

## **Protocol Development Summary**

### **Protocol:**

GULN Amphibian and Reptile Monitoring Protocol [short name: Herpetofauna Communities]

### **Parks Where Protocol will be Implemented:**

BITH, GUI5, JELA, NATR, PAAL, PAIS, SAAN, VICK

### **Justification/Issues being addressed:**

Amphibians communities are a Network-wide high priority vital sign for the GULN, although for some individual parks, key reptile species are also a high priority. All network parks host diverse breeding populations of amphibian and reptile (herpetofauna) species. Key reasons for monitoring amphibians and reptiles in network parks are that (1) various species are specifically identified in the management objectives of some of the parks; (2) herpetofaunal species are widely considered to be effective indicators of the quality and condition of park aquatic and wetlands ecosystems because they respond quickly to changes in resource conditions, and aquatic systems and wetlands are high-priority resources for most GULN parks; (3) comparable regional and national programs, methodologies and datasets exist for both amphibian and reptile monitoring, including studies adjacent to several GULN parks; (4) some species are potential legal mandates for assessment and monitoring under provisions of the Endangered Species Act (as amended in 1973) or may be identified as being state species-of-concern; and (5) on-going inventory and research projects being performed on or adjacent to GULN parks offer significant opportunity for the network to collaborate with and leverage off of current projects while realizing increased efficiency and cost-savings in monitoring.

Another compelling reason to extend the original GULN amphibian monitoring protocol to include reptiles is that monitoring reptiles during the process of monitoring amphibians is both practical and efficacious; many amphibian sampling techniques (i.e., cover-board arrays, debris-tipping studies, etc.) will also collect reptiles. In terms of the collections made and data obtained (i.e., species richness and change in species composition in an area, etc.), detection approaches, statistical assumptions, and presumed biases in data are similar for both faunal groups. This means that GULN can effectively extend its amphibian monitoring to include both terrestrial and aquatic amphibians and reptiles in unified sampling projects without added sites, methodology, cost, effort, or required expertise.

### **Specific Monitoring Questions and Objectives to be Addressed by the Protocol:**

Some of the specific monitoring questions that will be addressed by this protocol include:

- What are the long term trends in species composition and relative abundance of adult salamander, frog and toad assemblages on selected areas on a park?
- What is the natural level of variation in local distribution and species richness in the terrestrial adult salamander, frog and toad assemblages in selected areas on a park?

June 19, 2009

- What are the long-term trends in species composition and abundance of the targeted reptile populations and assemblages on selected areas on a park?
- What is the reproductive status and relative reproductive success of selected species of amphibians in the sampled parks?
- How do management activities that affect aquatic systems (wetlands, standing and running waters) affect the composition and abundance of “common species” amphibian assemblages on sampled parks?
- How do terrestrial management activities affect the abundance and distribution of “common” and targeted species of reptiles on sampled parks?
- Is there a correlation between locally-assessed climate change indicators and the species richness, composition, abundance, and reproductive success of the amphibian and/or reptile assemblages sampled on each park?

Some of the specific monitoring objectives that will be accomplished are as follows:

- Determine annual changes in species composition and relative abundance patterns for “common species” of adult herpetofauna in selected habitats on each sampled park.
- Estimate and assess annual status and changes in reproductive success (egg mass production, larval survival and development) of selected amphibian species in selected potential breeding habitats (ponds, streams, wetlands) on each sampled park.
- Investigate adult herpetofauna – habitat relationships and how they relate to vegetation structural changes due to either natural or human-induced processes. (*The GULN Vegetation Structure and Composition monitoring protocol will help to address this issue.*)

### **Basic Approach:**

The GULN Amphibian and Reptile Monitoring Protocol is a composite monitoring protocol comprising several park-specific projects to track status and trends in amphibian and reptile assemblage structure and site occupancy of selected species in selected areas on each host park. Each project is a “stand-alone” monitoring effort using one or more standard herpetological monitoring methods deployed in a park-specific sampling design. The protocol emphasizes the use of standardized methods and designs across parks and projects to facilitate collection of comparable data, while easing logistical complication. Sampling approaches will emphasize use of passive and non-trap-based techniques so as to limit harm to park fauna caused by some sampling methodologies. Projects will share a common unified database and data-handling procedures.

