

Indiana Dunes Climate Change Adaptation Plan



Funded by the Indiana Department of Natural Resources Lake Michigan Coastal Program and National Oceanic and Atmospheric Administration



Indiana Dunes Project Background



Cathy Martin
Program Manager

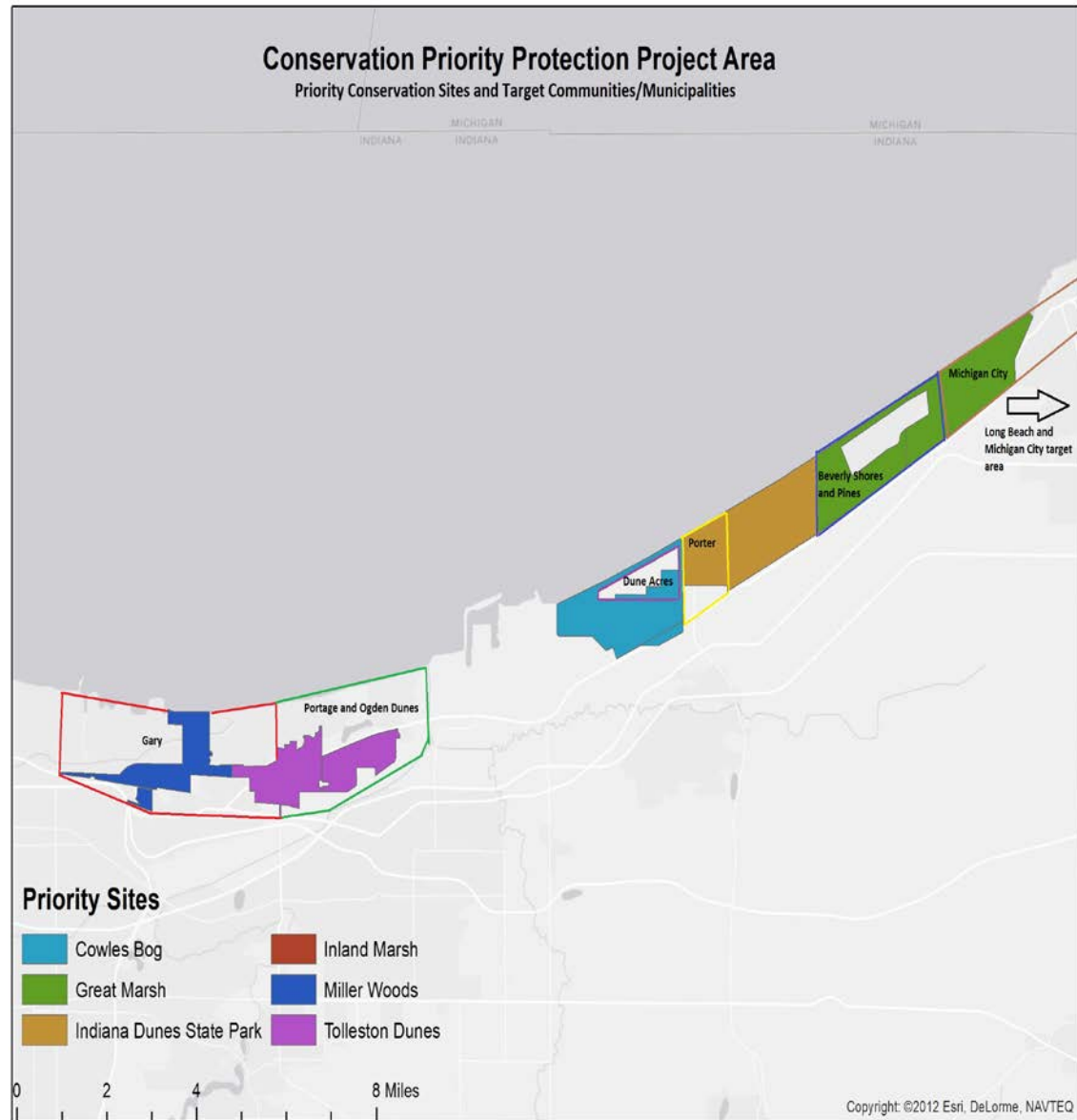


Indiana Dunes Strategic Framework



Indiana Dunes Ecosystem Alliance

- Partners:
 - Save the Dunes
 - National Park Service
 - Indiana Department of Natural Resources
 - United States Geological Survey
 - The Nature Conservancy
 - Shirley Heinze Land Trust
 - National Parks Conservation Association



Conservation Targets

Dune & Swale Complex

- Fordune
- Interdunal wetlands
- Forested ridges & swales
- Lagoons

Savanna Complex

- Oak savanna/openings
- Woodland, forested dune

Prairie Complex

- Mesic prairie
- Wet-mesic prairie

Wetland Complex

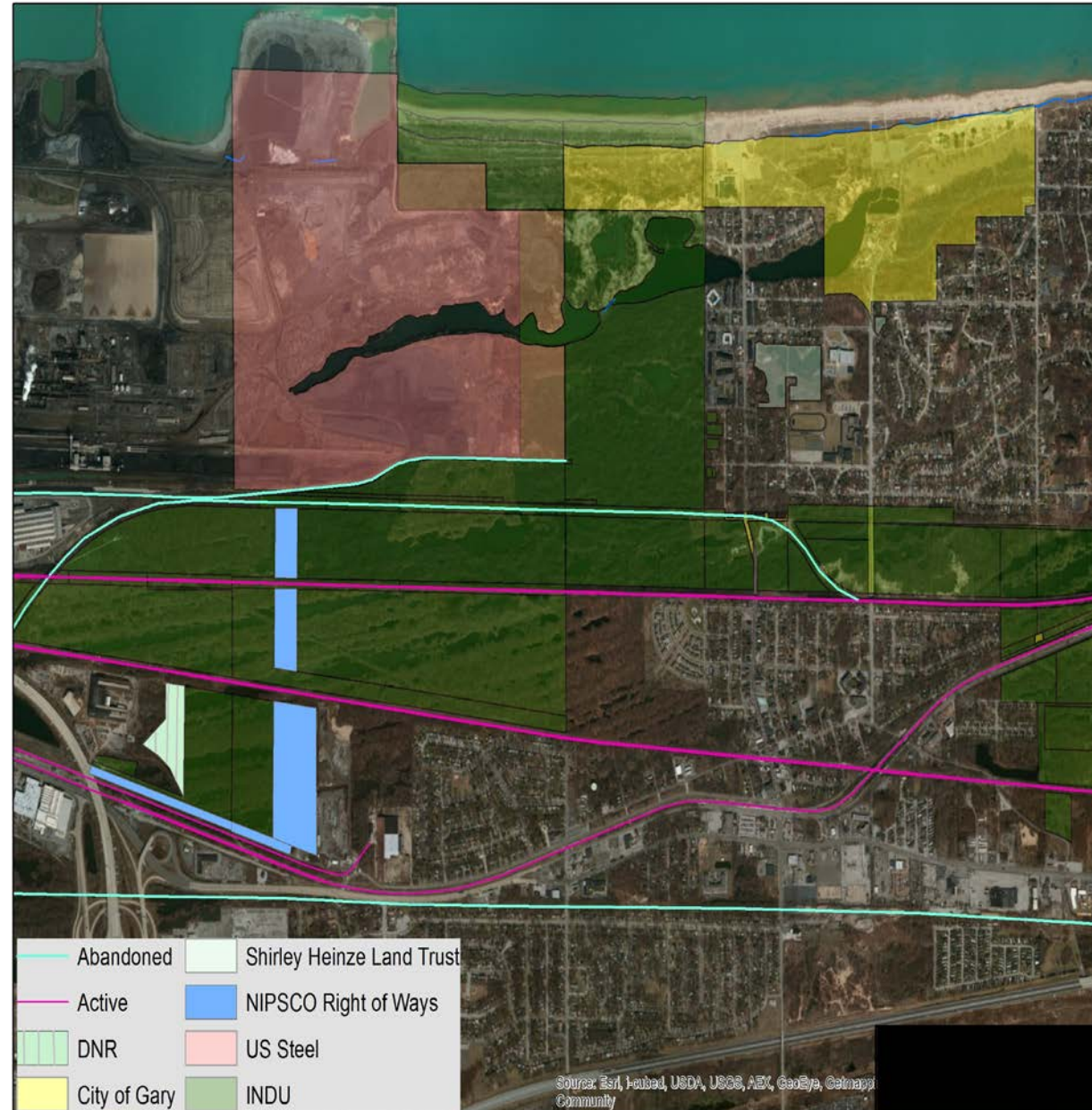
- Bog
- Marsh
- Fen
- Shrub swamp
- Sedge meadow

