

ON TO 2050

Natural Resources Snapshot

Protecting our region's assets

February 1, 2018

Presentation agenda

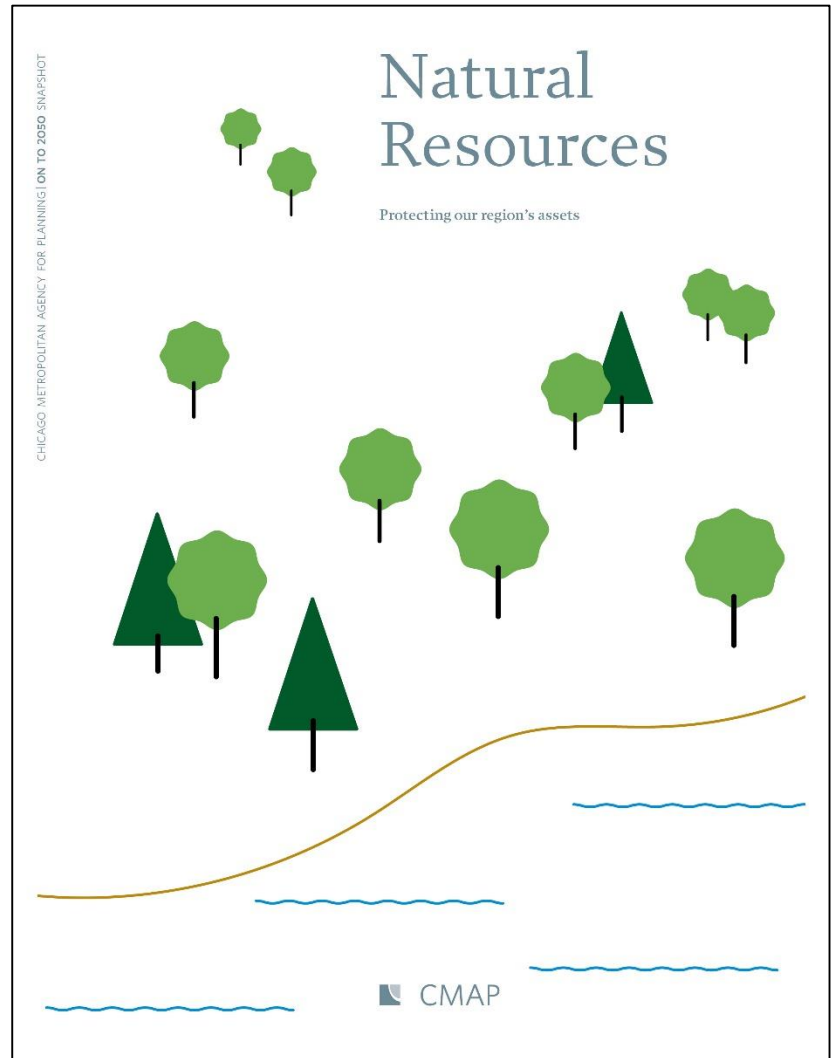
- Purpose and scope
- Content overview
- Questions and discussion

Purpose of natural resources snapshot

- Lend existing conditions and trends background to environmental topics
- Draw upon and support other ON TO 2050 development work

Content overview

- Ecosystem services
- Primary drivers
 - Climate change
 - Development
- Current conditions
 - Habitat
 - Parks and recreation
 - Water quality
 - Water supply
 - Air quality



Ecosystem services

- Framing concept
- Region's natural areas provide at least \$6.4 billion in value annually
- These services are reduced by climate change, development, and habitat degradation



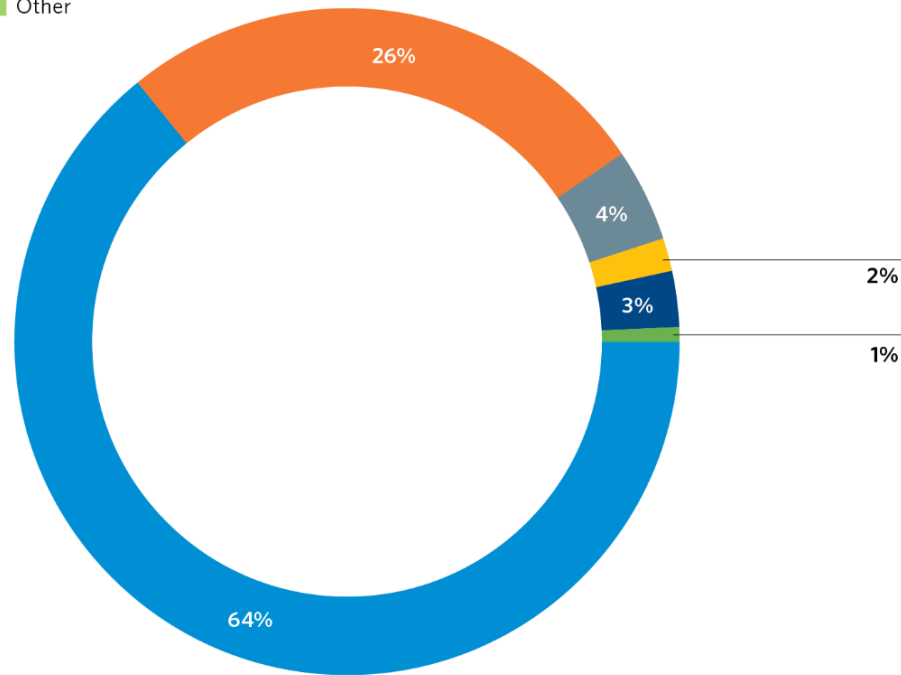
Photo by Brian Plunkett via Flickr

2010 GHG Emissions Inventory

Emissions by sector, CMAP region, 2010

Source: Chicago Metropolitan Agency for Planning
2010 Regional Greenhouse Gas Emissions Inventory.

- Building energy
- On-road transportation
- Rail and off-road transportation
- Waste and wastewater
- Solid waste
- Other



Drivers: climate change

2010 GHG Emissions Inventory

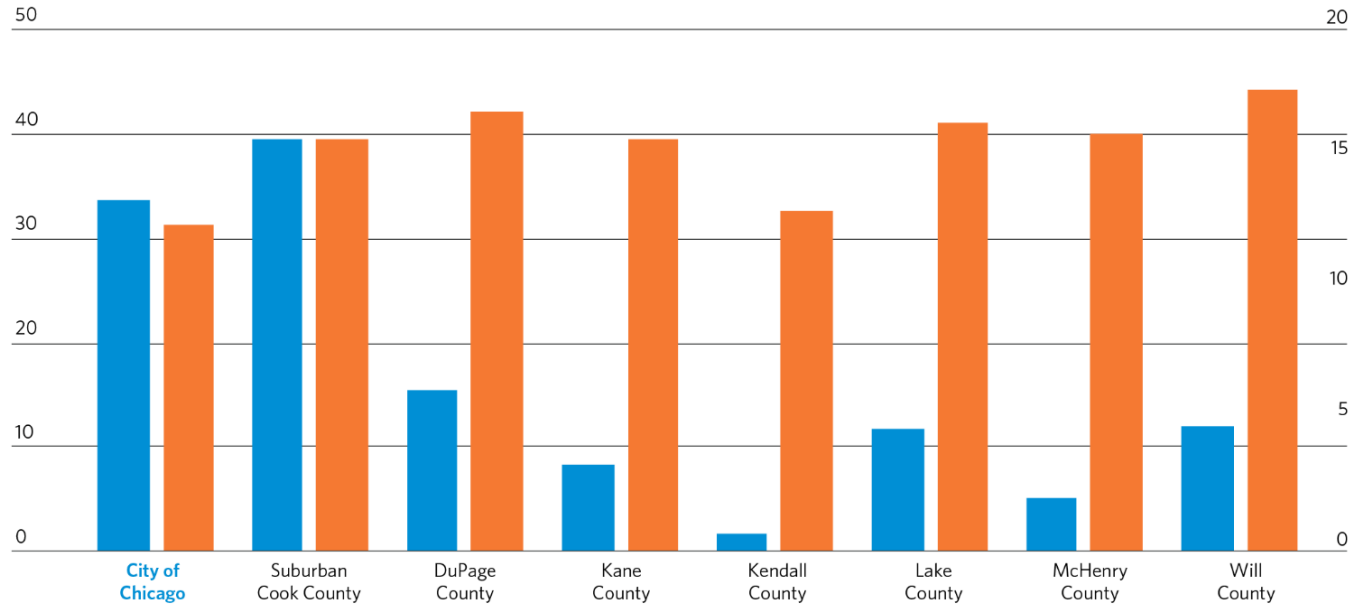
Emissions by county and City of Chicago, 2010

Source: Chicago Metropolitan Agency for Planning
2010 Regional Greenhouse Gas Emissions Inventory.

