Climate Change Update to the Chicago Wilderness Biodiversity Recovery Plan:

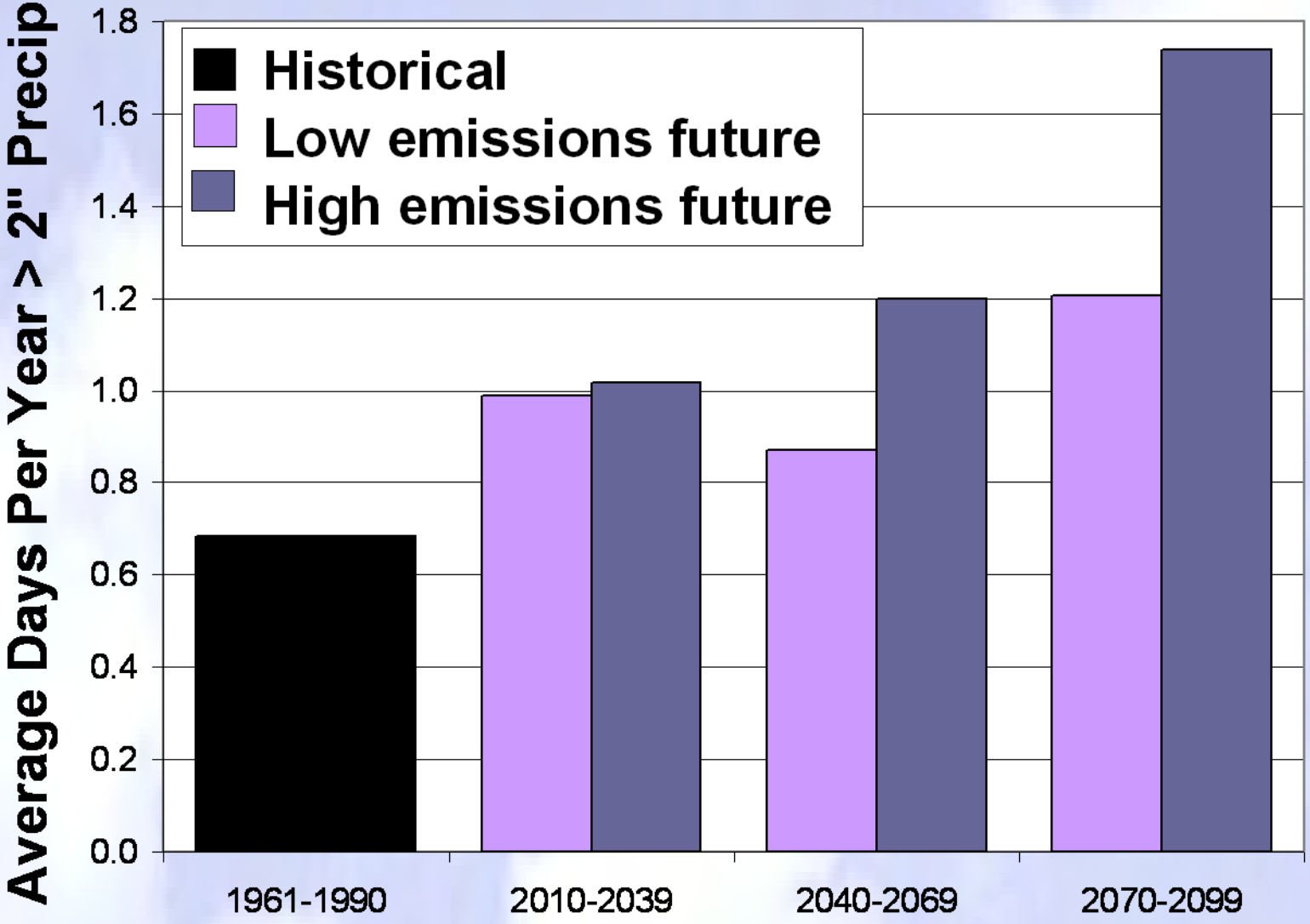
What Does it Mean to the Calumet Region?

Dr. Abigail Derby Lewis, Climate Change Ecologist
The Field Museum

A Changing Global Climate

- Higher temperatures
- Changing landscapes
- Wildlife at risk
- Rising seas
- Increased risk of drought, fire & floods
- Stronger storms & increased storm damage
- More heat-related illness & disease
- Economic losses

