

# Prairies Climate Change Adaptation Workshop 1



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

# Prairies Climate Change Adaptation Workshop 1 – Team Naming

10:00 – 10:10am

1. Choose a team name that is a prairie species
2. Elect a facilitator for activities
3. Elect a notetaker



# Prairies Climate Change Adaptation Workshop 1 - Logistics

WIFI

Location of Restrooms

Social Media

Parking

Other?





# Prairies Climate Change Adaptation Workshop 1 Agenda

## Morning

- Overview and background
- Pre-settlement Prairies
- Climate Change in the Midwest
- Social Perspectives



# Prairies Climate Change Adaptation Workshop 1 Agenda

## Afternoon

- Prairie Tours
- Remnants
- Urban Green Spaces



# Prairies Climate Change Adaptation Workshop 1 - Notes

**CWs Prairie Adaptation - Workshop 1**

**NOTES**

## **Morning Session**

Background and Goal for this Workshop (Katherine Moore Powell)

Prehistory on the Prairie (Joe Wheeler)

Climate Change in the Chicago Wilderness Region (Jim Angel)

People to People and People to Nature (Rev Debra Williams)

# Prairies Climate Change Adaptation Workshop 1 - Feedback

CWs Prairie Adaptation - Workshop 1

Feedback Activity Grid

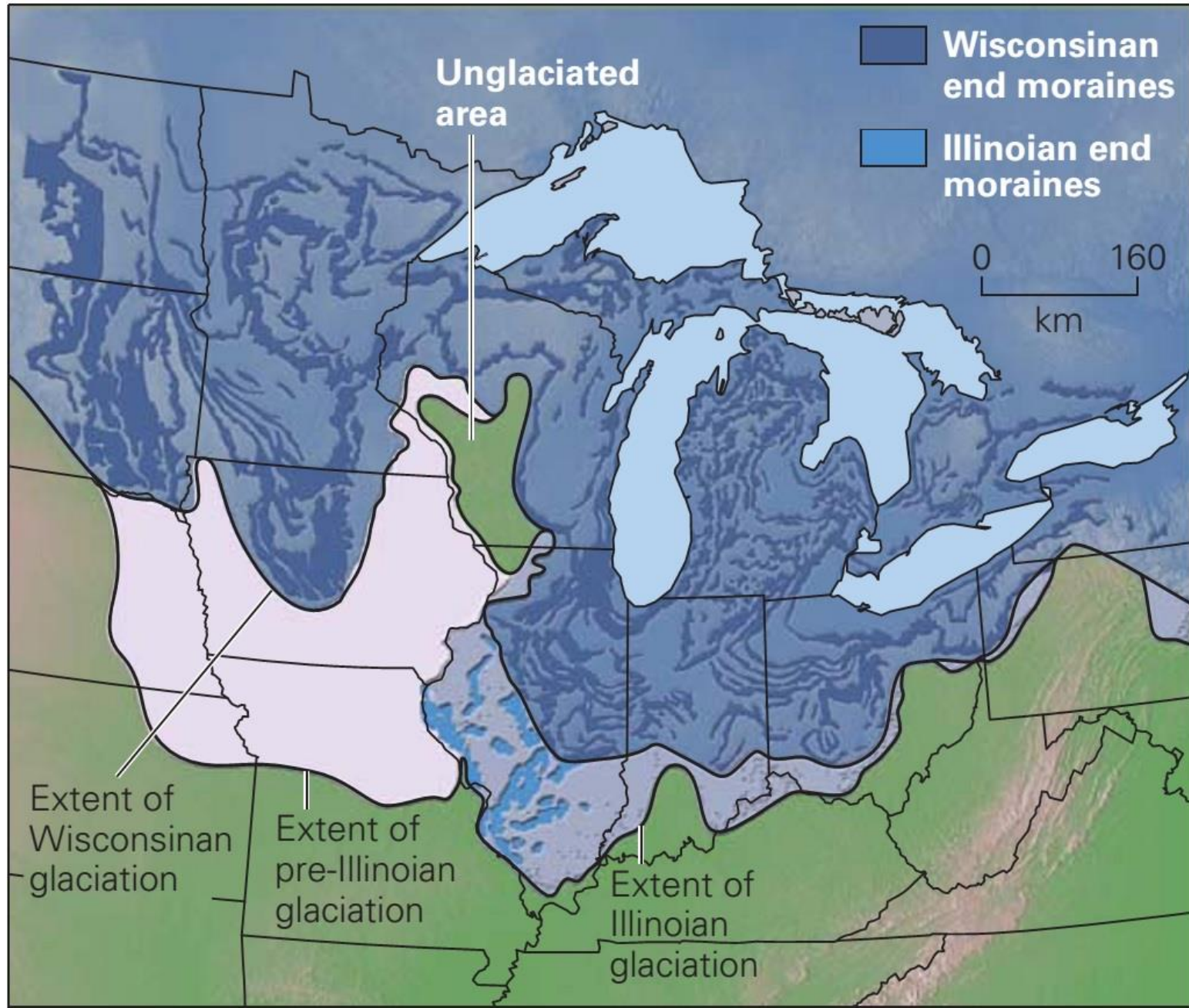
**TEAM NAME:** \_\_\_\_\_

**ACTIVITY:** Using notes and/or personal knowledge, discuss information from this workshop among team members and fill in the grid below - *this team sheet goes to organizer*