■ Per capita
■ Total

Total emissions
(MMT_{CO₂e})

Per capita emissions
(MTCO₂e)



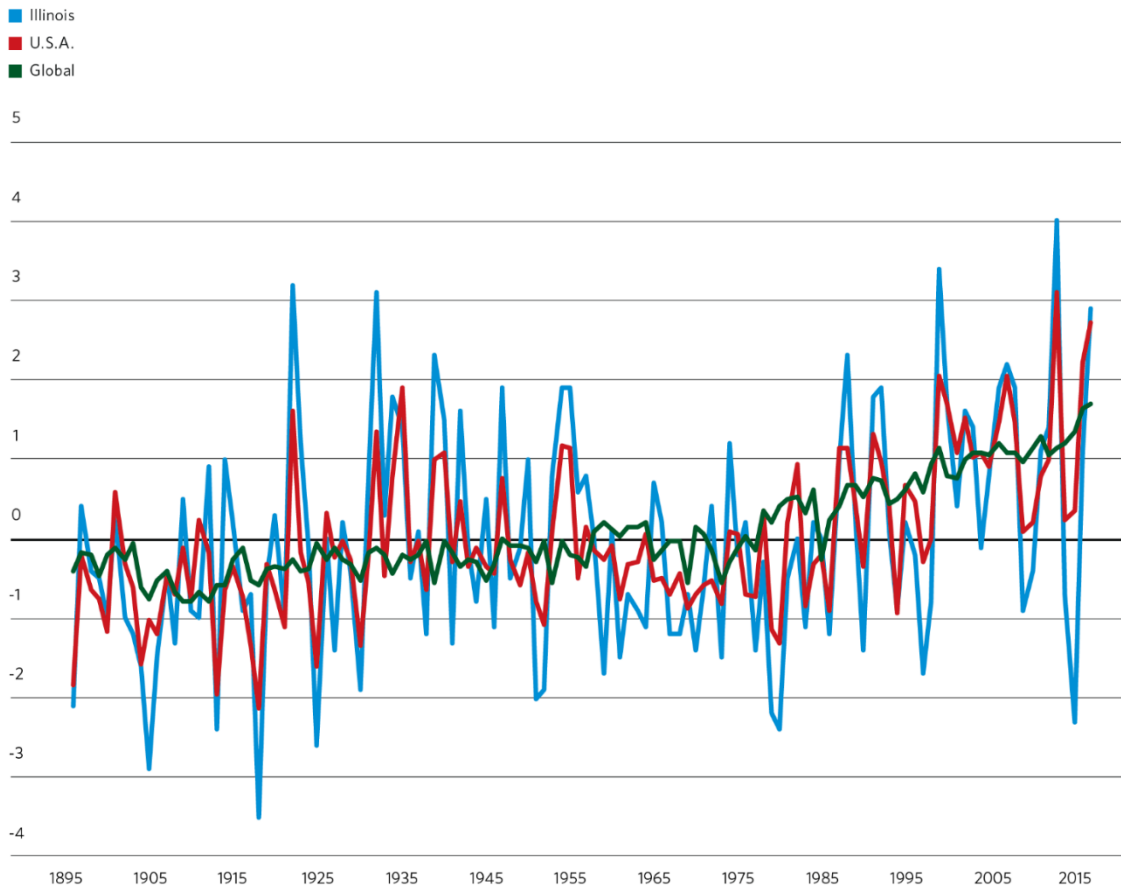
Drivers: climate change

The region's climate is becoming warmer, wetter, and more variable

- Average annual temperatures have increased by 1.5° F

Average temperature anomalies, in degrees Fahrenheit, 1895-2015

Source: National Centers for Environmental Information, "Climate at a Glance," National Oceanic and Atmospheric Administration, 2017.



Drivers: climate change

The region is becoming warmer, wetter, and more variable

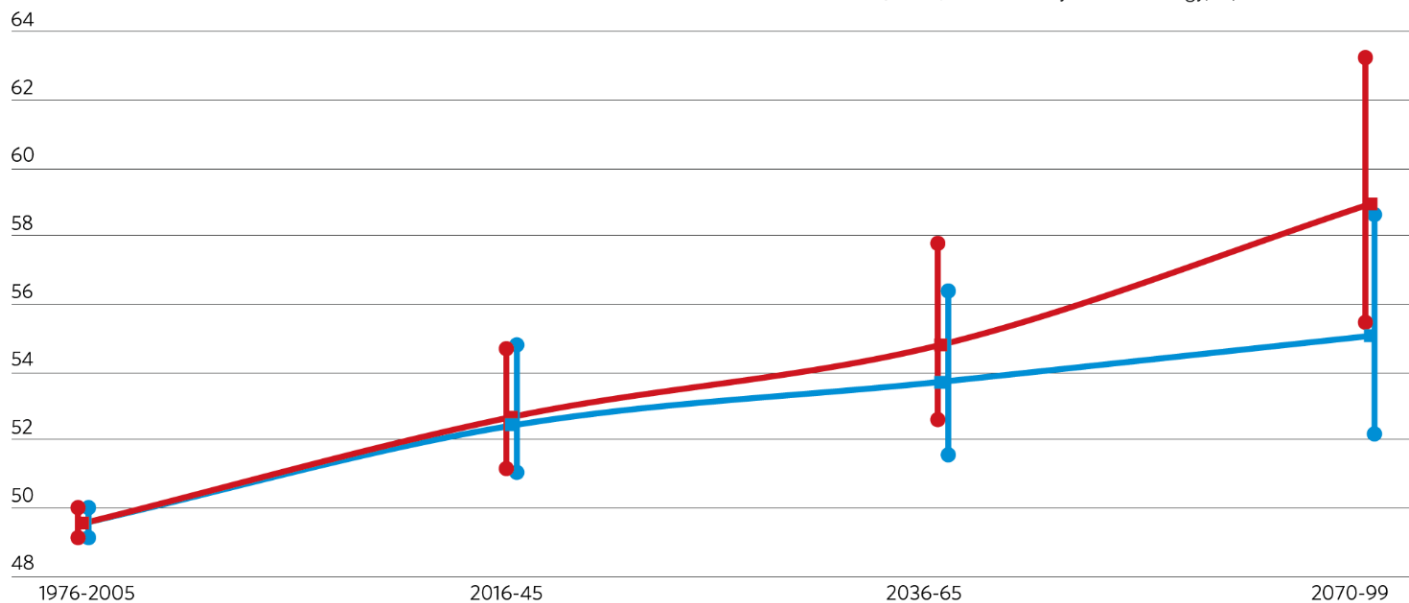
- Temperatures are expected to rise by 3-13° F by 2100

Range of projected daily average temperature, in degrees Fahrenheit, in northeastern Illinois

- High-emissions scenario mean
- Low-emissions scenario mean

Note: Under a scenario that assumes emissions will continue to increase, regional temperatures are expected to increase by nine degrees Fahrenheit above historical levels. Under a lower emissions scenario, regional temperatures are expected to increase by five degrees above historical levels.

Source: D.W. Pierce, D. R. Cayan, and B. L. Thrasher, 2014: Statistical downscaling using Localized Constructed Analogs (LOCA). *Journal of Hydrometeorology*, 15, 2558-85.



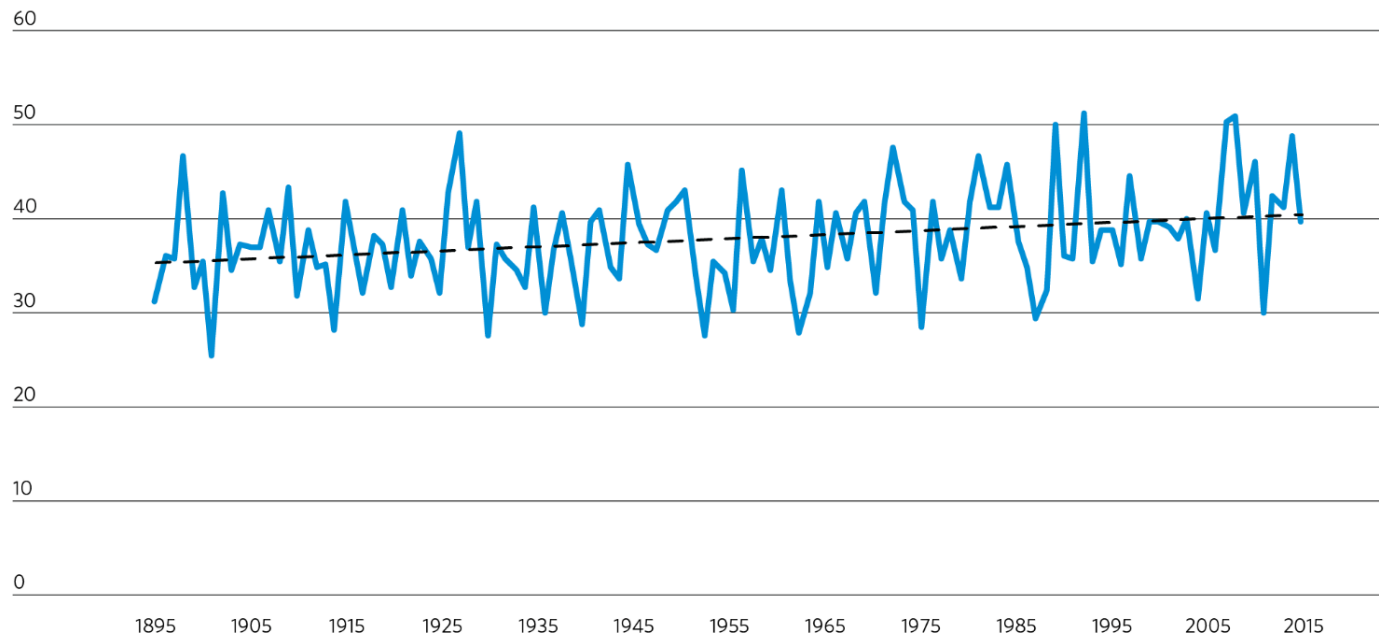
Drivers: climate change

The region is becoming warmer, wetter, and more variable

- Average annual precipitation has increased steadily
 - Most dramatic increases have been seen in the number of very large storms

Average annual precipitation, in inches, Illinois, 1895-2015

Source: National Centers for Environmental Information, "Climate at a Glance," National Oceanic and Atmospheric Administration, 2017.



