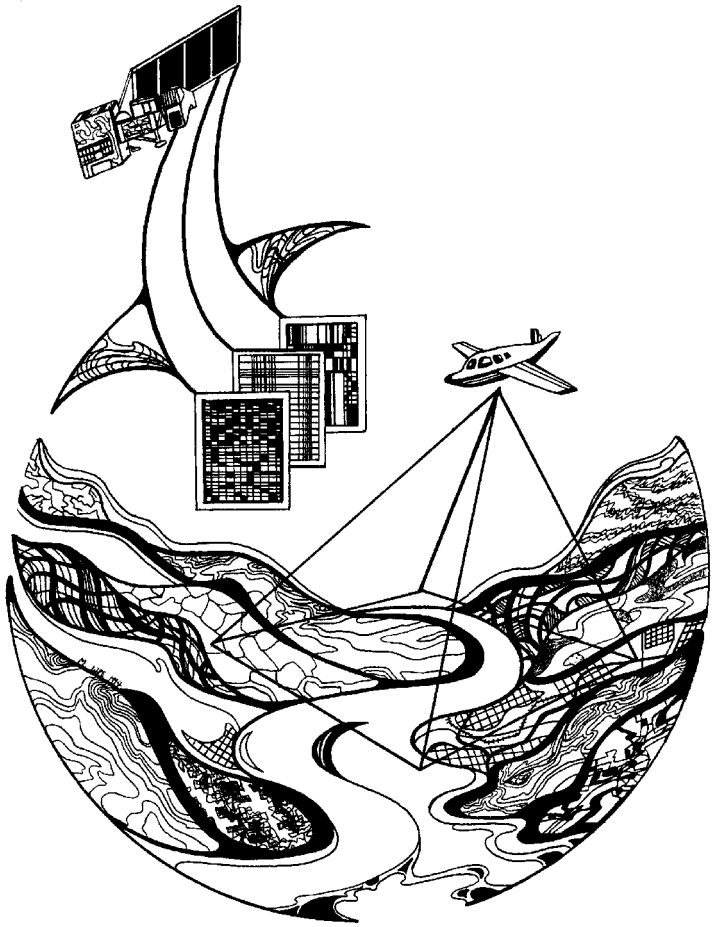
Long Term Resource Monitoring Program

Program Report

95-P008-2

Long Term Resource Monitoring Program
Standard Operating Procedures:

Field Station Photointerpretation



August 1995

Long Term Resource Monitoring Program Standard Operating Procedures: Field Station Photointerpretation

by

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The Environmental Management Technical Center issues LTRMP Program Reports to provide Long Term Resource Monitoring Program partners with programmatic documentation, procedures manuals, training manuals, and geospatial applications.

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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 to maintain 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 impacts, develop management alternatives, manage information, and develop useful products.

The strategy to develop and adopt standard operating procedures is included in the LRTMP 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 Monotoring 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).

This report should be cited as:

Owens, T. and K. D. Hop. 1995. Long Term Resource Monitoring Program standard operating procedures: Field station photointerpretation. National Biological Service, Environmental Management Technical Center, Onalaska, Wisconsin, August 1995. LTRMP 95-P008-2. 13 pp. + Appendixes A-E.

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Introduction

This chapter describes specific procedures that should be followed by Long Term Resource Monitoring Program (LTRMP) Field Station staff when preparing for and conducting a photointerpretation project. Procedures are provided for photo and work area preparation, scaling, field verification, and interpretation.

Aerial Photography Interpretation

Photo Preparation

Each field station will receive one set of color-infrared contact prints and one set of transparencies in a canister. The prints are used for indexing and field work. The transparencies are used to create work areas and for photointerpretation.

Immediately upon receipt of the photos, use the contact prints to find each photo center (the intersection of imaginary lines extended from the fiducial marks). Locate the point on the appropriate 7.5-ft topo quad and place a piece of tape labeled with the flight strip number and exposure number at that point. An alternative method is to show individual flightlines on a quadrangle schematic such as the example seen in Appendix A.

While indexing, carefully check the photos for proper endlap (60%) and sidelap (30%), color quality, crab (photos askew from the flight line due to side winds), cloud cover, and sufficient coverage. Immediately report major problems (gaps in coverage, insufficient endlap for stereo viewing, excessive cloud coverage, poor exposure) to the Environmental Management Technical Center (EMTC) cartographer.

Organize each flight strip into a file folder labeled with the strip number and exposure numbers. Place all topo quads, along with the filed prints, in an accordion folder labeled with photo type, scale, pool, and date. Cut transparencies into individual frames and put into clear plastic sleeves. Organize the transparencies in the same manner as the prints.

A list of materials necessary to complete the tasks described below is in Appendix B.

Scaling Photos/Minimum Mapping Unit

Aerial photos are taken at a nominal (or planned) scale, but the actual scale is not exactly the same, due to a variety of factors such as changes in topography or the aircraft's altitude. It is necessary to determine the actual photo scale to ensure that specifications were met and also to create a minimum mapping unit (MMU) guide (instructions follow).

First, locate a feature (usually a road) near the photo center with two points (such as intersections) that are easily identifiable on both the photo and the corresponding 1:24,000 topo quad.

Using dividers, carefully measure the photo distance (PD) and the map distance (MD) of the feature, using the same units. Place these distances into the following formula:

$$SCALE = \frac{PD}{MD} \times MAPSCALE = \frac{PD}{MD} \times \frac{1}{24{,}000}$$

The calculated scale should be close to the nominal scale (e.g., a nominal scale of 1:15,000 but an actual scale of 1:15,433). Repeat this process in different areas of the pool to determine scale variability.