Forest Complex

- Floodplain forest
- Mesic forest

Threats

- Invasive species
- Fragmentation
- Development
- Disturbances
- Limited resources for management, protection
- Climate change



Objectives



- **Minimize impacts of fragmentation and maximize available resources by enhancing cooperative management in priority sites**
- Influence key stakeholders including industry, legislative officials, municipalities, and adjacent landowners in land-use, planning, and development practices in an effort to limit disturbance to high quality habitats of priority sites
- Complete and buffer three priority sites- Miller Woods, Tolleston Dunes and Great Marsh- through the acquisition of priority properties

Indiana Dunes Climate Change Adaptation



Dr. Katherine Moore Powell
Climate Change Ecologist, The Field Museum

The **Field**
Museum

Advisory Committee and Climate Science Working Group

Save the Dunes

The Field
Museum

DNR
Indiana Department of
Natural Resources



PURDUE
UNIVERSITY



The Nature
Conservancy 

Shirley
Heinze
LAND
TRUST

 **USGS**
science for a changing world

INDIANA
LAKE MICHIGAN
COASTAL PROGRAM

**INDIANA DUNES
STATE PARK**



Dune Acres, Indiana



CHICAGO BOTANIC GARDEN

Sea Grant
ILLINOIS-INDIANA

 **GLERL**

 **EPA** United States
Environmental Protection
Agency



LOYOLA
UNIVERSITY CHICAGO

VALPARAISO  **UNIVERSITY**

PURDUE
UNIVERSITY
NORTHWEST

IGS | INDIANA GEOLOGICAL
& WATER SURVEY
INDIANA UNIVERSITY

I
ILLINOIS

 **UNIVERSITY OF
NOTRE DAME**

UIC

Adaptation Planning Steps

Climate Stressors



Vulnerabilities



Adaptation Strategies

Science



Action

Adaptation Planning Workshops

Workshop I
Climate Stressors



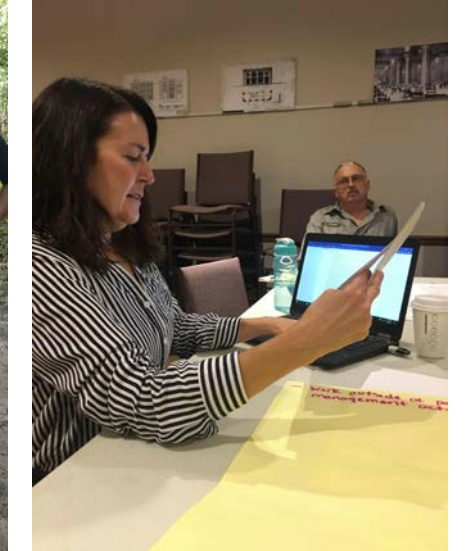
Workshop II
Vulnerabilities



Workshop III
Adaptation Strategies



Visits and Field Work



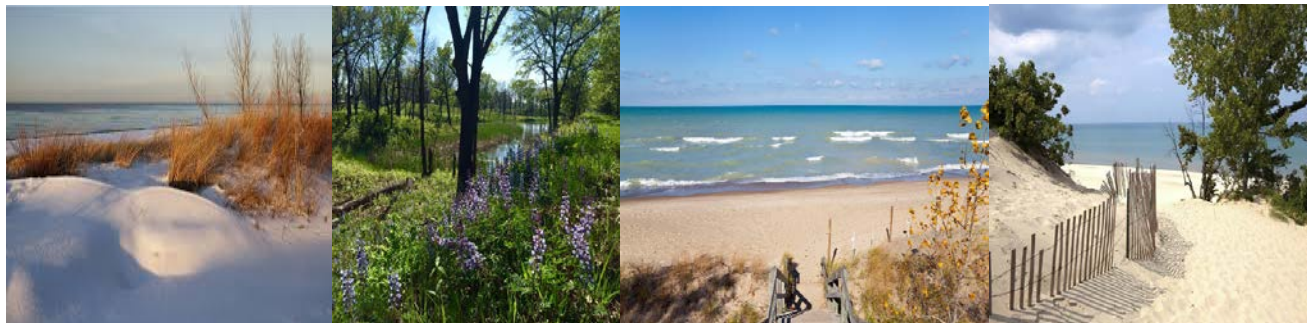
Adaptation Planning Webinars

Lake Michigan Ice and Snow



Dr. Drew Gronewold

Draft Adaptation Plan Overview



Dr. Katherine Moore Powell



Adaptation Planning Website

Save the Dunes

Email

The official page of

THE INDIANA DUNES CLIMATE CHANGE ADAPTATION PLAN

The Field
Museum

Email

[DRAFT Adaptation Plan](#)

*SPECIAL WEBINAR (September 14, 2017):
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Planning Phase Workshops:

