Implementation of Gaining Program Efficiencies by Electronic Field Data
Capture and Accessing Data Through the Internet

Automation of 2000 Land Cover/Land Use – Peoria Pool of the Illinois Waterway
and Pool 22 of the Upper Mississippi River

Bathymetric mapping of the UMRS – Surveys conducted for systemic mapping

1. Implementation of Gaining Program Efficiencies by Electronic Field Data

The mission of the Long Term Resource Monitoring Program (LTRMP) is to provide decision makers with the information needed to maintain the Upper Mississippi River System as a viable multiple-use large-river ecosystem. We are committed to making our data readily accessible to river managers and the public in a timely manner. Because of the volume alone, collecting, processing, managing, and reporting of LTRMP field data is a significant investment of time and money. The LTRMP water quality, fish, vegetation, and macroinvertebrate components collect more than 13,000 data points per year, with a variety of parameters collected at each site (roughly 356,000 observations). The volume and demands to quickly disseminate LTRMP data lead us to use computer technology to deliver the data in a timely manner.

Currently, all LTRMP components, except for the fish component, are using electronic data capture in the field. In FY03, the fish component also will begin using an electronic data entry program on ruggedized laptop computers. The electronic datasheets are designed to look similar to the “old” paper datasheets and have preloaded fields and dropdown menus to decrease data entry. An electronic data sheet allows us to have built-in data verification. By using electronic data capture, most of the errors in data recording that occur can be caught at the source (i.e., in the field) by use of syntax, contextual, and range checks made by data capture software run on a laptop computer, thus preventing most “bad” data from ever entering the system. Also, with electronic data capture, the data are available to the principal investigator about 2–3 months sooner than if paper datasheets are sent to a data entry contractor. Thus, the clean data and annual reports will be available at least 2 months sooner to river managers and the public.

Also in FY03, two other areas to gain efficiencies by field staff and Program Partners will be explored. First, we will assess the integration of a digital balance and an electronic fish measuring board linked to a ruggedized laptop computer. A major element of the workload is processing large number of fish for length and weight. Electronic devices that automate length and weight measurements reduce this workload by increasing staff efficiency. Also, any outliers are brought to the field station staff’s attention before the fish is discarded.

Secondly, new ways of accessing LTRMP data will be explored. A new LTRMP Internet public Web browser for accessing LTRMP component data will be created. Initially, an “Aquatic Vegetation Stratified Random Sampling” browser will be developed using new Internet technology and will be used as a template for other the LTRMP component browser upgrades. The new browser will allow the general public to query data and will return a data file that the user can download and use in programs, such as SAS, Microsoft Excel, Microsoft Access, and ARC/INFO. Each LTRMP component will have two browsers—one for QA data for the public and one for non-QA data for LTRMP and field stations’ internal users. When the new data (current collection year) has been QA and released by the component specialists and field station’s staff, the data will be made available to the public without a password necessary for access, as is currently the procedure. The new browsers will be developed using newer technologies for faster querying and data returns for users.
Also, a new computer interface that provides summary data and graphics directly from the LTRMP Fisheries Web browser will be developed. Currently, as mentioned above, the LTRMP provides access to data via a Web browser interface. The products of queries through this interface are flat files (raw data file in a generic file format) that require the user to import the data into various commercial desktop applications for graphical and tabular summarization. By providing this new interface using Web scripting, Program Partners would receive instantaneous data summaries in condensed tabular and graphical form, allowing them to interactively investigate patterns and trends in LTRMP data. We expect that this new interface will allow us to disseminate more meaningful and relevant information, more quickly to our Program Partners.

By using electronic data capture and developing Internet interfaces to access the LTRMP data, we will be able to more quickly disseminate LTRMP data to our partners and use the recovered staff’s time for science- and data management-related tasks rather than mundane processing of data.

