	GNA	MV	Western Mixed-grass/Shortgrass Prairie	Little Missouri Badlands, Missouri Plateau
<i>Potentilla diversifolia</i>	Mountain Meadow Cinquefoil	S1	G5	PS	Western Mixed-Grass/Shortgrass Prairie, Badlands, Rivers, Streams, and Riparian	Missouri Plateau, Little Missouri Badlands
<i>Sporobolus airoides</i>	Alkali Sacaton	S3	G5	PS	Rivers, Streams, and Riparian, Mixed-grass Prairie	Missouri Plateau

Saline Areas

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Botrychium minganense</i>	Moonwort	S1	G4	MV	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Northern Dark Brown Prairie, Turtle Mountains, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Botrychium multifidum</i>	Leathery Grapefern	S1	G5	MV	Tallgrass Prairie, Upland Deciduous Forest	Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Botrychium simplex</i>	Least Grapefern	S2	G5	PS	Tallgrass Prairie	Sand Deltas and Beach Ridges
<i>Campanula aparinoides</i>	Marsh Bellflower	S2S3	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges
<i>Carex alopecoidea</i>	Foxtail Sedge	S2	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Turtle Mountains, Sand Deltas and Beach Ridges, Drift Plains, Glacial Lake Agassiz Basin
<i>Carex formosa</i>	Handsome Sedge	S1	G4	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges
<i>Carex leptalea</i>	Delicate Sedge	S3	G5	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Glacial Lake Basin, Glacial Lake Agassiz Basin, Sand Deltas and Beach Ridges
<i>Chenopodium subglabrum</i>	Smooth Goosefoot	S1	G3G4	HV	Rivers, Streams, Riparian, Western Mixed-grass/ Shortgrass Prairie, Badlands	Little Missouri Badlands
<i>Collinsia parviflora</i>	Blue Lips	S2	G5	PS	Tallgrass Prairie, Rivers, Streams, and Riparian, Western Mixed-grass/Shortgrass Prairie	Little Missouri Badlands, Missouri Plateau

Saline Areas

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Cyperus bipartitus</i>	Brook Flatsedge	S2	G5	HV	Tallgrass Prairie, Mixed-grass Prairie, Rivers, Streams, and Riparian	Missouri Cateau, Sand Deltas and Beach Ridges
<i>Cypripedium candidum</i>	White Lady's-slipper	S2	G4	HV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Glacial Lake Basin, Glacial Lake Agassiz Basin, Saline Area, Drift plains, Sand Deltas and Beach Ridges, Tewaouk Dead Ice Moraine
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Basins, Glacial Lake Agassiz Basin
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	S2	G5T5	HV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basin, Sand Deltas and Beach Ridges, Turtle Mountains, Missouri Cateau, Pembina Escarpment, Drift Plains
<i>Cypripedium reginae</i>	Showy Lady's-slipper	S2	G4	HV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
<i>Desmanthus illinoensis</i>	Prairie Mimosa	S1	G5	PS	Tallgrass Prairie	Missouri Cateau Slope, Sand Deltas and Beach Ridges
<i>Eleocharis parvula</i>	Dwarf Spikerush	S2	G5	HV	Tallgrass Prairie, Mixed-Grass Prairie, Rivers, Streams, and Riparian	Drift Plains
<i>Equisetum palustre</i>	Marsh Horsetail	S2	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges
<i>Equisetum pratense</i>	Meadow Horsetail	S2	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
<i>Equisetum sylvaticum</i>	Wood Horsetail	S2	G5	HV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Basins, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Eriogonum visherii</i>	Dakota Buckwheat	S2	G3	MV	Western Mixed-grass/Shortgrass Prairie, Rivers, Steams, Riparian	Missouri Plateau, Little Missouri Badlands, River Breaks
<i>Eriophorum gracile</i>	Slender Cottongrass	S1	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges
<i>Eriophorum viridicarinatum</i>	Green Keeled Cottongrass	S2	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Agassiz Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Euonymus atropurpureus</i>	Wahoo	S3	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Glacial Lake Agassiz Basin, Sand Delta and Beach Ridges
<i>Galium labradoricum</i>	Bog Bedstraw	S3	G5	PS	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Gymnocarpium dryopteris</i>	Oakfern	S2	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Helianthemum bicknellii</i>	Bicknell's Sunrose	S1	G5	HV	Tallgrass Prairie	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
<i>Hudsonia tomentosa</i>	Wooly Beach-heather	S1	G5	MV	Tallgrass Prairie	Sand Deltas and Beach Ridges
<i>Lechea stricta</i>	Upright Pinweed	S2	G4?	MV	Tallgrass Prairie	Sand Deltas and Beach Ridges
<i>Leucocrinum montanum</i>	Sand Lily	S2	G5	PS	Western Mixed-grass/Shortgrass Prairie	Missouri Plateau, Little Missouri Badlands, Sagebrush Steppe
<i>Liparis loeselii</i>	Loesel's Twayblade	S2	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian, Mixed-grass Prairie	Drift Plains, Sand Deltas and Beach Ridges

Saline Areas

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Mahonia repens</i>	Creeping Barberry	S2	G5	PS	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Little Missouri Badlands, Sagebrush Steppe
<i>Mentzelia pumila</i>	Dwarf Mentzelia	S1	G4	PS	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Little Missouri Badlands
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basins, Turtle Mountains, Drift Plains, Sand Deltas and Beach Ridges
<i>Mimulus guttatus</i>	Monkeyflower	S1	G5	MV	Tallgrass Prairie	Sand Deltas and Beach Ridges
<i>Mitella nuda</i>	Naked Mitrewort	S3	G5	HV	Tallgrass Prairie, Upland Deciduous Forest	Turtle Mountains, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Oenothera rhombipetala</i>	Rhombic Evening-primrose	S2	G4G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
<i>Onoclea sensibilis</i>	Sensitive Fern	S2	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian	Prairie Cateau Escarpment, Sand Deltas and Beach Ridges
<i>Ophioglossum pusillum</i>	Adder's-tongue Fern	S2	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges
<i>Pinus flexilis</i>	Limber Pine	S1	G5	MV	Western Mixed-grass/Shortgrass Prairie, Rivers, Streams, Riparian	Little Missouri Badlands
<i>Platanthera clavellata</i>	Green Woodland Orchid	SH	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian	Saline Areas, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Platanthera praeclara</i>	Western Prairie Fringed Orchid	S2	G3	EV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains, Tewaoukon Dead Ice Moraine, Glacial Outwash
<i>Pogonia ophioglossoides</i>	Rose Pogonia	S1	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian	Saline Areas, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Polygonum hydropiperoides</i>	Swamp Smartweed	S1	G5	HV	Tallgrass Prairie	Sand Deltas and Beach Ridges
<i>Populus x acuminata</i>	Lanceleaf Cottonwood	S2	GNA	MV	Western Mixed-grass/Shortgrass Prairie	Little Missouri Badlands, Missouri Plateau
<i>Ribes cynosbati</i>	Prickly Gooseberry	S3	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Drift Prairie
<i>Salix pedicellaris</i>	Bog Willow	S3	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Turtle Mountains, Glacial Lake Deltas, Glacial Lake Basins
<i>Selaginella rupestris</i>	Ledge Spike-moss	S1	G5	HV	Tallgrass Prairie	Sand Deltas and Beach Ridges
<i>Solidago flexicaulis</i>	Zigzag Goldenrod	S2	G5	PS	Tallgrass Prairie, Rivers, Streams, and Riparian	Drift Prairie
<i>Spiranthes cernua</i>	Nodding Ladies'-tresses	S1	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian	Glacial Lake Deltas, Glacial Lake Basins, Drift Plains, Sand Deltas and Beach Ridges
<i>Sporobolus airoides</i>	Alkali Sacaton	S3	G5	PS	Rivers, Streams, and Riparian, Mixed-grass Prairie	Missouri Plateau
<i>Triplasis purpurea</i>	Purple Sandgrass	S1	G4G5	PS	Tallgrass Prairie	Sand Deltas and Beach Ridges
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort	S2	G5	HV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basins, Glacial Lake Agassiz Basin, Turtle Mountains
<i>Veronicastrum virginicum</i>	Culver's-root	SH	G4	PS	Tallgrass Prairie	Glacial Lake Agassiz Basin, Sand Deltas and Beach Ridges
<i>Viola conspersa</i>	Bog Violet	S2	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian	Saline Area, Missouri Plateau, Sand Deltas and Beach Ridges

Sand Deltas and Beach Ridges

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Allium canadense</i>	Meadow Onion	S1	G5	HV	Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Tewaukon Dead Ice Moraine, Prairie Coteau Escarpment
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian	Glacial Dark Brown Prairie, Missouri Cateau, Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, End Moraine Complex, Missouri Plateau, River Breaks, Little Missouri Badlands, Pembina Escarpment
<i>Astragalus neglectus</i>	Cooper's Milkvetch	S1	G4	HV	Tallgrass Prairie	Sand Deltas and Beach Ridges, Pembina Escarpment, Glacial Lake Agassiz Basin
<i>Dicentra cucullaria</i>	Dutchman's Breeches	S1	G5	MV	Eastern-Mixed Grass Prairie, Rivers, Streams, and Riparian	Prairie Cateau Escarpment, Glacial Lake Agassiz Basin
<i>Eleocharis parvula</i>	Dwarf Spikerush	S2	G5	HV	Tallgrass Prairie, Mixed-Grass Prairie, Rivers, Streams, and Riparian	Drift Plains
<i>Eleocharis wolfii</i>	Wolf's Spikerush	SH	G3?	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Glacial Lake Agassiz Basin
<i>Lipocarpha micrantha</i>	Small-flowered Lipocarpha	S1	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Orobanche uniflora</i>	One-flowered Broomrape	SH	G5	HV	Tallgrass Prairie	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Platanthera clavellata</i>	Green Woodland Orchid	SH	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian	Saline Areas, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Pogonia ophioglossoides</i>	Rose Pogonia	S1	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian	Saline Areas, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains

Sheyenne River

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Botrychium minganense</i>	Moonwort	S1	G4	MV	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Northern Dark Brown Prairie, Turtle Mountains, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Campanula aparinoides</i>	Marsh Bellflower	S2S3	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges
<i>Carex alopecoidea</i>	Foxtail Sedge	S2	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Turtle Mountains, Sand Deltas and Beach Ridges, Drift Plains, Glacial Lake Agassiz Basin
<i>Carex formosa</i>	Handsome Sedge	S1	G4	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges
<i>Carex leptalea</i>	Delicate Sedge	S3	G5	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Glacial Lake Basin, Glacial Lake Agassiz Basin, Sand Deltas and Beach Ridges
<i>Caulophyllum thalictroides</i>	Blue Cohosh	S1	G4G5	MV	Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Agassiz Basin, Drift Plains, Turtle Mountains
<i>Cyperus bipartitus</i>	Brook Flatsedge	S2	G5	HV	Tallgrass Prairie, Mixed-grass Prairie, Rivers, Streams, and Riparian	Missouri Cateau, Sand Deltas and Beach Ridges

Sheyenne River

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Cypripedium candidum</i>	White Lady's-slipper	S2	G4	HV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Glacial Lake Basin, Glacial Lake Agassiz Basin, Saline Area, Drift plains, Sand Deltas and Beach Ridges, Tewaakon Dead Ice Moraine
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Basins, Glacial Lake Agassiz Basin
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	S2	G5T5	HV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basin, Sand Deltas and Beach Ridges, Turtle Mountains, Missouri Cateau, Pembina Escarpment, Drift Plains
<i>Cypripedium reginae</i>	Showy Lady's-slipper	S2	G4	HV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
<i>Dicentra cucullaria</i>	Dutchman's Breeches	S1	G5	MV	Eastern-Mixed Grass Prairie, Rivers, Streams, and Riparian	Prairie Cateau Escarpment, Glacial Lake Agassiz Basin
<i>Equisetum palustre</i>	Marsh Horsetail	S2	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges
<i>Equisetum pratense</i>	Meadow Horsetail	S2	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
<i>Eriophorum gracile</i>	Slender Cottongrass	S1	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges
<i>Eriophorum viridicarinatum</i>	Green Keeled Cottongrass	S2	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Agassiz Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Euonymus atropurpureus</i>	Wahoo	S3	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Glacial Lake Agassiz Basin, Sand Delta and Beach Ridges
<i>Galium labradoricum</i>	Bog Bedstraw	S3	G5	PS	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Gymnocarpium dryopteris</i>	Oakfern	S2	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Liparis loeselii</i>	Loesel's Twayblade	S2	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian, Mixed-grass Prairie	Drift Plains, Sand Deltas and Beach Ridges
<i>Lipocarpha micrantha</i>	Small-flowered Lipocarpha	S1	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basins, Turtle Mountains, Drift Plains, Sand Deltas and Beach Ridges
<i>Oenothera rhombipetala</i>	Rhombic Evening-primrose	S2	G4G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin
<i>Onoclea sensibilis</i>	Sensitive Fern	S2	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian	Prairie Cateau Escarpment, Sand Deltas and Beach Ridges
<i>Ophioglossum pusillum</i>	Adder's-tongue Fern	S2	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges
<i>Orobanche uniflora</i>	One-flowered Broomrape	SH	G5	HV	Tallgrass Prairie	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains

Sheyenne River

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion - EPA Level IV
<i>Parnassia palustris</i> var. <i>parviflora</i>	Small-flowered Grass-of-Parnassus	S3	G4	MV	Eastern Mixed-Grass Prairie, Rivers, Streams, and Riparian	Northern Black Prairie, Turtle Mountains, Glacial Lake Deltas, Glacial Lake Basins
<i>Platanthera praeclara</i>	Western Prairie Fringed Orchid	S2	G3	EV	Tallgrass Prairie, Rivers, Streams, and Riparian	Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, Drift Plains, Tewaikon Dead Ice Moraine, Glacial Outwash
<i>Ribes cynosbati</i>	Prickly Gooseberry	S3	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian	Drift Prairie
<i>Salix pedicellaris</i>	Bog Willow	S3	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Turtle Mountains, Glacial Lake Deltas, Glacial Lake Basins
<i>Solidago flexicaulis</i>	Zigzag Goldenrod	S2	G5	PS	Tallgrass Prairie, Rivers, Streams, and Riparian	Drift Prairie
<i>Viola conspersa</i>	Bog Violet	S2	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian	Saline Area, Missouri Plateau, Sand Deltas and Beach Ridges

Souris River

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion - EPA Level IV
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian	Glacial Dark Brown Prairie, Missouri Cateau, Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, End Moraine Complex, Missouri Plateau, River Breaks, Little Missouri Badlands, Pembina Escarpment
<i>Botrychium campestre</i>	Prairie Grapefern	S1	G3G4	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian	Missouri Plateau
<i>Carex leptalea</i>	Delicate Sedge	S3	G5	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Glacial Lake Basin, Glacial Lake Agassiz Basin, Sand Deltas and Beach Ridges
<i>Carex sterilis</i>	Sterile Sedge	S1	G4	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian	Glacial Lake Basins, Glacial Lake Deltas
<i>Eriophorum chamissonis</i>	Chamisson's Cottongrass	S2	G5	HV	Eastern-Mixed-grass Prairie, Rivers, Strams, Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Turtle Mountains
<i>Galium labradoricum</i>	Bog Bedstraw	S3	G5	PS	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basins, Turtle Mountains, Drift Plains, Sand Deltas and Beach Ridges
<i>Rhynchospora capillacea</i>	Hair Beakrush	S2	G4	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian	Glacial Lake Deltas, Glacial Lake Basins, Drift Plains
<i>Salix pedicellaris</i>	Bog Willow	S3	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Turtle Mountains, Glacial Lake Deltas, Glacial Lake Basins
<i>Spiranthes cernua</i>	Nodding Ladies'-tresses	S1	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian	Glacial Lake Deltas, Glacial Lake Basins, Drift Plains, Sand Deltas and Beach Ridges
<i>Spiranthes romanzoffiana</i>	Hooded Ladies'-tresses	S1	G5	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Mixed-grass Prairie	Glaciated Dark Brown Prairie, Glacial Lake Deltas, Glacial Lake Basins
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort	S2	G5	HV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basins, Glacial Lake Agassiz Basin, Turtle Mountains

Souris River

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Asclepias lanuginosa</i>	Woolly Milkweed	S1	G4?	HV	Western-Mixed Grass/Shortgrass Prairie, Mixed-Grass Prairie, Eastern-Mixed Grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian	Glacial Dark Brown Prairie, Missouri Cateau, Drift Plains, Sand Deltas and Beach Ridges, Glacial Lake Agassiz Basin, End Moraine Complex, Missouri Plateau, River Breaks, Little Missouri Badlands, Pembina Escarpment
<i>Botrychium campestre</i>	Prairie Grapefern	S1	G3G4	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian	Missouri Plateau
<i>Carex leptalea</i>	Delicate Sedge	S3	G5	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie	Glacial Lake Basin, Glacial Lake Agassiz Basin, Sand Deltas and Beach Ridges
<i>Carex sterilis</i>	Sterile Sedge	S1	G4	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian	Glacial Lake Basins, Glacial Lake Deltas
<i>Eriophorum chamissonis</i>	Chamisson's Cottongrass	S2	G5	HV	Eastern-Mixed-grass Prairie, Rivers, Strams, Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Turtle Mountains
<i>Galium labradoricum</i>	Bog Bedstraw	S3	G5	PS	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basins, Turtle Mountains, Drift Plains, Sand Deltas and Beach Ridges
<i>Rhynchospora capillacea</i>	Hair Beakrush	S2	G4	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian	Glacial Lake Deltas, Glacial Lake Basins, Drift Plains
<i>Salix pedicellaris</i>	Bog Willow	S3	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Turtle Mountains, Glacial Lake Deltas, Glacial Lake Basins
<i>Spiranthes cernua</i>	Nodding Ladies'-tresses	S1	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian	Glacial Lake Deltas, Glacial Lake Basins, Drift Plains, Sand Deltas and Beach Ridges
<i>Spiranthes romanzoffiana</i>	Hooded Ladies'-tresses	S1	G5	MV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Mixed-grass Prairie	Glaciated Dark Brown Prairie, Glacial Lake Deltas, Glacial Lake Basins
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort	S2	G5	HV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basins, Glacial Lake Aggasiz Basin, Turtle Mountains

Turtle Mountains

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Botrychium minganense</i>	Moonwort	S1	G4	MV	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Northern Dark Brown Prairie, Turtle Mountains, Pembina Escarpment, Sand Deltas and Beach Ridges
<i>Carex alopecoidea</i>	Foxtail Sedge	S2	G5	MV	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Turtle Mountains, Sand Deltas and Beach Ridges, Drift Plains, Glacial Lake Agassiz Basin
<i>Carex backii</i>	Back's Sedge	S3	G4	MV	Mixed-grass Prairie, Upland Deciduous Forest	Turtle Mountains, Northern Black Prairie, Northern Dark Brown Prairie
<i>Carex echinata</i> ssp. <i>echinata</i>	Spiny Sedge	S1	G5T5	HV	Upland Deciduous Forest	TurtleMountains
<i>Caulophyllum thalictroides</i>	Blue Cohosh	S1	G4G5	MV	Rivers, Streams, and Riparian, Upland Dciduous Forest	Glacial Lake Agassiz Basin, Drift Plains, Turtle Mountains
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper Orchid	S2	G5	EV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Outwash, End Moraine Complex, Sand Deltas and Beach Ridges, Glacial Lake Basins, Glacial Lake Agassiz Basin

Turtle Mountains

State Scientific Name	State Common Name	State Rank	Global Rank	Climate Index Rank	NDCWCS Landscape Components	Ecoregion -EPA Level IV
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	S2	G5T5	HV	Eastern-Mixed-grass Prairie, Rivers, Streams, and Riparian, Tallgrass Prairie, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basin, Sand Deltas and Beach Ridges, Turtle Mountains, Missouri Cateau, Pembina Escarpment, Drift Plains
<i>Drosera rotundifolia</i>	Round-leaved Sundew	S1	G5	HV	Upland Deciduous Forest	Turtle Mountains
<i>Eriophorum chamissonis</i>	Chamisson's Cottongrass	S2	G5	HV	Eastern-Mixed-grass Prairie, Rivers, Strams, Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Turtle Mountains
<i>Eriophorum viridicarinatum</i>	Green Keeled Cottongrass	S2	G5	HV	Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Agassiz Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Galium labradoricum</i>	Bog Bedstraw	S3	G5	PS	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basin, Turtle Mountains, Sand Deltas and Beach Ridges
<i>Menyanthes trifoliata</i>	Buckbean	S2	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basins, Turtle Mountains, Drift Plains, Sand Deltas and Beach Ridges
<i>Mitella nuda</i>	Naked Mitrewort	S3	G5	HV	Tallgrass Prairie, Upland Deciduous Forest	Turtle Mountains, Pembina Escarpment, Sand Deltas and BeachRidges
<i>Salix maccalliana</i>	Swamp Willow	S1	G5?	HV	Upland Deciduous Forest	Turtle Mountains
<i>Salix pedicellaris</i>	Bog Willow	S3	G5	MV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Turtle Mountains, Glacial Lake Deltas, Glacial Lake Basins
<i>Scheuchzeria palustris</i>	Pod Grass	S1	G5	HV	Upland Deciduous Forest	Turtle Mountains
<i>Sphagnum teres</i>	Round-leaved Sphagnum	S1	G5	HV	Upland Deciduous Forest	Turtle Mountains
<i>Utricularia intermedia</i>	Flat-leaved Bladderwort	S2	G5	HV	Eastern-Mixed-grass Prairie, Tallgrass Prairie, Rivers, Streams, and Riparian, Upland Deciduous Forest	Glacial Lake Deltas, Glacial Lake Basins, Glacial Lake Aggasiz Basin, Turtle Mountains

Relationship between plants and focus areas

Overall, based on species distribution within the focus areas above, Saline Areas support the most plant species with 54 individual plants or 21% of all sensitive plant species. There are five focus areas that follow Saline Areas in supporting high numbers of sensitive plant species, they include the Sheyenne River (32 plant species), Souris River (24 plant species), Glacial Lake Deltas (18 plant species), and Turtle Mountains (18 plant species). Table 10 illustrates the landscape components the focus areas fall within, which are all east of the Missouri River. These focus areas are smaller regions within the top three supporting landscape components. Focus areas make it easier to create and implement conservation plans.

Table 11: Landscape components and specific focus areas within them.

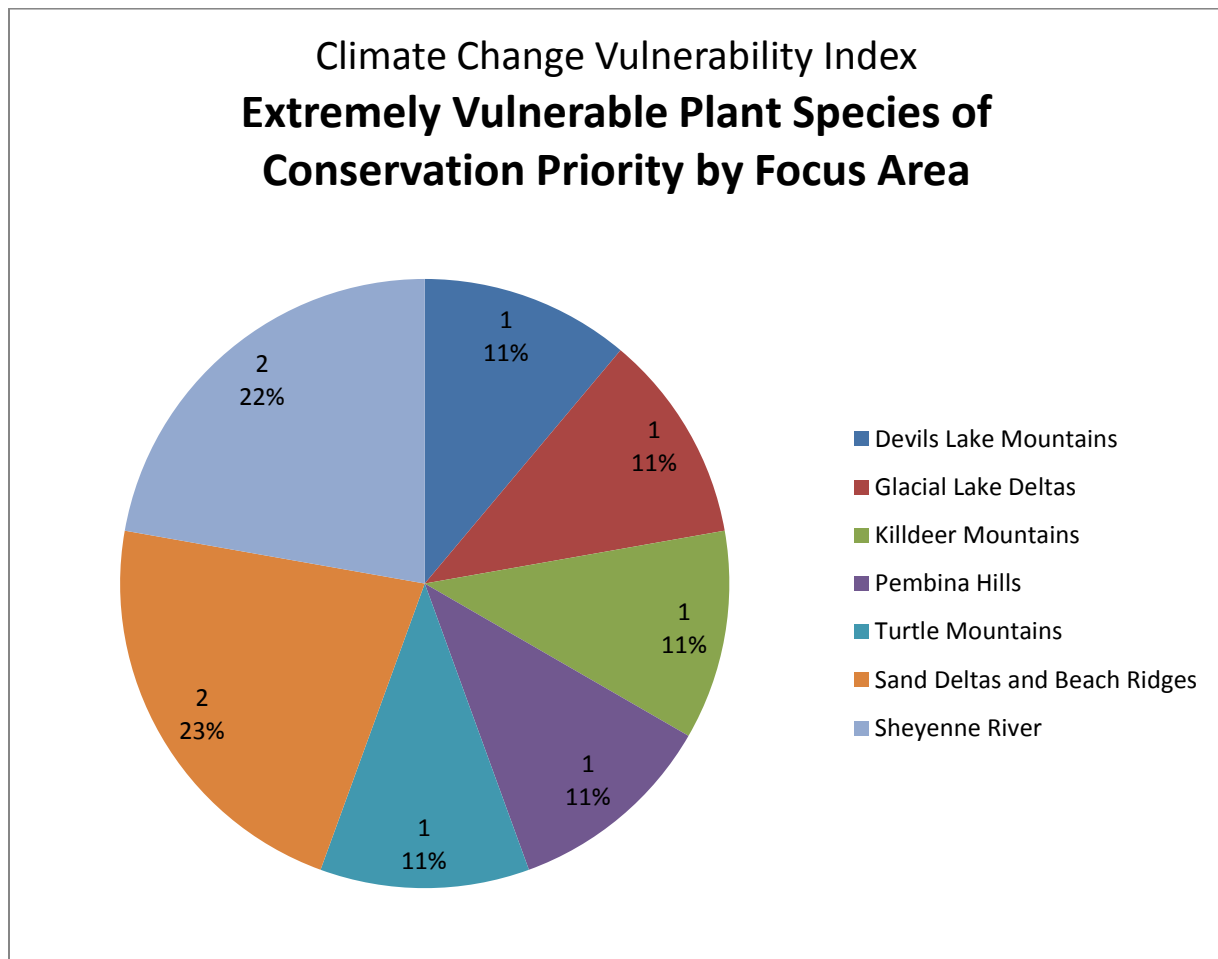
Landscape Components	Focus Area
Tallgrass Prairie (Red River Valley)	Saline Areas Sand Deltas and Beach Ridges
Eastern Mixed-grass Prairie (Drift Prairie)	Glacial Lake Deltas Devils Lake Basin
Mixed-grass Prairie (Missouri Coteau)	Missouri Coteau Breaks
Western Mixed-grass/Shortgrass Prairie (Missouri Slope)	Big Sagebrush Shrub-Steppe
Rivers, Streams, and Riparian	Missouri River System/Breaks Red River and Tributaries Sheyenne River James River Souris River Cannonball River Heart River Knife River Little Missouri River
Badlands	Ponderosa Pines
Upland Deciduous Forest	Pembina Hills Turtle Mountains Devils Lake Mountains Killdeer Mountains

Plant Species Distribution by CCVI Score

The sensitive plant species were further broken down by their final CCVI score (EV, HV, MV, and PS), and tallied to determine which focus areas harbor the most EV and HV plant species. We also looked at where the most MV and PS plant species were located compared to the EV and HV plant species. Analyzing focus areas and associated sensitive plant species vulnerable to climate change can help link plant species with opportunities for range shifts.

