Climate Change Vulnerability Assessment of Tier 1 Species

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Natural Legacy Conference

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NEBRASKA GAME PARKS

NEBRASKA Natural Heritage Program

Goals of the Assessment

Identify relative vulnerability of species

Identify vulnerable species assemblages

Understand causative factors

Inform adaptation strategies

Prioritize conservation actions

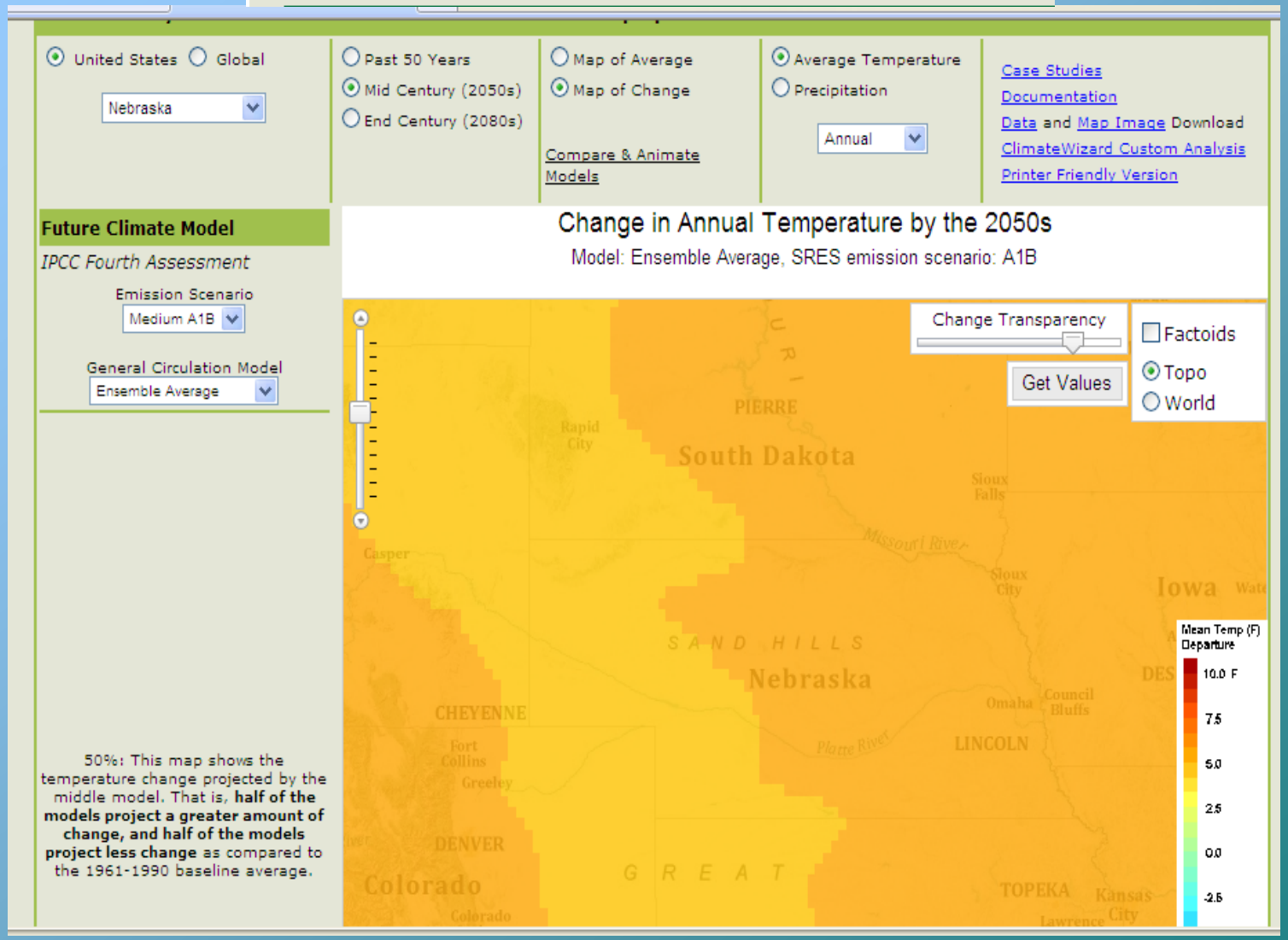
NatureServe

Climate Change Vulnerability Index

- Exposure
- Indirect Exposure
- Sensitivity

The Nature Conservancy
Protecting nature. Preserving life.™

ClimateWizard



NatureServe

Climate Change Vulnerability Index