**Total Funding required:** $73,000

**Milestones**

- **August 31, 2002**
  - Acquire ruggedized laptop computers for field electronic data entry
- **August 31, 2002**
  - Test MS Assess electronic fish data sheet
- **September 30, 2002**
  - Complete initial beta testing of the “Aquatic Vegetation Stratified Random Sampling” data browsers
- **September 30, 2002**
  - Complete Web interface that will provide the ability to create summaries and graphs on the LTRMP Fish monitoring data

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The Upper Midwest Environmental Sciences Center (UMESC) is developing a Year 2000 land cover/land use (LCU) dataset for the entire Upper Mississippi River System (UMRS). This dataset will be developed using the 31-General Classes, a classification system that is based on plant dominance and plant hydrology. This classification crosswalks to all previous LCU datasets developed by UMESC for the UMRS. Once complete, this dataset will provide an 11-year time step since the 1989 systemic coverage, allowing examination of changes resulting from the 1993 flood, HREP projects, and the ongoing development and urbanization of the floodplain. At present, all
trend pools are complete and available for download via the Internet. In addition, LCU data for the Alton Pool, and Pools 24 and 25 have recently been completed and are available for download via the UMESC web site. This proposal offers to complete the vegetation datasets for the Peoria Pool and one-half of the process for Pool 22, both contiguous to large portions of previously completed 2000 LCU.

**Objectives**

Assist in the integrated UMRS management planning by completing the Year 2000 LCU for the Peoria Pool of the Illinois River and one-half of Pool 22 of the UMRS.

**Methods**

Aerial photographs of the entire UMRS were taken in color infrared (CIR) at 1:24,000 and in True Color (TC) at 1:16,000-scale in the late summer of 2000. TC aerial photos of Pools 22 and Peoria will be scanned, rectified, and served via the UMESC Internet site. The CIR aerial photos will be interpreted and automated using the 31-class LTRMP vegetation classification (see Attachment A). This database will be prepared by or under the supervision of competent and trained professional staff using documented standard operated procedures and will be subject to rigorous quality control (QC) assurances (NBS, 1995). The Peoria Pool dataset will be provided in the NAD27 and NAD83 datums and in the UTM Zone 16 projection. Once complete, the Pool 22 dataset will be provided in the NAD27 and NAD83 datums and in the UTM Zone 15 projection. This funding will accelerate the automation of Pool 22 resulting in completion of one-half of the process this fiscal year. The remaining effort (data automation, crosswalk, and final QA/QC) will be accomplished in early FY03 pending funding for the completion of Pool 22.

**FY02 Schedule of Products**


Task B. Georeference, mosaic, and compress approximately 90 1:16,000 scale true color aerial photos for Peoria Pool and approximately 60 photos for Pool 22. Serve via the UMESC Internet site.

Total Funding required for Pool 22: $ 29,100
Total Funding required for Peoria Pool: $ 60,000
**Total Funding required:** $ 89,100

**Milestones**

September 30, 2002 Complete LCU dataset and photo mosaic for Illinois River Peoria Pool and one-half of the process for Pool 22 of the Mississippi River.

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### LTRMP 31-Class Vegetation Classification