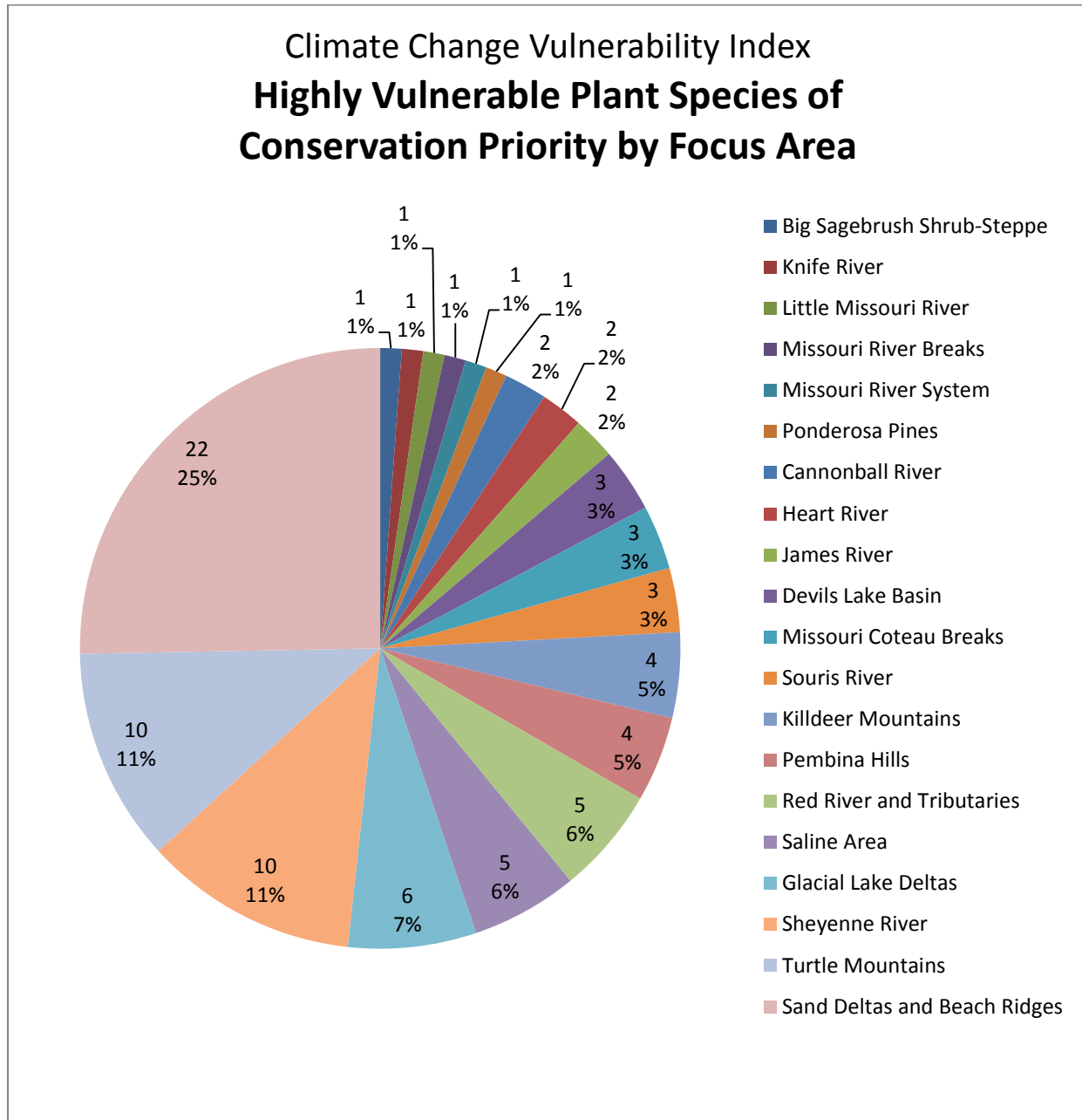
Extremely vulnerable plant species are present in 7 focus areas (figure 26), but are most prevalent in Sand Deltas and Beach Ridges (23% of plant species) and the Sheyenne River (22% of plant species); the rest of the focus areas each support 11% of plant species.

Figure 26: Extremely vulnerable plant species distribution by focus area



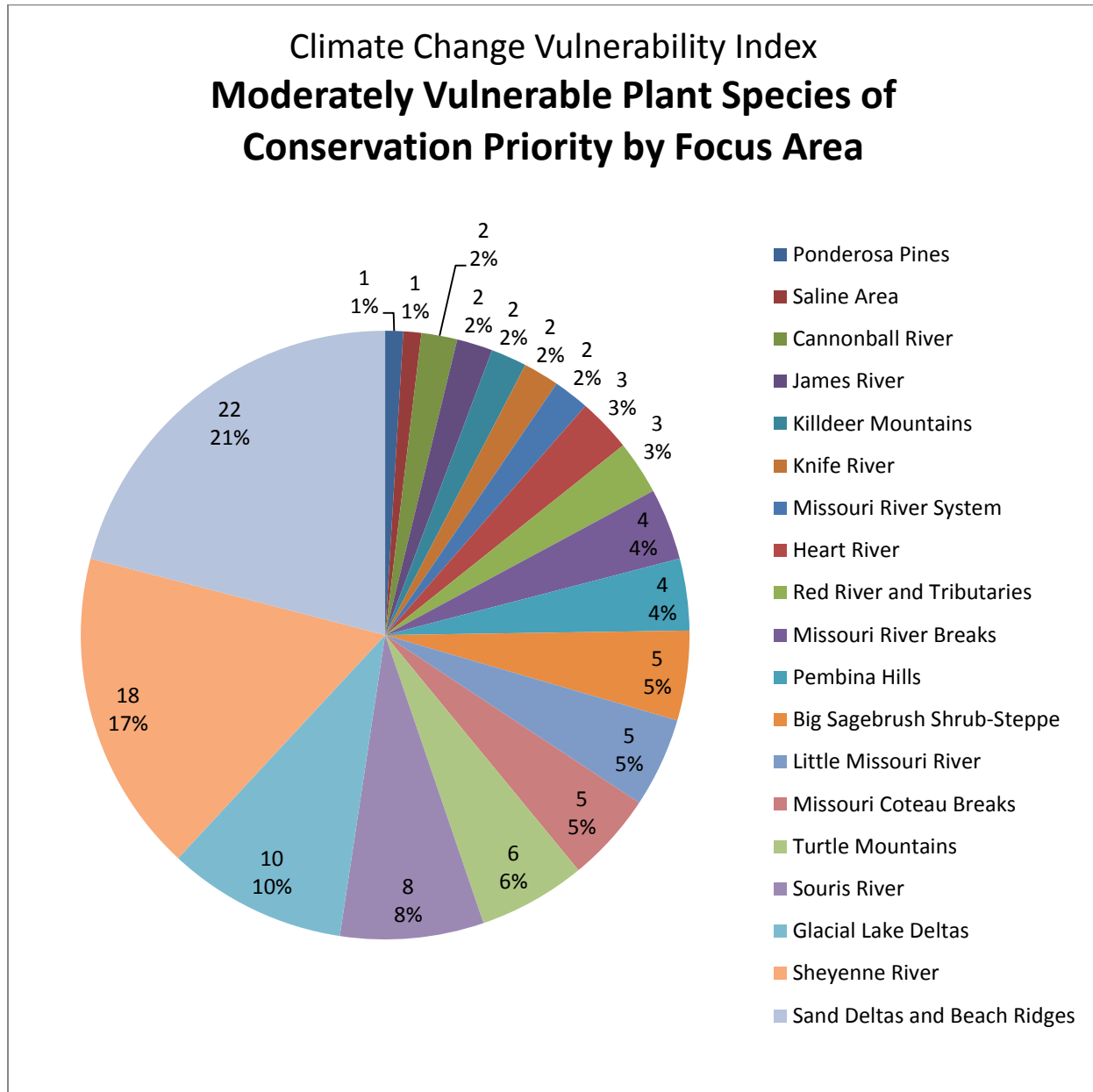
Highly vulnerable plant species are present in 20 focus areas (figure 26) with the majority of plants in three of them including 25% in Sand Deltas and Beach Ridges, 11% in the Turtle Mounitans, and 11% in the Sheyenne River area. The rest of the focus areas support &% or less of HV plant species. The three major supporting focus areas all coincide with the eastern and northern portion of North Dakota.

Figure 27: Highly vulnerable plant species distribution by focus area



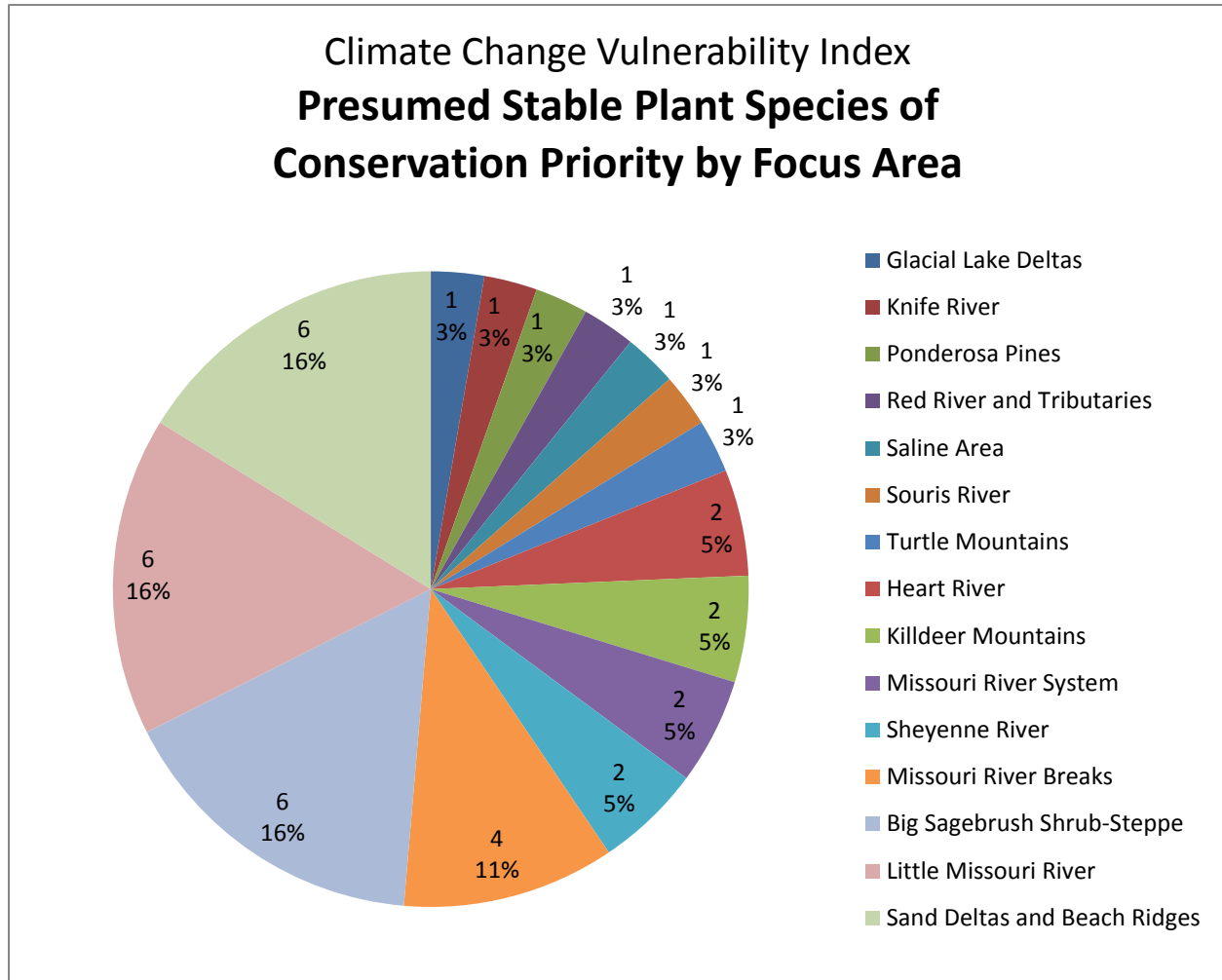
The majority of moderately vulnerable plant species are found in Sand Deltas and Beach ridges supporting 21% of sensitive plant species, followed with 17% in The Sheyenne River area, and 10% in Glacial Lake Deltas. The rest of the focus areas support a relatively small percentage of sensitive plant species as shown in figure 27.