Workshop I

Held on April 27, 2017 at the

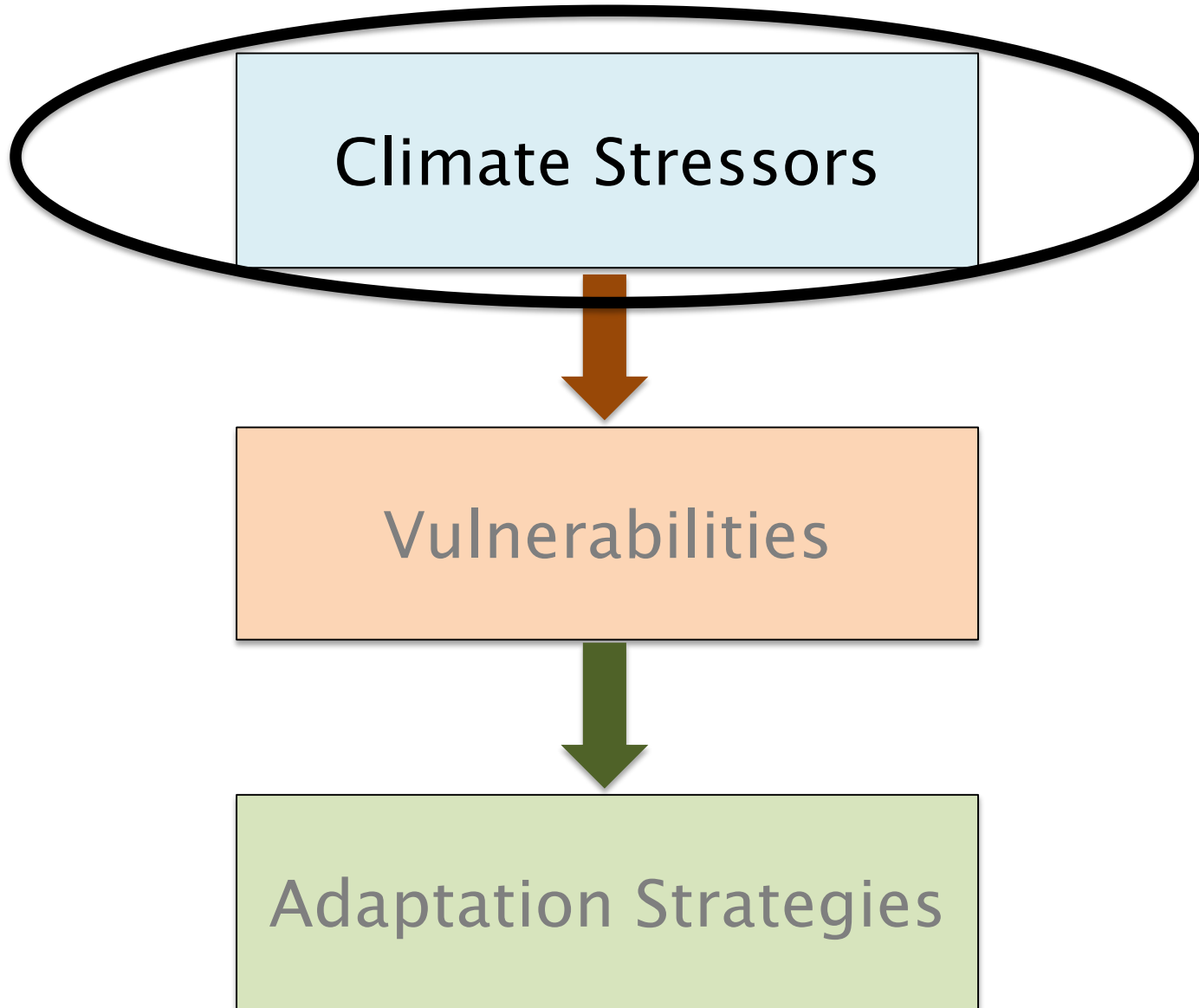
Workshop II

Held on June 8, 2017 at the

Workshop III

Held on September 20, 2017

Adaptation Planning Steps



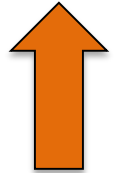
Already Happening...