Indirect exposure

- Sea level rise
- Barriers to movement
- Land use change due to human response to climate change

NatureServe

Climate Change Vulnerability Index

Sensitivity

- Dispersal ability
- Sensitivity to temp and moisture changes
- Dependence on specific disturbance regime
- Dependence on ice or snow habitats

NatureServe

Climate Change Vulnerability Index

Sensitivity

- Reliance on interspecific interactions
- Restriction to uncommon geologic features
- Genetic factors
- Phenological response to changing seasonal temperature and precipitation

CCVI Results Table

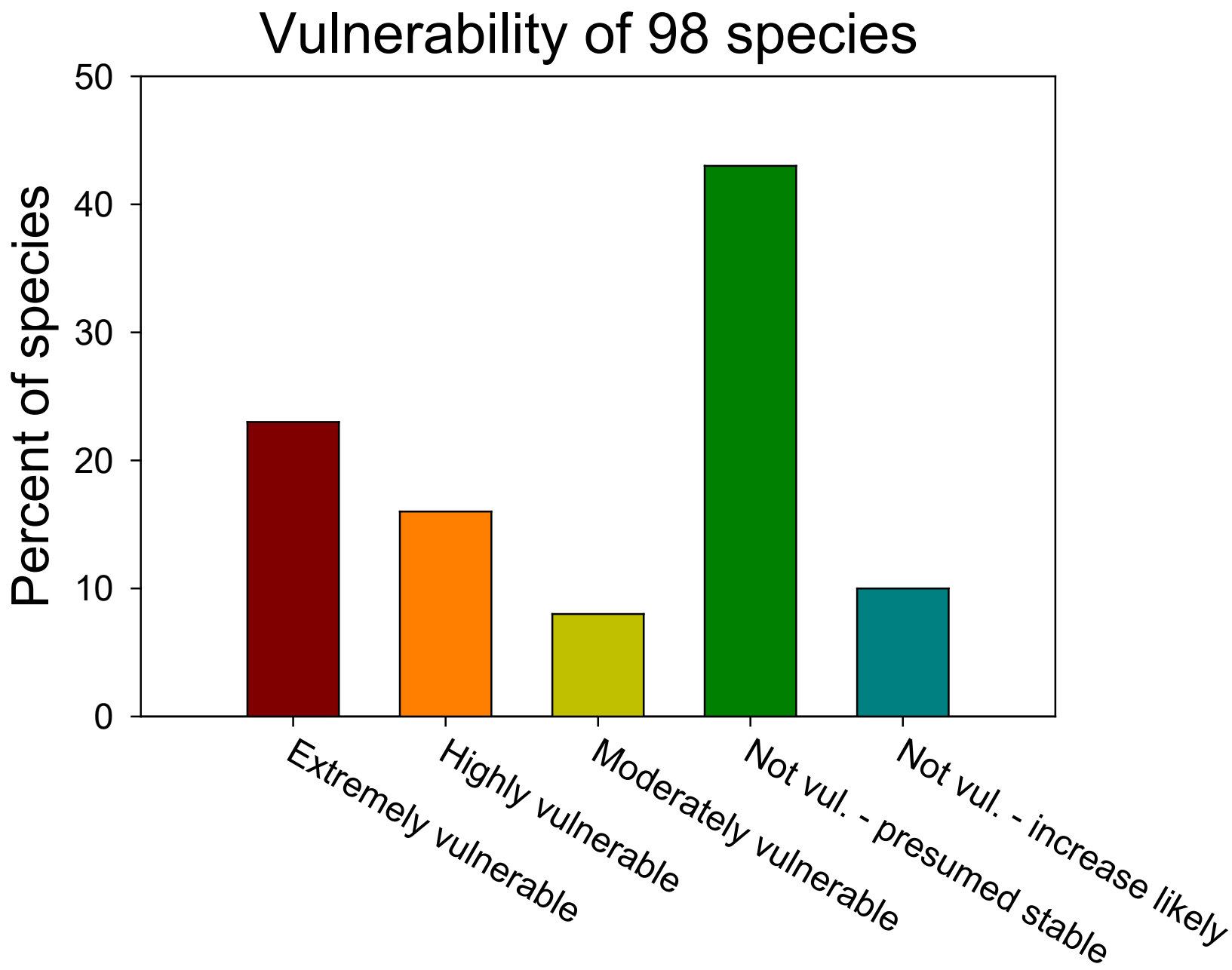
Nebraska Natural Legacy Project (SWAP) Tier 1 at-risk species