Extreme Precipitation

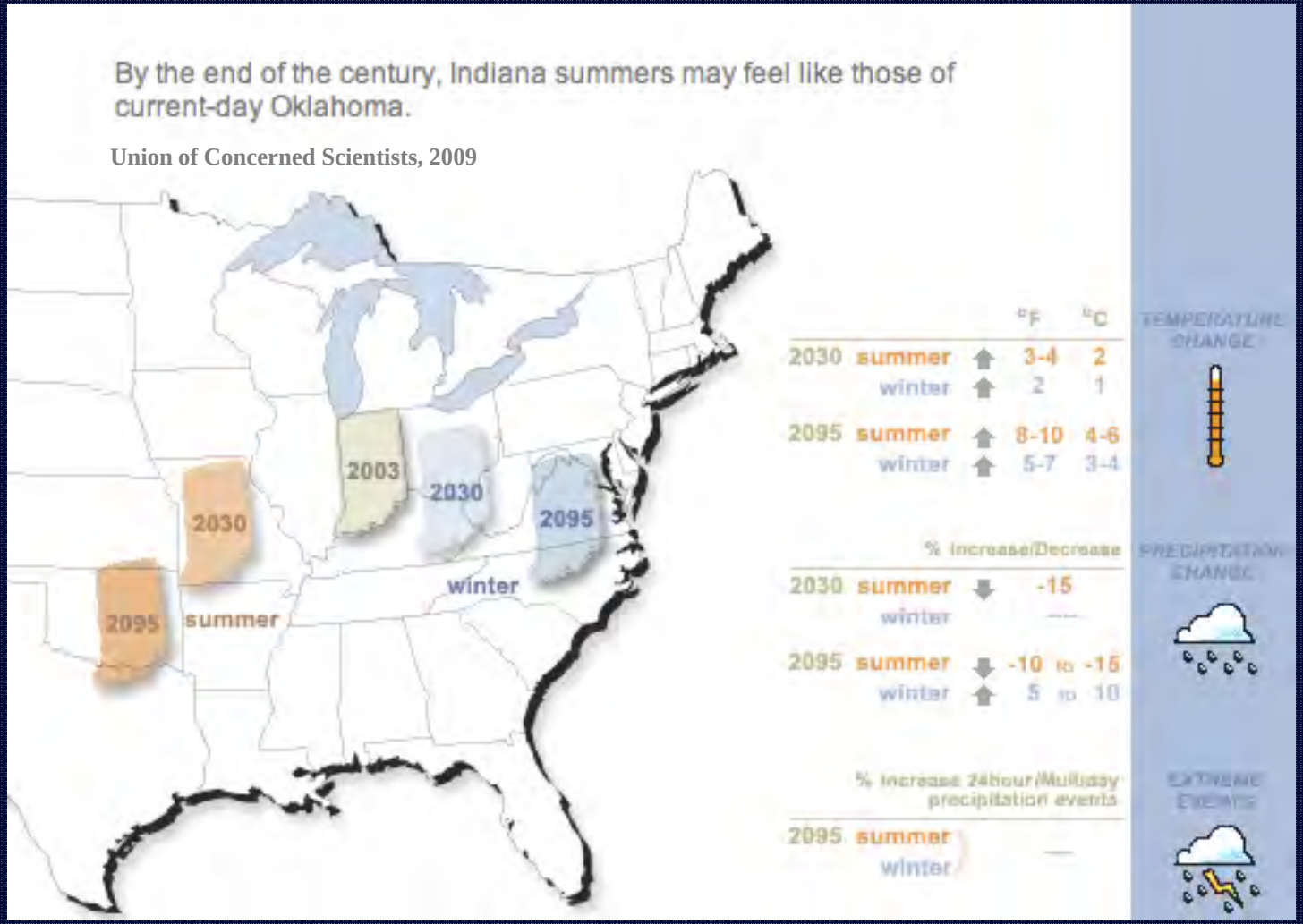


Higher Emissions:
31 days

Projected number of 100-degree days per year in Chicago

Lower Emissions:
8 days

Impacts of Climate Change in Indiana



****Climate protection policies, if implemented quickly, could reduce emissions significantly below the emissions scenario considered here**

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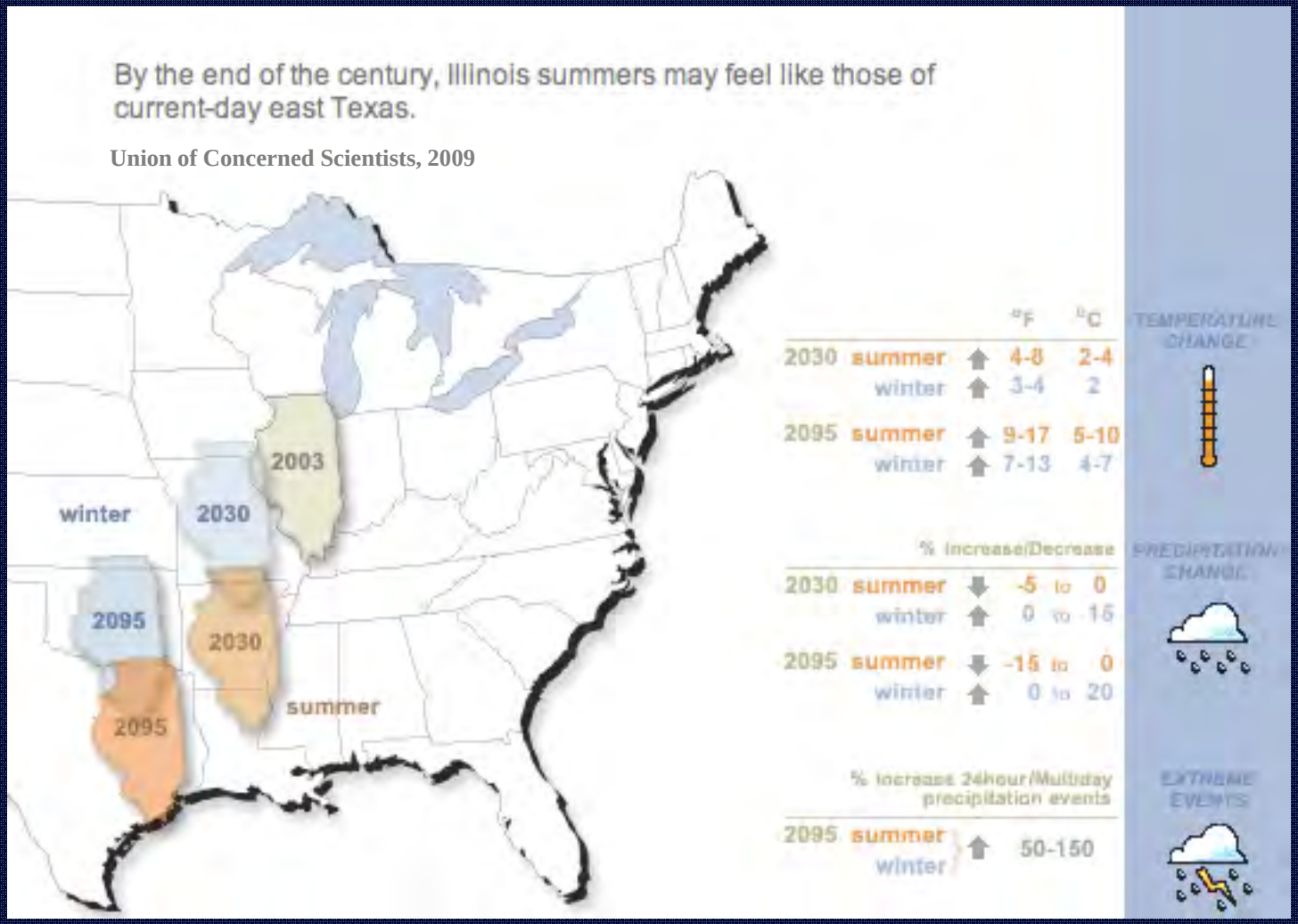

