



Most GULN vital signs are already well-suited to detect impacts of climate change on network parks. Long term monitoring is designed to detect changes in park ecosystems over time. In many cases the cause of those changes can be linked to climate change. GULN vital sign selection was driven by landscape-scale issues of common concern among network parks. The network's conceptual models include both "natural" and "anthropogenic" components of weather and climate as primary drivers of park ecosystems.

Water Quality

GULN has implemented water quality monitoring on all 8 network parks. Changes in water quality may be directly linked to issues such as frequency, duration, and amount of rainfall. In the case of the coastal parks, we expect to document to some degree changes in water level and changes in the frequency and magnitude of both fresh water inputs and salt water intrusion into estuarine systems. In 2008 the network documented hurricane signatures in water quality and associated potential impacts on amphibians at JELA following hurricanes Gustav and Ike.

Amphibian and Reptile Communities

Amphibians are widely recognized to be good indicators of environmental change. Factors such as temperature, rainfall quantity and frequency are likely to change over time resulting in shifts of amphibian communities that are measured by the GULN amphibian monitoring protocol. The protocol is designed to monitor population estimates, species composition, and success and timing of breeding.

Coastal Dynamics

The northern Gulf of Mexico has some of the highest rates of relative sea level rise in the nation. NOAA estimates for Louisiana (JELA) are nearly 10 mm/year, for Mississippi and Florida (GUIS) are approximately 2-3 mm/year, and for Texas (PAIS) are approximately 4-5 mm/year. These coastal systems will continue to see an increased impact from tropical storms and winter frontal passages, simply because of sea level rise. Any additional increases in local sea level rise or storm intensity and/or frequency that may come with climate change will only exacerbate the problem. The GULN is using Light Detection And Ranging (LiDAR) data for monitoring changes in coastal geomorphology, dune volume and position, shoreline position, and coastal vegetation, changes to which are directly linked to relative sea level rise and climate change.

Vegetation Communities

The GULN is taking a landscape-scale approach to monitoring changes in park vegetation over time. Changes in vegetation structure (which reflects changes in species composition, canopy density, health or condition of the canopy) will be monitored using classification of waveform lidar data. Monitoring will detect vegetation changes that reflect climate related shifts in temperature, rainfall, and storm impacts. Others, such as private lumber companies, are using LiDAR data for forest inventory metrics such as estimates of biomass and carbon. Although this is not the focus of the GULN vegetation monitoring protocol, those metrics may be useful if the parks need to estimate impacts of management activities on carbon sequestration. The lidar data also provides park-wide "bare earth" topography that can be used in modeling of changes in flooding risks associated with changes in surface runoff.



Water quality sampling at Natchez Trace Parkway, North Fork Coles Creek.



PVC pipe sampling at Jean Lafitte National Historical Park & Preserve.



Gulf Islands National Seashore- Cat Island after Hurricane Katrina in 2005.



About the Gulf Coast Network

The Gulf Coast Network (GULN) is one of 32 networks included in the Servicewide Inventory and Monitoring (I&M) Program. The network approach facilitates collaboration, information sharing, and economies of scale in natural resource monitoring. The eight network parks distribute across six ecoregions of the south-central and southeastern U.S.: the East Central Texas Plains (SAAN), Western Gulf Coastal Plain (PAAL, PAIS, BITH), Mississippi Alluvial Plain (VICK, JELA), Mississippi River Loess Plain (VICK, NATR), Southern Coastal Plain (GUIS), and Southeastern Plain to Interior Plateau (NATR). The combination of upland, alluvial, and shoreline physical landscapes occurring in conjunction with the convergence of temperate and subtropical climates across the region creates enormous diversity in ecosystems and makes the region, the GULN, and its parks a center of biodiversity of great national value and interest.

The primary role of the Inventory and Monitoring (I&M) Program is to collect, organize, and make available natural resource data and to transform data into information through analysis, synthesis, and modeling.

The primary goals of the I&M Program are to:

- Inventory the natural resources under National Park Service stewardship to determine their nature and status.
- Monitor park ecosystems to better understand their dynamic nature and condition and to provide reference points for comparisons with other, altered environments.
- Establish natural resource inventory and monitoring as a standard practice throughout the National Park system that transcends traditional program, activity, and funding boundaries.
- Integrate natural resource inventory and monitoring information into National Park Service planning, management, and decision making.
- Share National Park Service accomplishments and information with other natural resource organizations and form partnerships for attaining common goals and objectives.