Drivers: climate change

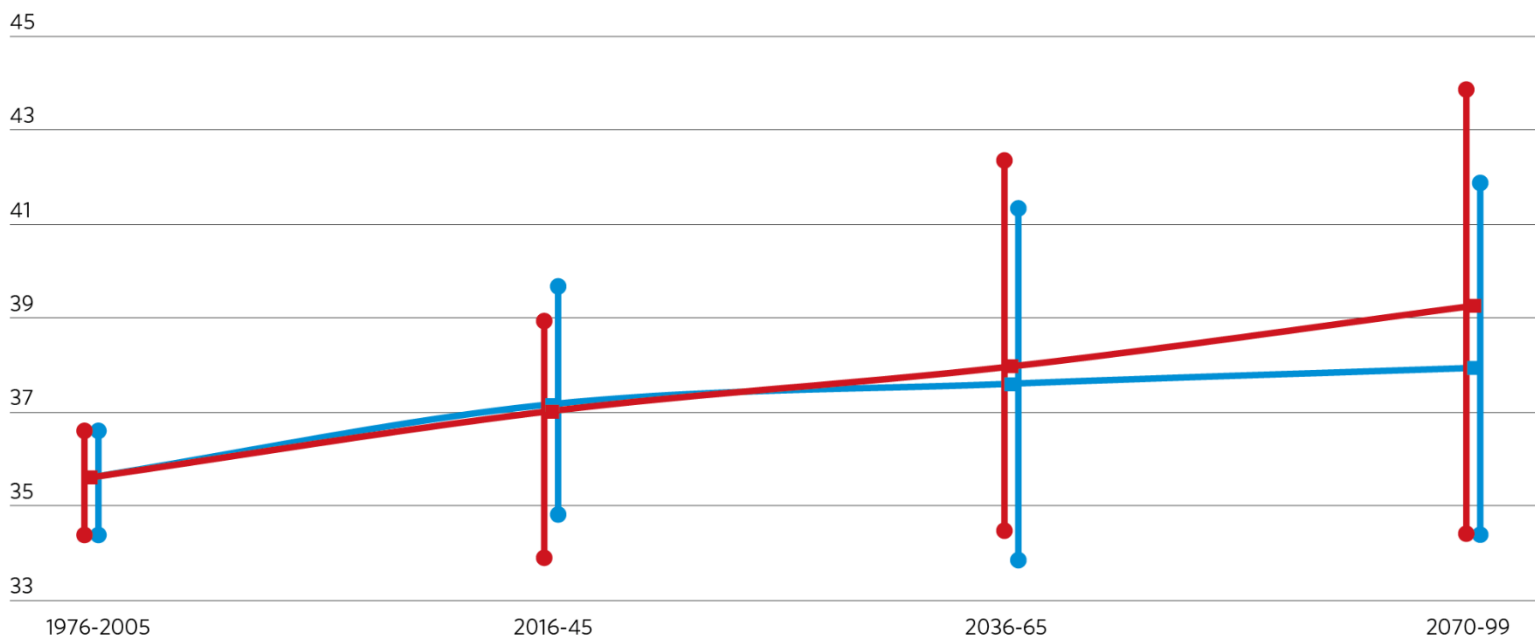
The region is becoming warmer, wetter, and more variable

- Modest increases in annual precipitation: 2-4 inches (mean)
 - Large increases are expected in seasonal and year-to-year variability

Range of projected annual total precipitation, in inches, in northeastern Illinois

Source: D.W. Pierce, D. R. Cayan, and B. L. Thrasher, 2014: Statistical downscaling using Localized Constructed Analogs (LOCA). Journal of Hydrometeorology, 15, 2558-85.

■ High-emissions scenario mean
■ Low-emissions scenario mean



Drivers: climate change

The climate is changing

Mitigation alone will not be sufficient

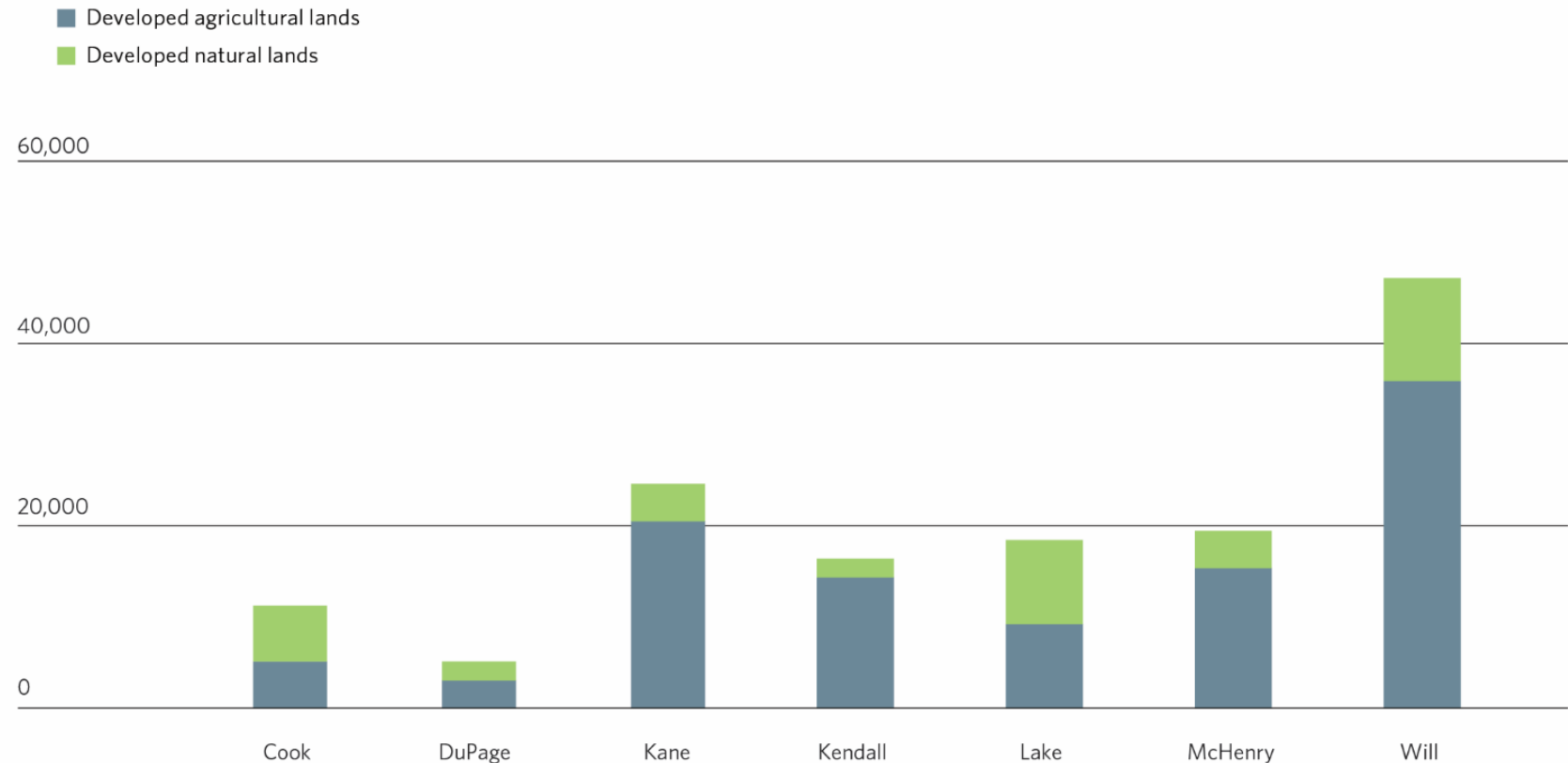
- Reduced ecosystem services
- Property damage and transportation delays
- Regional, national, and global impacts

Drivers: development

Development of agricultural and natural lands

Land development, in acres, CMAP region, 2001-15

Source: 2001-11 National Land Cover Dataset and 2015 Northeastern Illinois Development Database.



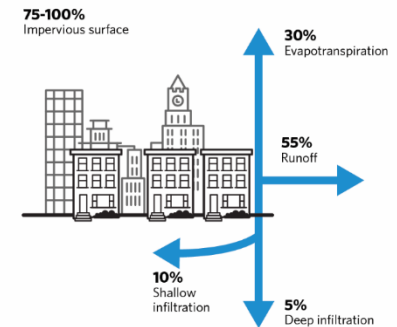
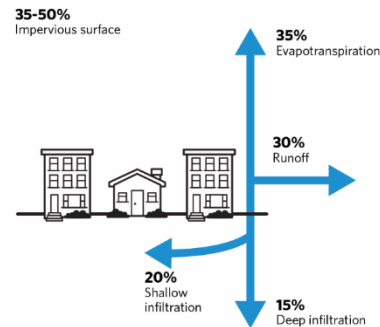
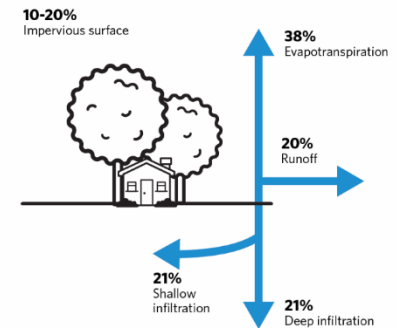
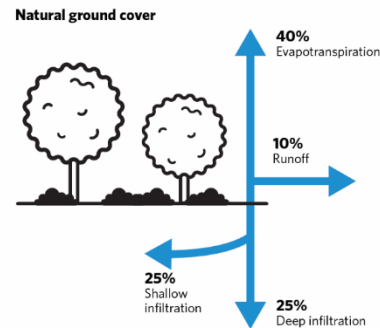
Drivers: development