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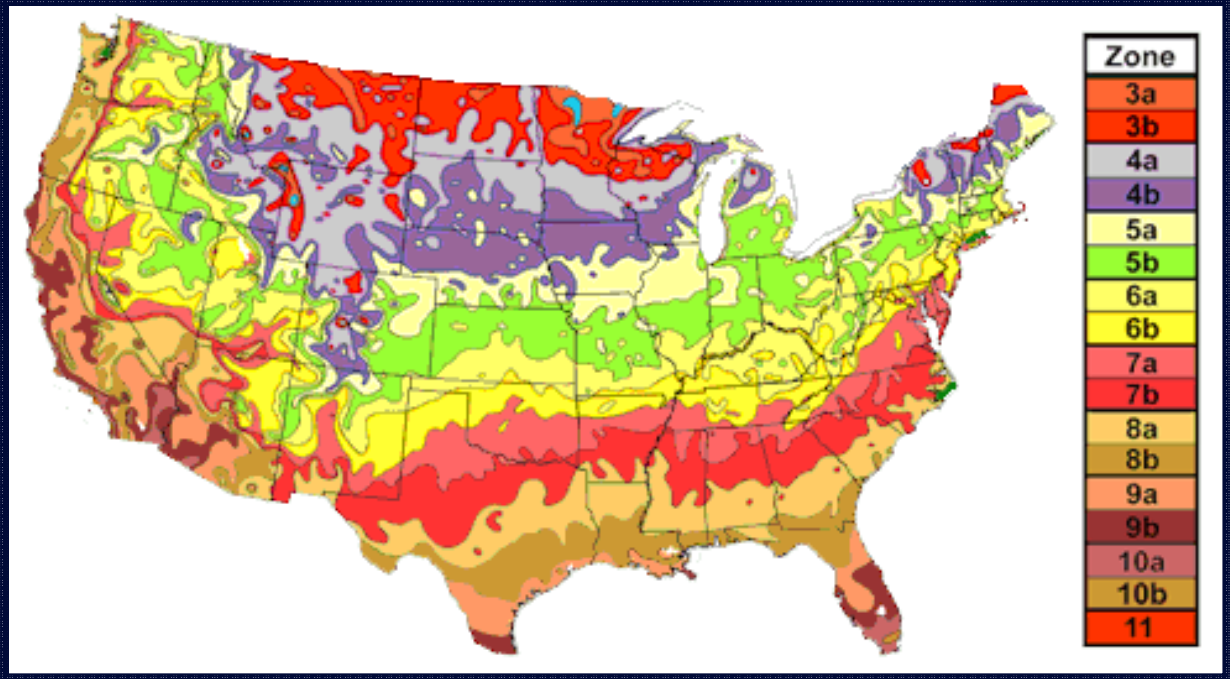
Climate Change Impacts: Vegetation