Next, create the MMU guide, which is a small piece of clear plastic with the MMU drafted on it at the photo scale. For example, at the scale of 1:15,000, if the MMU is 1 acre, the guide could have a 0.17-inch square and a 0.05- x 0.50-inch rectangle. This guide will serve as a calibration tool for the interpreter's eye so that polygons smaller than the MMU are not delineated, thus eliminating unnecessary detail. Use of the MMU is not a hard and fast rule. Land cover/use types which are less than the MMU may be delineated if they are obviously and significantly different than their surroundings. For example, if the MMU is 1 acre, a 3/4-acre forested island within the open water of the river may be delineated. However, land cover/use types which are less than MMU should be incorporated in with other types if possible. For example, a 3/4 acre of *Sagittaria* spp. next to a 1/2 acre of *Scirpus* spp. should be delineated together creating one polygon (with an attribute of *Scirpus/Sagittaria* mix), thus meeting the MMU criteria.

Work Area Preparation

Overlay Preparation

First, cut a clear plastic sheet to size, approximately 9 inches on a side. Secure the sheet to the four corners of the transparency with rectangles of drafting tape cut to 1/2 inch by 3/4 inch. Affix the overlay to the photograph with the overlay's curl side up. This will help flatten the transparency photo, which is curled the opposite direction. When handling the overlay sheets, use extra care not to touch the area where delineations will be applied, as ink does not adhere well to skin oils. Because the edges of the sheets should be handled minimally, wearing thin nylon or cotton industrial gloves may help prevent excessive contact. Always protect the photograph and overlay with a photograph sleeve.

Neatly mark fiducials and photo numbers on the overlay, using a drafting pen (size 0 or 0.35 mm). If the overlay is shifted or removed, it can then be accurately replaced.

Endlap Preparation

Beginning with the first photo in a flight strip, mark the study area boundary (SAB) on the photo.

On a light table, place the end photo over the next photo in the flight line. Line up features in the overlap area on both photos, determine the halfway point of the overlap, and draw a line (perpendicular to the flight line) on the overlay to mark this point.

With the stereoscope at 1.0 magnification, set the two photos into a stereo model and locate the line just drawn. On the matching photo, mark several points that appear to lie on this line and connect the points with a straight edge, completing the process of creating end-match lines for this stereo pair.

Continue this process until all photos that cover the study area have end-match lines or SABs. End-match lines do not have to be perfectly perpendicular to the flight line; in fact, where two flight lines meet at a bend in the river, the end-match lines will be angled across the photos. Draw the project boundary on photos as the work areas are created.

Sidelap Preparation

When all end-match lines are completed, create side-match lines. Locate the end photos in two adjacent flight lines and mark the SAB on the appropriate photo.

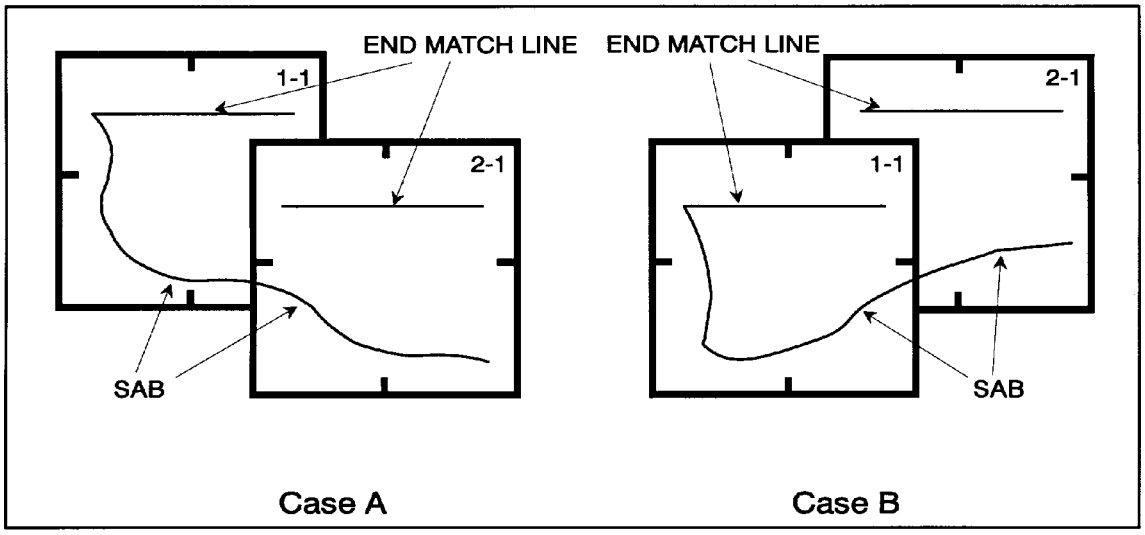


Figure 1. **Side-matching photos - Case A: The left-hand photo is offset above the right-hand photo. Case B: The left-hand photo is offset below the right-hand photo.**

Photos on adjacent flight lines are normally offset from each other, and each photo must be side-matched with two photos in the next flight line. Two cases can occur, as shown in Figure 1.

Creation of the side-match lines will begin differently in each case, but once the process to side-match the flight line is started, the procedure is identical to the procedure for end-match lines.

On a light table, place the photo with the lower SAB over the adjacent photo, and line up features in the overlap area on both photos. In Figure 1, case A, the right-hand photo would be on top of the left-hand photo; in case B, the left-hand photo would be on top of the right-hand photo.

Next, locate the halfway point of the overlap, and draw a line on the overlay along the side of the photo from where it intersects with the SAB to the intersection with the end-match line.

Set up the two photos into a stereo model and locate the line just drawn. On the matching photo, mark several points that appear to lie on this line as far as the line appears to go and then connect them with a straight edge. In Figure 1, case A, the right-hand photo will have a closed side and the left-hand photo will have a partially closed side. In case B, the left-hand photo will have a closed side and the right-hand photo will have a partially closed side.

