

## Approach

- Field Work

Study Area: A six county region bordering the Missouri River in west central Missouri. Counties included are Boone, Chariton, and Howard north of the river; Carroll, Cooper, and Saline south of the river.

Reference sites (also referred to as training sites) will be chosen from representative wetlands located on public lands in our study area. Examples from the Lacustrine, Palustrine and Riverine systems (as defined by Cowardin, et. al. 1979) will be included provided they occur in our study area on publicly accessible lands. Reference sites will be used to train the software to recognize wetland types found in the mid-continent and fine tune our classification methods. EPA region 7 staff will assist with field work and carry out wetland delineations, with grant staff assistance, according to federal delineation guidelines established in the 1987 Corps of Engineer's Wetlands Delineation Manual (COE, 1987).

- Image Processing

Each dataset will be processed using PCI EASI/PACE software according to the most appropriate protocol found in current literature, (Jensen, 1996; Verbyla, 1995). The raw data will be processed to create images using unsupervised, quasi-supervised and supervised land classification methods. These classification methods involve varying levels of operator intervention. Other common procedures include georeferencing, and production of polygon, line, and point coverages for use in geographic information systems (GIS).

- Accuracy Assessment

Accuracy assessment for false positives will be performed on the results gained from processing each image platform. The final project report will contain the results of the accuracy assessment. Details will be included to allow the calculations to be independently duplicated (see B5). Selected polygons, which have been identified as wetlands, will be field checked to determine the accuracy of the methodology using the following procedure:

- Determine a representative sample size for each image platform. This will depend on the areal coverage of the imagery, the number of wetland sites located on public lands, and the time and resources available to perform site visits.
- Select sites for field verification, and generate coordinates in the GIS. Site selection will be based on accessibility and will attempt to include representative wetland types found in the study area.
- Visit each accuracy assessment site, using a Global Positioning System (GPS) meter to find each coordinate determined by the GIS.
- Conduct a wetland determination according to 1987 Corps of Engineers Wetland Delineation Manual procedures. EPA staff (Kathy Mulder or alternate designated by the EPA Project Officer) will assist in all wetland delineations.
- Perform statistical analysis on results of the field visits.

Accuracy assessment of false negative results is more difficult to achieve. False negatives occur when areas that are wetlands are not identified as such. In order to address omission errors, we need to have an accurate map of the location and extent of current wetlands. Up to date maps of wetlands in our study area are not available, this study attempts to develop methods which could be used to accurately identify existing wetlands. The most recent maps available are from the National Wetlands Inventory conducted by the U. S. Fish and Wildlife

Service. Those maps were created from aerial photography (scale = 1:85000) dating from the early to mid 1980's and are not current enough to be used for accuracy assessment. The limited study area further complicates the lack of current wetland maps. Although we are working in a six county area, our effective study area lies only on public lands within that region. Given these limitations and the scope of the current study we will not be able to realistically address this issue.

- Reporting

All spatial data coverages resulting from this study will be accompanied by documentation that conforms to Federal Geographic Data Committee (FGDC) metadata standards (FGDC, 1997). Metadata files prepared by the data originator will accompany any ancillary data incorporated into the study.

Processing journals will record all image processing procedures carried out on each dataset, including commentary on the results. Field records will include any forms used during the delineations (Corps Data Collection Sheets and field notes), photographs or videotapes of the sites, and any maps used during site selection. All project journals, records, and data will be kept at the Water Resources Program offices according to guidelines published in OMB circulars.

At project completion, the Principal Investigator will present a final report to the EPA Project Officer. The report will consist of the following items:

- Narrative report detailing project procedures and results.
- Mounted images of selected wetland areas to show a representative cross section of the final products.
- Poster session products for display and educational purposes.
- Methodology report.
- Evaluation of comparison analysis of the six image platforms.
- Digital copies of all project images suitable for inclusion on a web page.
- Photographs/videos of reference wetland sites.
- Slides detailing image processing procedures. These will be direct screen shots for use in a "how we did it" presentation.

References:

Corp of Engineers. 1987. Corps of Engineers Wetlands Delineation Manual. US Army Corps of Engineers Waterways Experiment Station, Environmental Laboratory. Technical Report Y-87-1

Cowardin, L. M., V. Carter, F. C. Golet, and E. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service. U.S. Government Printing Office, Washington D.C.

Federal Geographic Data Committee. 1997. Content Standard for Digital Geospatial Metadata (revised April 1997). Federal Geographic Data Committee. Washington. D.C.

Jensen, J. R. 1996. Introductory Digital Image Processing: A Remote Sensing Perspective, 2nd ed. Prentice-Hall, Inc. Upper Saddle River, NJ

Verbyla, D. L. 1995. Satellite Remote Sensing of Natural Resources. CRC Press. Boca Raton, FL.