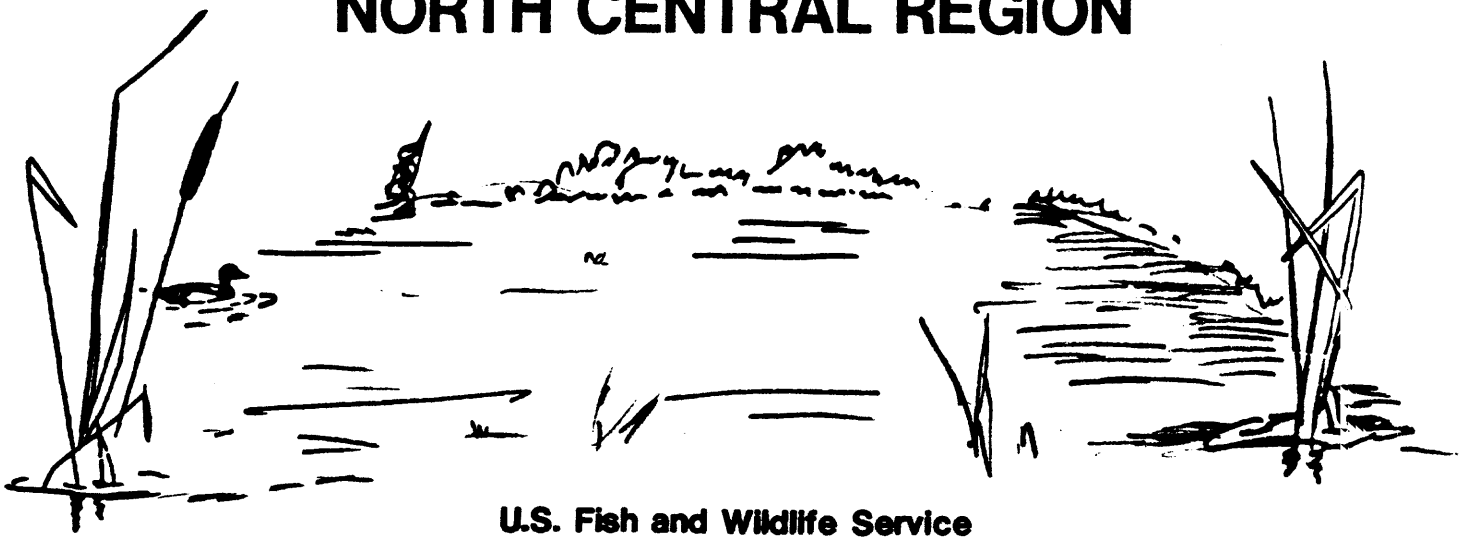
NATIONAL WETLAND INVENTORY USER REPORT 1:100,000 MAP AREA

MAP AREA: MANITOWOC SE

1:100,000 NAME: MANISTEE

STATE: MICHIGAN

NORTH CENTRAL REGION



U.S. Fish and Wildlife Service

Federal Building, Fort Snelling Twin Cities, Minnesota 55111

USER REPORT
NATIONAL WETLAND INVENTORY
U.S. FISH AND WILDLIFE SERVICE
REGION 3

PREPARED BY

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TWIN CITIES, MINNESOTA 55111

USER CAUTION

Maps for this 1:100,000 scale map were prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands were identified on the photographs based on vegetation, visible hydrology, and geography in accordance with Classification of Wetlands and Deepwater Habitats of the United States, Cowardin, et al., 1979. The aerial photographs reflect conditions during the specific year and season when they were taken. Some small wetlands and those obscured by dense forest cover may not be included on the map document. In addition, there is a margin of error inherent in the use and interpretation of aerial photographs. Thus a detailed on-the-ground and historical analysis of a single site may result in revision of the wetland boundaries established through photographic interpretation.