Put aside the lower photo in each case; this photo is completed for the moment. Then place the photo above the photo just set aside below the remaining photo on the light table (Fig. 2).

After determining where the overlap intersects with the upper end-match line on the top photo (the point labeled "half overlap"), draw a line from the end of the previously completed side-match line to this point to correct for variation in sidelap up and down the flight lines.

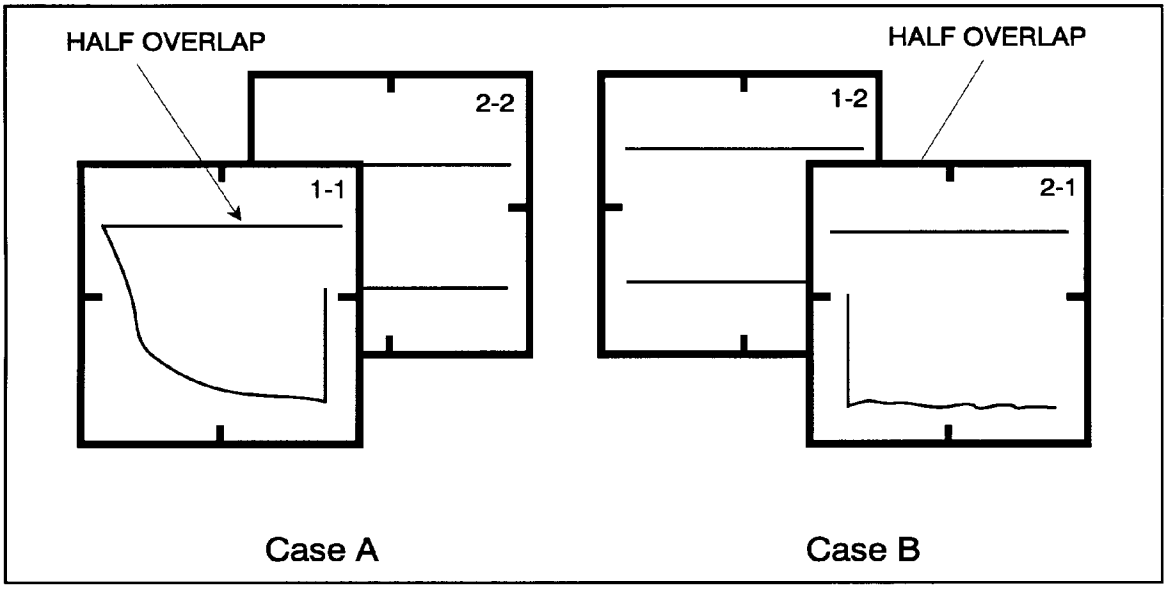


Figure 2. Sidelap correction

Set the two photos into a stereo model under the stereoscope and mark the points that appear to lie on the line on the adjacent photo. Then connect these points with a straight edge. Set aside the lower photo with a closed edge. Repeat the process described to complete the upper photo.

During this process, draft the numbers of adjacent photos on the margins of all photos so it will be easy to find these photos when necessary. Progressing up the flight lines, determine the side-match lines between two adjacent flight lines. When this process is complete, repeat it for the next two adjacent

flight lines. The final products are closed polygons drafted on all overlays that cover the center portion of each photo.

Field Verification

Field verification can be done first, as it is not dependent upon completion of work areas. Field work is an ongoing process that will occur before, during, and after photointerpretation and whenever new questions arise.

Inspect the photographs and locate questionable areas easily accessible by land vehicle, boat, or foot. Note major signatures (see Standard Operating Procedures for Photointerpretation [Owens and Hop 1995]) and cover types that are also accessible.

Place prints to be field-checked in clear plastic sleeves for protection and annotation. Register sleeves to the prints by marking the fiducials with a fine-tipped permanent marker. Record the photo number and the date visited in the field at the top right-hand corner of the sleeve.

At the field sites, note pertinent details about vegetation cover types on the sleeves. These can be brief notes, using abbreviations for different genera. For example, a willow stand could have a lead line drawn to it and labeled "SA" for *Salix*. Lead lines are drawn from the stands to the labels (polygons are not drawn around stands because these lines obscure details on the photos). Notes are made only for areas that have been visited or directly observed; extrapolation of signatures should be done in the office under the stereoscope.

Ground photography helps trigger memories when doing photointerpretation. When taking ground photos, record the origination point and direction. Record the frame number on the sleeve registered to the print.

Back in the office, review field notes carefully to verify that all questions have been answered. Subsequent field work may be necessary as photointerpretation proceeds.

Photointerpretation

The land cover/use are classified according to the classification system listed in Appendix C. Descriptions of the major classes are in Appendix D.

Photointerpretation is done using a magnifying stereoscope and a light table. A pair of transparencies is set up as a stereo model under the stereoscope. Interpretation is done on overlays registered to the photograph using a fine-tipped drafting pen (size 0000 or 0.19 mm).

Features are delineated by identifying signatures, the characteristic appearance of an object on a given type of imagery. Vegetation signatures vary greatly according to time of day, season, type of photography, and scale. Signatures are affected by color/tone, texture, pattern, shape, size, and location. A single factor may not be sufficient to identify an object, but combinations of these factors will lead to proper identification. For example, two vegetation types found in different locations may have the same

color and texture; conversely, two vegetation types found in the same location may have different colors. It is important to learn the combinations of factors that distinguish one vegetation type from another.

To begin photointerpretation, select an area that has been field-checked. A stereo model is set up under the stereoscope with the transparencies and overlays and viewed at 3x magnification.

