



Climate Monitoring in Great Lakes National Parks

Background

Climate is the prevailing weather conditions of an area examined over a period of time. The nine Great Lakes Network park units are all in a continental climate region dominated in winter by cold, dry polar air that is occasionally replaced by comparatively milder maritime polar air. During the summer, hot and dry continental air masses from the American southwest alternate with warm and moist maritime tropical air that originates over the Gulf of Mexico. Spring and fall are transition periods with alternating intrusions of air from various sources. Many of the Network parks are located next to a Great Lake or other large water body that can have a significant influence on the local climate.

Climate is a primary driver of most biological and physical processes in natural systems. Fire frequency and severity, floods, droughts, nutrient cycling, and water quantity and quality are among the physical factors strongly influenced by climate. Climate's influence on biological systems might be subtle and include such things as when birds begin nesting, when insects hatch, or when plants flower. Dramatic influences include such things as pushing the water temperature of a stream over the threshold for a species of fish, or droughts that inhibit the reproduction of certain plants.

Monitoring Approach

The Network's primary objectives for climate monitoring are to:

- Understand the variations in other park resources being monitored by the environmental scientists in the parks, particularly the Network Vital Signs.
- Provide data and climate analysis to park managers to help with park planning and providing visitor services.

The Network monitors climate in all of the Network parks using representative weather stations that are in or adjacent to the parks. These stations are mostly members of the National Weather Service COOP

(Cooperative Observer Program) and RAWS (Remote Automated Weather Station) networks. Stations with extensive historical records are the most useful in detecting climate change. The Network uses comparisons of current climate with the station period of record and climate normal periods. Data on temperature and precipitation (rain and snow) have the greatest direct effect on the environment and are the primary climate variables used by the Network in analysis and reporting. Although some stations record conditions hourly, the Network focuses on daily, monthly, seasonal and annual intervals for climate analysis.

One challenge in this monitoring effort is that some of the climate variation found in Network parks is not accounted for by the standard locations of most meteorological stations. This is particularly true for islands and other places in the parks that are strongly influenced by their proximity to large water bodies. The Network is working to capture this variation found in special park environments by locating new weather stations in climates that are not covered by existing stations.

Climate and Weather Resources

The Network has assembled a list of specific climate and weather data sources for each of the parks. This list is found on the Network website at http://science.nature.nps.gov/im/units/GLKN/monitor/climate/climate_resources.cfm.



A remote automated weather station (RAWS) in Pictured Rocks National Lakeshore (Michigan).

