

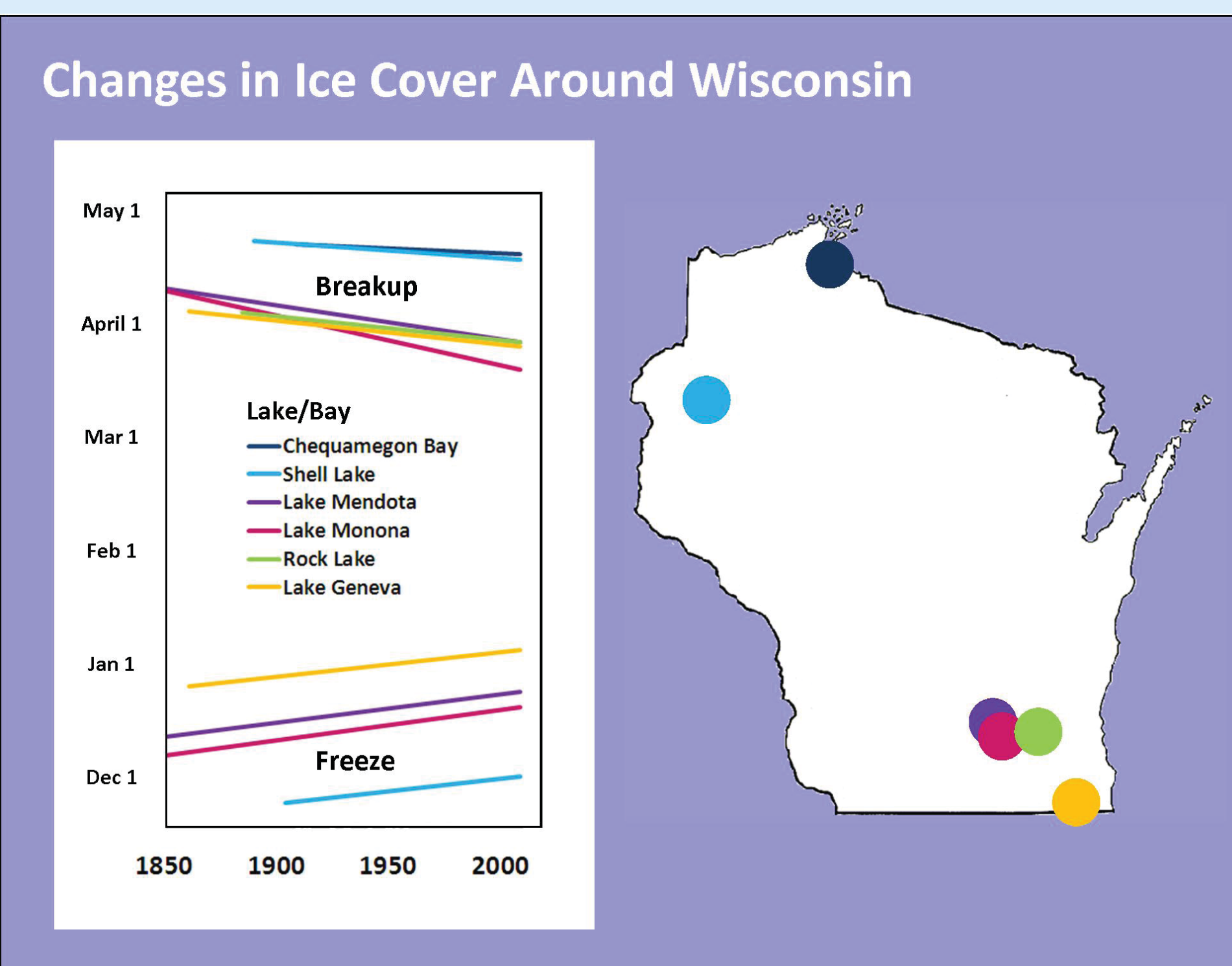
CLIMATE CHANGE IMPACTS ON WISCONSIN'S WATER RESOURCES