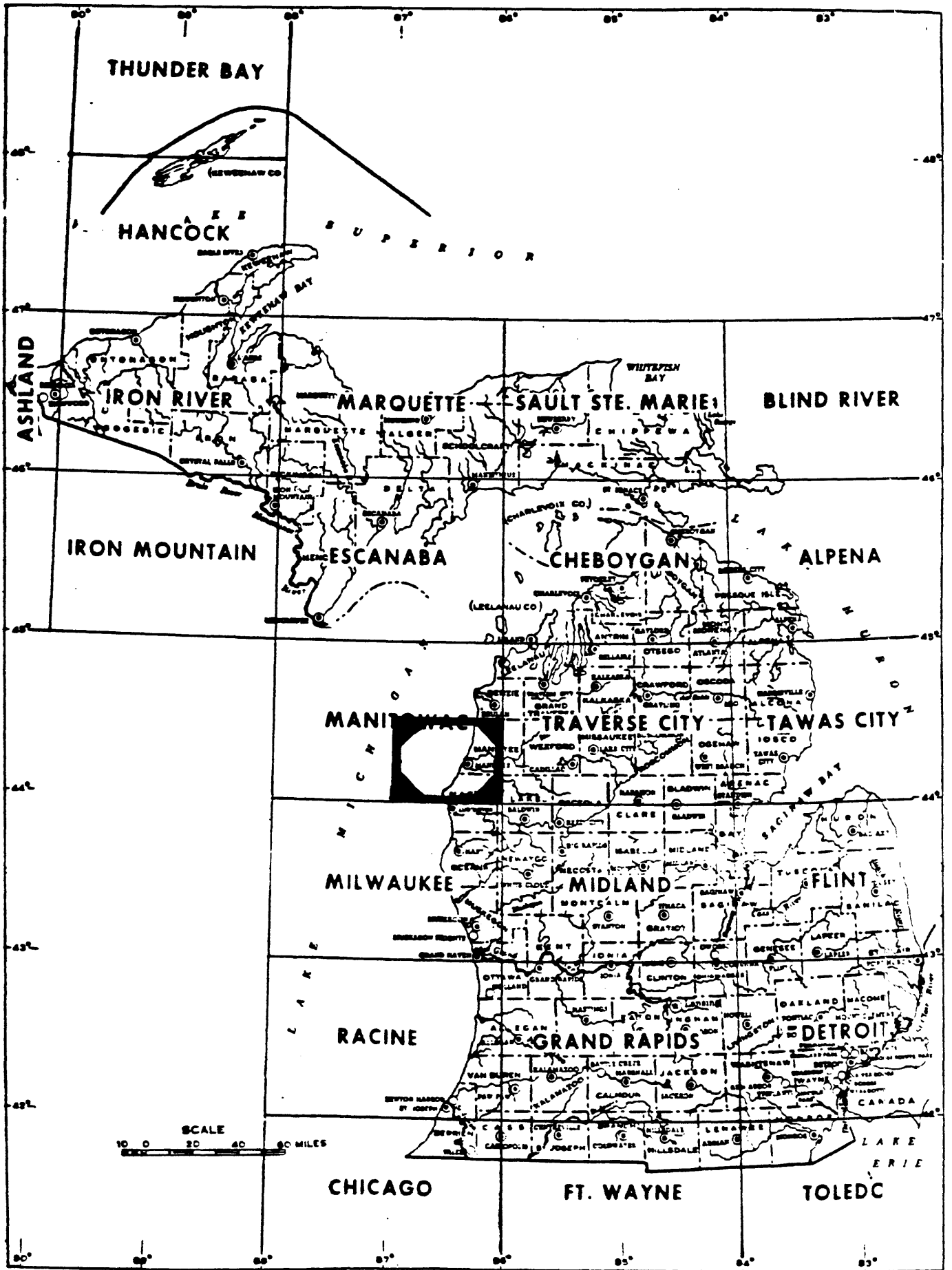
Federal, State, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either design or products of this inventory, to define limits of proprietary jurisdiction of any local, State, or Federal government or to establish the geographical scope of regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, State, or local agencies concerning specific agency regulatory programs and propriety jurisdictions that may affect such activities.