Plant Hardiness Zones



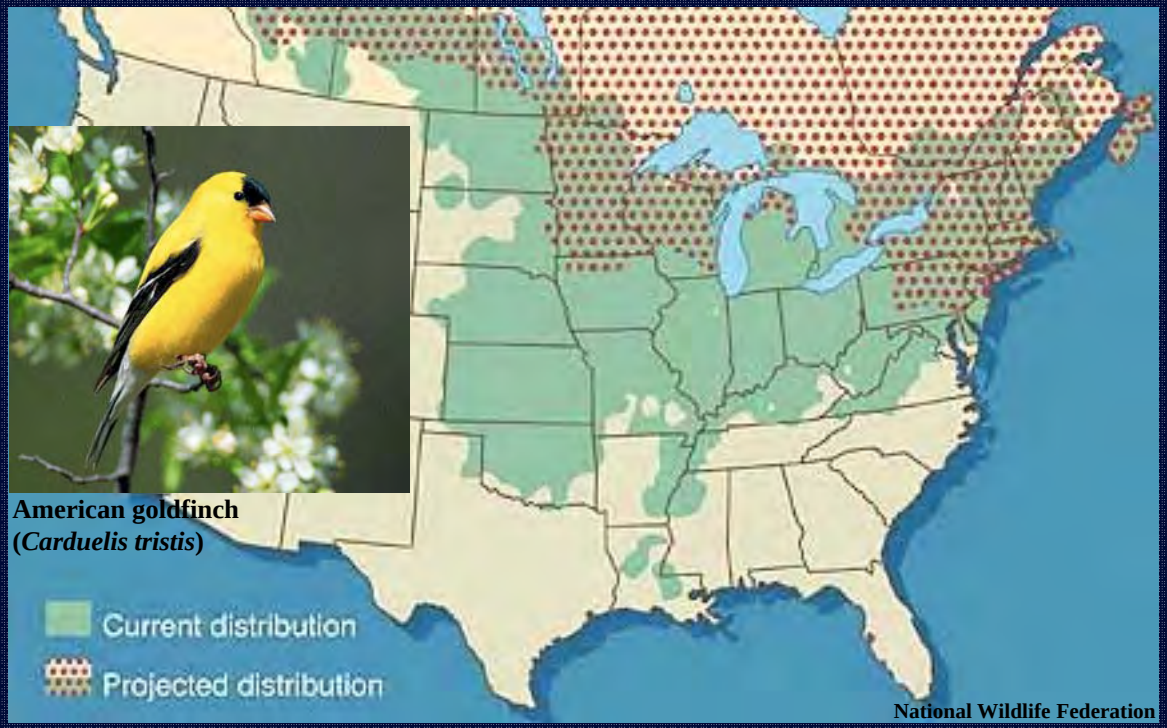
- ✧ **Projected to move northward**
- ✧ **Within next several decades: 5b – 6a***
- ✧ **By end of century: 6b (L) – 7a (H)**

***Irrespective of future emissions scenarios**

(Hellmann et al. 2010)

Climate Change Impacts: Animals

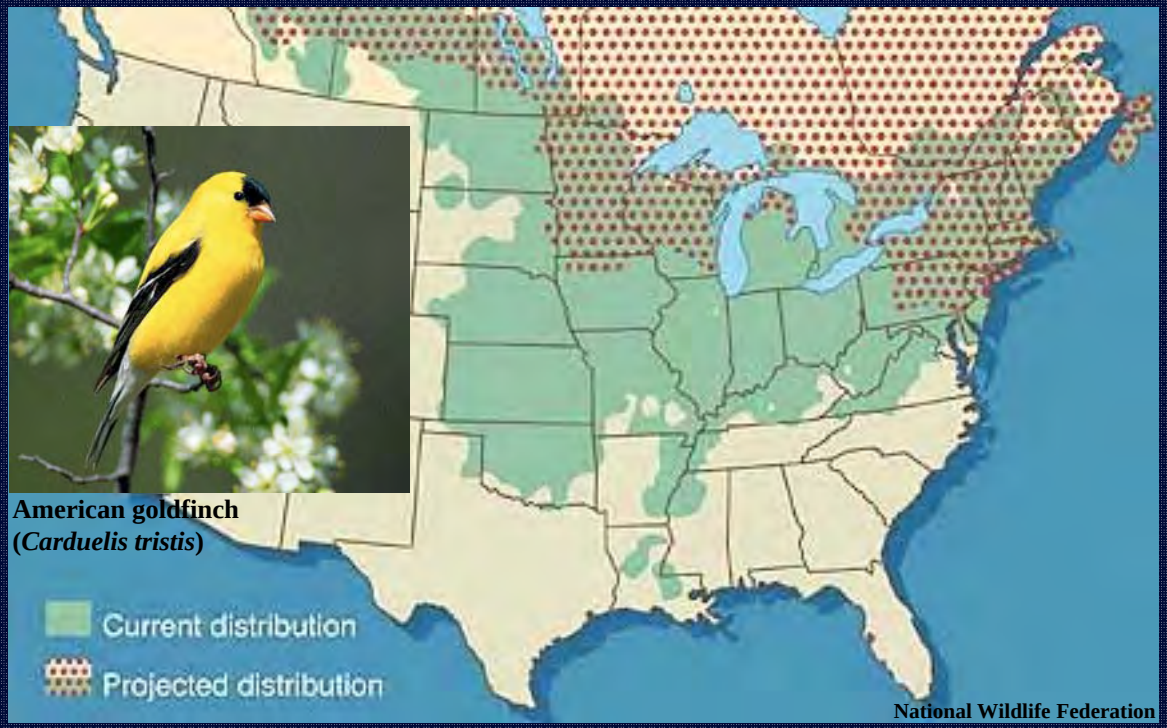
Changes in Abundance & Distribution



American goldfinch
(*Carduelis tristis*)

Climate Change Impacts: Animals

Changes in Abundance & Distribution



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✧ **Responses of species will depend on their climatic tolerances and on responses of key species they rely on**

Climate Change Impacts: Animals

Changes in Abundance & Distribution

Photo by T. Meyer

- **Specialists and threatened species likely to be most challenged (e.g., Karner Blue butterfly: *Lycaeides melissa samuelis*)**

