

## Protocol Development Summary – ALU-Early Detection

### **Protocol:**

Monitoring for Early Detection of Changes in Land Use Adjacent to Parks [short name: Adjacent Land-use Change]

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

All GULN parks, or TBD

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

One of the highest priority management concerns for parks in the GULN is changing land use outside of the park boundaries and the potential impacts of those changes on park natural resources. Increased development around the parks can contribute to the increased presence of non-native, invasive species; contribute to fragmentation of habitats; alter water and air quality; impact park viewscapes and soundscapes; increase litter and debris within the park; increase visitor impacts. Information about changes in the type and intensity of usage of adjacent lands is thus of immense potential value to park managers. Adjacent Land Use (ALU) has, accordingly, been selected as a high priority vital sign for the GULN monitoring program.

Conceptually, two general types of approaches may be considered for assessing and monitoring changes in land use: 1) “historical” approaches where one documents land use changes that have already occurred, using techniques such as aerial and satellite imagery and written records, and 2) “predictive approaches”, where one assesses evidence for upcoming development by tracking such activity as building permits and plans, to forecast near-future development. The “historic” approach, widely used by land managers, is the basis for current development of NPS service-wide ALU monitoring. GULN is developing a “predictive” approach and methodology that will augment the monitoring of “historic” changes in land use by providing network parks with the potential to detect and prepare for planned development that has a high probability of occurring in the near future on adjacent lands.

Key reasons for monitoring to detect planned development of lands adjacent to network parks are that (1) changes in land use, type and intensity inevitably lead to changes in threats that transfer across boundaries to impact park resources; (2) natural and cultural resources are specifically identified in park founding legislation and as key management objectives of the parks, and these resources are vulnerable to threats originating from adjacent land use; (3) actual development planning documents, such as filed building permits and zoning requests, are likely to be the best indicators of what will be built, changed, or developed on adjacent lands into the near-future; and (4) the earliest and most-precise possible warning of upcoming land use changes will provide park management with their best opportunity to develop appropriate responses to coming changes; i.e., an “early warning system”. The proposed GULN ALU-Early Detection monitoring protocol will be developed to acquire and report on site- and parcel-specific permitted zoning-changes and development within defined “belts or buffer-zones” on lands adjacent to parks.

### **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 major types of development will occur within the next 1-3 years on selected adjacent lands on a per-parcel basis; new mall, new factory, change in local waterways or drainages, new apartment complex, etc.?
- What is the near-future (1-3 years) larger-scale land use and development “trajectory” for selected areas of adjacent lands; the trend in anticipated development in the area, such as creation of a new neighborhood, urban infrastructure segment, major highway, etc.?
- What changes in land-use and land-conversion will occur in selected sections of park-adjacent lands in the next 1-3 years?
- How will permitted land use changes be reflected in changes in the type, frequency and intensity of specific material threats being transferred onto parks from selected adjacent lands? How will local developments change threats such as feral animals, invasive species, litter and trash, sewage and pollution loading on the park? [*Note: a set of research studies with formal experimental designs would be needed to fully answer this question; monitoring may provide correlative insights, but cannot answer questions requiring experimental manipulation for full evaluation*]

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

- Identify and classify current approved building permits for park-designated or identified land on a regular (period to be determined by park and available permit data sources) basis to provide specific per-parcel development information (type, size and estimated time-frame of project) advisories to the park. (*In general, approved permits are likely to be followed by physical development and construction. Any adjacent land and parcels may be considered- each park may select or designate both type of development and any land unit as being “of interest” for monitoring.*)
- Identify and classify current applications for changes in land zoning, and approved zoning-changes for park-designated or identified adjacent land parcels on a regular (period to be determined by park and by available permit data sources) basis to provide specific per-parcel pending and approved change-in-zoning advisories to the park. (*In general, changes in parcel zoning presage significant future development- residential to commercial conversions, single-family to multi-family, etc. Any park-adjacent land may be considered- each park may select or designate both type of development and any land unit as being “of interest” for monitoring.*)
- Identify and classify proposed and requested larger-scale land-conversions, such as from agricultural to manufacturing or to sub-divisible status, creation of new sub-divisions, planned communities, and retail and industrial zones. *Justification: Larger-scale land conversions provide the longer-term basis for major development changes at the larger scales, which will result in cumulative and complex changes in development-related threats and larger-scale pressures on park resources.*

### **Basic Approach:**

The GULN ALU- Early Detection monitoring protocol will be developed around periodic and continuous collection and analysis of public information relating to land conversion, specific land-use project development, and proposed larger-scale land-use changes. Data sources to be monitored include, but are not limited to, building permits, wetland alteration permits, utility installation permits, and standard base data (property boundaries and ownership, roads, streams, administrative boundaries,). Each sampled park will identify its desired “buffer zone” of adjacent land in which it wants to conduct monitoring, and will define what types and classes of development it is primarily interested in monitoring. Monitoring will be performed primarily by database-mining, followed by periodic and event-based reporting of alerts and critical information to parks. Data collection and analysis will be performed by GULN staff. Data is anticipated to be spatially-linked with other GULN

monitoring efforts and protocols, and with park-based projects such as invasive species management, etc.

Initial protocol development will be performed at SAAN by a team from Texas A&M University (TAMU) headed by Dr. Sam Brody, in close collaboration with park and network staff. Development involves defining initial ALU buffer-zones for monitoring; identifying classes and types of permits to monitor; identifying and evaluating data sources for availability, quality, quantity, consistency, and format; and developing a geodatabase, allowing all the data to be accessed and mapped using spatially explicit GIS format. Additional work will include development of the full protocol documentation and databases. Protocol narrative and other text elements will be developed by GULN-NPS staff. Documentation for the protocol will be developed in format that meets NPS standards (Oakley et al. 2003).

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

Protocol development will be done by TAMU (led by Dr. Sam Brody) in collaboration with GULN Network and SAAN Lead(s) (GULN NPS staff members are TBD).

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

Initial development meeting began in June, 2006. Methods development occurred in calendar 2006 and 2007. Methods evaluation (field-testing of data collection approaches and initial analysis design) were performed on SAAN during FY2007. Establishing sources of data, data analysis, refinement of the GIS-based change detection tool, and document preparation will continue during FY2008, together with expansion of field testing to include one or more additional GULN parks. The P.I.'s will produce a draft ALU monitoring protocol ready for external peer referees by early in FY2008. After peer review, revision and approval, we hope to fully implement the protocol at SAAN as of March, 2008. The budget for the development of the SAAN pilot was \$113,032.33 from FY2006 funds. FY2007 funds in the amount of \$120,000.00 will be used to conduct data discovery and expand the protocol to additional network parks.

#### **Literature Cited:**

Oakley, K.L., L.P. Thomas, and S.G. Fancy, 2003. Guidelines for long-term monitoring protocols. *Wildlife Society Bulletin* 31(4): 1000-1003.