Scan the entire work area and determine how the area will be mapped, based on ground information and the visual clues of color, shape, size, texture, and pattern. Map from the general to the specific. First, delineate large areas that may contain smaller islands of different vegetation. Then delineate the smaller areas, keeping the MMU in mind. Label polygons as soon as they have been delineated. It is vital that interpretation and delineations of cover types, density modifiers, and height modifiers are consistent.

Delineation and labeling must be done in a neat, legible manner. Lines should be of uniform width, following the ground features on the photograph. For example, a forested island surrounded by water must be delineated at the shoreline as opposed to delineating the overhanging tree canopy. If a mistake in delineation is made, it should be erased (a wooden skewer or toothpick works well) and redrawn. Delineations should be drawn simply, yet in enough detail to accurately reflect the ground features.

Polygons must be closed and labeled. Linears should be used for significant land cover too narrow to delineate with a polygon (for example, a single row of trees surrounding an emergent wetland). Short linears (those less than MMU) should not be used. An arrow extends from the label to the linear to designate its description. Delineations should extend 1/8 inch past the work area. For complex edge ties, erase a portion of the work area to help clarify the delineations. Place labels within the polygon. If the polygon is too small, place the label outside the polygon with a lead line drawn from the label and into the polygon. If the label interferes with the polygon delineation, then the polygon is too small. For sample delineation and labeling procedures, refer to Appendix E.

After each photo is interpreted, match all lines and labels with the adjacent photos to ensure that edge ties and labels are accurate and consistent (including side matches). After edge tie is complete, notate "tied" within the margin of each photo to show its completeness.

When interpretation of a photo is complete, place a clean sheet of white paper between the overlay and the photo to check for completeness of linework and labeling, as well as for interpretation errors. Then sign and date the interpreted photograph at the top right-hand corner.

A production log is used to track and record completed work. Logs are essential to record completed photos, document problems or concerns, and to track progress.

Send the following to the EMTC cartographer: (1) completed overlays registered to the transparencies, (2) production logs, (3) copies of the indexed topo quads or a flight line index to show photo location, (4) contact prints, and (5) photo sleeves with field notes. The photos are QC'd and if approved, the data are transferred and digitized into a geographic information system (GIS). The GIS data are sent back to the stations when complete.

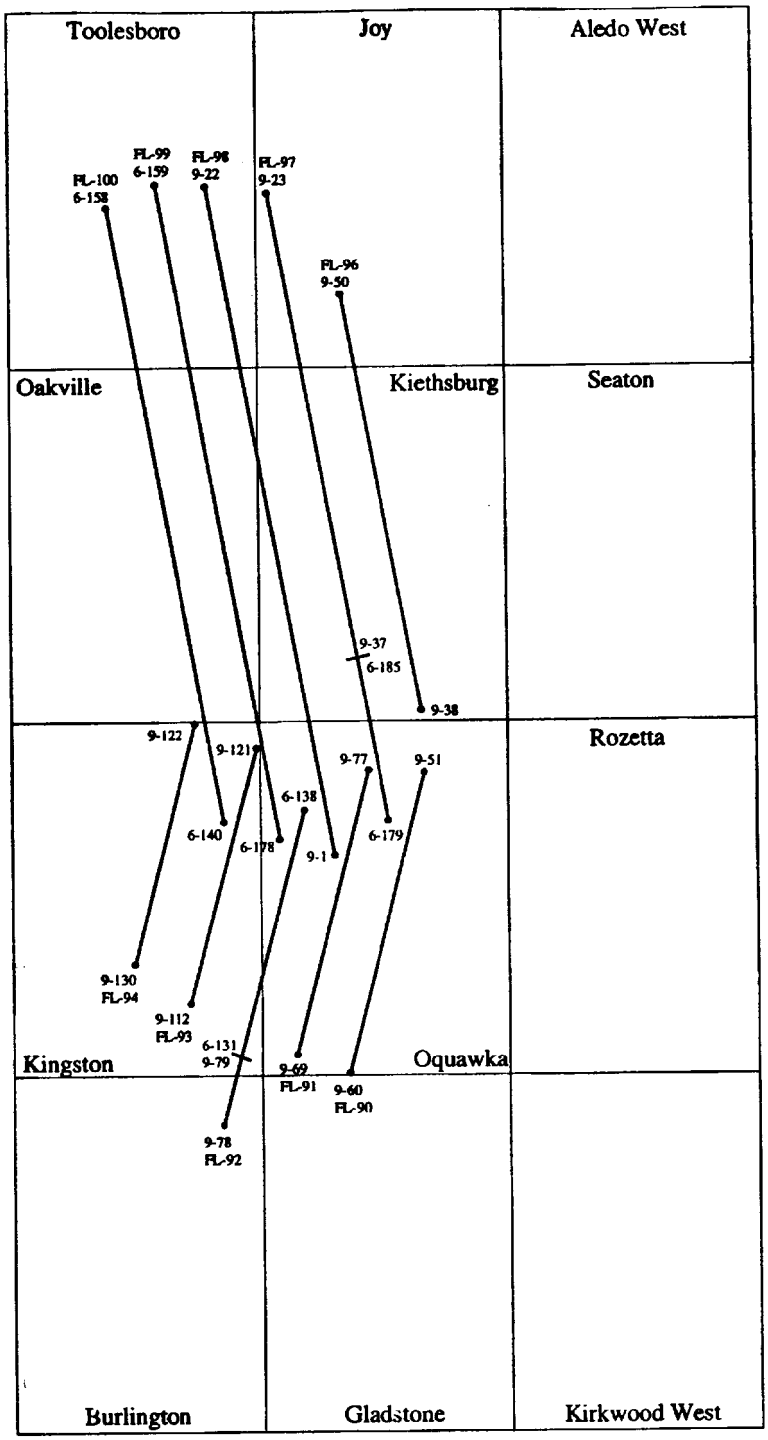
References

Owens, T., and K. D. Hop. 1995. 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.

