



Executive Summary
**Monitoring Land Cover and Land Use
in Great Lakes Network Parks**
February 2009



The general objective of Land Cover/Land Use (LCLU) monitoring is to identify and map landscape scale changes for each Great Lakes Network park at a 6-year interval. Three parks (Voyageurs, Isle Royale, and St. Croix), because of their larger sizes, will be on a 12-year rotation. In addition, the complementary nature of the Network's LCLU and terrestrial vegetation monitoring programs will allow the LCLU program to place the vegetation sampling data in a larger landscape-scale context and provide information on land cover changes not captured by the vegetation plots. In turn, the vegetation plots will provide ground-truthing to the LCLU program. Monitoring frequency is aligned between these programs in order to facilitate this link.

Land cover program staff have been coordinating completion of detailed vegetation mapping projects for all parks in the Network. These vegetation inventories will provide the baseline for subsequent monitoring of land cover over time. The LCLU program will not provide the same level of detail, as these inventories require several years to complete and at considerable expense. The intent of this monitoring is to detect natural and anthropogenic (human) disturbances occurring inside and outside the park boundary. This will give park resource managers tools to recognize significant events that have altered the cover, to understand disturbance frequency and history, and make decisions on when and where to undertake remedial action or restoration.

To accomplish the objectives of the LCLU program, we will use multiple sources of information (Table 1). Analyses begin with a complete set of annual Landsat imagery from 1984-Present (approx. 23 images per year) that will be used to detect changes in vegetation. Using at least one image taken at mid-summer each year, we can detect subtle incremental shifts in vegetation as well as dramatic disturbance events (fire, blow-down, or tree removal).

The second part of this monitoring program consists of acquiring high resolution imagery which will be used to identify and validate the changes detected by the satellite imagery. This high resolution imagery will allow us to accurately quantify the changes and update the existing vegetation map so that it does not become obsolete over time. In addition to updating the existing vegetation map, the Landsat-based analysis of disturbances since 1984 will also provide valuable insight into the disturbance regime in each of the GLKN parks.

For more information about this project, contact:

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Table 1. Geospatial data layers acquired for Great Lakes Network parks as of November 2008.

Data Source	APIS	GRPO	INDU	ISRO	MISS	PIRO	SACN	SLBE	VOYA
National Land Cover Data	ca. 1990 & 2000 Dataset	ca. 1990 & 2000 Dataset	ca. 1990 & 2000 Dataset	ca. 1990 & 2000 Dataset	ca. 1990 & 2000 Dataset	ca. 1990 & 2000 Dataset	ca. 1990 & 2000 Dataset	ca. 1990 & 2000 Dataset	ca. 1990 & 2000 Dataset
Coarse Scale Landsat (1984-present)	Freely available	Freely available	Freely available	Freely available	Freely available	Freely available	Freely available	Freely available	Freely available
CIR Imagery - Medium Scale	1992/1998 NAPP 40,000 scale, 1m resolution; 2005 NAIP	1998 NAPP 40,000 scale, 1m resolution	1998 NAPP 40,000 scale, 1m resolution	1998 NAPP 40,000 scale; 2005 NAIP, 1m resolution	1992 NAPP, 2003 NAIP 40,000 scale, 1m resolution	1998 NAPP 40,000 scale, 1m resolution	1992 NAPP 40,000 scale, 1m resolution	1998 NAPP 40,000 scale, 1m resolution	1992 NAPP 40,000 scale, 1m resolution; 2003 NAIP
CIR Imagery - Large Scale	1:12,000 scale, 10/2004 0.3m resolution	1:12,000 scale, 10/2006, 0.15m resolution	1:12,000 & 1:6,000 scale, 10/2004, 0.2m resolution			1:12,000 scale, 10/2005, 0.2m resolution	1:12,000 scale, 10/2005, 0.2m resolution	1:12,000 scale, 10/2007, 0.15m resolution	1:15,840 scale, fall 2005, 2006 MNDNR, 1m resolution
Recent Aerial Photo	1:12,000 scale, 4/2005, 0.3m resolution	1:8,000 scale, 5/2003, 0.15m resolution	1:12,000 scale, 4/2004, 0.2m resolution		Spring 2005 (USGS funded), 0.6 meter resolution	1:12,000 scale, 5/2004, 0.25m resolution	1:12,000 scale, 4/2006 & 4/2007, 0.15m resolution	1:12,000 scale, 4/2007, 0.15m resolution	1:12,000 scale color & CIR 5/23/2008, 0.15m resolution
High Resolution Satellite Imagery	IKONOS mainland summer 2004		IKONOS Summer 2004			IKONOS Summer 2004		IKONOS Summer 2004	IKONOS Summer 2003
Early Historical Imagery (1920-1940s)	Ortho production for 1938 imagery complete	Scanning and ortho of 1940 imagery complete	Ortho production for 1939 imagery, few frames missing	Prints from 1930 imagery available, scanning in progress	Scanning of 1937 imagery in progress, ortho completed for Hennepin Co.	Scanning and ortho production of 1938 imagery in progress		1939 imagery on order	Ortho production of 1927 imagery complete
Mid-historical Imagery (1950-1970s)									
Other remote sensing products	Coastal LiDAR from USACE due 2009	Coastal LiDAR from USACE due 2009	Coastal LiDAR from USACE due 2009	LiDAR data, acquired 9/2004; Coastal 2009	Coastal LiDAR from USACE due 2009			Coastal LiDAR from USACE due 2009	

CIR=Color Infrared, LiDAR=Light Detection and Ranging, MLCCS=Minnesota Land Cover Classification System, NAIP=National Agricultural Imagery Program, NAPP=National Aerial Photography Program, NHD=National Hydrography Dataset, NLCD=National Land Cover Database, TIGER= Topologically Integrated Geographic Encoding and Referencing system.