Earlier Springs



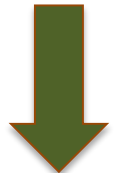
Getting Warmer: 0.5° F per century



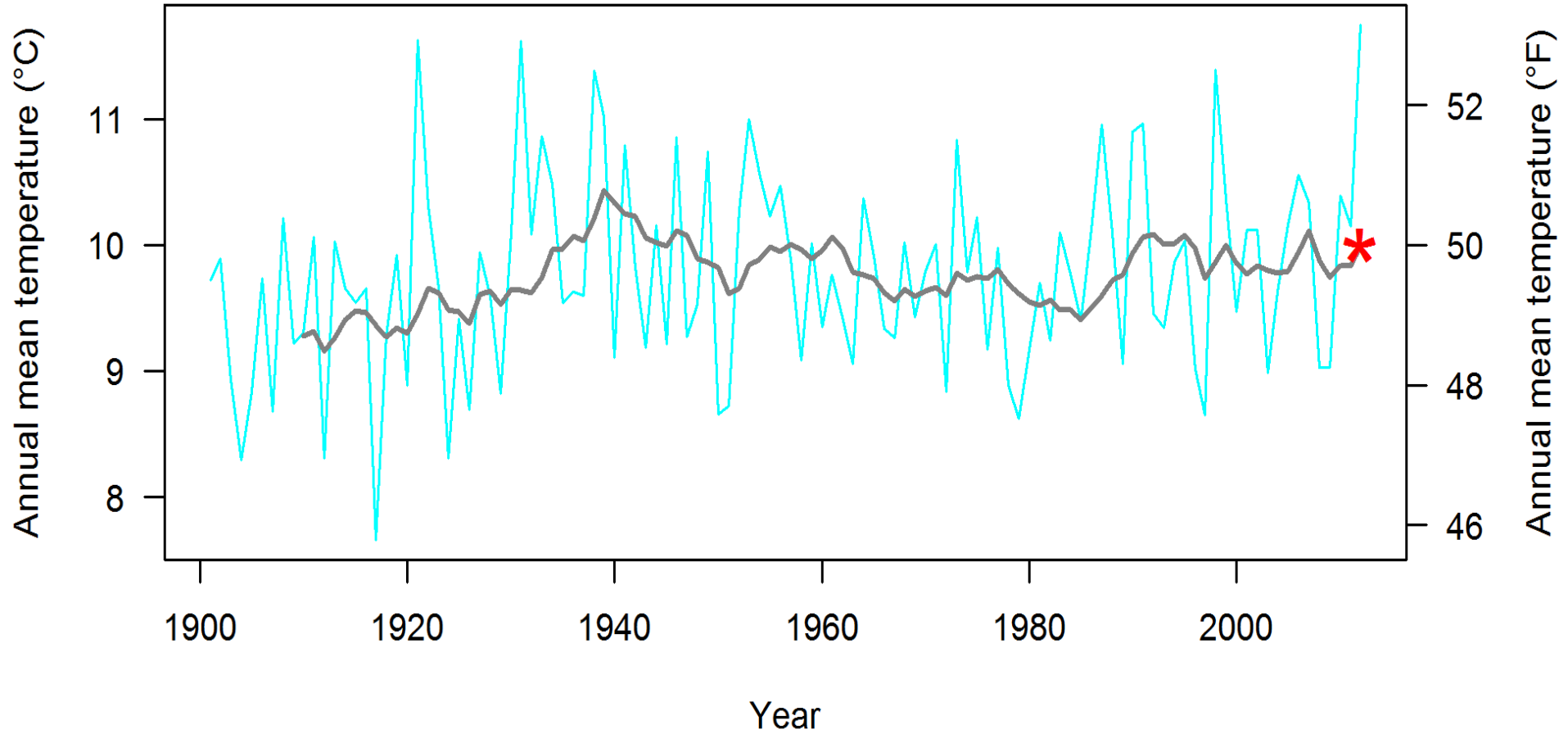
Getting Wetter: 18% per century



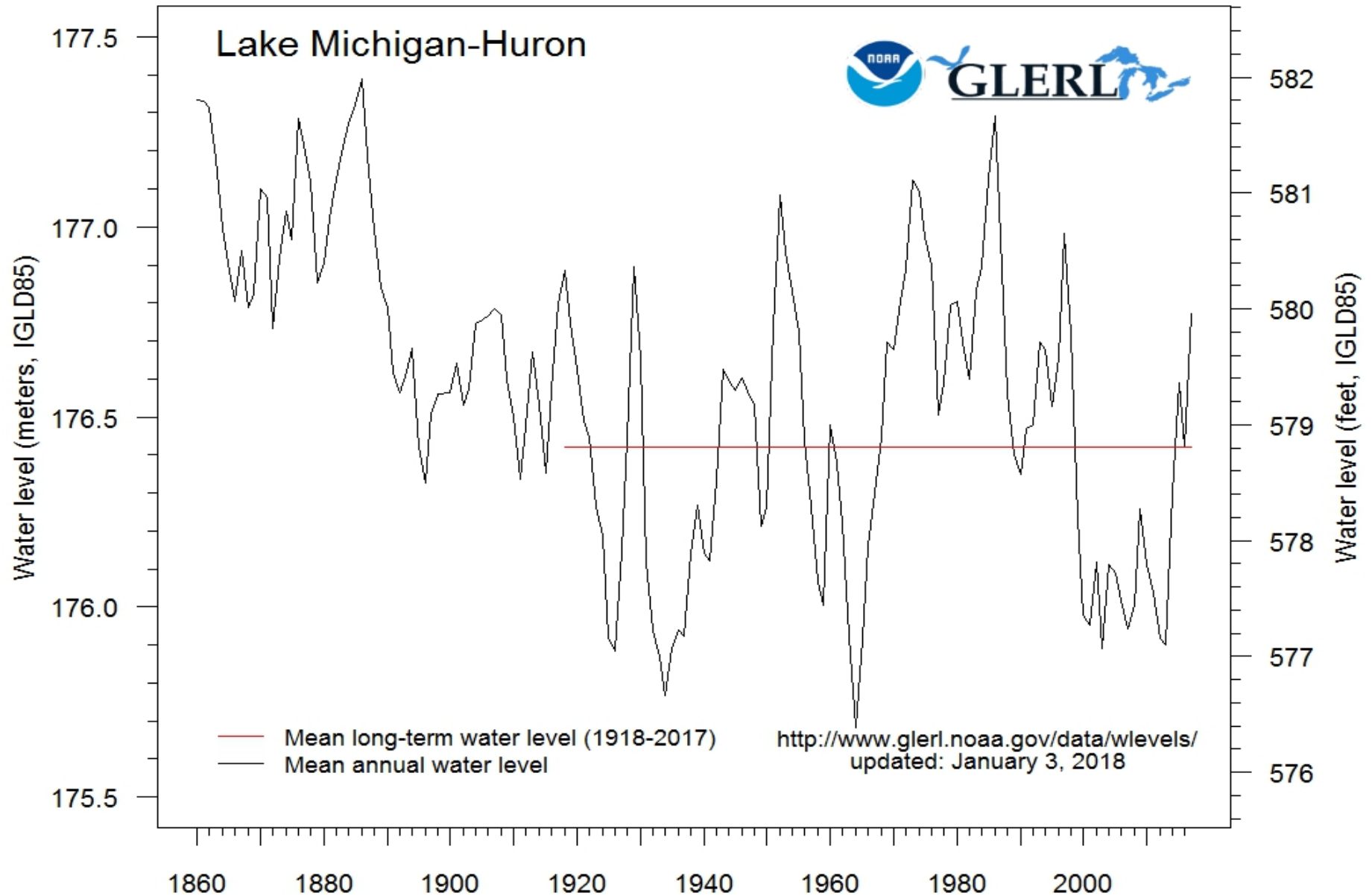
Losing species: Karner blue butterfly extirpated in 2012



Variability



Lake Michigan



Still to Come...



Model forecasts for 2050

PURDUE UNIVERSITY
Discovery Park

Purdue Climate Change Research Center

Still to Come...



Growing Season: 1 Month Longer



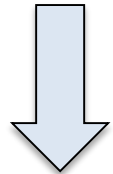
33 - 45 more days above 90°F



14 - 22% more precipitation



24 - 36 fewer days of
snow cover



Still to Come...