Climate Chg Factor	Questions / Considerations	Target Stakeholder(s) and Additional Information



# Geological History of Prairies





# Geological History of Prairies



# Prairies in the Midwest

Climate



Grazing



Fire



# Prairies in the Midwest

## Climate



Extreme ranges of temperatures

Hot summers and cold winters

Great temperatures fluctuations within growing seasons

Rainfall varies year to year & within growing seasons

Droughts / prolonged dry period during the summer

Major droughts lasting for several years



# Prairies in the Midwest

## Grazing



Considerable above ground biomass consumed each year by bison, elk, deer, rabbits, and grasshoppers  
Grasslands and ungulate mammals coevolved together  
Recycles nitrogen through urine and feces  
Trampling opens up habitat for plant species that prefer some disturbance of the soil

# Prairies in the Midwest

## Fire

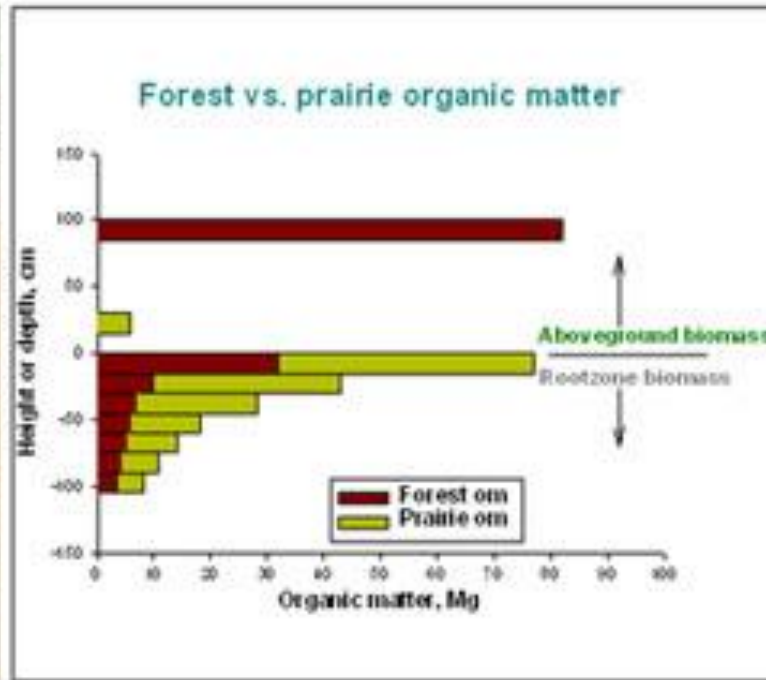


Fires were commonplace before European settlement  
Moved rapidly so damaging heat did not penetrate the soil to any great extent  
Kills most saplings of woody species  
Removes thatch that aids nutrient cycling  
Promotes early flowering spring species

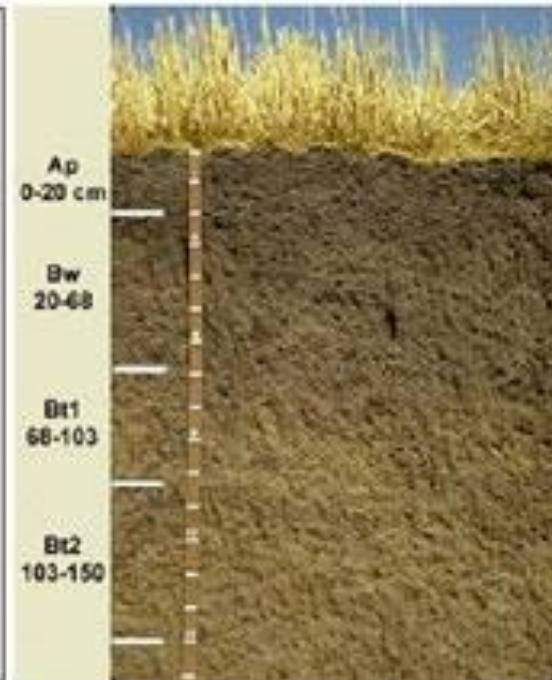
# Prairies in the Midwest

## Soils

Forest Soil



Grassland Soil



Organic layer is thicker (deeper) - there is more litter  
The clay content is higher in the surface layers  
The nitrogen and carbon content higher than forest soils



# Loss of Prairies - Chicago Wilderness Region



# Climate Impacts To Prairies in the Midwest

- Increase in temperatures
- Heavier rainfall events
- Shift in seasonal precipitation - more occurring in the spring and winter
- Increase in the concentration of CO<sub>2</sub> favoring cool season grass species?