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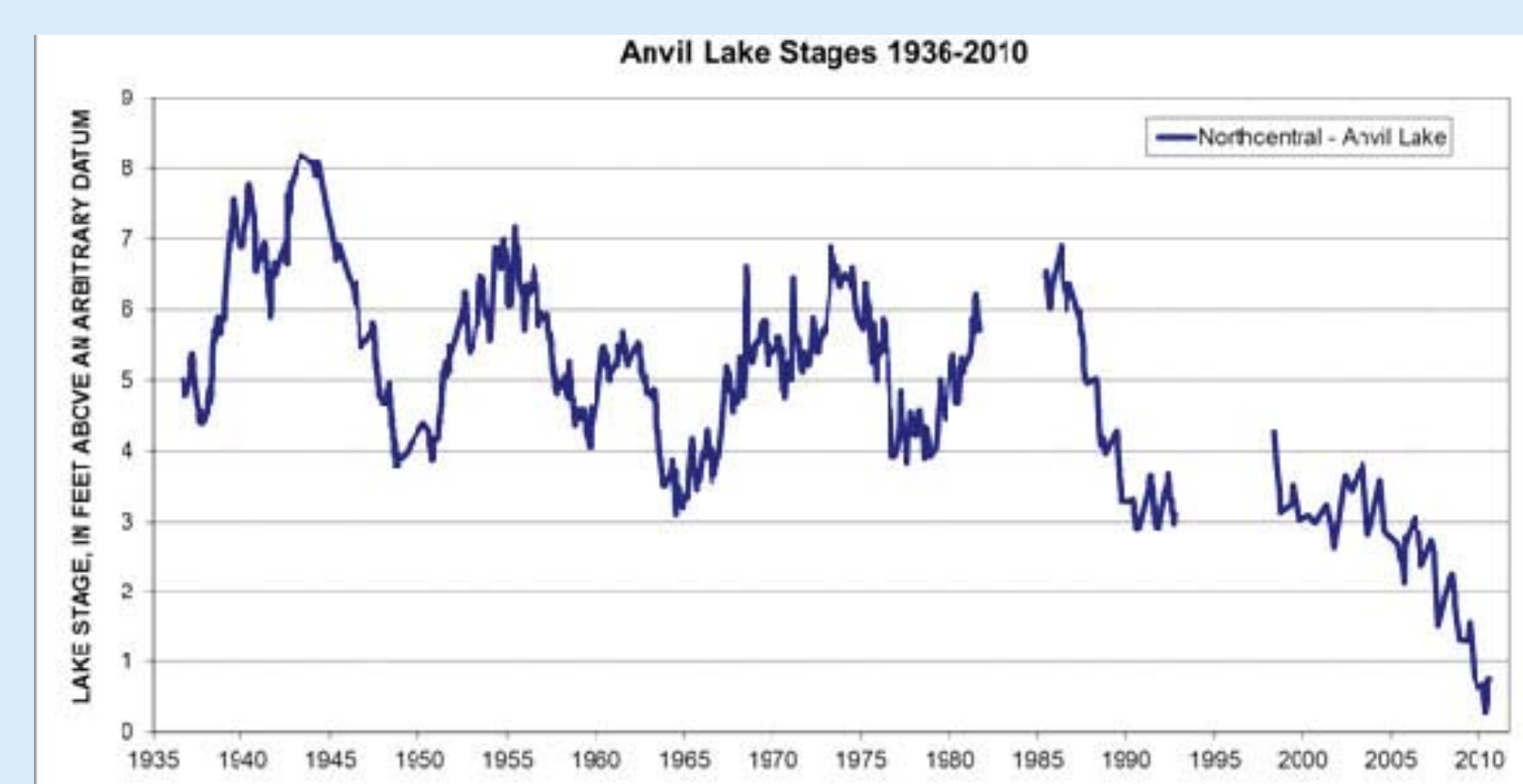
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HISTORICAL DATA ANALYSIS