Impervious surfaces

- Stormwater runoff increases flood risk and reduces water quality

Effect of imperviousness on stormwater

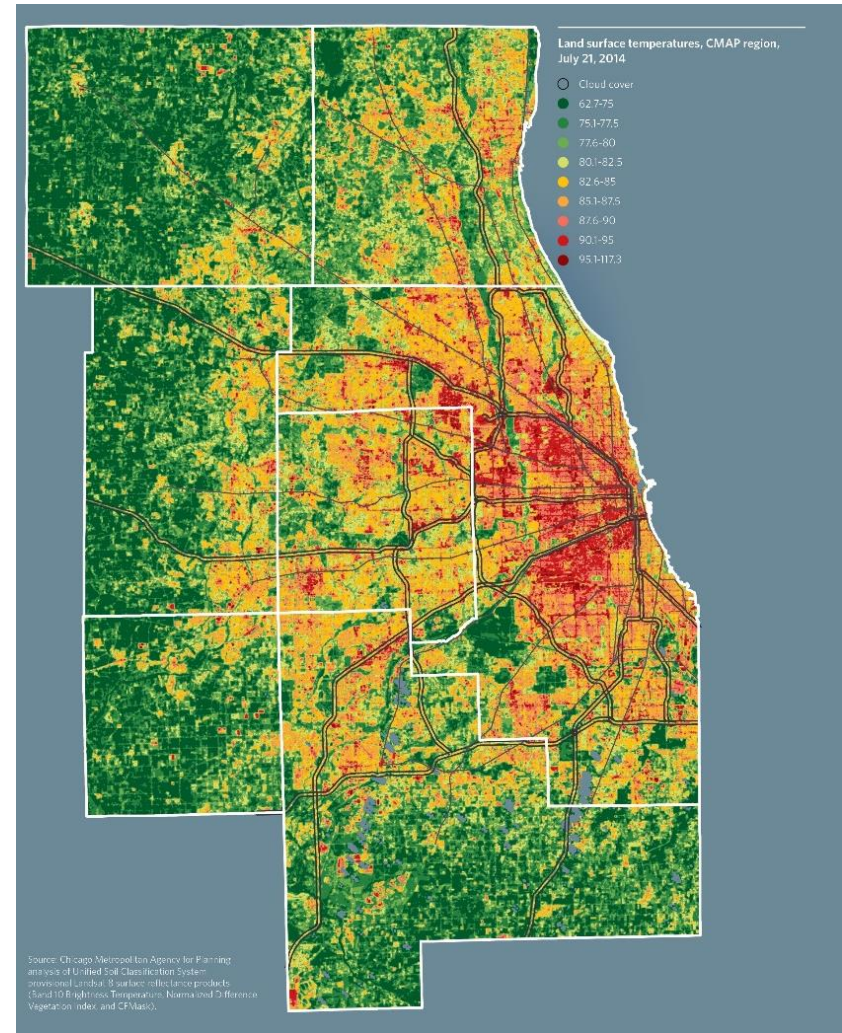
Data source: U.S. Environmental Protection Agency, Impervious Surfaces and the Hydrologic Balance of Watersheds.



Drivers: development

Impervious surfaces

- Stormwater runoff increases flood risk and reduces water quality
- Affects extreme heat and climate patterns through the urban heat island effect



Current conditions: habitat

6 primary habitat types



Prairies



Savannas



Forests



Wetlands



Inland lakes and streams



Lake Michigan

Current conditions: habitat

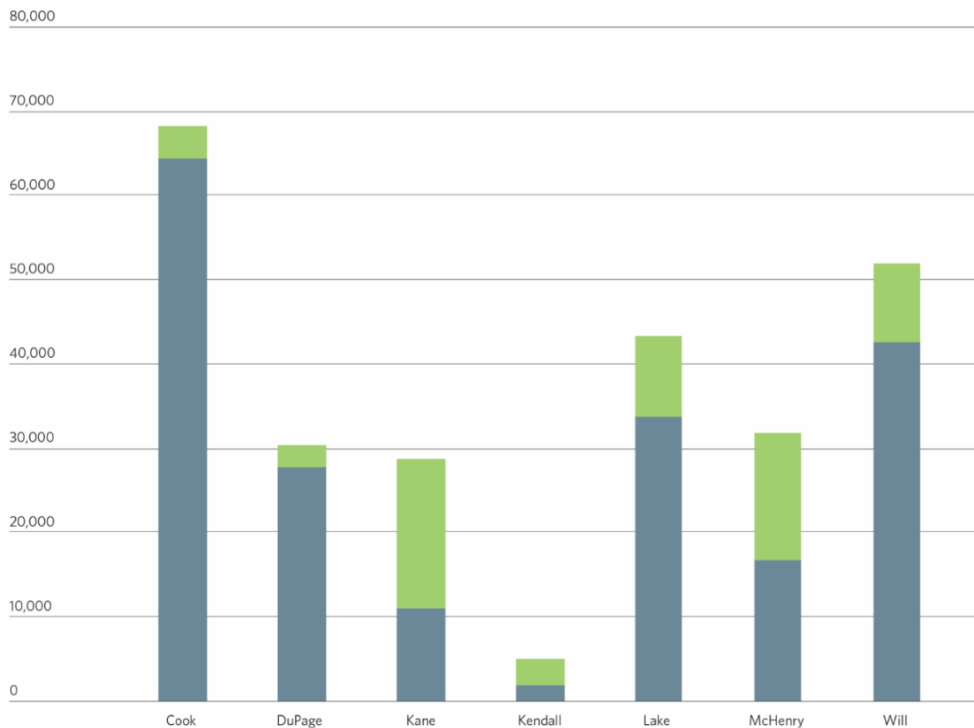
Land conservation

2001-2015: 61,500 acres were preserved

Land conservation, in acres, CMAP region,
prior to and since 2001

- Protected prior to 2001
- Protected since 2001

Source: Chicago Metropolitan Agency for Planning Land Use Inventory, Illinois Department of Natural Resources, County Forest Preserves or Conservation Districts, Kendall County Forest Preserve District Master Plan, and I-View: Prairie State Conservation Coalition's database of Illinois protected natural lands.



Current conditions: habitat

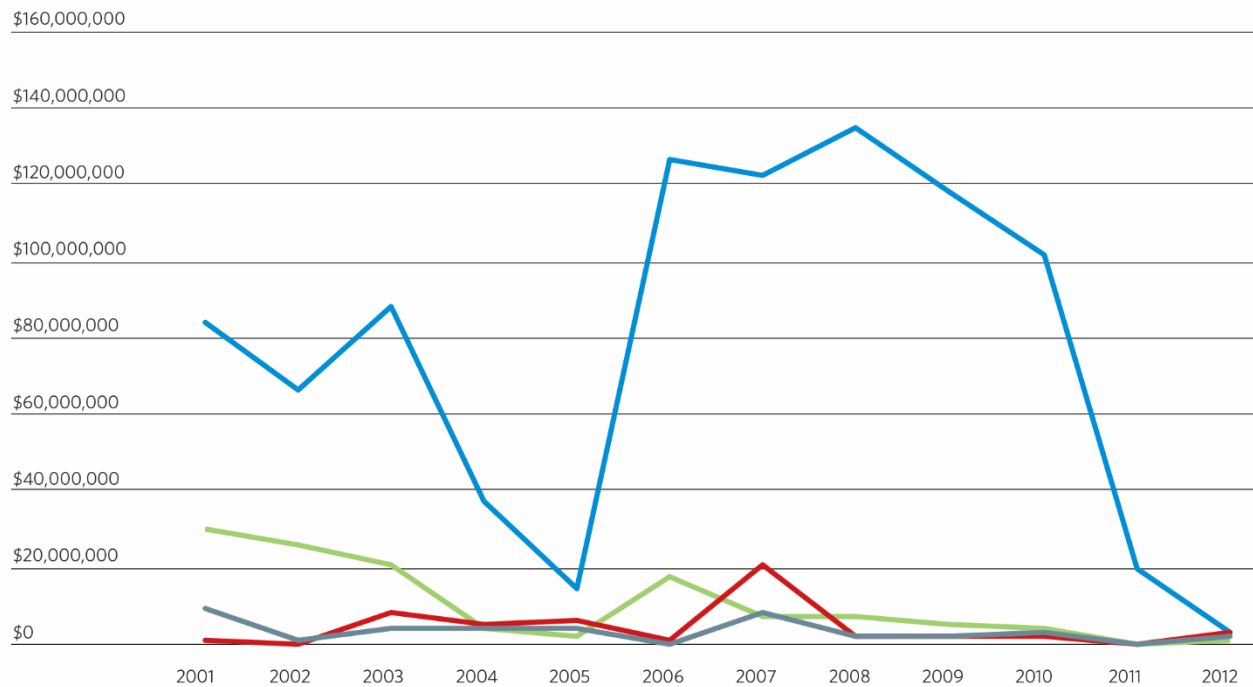
Land conservation funding

Conservation funding by source, 2001-12

- Local funding
- State funding
- Federal funding
- Other

Note: Data from the Trust for Public Land's Conservation Almanac, shown here, does not account for all municipally funded conservation projects.

Source: The Trust for Public Land, Conservation Almanac, 2016.