Major Threats To Biodiversity

- **Habitat Destruction**
- **Invasive Species**
- **Pollution**

Clark and Pine Nature Preserve in Gary, Indiana.
Photo: Mike MacDonald/ChicagoNature.com

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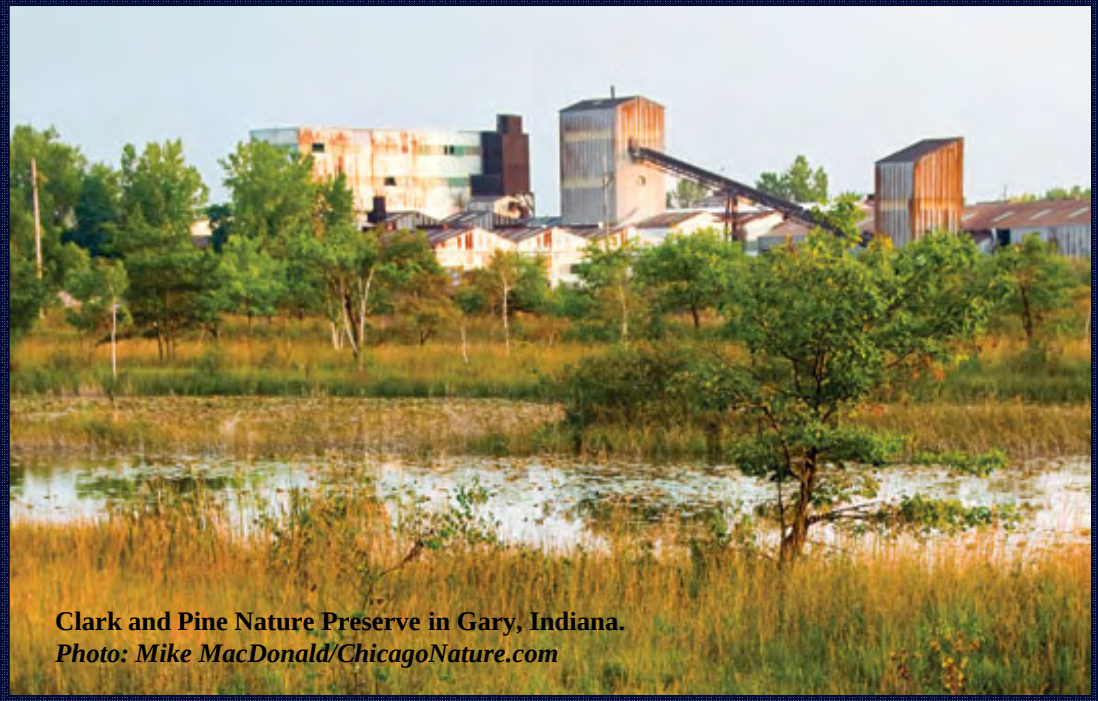


Clark and Pine Nature Preserve in Gary, Indiana.
Photo: Mike MacDonald/ChicagoNature.com

*****CLIMATE CHANGE IS A THREAT AMPLIFIER*****

Climate Action Plans

City of Chicago Climate Action Plan

- Human population
- Buildings
- Transportation infrastructure
- Landscaping

- Urban forests
- Water infrastructure
- Vacant land

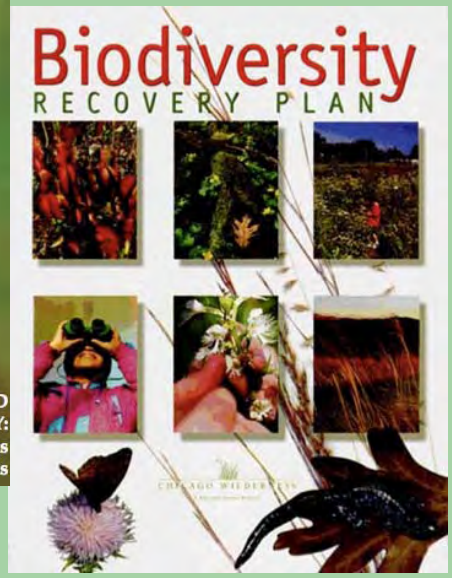
Chicago Wilderness Climate Action Plan for Nature

- Rivers and lakes
- Restored natural areas
- Remnant natural areas
- Native species

Climate Action Plans

Over 360,000 acres of protected open space

Chicago Wilderness Climate Action Plan for Nature



Biodiversity Recovery Plan
Climate Change Review

Climate Change Update

- What Is It?
  - Identify and understand the specific ways natural communities, and existing threats, will be affected by climate change
  - Examine if strategies needed to promote biodiversity adaptation differ from current restoration/conservation strategies
  - Outline actions to help natural communities adapt to both current and future landscapes

Biodiversity Recovery Plan
Climate Change Review

Climate Change Update

- What Is The Process?
  - Composite information from 2 workshops (Feb, July 2009)
  - Input and feedback from members of the CW Climate Change Task Force
  - Input and feedback from regional/local experts in climatology, ecology, biology, genetics, environmental science, and natural resource and land management

Biodiversity Recovery Plan
Climate Change Review

Climate Change Update

- Where Are We Now?
  - Internal content review by the Task Force and Research Specialists
  - Workshop with land managers to get input on adaptation strategies
  - Open review for CW members
  - Living document on-line web portal: interactive with blog and chat applications, annual updates of content