# Climate Change Models and Research

Journal of Great Lakes Research 36 (2010) 7–21



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Journal of Great Lakes Research

journal homepage: [www.elsevier.com/locate/jglr](http://www.elsevier.com/locate/jglr)



Great Lakes Environmental Research Laboratory

## Regional climate change projections for Chicago and the US Great Lakes

Katharine Hayhoe<sup>a,b,\*</sup>, Jeff VanDorn<sup>a</sup>, Thomas Croley II<sup>c</sup>, Nicole Schlegal<sup>d</sup>, Donald Wuebbles<sup>e</sup>

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<sup>b</sup> Texas Tech University, Lubbock, TX 79409, USA

<sup>c</sup> NOAA Great Lakes Environmental Research Laboratory (ret'd), Ann Arbor, MI, USA

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### ABSTRACT

Assessing regional impacts of climate change begins with development of climate projections at relevant temporal and spatial scales. Here, proven statistical downscaling methods are applied to relatively coarse-scale atmosphere–ocean general circulation model (AOGCM) output to improve the simulation and resolution of spatial and temporal variability in temperature and precipitation across the US Great Lakes region. The absolute



THE UNIVERSITY  
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MADISON



**PCCRC**

Purdue Climate Change Research Center





# Climate Change Vulnerability Assessments

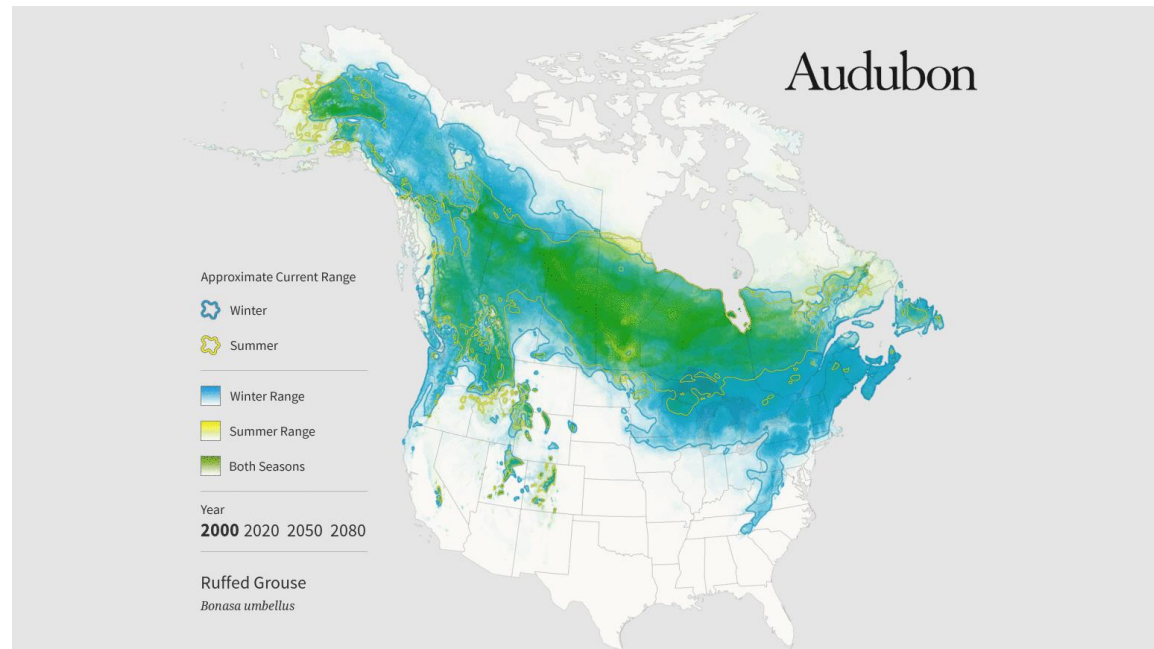


NatureServe



## BIODIVERSITY RECOVERY PLAN

Climate Change Update



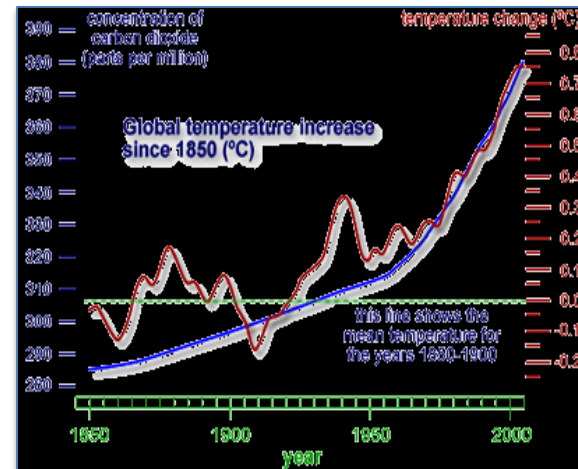


# History of Prairie and Grassland Conservation in the Chicago Wilderness Region





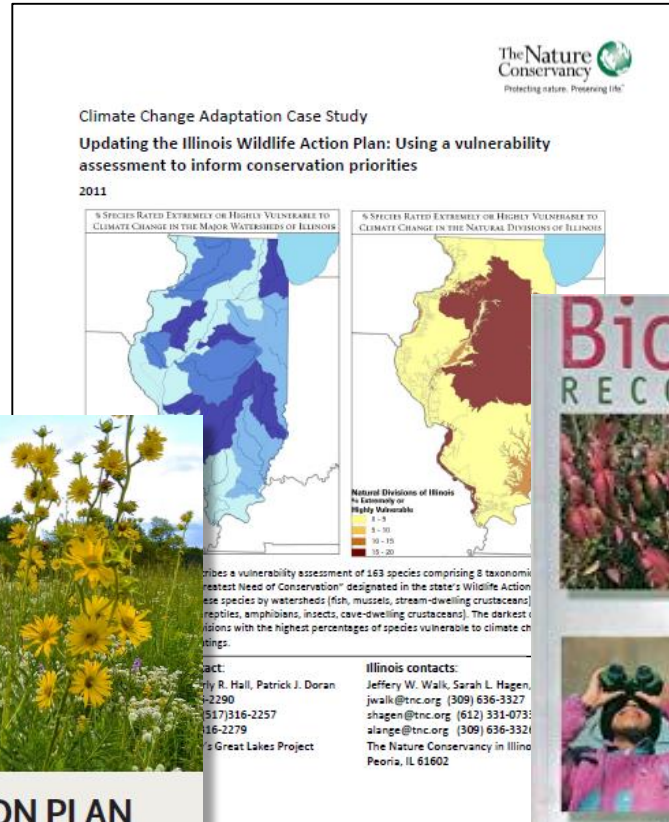
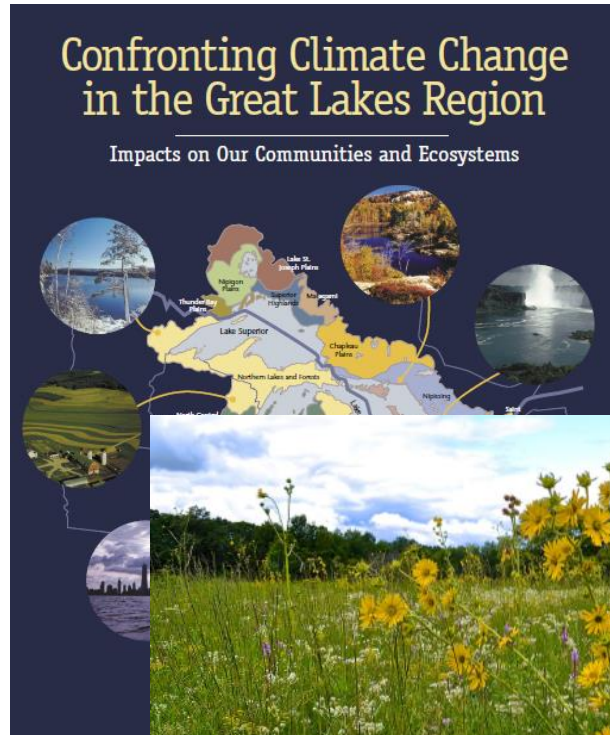
# Intersection of Knowledge and Experience



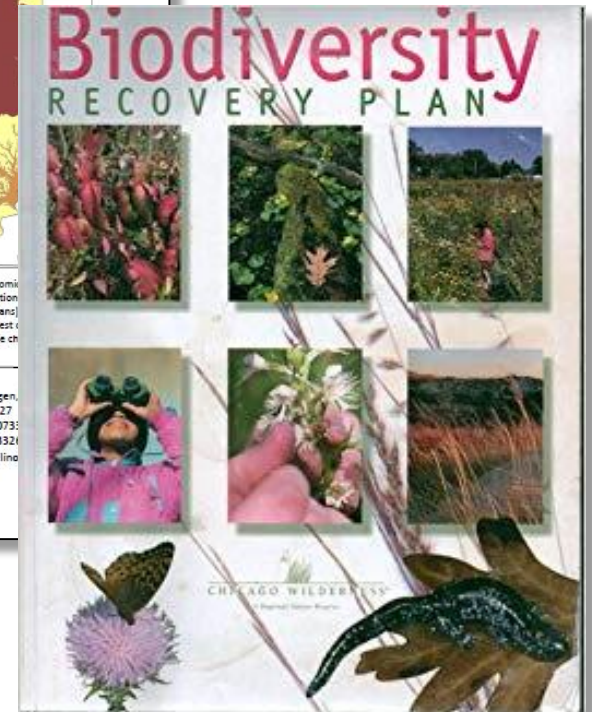


# Prairie Adaptation Plan Objectives - 1

Review climate projections, vulnerability assessments, climate impacts, and adaptation options for prairies