Current conditions: habitat

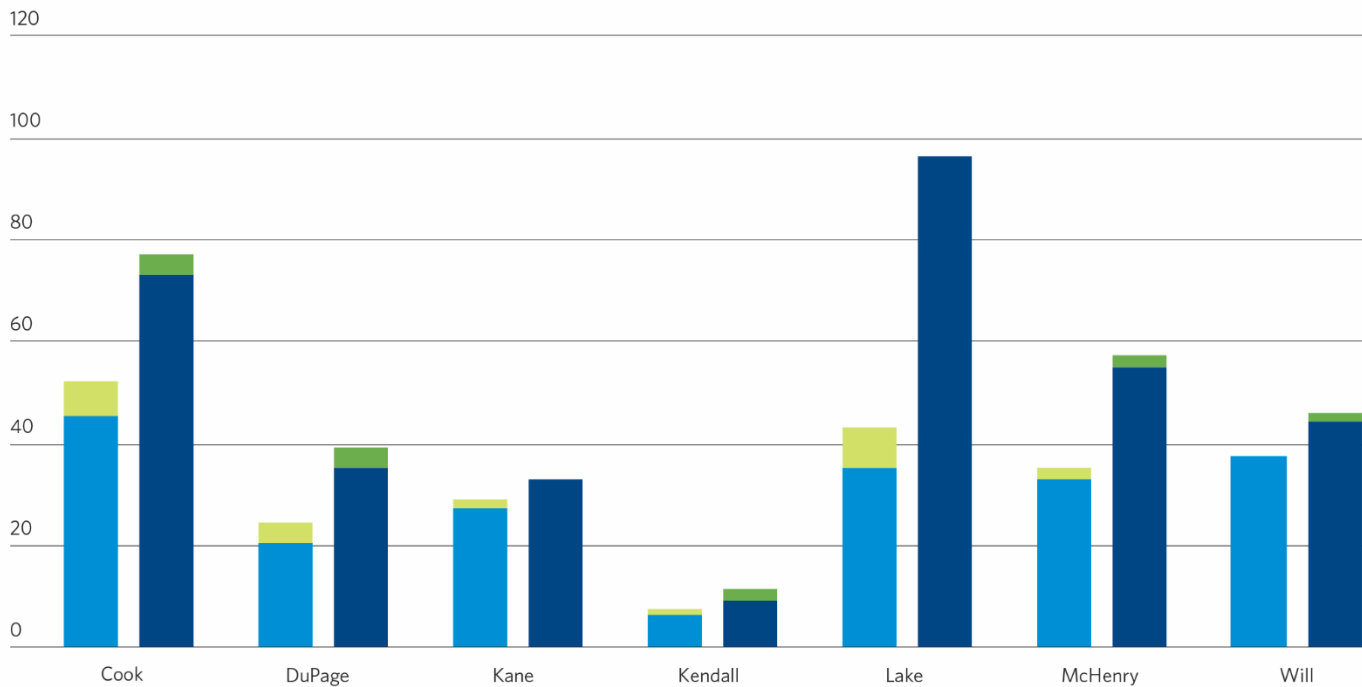
Threatened and endangered species

Threatened and endangered species by county

- Illinois threatened
- Federally threatened
- Illinois endangered
- Federally endangered

Note: All species on the federal lists are also included on state lists.

Source: Chicago Metropolitan Agency for Planning analysis of Illinois Department of Natural Resources and U.S. Fish and Wildlife Service data.



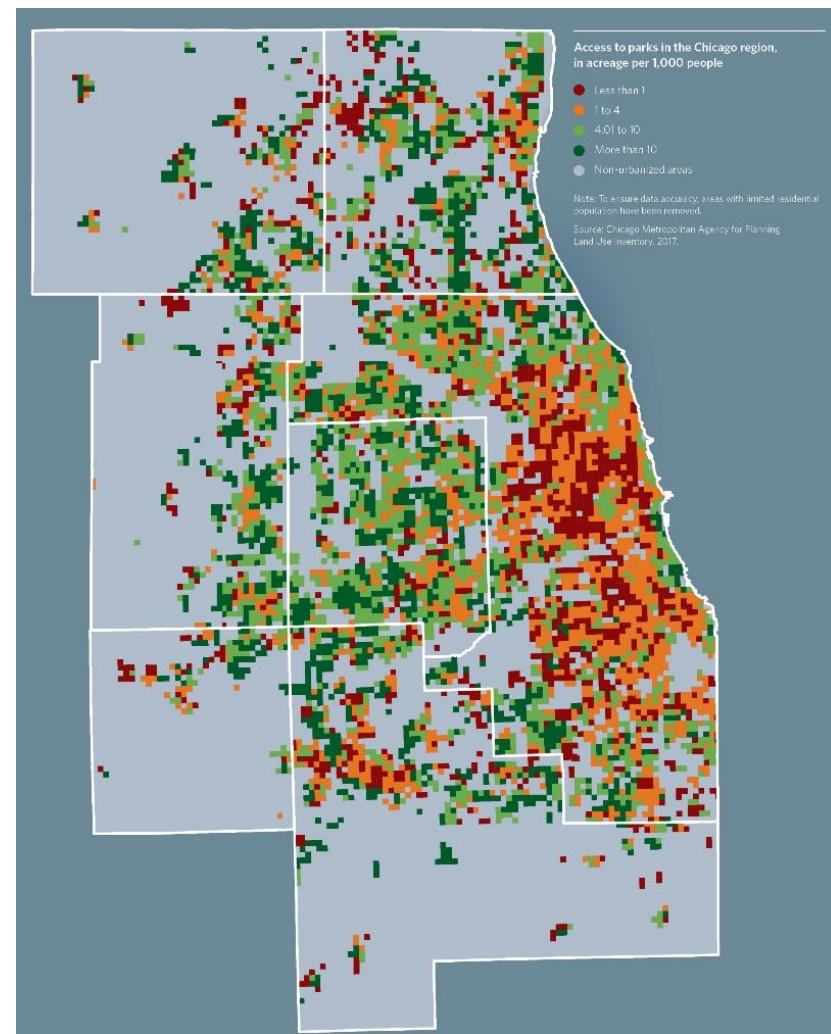
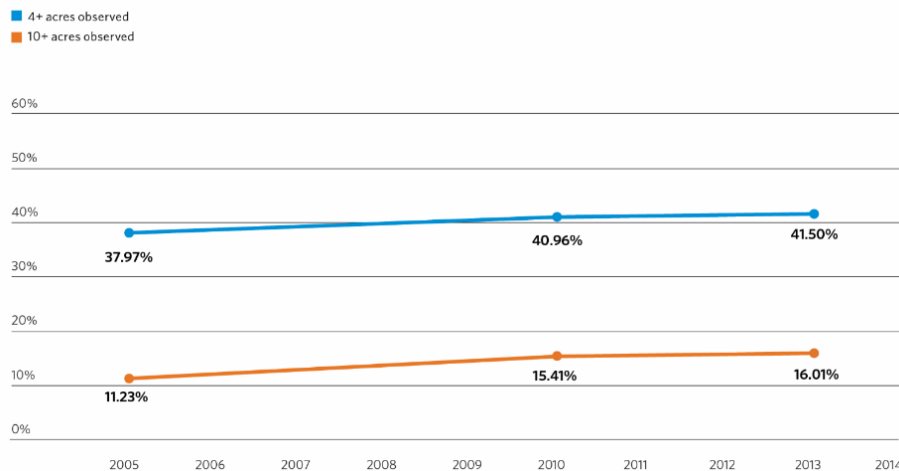
Current conditions: parks and recreation

Park access

- Updated methodology
- Steady improvement at both levels

Regional access to parks

Source: 2010 Census, Chicago Metropolitan Agency for Planning 2010 Land Use Inventory, and Chicago Park District.



Current conditions: parks and recreation

Regional Trails Plan

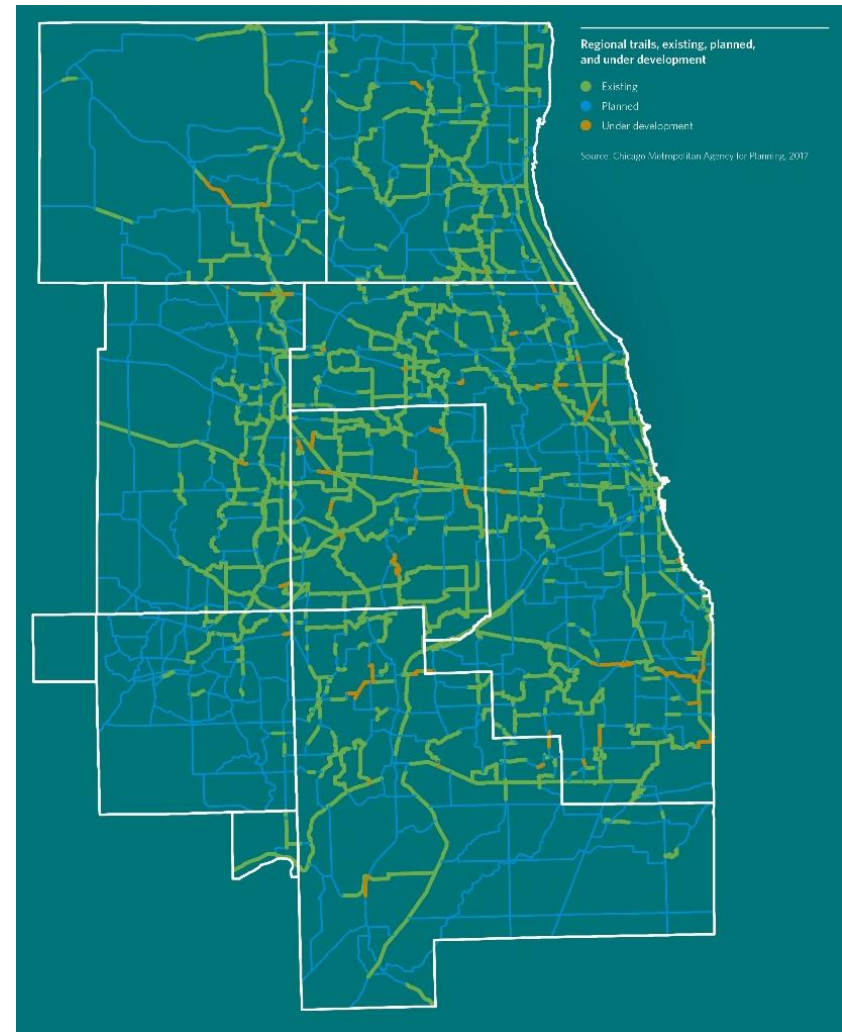
- System has expanded significantly during the last 20 years

Regional access to parks

Note: the original 1992 plan did not track trail completion progress, but identified 1000 miles of greenways, of which 35% were publicly owned at that time. I don't think this is comparable to trails completion. Trails were emphasized beginning in 1997, at least partly as organizing lines around which greenway corridors could be purchased.