X	X	Increased temperatures and changes in precipitation patterns will alter seasonal patterns of snow accumulation and snowmelt.	X							
X	X	Increased temperatures will promote species that are invasive or act as disease vectors.			X		X	X	X	
X		Increased temperatures will lead to mismatched shifts in timing of various ecological events (e.g., budburst), leading to disruptions in species inter								
X		Increased te...etc) will lead to differential shifts in ranges due to differences in dispersal abilities/rates, leading to disruption of key species interactions ("tearing apart of communities").		X						

Savannas/Forested Communities

TERRESTRIAL COMMUNITIES

Change in structural diversity

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X	X	Increased temperatures and changes in precipitation will drive human changes in land and resource use, leading to more habitat loss.	X	X					X	
X	X	Increases in ambient CO_2 concentrations, temperature, and drought stress may lead to changes in the competitive ability of native C3 and C4 plants relative to each other and to invasives (but interactions are complex).						X	X	

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				of warm water (combination of increased temperature effect, and increased storm intensity)							
X	X			Increased temperatur **Climate Change Impacts** id/ephemeral stream, further isolate/fragment and stress wetlands/riparian habitats that remain.	X	X				X	
X				Increased temperatures and lake level drops will increase pressure on groundwater resources, threatening groundwater fed systems.	X						
		X	X	Increased temperature will reduce the duration/extent of ice cover on lakes.	X						
		X		Climatic changes will lead to changes in wind patterns, which alter the circulation of water in coastal areas (bays).	X						
X	X	X	X	Overland flow from storm events will expose sensitive systems to pulses of warm water (combination of increased temperature effect, and increased storm intensity).	X						
X	X			Increased temperatures will lead to drying of wetland/ephemeral stream, further isolate/fragment and stress wetlands/riparian habitats that remain.	X	X				X	
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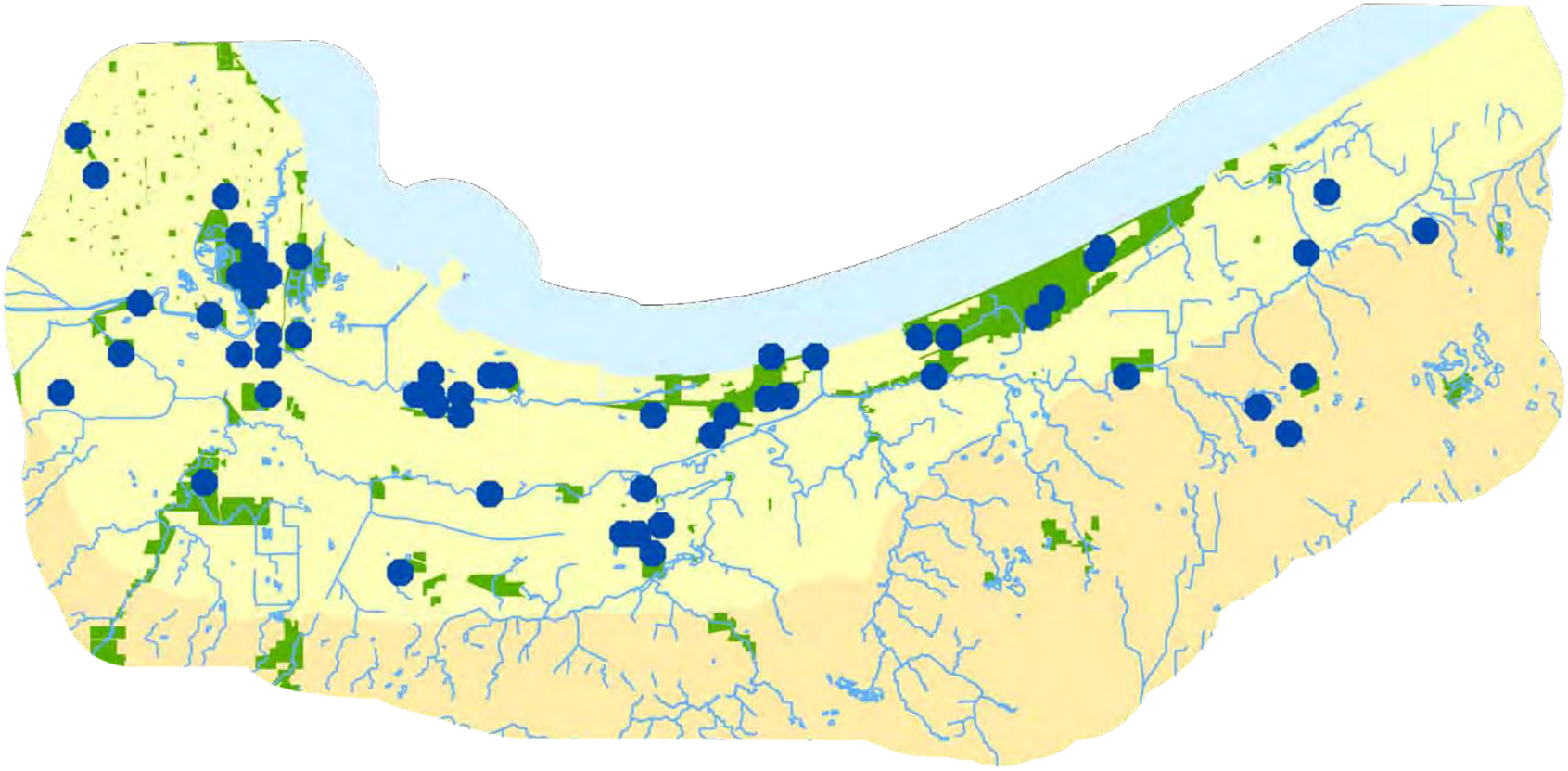
		X	X	Increased temperatures/evapotranspiration will lead to drops in lake levels & promote shifts in the location of coastal and nearshore habitats.				X		X	
X	X	X		Increased demand for biofuels will intensify potential for run-off/erosion related impacts on aquatic systems as land is converted and usage of fertilizer and pesticides increases.			X	X			
		X		Drops in lake levels will expose toxic sediments.			X				
		X		Drops in lake levels will expose more nearshore areas to aquatic invasives like *Phragmites*.		X			X		