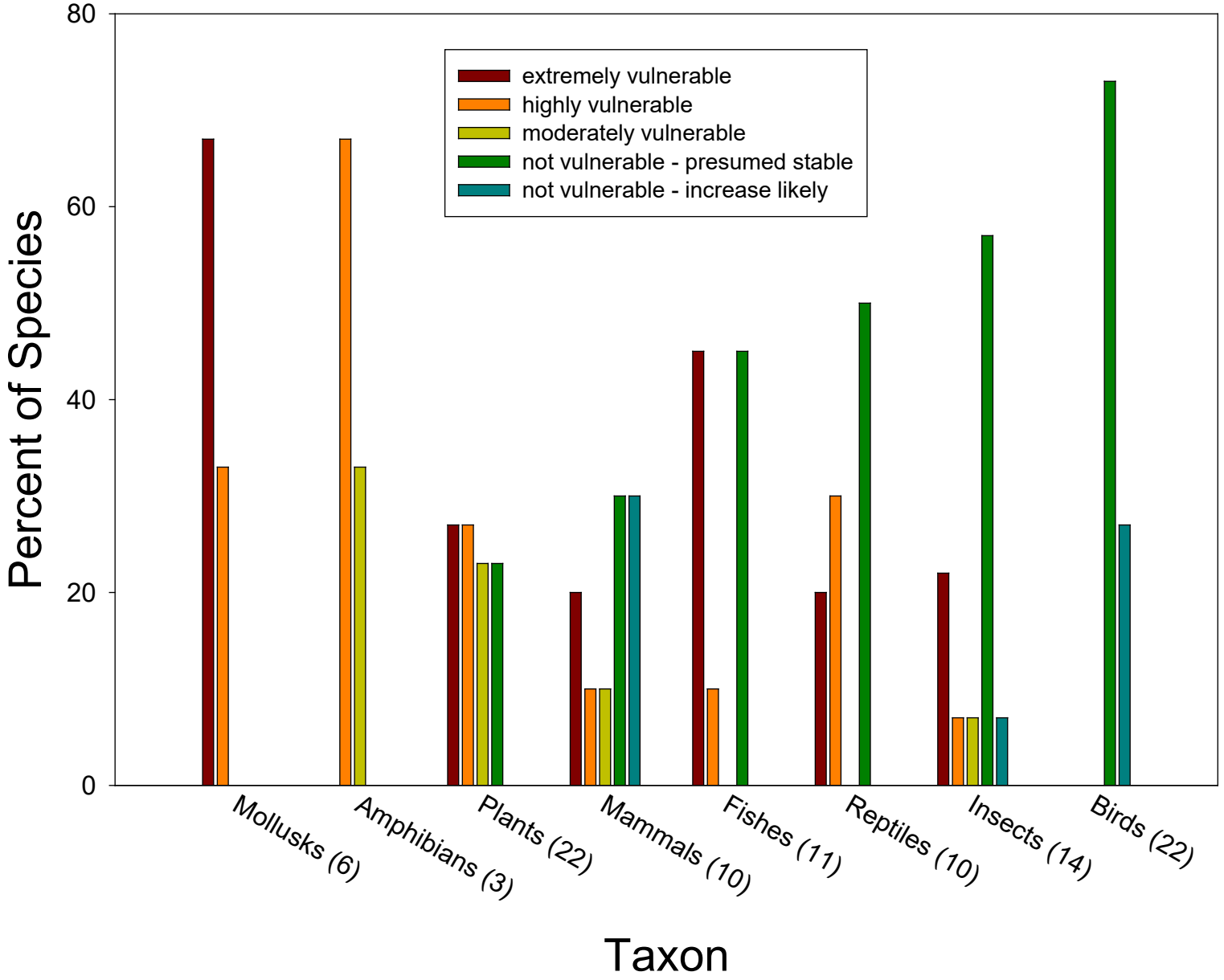
Nebraska Natural Heritage Progra
Nebraska Game and Parks Commi
March, 2011