Additional information regarding this map or other National Wetland Inventory activities may be obtained by contacting:

Regional Director, Region 3 (AH/TS)
Attn: Regional Wetlands Coordinator
United States Fish and Wildlife Service
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

Michigan Department of Natural Resources
Land Resources Program
Box 30028
Lansing, Michigan 48909

LOCATION OF REPORT
STATE OF MICHIGAN



U.S. Fish and Wildlife Service Region 3 National Wetland Inventory

Date: December 1983

MAP PREPARATION

Basic Data

Photography Used:

	Emulsion	Scale	Date	Percent Coverage
1.	Black and white	1:80,000	May 1976	100%

Field Check Dates

1. March 8, 1979
2. March 13 - 14, 1979
3. December 19 - 20, 1979

Contractor(s) for Photo Interpretation

1. Michigan Department of Natural Resources

Collateral Data Used

1. USGS topographic quad sheets

Mapping Legend: (See Appendix D)

Farmed Wetlands

It is the policy of the Fish and Wildlife Service to not map farmed wetlands in the National Wetlands Inventory unless the wetland is a pothole-like depression, such as those found in the Prairie Pothole Region, intermittently flooded lake bottoms, cranberry bogs, or diked former tidelands in California. Therefore this map area may contain various amounts of non-depression type wetlands which were farmed on the date of the photography and intentionally not included in the inventory. Many of these omitted wetlands commonly occur in floodplains.

GEOGRAPHY

A. General Location

Degrees Longitude: 86° 0' to 87° 0' West

Degrees Latitude : 44° 0' to 44° 30' North

Largest Cities : Manistee, Michigan

Manitowoc SE is located in the northwestern portion of Michigan's lower peninsula and is bordered on the west by Lake Michigan. Most of the map area lies within Lake Michigan. The map area encompasses portions of Manistee and Big Sable River drainage basins in the Lake Michigan watershed. Manistee National Forest occurs within the map area.

B. Ecoregion

Bailey's Ecoregion Classification and Description (Bailey 1978):

Code: 2113L

Humid Temperate Domain (2000)
The entire Manitowoc SE map is in this Domain.

The climate of this Domain has strong seasonal temperatures and precipitation cycles, and a distinctive winter season. The Humid Temperate Domain comprises the humid midlatitude forests of broadleaf deciduous and needleleaf evergreen trees.

Warm Continental Division (2100)
All of the Manitowoc SE map falls within this Division.

This Division characteristically has warm summers and cold, snowy winters. The natural vegetation is needleleaf and mixed needleleaf-deciduous forest. The soils of this Division are Spodosols, which are strongly leached but have a top layer of humus. Spodosols are usually acidic and lack calcium, potassium and magnesium. Despite these deficiencies, Spodosols are very suitable for growing the conifers found in this Division.

Laurentian Mixed Forest Province (2110)
The entire Manitowoc SE map area lies within this Province.

The vegetation of this Province is representative of the transitional zone in which it lies, between the boreal and deciduous forest zones. Forests consist either of mixed conifer-deciduous stands or mosaic-like arrangements with pure stands of deciduous forest growing on good soil sites and pure stands of conifers growing on poor soil sites.

Pines (*Pinus* spp.) are the most representative conifers of the mixed forest stands, with white pine (*P. strobus*) dominating in the Great

Lakes region. Pines are often a pioneer woody species following forest fires. Eastern hemlock (Tsuga canadensis) and eastern red cedar (Juniperus virginiana) also grow in this Province.

Northern Hardwoods Forest Section (2113L)
This Section occurs in lowlands and includes all of the Manitowoc SE map area.

Hardwoods are the most common tree species of this Section.

C. Topography and Land Forms

Hammond's Land Surface Form and Physical Subdivision (Hammond 1965, 1969):

Codes: (III-3) B2b, (III-3) B3b

Interior Physical Division (III) - The entire Manitowoc SE map area lies within this Physical Division.