U.S. Fish and Wildlife Service. 1992. Operating Plan for the Upper Mississippi River System Long Term Resource Monitoring Program. Environmental Management Technical Center, Onalaska, Wisconsin, Revised September 1993. EMTC 91-P002. 179 pp. (NTIS #PB94-160199)

Appendix A

LTRMP 1989 Flight Line Index Pool 18



Appendix B

Photointerpretation Materials List

Field-Checking Materials

Binoculars
Loupe (hand magnifying glass)
Clear plastic sleeves
Fine-tipped, permanent markers (e.g., "Sharpies")
Clipboard
Waterproof container for photos, maps, etc. (e.g., cooler)
Note paper, pencils, pens

Interpretation/Preparation Materials

Complete set of 9 x 9 color-infrared prints
Complete set of transparencies
Complete set of 1:24,000 topo quads
Magnifying stereoscope
Light table
Map of study area boundary
Masking tape
Scissors
Rapidograph drafting pens (sizes 0 and 0000)
Drafting ink (best is waterproof fast-drying ink dedicated for film only)
4-mm clear plastic to cut into approximately 9-inch squares
Straight edge/ruler (preferably with inches divided into tenths)
Dividers, file folders
Minimum mapping unit guide
Wooden skewers or toothpicks (for erasing ink)

Appendix C

LTRMP Vegetation Classification
Photo Interpreter's List

Version 3.00
3 April 1995

100	Open Water
101	Lemnaceae
102	Azolla
200	Submergents
201	Lemnaceae/submergents
202	Myriophyllum
203	Zosterella
204	Vallisneria/Zosterella
205	Myriophyllum/Zosterella
206	Vallisneria/Potamogeton
207	Myrioph/Potamoget/Vallis
208	Potamoget/Vallis/Zost/Cerat
209	Elodea
210	Azolla/submergents
250	Vallisneria/Potamoget/Heteran
251	Ceratophyllum
252	Lemnaceae/Ceratophyllum
253	Lemna/Ceratophyll/Potamogeton
254	Potamogeton
255	Vallisneria
300	Submerg-Rooted Floating Aqua
301	Brasenia/submergents
302	Nelumbo/Nymphaea/submerg/Lemn
303	Nelumbo/submergents
304	Nelumbo/submergents/Lemnaceae
305	Nymphaea/Nelumbo/submergents
306	Nymphaea/submergents
307	Nymphaea/submergents/Lemnaceae
308	Nymphaea/Myriophyllum
309	Nelumbo/Myriophyllum
310	Nelumbo/Nymphaea/Myriophyllum
311	Nymph/Ceratoph/Myriophyl/Lemna
312	Nymphaea/Ceratophyllum/Lemna
400	Submerg-Rooted Floating-Emerg
401	Nelum/Nymph/Sag/Sparg/sub/Lemn
402	Nelum/Nymph/Ponted/sub/Lemn
403	Scirpus/Nelumbo/submergents
404	Scirpus/Nymphaea/submergents
405	Zizania/Nymphaea/Nelumbo/sub
406	Pontederia/Nymph/Nelumbo/sub
407	Sagittaria/Ceratophyllum/Lemnaceae
408	Nelumbo/Sagittaria/submergents
409	Nelumbo/Nympheae/Sagittaria/ submergents
500	Rooted Floating Aquatics
501	Brasenia
502	Jussiaea
503	Nelumbo
504	Nelumbo/Lemnaceae
505	Nelumbo/Nymphaea
506	Nuphar
507	Nymphaea
508	Nelumbo/Nymphaea/Lemnaceae
509	Nymphaea/Lemnaceae
600	Rooted Floating Aqua-Emergents
601	Nelumbo/Nymphaea/Sagittaria
602	Nymphaea/Sagittaria
603	Nymphaea/Scirpus
604	Sagittaria/Nelumbo
700	Emergents
701	Acoris
702	Carex
703	Cyperus
704	Decodon
705	Echinodorus
706	Eleocharis
707	Lythrum salicaria
708	Pontederia
709	Sagittaria
710	Sagittaria/Lemnaceae
712	Sagittaria/Scirpus/Sparganium
713	Sagittaria/Sparganium
714	Scirpus
715	Scirpus/Sagittaria
716	Scirpus/Sparganium
717	Sedge meadow
718	Sparganium
719	Typha
720	Typha/Sagittaria
721	Typha/Scirpus
722	Typha/Scirpus/Sparganium
723	Typha/Sparganium
724	Zizania

725 Equisetum
727 Scirpus/Zizania
728 Typha/Sagittaria/Scirpus
729 Typha/Sagittaria/Sparganium
730 Typha/Sagittaria/Scirpus/ Sparganium

800 Emergents-Grasses/Forbs
801 Leersia/Carex/Polygonum
802 Leersia/Carex/Sagit/Polygonum
803 Leer/Phalar/Scirp/Lythr/Phrag
804 Leersia/Sagittaria
805 Sagittaria/Phalaris
806 Sagittaria/Polygonum
807 Sag/Sparg/Typ/Scirp/Leer/Phrag
808 Scirpus/Leersia
809 Scirpus/Carex/Leersia/Polygon
810 Scirpus/Phalaris
811 Scirpus/Phragmites
812 Scirpus/Polygonum
813 Scirpus/Typha/Phalaris
814 Sparganium/Leersia
815 Typha/grasses/forbs
816 Scirpus/grasses/forbs
817 Sagittaria/Scirpus/Leersia