Growing Season: 1 Month Longer



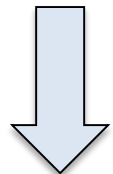
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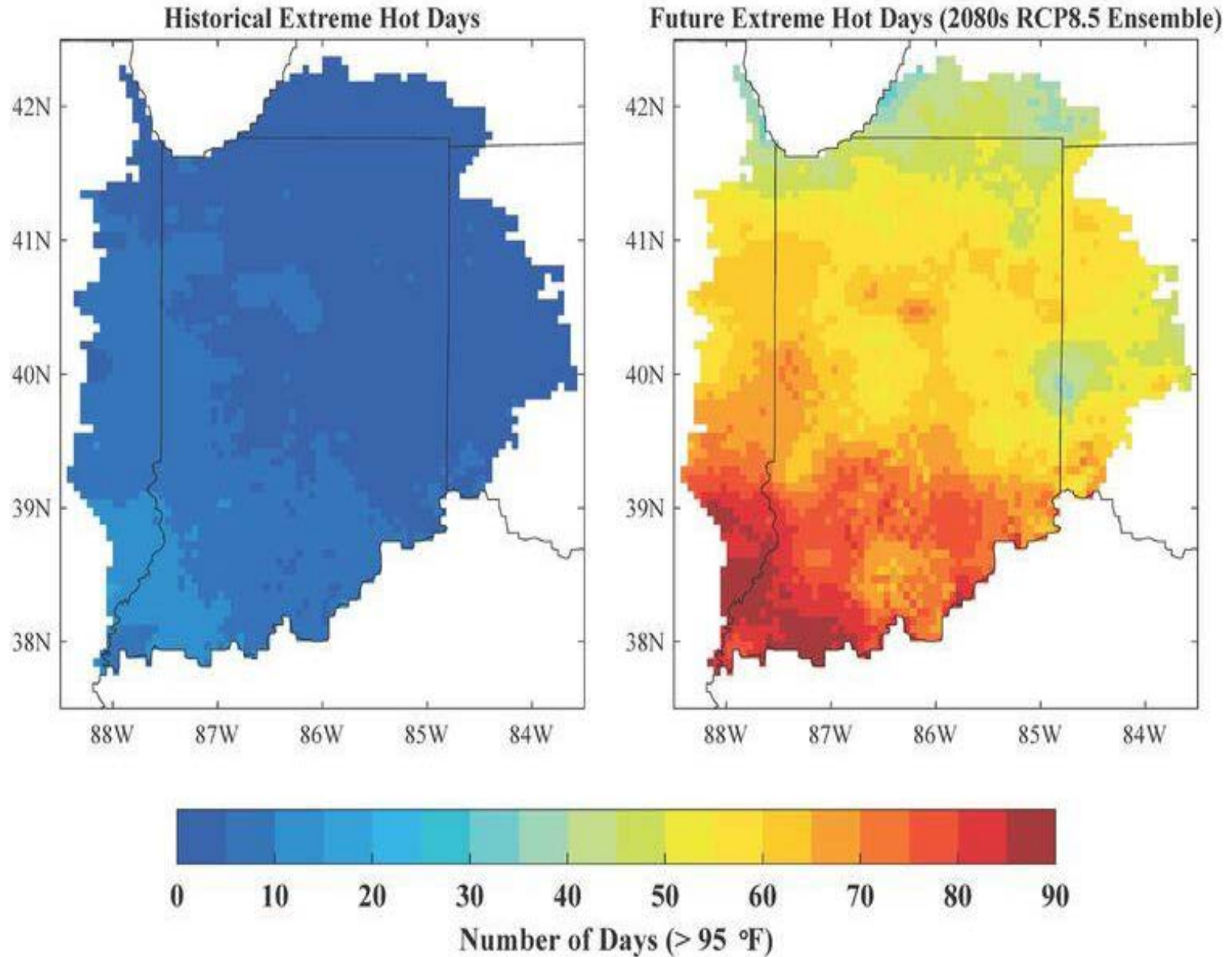
14 - 22% more precipitation



