



GEOSPATIAL TECHNOLOGY

Northern Prairie Wildlife Research Center Jamestown, North Dakota

Northern Prairie Wildlife Research Center uses remote sensing, geographic information systems (GIS) technology, and global positioning system (GPS) technology to conduct research of prairie ecosystems. Initially Northern Prairie cooperated with the Environmental Research Institute of Michigan to study the use of aircraft and satellite multispectral scanner data to inventory wetlands and uplands in the prairie pothole region. This pioneering research was funded by the National Aeronautics and Space Administration as part of the early evaluation of Landsat Multispectral Scanner Imagery. Northern Prairie also developed a remote sensing (RS) system for estimating breeding waterfowl numbers and production using RS and GIS technology. The system uses data from airborne video, National Wetlands Inventory, upland habitat derived from aerial photography, and land ownership in a GIS. Current activities include digital analysis of imagery, GIS analysis, and modeling using a variety of sources, including aerial photography, aerial video, satellite imagery and vector coverages.

CURRENT ACTIVITIES

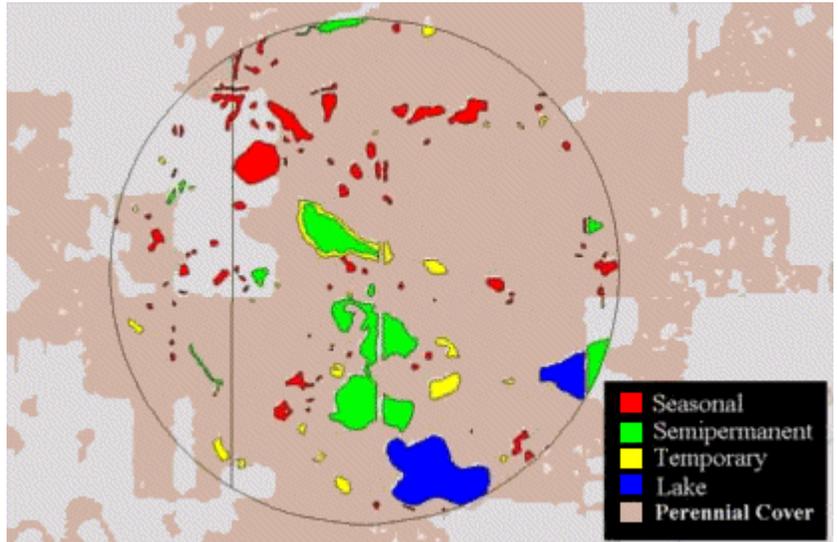
- Waterfowl brood ecology in relation to wetland and upland habitat conditions, as determined from digital color infrared photography and National Wetland Inventory data in a GIS.
- Mapping and analysis of swift fox locations and populations in the United States.
- Mapping and analysis of sand hill crane migration, using satellite transmitters, in North America and Russia.
- Mapping and analysis of pintail ducks during spring migration.
- Mapping and analysis of cowbird predation of grassland breeding birds.
- Analysis of predator populations in Region 3, US Fish and Wildlife Service.
- Production of a digital vegetation map of Ozark National Scenic Riverways.
- Integrated geographic and ecological research for identifying potential habitats and predicting future spreading of selected invasive plants
- North Dakota GAP analysis
- Hierarchical multi-scale analysis of high resolution imagery to differentiate woody vegetation types
- Prediction of vertebrate species occurrences using point intercept data from LIDAR and remotely sensed images in the Northwoods.
- Evaluation of the distribution and densities of non-game grassland nesting birds relative to grazing treatments
- Long term monitoring of wetlands at Cottonwood Lake
- Distribution of invasive and exotic plants in National Park

RECENT ACTIVITIES

- ❖ Cooperation between North Dakota, Oklahoma, and Canada to establish better methods to identify mid-continental Sandhill Crane sub-species, with the primary focus on population dynamics and the role of staging areas in the life cycle of the species.
- ❖ Mapping and analysis of whooping crane locations within the United States.
- ❖ American badger ecology.
- ❖ Modeling and mapping of potential wetlands for restoration.
- ❖ Avian communities in relation to landscape composition and fragmentation.
- ❖ Inventory and monitoring of spring phenology and nest site availability for input to models forecasting fall populations sizes of arctic nesting geese.
- ❖ Improving pond counts with aerial videography and global positioning systems.
- ❖ The effects of grassland patch size, edge features, and landscape variables on duck nest success.
- ❖ Investigation of predator foraging ecology in relation to habitat composition and fragmentation.
- ❖ Developing a study to determine responses of breeding ducks to restored wetlands on previously dry agricultural land.

RELATED INFORMATION

Spatial Data Analysis Lab – Currently, the lab has 6 Pentium personal computers and 5 Sun workstations configured to work with digital geographic data. All workstations are on a Novell network allowing files to be accessed from the network server and attached to the workstations and server are external hard drives providing over 600 GB of disk space. Available software includes ARCGIS 8.3 (ARCINFO, ARCMAP, and Spatial Analyst), TNTMIPS (8 user), GRASS, PCI and IDRISI. ARCGIS and ESRI products are accessible from every personal computer at the Center. Additional ESRI packages are available for installation on field laptop computers. Standalone image processing software developed at Northern Prairie or acquired from other facilities is also available on the Sun workstations. This software includes: NAVIGATE - programs for georegistration and resampling of Advanced Very High Resolution Radiometer (AVHRR) images to map projections, CALIBRATE - programs for radiometric calibration of AVHRR images, MIXTURE - mixture model analysis of multispectral images, CLASSIFY - maximum likelihood classification with the option to create posterior probability images, FIVES - an atmospheric radiative transfer program, and FRAGSTATS - a spatial pattern analysis system for quantifying landscape structure.



The Center has three Trimble Pathfinder Professional GPS units with Corvallis Microtechnology data loggers, three Trimble GeoExplorer GPS units, five Garmin GPS units, and two Rockwell PLGR GPS receivers. The GPS units can be used alone or in combination with other hardware and software for real time differential correction, post processed differential correction, connection to laptop computers for field data entry and real time overlay on any GIS background layers. The lab has capabilities for converting maps and photographs to a digital format. A 12" × 17" color scanner works with hard-copy reflective and transparency images. A Polaroid 35 mm slide scanner converts 35 mm slides or negatives to digital data. Hardcopy output devices include a QMS Magicolor 2-color laser printer and a Hewlett Packard DesignJet 2500CP 36" color plotter/printer.

FOR FURTHER INFORMATION:

Larry L. Strong
Northern Prairie Wildlife Research Center
8711 37th Street SE
Jamestown, North Dakota 58401-7317
(701) 253-5524
larry_strong@usgs.gov

H. Tom Sklebar
Northern Prairie Wildlife Research Center
8711 37th Street SE
Jamestown, North Dakota 58401-7317
(701) 253-5554
tom_sklebar@usgs.gov

Betty R. Euliss
Northern Prairie Wildlife Research Center
8711 37th Street SE
Jamestown, North Dakota 58401-7317
(701) 253-5538
betty_euliss@usgs.gov