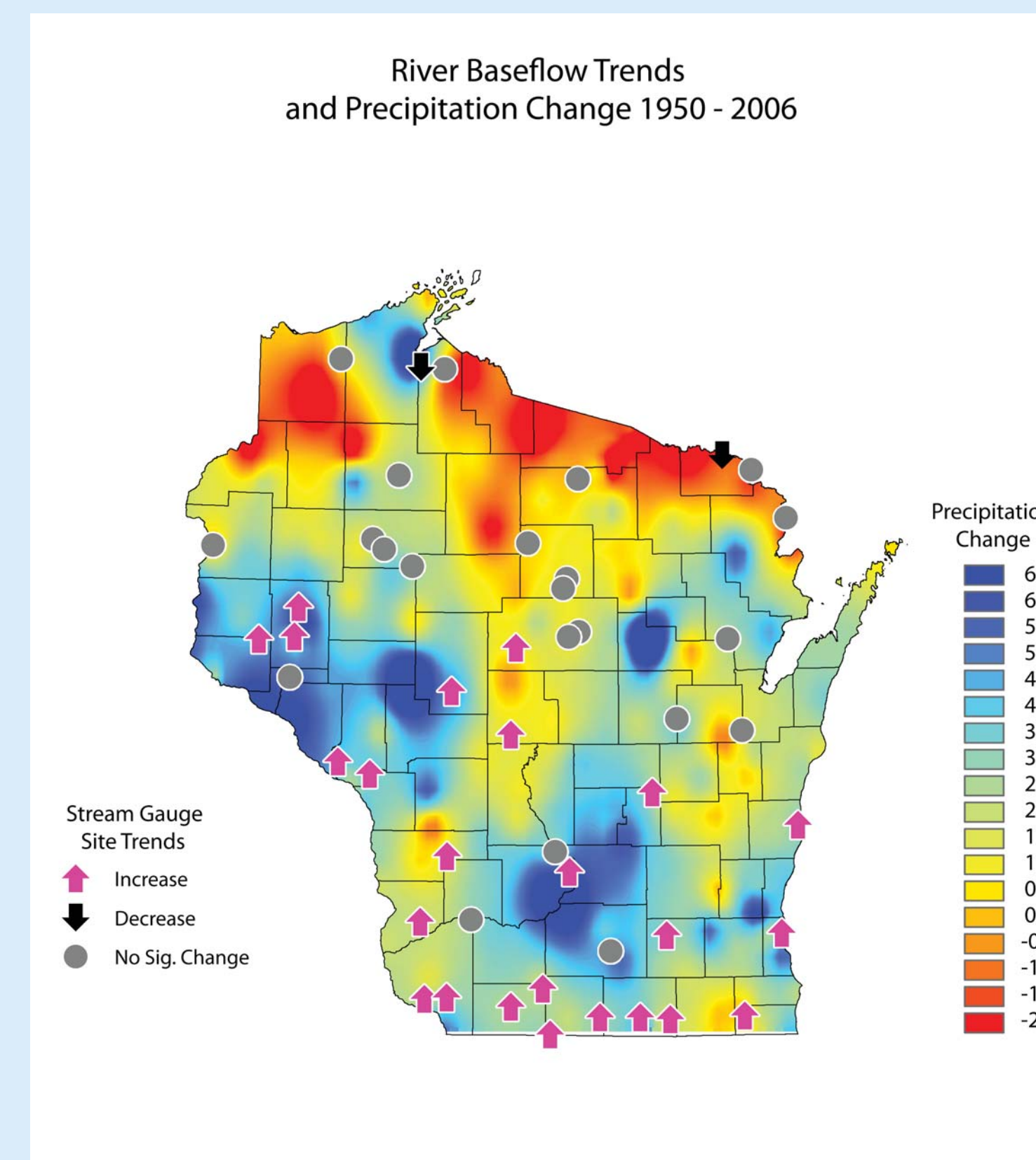
Analysis of historical data shows that water resources are intimately linked to local and regional climate conditions. Long-term records of lake ice duration, lake water levels, stream baseflow, and groundwater levels are correlated with long-term trends in atmospheric temperature and precipitation.



This illustration shows that over the past 150 years ice cover for four southern and two northern lakes occurs later and breaks up earlier. Lake Geneva did not freeze two winters around 2000. (Source: University of Wisconsin - Madison, Center for Limnology. Prepared by Christina Wolbers)



The 74-year water level record for Anvil Lake, a northern Wisconsin seepage lake, demonstrates pronounced, recurring highs and lows. The record appears to indicate that lake levels are getting progressively lower during each succeeding dry period and especially during the present period. The low levels reached between 2004 and 2010 are the lowest observed to date and are associated with the low precipitation in recent years. Source: U.S. Geological Survey; data prepared by Dale Robertson)