Northeastern Illinois Regional Greenways and Trails Plan - Regional Trails Plan Completion Tracking

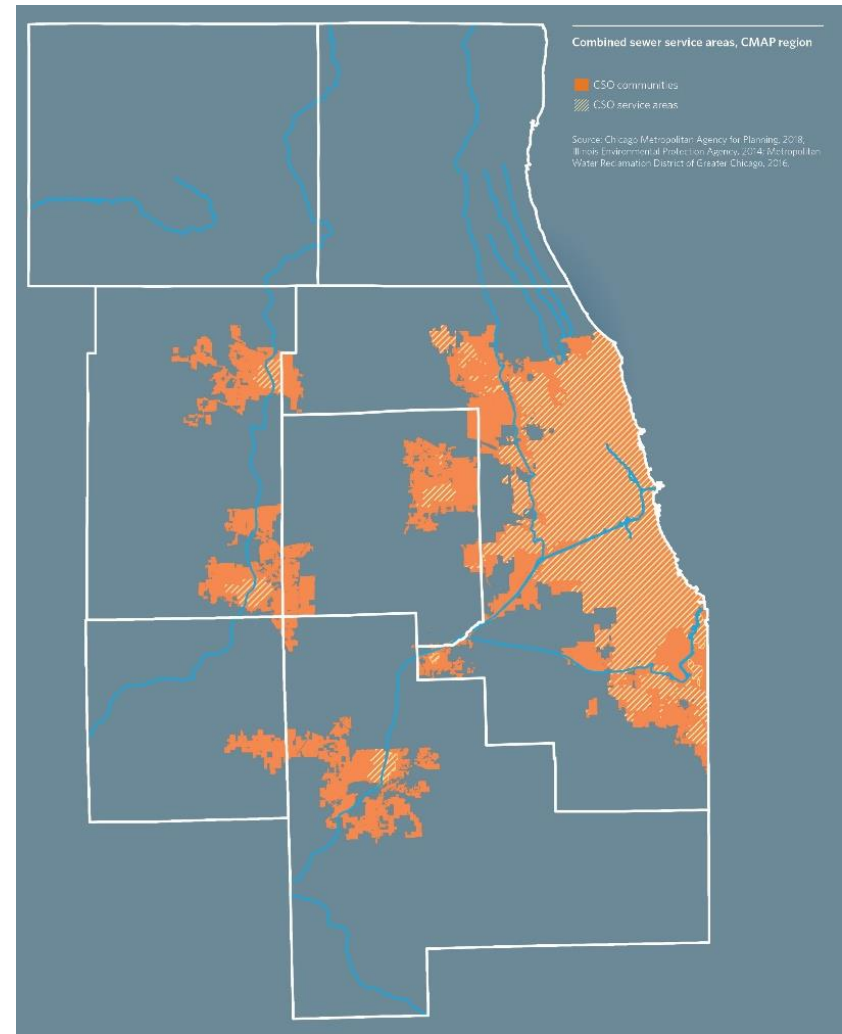
Plan Update Year	Total Length of System (in miles)	Length of System Complete (in miles)	Percent Complete
1997	2000	500	25.0%
2009	2720	998	36.7%
2017	3168	1313	41.4%



Current conditions: water quality

Combined sewer overflows

- Major source of water contamination



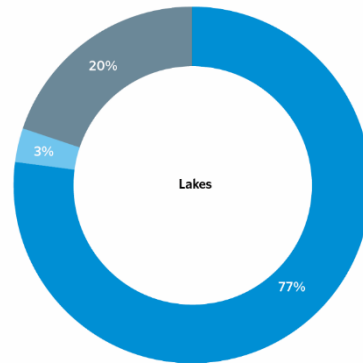
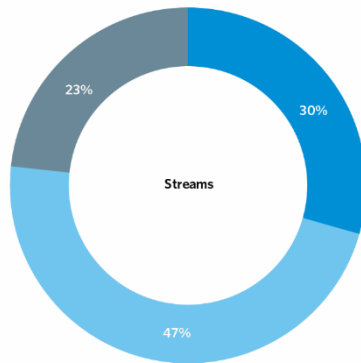
Current conditions: water quality

Water quality criteria

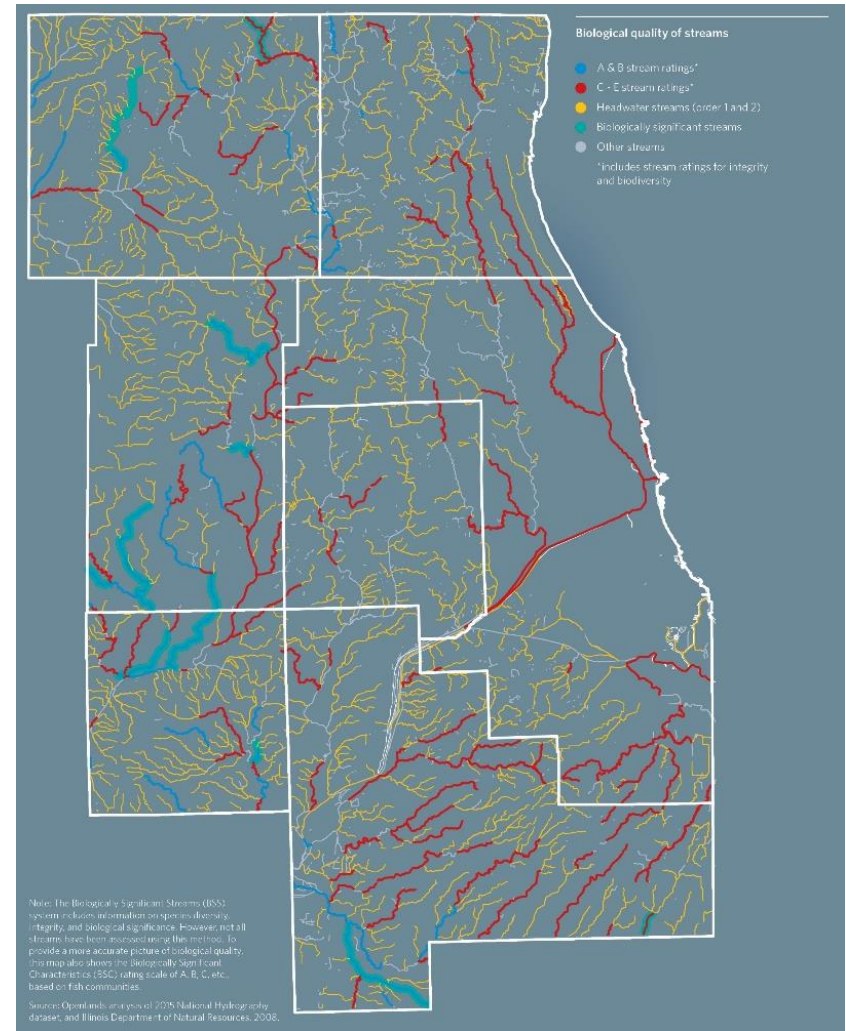
- < 50% of all waterways have been assessed
- Many waterways do not meet their water quality criteria

Attainment of aquatic life water quality standards, CMAP region

■ Fully supporting
■ Not supporting
■ Not assessed



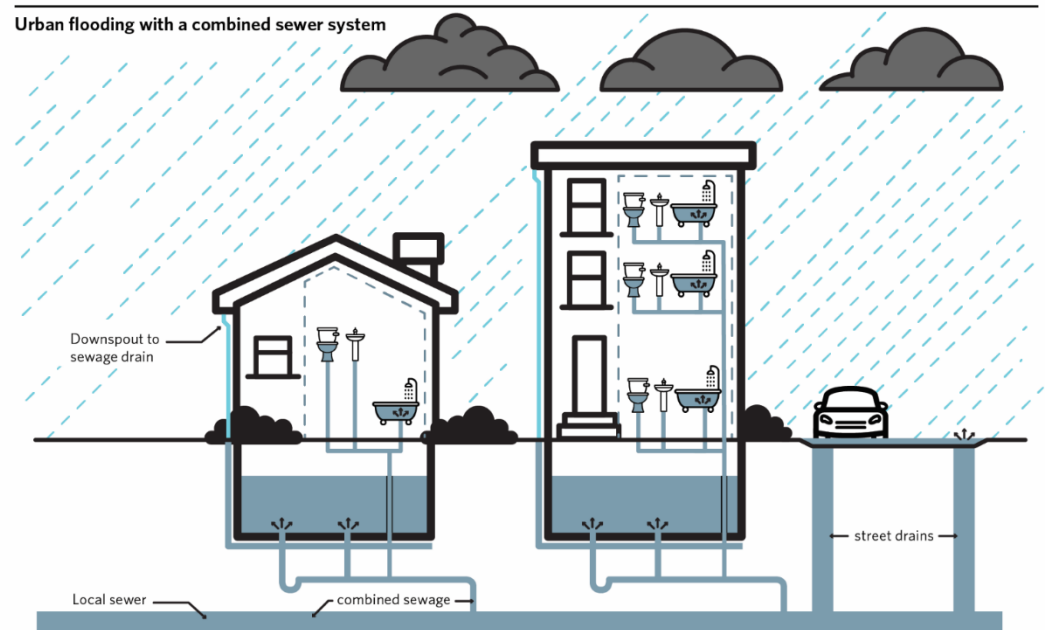
Source: Illinois Environmental Protection Agency, "Appendix B-2 Specific Assessment Information for Streams, 2016," and "Appendix B-3 Specific Assessment Information for Lakes, 2016;" Illinois Integrated Water Quality Report and Section 303(d) List - Vol I: Surface Water - 2016.