Figure 28: Moderately vulnerable plant species distribution by focus area



Species that were scored as presumed stable by the CCVI are a little more evenly spread out (figure 28) with 16% of plant species in Sand Deltas and Beach Ridges, The Little Missouri River region, and the Big Sagebrush Shrub-Steppe. The Missouri River Break focus area supports 11% of sensitive plant species are the rest of the focus areas in figure 26 support 5%-3% of these plant species. Presumed stable plant species have two top focus areas (Little Missouri River and Big Sagebrush Shrub-Steppe) that differ from EV, HV, and MV plant species. More research is needed to specifically understand the reasons behind this.

Figure 29: Presumed stable vulnerable plant species distribution by focus area



Landscape Components and Associated Focus Areas

Tallgrass Prairie (Red River Valley)

Area: 4,630,000 acres (1,874,000 ha)

Description and Overall Condition: This landscape component consists of the tallgrass prairie, and associated wetlands, historically found predominantly in the eastern one-fourth of North Dakota. The Red River of the North forms the state line between North Dakota and Minnesota. This region today is commonly referred to as the Red River Valley. Until just 10,000 years ago, a large glacial lake named Lake Agassiz covered this region. The flat topography and rich soil of the glacial Lake Agassiz basin provides for excellent but intensive agricultural production including potatoes, beans, sugar beets, corn and wheat. By the 20th century, much of the tallgrass prairie had been converted to farmland. Few tracts of native vegetation remain in this region today. Places where small natural areas remain intact are remnants of Lake Agassiz. The shoreline of Lake Agassiz created diagonal striations of sand and gravel a few feet high that are still visible in aerial and satellite imagery today. These beach ridges are one component of the focus area “Sand Deltas and Beach Ridges” in conjunction with several large fan-shaped deltas of sand formed from Agassiz. Saline areas of unsuitable farmland due to the high salt concentration of the soil remain intact. The largest continuous area just west of Grand Forks is another focus area, the “Saline Area.” The Red River Valley has few wetlands compared to the mixed-grass prairie to the west, with roughly 150,000 total wetland basin acres. Farmland with woodlot and shelterbelt plantings is now prevalent, particularly in Grand Forks County.

Predominant Natural Vegetation:

Grasses: big bluestem, little bluestem, switchgrass, Indiangrass, prairie dropseed, slender wheatgrass, porcupine grass, mat muhly, fescue sedge, meadow sedge

Forbs: western prairie fringed orchid, blue-eyed grass, meadow anemone, prairie cinquefoil, wild licorice, prairie blazing star, tall goldenrod, black-eyed susan, white sage

Associated Species of Conservation Priority:

Birds	Mammals	Reptiles/Amphibians
American Bittern Northern Pintail Northern Harrier Sharp-tailed Grouse Greater Prairie-chicken Willet Upland Sandpiper Marbled Godwit Wilson’s Phalarope Short-eared Owl Wren Grasshopper Sparrow Le Conte’s Sparrow Nelson’s Sharp-tailed Sparrow Dickcissel Bobolink	Pygmy Shrew Arctic shrew Plains Pocket Mouse Richardson’ Ground Squirrel	Canadian Toad Northern Prairie Skink Smooth Green Snake Western Hognose Snake
		Plants
		Western Prairie Fringed Orchid Small Yellow Lady’s-slipper Meadow Onion Cooper’s Milkvetch Bicknell’s Sunrose Rose Pogonia Swamp Smartweed Ledge-spike Moss Yellow Lady’s-slipper

Other Characteristic Wildlife:

Birds: mallard, blue-winged teal, red-tailed hawk, American kestrel, ring-necked pheasant, killdeer, Eastern kingbird, Western kingbird, American crow, common yellowthroat, clay-colored sparrow, vesper sparrow, Savannah sparrow, Henslow's sparrow, Western meadowlark, brown-headed cowbird

Mammals: Northern short-tailed shrew, white-tailed jackrabbit, snowshoe hare, Franklin's ground squirrel, thirteen-lined ground squirrel, Northern pocket gopher, plains pocket gopher, Western harvest mouse, deer mouse, Northern grasshopper mouse, prairie vole, meadow vole, meadow jumping mouse, Western jumping mouse, coyote, red fox, raccoon, badger, striped skunk, white-tailed deer, moose

Reptiles and Amphibians: American toad, Great Plains toad, Northern leopard frog, chorus frog, tiger salamander, plains garter snake, common garter snake

Plants: leathery grapefern, least grapefern, marsh bellflower, handsome sedge, delicate sedge, white lady's-slipper, showy lady's-slipper, prairie mimosa, Wolf's spikerush, marsh horsetail, meadow horsetail, wood horsetail, slender cottongrass, wahoo, bog bedstraw, wooly beach-heather, upright pinweed, small-flowered lipocarpha, buckbean, yellow monkeyflower, rhombic evening primrose, sensitive fern, Adder's-tongue fern, one-flowered broomrape, green woodland orchid, rose pogonia, prickly gooseberry, bog willow, ledge-spike moss, zigzag goldenrod, nodding ladies'-tresses, purple sandgrass, flat-leaved bladderwort, culver's root, bog violet

Focus Area: Saline Area

Area: 200,000 acres (83,000 ha)

Public Landholdings: 11,600 acres (NDGFD 4,100; NDSL 1,800; USFWS 5,700)

Description and Condition: This area is characterized by saline soil due to salty ground water flowing to the surface from underlying sandstone. This land is mostly unsuitable for crop farming and grazing occurs in most areas that are not cultivated. Salt-tolerant plants occur and many of the wetlands are brackish in nature. This area includes several larger tracts (>640 acres) of native tallgrass prairie. The majority of this area is not protected with an easement. Landowners appear willing to work with conservation agencies or groups to protect this rare area. The Grand Forks County Prairie Partners advocates preservation of this rare ecosystem. A major threat includes urban expansion as most of this area is within 15 miles of Grand Forks.

Key Species of Conservation Priority

Birds: greater prairie-chicken, upland sandpiper, sedge wren, Le Conte's sparrow

Plants: marsh bellflower, foxtail sedge, handsome sedge, delicate sedge, blue lips, brook flatsedge, white lady's-slippers, showy lady's-slippers, yellow lady's-slipper, dwarf spikerush, marsh horsetail, slender cottongrass, bog bedstraw, sensitive fern, buckbean, green woodland orchid

Focus Area: Sand Deltas and Beach Ridges

Area: 914,000 acres (370,000 ha)

Public Landholdings: 83,750 acres (NDGFD 5,800; NDSL 500; NDFS 450; NDPRD 1,400; USFWS 3,600; USFS 72,000)

Description and Condition: Thick sand deposits from river sediments carried to glacial Lake Agassiz form windblown sand dunes, the largest being the Sheyenne delta in the southern portion of the Red River Valley. Beach ridges of parallel lines of sand and gravel are more prevalent in the northern portion, along with a smaller delta east of the Pembina Hills. Some agriculture, including irrigation, is taking place in the deltas and around the beach ridges.

This focus area contains the Sheyenne National Grasslands which is approximately 72,000 acres in size and is managed by the USFS, making this the largest publicly owned tallgrass prairie preserve in the United States. Oak savannah occurs in the delta areas. The Sheyenne River runs through the deltas. Overall, the USFS land is in suitable condition, although there are areas of overgrazing. Stands of privately owned native tallgrass prairie adjacent to the SNG are not protected by easements or other conservation.

Key Species of Conservation Priority

Birds: greater prairie-chicken, sharp-tailed grouse, short-eared owl, upland sandpiper, sedge wren, Le Conte's sparrow

Mammals: plains pocket mouse

Reptiles and Amphibians: Northern prairie skink, Western hognose snake

Plants: least grapefern, prairie mimosa, Bicknell's sunrose, woolly beach-heather, upright pinweed, yellow monkeyflower, swamp smartweed, ledge spike-moss, purple sandgrass, Culver's root, graceful sedge, brook flatsedge, marsh bellflower, handsome sedge, marsh horsetail, slender cottongrass, wahoo, rhombic evening-primrose, sensitive fern, Adder's tongue fern, Western prairie fringed orchid, prickly gooseberry, zigzag goldenrod, bog violet, Loesel's twayblade, Northern lady-fern, moonwort, foxtail sedge, green keeled cottongrass, oakfern, leathery grapefern, naked mitrewort, Cooper's milkvetch, dwarf spikerush, one-flowered broomrape, Wolf's spikerush, small-flowered lipocarpha, green woodland orchid, rose pogonia, delicate sedge, white lady's-slipper, showy lady's-slipper, small yellow lady's-slipper, large yellow lady's-slipper, nodding ladies'-tresses, bog bedstraw, buckbean, bog willow, flat-leaved bladderwort, wood horsetail, meadow onion, and woolly milkweed



*Sand hills in southeastern
North Dakota.*

Eastern Mixed-grass Prairie (Drift Prairie)

Area: 16,425,000 acres (6,647,000 ha)

Description and Overall Condition: This landscape component consists of the Eastern mixed-grass prairie, or Drift Prairie, and associated wetlands. The Drift Prairie is the transition zone between the wetter tallgrass prairie to the east and drier shortgrass prairie to the west. A high concentration of temporary and seasonal wetlands occurred within the prairie before settlement. Approximately 1.4 million wetland basin acres are present although extensively drained or filled. The Pembina Hills, Turtle Mountains, and Devils Lake are defining features within this region but are included under the landscape component of Upland Deciduous Forest. A large area of untilled land due to sandy, gravelly soil from another glacial lake delta exists in and around McHenry County and south of the Turtle Mountains. This focus area, referred to as “Glacial Lake Deltas” is to a large extent native vegetation with many wetlands remaining. In more recent years, irrigation has allowed areas once unsuitable for cropland to be farmed for potatoes and other crops. The Souris River riparian area divides the Glacial Lake Deltas. Another focus area, the “Devils Lake Basin” is the result of glacial ice blockage and includes a high concentration of larger wetlands or lakes and slightly lesser amount of grassland than the Glacial Lake Deltas. This focus area is extremely important for migrating waterfowl and other waterbirds and shorebirds. The rest of the Drift Prairie is generally flat land much of which has been converted to cropland of spring wheat, durum, other small grains, canola, sunflowers, and alfalfa. The Sheyenne and James rivers meander through this region.