900 Grasses/Forbs
901 Ambrosia
902 Grass
903 Hay meadow
904 Pasture (heavily grazed areas)
905 Leersia
906 Leersia/Polygonum
907 Meadow
908 Mixed forbs and/or grasses
909 Nettles
910 Phalaris
911 Phalaris/Polygonum
912 Phragmites
913 Phragmites/Phalaris
914 Polygonum
915 Polygonum/Nelumbo
916 Rdside-levee/grass/forbs/shrub
917 Sand-prairie
918 Spartina
919 Vines as dense overgrowth
920 Polygonum/Eupatorium
922 Grass/forbs/shrubs

1000 Woody Terrestrial
1001 Acer
1002 Acer/Populus and/or Salix
1003 Amorpha
1004 Betula
1005 Brush
1006 Carya/Nyssa
1007 Cephalanthus
1008 Forest-mesic (moist soil sp.)
1009 Forest-upland (dry soil sp.)
1010 Fraxinus
1011 Plantation
1012 Populus
1013 Quercus
1014 Salix
1015 Salix and/or Populus
1016 Salix and/or Populus - grass
1017 Shrub/grass/forbs
1018 Shrub/Scirpus
1019 Taxodium
1020 Taxodium/Nyssa
1021 Ulmus
1022 Conifers
1023 Juniperus
1024 Populus/Acer/Ulmus/Fraxinus community
1025 Quercus/Carya community
1026 Salix community
1027 Populus community
1028 Salix/Populus community
1029 Quercus/Nyssa/Taxodium community

1030 Acer/Tilia community
1031 Upland Forest community
1032 Cephalanthus community
1033 Mixed shrubs community
1034 Plantation community

1100 Agriculture

1200 Urban/Developed
1201 Developed
1202 Developed parks
1203 Industrial pond
1204 Urban
1205 Revetted bank

1300 Sand/Mud
1301 Mud
1303 Sand

1400 No Coverage

Modifiers:

A 10-33% Vegetation Cover
B 34-67% Vegetation Cover
C 68-90% Vegetation Cover
D >90% Vegetation Cover

1. 0-20 Feet Tall
2. 21-50 Feet Tall
3. >50 Feet Tall

Appendix D

Long Term Resource Monitoring Program's 13-Class Generalized Land Cover/Use Data

Open Water: Areas classified as Open Water have <10% vegetation cover and are classified as either water or duckweed. Note: Duckweed is treated as Open Water due to its mobile tendencies.

Submergents: Land cover types grouped into this class are areas classified as having either submergent vegetation or submergent vegetation mixed with duckweed.

Submergents-Rooted Floating Aquatics: Land cover types grouped into this class contain mixtures of submergents combined with American lotus, watershields, and white water lily.

Submergents-Rooted Floating Aquatics-Emergents: Land cover types grouped into this class are mixtures of submergents combined with American lotus and/or white water lily, along with arrowhead, bulrush, bur-reed, pickerelweed, or wild rice.

Rooted Floating Aquatics: Land cover types grouped into this class contain either pure stands or mixtures of American lotus, watershields, water primrose, white water lily, or yellow water lily.

Rooted Floating Aquatics-Emergents: Land cover types grouped into this class contain mixtures of American lotus and/or white water lily mixed with arrowhead and/or bulrush.

Emergents: Land cover types grouped into this class contain either pure stands or mixtures of arrowhead, bulrush, burheads, bur-reed, cattail, flat sedge, horsetail, pickerel weed, purple loosestrife, sedges, sedge meadow, spike rush, sweetflag grass, water-willow, or wild rice.

Emergents-grasses/Forbs: Land cover types grouped into this class contain mixtures or arrowhead, bulrush, cattail, or purple loosestrife mixed with common reed, cutgrass, reed canary grass, sedges, or smartweed.

Grasses/Forbs: Land cover types grouped into this class contain either pure stands or mixtures of cord grass, common reed, cutgrass, lowland hay meadow, grass, live stem vines, mixed forbs and/or grasses, nettles, pasture, ragweed, reed canary grass, roadsides/levees, sand-prairie, smartweed, or upland meadows.

Woody Terrestrial: Land cover types grouped into this class contain either pure stands or mixtures of ash, bald cypress, birch, buttonbush, conifers, cottonwood, Eastern red cedar, elm, false indigo, hickory, maple, mesic forests, oaks, plantations, shrubs, sour gum, upland forests, or willow.

Agriculture: Agriculture is used to define any area where the ground is turned with a plow or worked with a disk.

Urban/Developed: Land cover types grouped into this class are areas that have been developed into campgrounds, picnic areas, industrial developments, urban developments, or are covered with riprap.

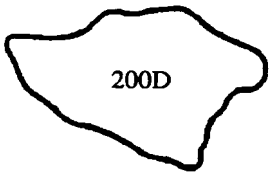
Sand/Mud: Land cover types classified as Sand/Mud have <10% vegetation cover and are classified as either sand or mud.

Appendix E

Basic Conventions for Delineation and Labeling

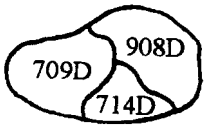
Delineations

Delineations must be of simple origin, following land and vegetative features; overly complex delineations must be avoided.



Correct

Incorrect



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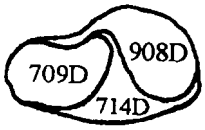
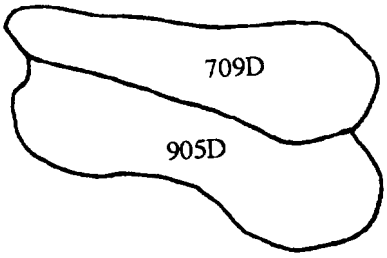
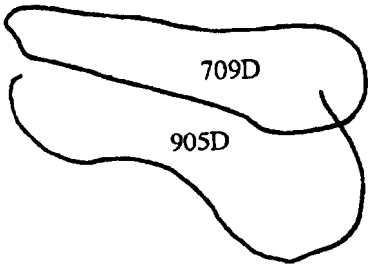


Incorrect

All polygons must be closed; avoid dangling segments.