GI = Greatly Increase
Inc = Increase
SI = Somewhat Increase
N = Neutral
SD = Somewhat Decrease
Dec = Decrease

	Taxonomic Group	English Name	B1 Sea level	B2a Natl barriers	B2b Anth barriers	B3 CC mitigation	C1 Dispersal/Movement	C2ai historical thermal niche	C2aii physiological thermal niche	C2bi historical hydrological niche	C2bii physiological hydrological niche	C2c Disturbance	C2d Ice/snow	C3 Phys habitat	C4a Other spp for hab	C4b Diet	C4c Pollinators	C4d Other spp disp	C4e Other spp interaction	C5a Genetic var	C5b Gen bottleneck	C6 Phenol response
26	Bird	Long-Billed Curl	N	N	N	Inc	Dec	SD	N	Inc	N	N	N	SD	N	N	N/A	N	N	U	N	U
27	Bird	Brewer's Sparro	N	N	N	Inc	Dec	SD	N	Inc	N	N	N	SD	SI	SD	N/A	N	N	U	N	U
28	Bird	Interior Least Te	N	N	N	SI	Dec	SD	N	SI	SI-SD	SI-SD	N	SD	N	N	N/A	N	N	SI	N/A	U
29	Bird	Buff-breasted Sa	N	N	N	Inc	Dec	SD	N	Inc	SI-SD	N	N	SD	N	N	N/A	N	N	U	N	U
30	Bird	Greater-Prairie (	N	N	Inc	Inc	Dec	SD	N	SI	N	N	N	SD	N	SD	N/A	N	N	U	N	U
31	Bird	Bell's Vireo	N	N	N	SI	Dec	SD	N	N	N	N	N	SD	N	SD	N/A	N	N	U	N	U
32	Fish	Lake Sturgeon	N	N	GI	N	Dec	SD	N	SI	N	SD	N	N	N	N	N/A	N	N	U	N	U
33	Fish	Blue Sucker	N	N	GI	N	Dec	SD	N	SI	N	SD	N	N	N	N	N/A	N	N	U	N	U
34	Fish	Plains Topminn	N	Inc	Inc	SI	SI	SD	SI	SI	N	SD	N	N	N	N	N/A	N	N	SI	N/A	U
35	Fish	Sturgeon Chub	N	N	GI	N	SD	SD	N	Inc	N	SD	N	N	N	N	N/A	N	N	U	N	U
36	Fish	Sicklefin Chub	N	N	GI	N	SD	SD	N	Inc	N	SD	N	N	N	N	N/A	N	N	U	N	U
37	Fish	Pearl Dace	N	GI	N	N	SI	SD	Inc	Inc	N	SD	N	N	N	N	N/A	N	N	U	N	U
38	Fish	Blacknose Shin	N	GI	N	N	SI	SD	GI	Inc	N	N	N	N	N	N	N/A	N	N	U	SI	U
39	Fish	Topeka Shiner	N	SI	GI	SI	SI	SD	Inc	Inc	N	SD	N	N	N	N	N/A	N	N	U	Inc	U
40	Fish	Northern Redbel	N	GI	N	N	SI	SD	Inc	Inc	N	N	N	N	SI	N	N/A	N	N	U	N	U
41	Fish	Finescale Dace	N	GI	N	N	SI	SD	GI	Inc	N	N	N	N	SI	N	N/A	N	N	U	N	U
42	Fish	Pallid Sturgeon	N	N	GI	N	Dec	SD	N	SI	N	SD	N	N	N	N	N/A	N	N	Inc	N/A	U