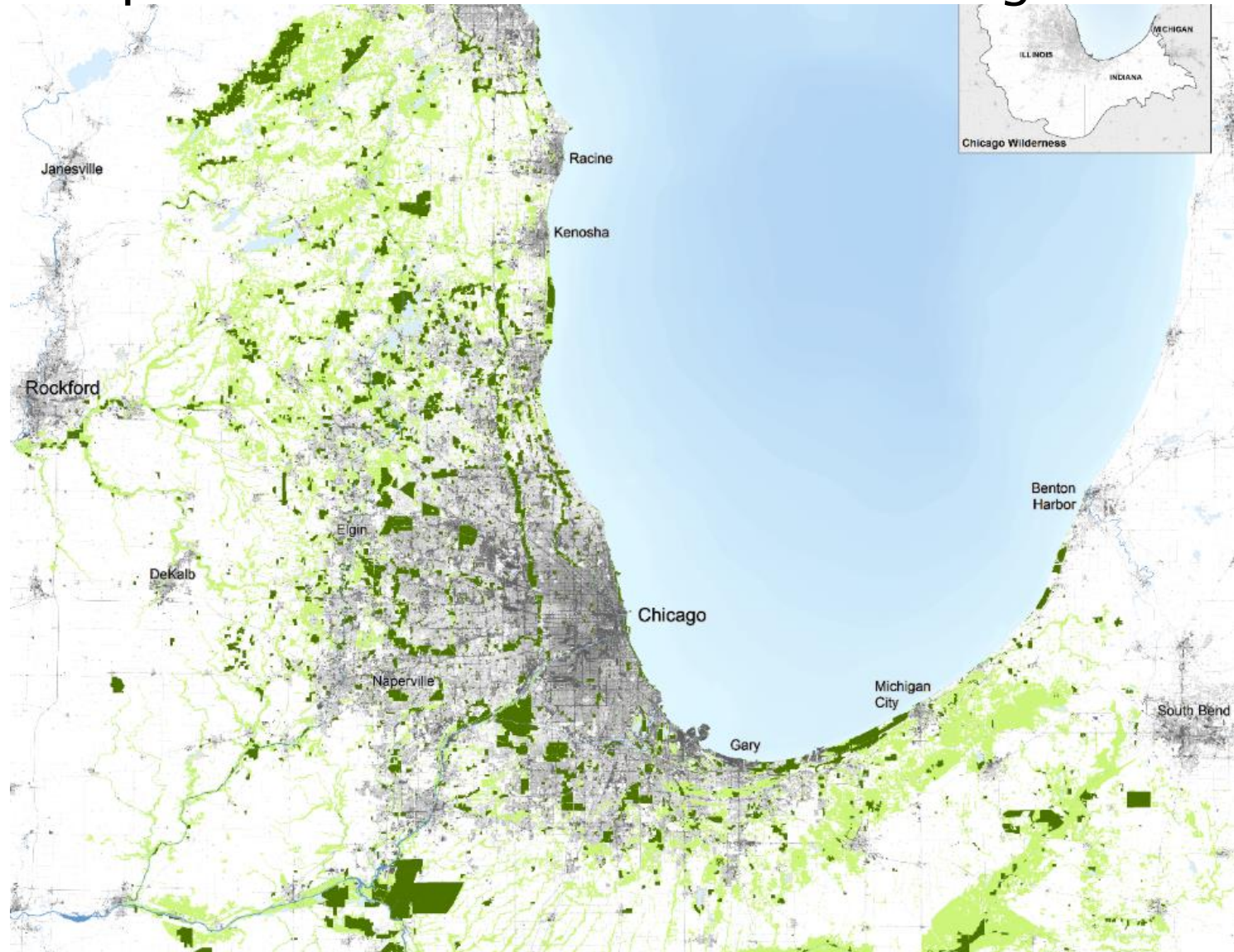


## NEXT CENTURY CONSERVATION PLAN for the Forest Preserves of Cook County



# Prairie Adaptation Plan Objectives - 2

Develop strategies to improve connectivity across landscapes that enhance the climate change resilience





# Prairie Adaptation Plan Objectives - 3



Assess the perspective people have of the role prairies play in their communities (e.g., recreation, health, stormwater mitigation, wildlife habitat, other)





# Prairie Adaptation Plan Objectives - 4

Compose, publish, and distribute a climate change adaptation plan for the range of CW prairie grasslands

Indiana Dunes Climate Change Adaptation Plan

## Current Climate Threats to the Indiana Dunes Region

### Recent Climate Trends

The National Park Service Climate Change Response Program evaluated the climate trends and vulnerabilities at the Indiana Dunes National Lakeshore (Gonzalez 2014) and conducted an analysis of recent (past 10, 20, and 30 year windows) temperature, precipitation, and indications of the onset of spring relative to historic values (1901-2012) to describe the park's exposure (Monahan et al. 2016; Fisichelli et al. 2015; Monahan and Fisichelli 2014b). Climate change exposure was defined as "extreme" when climate values for recent decades exceeded 95% of the historical values. The panel on the right summarizes the findings from those studies (see Appendix B: NPS Climate Change Assessments), and relevant climate impacts for specific habitats within the Indiana Dunes region are included in each chapter under the TERRESTRIAL COMMUNITIES section.