Predominant Natural Vegetation:

Grasses: prairie junegrass, green needlegrass, needle-and-thread, blue grama, little bluestem, yellow sedge, Western wheatgrass, Canada wild rye, spike oats, big sandgrass, porcupine grass, mat muhly, side-oats grama, Leiberg’s panicum, needleleaf sedge, threadleaf sedge

Forbs: pasque flower, Western wall-flower, torch flower, prairie rose, Missouri milkvetch, purple loco, lead plant, Indian breadroot, purple prairie-clover, gaura, hairy puccoon, harebell, stiff goldenrod, smooth fleabane, purple coneflower, upland wormwood, fringed sage

Associated Species of Conservation Priority:

Birds	Mammal	Reptiles/Amphibians
American Bittern	Arctic Shrew	Plains Spadefoot
Northern Pintail	Pygmy Shrew	Canadian Toad Smooth
Northern Harrier	Richardson's Ground Squirrel	Green Snake Western
Swainson's Hawk		Hognose Snake
Ferruginous Hawk		Plants
Sharp-tailed		Sweet Flag
Grouse Willet		Hair-like Sedge
Upland Sandpiper		Sterile Sedge
Marbled Godwit		Hooded Ladies'-tresses
Wilson's		Chamomile Grapefern
Phalarope		Chamisson's Cottongrass
Short-eared Owl		Prairie Grapefern
Loggerhead		Hair Beakrush
Shrike Sedge		Delicate Sedge
Wren Sprague's		Lady's-slippers
Pipit Lark		Wood Horsetail
Bunting		Buckbean
Grasshopper Sparrow		Flowered Penstemon
Baird's Sparrow		Nodding Ladies'-tresses
Le Conte's Sparrow		Sticky False-asphodel
Nelson's Sharp-tailed		
Sparrow Chestnut-collared		
Longspur Dickcissel		
Bobolink		

Other Characteristic Wildlife:

Birds: American wigeon, green-winged teal, mallard, blue-winged teal, Northern shoveler, gadwall, lesser scaup, red-tailed hawk, American kestrel, gray partridge, ring-necked pheasant, spotted sandpiper, killdeer, mourning dove, common nighthawk, Western kingbird, Eastern kingbird, horned lark, American crow, Eastern bluebird, common yellowthroat, clay-colored sparrow, vesper sparrow, Savannah sparrow, Western meadowlark, brown-headed cowbird

Mammals: Northern short-tailed shrew, white-tailed jackrabbit, snowshoe hare, Franklin's ground squirrel, thirteen-lined ground squirrel, Northern pocket gopher, olive-backed pocket mouse, Western harvest mouse, deer mouse, Northern grasshopper mouse, prairie vole, meadow vole, meadow jumping mouse, Western jumping mouse, coyote, red fox, raccoon, badger, striped skunk, white-tailed deer, moose

Reptiles and Amphibians: American toad, Great Plains toad, Woodhouse's toad, Northern leopard frog, chorus frog, tiger salamander, plains garter snake, common garter snake

Plants: white lady's-slipper, showy lady's-slipper, small yellow lady's-slipper orchid, large yellow lady's-slipper, nodding ladies'-tresses, bog bedstraw, buckbean, bog willow, flat-leaved bladderwort, wood horsetail

Focus Area: Glacial Lake Deltas

Area: 1,500,000 acres (606,000 ha)

Public Landholdings: 92,200 acres (NDGFD 2,300; NDSL D 34,700; NDFS 800; USFWS 54,400)

Description and Condition: Glaciated flat sheets of sand and gravel or rolling sand dunes make this area rather unsuitable for cropland. The droughty soils are used primarily for cattle grazing; however, some cropland exists and irrigation is allowing once unsuitable land to be farmed. Tallgrass prairie communities also occur within this focus area. The vegetative cover is thin and dominated by little bluestem, indiagrass, prairie sandreed, switchgrass, and sand bluestem

Key Species of Conservation Priority

Birds: Sprague's pipit, Baird's sparrow, Le Conte's sparrow

Plants: prairie grapefern, hair-like sedge, sterile sedge, Chamisson's cottongrass, bog willow, ladies'-tresses, flat-leaved bladderwort

Focus Area: Devils Lake Basin

Area: 1,295,000 acres (525,000 ha)

Public Landholdings: 71,600 acres (NDGFD 3,300; NDSL D 22,500; NDPRD 1,000; USFWS 44,800)

Description and Condition: Extensive wetland drainage and intense farming is predominant due to the rich soil and relatively flat topography. A higher concentration of large wetlands and lakes exist, in part from the drainage of smaller, temporary and seasonal wetlands for farming. The James and Sheyenne rivers meander through the southern portion of the basin, with adjacent non-wooded uplands intact in many areas.

Key Species of Conservation Priority

Birds: American bittern, Northern pintail, Northern harrier, Swainson's hawk, sharp-tailed grouse, willet, upland sandpiper, marbled godwit, short-eared owl, and bobolink

Mammals: Richardson's ground squirrel

Reptiles and Amphibians: plains spadefoot

Plants: white lady's-slipper, showy lady's-slipper, large yellow lady's-slipper



Native mixed-grass prairie hillside

Mixed-grass Prairie (Missouri Coteau)

Area: 10,290,000 acres (4,164,000 ha)

Description and Overall Condition: This landscape component includes the mixed-grass prairie of the Missouri Coteau and associated wetlands. This region marks the boundary of the western limits of glaciation in North Dakota. The hummocky, rolling hills of the Missouri Coteau dramatically rise 150 to 500 feet above the Drift Prairie. A high concentration of wetlands are present, roughly 800,000 basin acres. Alkaline lakes are also more prevalent here. Streams and rivers are nearly absent, as are upland deciduous forests but tracts of aspen parkland occur in the north. A considerable amount of native prairie remains and this region provides primarily for cattle grazing. Areas of reduced slope, particularly the western edge, have been converted to cropland such as small grains, sunflowers, corn, and alfalfa hayland. The Coteau is known for supporting some of the highest numbers of breeding ducks in North America. Due to the large amount of grassland and wetlands which remain or have been restored, this area is especially crucial to many other species and constitutes the focus area “Missouri Coteau Breaks.” Much of the Coteau is classified as good to outstanding for wind energy potential, which could pose the threat of habitat fragmentation. Irrigation and new advances in cropland could allow for native prairie to be farmed. Oil and gas activity is established in the extreme northwest.

Predominant Natural Vegetation:

Grasses: prairie junegrass, little bluestem, needle-and-thread, blue grama, green needlegrass, porcupine grass, prairie cordgrass, Northern reedgrass, plains muhly, Western wheatgrass, Kentucky bluegrass,

Forbs: pasque flower, torch flower, yarrow, gumweed, golden aster, prairie rose, Missouri milkvetch, purple loco, lead plant, Indian breadroot, purple prairie-clover, gaura, hairy puccoon, harebell, goldenrod, smooth fleabane, perennial ragweed, purple coneflower, upland wormwood, green sage and fringed sage.

Associated Species of Conservation Priority:

Birds	Mammal	Reptiles/Amphibians
American Bittern	Richardson’s Ground Squirrel	Plains Spadefoot
Northern Pintail		Canadian Toad Smooth
Northern Harrier		Green Snake Western
Swainson’s Hawk		Hognose Snake
Ferruginous Hawk		
Sharp-tailed		Plants
Grouse Willet		Woolly Milkweed
Upland Sandpiper		Chamomile Grapefern
Marbled Godwit		Back’s Sedge
Wilson’s		Stickseed
Phalarope		Loesel’s Twayblade
Short-eared Owl		American Primrose
Loggerhead		Hooded Ladies’-
Shrike Sedge		tresses
Wren Sprague’s		Alkali Sacaton
Pipit Lark		
Bunting		
Grasshopper Sparrow		
Baird’s Sparrow		
Le Conte’s Sparrow		

Other Characteristic Wildlife:

Birds: American wigeon, green-winged teal, mallard, blue-winged teal, Northern shoveler, gadwall, lesser scaup, red-tailed hawk, American kestrel, gray partridge, ring-necked pheasant, spotted sandpiper, killdeer, mourning dove, common nighthawk, Western kingbird, Eastern kingbird, horned lark, American crow, Eastern bluebird, common yellowthroat, clay-colored sparrow, vesper sparrow, Savannah sparrow, Western meadowlark, brown-headed cowbird

Mammals: white-tailed jackrabbit, snowshoe hare, thirteen-lined ground squirrel, Northern pocket gopher, olive-backed pocket mouse, Western harvest mouse, deer mouse, Northern grasshopper mouse, prairie vole, meadow vole, meadow jumping mouse, coyote, red fox, raccoon, badger, striped skunk, white-tailed deer

Reptiles and Amphibians: Great Plains toad, Woodhouse's toad, Northern leopard frog, chorus frog, tiger salamander, plains garter snake, common garter snake, yellowbelly racer, bull snake

Focus Area: Missouri Coteau Breaks

Area: 5,765,000 acres (2,333,000 ha)

Public Landholdings: 308,200 acres (NDGFD 17,700; NDSL 155,000; USFWS 192,000; USBLM 640)

Description and Condition: Rolling, steep topography has spared much of this area from being farmed. Native prairie remains intact among areas tilled for wheat or hayed. Cattle grazing is the most common use. Abundant wetlands of all classes occur throughout. A great amount of conservation effort, including grassland easements, has been directed to the Coteau especially within the last 15 years

Key Species of Conservation Priority

Birds: American bittern, Northern pintail, Northern harrier, Swainson's hawk, ferruginous hawk, sharp-tailed grouse, willet, upland sandpiper, marbled godwit, Wilson's phalarope, short-eared owl, loggerhead shrike, sedge wren, Sprague's pipit, lark bunting, grasshopper sparrow, Baird's sparrow, Le Conte's sparrow, Nelson's sharp-tailed sparrow, chestnut-collared longspur, dickcissel, bobolink

Mammals: Richardson's ground squirrel

Reptiles and Amphibians: spadefoot toad, smooth green snake

Plants: woolly milkweed, chamomile grapefern, Back's sedge, stickseed, Loesel's twayblade, American primrose, hooded ladies'-tresses, alkali sacaton



The rolling hills of the Missouri Coteau

Western Mixed-grass/Short-grass Prairie (Missouri Slope)

Area: 9,450,000 acres (3,828,000 ha)

Description and Overall Condition: This landscape component includes the Western mixed-grass prairie and short-grass prairie of the Missouri Slope and associated wetlands. This semiarid, unglaciated region of North Dakota includes level to rolling plains topography with isolated sandstone buttes or badlands formations. The Missouri River System/Breaks is considered by some to be a component of or the boundary between the Missouri Coteau and Missouri Slope, but is described within the Stream, Rivers, and Riparian landscape component. Shrub- steppe, or prairie that has a large component of sagebrush, occurs scattered throughout. Wetland basins are minimal, probably constituting only several hundred-thousand acres. Land use is predominantly dryland farming of spring and winter wheat, barley, sunflowers and corn, interspersed with cattle grazing. However, landcover classifications indicate there is a fair amount of native vegetation remaining. The oil and gas industry is expanding in the western portion of this region.

Predominant Natural Vegetation:

Grasses: blue grama, Western wheatgrass, prairie junegrass, needle-and-thread, needleleaf sedge, buffalo grass, spikemoss, sixweeks fescue, green needlegrass, plains muhly, little bluestem, threadleaf sedge

Forbs: yarrow, gumweed, skeleton weed, purple coneflower, sandlily, white wild onion, death camas, buffalo-bean, purple loco, silverleaf, plains pricklypear, ball cactus, moss phlox, white beardtongue, fringed sage

Associated Species of Conservation Priority:

Birds	Mammal	Reptiles/Amphibians
Northern Pintail	Hispid Pocket Mouse	Plains Spadefoot
Northern Harrier	Sagebrush Vole	Short-horned Lizard
Ferruginous	Black-tailed Prairie Dog	Northern Sagebrush
Hawk	*Swift Fox	Lizard Western Hognose
Swainson's	*Black-footed Ferret	Snake
Hawk Golden		
Eagle Prairie		
Falcon		
Sharp-tailed Grouse		
Greater Sage-		
Grouse Upland		
Sandpiper Long-		
billed Curlew		
Wilson's Phalarope		
Burrowing Owl		
Short-eared Owl		
Loggerhead		
Shrike Sprague's		
		Plants
		Dakota Buckwheat
		Smooth Goosefoot
		Blue Lips
		Torry's Cryptantha
		Dakota Buckwheat
		Stickseed
		Sand Lily
		Creeping Barberry
		Dwarf Mentzelia
		Limber Pine
		Thin-fruited Knotweed

Other Characteristic Wildlife:

Birds: mallard, blue-winged teal, Northern shoveler, gadwall, red-tailed hawk, American kestrel, merlin, gray partridge, ring-necked pheasant, wild turkey, killdeer, mourning dove, common nighthawk, Western kingbird, Eastern kingbird, horned lark, Eastern bluebird, mountain bluebird, common yellowthroat, clay-colored sparrow, vesper sparrow, lark sparrow, Savannah sparrow, Western meadowlark, brown-headed cowbird

Mammals: thirteen-lined ground squirrel, Northern pocket gopher, olive-backed pocket mouse, Ord's kangaroo rat, Western harvest mouse, deer mouse, Northern grasshopper mouse, prairie vole, meadow vole, meadow jumping mouse, coyote, red fox, raccoon, badger, striped skunk, mountain lion, bobcat, elk, mule deer, white-tailed deer, pronghorn

Reptiles and Amphibians: Woodhouse's toad, Great Plains toad, Northern leopard frog, Western chorus frog, tiger salamander, common garter snake, plains garter snake, yellowbelly racer, bullsnake, prairie rattlesnake

Focus Area: Big Sagebrush Shrub-Steppe

Area: 300,000 acres (120,000 ha)

Public Landholdings: 69,000 acres (NDSL 15,000; USFS 19,000; USBLM 35,000)

Description and Condition: Eroded buttes, scoria mounds, and salt pans make this area similar to the badlands. Minimal agriculture and low human occupancy but the oil and gas industry is prevalent. This characteristic big sagebrush ecosystem has been altered by livestock grazing, conversion to cropland, and in more recent years, oil development. What remains of this fragile habitat is severely fragmented and faces a series of continual threats.

Key Species of Conservation Priority

Birds: greater sage grouse, Brewer's sparrow

Mammals: sagebrush vole

Reptiles and Amphibians: short-horned lizard, sagebrush lizard

Plants: alkali sacaton, Dakota buckwheat, sand lily, Torrey's cryptantha, mountain meadow cinquefoil, stickseed, creeping barberry, dwarf mentzelia, limber pine, blue lips, smooth goosefoot

Big sagebrush in extreme southwestern North Dakota.