Current conditions: water quality

Water quality criteria

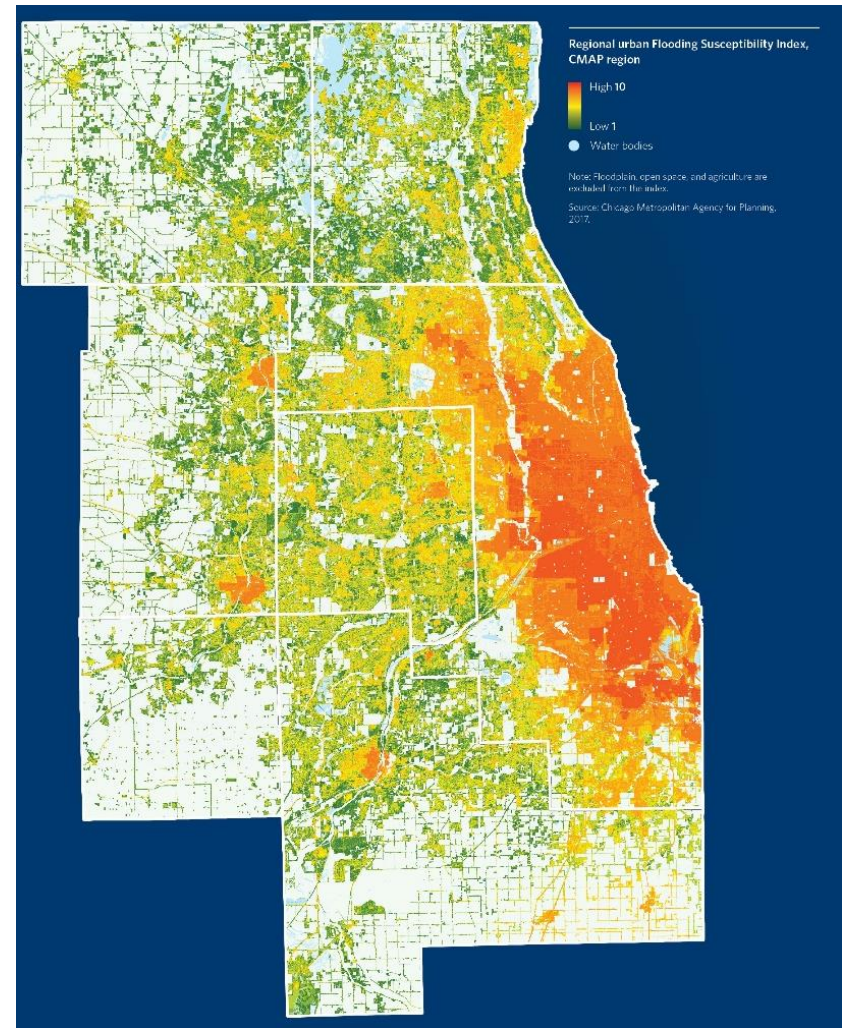
- Typically occurs outside of the floodplain
- Risk factors include impervious coverage, aging or insufficient drainage systems, and clay soils



Current conditions: water quality

Urban flood susceptibility index

- Uses environmental, hydrologic, land use, insurance claim, and other data to calculate an area's susceptibility to urban flooding
- 5x5 foot resolution



Current conditions: water quality

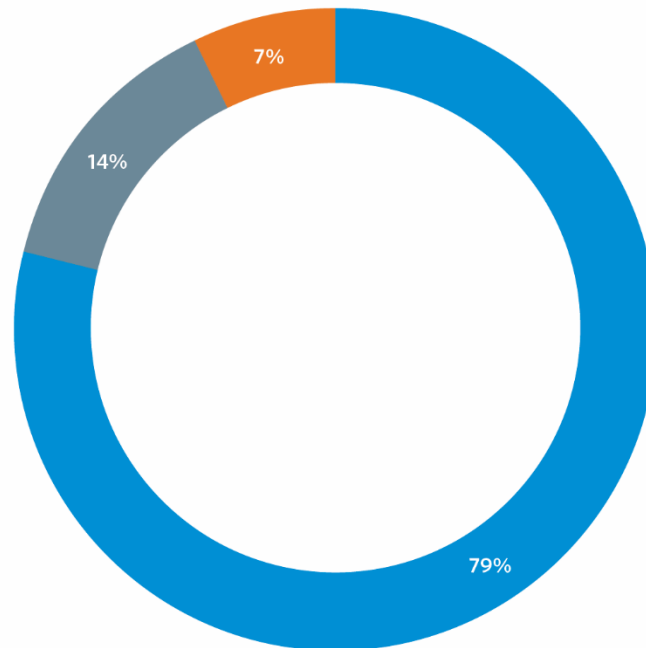
Water quality criteria

- Flood damages are not covered by most homeowners/renters insurance policies

Total insurance and disaster relief payouts, by geography, 2007-14

- CMAP region \$1.8 billion
- Rest of Illinois \$325 million
- Statewide \$162 million

Source: Brad Winters, et al, "Report for the Urban Flooding Awareness Act," State of Illinois Department of Natural Resources, Office of Water Resources, June 2015, www.isws.illinois.edu/hilites/more.asp?id=ufaa&fr=hi



Current conditions: water supply

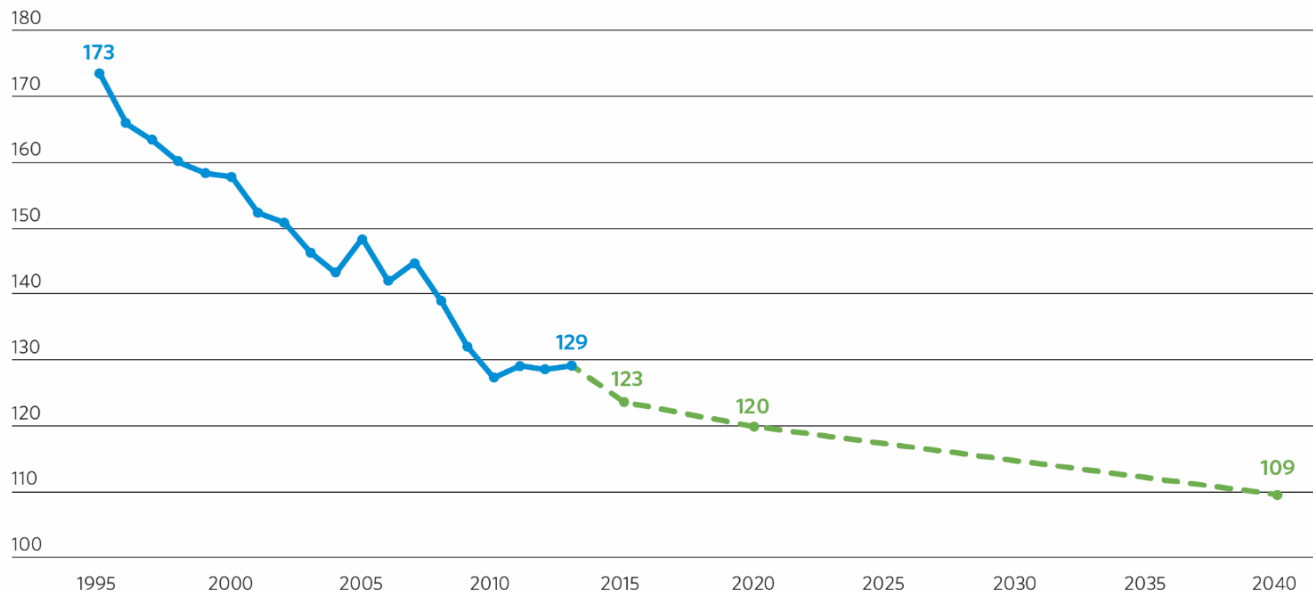
Per capita water consumption

- Steady decrease since the mid 90s

Per capita water consumption, in gallons per day, 1995-2013, and GO TO 2040 targets

■ Recorded history
■ GO TO 2040 targets

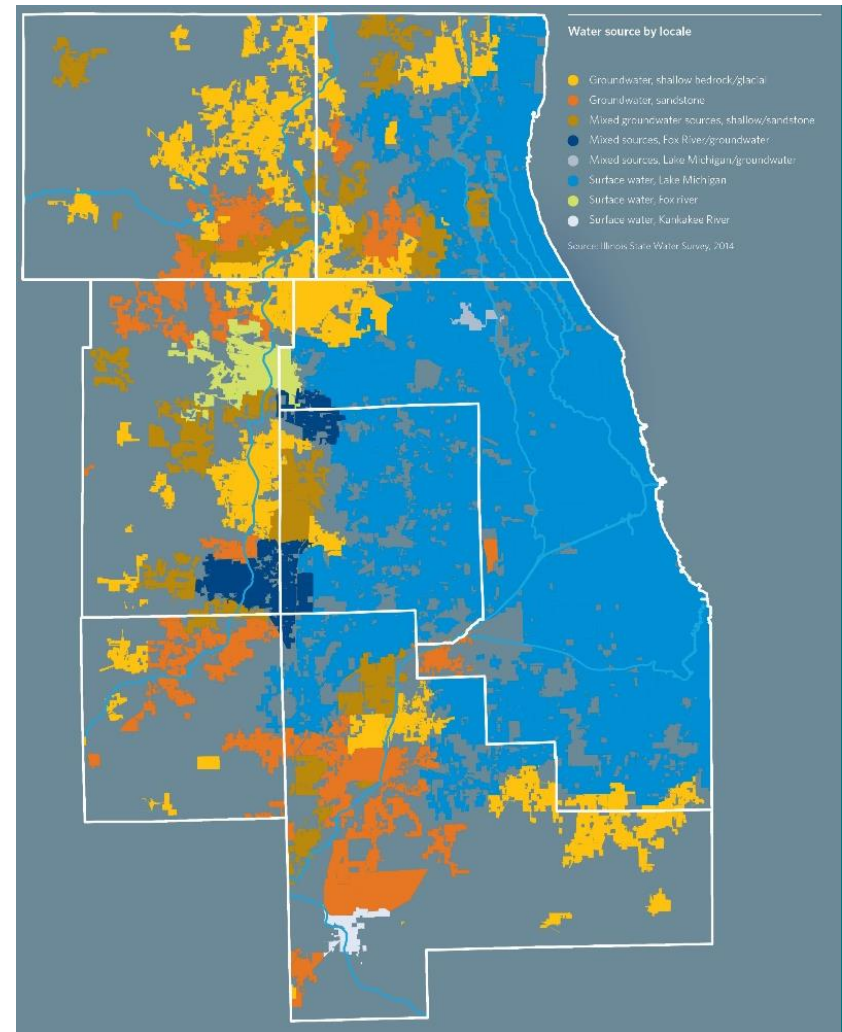
Source: Illinois Water Survey (1991-2012); Dziegielewski and Chowdhury, 2008 (Regional Water Demand Scenarios for Northeastern Illinois: 2005-50) for future years. U.S. Census Bureau and Chicago Metropolitan Agency for Planning socioeconomic forecast.