### Phenological Mismatch

Phenological mismatch is a term that describes out of sync life cycle associations between organisms (e.g., predator-prey, migration, breeding) that occurs when changes in individual phenology shift at different rates (Hurlbert and Liang 2012). This mismatch is currently occurring in the Indiana Dunes region because the triggers for life cycle events in many plants and animals are differentially affected by climate change. For example, most birds track photoperiods (day length) to trigger

increase or decrease, the amount of beach area will grow or shrink, impacting the establishment


## ALREADY HAPPENING...

### EARLIER SPRINGS




First leaf and first bloom happening much earlier

### GETTING WARMER



Temperature is increasing about 0.5° F per century

### GETTING WETTER



## Threats

reduces overall biodiversity (Nowacki and Abrams 2008). Fire-adapted ecosystems depend on disturbance of natural fire regimes to

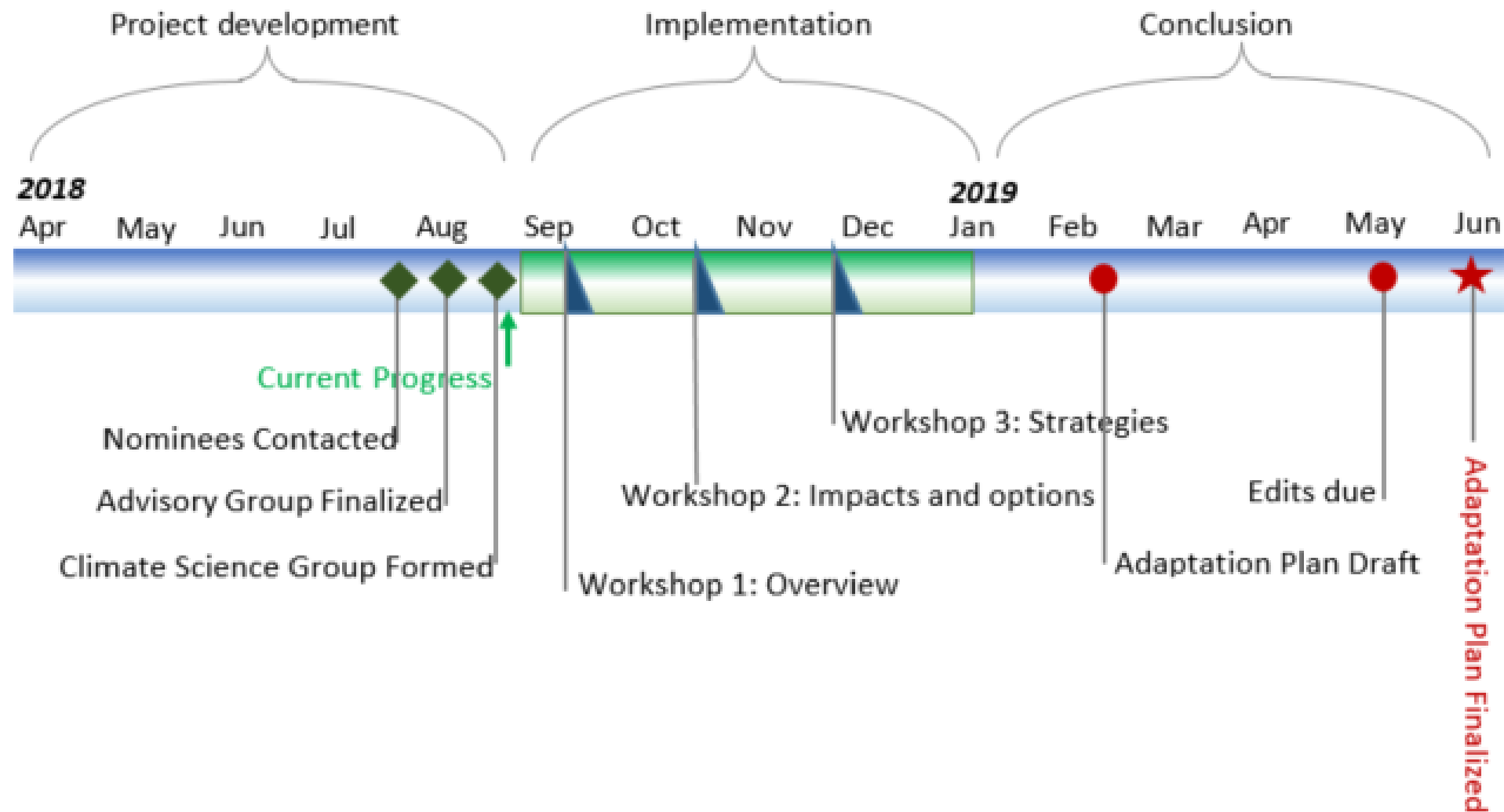
habitat fragmentation and modern fire-containment capability (see box below,

## Vulnerabilities

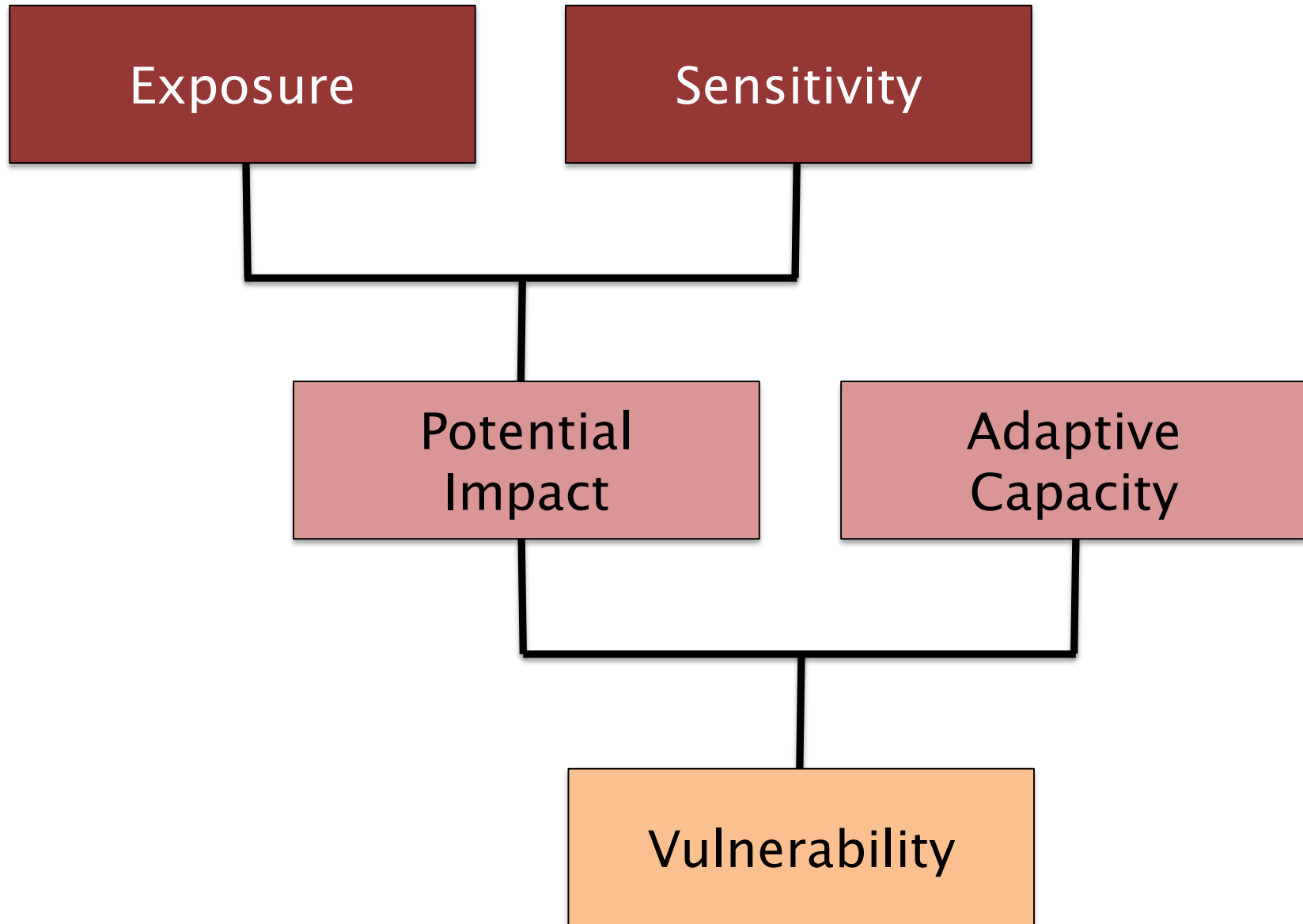
adequate plants and the main layer erosion periods of are more lead to res can The burn or must be burning and will lifting ating ally, it's matches impact on the oak at ease es will by