Rivers, Streams and Riparian

Total River Miles: 58,890 (includes all rivers and streams)

Description and Overall Condition: This landscape component includes all rivers, streams, and associated riparian areas which are distributed throughout the state. River floodplains and the associated riparian habitat represent narrow corridors of unique habitat in the state. Cattle grazing in some areas have been detrimental to riparian habitat and is one factor relating to reduced water quality. Development such as increased housing along the Missouri River can be disturbing to some wildlife species. Many small low-head dams have impeded fish movement. The creation of larger dams such as Garrison Dam resulted in numerous positive benefits, but is an obstruction in the natural cycle of cottonwood regeneration.

Predominant Natural Vegetation:

Trees and Shrubs: cottonwood, American elm, green ash, box elder, bur oak, basswood, hackberry, peachleaf willow, hophornbeam, prickly ash, Missouri gooseberry, black currant, buckthorn, nannyberry

Forbs: Virginia wild rye, nodding muhly, charming sedge, Sprengel's sedge, jack-in-the-pulpit, wood leek, large bellwort, false Solomon's seal, Solomon's seal, nodding trillium, carrion flower, tall nettle, wood nettle, wild four-o'clock, baneberry, wild ginger, columbine, kidneyleaf buttercup, tall meadowrue, bloodroot, yellow wood violet, pink wood violet, white avens, sweet cicely, wild sarsaparilla, honeywort, waterleaf, yellow wood parsnip, fringed loostripe, tall coneflower

Associated Species of Conservation Priority:

Birds	Mammal	Reptiles/Amphibians
Golden Eagle Bald Eagle Red-headed Woodpecker Black-billed Cuckoo Piping Plover	Western Small-footed Myotis Long-legged Myotis Long-eared Myotis Pygmy Shrew River Otter	False Map Turtle Smooth Softshell Common Snapping Turtle Northern Redbelly Snake
Fish	Mussels	Plants

Chestnut Lamprey	Threeridge	Meadow Onion
Silver Lamprey	Wabash Pigtoe	Prairie Grapefern
Pallid Lamprey	Mapleleaf	Moonwort
Sturgeon	Black Sandshell	Leathery Grapefern
Paddlefish	Creek	Spiny Sedge
Sturgeon	Heelsplitter Pink	Dutchman's Breeches
Chub	Heelsplitter Pink	Slender Cottongrass
Sicklefin	Papershell	Stickseed
Chub Silver		Small-flowered Lipocarpa
Chub Pearl		Dwarf Mentzelia
Dace		Small-flowered Penstemon
Hornyhead		Downy Phlox
Chub Pugnose		Limber Pine
Shiner		Rose Pogonia
Blacknose		Thin-fruited Knotweed
Shiner		Heart-leaved Buttercup
Rosyface Shiner		Nodding Ladies'-tresses
Northern Redbelly Dace		Hooded Ladies'-tresses
Finescale Dace		Bog Violet

Other Characteristic Wildlife:

Birds: wood duck, mallard, hooded merganser, common merganser, turkey vulture, osprey, sharp-shinned hawk, Cooper's hawk, red-tailed hawk, American kestrel, ring-necked pheasant, wild turkey, American woodcock, mourning dove, yellow-billed cuckoo, great horned owl, Eastern screech owl, barred owl, long-eared owl, common nighthawk, chimney swift, ruby-throated hummingbird, yellow-bellied sapsucker, downy woodpecker, hairy woodpecker, yellow-shafted flicker, pileated woodpecker, Western wood pewee, Eastern wood-pewee, yellow-bellied flycatcher, willow flycatcher, least flycatcher, Eastern flycatcher, great crested flycatcher, purple martin, tree swallow, Northern rough-winged swallow, bank swallow, cliff swallow, blue jay, black-billed magpie, common crow, black-capped chickadee, white-breasted nuthatch, brown creeper, house wren, Eastern bluebird, veery, wood thrush, American robin, gray catbird, brown thrasher, cedar waxwing, Bell's vireo, yellow-throated vireo, warbling vireo, Philadelphia vireo, red-eyed vireo, yellow warbler, yellow-rumped warbler, American redstart, ovenbird, Northern waterthrush, common yellowthroat, migratory warblers, scarlet tanager, rose-breasted grosbeak, black-headed grosbeak, lazuli bunting, indigo bunting, spotted towhee, Eastern towhee, chipping sparrow, lark sparrow, clay-colored sparrow, song sparrow, common grackle, brown-headed cowbird, orchard oriole, Bullock's oriole, Baltimore oriole, American goldfinch

Mammals: little brown bat, silver-haired bat, big brown bat, Eastern red bat, hoary bat, Eastern cottontail, woodchuck, Eastern chipmunk, gray squirrel, fox squirrel, Northern flying squirrel, beaver, white-footed mouse, Southern red-backed vole, meadow vole, meadow jumping mouse, Western jumping mouse, porcupine, coyote, red fox, gray fox, raccoon, American marten, ermine, long-tailed weasel, least weasel, bobcat, elk, mule deer, white-tailed deer

Reptiles and Amphibians: Woodhouse's toad, Great Plains toad, gray tree frog, Northern leopard frog, tiger salamander, common mudpuppy, common garter snake, plains garter snake, painted turtle

Focus Area: Missouri River System/Breaks

Water: 444,000 acres

Breaks: 2,248,000 acres (910,000 ha)

Description and Condition: The longest river in the United States, the Missouri River begins in the Rocky Mountains of Montana and flows southeast to its confluence with the Mississippi River in Missouri. It is the largest river system in North Dakota. Tributaries in North Dakota include the Yellowstone, Little Missouri, Knife, Heart, and Cannonball rivers, and the Little Muddy and Tobacco Garden creeks. The natural river flow was altered by damming in the 1950s. The River Breaks



are rather steep, dissected topography with woody draws, riparian forest, and uplands of shortgrass prairie. Cottonwood regeneration is lacking in some areas due to loss of natural flooding events which stimulates new cottonwood growth. Human development and urban expansion is occurring in some areas, particularly around the Bismarck/Mandan area.

Key Species of Conservation Priority

Birds: bald eagle, piping plover, least tern, red-headed woodpecker, golden eagle

Mammals: river otter

Reptiles and Amphibians: smooth softshell, false map turtle

Fish: sturgeon chub, pearl dace, blue sucker, paddlefish, pallid sturgeon, flathead catfish, flathead chub, sicklefin chub, yellow bullhead

Plants: Dakota buckwheat, stickseed, wooly milkweed, Drummond's milkvetch, nine-anthered dalea, alyssum-leaved phlox, heart-leaved buttercup, Hayden's yellowcress, prairie fameflower

Focus Area: Red River

Description and Condition: The Red River basin drains 39,300 square miles of the three-state region, including 21,000 acres of eastern North Dakota. Its largest North Dakota tributary is the Sheyenne River, but includes the Wild Rice, Maple, Rush, Elm, Goose, Turtle, Forest, Park and Pembina rivers. Many of these rivers are influenced by channelization and flood control impoundments implemented to control land drainage for agriculture. Extensive drainage ditch systems in the region also alter the natural hydrology of this basin. Agricultural run-off and wastewater inputs also impair the system.

Key Species of Conservation Priority

Birds: bald eagle, red-headed woodpecker, black-billed cuckoo

Mammals: river otter

Reptiles and Amphibians: redbelly snake

Fish: pearl dace (Tongue and Park rivers), silver chub, Northern redbelly dace (Rush River), trout-perch, chestnut lamprey, silver lamprey, central stoneroller (Forest River), hornyhead chub (Forest River), pugnose shiner (Forest River), blacknose shiner, finsecale dace (Tongue River), yellow bullhead, logperch, river darter

The Red River of the North.



Mussels: threeridge, wabash pigtoe, mapleleaf, black sandshell, creek heelsplitter, pink heelsplitter, pink papershell (Bois de Sioux River)
Plants: Wolf's spikerush, wild geranium, small-flowered lipocarpha, green woodland orchid, rose pogonia, downy phlox, blue cohosh, zigzag goldenrod

Focus Area: Sheyenne River

Description and Condition: The basin of the Sheyenne River covers 360,000 ha, making it the largest contributing tributary to the Red River in area. It originates in the mixed grass region of central North Dakota and flows southeasterly to its confluence with the Red River. Agricultural and ranching practices throughout the region along with wastewater discharge affect water quality in this drainage. The construction of an outlet from Devils Lake in to the Sheyenne River also poses risks to the system.



Sheyenne River

Key Species of Conservation Priority

Birds: black-billed cuckoo, red-headed woodpecker

Mammals: river otter

Reptiles and Amphibians:

Fish: Northern redbelly dace, pugnose shiner, blacknose shiner, roseface shiner, yellow bullhead

Mussels: threeridge, wabash pigtoe, mapleleaf, black sandshell, creek heelsplitter, pink heelsplitter

Plants: brook flatsedge, marsh bellflower, handsome sedge, marsh horsetail, meadow horsetail, slender cottongrass, wahoo, rhombic evening-primrose, sensitive fern, Adder's-tongue fern, Western prairie fringed orchid, prickly gooseberry, zigzag goldenrod, bog violet, Loesel's twayblade, moonwort, foxtail sedge, green keeled cottongrass, oakfern, one-flowered broomrape, small-flowered lipocarpha, delicate sedge, white lady's-slipper, showy lady's-slipper, small yellow lady's-slipper orchid, large yellow lady's-slipper, bog bedstraw, buckbean, bog willow, Dutchmen's breaches, blue cohosh

Focus Area: James River

Description and Condition: The James River begins in the Drift Prairie of central North Dakota and flows south into South Dakota. Land use of this area is predominantly agricultural. One large reservoir north of the town of Jamestown is used for flood control and municipal needs. Poor land use practices and water withdrawal are identified as threats to this system. Many stretches of this river are impaired by high nutrient loads and sedimentation.



James River

Key Species of Conservation Priority

Birds: black-billed cuckoo

Plants: Loesel's twayblade, hair beakrush, nodding ladies'-tresses, woolly milkweed, white lady's-slipper, flat-leaved bladderwort

Focus Area: Souris River

Description and Condition: The Souris River begins in eastern Saskatchewan and flows south into northern North Dakota and then returns north into Canada. Water flows are controlled by two large reservoirs in Saskatchewan and a number of smaller dams in North Dakota. Land use in this drainage is prominently agricultural. A number of stretches of the river are impaired by high nutrient content, and sedimentation. Wastewater discharge also affects water quality in this region.

Key Species of Conservation Priority

Birds: black-billed cuckoo

Mammals: river otter

Fish: pearl dace, trout-perch

Plants: sterile sedge, hooded ladies'-tresses, Chamisson's cottongrass, prairie grapefern, hair beakrush, delicate sedge, nodding ladies'-tresses, bog bedstraw, buckbean, bog willow, flat-leaved bladderwort, small-flowered grass-of-parnassus, wooly milkweed



Souris River

Focus Area: Cannonball River

Description and Condition: The Cannonball River flows 135 miles, west to east across southwestern North Dakota before flowing into Lake Oahe on the Missouri River. Flow in the river can range from no flow during dry years to 95,000 cubic feet per second during wet years. The Cannonball River and tributaries are threatened in both the upper and lower portions of its drainage by high nutrient levels and high sedimentation, most likely caused by land use practices in that watershed. Pathogens have also been cited as impairments to this river system.

Key Species of Conservation Priority

Birds: golden eagle (possible)

Reptiles and Amphibians: smooth softshell (possible)

Fish: Northern redbelly dace, flathead chub

Plants: Dakota buckwheat, stickseed, wooly milkweed, thin-fruited knotweed



Cannonball River

Focus Area: Heart River

Description and Condition: The Heart River crosses approximately 180 miles of western North Dakota. It begins in Billings County, in the Little Missouri National Grassland. It flows east through the Patterson Reservoir near Dickinson. At Gladstone, it is joined by the Green River, and flows ESE, through Lake Tschida which is formed by the Heart Butte Dam. It then turns northeast and joins the Missouri



Heart River Oxbow

River at the town of Mandan. The Heart River is threatened due to land use practices. Current problems include reduced riparian width, lack of native riparian plant diversity, stream bank erosion, channel and pool filling with sediments, and increased runoff from watershed. Degradation of the riparian zone is the result of poor grazing practices. A few stretches, particularly east of Lake Tschida, appear in satisfactory condition.

Key Species of Conservation Priority

Reptiles and Amphibians: smooth softshell (possible)

Fish: Northern redbelly dace, flathead chub, rosyface shiner

Plants: Torrey's cryptantha, mountain meadow cinquefoil, stickseed, wooly milkweed, thin-fruited knotweed, nine-anthered dalea

Focus Area: Knife River

Description and Condition: The Knife River originates in the badlands area in west-central North Dakota and flows easterly 200 miles to its confluence with the Missouri River. Much of the watershed is threatened by poor land use practices. Increased erosion in the area has led to higher sediment loads. Run-off from area land into the watershed also causes impairment.