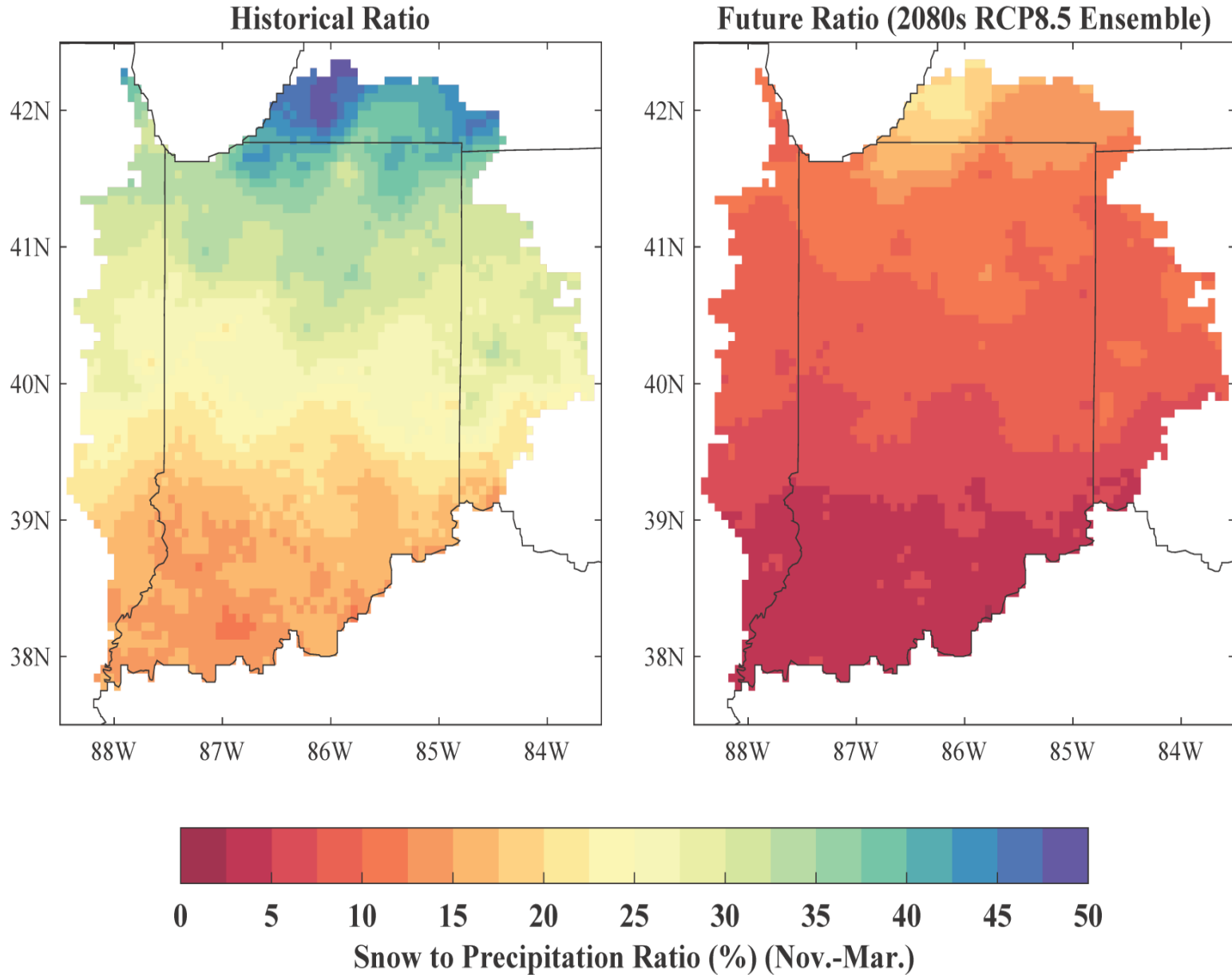
24 - 36 fewer days of
snow cover



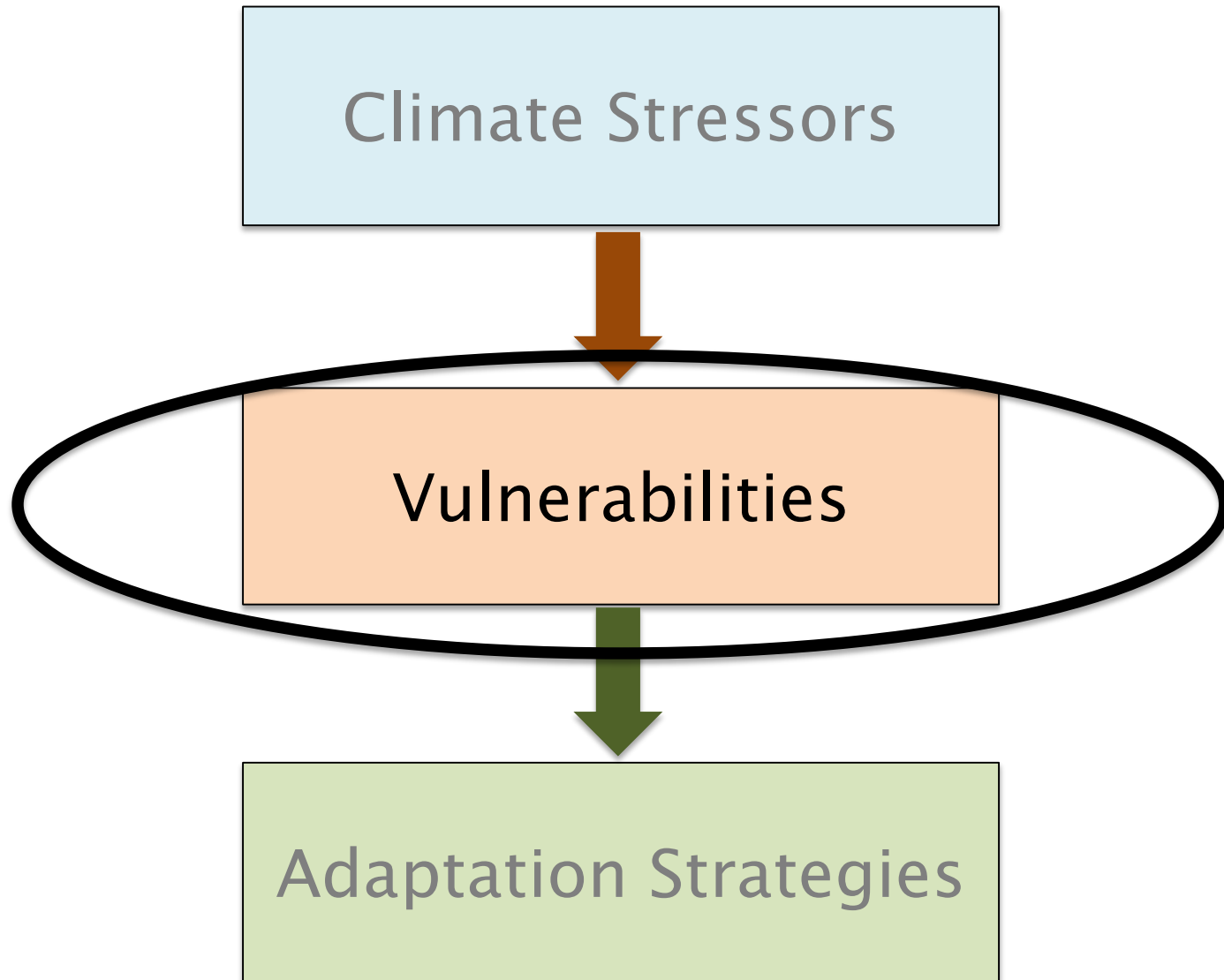
Increase in Extreme Heat



More Precipitation Falling as Rain

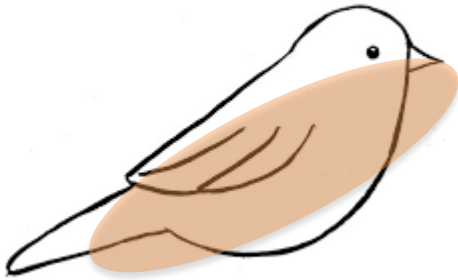


Adaptation Planning Steps

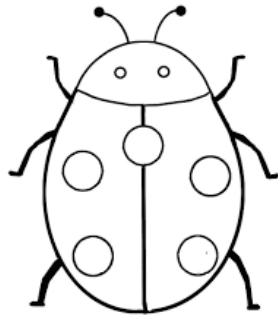


Vulnerabilities

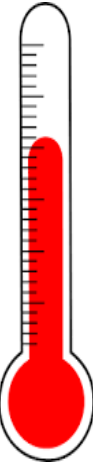
Life Cycle Mismatches



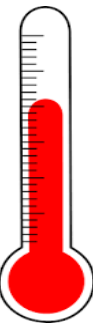
No change in day length



Big change in air temperature



Slower, less change in soil temperatures



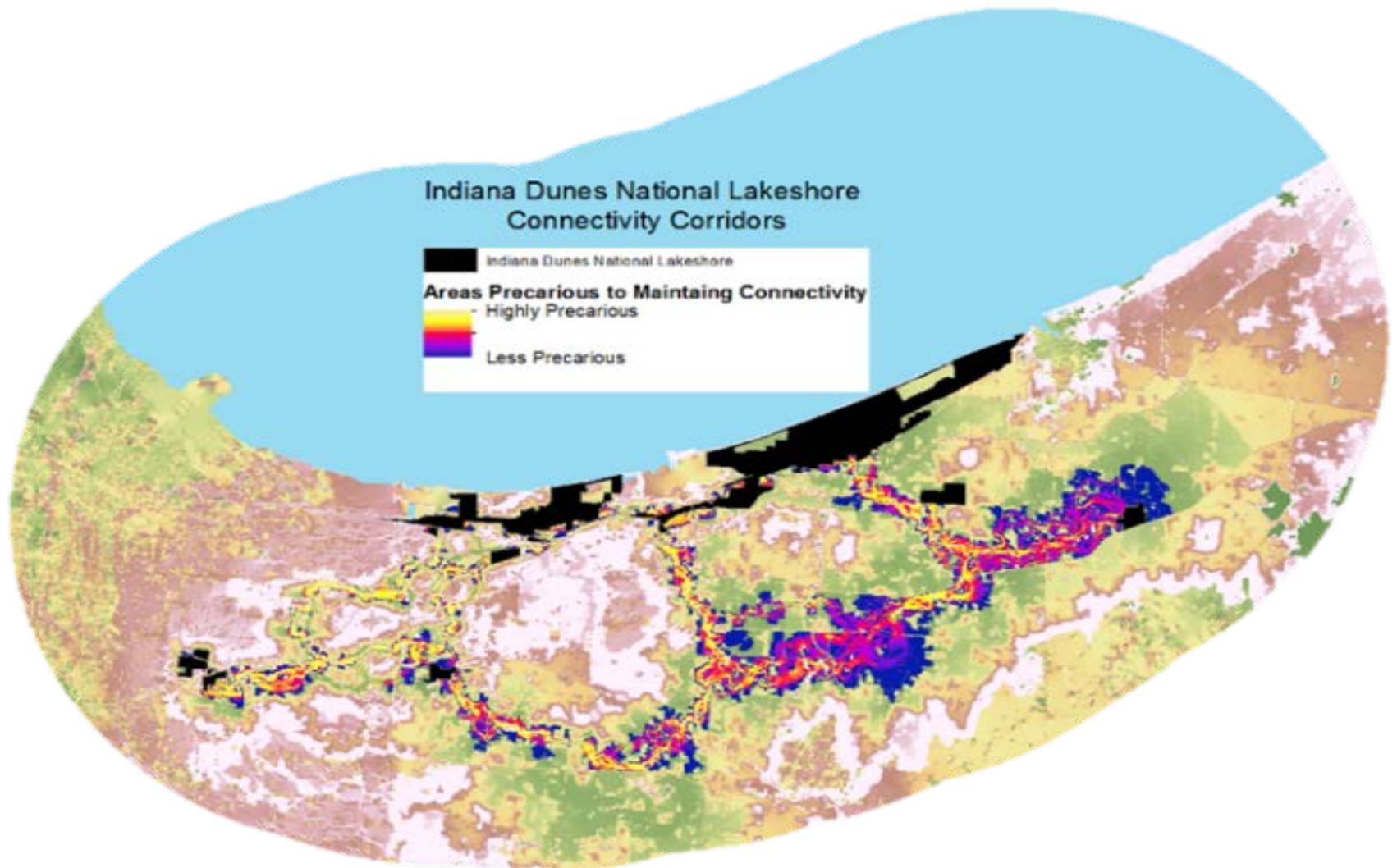
Vulnerabilities

Invasive species issues get worse
(Phragmites, Oriental Bittersweet)



Vulnerabilities

Habitat Fragmentation

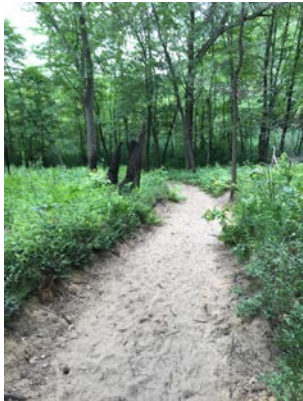


Impacts to Conservation Targets

**Dune &
Swale
Complex**