North Central Lake-Swamp-Moraine Plains Subdivision (3) - This Subdivision covers all of the Manitowoc SE map area.

Irregular Plains Class (B2b) - This Class includes 40% of the map area, extending from the southeastern and east-central portions of the map to the central and southeastern portions. Fifty to 80% of the land is in gentle slopes. Fifty to 75% of these slopes occur in lowlands. Local relief ranges from 100 to 300 feet.

Plains With High Hills Class (B3b) - This Class includes the northern 35% of the map and extends into the extreme west-central portion. The southernmost 25% of the map is also covered by this Class. Fifty to 80% of the land is in gentle slopes. Fifty to 75% of these slopes occur in lowlands. Local relief ranges from 300 to 500 feet.

RESOURCES

A. Wetlands*

No wetland acreage figure is available for the Manitowoc SE area at the present time.

Many wetlands in the Manitowoc SE area have been lost to industrial, commercial, residential and agricultural development. Industrial development has occurred primarily in the Manistee area and also in the Hamlin Lake area where sand mining operations take place. Commercial development, primarily of marina and other boating related facilities, has caused destruction of a significant amount of wetlands on larger inland lakes and Lake Michigan, and near river mouths. Residential development has taken its toll on wetlands around inland lakes and along rivers.

Many of the wetlands which remain in the Manitowoc SE map area are associated with river systems. Important plant species of the emergent wetlands along rivers include smartweeds (Polygonum spp.), rushes (Juncus spp.), cattail (Typha latifolia), sedges (Carex spp.) and spikerush (Eleocharis sp.). Scrub-shrub wetlands are also found in association with river systems and consist most often of willow (Salix sp.) and alder (Alnus sp.) with an understory of grasses and sedges. Northern white cedar (Thuja occidentalis) is the predominant tree species in the forested wetlands found along rivers.

Numerous small wetlands also occur in the map area and include forested, scrub-shrub and emergent wetlands that are saturated to semi-permanently flooded. Several small leatherleaf (Chamaedaphne calyculata) bogs and wetlands associated with sand dunes are also present. The forested wetlands consist mainly of northern white cedar, or a mixture of red maple (Acer rubrum), ash (Fraxinus sp.) and elm (Ulmus sp.). Willow, dogwood (Cornus sp.) and alder are predominant in the scrub-shrub wetlands. Important plants of the emergent marshes include grasses, sedges and cattail. A list of plant species for wetland types can be found in Appendix C.

*Plant species named here were found in adjacent 1:100,000 map areas and are believed to be representative of species also present in the Manitowoc SE map area.

B. Wildlife and Fish

Several species of waterfowl inhabit the area, particularly along the Manistee River and in the vicinity of Portage Lake. These species include scaups (Aythya spp.), canvasbacks (A. valisineria), redheads (A. americana), ring-necked ducks (A. collaris), mallards (Anas platyrynchos), black ducks (Anas rubripes), wood ducks (Aix sponsa), goldeneyes (Bucephala clangula), buffleheads (B. albeola), old squaws (Clangula hyemalis), Canada geese (Branta canadensis) and whistling swans (Olor columbianus) (Great Lakes Basin Commission 1975b, Panzner 1955, Rounds 1956).

Small game, including ruffed grouse (Bonasa umbellus), American woodcocks (Philahela minor), eastern cottontails (Sylvilagus floridanus) and squirrels (Sciurus spp.) have maintained stable populations or have increased. Furbearers, including beavers, (Castor canadensis), raccoons (Procyon lotor), weasels (Mustela spp.), mink (M. vison) and river otters (Lutra canadensis), have also done well, except in areas of marsh drainage or other disturbance.

Some wildlife species in the area are on the Endangered and Threatened list. Kirtland's warblers (Dendroica kirtlandii), for instance, have declined because of habitat loss and competition for nest usage by brown-headed cowbirds (Molothrus ater). Bald eagles (Haliaeetus leucocephalus) and peregrine falcons (Falco peregrinus) have decreased in numbers, primarily because of reproductive failure attributed to the use of pesticides. However, Madsen et al. 1982 report that bald eagle production in Michigan showed an overall increase during the period 1973-1981.