Key Species of Conservation Priority

Fish: Northern redbelly dace, flathead chub

Plants: Torrey's cryptantha, stickseed, wooly milkweed

Focus Area: Little Missouri River

Description and Condition: The Little Missouri River originates in eastern Wyoming. The North Dakota portion of the river flows north through the badlands of western North Dakota. It eventually dumps into Lake Sakakawea at Little Missouri Bay. Areas of plains cottonwood forest along the river banks still occur, but have been reduced from historic levels. Cattle grazing and unrestricted use along the majority of the river is a possible threat in North Dakota.

Key Species of Conservation Priority

Birds: red-headed woodpecker, golden eagle

Mammals: Western small-footed myotis, long-legged myotis, long-eared myotis

Fish: sturgeon chub, Sicklefin chub, Northern redbelly dace, flathead chub, flathead catfish

Plants: alkali sacaton, Dakota buckwheat, Torrey's cryptantha, mountain meadow cinquefoil, stickseed, wooly milkweed, creeping barberry, dwarf mentzelia, limber pine, blue lips, nine-anthered dalea, smooth goosefoot

Badlands

Area: 1,845,000 acres

Description and Overall Condition: This landscape component includes the area associated with the Little Missouri Rive drainage and is commonly referred to as badlands. This highly dissected landscape was formed by water erosion of the soft silt or clay soil and collapse following lignite coal bed burnings. Badly eroded clay-scoria slopes, buttes, and steep canyons are common throughout. Thickets of small trees and shrubs or woody draws of cottonwood and green ash naturally occur on north or east facing escarpments. Bare hills with scattered Rocky Mountain juniper and shortgrass prairie in the bottomland and on top of buttes occur throughout. A few small, unique stands of native coniferous forest are present, specifically in Billings, Golden Valley, Slope and Bowman counties. Perhaps the most unique of these is the ponderosa pines, making it a focus area. The lack of recent fire has allowed the expansion and overgrowth of juniper in some areas. Ephemeral or intermittent streams are common in steep valleys. Natural wetlands are rare but water impoundments are common. Cattle grazing is prevalent and the most common land use. Recreation and oil and gas activity are intensifying. The badlands are becoming extremely fragmented with the escalating number of roads required for industrial development. The USFS owns and manages about 1 million of acres as multiple-use in this landscape.

Predominant Natural Vegetation:

Grasses/Shrubs/Trees: cottonwood, green ash, Rocky Mountain juniper, Ponderosa pine, limber pine, bur oak, dwarf juniper, creeping juniper, spiny saltbrush, greasewood, prickly pear, rabbitbrush, silver sage, Western wheatgrass, blue grama, little bluestem, prairie sandreed, ricegrass, bluebunch wheatgrass, Indian ricegrass
Forbs: yucca, fern, winter fat (TRNP), golden eriogonum, large-flowered dock, butte primrose, standing milkvetch, penstemon, purple coneflower, long-headed coneflower

Associated Species of Conservation Priority:

Birds	Mammals	Reptiles/Amphibians
Swainson's Hawk Golden Eagle *Peregrine Falcon Prairie Falcon Sharp-tailed Grouse Burrowing Owl Loggerhead Shrike Lark Bunting Grasshopper Sparrow	Western Small-footed Myotis Long-eared Myotis Long-legged Myotis Black-tailed Prairie Dog *Black-footed Ferret *Swift Fox	Plains Spadefoot Short-horned Lizard Northern Sagebrush Lizard
		Plants
		Smooth Goosefoot Torrey's Cryptantha Stickseed Mountain Meadow Cinquefoil Blue Lips Nine-anthered Dalea Dakota Buckwheat Sand Lily Creeping Barberry Dwarf Mentzelia Limber Pine

Other Characteristic Wildlife:

Birds: turkey vulture, red-tailed hawk, sharp-shinned hawk, Cooper's hawk, Northern goshawk, American kestrel, merlin, ring-necked pheasant, wild turkey, great horned

owl, long-eared owl, boreal owl, Northern saw-whet owl, rock dove, mourning dove, common nighthawk, common poorwill, downy woodpecker, hairy woodpecker, Northern flicker, Clark's nutcracker, least flycatcher, say's phoebe, Western kingbird, Eastern kingbird, black-billed magpie, American crow, common raven, horned lark, tree swallow, Northern rough-winged swallow, cliff swallow, barn swallow, violet-green swallow, black-capped chickadee, red-breasted nuthatch, white-breasted nuthatch, brown creeper, house wren, rock wren, golden-crowned kinglet, ruby-crowned kinglet, mountain bluebird, American robin, gray catbird, brown thrasher, townsend's solitaire, gray-cheeked thrush, Bohemian waxwing, cedar waxwing, yellow warbler, yellow-rumped warbler (Audubon's), black-and-white warbler, American redstart, ovenbird, pine warbler, blackpoll warbler, common yellowthroat, yellow-breasted chat, spotted towhee, chipping sparrow, clay-colored sparrow, field sparrow, vesper sparrow, lark sparrow, lazuli bunting, pine grosbeak, red crossbill, white-winged crossbill, evening grosbeak, Western meadowlark

Mammals: desert cottontail, mountain cottontail, Northern myotis, least chipmunk, bushy-tailed woodrat, bighorn sheep, elk, mule deer, white-tailed deer, pronghorn

Reptiles and Amphibians: Woodhouse's toad, Great Plains toad, Northern leopard frog, common garter snake, plains garter snake, bullsnake, yellowbelly racer, prairie rattlesnake



Typical eroded clay-scoria buttes and Juniper trees of the Badlands.



Fire scorched Ponderosa Pines in Slope County.

Focus Area: Ponderosa Pine Forest

Area: 8,000 acres (3,270 ha)

Description and Condition: The actual ponderosa pines occupy approximately 2,000 acres on private, USFS, and state school land. This forest may be outliers from pines in the Black Hills of South Dakota. In the summer of 2004, a fire swept through the region burning several hundred acres of pines.

Key Species of Conservation Priority

Mammals: Possibly the bat species

Plants: mountain meadow cinquefoil, stickseed, smooth goosefoot

Upland Deciduous Forest

Area: 900,000 acres

Description and Overall Condition: This landscape component includes the larger tracts of native upland deciduous forest which occur scattered throughout the state. Representative upland deciduous forest constitutes approximately 2.2% of North Dakota. The larger tracts of forest have been identified as focus areas and include the Pembina Hills, Turtle Mountains, Devils Lake Mountains, and the Killdeer Mountains, although the term “mountain” is only relative to the rather level topography of North Dakota. Smaller, scattered tracts of deciduous forest occur on the Sheyenne River bluffs and north- and east-facing slopes of the badlands. These natural upland tracts of deciduous trees in North Dakota represent a unique community rare to the state. Most forested areas are under private ownership and are used primarily for cattle grazing. Over-harvest for wood products does not appear to be of concern but the possible lack of forest regeneration may be of concern. Clearing of trees for farming or other development has occurred.

Predominant Natural Vegetation:

Trees and Shrubs: bur oak, green ash, quaking aspen, balsam poplar, paper birch, American hazelnut, black currant, Missouri gooseberry, red raspberry, Saskatoon serviceberry, hawthorn, prickly rose, pin cherry, choke cherry

Forbs: false lily-of-the valley, early meadowrue, yellow avens, pink wood violet, wild sarsaparilla, dwarf cornel, pink wintergreen, arrowleaf aster

Associated Species of Conservation Priority:

Birds	Mammal	Reptiles/Amphibians
Golden Eagle	Arctic Shrew	Northern Redbelly Snake
Bald Eagle	Pygmy Shrew	
Swainson’s Hawk	Western Small-footed Myotis	Plants
Black-billed	Long-eared Myotis	Meadow Onion
Cuckoo	Long-legged Myotis	Moonwort
Red-headed Woodpecker		Leathery Grapefern
		Slender Lip Fern
		Slender-lobed Clematis
		Round-leaved Sundew
		Nodding Buckwheat
		Stiff Sandwort
		Swamp Willow
		Pod Grass
		Round-leaved Sphagnum
		Flat-leaved Bladderwort
		Small Yellow Lady’s-slipper

Other Characteristic Wildlife:

Birds: turkey vulture, sharp-shinned hawk, Cooper’s hawk, broad-winged hawk (Turtle Mountains), red-tailed hawk, American kestrel, merlin, ruffed grouse, wild turkey, mourning dove, great horned owl, Eastern screech owl, long-eared owl, common nighthawk, ruby-throated hummingbird, yellow-bellied sapsucker, downy woodpecker, hairy woodpecker, yellow-shafted flicker, Western wood pewee, Eastern wood-pewee, yellow-bellied flycatcher, willow flycatcher, least flycatcher, great crested flycatcher, purple martin, tree swallow, blue jay, black-billed magpie, common crow, black-capped chickadee, white-breasted nuthatch, brown creeper, house wren, golden-crowned kinglet, ruby-crowned kinglet, Eastern bluebird, veery, wood thrush, American robin, gray catbird, brown thrasher, cedar waxwing, yellow-throated vireo, warbling vireo, Philadelphia vireo, red-eyed vireo, yellow warbler, chestnut-sided warbler, yellow-

rumped warbler, American redstart, black-and-white warbler, ovenbird, Northern waterthrush, mourning warbler, common yellowthroat, migratory warblers, scarlet tanager, rose-breasted grosbeak, black-headed grosbeak, lazuli bunting, indigo bunting, spotted towhee, Eastern towhee, chipping sparrow, lark sparrow, clay-colored sparrow, song sparrow, common grackle, brown-headed cowbird, orchard oriole, Bullock's oriole, Baltimore oriole, pine siskin, American goldfinch, evening grosbeak

Mammals: little brown bat, silver-haired bat, big brown bat, Eastern red bat, hoary bat, Eastern cottontail, woodchuck, Eastern chipmunk, gray squirrel, fox squirrel, Northern flying squirrel, beaver, white-footed mouse, southern red-backed vole, meadow vole, meadow jumping mouse, Western jumping mouse, porcupine, coyote, red fox, gray fox, raccoon, American marten, ermine, long-tailed weasel, least weasel, bobcat, elk, mule deer, white-tailed deer

Reptiles and Amphibians: American toad, gray tree frog, wood frog, common garter snake, plains garter snake

Plants: twinflower, stiff sandwort, sweet coltsfoot, swamp willow, round-leaved sphagnum

Focus Area: Pembina Hills

Area: 168,000 acres (68,000 ha)

Description and Condition: The Pembina Hills is a rather small piece of steep, dissected escarpment on the edge of the Drift Prairie and bordering the Red River Valley and Canada. Bur oak, quaking aspen, green ash, cottonwood, and American elm are the dominant deciduous forest components. The steep slopes maintain the natural woodland community, but cattle grazing occurs. Flatter areas have been cleared for cropland of small grains, sunflowers, and flax.

Key Species of Conservation Priority

Birds: black-billed cuckoo

Reptiles and Amphibians: Northern redbelly snake

Plants: moonwort, oakfern, naked mitrewort, leathery grapefern, small yellow lady's-slipper orchid, wood horsetail, leatherwood, stiff sandwort, sweet coltsfoot

Deciduous trees and forest understory.



Focus Area: Turtle Mountains

Area: 262,000 acres (106,000 ha)

Description and Condition: Set in the northern Drift Prairie, the rolling topography and extra 10 inches of precipitation per year supports deciduous forest cover of bur oak, aspen, green ash, paper birch, boxelder, sumac, serviceberry, and snowberry. The Turtle Mountains rise 600 to 800 feet above the surrounding prairie/wetland landscape. The soil is rather erodible and poorly suited for farming, although some occurs. Native woodland clearings have made way for pastureland. Hundreds of large, deep ponds and lakes are present throughout.

Key Species of Conservation Priority

Birds: horned grebe, possibly bald eagle

Reptiles and Amphibians: Northern redbelly snake



Woodland-bordered wetland of the Turtle Mountains

Plants: moonwort, foxtail sedge, green keeled cottongrass, naked mitrewort, Chamisson's cottongrass, small yellow lady's-slipper orchid, large yellow lady's-slipper, bog bedstraw, buckbean, bog willow, flat-leaved bladderwort, lesser panicled sedge, Back's sedge, blue cohosh, spiny sedge, round-leaved sundew, swamp willow, scheuchzeria, round-leaved sphagnum

Focus Area: Devils Lake Mountains

Area: 3,500 acres

Description and Condition: The deciduous forest bordering Devils Lake is similar to that of the Pembina Hills. Much of the natural forest along the shorelines of the lake has largely been inundated by recent rising water levels. Bald eagles now nest in the large, dead flooded trees.

Key Species of Conservation Priority

Birds: bald eagle

Reptiles and Amphibians: Northern redbelly snake

Plants: sticky false-asphodel, showy lady's-slipper



Focus Area: Killdeer Mountains

Area: 15,000 acres (6,000 ha)

Description and Condition: Slightly set aside from the main stem of the badlands, the Killdeer Mountains rise 700-1,000 feet above the surrounding prairie landscape. The highest elevation is 3,314 feet, or about 200 feet lower than the highest point in the state, White Butte. Bur oak, quaking aspen, green ash, paper birch, Western black birch and American elm are the dominant deciduous vegetation. Grazing occurs on private land.