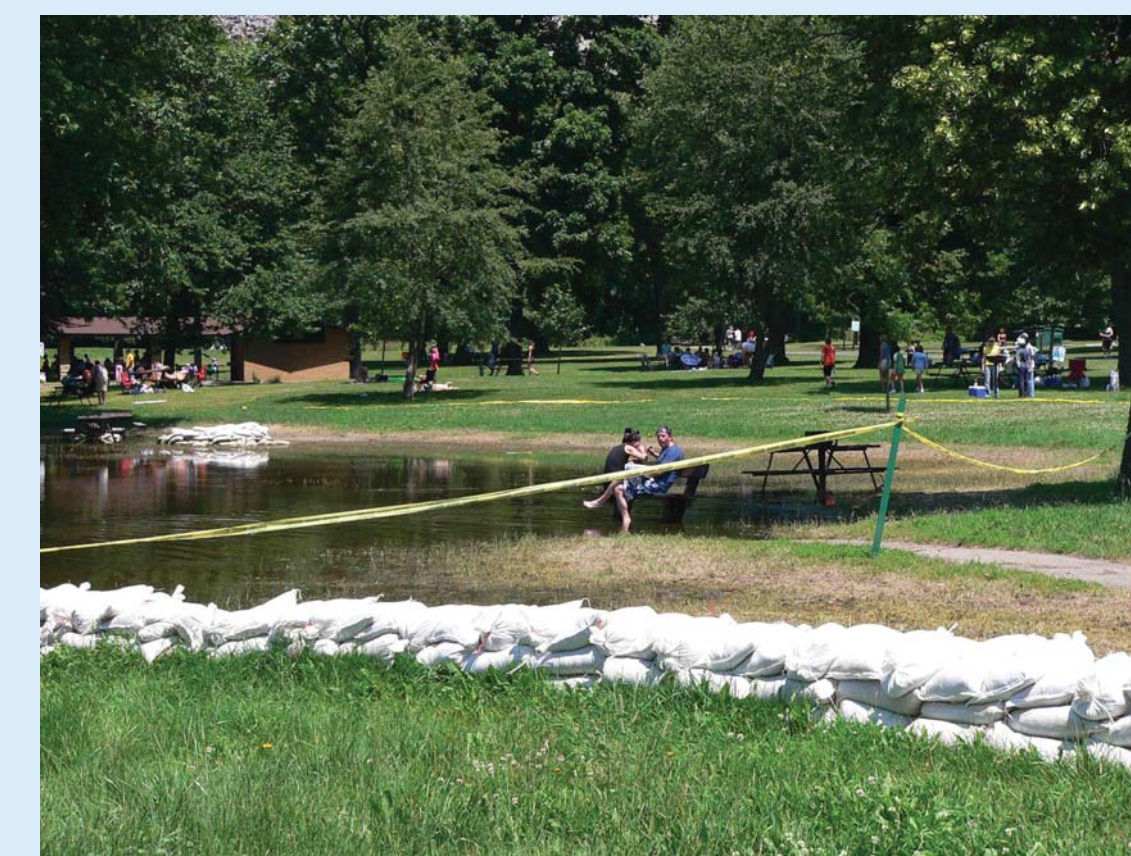
From 1959 to 2006, Wisconsin as a whole became wetter, with an increase in annual precipitation of 3.1 inches. This observed increase in annual precipitation was primarily in southern and western Wisconsin, while northern Wisconsin was drier. The southern and western regions of the state had increases in baseflow and annual flow between 1950 and 2006, corresponding to the areas with the greatest increases in precipitation. (Source: Kucharik, et al., 2010; and Greb, Unpublished data. Map prepared by Eric Erdmann.)

CLIMATE CHANGE IMPACTS AND ADAPTATION STRATEGIES

The Water Resources Working Group of the Wisconsin Initiative on Climate Change Impacts identified six major climate change impacts and adaptation strategies to address these impacts:

Harmful blue-green algal blooms will occur more frequently with increased summer temperatures. We must:

- Increase monitoring of inland beaches
- Develop better prediction tools for blue-green algal toxins
- Develop statewide standards for blue-green algal toxins and take appropriate action to protect public health.



Increased flooding will have impacts on infrastructure and agricultural land. We must:

- Identify, map, and prioritize potentially restorable wetlands in floodplain areas
- Restore prior-converted wetlands in upland areas to provide storage and filtration
- Mitigate storm flows and nutrient loading downstream
- Develop both long-term and short-term changes to community infrastructure.

Demand for water and groundwater extraction will increase as a result of precipitation projections and warmer growing season temperatures. We should:

- Encourage major water users such as power plants to locate in areas with adequate and sustainable water sources, including large rivers or the Great Lakes
- Encourage rural and urban water conservation through incentives and regulation; and promote integrated water management by planning water use based on long-term projections of supply and demand and by tying water use to land use and economic growth forecasts

Seepage lakes will change as a result of variable precipitation, recharge, or increased potential evapotranspiration with additional implications for water chemistry, habitat, and shorelines. We must:

- Enhance and restore shoreline habitat to withstand variations in water levels
- Enhance infiltration in headwater areas by reducing impervious surfaces in urban and riparian areas and changing land management practices
- Change planning and zoning for lakeshore development to account for changes in water levels
- Adjust and modify expectations and uses of lakes, especially seepage lakes, by recognizing that some lakes are not suited for all uses

Sediment and nutrient loading will increase as a result of earlier and more intense spring runoff events. We should:

- Resize manure storage facilities, wastewater facilities, stormwater drains, and infrastructure to accommodate increased storm flows
- Reverse the loss of wetlands; restore prior-converted wetlands to provide storage and filtration by mitigating storm flows and nutrient loading
- Protect recharge and infiltration areas and riparian buffers to reduce overland flow of polluted runoff; and incorporate water management strategies based on climate projections into farm-based nutrient management plans

The spread of aquatic invasive species is likely to increase. In order to slow the spread, we need to

- Identify potential pathways for invasive species migrations under changing climate regimes and take preventive action
- Encourage regulatory activities aimed at preventing future invasions of exotic and invasive species likely to thrive in warmer temperatures
- Continue exotic and invasive species education/awareness programs for boaters, anglers, and others
- Develop rapid response planning and implementation methods to improve existing aquatic invasive species control programs



FOR FURTHER INFORMATION

Please contact Carolyn Betz at betzc@aqu.wisc.edu. More information about the Wisconsin Initiative on Climate Change Impacts, a copy of the full Water Resources Working Group report, and a PDF of this poster, go to wicci.wisc.edu/.