**Savanna
Complex**



**Prairie
Complex**



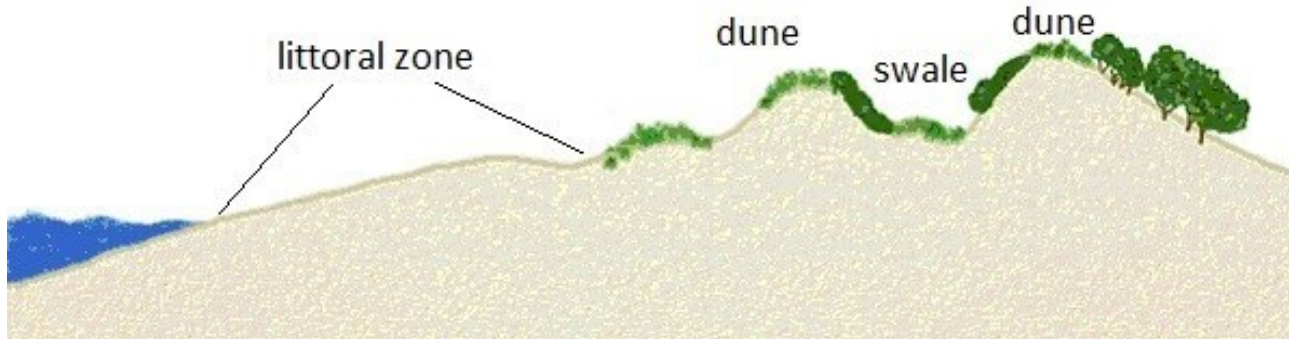
**Wetland
Complex**



**Forest
Complex**



Dune and Swale Complex



Warmer temperatures

Warmer, drier conditions in the growing season

Plant heat zone goes from 5 to 7



Wetter winter / spring and drier summer

14 to 22% increase in precipitation

17 to 23% increase in winter / spring runoff

Longer dry periods



Lake Michigan surface water temperatures increasing

Less shelf ice

Lake level changes

Pitcher's Thistle

Endemic, threatened; confined to open sandy soils along lakefront; insect and bird stresses are already threatening



photos: Michigan Sea Grant, Noel Pavlovic, USGS

Pitcher's Thistle

Air temperature
increases



Exceed the Thermal
Range for
Pollinators
(Bumblebees)