Key Species of Conservation Priority

Birds: golden eagle

Plants: small yellow lady's-slipper orchid, stickseed, nodding buckwheat, blue lips, smooth cliffbrake, bent-flowered milkvetch, slender lip fern, slender-lobed clematis, cushion fleabane



Section 6

Monitoring

Introduction

The primary function of monitoring is to acquire information for the purpose of assessing and directing management activities. Monitoring is an essential part of any management program and is just one step in the process of planning and implementing management strategies.

Monitoring has changed in many ways over the years. Concern has shifted from protecting single species to the protection of biological diversity, entire ecosystems, and landscapes. We understand the importance of natural processes such as fire, floods, and herbivory regimes in the structure and functioning of ecosystems. We also recognize the need for management that restores or mimics natural processes in wildland ecosystems.

Current perception of the natural world views populations and communities as variable and dynamic over space and time which are interconnected with disturbances operating at many levels. To understand these dynamics and preserve this diversity, we must understand the history of species and plant communities and the disturbances and processes that influence their distribution, abundance, and dynamics.

Developing, coordinating, and implementing a statewide monitoring program for these species of concern on a statewide level will be a challenge. Some data has been collected by several different agencies and contractors on a varying level. Researching and acquiring this previously collected data and housing it in one central location should be a priority of the state. The framework to house this information is already established within the ND Parks and Recreation Departments Natural Heritage Inventory Program. The real challenge is obtaining past, present, and future survey information collected by state and federal agencies, local, private, universities, etc. When information from these surveys is pooled together, a better picture of each species range, habitat, presence, populations, etc. will be better understood. Working together with all agencies and others with viable data is the clear objective when developing a monitoring program.

Ecological Monitoring

Ecological monitoring is the acquisition of information to assess the status and trend in status of the structure and functioning of biological populations and communities, and their habitat, and larger-scale ecosystems (i.e. landscapes) over time, for the purpose of assessing and directing management activities.

Common traits

Monitoring includes three common traits 1) Monitoring actions are repeated over time, 2) Monitoring results are interpreted by comparison to some standard or objective, and 3) Results from monitoring seldom lead to only one possible explanation. The most challenging and important of these traits is developing a standard or goal. Our ability to interpret and utilize monitoring data is dependent upon the validity of a standard or goal to which monitoring results are compared.

Role of monitoring

Monitoring is used to obtain information about the welfare of the element which we have stewardship responsibility. Monitoring is the means by which we determine how well we are doing our job of protecting natural resources and preserving natural diversity. The role of monitoring is twofold:

- a. Monitoring adds to the biological information about populations, communities, ecosystems, and disturbance regimes, enhancing our knowledge and thus ability to manage.
- b. Monitoring provides information by which management activities may be evaluated (i.e. are we meeting our goals) and reported to others.

The North Dakota Natural Heritage Program (NDNHP)

The NDNHP serves as the state's primary repository for rare and unique species and habitat information. The ability for the program to network with other agencies, collect their data, and enter this data into the GIS based database is greatly influenced by available funding, department goals and staff commitments. Rare plant survey data has been provided by other agencies and contractors alike. A full-time position committed to this work would greatly enhance the programs ability to address conservation issues related to rare species in North Dakota.

The NDNHI field survey requirements include:

1. Reasonable geographic coverage must be covered by a formal field search.
2. Survey suitable plant habitat when potential species are most viable.
3. Survey suitable rare species habitat twice during the growing season.
4. Revisit sites where plant species of concerns have been previously recorded **every four years.**
5. Complete ND ecological community field survey form when prospective sites are visited or searched for rare species.
6. Complete ND rare species field survey form, take a photo of rare species and its habitat, GPS rare species location, and map rare species location on a topo/quad map and/or aerial photo when rare species are found.
7. Voucher specimens may only be collected with a valid NDPRD collection permit.

Monitoring Conservation Actions

Conserving North Dakota's species of concern is the ultimate goal of the program. The ability to gauge the success for each species begins with monitoring and ends with favorable management that can be measured. Five questions we begin with include:

1. How are ND species of concern doing?
2. What are the challenges facing these species and what conservation role do we play?
3. What conservations measures must be taken and at what capacity?
4. Where does the support come from to support conservation work?
5. Are the implemented management actions reaching our goals?

Monitoring Guidelines

This direction applies directly to all state parks and department employed staff. Questions regarding these guidelines should be directed to the ND Parks and Recreation Department's Natural Resource Program staff.

1. Conduct all necessary pre-field tasks as outlined in Natural Heritage Survey Methods.
2. Contact all landowners/land managers for permission to survey on their property.
3. Hire qualified botanists
4. Conduct survey at the proper time of year when species are evident and identifiable. Usually when plants are flowering or fruiting.
5. Follow Natural Heritage Methodology for plant species of concern surveys.
6. Complete and submit forms, reports, and maps in a timely fashion.
7. Revisit previously recorded locations on Dept. owned/managed property every 4 years.
8. Revisit high priority elements as time and money allows.
9. Follow Natural Heritage Methodology for plant species of concern monitoring.
10. Complete and submit forms and maps in a timely fashion.
11. Final reports must be completed as outlined in methods section.
12. Completed rare species field forms, maps, and field notes should be sent to NDPRD, ATTN: Natural Resource Program Coordinator.
13. Voucher specimens should be properly labeled and mounted and sent to the NDPRD, ATTN: Natural Resource Program Coordinator.

Monitoring Methods

Pre-field Analysis

- A. Develop a listing of potential plant species of concern within the project area.
- B. Obtain existing plant species of concern information such as the ND plant species of concern list, plant species of concern occurrence records, files, assorted (biological, ecological and phenological) habitat requirements and identifying characteristics. Utilize the ND Ecological Community Classification to determine plant species of concern species habitat requirements and identifying characteristics
- C. Develop a calendar of potential rare species blooming times (updated as necessary).
- D. Map or identify suitable rare species habitat within the survey area.
- E. Contact the landowner/manager to gain permission to survey on the property in question.

Field Survey Analysis

Two types of plant species of concern surveys are conducted by the NDNHI: target surveys and floristic surveys. The type of survey completed depends on the goals of the project.

Target Surveys: These surveys focus on a single species. All or a representative portion of a species specific habitat is surveyed. Target surveys may combine studies of known sites, searches for historical collections, and inventories of un-surveyed habitat. The approach is often used to determine the rarity status of a species.

Floristic Surveys: These surveys examine a specific area for plant species of concern species. Within the area of interest, habitat with high potential for plant species of concerns can be identified and targeted. A species list is usually completed. This approach is frequently used in a project-level analysis.

A. Level of survey (Reconnaissance, population or demographic)

Three levels of surveys are conducted by the NDNHI: reconnaissance, population, and demographic.

Reconnaissance Surveys: These surveys focus on a single previously recorded element occurrence.

Population Surveys: These surveys focus on population numbers.

Demographic Surveys: These surveys focus on the vital statistics of populations (mortality rates, reproductive rates, etc).

B. There are two formal field search methods, which are commonly used: the random meander and transect method.

1. Random Meander: In this approach the investigator reviews the project site and focuses on areas, which appear to contain potential plant species of concern habitat based on research, field experience, and knowledge of the species of interest. This method may result in lack of coverage of the entire project area.

2. Transects: This survey utilizes regularly spaced traverse routes to survey the entire project area. Transects serve as guides only and are not necessarily perfectly straight. This level of survey may be unnecessary for large portions of a project area.

C. Different intensity levels may be appropriate for a plant species of concern survey, dependent on the project goals and likelihood of plant species of concern within the project area. A number of factors dictate when a more intensive survey is necessary. The surveyor should consider whether the area is or will be disturbed by a development, whether a plant community is known to support plant species of concern, vegetation density and plant species of concern visibility. The NDNHI utilizes five different survey intensity levels:

Field Check: The area is given a quick survey, but the entire area is not walked through.

General: The surveyor walks one or more times through the project area and around the perimeter of the area. Most of the project area is examined.

Limited Focus: Inventory focuses only on habitat-specific locations, which are judged to have higher potential for plant species of concern species.

Intuitive Controlled: A complete survey is conducted on specific habitat areas within the project along with traversing through the area and its perimeter.

Complete: A complete survey includes walking throughout the area in a systematic manner in order to examine all of the project area.

Documenting and Reporting

- A. All documentation of rare species occurrences should be recorded on Natural Heritage Inventory Forms and maps (rare species field survey forms and ecological community field survey forms).
- B. The final report should minimally include: a description of the project, a description of the survey and field methods, the survey results and related discussion, and all field forms and maps.
- C. Documents should be sent to the North Dakota Parks and Recreation Department, ATTN: Natural Resource Program Coordinator.

Surveyor Qualifications

- A. Experience as a botanical field investigator
- B. The taxonomic experience to identify, in the field, most plant species.
- C. Knowledge of plant ecology.
- D. A knowledge of the local flora and potential rare species in the habitats surveyed.

Plants

One hundred species are represented on North Dakota's Species of Concern list. For many of these species, very little or no monitoring data has been collected. These species generally have small/isolated populations, little suitable habitat, and increased vulnerability to climate change. Each plants S rank was recently updated. The rarity of these species in North Dakota is based on what is known from prior surveys, habitat availability in North Dakota as well as other factors. A monitoring system for these species will produce the much needed distribution data throughout the state. This will greatly aid in the overall conservation of each species.

Threatened and Endangered Species

The only plant listed as a threatened species in North Dakota is the Western Prairie Fringed Orchid (*Plantanthera praeclara*). There are no endangered plants known to occur in North Dakota.

- The US Forest Service, US Fish and Wildlife Service, Universities, ND Parks and Recreation Department, volunteers, professional contractors, and private landowners have been involved in population surveys in the Sheyenne National Grasslands since the 1980's. Researchers have been involved in studies involving pollination, artificial propagation, and population monitoring; to name a few.

Existing Surveys

Rare plant survey data is widely scattered across the state and housed with several state and federal agencies and universities. Collecting this data and housing it within a central database, much like the ND Natural Heritage Programs' Biotics Database, will help fill the gaps for those species.

Partnerships need to be created and data should be shared among all entities in order to move to a comprehensive understanding of these species in North Dakota.

Recommended monitoring actions include:

- Prioritize monitoring needs for the 100 Plant Species of Conservation Priority and share those with agencies, scientific and academic communities.
- Establish new monitoring projects through partnerships.
- Encourage the use of a central database.
- Secure funding which support those conducting research and provide results to appropriate land managers.
- Devise a monitoring schedule for each species at the appropriate and cost effective intervals based on management goals.
- Use consistent methodology when conducting plant surveys.
- Share this data with land managers and follow up with appropriate management recommendations.

Field Inventory Gaps

Past data collection and knowledge of plant locations varies widely for North Dakota's 100 species of priority. Plants like the western prairie fringed orchid have drawn a lot of attention and have been surveyed for annually while other plants have little or no field data. Other plant data comes from targeted field surveys occurring on small geographic regions in our state. Overall, our state has large field inventory gaps across all major eco-regions and focus areas.

Field inventory gaps apply to all species of concern across North Dakota. Plant surveys to bridge some inventory gaps would be surveys that:

- Focus on rare species that lack or have limited survey information.
- Focus on those eco-regions and focus areas with limited survey data.
- Are located in a threatened or rare habitat type.
- Provide access across both public and private lands.
- Are feasible with limited staff and resources.

The focus areas containing rare plants are found within larger landscapes. The understanding of the dynamics of these smaller areas interconnected to the larger eco-regions will help us understand and manage our state rare species of concern and habitats supporting them.

Potential Inventory Sites

Inventories will be targeted across all major landscapes in North Dakota. The high priority landscapes will be based on focus areas containing or potentially containing rare plants, number of state listed plants contained within them, past inventories, and the combined threats associated with each eco-region and habitat type. Major landscapes containing the majority of the documented rare species in North Dakota include:

- Tall grass prairie
- Rivers and streams
- Upland deciduous forests
- Eastern mixed-grass prairie
- Badlands

Potential future inventory sites would include more surveys within the Badlands in North Dakota. Targeted surveys in the badlands have been completed for select rare plants. This area is vast with only a small percentage of the total landscape surveyed. This region faces new threats from oil and gas exploration and increased developments and disturbances. Surveys that describe rare habitats and their plant associations should be ongoing in this region.

Monitoring Sites

Our heritage program continues to perform rare species monitoring. The majority of this monitoring takes place on ND Parks and Recreation owned or managed lands and Forest Service Lands. The most intensive monitoring system in place occurs for the Western Prairie Fringed Orchid. Our program has been surveying for this plant since the early 1980's and has an extensive database dedicated to North Dakota's only threatened plant species of concern.

Monitoring the rarest and most vulnerable plants will be a priority of the program as more survey work is completed in the above mentioned eco-regions and focus areas. As more knowledge is gained about rare plants, our program has intentions to define the role of monitoring on the landscape and how it relates to the habitats supporting these species.

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