<table>
<thead>
<tr>
<th>UMR_CODE</th>
<th>UMR_CLASS</th>
<th>UMR_CLASS_DESCRIPTION</th>
<th>HYDRO_DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG</td>
<td>Agriculture</td>
<td>All obviously cultivated fields. This category may include transitional fallow fields that show evidence of tilling.</td>
<td>Infrequently Flooded Non-Forest</td>
</tr>
<tr>
<td>CN</td>
<td>Conifers</td>
<td>All natural or semi-natural evergreen communities. Typically Pine, but occasionally Cedar.</td>
<td>Infrequently Flooded Forest</td>
</tr>
<tr>
<td>DMA</td>
<td>Deep Marsh Annual</td>
<td>Dominated by Wild Rice, but may include floating-leaf species, submergents, or deep marsh perennials.</td>
<td>Semipermanently Flooded Non-Forest</td>
</tr>
<tr>
<td>DMP</td>
<td>Deep Marsh Perennial</td>
<td>Persistent emergents that prefer lots of water. Dominated by Arrowhead, Bur-reed, and Cattail and may include Pickerelweed, Giant Reed Grass, and Bulrush.</td>
<td>Semipermanently Flooded Non-Forest</td>
</tr>
<tr>
<td>DMS</td>
<td>Deep Marsh Shrub</td>
<td>Shrubby vegetation &gt;25%, dominated by Buttonbush and Water Willow, frequently growing in standing water. May include RFA, SV, and deep marsh perennials.</td>
<td>Semipermanently Flooded Shrubs</td>
</tr>
<tr>
<td>DV</td>
<td>Developed</td>
<td>Areas that are predominantly artificial in nature such as cities/towns, large farmsteads, and industrial complexes.</td>
<td>Infrequently Flooded Non-Forest</td>
</tr>
<tr>
<td>FF</td>
<td>Floodplain Forest</td>
<td>Softwood forests growing on saturated soils near the main channel and in floodplain backwaters. These forest are predominantly Silver Maple, but also include Elm, Cottonwood, Black Willow, and River Birch.</td>
<td>Seasonally Flooded Forest</td>
</tr>
<tr>
<td>GR</td>
<td>Grassland</td>
<td>Drier upland grass or grass/forb fields. May include fallow fields, sand prairies, and shrubby vegetation &lt; 25%.</td>
<td>Infrequently Flooded Non-Forest</td>
</tr>
<tr>
<td>LF</td>
<td>Lowland Forest</td>
<td>Lowland Forest - More common on southern reaches of the UMRS. These forests grow along the river banks on sites that are drier than FF sites. Typical species include many Hickories, Pecan, River Birch.</td>
<td>Temporarily Flooded Forest</td>
</tr>
<tr>
<td>LV</td>
<td>Levee</td>
<td>All continuous dikes or embankments designed for flood protection. More common on southern reaches of the UMRS and typically covered with mixed grass and forbs.</td>
<td>Infrequently Flooded Non-Forest</td>
</tr>
<tr>
<td>MUD</td>
<td>Mud</td>
<td>Exposed, non-vegetated mudflats. May occur near the main channel or in backwaters.</td>
<td>Seasonally Flooded Non-Forest</td>
</tr>
<tr>
<td>NPC</td>
<td>No Photo Coverage</td>
<td>Gaps in photo coverage. May include areas obscured by clouds or shadows.</td>
<td>No Photo Coverage</td>
</tr>
<tr>
<td>OW</td>
<td>Open Water</td>
<td>All non-vegetated open bodies of water.</td>
<td>Permanently Flooded Non-Forest</td>
</tr>
<tr>
<td>PC</td>
<td>Populus Community</td>
<td>Predominantly Cottonwood (&gt;50%) but may include willow and other floodplain forest species.</td>
<td>Seasonally Flooded Forest</td>
</tr>
<tr>
<td>PN</td>
<td>Plantation</td>
<td>All commercially-grown evergreen plantations, large nurseries, and orchards. Typically will be Red or White Pine.</td>
<td>Infrequently Flooded Forest</td>
</tr>
<tr>
<td>PS</td>
<td>Pasture</td>
<td>All grass fields used for the production of livestock.</td>
<td>Infrequently Flooded Non-Forest</td>
</tr>
<tr>
<td>RD</td>
<td>Roadside Grass/Forbs</td>
<td>Grass/forb-covered right-of-ways along side of roads, highways, and railroads.</td>
<td>Infrequently Flooded Non-Forest</td>
</tr>
<tr>
<td>RFA</td>
<td>Rooted Floating Aquatics</td>
<td>Typically Lotus and Lily, but may include Water Shield and Water Primrose. Frequently grows with submergent vegetation when RFA density is &lt; 90%.</td>
<td>Permanently Flooded Non-Forest</td>
</tr>
<tr>
<td>SB</td>
<td>Sand Bar</td>
<td>Exposed sand bars typically found in and near the main channel, and often associated with wing dams and islands.</td>
<td>Temporarily Flooded Non-Forest</td>
</tr>
<tr>
<td>SC</td>
<td>Salix Community</td>
<td>Predominantly Willow (&gt;50%) but may include Cottonwood and other floodplain forest species.</td>
<td>Seasonally Flooded Forest</td>
</tr>
</tbody>
</table>
### Habitat Types

<table>
<thead>
<tr>
<th>Code</th>
<th>Category</th>
<th>Description</th>
<th>Flooding Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD</td>
<td>Sand Dunes/Spoil</td>
<td>Sand spoil banks, beaches, and other sparsely-vegetated sandy areas.</td>
<td>Infrequently Flooded Non-Forest</td>
</tr>
<tr>
<td>SM</td>
<td>Sedge Meadow</td>
<td>Dominated by mixed Sedges but may include perennial emergents and moist soil grass/forbs.</td>
<td>Temporarily Flooded Non-Forest</td>
</tr>
<tr>
<td>SMA</td>
<td>Shallow Marsh Annual</td>
<td>Typically Wild Millet and Beggarticks and other annual species that favor mudflats and shallow basins.</td>
<td>Seasonally Flooded Non-Forest</td>
</tr>
<tr>
<td>SMP</td>
<td>Shallow Marsh Perennial</td>
<td>The transition zone between deep marsh and wet meadow that is dominated by Bulrush, and to a lesser extent Cattail, Arrowhead, Bur-reed, Giant Reed Grass, Smartweed, and other moist soil species.</td>
<td>Seasonally Flooded Non-Forest</td>
</tr>
<tr>
<td>SMS</td>
<td>Shallow Marsh Shrub</td>
<td>Mixed shrubs &gt;25%, but typically Sandbar Willow growing near the main channel and in backwaters along with mixed emergents, grasses, and forbs.</td>
<td>Seasonally Flooded Shrubbs</td>
</tr>
<tr>
<td>SS</td>
<td>Shrub/Scrub</td>
<td>Shubby vegetation &gt; 25% on drier soils with a mixed grass/forb understory.</td>
<td>Infrequently Flooded Shrubbs</td>
</tr>
<tr>
<td>SV</td>
<td>Submerged Aquatic Vegetation</td>
<td>All submersed aquatic vegetation.</td>
<td>Permanently Flooded Non-Forest</td>
</tr>
<tr>
<td>UF</td>
<td>Upland Forest</td>
<td>Forests growing at the edge or out of the UMRS floodplain. Species include Red/White Oak, Hickories, Elm, and other deciduous trees.</td>
<td>Infrequently Flooded Forest</td>
</tr>
<tr>
<td>WM</td>
<td>Wet Meadow</td>
<td>Dominated by moist soil grasses such as Reed Canary Grass and Rice Cutgrass. Also includes Loosetrife, Smartweed, and small inclusions of other mixed emergents, grasses, and forbs.</td>
<td>Saturated Soil Non-Forest</td>
</tr>
<tr>
<td>WMS</td>
<td>Wet Meadow Shrub</td>
<td>Mixed shrubby vegetation &gt; 25%, typically Alder, Elder, False Indigo, Dogwood and/or Willow with a sedge/grass/forb understory.</td>
<td>Temporarily Flooded Shrubbs</td>
</tr>
<tr>
<td>WS</td>
<td>Wooded Swamp</td>
<td>Most common in southern reaches of UMRS. Includes Bald Cypress, Water Tupelo, Sourgum, and Black Ash.</td>
<td>Semipermanently Flooded Forest</td>
</tr>
</tbody>
</table>

### Density Modifier

- **A** = 10-33%
- **B** = 33-66%
- **C** = 66-90%
- **D** = > 90%

### Height Modifier

- **1** = 0-20 feet
- **2** = 20-50 feet
- **3** = > 50 feet

### 3. Bathymetric mapping of the UMRS – Surveys conducted for systemic mapping

This proposed work is an enhancement of Task 2.7 in the FY2002 Scope of Work. The Long Term Resource Monitoring Program has continued to collect bathymetric data in order to complete a one-time systemic GIS database. The Upper Midwest Environmental Sciences Center (UMESC) will complete identification of gaps in the systemic database as part of base-funded Task 2.7. Surveys will be conducted to fill these gaps, or conducted in newly selected pools (Pool 20 and Peoria Pool are currently proposed), by Rock Island District hydrosurvey section. St. Louis District will complete wingdam surveys that were not completed in FY2001. All data collected will be processed in a GIS at UMESC, as funded in Task 2.7. The status of the pool-wide GIS coverages will be depicted by a map on the LTRMP web site (www.umesc.usgs.gov/aquatic/bathymetry/status.html).

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Objectives
To complete additional pool-wide surveys in order to expedite the completion of a systemic GIS bathymetric data set for the UMRS.

Methods
No major changes to the existing methodology used in the past by LTRMP are anticipated. The methods for bathymetric surveys by boat are designed to produce data suitable for generating a pool-wide GIS coverage using interpolation between sample points.

FY02 Schedule of Products
Standard set of products (i.e. data, images) available through the UMESC bathymetry web pages for completed pools.

Funding provided to Rock Island District: $15,000
Funding provided to St. Louis District: $70,000
Total Funding required: $85,000

Milestones
September 30, 2002 Standard set of products (i.e. data, images) available through the UMESC bathymetry web pages for completed pools.