Wetlands, Wet Prairies, Wet Swales

- **62% of Calumet Region Restoration Sites**



CW Magazine Calumet Region Map - Bouman et al 2009

Data from: An Assessment of Restoration and Stewardship in the Calumet Region of Illinois and Indiana, 2009; Restoration Inventory Project, 2006

Hydrology in the Calumet Region

- Most of the hydrologic systems in the Calumet region have been altered

- Changing precipitation patterns change (e.g., overall drier summers, more severe flood events) will create even greater challenges for these systems

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  - Wetlands disconnected from lake, floodplains, and from each other
  - Emergent marshes drying up

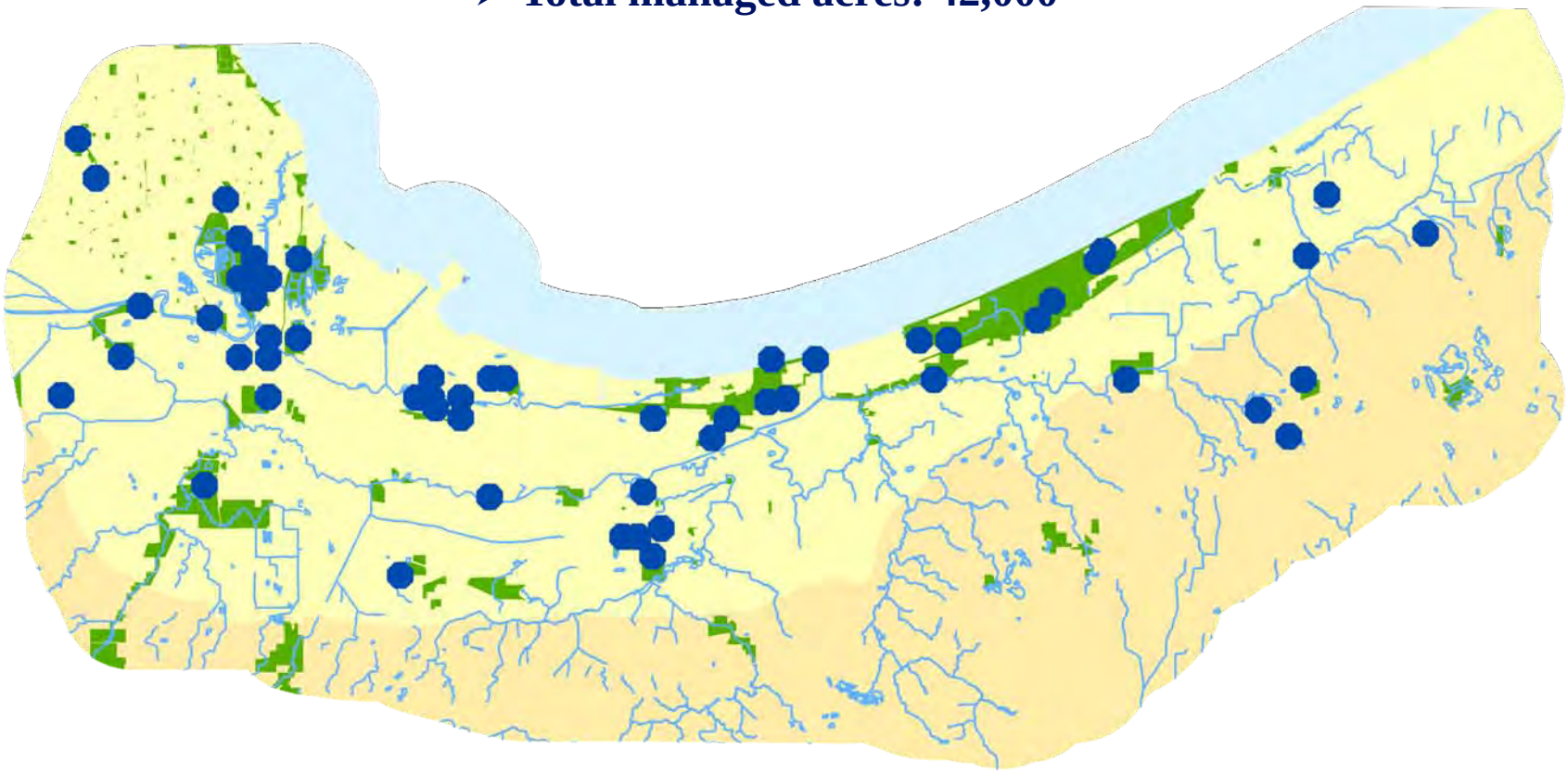
General Adaptation Strategies

Examples

- Make current projects “climate smart”: e.g., sediment remediation project along West Branch of Grand Calumet River
- Manage species that reduce water from permanent water habitats (e.g., cottonwoods, cattails, *Phragmites* in Spangler Fen)
- Keep full hydrologic gradient intact within natural communities