Correct



Incorrect

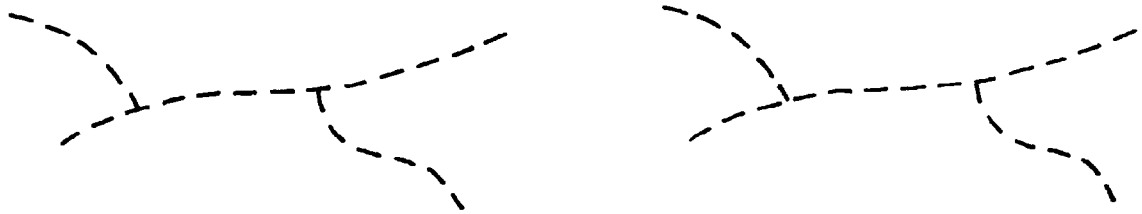
Delineations must be linear if a polygon is too narrow to delineate correctly; delineation from each side of polygon may not touch each other.

Correct Incorrect

Polygons adjacent a linear must connect to the linear in the middle of a dashed segment of the linear.

Correct Incorrect

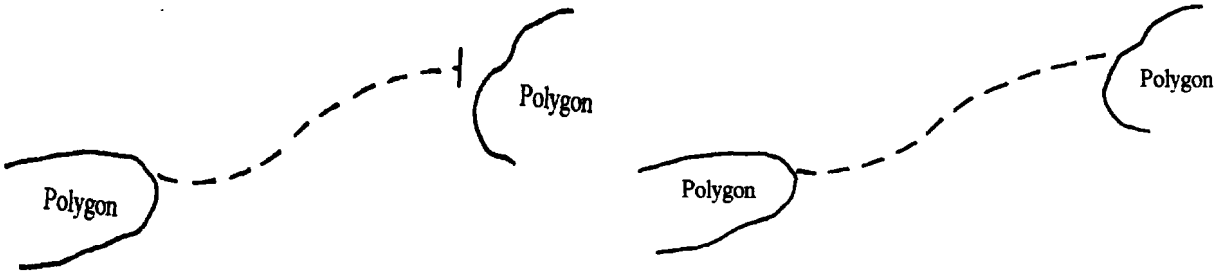
Linears connecting with an adjacent linear must connect in the middle of a dashed segment of the linear.



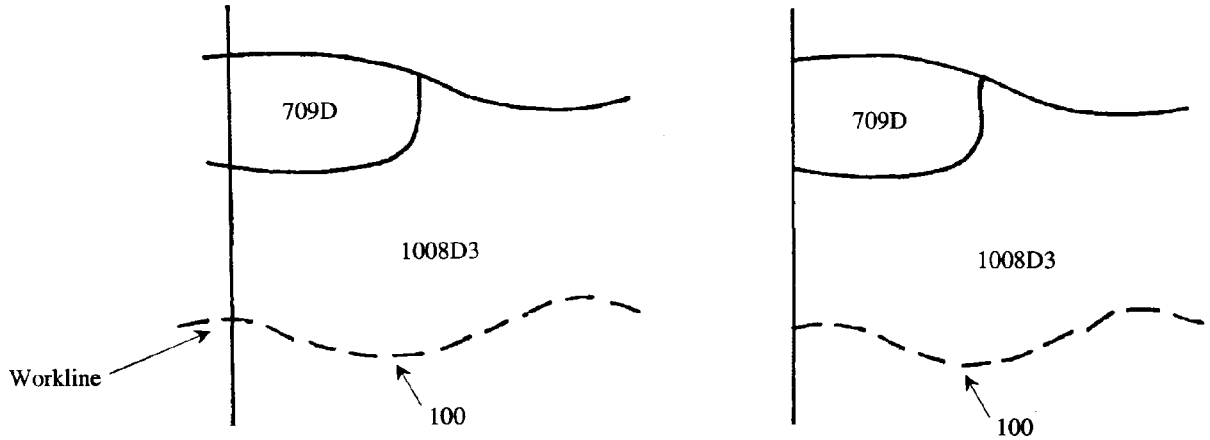
Correct Incorrect

Add "end breaks" to terminate linears.

Correct Incorrect



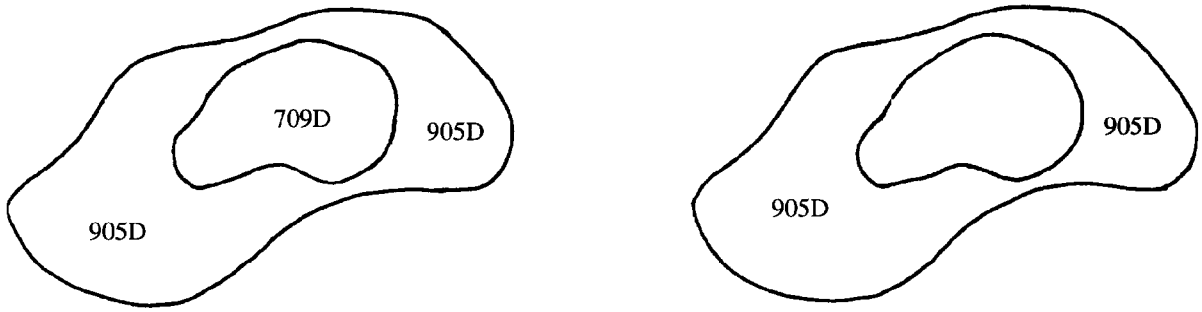
Extend delineations over the work area line (approximately 1/8").



