Mississippi River Wetlands: Mapping the Batture Habitat

Principal Investigators:
Larry Handley
David Shaver, Mid-Continent Geographic Science Center
Chris Wells, National Wetlands Research Center
Ray Fox, USGS Geospatial Liaison for Missouri

Additional USGS contributors:
Bill Sneed, USGS Geospatial Liaison for Arkansas
Chris Cretini, USGS Geospatial Liaison for Louisiana
Jason Dugas, IAP World Services, NWRC

Partner Collaborators:

Malcolm Williamson, CAST, University of Arkansas and review of completed maps.	In-kind, existing data
Ken Brazil, Arkansas Department of Natural Resources	In-kind
Joe Holmes, Louisiana Department of Environmental Quality, of completed maps and peer review of change analysis	In-kind, field review
Tony Spicci, Missouri Department of Conservation	In-kind

Introduction

The word "batture" is derived from the French, *battre*, to beat, and was originally applied to the shallow sea floor and beach pounded by waves but in use along the Mississippi River, originally referred to the riverbed left dry when the water was low. It has gradually come to refer to the low water river land and inland to the levees, which is seasonally flooded. Thus, it includes both bare soil and vegetated surfaces varying from emergent marsh to cypress swamps to seasonally or even infrequently flooded hardwood forests.

For the decades and even centuries since the Mississippi River has been leveed from the confluence of the Ohio River to the confluence of the Red River, the batture land has been regarded as a waste land for most of it's area, though some portions of it are seasonally farmed or used as range for grazing livestock and the forests have been harvested for timber. But for the most part, the batture lands have been left untouched as compared to the lands outside of the levee system.

Biologically, the batture has proven to be a refuge for wetland vegetation and a migration corridor for birds and terrestrial animals. The Mississippi River system in the broad sense is one of the major migratory waterfowl flyways in the United States. Thus, the batture may be one of the most important, longest extent, and least impacted wetland ecosystems in the southern United States. River managers would be well-served by having access to habitat information of the batture.

The importance of the project is to provide a process for extracting basic wetland related feature information without the expensive, more detailed, and time consuming effort of characterizing and interpreting wetlands along the rivers using either NWI or HGM product development.

These resulting products will have immediate use within the Lower Mississippi river Resource Assessment (LMRRA) which is being developed between the U.S. Army Corps of Engineers and the USFWS beginning in 2010. The LMRRA will provide an assessment of information needed for river-related management, and assessment of natural resource habitat needs, and an assessment of the need for river-related recreation and access. Recommendations of the information and data work team has listed as a high priority for knowing the current status of aquatic habitats within the batture lands of the Mississippi River and how they have changed over time.

Proposal

We propose to initially extract the water features, forests, wetlands, and forested wetlands from eight USGS quadrangles located in Missouri and eight USGS quadrangles located in either Louisiana or Arkansas. These same features will then be updated for the sixteen quadrangles using the most recent DOQQ imagery available.

Upon successful completion of this prototype mapping project, the potential to apply this process to all of the 1:24,000 USGS quadrangles that are coincident within a 2 mile corridor of the centerline of the Mississippi River, of the lower Mississippi River from the confluence with the Ohio River to the confluence with the Red River, an estimated 310 quadrangles exists.

Methodology

Object oriented feature extraction methodology will be used to extract the wetlands, forest, and water features from existing USGS Quadrangles. Object-oriented feature extraction uses color, shape, size, texture, pattern, and context to identify land cover classes. In manual photo interpretation, scientists use many of these attributes to interpret the content of an image. The ability to extract wetland symbology from maps has already been successfully demonstrated by creating customized sampling input patterns to utilize during feature extraction. It is anticipated that forests and water features can also be extracted from the quadrangles using similar strategies.

The most recent DOQQ imagery for these same quadrangles will be obtained for updating the features previously extracted from the USGS quadrangles. Object oriented feature extraction is very effective at extracting water features and forest cover but photo interpretation with ground truthing will most likely be required to finalize the mapping of wetland habitats. Leveraging object oriented feature extraction with the knowledge of experienced photo interpreters promises to produce a cost effective, reliable methodology for the capture of these important land cover classes.

Validation

The map separates used in producing the USGS quadrangle maps will be used to validate the capture of all existing wetlands, woodlands, and water features from the selected 7.5 minute USGS quadrangle maps. These separates may potentially be the data source for feature collection from existing maps if they are scanned. The delineation of data derived from the most recent DOQQ's will be spot checked by site visits to the study areas and by examining other ancillary data sources if they are of similar time periods.

Analysis of Change

Identifying the amount and distribution of wetlands, forest, and water features from each of the sixteen USGS 7.5 minute quadrangle maps provides a rich dataset for analysis when compared to the same datasets derived from the DOQQ imagery. Measurements of the increase and decrease of these land cover classes within each USGS quadrangle provides a valuable indicator of change. Changes in the distribution of the land cover classes allows additional information to be derived such as land cover class fragmentation and the change in relationship with adjoining land cover classes.

Scope of Project:

8 1:24,000 scale quadrangles in Southeast Missouri along the Mississippi River
8 1:24,000 scale quadrangles in either Louisiana or Arkansas along the Mississippi River

Products:

Database of extracted marsh, woodland, water, and swamp features from existing 1:24,000 scale quads

Database of extracted and interpreted marsh, woodland, water, and swamp features for most current DOQQ's

Map and acreage tables providing analysis of marsh, woodland, water, and swamp feature change within the Batture lands of the Mississippi River

Report on the process for updating wetland features on the USGS topographic quads

Budget:

GIS Specialist (MCGSC) Feature Extraction $15,000

Photointerpreter (NWRC) Marsh and Swamp Delineation $15,000

GIS Analysis (MCGSC and NWRC) Comparison of previously mapped
                      Features and newly interpreted features and
                      and report on feature updating process $10,000

Data availability   (In-kind from Arkansas) $ 5,000

Completed Map and data review   (In-Kind from Arkansas, Louisiana) $15,000

Total Project Cost $60,000