Current conditions: water supply

Water source

- Lake Michigan (~80%)
- Groundwater
- Fox River
- Kankakee River

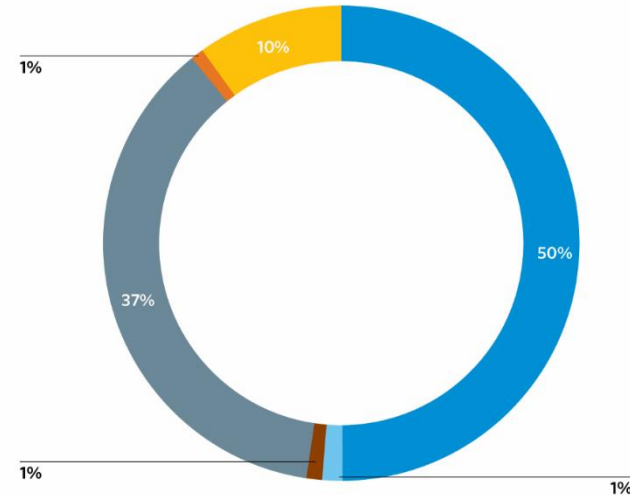
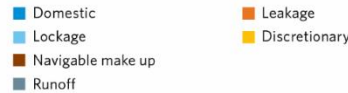


Current conditions: water supply

Lake Michigan Allocation

- Includes more than municipal water systems
- Limited capacity for new users
 - ~3% of the total allocation
- Alternative source will likely become more important during the coming years

Breakdown of Lake Michigan Diversion, 2005-07, 2009-13



Note: All water diverted from Lake Michigan counts toward the region's allocation, including municipal withdraws, river flow, stormwater runoff, and leaking pipes. When water is lost to runoff or leakage, less water is available for the region's residents and businesses.

Source: U.S. Army Corps of Engineers; Lake Michigan diversion accounting reports unavailable for water years 2008, 2014, and 2015.

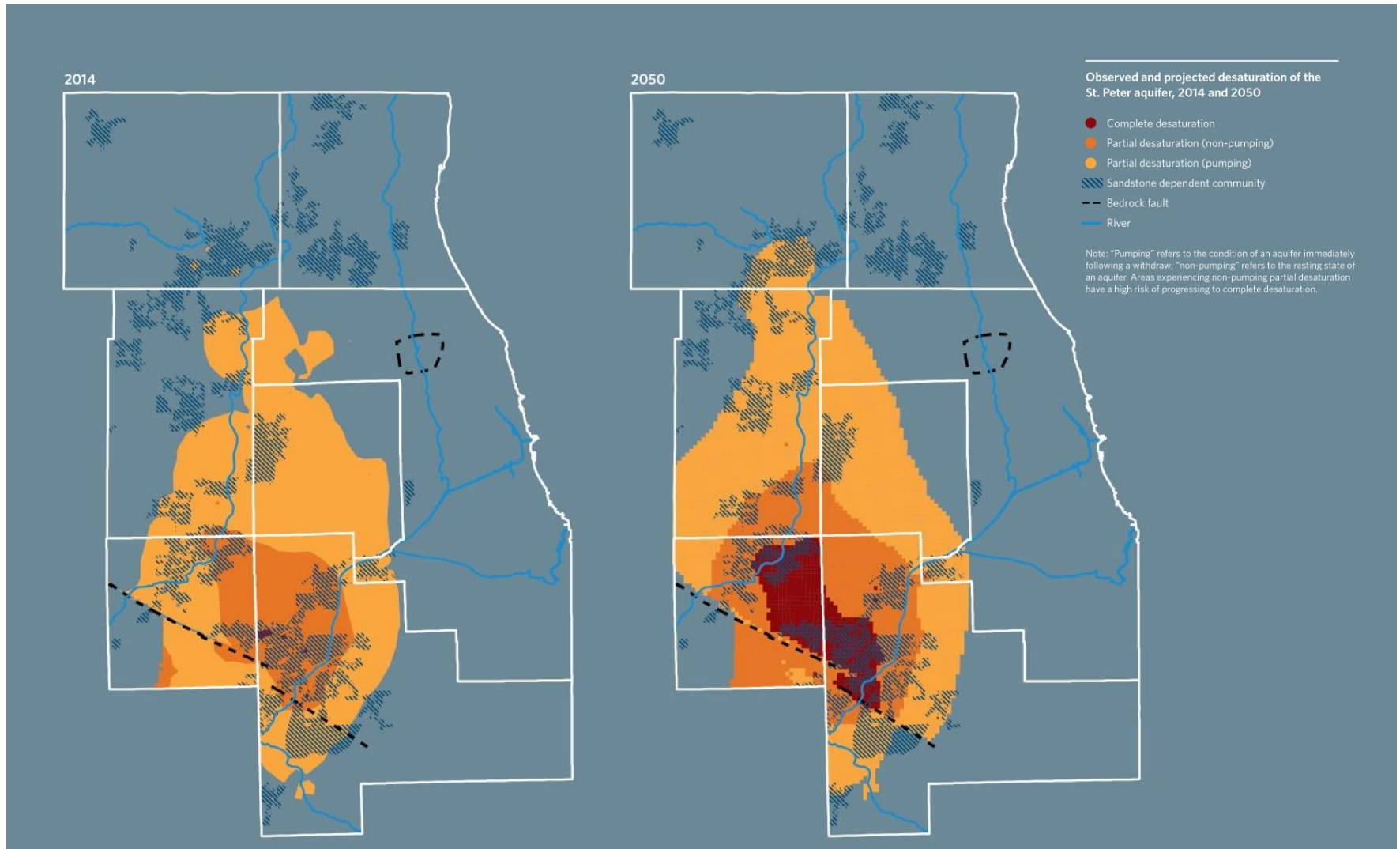
Current conditions: water supply

Groundwater – aquifer drawdown

- Fastest growing water source by consumption
- Deep bedrock aquifers are being overexploited, leading to drawdown at a regional scale

Current conditions: water supply

Groundwater – aquifer drawdown



Current conditions: air quality

Clean Air Act criteria pollutants

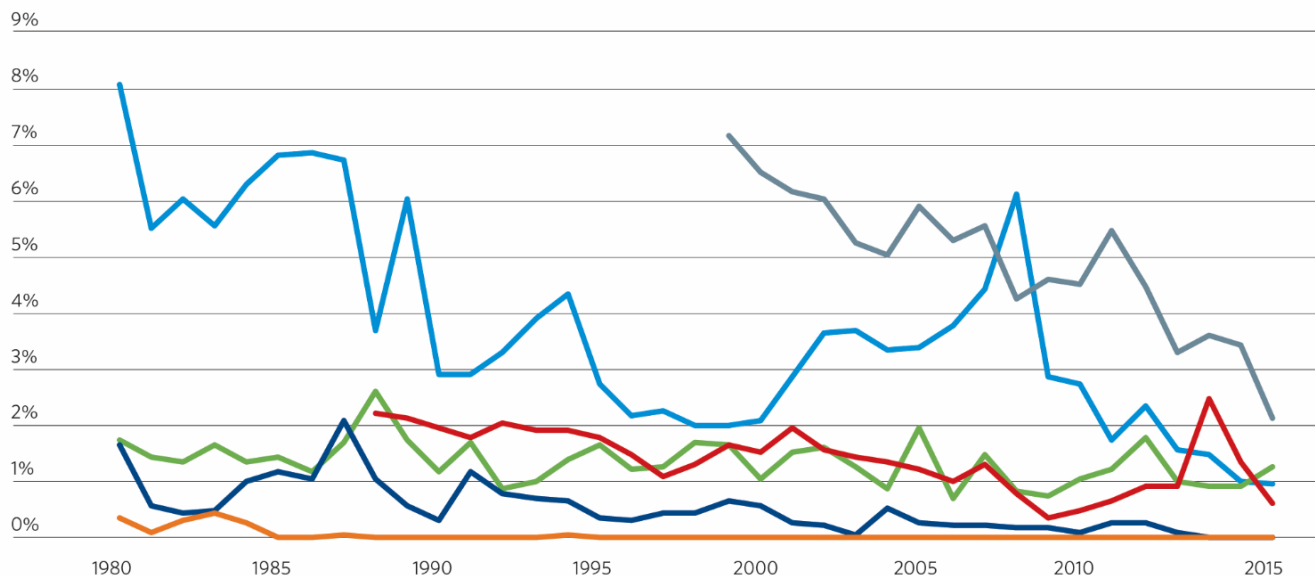
- Entire region is in non-attainment for 8-hour ozone
- Significant reductions in CAA criteria pollutants

Percent of days with potentially unhealthy Air Quality Index (AQI) readings per year

■ NO₂ ■ PM2.5
■ Ozone ■ SO₂
■ PM10 ■ CO

Note: Ozone, particulate matter, and nitrogen dioxide affect public health at lower concentrations than sulfur dioxide or carbon monoxide. To account for this difference, this chart shows AQI scores greater than 50 "moderate" for ozone, PM10, PM 2.5, and NO₂, and AQI scores greater than 100 "unhealthy for sensitive populations" for SO₂ and CO. AQI data is available for six counties in the CMAP region. Kendall County is not included in this dataset.

Source: Chicago Metropolitan Agency for Planning analysis of U.S. Environmental Protection Agency data.



ON TO 2050

Feedback