Correct Incorrect

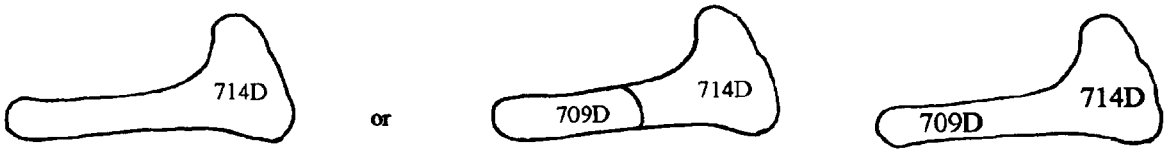
Labeling

Each polygon must have an attribute (label); large and/or complex polygons may have more than one like attribute.



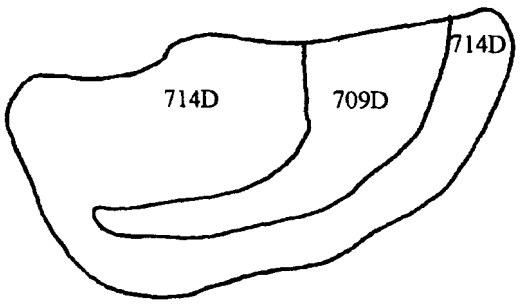
Correct Incorrect

Each polygon may not have more than one different attribute.

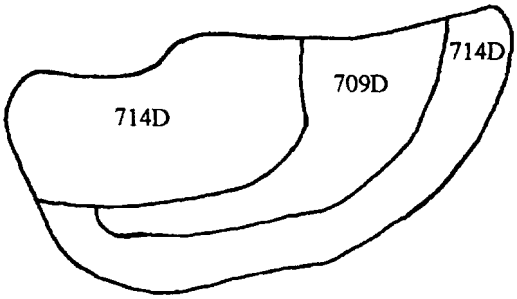


Correct Incorrect

Adjacent polygons must have different attributes.

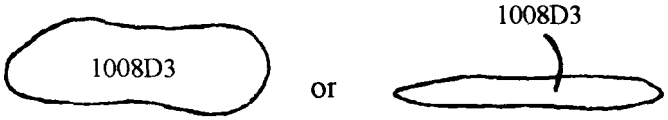


Correct



Incorrect

Label attribute within the polygon; if polygon is too small, label the polygon with a leadline.

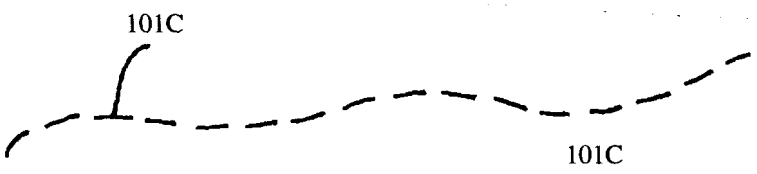


Correct

Incorrect

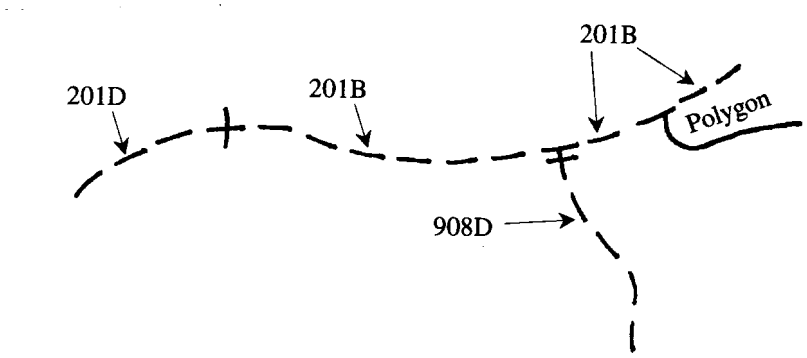
Label linears with an arrow; more than one label may be used for long linears.

Correct

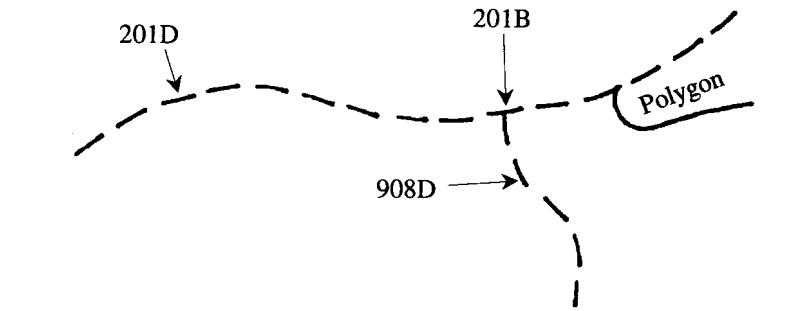


Incorrect

Label all sections of a linear; add a "break" to show an attribute change along the linear.



Correct



Incorrect

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13. ABSTRACT (Maximum 200 words) This chapter describes specific procedures that should be followed by Long Term Resource Monitoring Program (LTRMP) Field Station staff when preparing for and conducting a photointerpretation project. Procedures are provided for photo and work area preparation, scaling, field verification, and interpretation. The procedures are divided into several steps: 1) photo preparation, 2) scaling photos and determining the minimum mapping unit, 3) work area preparation, 4) field verification, and 5) photointerpretation. Required materials and equipment are listed and the classification is listed and described. Basic conventions to delineation and labeling are described.			
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The Long Term Resource Monitoring Program (LTRMP) for the Upper Mississippi River System was authorized under the Water Resources Development Act of 1986 as an element of the Environmental Management Program. The mission of the LTRMP is to provide river managers with information to maintain the Upper Mississippi River System as a sustainable large river ecosystem given its multiple-use character. The LTRMP is a cooperative effort by the National Biological Service, the U.S. Army Corps of Engineers, and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin.