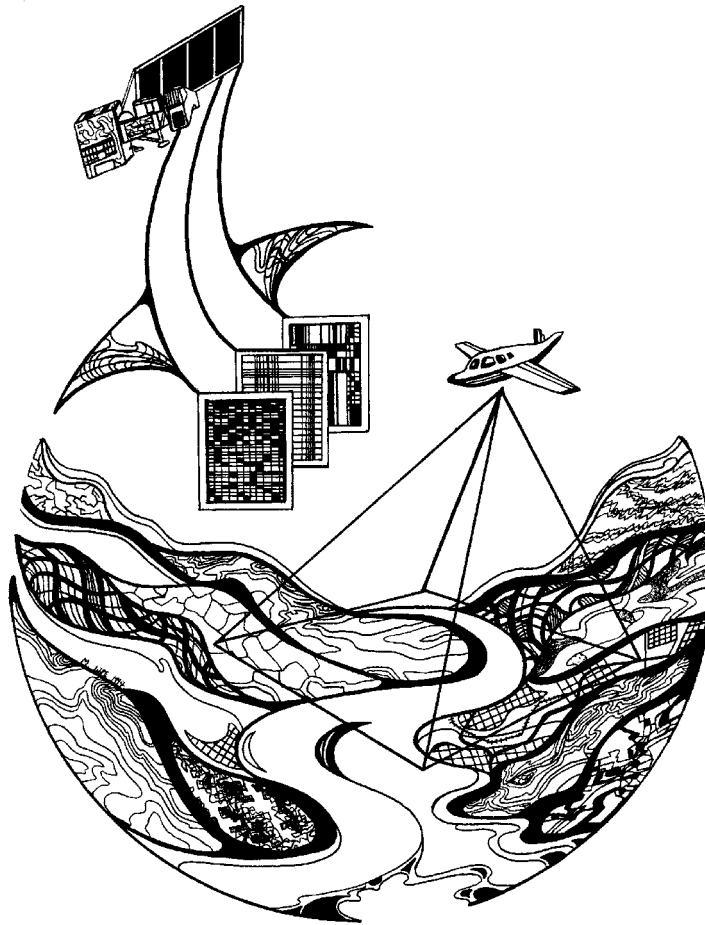


Long Term Resource Monitoring Program

Program Report

95-P008-6

Long Term Resource Monitoring Program
Standard Operating Procedures:
**Aquatic Areas Database
Production**



March 1996

**Long Term Resource Monitoring Program
Standard Operating Procedures:
Aquatic Areas Database Production**

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Preface

The Long Term Resource Monitoring Program (LTRMP) was authorized under the Water Resources Development Act of 1986 (Public Law 99-662) as an element of the U.S. Army Corps of Engineers' Environmental Management Program. The LTRMP is being implemented by the Environmental Management Technical Center, an office of the National Biological Service, in cooperation with the five Upper Mississippi River System (UMRS) States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, with guidance and Program responsibility provided by the U.S. Army Corps of Engineers. The UMRS encompasses the commercially navigable reaches of the Upper Mississippi River, as well as the Illinois River and navigable portions of the Kaskaskia, Black, St. Croix, and Minnesota Rivers.

The mission of the LTRMP is to provide decision makers with information for maintaining the UMRS as a sustainable large river ecosystem given its multiple-use character. The long-term goals of the Program are to understand the system, determine resource trends and effects, develop management alternatives, manage information, and develop useful products.

The strategy of developing and adopting standard operating procedures is included in the LTRMP Operating Plan as Strategy 4.1.1, *Develop and Update Information Management Guidance Documents* under Objective 4.1, *Provide Direction for Automation Activities*. This report was developed with funding provided by the Long Term Resource Monitoring Program.

Additional copies of this report may be obtained from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161 (1-800-553-6847 or 703-487-4650).

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Introduction

The aquatic areas described by Wilcox (1993) are used to delineate major aquatic features within the Upper Mississippi River System floodplain. A spatial database of these features is created by grouping specific features in the land cover/use database and adding features such as main channel and side channel delineation. This section of the Standard Operating Procedures (SOPs) contains instructions on how this is accomplished after the land cover/use database has been developed. We have focused on the 1989 land cover/use database, but any year may be used for which similar land cover/use databases exist.

