**Monitoring Changes in Landscape Dynamics –
Update on Current Plans and Actions**

John E. Gross, March 2008

Introduction

Because land cover and land use change have such pervasive and profound impacts on park resources, most I&M Networks identified landscape dynamics as a high priority vital sign. Several Networks have been successful in developing protocols for landscape dynamics that meet their Network-specific needs, but the majority of networks have not yet developed an effective and yet affordable approach for addressing the landscape dynamics vital sign.

The goal of this project is to economically and efficiently identify, evaluate, and report a small suite of information-rich measures of landscape dynamics that can be provided for all I&M parks to meet the basic need of identifying trends in landscape dynamics at the park and national levels. These 'core' vital sign measures will be generated for all I&M parks by the Fort Collins office from existing data available from regional- and national-scale datasets. Examples of potential measures include population density, road density, and area of broad land cover types. Many networks have discovered that there is considerable cost and effort involved in learning how to acquire, process, and interpret these types of data, and it will be much more efficient and practical to centrally process these data sets and deliver them to all parks. We expect that the products of this project will meet the basic needs for most parks for tracking changes in landscape dynamics, but some networks will probably conduct more detailed or sophisticated analyses at finer scales to address other network-specific needs.

Approach

The general approach is to identify a core set (< 10) of information-rich and complementary vital sign measures that can be developed from existing datasets and provided to all I&M parks. We will also compile and organize additional datasets and make them available for analysis by the I&M networks for a larger set of secondary measures that will address the specialized needs of some networks. Some of these secondary measures will be highly correlated with the core measures (e.g., housing density and night light density are highly correlated, and both would not be included in the core set), and others may be specific to particular habitats or regions. We will select these secondary datasets and potential measures based on needs and priorities identified by the networks and available resources.

No decisions have been made yet on which measures and datasets to focus on, but some obvious and strong candidate indicators and data sources are listed in Table 1. The information in Table 1 is provided only as an example to better explain what this project will produce.

Products

The main products will be:
- Documentation of core and secondary indicators and measures, including justification and criteria for evaluation
- Spatial datasets, available to Networks, with key measures and derived indicators
- Example reports of data
- Documented datasets and methods that can readily be incorporated into protocol SOPs

Schedule

We expect that we will be able to decide on the core indicators and measures and to provide documentation on the justification and criteria for selecting these core measures before August 2008. We expect core datasets to be acquired, processed, and evaluated by December 2008, and the initial datasets, analyses, and reports should be available for all I&M parks by July 2009. Datasets and example analyses and reports for at least some of the secondary indicators should also be available beginning in 2009.

Table 1. Potential core indicators, measures, and data sources that could contribute to landscape dynamics vital signs across I&M parks.

Indicator	Potential Measures	Data Sources
Human population growth	Current number of people in counties adjacent to park; % change in population in counties adjacent to parks in recent 10-yr period; Projected % change to 2030; People per km^2	US Census Bureau; Woods and Poole Economics, Inc.; GeoLytics, Inc., ESRI; Theobald redistribution datasets; CIESIN; IPUMS
Physical disturbance	Km roads per km^2 area; Dwellings per km^2 in area adjacent to parks; Night light density; Area burned by severity class; Insect infestations	ESRI; Ray Watts consolidated dataset (GRD via USGS); US Census TIGER; DMSP; USGS Fire Atlas; USFS FHTET
Pollutants	Industrial discharge sites	State records; EPA
Habitat condition	Area (km^2) of land cover types; Changes in agricultural use; Area (km^2 or %) in each fire condition class; Core area; Hydrological modifications	MRLC / NLCD; USDA NASS; LandFire; EPA

Coordination and Other Considerations

We will collaborate with the new NPS socio-economic monitoring program, which will likely use or develop, and perhaps 'take over', some national-level socio-economic indicators. We will also benefit from the work by Parks Canada to develop a core set of landscape dynamics indicators. Efforts by several networks that we will collaborate with include the new SOPN/SODN – USGS project, the ERMN socio-economic/landscape indicator project, and various network efforts that include pattern analyses (NCRN, GLKN, PACN), and efforts related to the Socio-economic Atlas Project that was led by Jean McKendry. Final selections on data sources and measures will likely be driven, in part, by needs of long-term partners. As Table 1 demonstrates, there are many potential data sources, and literally hundreds of potential measures. Please keep me informed of other relevant activities.