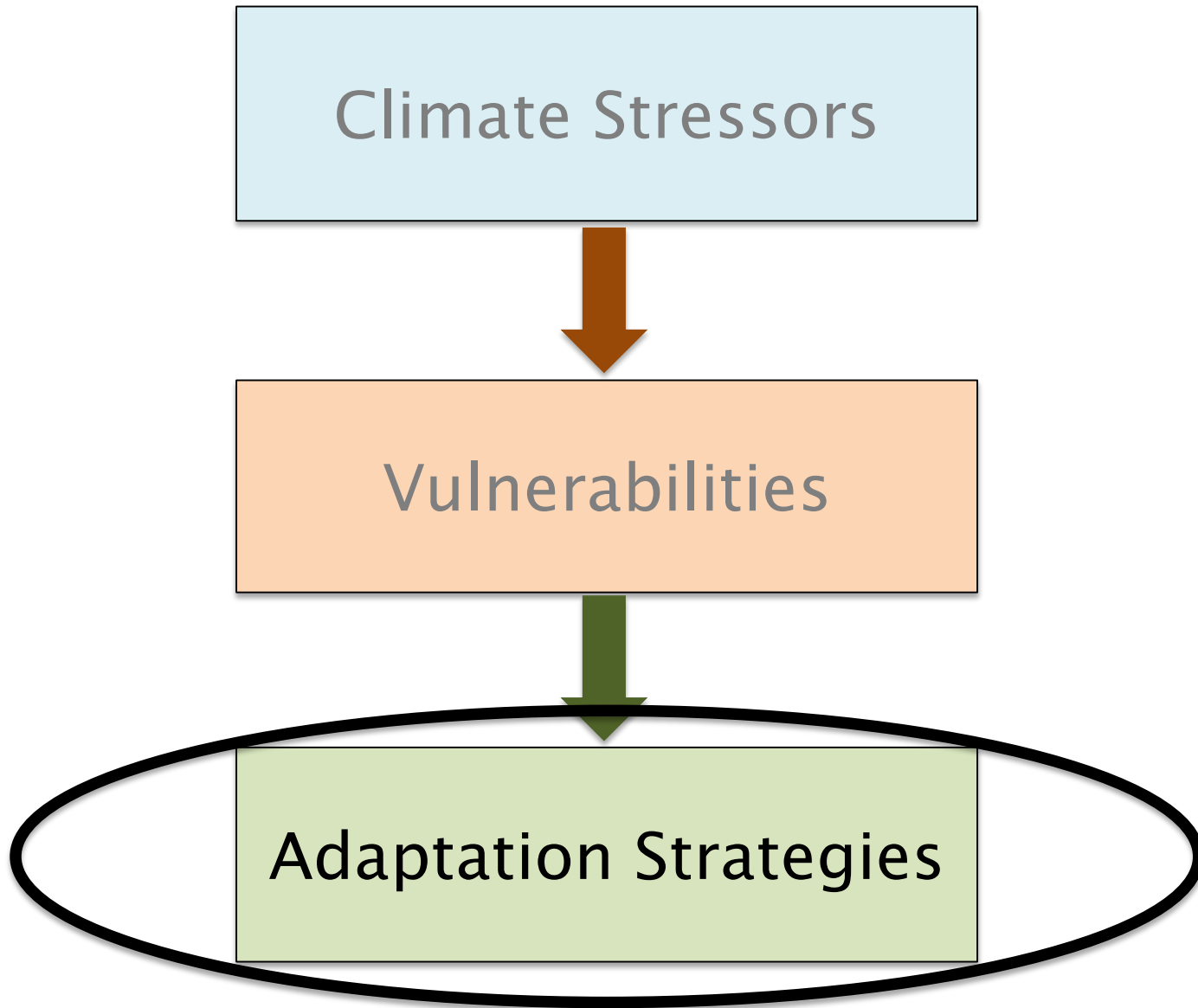


Negative Impact on
Mutualistic Insect-Plant
Interactions
Decrease in Pollination?



photo: Xerces Society

Adaptation Planning Steps



Adaptation Strategies

- ✓ Targeted land management paradigm
- ✓ Improve landscape connectivity
- ✓ Change how fire used as a management tool



Pitcher's Thistle

- ✓ Plantings in several areas to increase redundancy in plant populations
- ✓ Prioritize cooler micro-habitats that provide insects refuge from heat
- ✓ Reduce Oriental Bittersweet encroachment



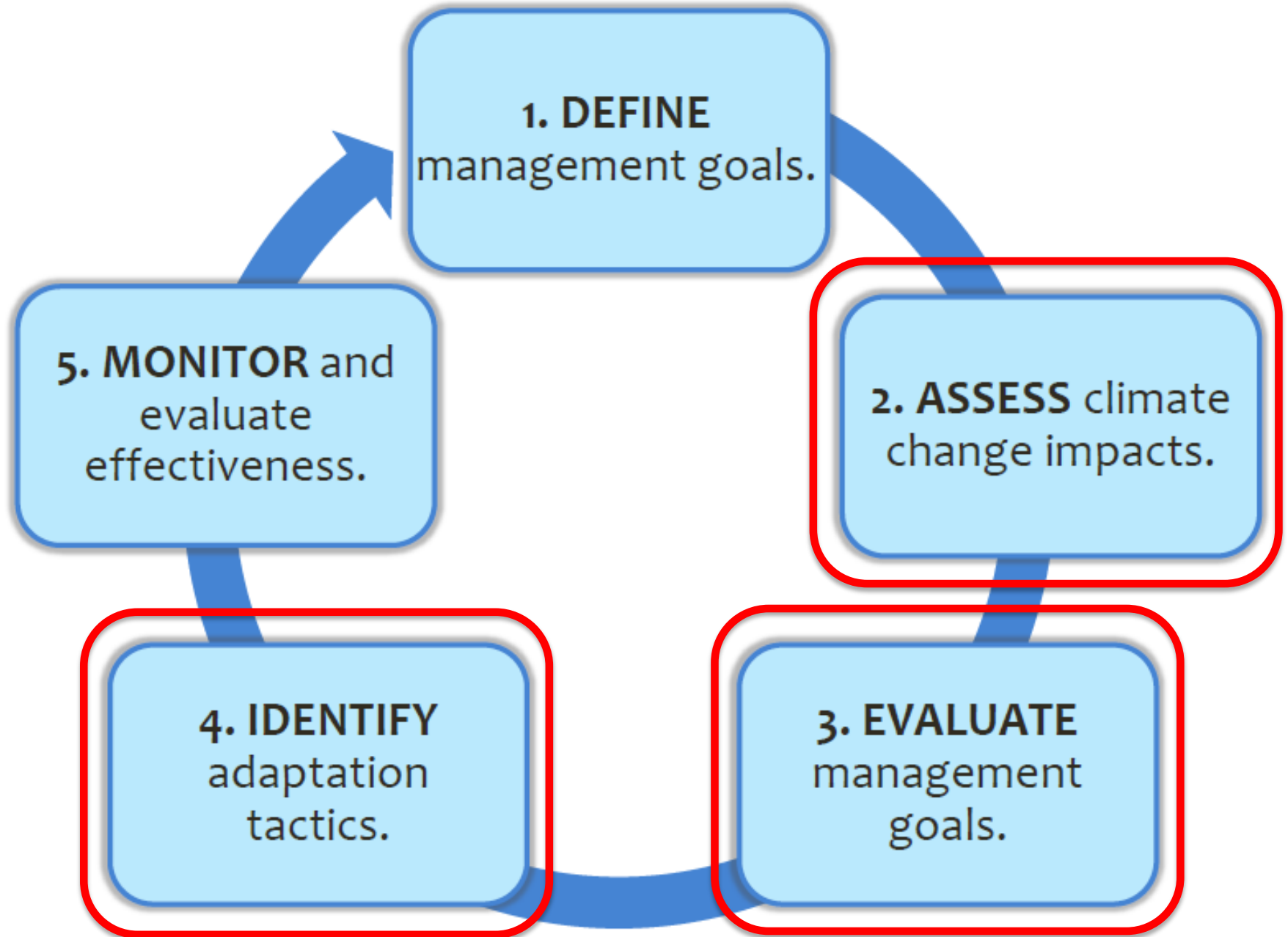
photos: Michigan Sea Grant, Noel Pavlovic, USGS

Next Steps

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Adaptive Management



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Outreach Activities



Outreach Activities



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