Transfer Structures and Define the Main Channel

Identify the locations of buoys and lights marking the main channel on the 1:15,000 color-infrared aerial photographs under a magnifying stereoscope. Using a drafting pen, mark these structures on a registered clear plastic overlay. See the SOPs for Photointerpretation (Owens and Hop 1995b) for information on preparing overlays if overlays do not exist.

Transfer the marked buoys to overlays registered to 7.5-minute quads using a Zoom Transfer Scope (ZTS). See the SOPs for the Automated Zoom Transfer Scope (Robinson 1995, 1996) for instructions on the use of the ZTS.

Transfer the locations of wing dams, revetments, and other structures from the most recent U.S. Army Corps of Engineers navigation charts to the same overlay registered to the 7.5-minute quads using the ZTS. Use the location of the buoys and wing dams and other structures on the map to determine the location of the main navigation channel.

Under the guidance of a senior cartographer, delineate the location of the main navigation channel by connecting the buoys or wing dams, whichever is farthest out into the main channel. The main navigation channel is about 200 ft wide in straight reaches and 500 ft wide in bends. Have a senior cartographer check the transferred data for quality.

You have created two layers of information on the 7.5-minute quad overlay: (1) the main channel, which is a polygon and will be merged with the polygonal aquatic area coverage derived from the land cover/use coverage and (2) the structures, which are linear data and will be merged with the linear aquatic area coverage derived from the land cover/use coverage.

Digitize the Main Channel and the Structures

Create a workspace named "aquatic" in your directory using the ARC command "cw" and move into the aquatic workspace. Following the digitizing procedures, digitize the structure data into an ARC/INFO line coverage and the main channel into a polygon coverage. Have the digitizing supervisor check the linework on plots for quality. Mapjoin the individual quad coverages for both the structure and the main channel coverages into pool-wide coverages.

Project both coverages into the Universal Transverse Mercator projection, Zone 15. Name the final main channel coverage "mcp#" and name the structure's linear coverage "strp#" (where # = pool number).

Prepare Coverage for Adding Attributes

The following procedures describe commands in ARC/INFO that are used to group features in the land cover/use coverage and to combine them with new digitized features.

Use the ARC "dissolve" command on the lcu89p# coverage:

```
Arc: dissolve lcu89p# dis89p# LW
```

where lcu89p# is the in_cover, dis89p# is the dissolve cover, and LW is the dissolve item. This command creates a cover with two types: LW type 1 = land and LW type 2 = water.

Perform the union command with mcp# and dis89p#:

```
Arc: union dis89p# mcp# aqa89p#
```

This creates one polygon coverage with both the main channel and the dissolved land cover areas.

Use the dropitem command to eliminate the "-id" and "#" attributes left over from the in_cover and the union_cover in the aqa89p#.pat.

The next step is to add an item to the aqa89p# attribute table with the "additem" command. This item will be called "AQUATIC_AREAS" and have a width of 4, an output width of 4, and a type = C.

```
Arc: additem aqa89p#.pat aqa89p#.pat AQUATIC_AREAS 4 4 C
```

Then invoke tables, select the aqa89p#.pat file, reselect LW = 1, and move 'N' to AQUATIC_AREAS. This assigns the class N (Nonaquatic) to all nonaquatic areas.

Return to ARC and perform the dropitem command to eliminate the LW attribute in the aqa89p#.pat. The aqa89p# is ready to be attributed in ARCEDIT. Add the same item to the strp# attribute table. It is not necessary to assign classes to this coverage now.

Classify Coverages On-Screen

In ARCEDIT, set the edit cover as aqa89p#, with the draw environment as arcs. With a different line color, bring in as a background cover strp#, set the background draw environment as arcs, and draw. The polygons will be reclassified by the technician according to Wilcox's classification (1993). The classes will be added to the AQUATIC_AREA attribute; the codes are listed in the Appendix. Add arcs and labels as necessary, and use the "moveitem" command to classify the labels. Select several of the same class and use the "moveitem" to classify many at a time.

This work must be done by someone with experience in the classification system, or under the close guidance of such a person.

Once the reclassification is complete, exit out of ARCEDIT, clean aqa89p#, and check for label and node errors. Run the "statistics" command with "AQUATIC_AREAS" as the item, and list the resulting INFO table (the "AREA" Arc Macro Language or "frequency" report will also work). Check to make sure all attributes are legal.

This process must also be completed for the linear structure coverage strp#. In ARCEDIT, set the edit cover as strp#, with the draw environment as arcs. With a different line color, bring in as a background cover aqa89p#, set the background draw environment as arcs, and draw. The arcs will be classified according to Wilcox's classification (1993). The classes will be added to the AQUATIC_AREA attribute; the codes are listed in the Appendix. Use the "moveitem" command to classify the arcs. Select several arcs of the same class and use the "moveitem" to classify many at a time.

When the classification is complete, exit out of ARCEDIT and clean strp# as a line coverage. Run the "statistics" command with "AQUATIC_AREAS" as the item and list the resulting INFO table. Check to make sure all attributes are legal. Rename the coverage to aqa89p#1 (1 = line features coverage).

Completing the Attribute Tables

The attribute tables for both coverages need to be expanded to include all attributes. Fortunately, a lookup table exists that makes this operation easy. Use the "joinitem" command to add the new attributes to the existing tables.

For the polygon attribute table (PAT) of the aqa89p7 coverage, use the command:

```
joinitem aqa89p#.pat /net/sun06/usr3/arc_work/dao0/attribute_database/aqa.lkp aqa89p#.pat  
AQUATIC_AREAS AQUATIC_AREAS
```

where

aqa89p#.pat is the in_info_file,

/net/.../aqa.lkp is the join_info_file,

aqa89p#.pat is the out_info_file, AQUATIC_AREAS is the relate item, and

AQUATIC_AREAS is the start item.

Then list and carefully inspect the resultant PAT to ensure that the joinitem worked properly.

Repeat the process for the arc attribute table (AAT) of the linear coverage aqa89p#l, substituting aqa89p#l.aat for aqa89p#.pat for the in_info_file and out_info_file.

Again list and carefully inspect the resultant AAT to ensure that the joinitem worked properly.

Once you have thoroughly checked the coverage, notify your supervisor that the coverage is complete and indicate where it exists on the system.

Put the Coverages in the Database

Once the automation process is complete, the digitizing supervisor, in coordination with an experienced interpreter, performs quality control checks on the coverage. Afterwards, the coverages are placed in the online directories and the necessary metadata documentation is completed.

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- Owens, T., and K. D. Hop. 1995a. Long Term Resource Monitoring Program standard operating procedures: Photointerpretation. National Biological Service, Environmental Management Technical Center, Onalaska, Wisconsin, July 1995. LTRMP 95-P008-1. 7 pp. + Appendixes A and B.
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- Wilcox, D. B. 1993. An aquatic habitat classification system for the Upper Mississippi River System. U.S. Fish and Wildlife Service, Environmental Management Technical Center, Onalaska, Wisconsin, May 1993. EMTC 93-T003. 9 pp. + Appendix A. (NTIS # PB93-208981)

Appendix

UMRS Aquatic Area Classes

<u>Type</u>	<u>Code</u>
Channel	
Main channel	
• Navigation Channel	MNC
• Channel Border	MCB
• Secondary Channel	SC
• Tertiary Channel	TC
• Tributary Channel	TRC
• Excavated Channel	EC
• Sandbar	SB
Backwater	
Contiguous	
• Abandoned Channel Lake	CACL
• Tributary Delta Lake	CTDL
• Floodplain Depression Lake	CFDL
• Lateral Levee Lake	CLLL
• Scour Channel Lake	CSCL
• Human-Made Lake	CMML
• Borrow Pit	CBP
• Floodplain Shallow Aquatic	CFSA
• Impounded	CIMP
Isolated	
• Abandoned Channel Lake	IACL
• Tributary Delta Lake	ITDL
• Floodplain Depression Lake	IFDL
• Lateral Levee Lake	ILLL
• Scour Channel Lake	ISCL
• Man Made Lake	IMML
• Borrow Pit	IBP
• Floodplain Shallow Aquatic	IFSA
Channel Features	
• Closing Dam (Linear)	CD
• Wing Dam (Linear)	WD
• Revetted Bank	RB
Nonaquatic N	
No Photo Coverage	NOPH

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13. ABSTRACT (Maximum 200 words) This chapter describes specific procedures that are to be followed by Long Term Resource Monitoring Program (LTRMP) staff when creating aquatic areas coverages. This procedure uses data already created for the land cover/use coverage for the pool. The procedures are divided into several steps: (1) delineation of the main channel, (2) digitizing the main channel and structures, (3) dissolving the land cover data into aquatic and nonaquatic classes, (4) on-screen digitizing and classification, (5) completing the attribute tables photointerpretation, and (6) placing the coverages in the database. The aquatic areas classification is appended.			
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