Wetlands, Wet Prairies, Wet Swales

- **Total acres in CW Calumet Bi-State area: 551,000**
- **Total managed acres: 42,000**



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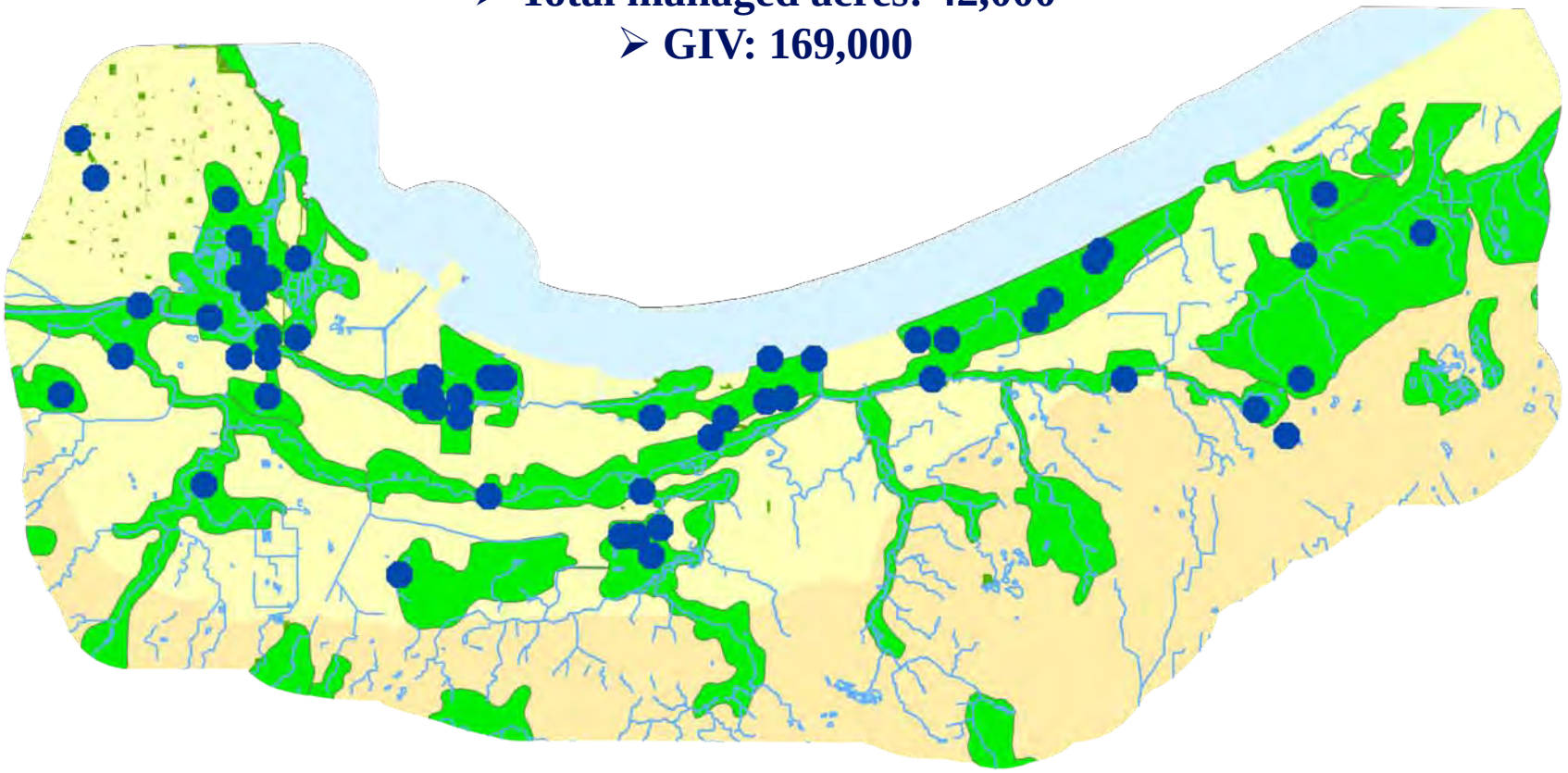

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Shifting Landscapes, Shifting Perspectives?

Examples

- How might our perspective on ecological concepts change?
  - "Native" species
  - Best Management Practices
  - Restoration

Shifting Landscapes, Shifting Perspectives?

Examples

- How might our perspective on ecological concepts change?
  - "Native" species
  - Best Management Practices
  - Restoration

- Overall focus on ecosystem functionality
  - Managing for the arenas, not the players

ACKNOWLEDGEMENTS

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Paul Labus
Kirk Anne Taylor
Kim Hall
CW Climate Change Task Force

The Field Museum

Chicago Wilderness


Tiger Salamander, photo by Scott Albert


Karner Blue Butterfly


Fringed gentian, photo by Doug Sherman


Blue-winged warbler


Hine's Emerald Dragonfly