Sheet1 Sheet2 Sheet3


Vulnerability of 98 species
Percent of species
50
40
30
20
10
0
Extremely vulnerable
Highly vulnerable
Moderately vulnerable
Not vul. - presumed stable
Not vul. - increase likely


80
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Percent of Species
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Mollusks (6)
Amphibians (3)
Plants (22)
Mammals (10)
Fishes (11)
Reptiles (10)
Insects (14)
Birds (22)
Taxon

Mollusks (6)

2/3 extremely vulnerable 1/3 highly vulnerable

<u>Factors affecting vulnerability</u>

- Anthropogenic barriers to movement - dams
- Changes in hydrology

  ↑ frequency and intensity of flooding

Amphibians (3) All vulnerable

HV: American Toad, GP Narrowmouth Toad
MV: Smallmouth Salamander

Factors affecting vulnerability

- Anthropogenic barriers to movement
- Changes in hydrology

Plants (22) ¾ vulnerable

EV: Saltwort, Ute ladies'-tresses, Snow trillium, Short's milkvetch, Missouri sedge

HV: Blowout Penstemon, CO butterfly Plant, Hall's bulrush, Matted prickly phlox

Factors affecting vulnerability

- Barriers to movement
- Limited habitat
- Changes in hydrology

Mammals (10)

2/3 Not vulnerable

EV: Cheyenne & Pierre N. pocket gopher
HV: S. flying squirrel
MV: Fringed-tailed myotis

Factors affecting vulnerability

- Barriers to movement
- Limited habitat
- CC mitigation – wind energy

Fishes (11) ½ extremely vulnerable

EV: Blacknose & Topeka shiner, Finescale & N. redbelly dace, Plains topminnow

NV: Lake & Pallid sturgeon, sicklefin & sturgeon chub, Blue sucker

Factors affecting vulnerability

- Barriers to movement
- Changes in water temperature

Reptiles (10) ½ vulnerable

EV/HV: Massasauga, Sagebrush lizard, Redbelly snake, Mt. short-horned lizard

NV: Blanding's turtle, Timber rattlesnake, Glossy snake, Copperhead

Factors affecting vulnerability

- Barriers to movement
- Limited physical habitat
- CC mitigation - biofuels

Insects (14) 2/3 Not vulnerable

EV: Salt Cr. tiger beetle, Platte R. caddisfly, Bucholz black dash

HV: American burying beetle

Factors affecting vulnerability

- Changes in hydrology
- Limited habitat

Birds (22)

None vulnerable to CC – in Nebraska

Changes

- Increase in temperature
- Changes in precipitation patterns
- Lengthening of the growing season
- Increase in extreme events: storms, floods, drought
- Increase in wildfires

Effects on Species and Ecosystem

- Changes in species' distribution ranges
- Changes in species' phenology
- Un-coupling of relationships: predator-prey, herbivore-plant, mutualisms, etc.
- Increase in invasives, pests, pathogens
- Loss of habitat
- Increased physiological stress
- Changes in community composition

Adaptation Strategies

Reduce Impacts of Non-Climate Stressors

Restore and Maintain Ecosystem Functions

Expand Network of Conservation Lands

Restore and Maintain Landscape Connectivity

Questions/Comments?