## Adaptations

# Prairie Adaptation Plan Timeline

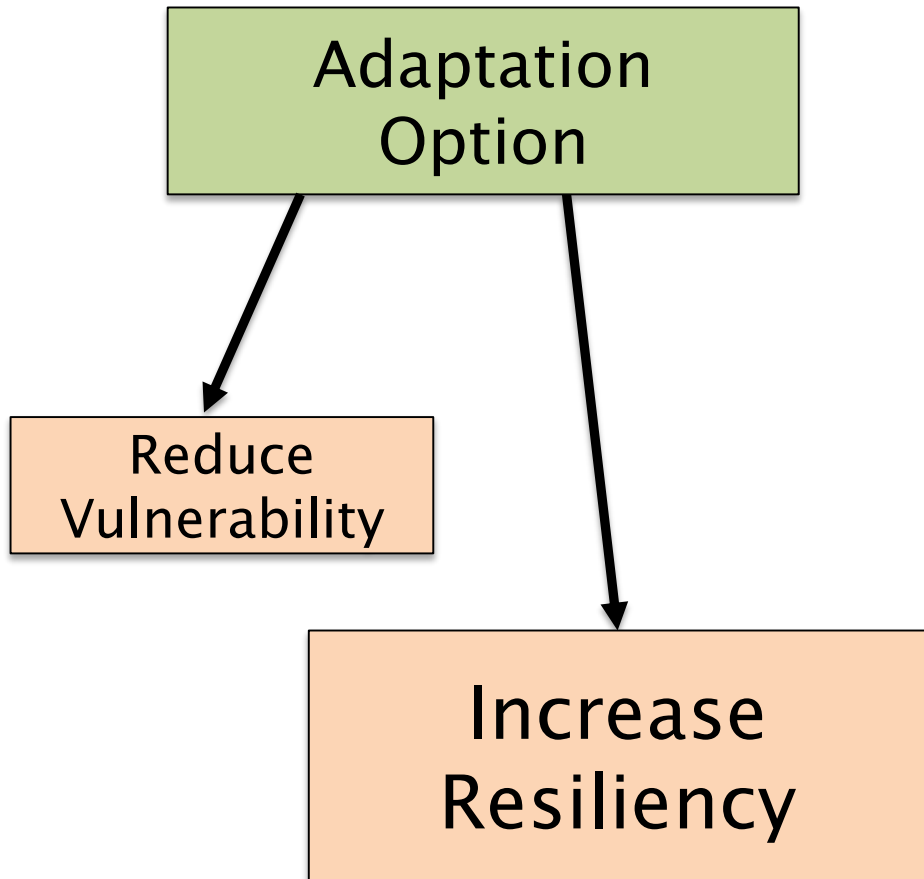


# Adaptation Planning





# Adaptation Planning



# Prairies Climate Change Adaptation Workshop 1 – The Goal Today!

- List of climate change factors affecting prairies and grasslands and
- Related questions and considerations

These will be the foundation that we build on, refine, and form the basis for the next workshops, where we will pilot a climate-informed, decision-tree style worksheet of land management strategies

## CWs Prairie Adaptation - Workshop 1

## Feedback Activity Grid

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# Prairies Climate Change Adaptation Workshop 1 – Morning Speakers





# Prairies Climate Change Adaptation Workshop 1 – Morning Activity



# Prairies Climate Change Adaptation

## Workshop 1 – Morning Activity

### CWs Prairie Adaptation - Workshop 1

### Feedback Activity Grid

**ACTIVITY:** Using notes and/or personal knowledge, discuss information from this workshop among team members and fill in the grid below - *this sheet stays with you*

Climate Chg Factor	Questions / Considerations	Target Stakeholder(s) and Additional Information
Increasing Air Temp	What grass and forbs species are vulnerable to the higher temperatures? What other prairie species are affected by extreme heat? Does the urban heat island make this worse?	Land managers, landscape architects - warm season grasses will probably do better, but precipitation is also a factor

# In pioneer cemeteries, a disappearing part of Illinois' landscape lives on

Christopher Benda, an Illinois naturalist visits Pellsville Cemetery Prairie near Rankin, Illinois. He works to preserve pioneer prairie cemetery plots, the last places in the state where original tall grasses and other native plants still reside. (Zbigniew Bzdak / Chicago Tribune)



**Christopher Borrelli** **Contact Reporter** Chicago Tribune

You won't find the Pellsville Pioneer Cemetery in Pellsville. You won't find Pellsville there either. There is no Pellsville. It was planned in the 1800s for Vermilion County, in east central Illinois, and never incorporated. So Pellsville





Chicago  
Tribune

Pellsville Cemetery Prairie in Rankin, Illinois

<http://www.chicagotribune.com/entertainment/columnists/ct-ent-pioneer-cemeteries-0806-20170803-column.html>

# Prairies Climate Change Adaptation

## Workshop 1 – Remnant Prairies

Mid 1970's Illinois Natural Areas Inventory:

- Biologist sought to find remnant vegetation of intact communities throughout the state



# Prairies Climate Change Adaptation Workshop 1 – Remnant Prairies

They learned that a lot of prairie habitat was being converted to agriculture - that some of the best remnants were found in cemeteries – which were never plowed.





# Prairies Climate Change Adaptation Workshop 1 – Remnant Prairies

Purple Prairie Clover



White Wild Indigo



Prairie Dock



Wild Quinine



Compass Plant





# Prairies Climate Change Adaptation Workshop 1 – Conclusion, Next Steps!

A photograph of a field of yellow Black-eyed Susans in the foreground, with the Chicago skyline visible in the background under a hazy sky.

## *Tentative Dates*

Workshop 2 – Monday Oct 15

Workshop 3 – Monday Dec 10

Invitation to Google Sites