Herpetofauna are closely associated with specific ecological conditions and habitats. These are often patchy and localized, thus, distribution of sampling sites will be oriented toward local assessments. The GULN program has elected to design its approach around targeted fauna in limited areas selected by park management to be of higher priority. Project selection, design and scale are specifically intended to provide assessment of the resources in a focal area on a park; most projects are NOT intended to provide inference for the targeted species or assemblage across the entire park.

Projects will focus on detection of change in community structure and local distribution, rather than on finite population size estimation. Specific exceptions to this approach include the planned projects to monitor Texas Tortoise (PAAL and SAAN) and Gulf Coast Box-Turtles (GUIS-Naval Live Oaks unit), where the questions call for, and monitoring approaches directly facilitate

June 19, 2009

population estimation. The projects will focus on species locally abundant on specific parks, as these species will provide larger sample size and support greater detection power, and thus are better indicators of resource and ecosystem condition and change.

Key standardized sampling methods include:

- Cover-board Arrays (long-term placement of metal or wood “boards” in fixed arrays in selected terrestrial monitoring sites) provide species, frequency, occupancy, age, size and sex data.
- PVC-pipe tree-samplers are a passive sampling method suitable for tracking tree frogs in forested habitats and provide species, frequency, occupancy, and population characteristics.
- Visual Encounter Surveys (VES) are time- or area-limited techniques where observers walk transects and observe individuals and their position relative to the transect path. VES methods provide occupancy, density, species richness, location and frequency for surface-active species.
- Basking Surveys: A VES involving searching established basking sites to yield occupancy, frequency, species, sex and size data on aquatic turtle assemblages.
- Funnel Traps are short-term samplers deployed in arrays in shallow water to collect aquatic amphibians and provide occupancy, species, frequency, and developmental data on larval and aquatic adult amphibians.
- Dip-Net Surveys are time- and/or area-defined active sampling using a standard net in shallow water areas along pond and stream edges to provide data on occupancy, species, frequency, and development stage of aquatic amphibian larvae.
- Egg-Mass Counts are visual surveys to estimate numbers and sizes of amphibian egg-masses along edges of shallow waters to provide data on species and estimates of continued reproductive rate in a sampled water body.
- Road Cruising Surveys are a standard method for sampling species richness and relative abundance of both amphibians and reptiles based on encounters during time- and area-defined road cruising.
- Mark-Recapture Methods will be used to facilitate tracking of individuals through space and time (growth, longevity, fate, movement, population size, reproductive assessment, etc.) for Texas Tortoise and Gulf Box-Turtle.

### **Principal Investigators and NPS Lead:**

Protocol development is being lead by Dr. Kurt Buhlmann, University of Georgia – Savannah River Ecological Laboratory in close collaboration with GULN Network staff (Ecologist Bob Woodman, Data Manager Whitney Granger, and GIS Specialist Jeff Bracewell).

### **Development Schedule, Budget, and Expected Interim Products:**

Protocol development began in the fall of 2006, with development of park issues and needs and review of park amphibian and reptile inventories. Field visits to network parks were conducted in FY2007 and early FY2008 to identify specific park interests and to locate possible sampling sites. In late FY2007, GULN and SREL staff identified specific projects for six network parks (GUIS, JELA, NATR, PAAL, SAAN, VICK) and identified the initial sampling sites, methods, designs and schedules to be used in each. GULN and SREL staff began drafting protocol documentation (narrative content, SOP for Methods, Designs, Analysis, Parks and Projects lists, Equipment and Personnel Needs, Sampling Schedules) starting in September, 2007. The network plans to produce a

June 19, 2009

draft protocol ready for external peer review by the end of FY2009. Initial pilot projects were started on the above six GULN parks during FY2008. Additional pilot projects will be developed for BITH and PAIS in FY2009. After peer review, revision and approval, we hope to fully implement the protocol early in FY2010. Protocol development budget: \$78,000.00 in FY2006, \$37,400.00 in FY2007, and \$83,927.00 in FY2008.

**Literature Cited:**

Graeter, G., K. A. Buhlmann, L. R. Wilkinson, and J. W. Gibbons. 2007. Inventory and Monitoring: Recommended Techniques for Reptiles and Amphibians with Application to the United States and Canada. Partnership for Amphibian and Reptile Conservation (PARC) Technical Report.

Oakley, K. L., L. P. Thomas and S. G. Fancy. 2003. Guidelines for long-term monitoring protocols. *Wildlife Society Bulletin* **31**:1000–1002.