



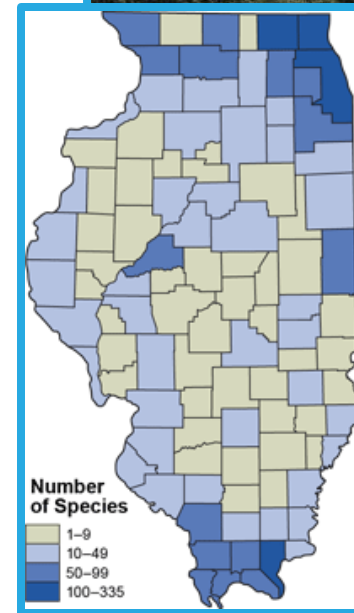
# Ecosystems and Climate Change





# Chicago: Urban Area Ecosystem

- Urban forests
- Prairies, savannas, marshes
  - 11% of Cook County consists of protected lands
- Lake Michigan
- High diversity of native species (e.g. plants)
- Wildlife (e.g. hawks, snakes, fox, coyotes)



*Populations of Endangered and Threatened Species in IL (IDNR, 1993)*



# Ecosystems and Climate Change

- Climate is an important environmental influence on ecosystems
- Climate change can alter **where** species live and **how** they interact
  - Potential to fundamentally transform current ecosystems



# Ecosystems and Climate Change

- Temperature
- Precipitation
  - When we receive it
  - How we receive it
- Not just weather and climate...
  - Length of day
  - Ice cover



Above: Chicago Botanic Garden

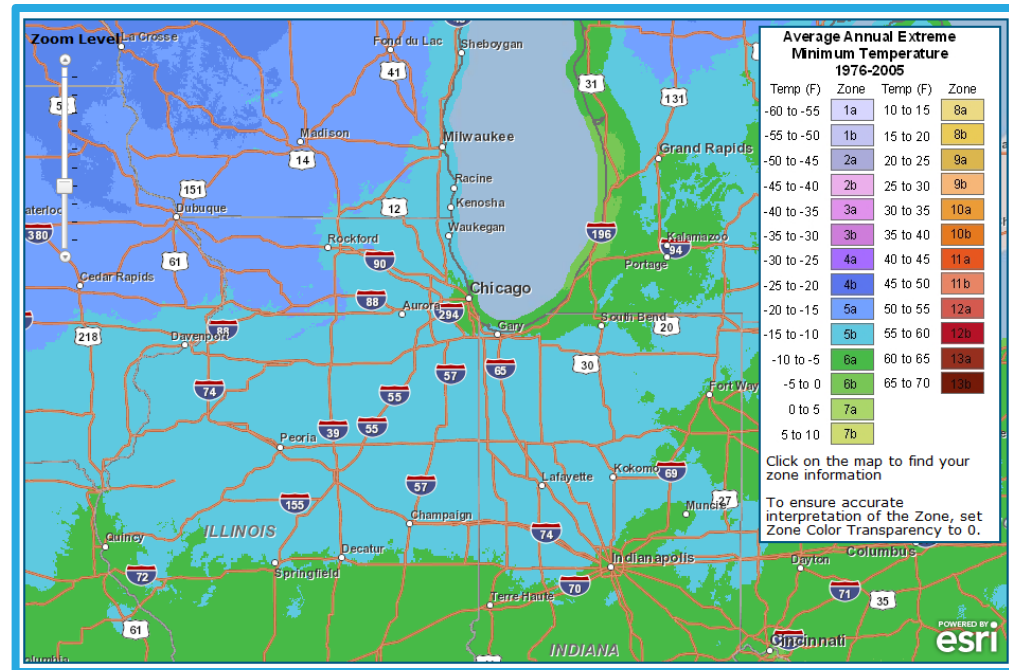


Left: Plant Hardiness Zones (USDA)



# Temperature Changes

- Plant hardiness zones
  - Determined by the extremes of winter cold
  - Guides the selection of plants for both ornamental and agricultural purposes
  - Zones are changing as climate warms



*Plant Hardiness Zones (USDA)*



# Temperature Changes

## Shifts in Plant Hardiness Zones

Zone Changes in Past 10 Years  
In color of New Planting Zone



Zone Changes in Next 30 Years  
In color of New Planting Zone



### Average Annual Extreme Minimum Temperature by Climate-Related Planting Zone

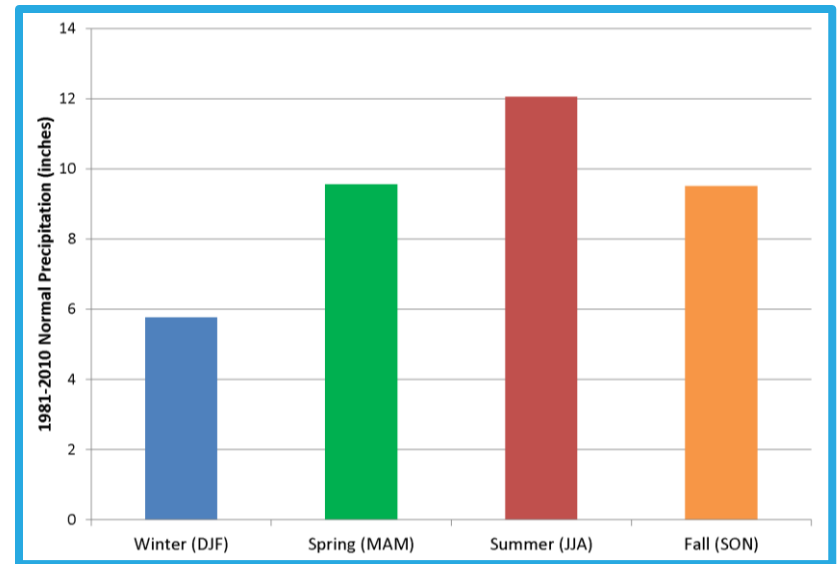


**Figure 31.** The map on the left shows the change in Plant Hardiness Zones calculated from those based on the 1971-2000 climate to those based on the 1981-2010 climate. Even greater changes are projected over the next 30 years (right). (Figure source: NOAA).



# Precipitation Changes

- Seasonal precipitation patterns
- Intensity of precipitation



1981-2010 precipitation normals by season (Chicago O'Hare Airport)







# NCA Key Messages on Ecosystems

Landscapes and seascapes are changing rapidly, and **species**, including many iconic species, **may disappear from regions** where they have been prevalent or become extinct, altering some regions so much that their mix of plant and animal life will be come almost unrecognizable.



**Timing of critical biological events**, such as spring bud burst, emergency from overwintering, and the start of migrations, has shifted, leading to important impacts on species and habitats.



The **composition of the Midwest's forests is expected to change** as rising temperatures drive habitats for many tree species northward. **Increased vulnerability due to fire, insect infestation, drought, and disease outbreaks.**



Climate change will exacerbate a range of risks to the Great Lakes, including changes in the range and distribution of certain fish species, increased invasive species and harmful blooms of algae, and declining beach health.

