High-quality wet pine savannas are open, park-like, fire-maintained wetland ecosystems in nearly level terrain. They typically have a sparse overstory of pines and an understory consisting of native bunchgrasses and herbs. Shrubs and woody midstory plants are few or absent due to frequent burning.

**ABSTRACT:** A set of vegetation classification maps were developed for the Fire Management Center of the Mississippi Sandhill Crane National Wildlife Refuge including adjacent lands (67.246 acres). These vegetation classifications were designed to be related to fire fuel model groups and used by the Fire Management Team for prescribed burn planning within the Refuge. DigitalGlobe® QuickBird satellite imagery (multispectral and panchromatic) were purchased for the project and obtained for December 5 and 18, 2003. The Refuge consists of more than 20,000 acres in four major units. The fire management program at the Mississippi Sandhill Crane National Wildlife Refuge is responsible for both the applications of prescribed fire and the suppression of undesired wildfire. The prescribed fire program at the refuge strives to return the wet pine savannas to a natural condition, providing suitable habitat for native plant communities and the cranes. Mississippi sandhill cranes (Grus canadensis pulla) are a critically endangered subspecies found nowhere else on earth but on and adjacent to the Mississippi Sandhill Crane National Wildlife Refuge. There are only about 100 individuals remaining, including about 20 breeding pairs. Without intensive management from the U.S. Fish and Wildlife Service and its cooperators and partners, this unique bird may disappear from the wild.

**Introduction**

The Mississippi Sandhill Crane National Wildlife Refuge is one of more than 500 national wildlife refuges administered by the U.S. Fish and Wildlife Service. It was established in 1975 to safeguard the critically endangered Mississippi sandhill crane and its unique disappearing habitat. The refuge consists of more than 20,000 acres in four units and is now part of the Gulf Coast National Wildlife Refuge Complex. The refuge objectives are to:

1. provide protection and management for the cranes,
2. protect and preserve unique wet pine savanna communities, and
3. provide environmental education, interpretation, and wildlife-oriented recreation.

The fire management program at the Mississippi Sandhill Crane National Wildlife Refuge is responsible for both the applications of prescribed fire and the suppression of undesired wildfire. Fire is a naturally occurring phenomenon throughout the longleaf and slash pine ecosystem and has shaped the appearance of the landscape on these refuges. Historically, natural fire occurred on a three to five-year interval. Fires were of low intensity, fueled by grasses and pine litter. Prescribed fire simulates natural fire. Fire management officers write a prescription for fire to be ignited only when certain weather, fuel, and moisture conditions occur that will make the fire manageable. The prescribed fire program at the refuge strives to return the wet pine savannas to a natural condition, providing suitable habitat for native plant communities such as wiregrass and pine pitch pine. Fire is mainly applied in the fall and spring. Fall fires are used to improve savannas overstocked with planted slash pine and enhance crane nesting areas. Spring fire is used to clear unwanted woody vegetation from savannas that have grown up in thickets. This brush shades out desirable herbaceous plants and makes the savanna unsuitable for crane nesting. Spring fire improves the growth response of herbaceous plants while reducing the viability of the woody plants.

**Methods**

DigitalGlobe® Quickbird satellite orthorectified multispectral (2.44m resolution) and panchromatic (90cm resolution) imagery of the study area was purchased. Imagery for the eastern half of the study area was acquired on December 5, 2003. The western half was acquired on December 18, 2003. All imagery contained 0% cloud cover. Imagery for each date was processed separately. A mask of water areas was created. An unsupervised isodata classification was performed on unmasked areas using ERDAS IMAGINE® software. Bands used in the classification included: Blue (0.45-0.52µm), Green (0.52-0.60µm), Red (0.63-0.69µm), Near-Infrared (0.76-0.90µm), and short and medium wavelength infrared bands.

Imagery was classified into three topographically driven vegetation/landscape classes: Agriculture, Woodland, and Savanna. Some areas had to be manually reclassified by drawing areas of interest (AOI) and recoding. These included areas in deep shadow which were incorrectly classified as water, agriculture areas (mainly chufa, Cyperus esculentus, planted inside the refuge for crane feeding) classified as grass/savanna, and swamp areas classified as woodland.

Thirty classes were created in the isodata classification. These classes were analyzed, combined, and assigned to nine classes: Agriculture, Grass/Savanna, Wooded Shrub/Scrub, Woodland, Slash, Marsh, Swamp, Concrete/Sand, or Water. In another classification set the Woodland/Shrub/Scrub were combined.

**Background**

Modeling fire behavior requires an understanding of the three elements of the “fire environment triangle”: topography, meteorology, and fuel properties. Techniques are readily available for determining topographic and meteorologic variables over large areas. Mapping fuel properties is much more difficult because of higher spatial and temporal variability. Fuels for fire fuel models have been classified into four groups – grasses, brush (shubs), timber, and slash. The differences in fire behavior among these groups are basically related to the fuel load and its distribution among the fuel particle size classes.

Fire management officers at the Mississippi Sandhill Crane National Wildlife Refuge are responsible for both the applications of prescribed fire and the suppression of undesired wildfire. The prescribed fire program at the refuge strives to return the wet pine savannas to a natural condition, providing suitable habitat for native plant communities and the cranes. Mississippi sandhill cranes (Grus canadensis pulla) are a critically endangered subspecies found nowhere else on earth but on and adjacent to the Mississippi Sandhill Crane National Wildlife Refuge. There are only about 100 individuals remaining, including about 20 breeding pairs. Without intensive management from the U.S. Fish and Wildlife Service and its cooperators and partners, this unique bird may disappear from the wild.

**Products**

DigitalGlobe® Quickbird satellite orthorectified multispectral (2.44m resolution) and panchromatic (90cm resolution) imagery of the study area was purchased. Imagery for the eastern half of the study area was acquired on December 5, 2003. The western half was acquired on December 18, 2003. All imagery contained 0% cloud cover. Imagery for each date was processed separately. A mask of water areas was created. An unsupervised isodata classification was performed on unmasked areas using ERDAS IMAGINE® software. Bands used in the classification included: Blue (0.45-0.52µm), Green (0.52-0.60µm), Red (0.63-0.69µm), Near-Infrared (0.76-0.90µm), 1st Principal Component of visible bands, NDVI (Normalized Difference Vegetation Index), SAVI (Soil-Adjusted Vegetation Index), and Green/Red ratio.

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Map products were created in ArcMap®.