Other wildlife species of Manitowoc SE include woodchucks (Marmota monax), opossums (Didelphis marsupialis) and porcupines (Erethizon dorsatum).

Sport fishing opportunities are available in inland lakes and rivers, and in Lake Michigan and its immediate tributaries. Commercial fishing is limited to Lake Michigan.

Common fish species of inland lakes, where most sport fishing occurs, include walleyes (Stizostedion vitreum vitreum), largemouth bass (Micropterus salmoides), smallmouth bass (M. dolomieui), northern pike (Esox lucius), muskellunge (E. masquinongy), suckers (Catostomus), rainbow smelt (Osmerus mordax), lake trout (Salvelinus namaycusch), whitefish (Coregonus clupeaformis), yellow perch (Perca flavescens), bluegills (Lepomis macrochirus) and other panfish (Lepomis spp., Pomoxis spp.).

Inland rivers and Lake Michigan tributaries provide some of the best sport fishing opportunities in the Manitowoc SE area. Northern pike, walleyes, bass and panfish are found in impounded backwater areas of rivers; brook trout (Salvelinus fontinalis) and brown trout (Salmo trutta) are prevalent in cold, headwater areas. Brown and brook trout, walleyes, smallmouth bass and panfish are also fished in Lake Michigan tributaries, as are rainbow trout (steelhead-Salmo gairdneri), suckers, coho salmon (Oncorhynchus kisutch) and chinook salmon (O. tshawytsha).

Common sport fish of Lake Michigan include yellow perch, smelt, northern pike, walleyes, suckers, smallmouth bass, panfish, coho and chinook salmon and lake, rainbow, brook and brown trout. Lake whitefish and chubs (Semotilus) are the most important commercial species; however, alewife (Alosa pseudoharengus) and smelt have increased in importance (Great Lakes Basin Commission 1975a).

Appendix A

REFERENCES

Bailey, R. G. 1978. Descriptions of the Ecoregions of the United States. USDA For. Serv. Intermtn. Reg. Ogden, Utah. 77 p.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U. S. Fish and Wildlife Service, Washington, D. C. FWS/OBS-79/31. 103 p.

Great Lakes Basin Commission. 1975a. Fish: Great Lakes Basin Comm. Great Lakes Basin Framework Study, App. 8. Ann Arbor, Mich. 290 p.

Hammond, E. H. 1965. 1:17,000,000 scale Physical Subdivisions. 1 map. p. 61. In Gerlach, A. C., ed. 1970. National Atlas of the United States of America. USDI Geol. Surv. Washington, D. C. 417 p.

----- 1969. 1:7,500,000 Scale Classes of Land Surface Form. USDI Geol. Surv. 1 map. p. 62-63. In Gerlach, A. C., ed. 1970. National Atlas of the United States of America. USDI Geol. Surv. Washington, D. C. 417 p.

Madsen, C. R., T. J. Sheldrake, and J. T. Leach, eds. 1982. Bald Eagle Production in the Great Lakes States 1973 - 1981. U. S. Fish and Wildlife Service, Reg. 3. Twin Cities, Minn. p.

Panzner, E. R. 1955. Wetlands Inventory of Michigan. U. S. Fish and Wildlife Service, Office of River Basin Studies. Minneapolis, Minn. 19 p.

Rounds, B. W. 1956. Inventory of Permanent Water Habitat Significant to Waterfowl in Michigan. U. S. Fish and Wildlife Service, Office of River Basin Studies. Minneapolis, Minn. 10 p.

ADDITIONAL INFORMATION

The purpose of this report is to provide general information regarding the production of the map and wetlands found within the area of this map. It does not include descriptions of all wetlands found in the area nor complete species information. For additional information, the following references are recommended:

Hammond, E. H. 1964. Analysis of Properties in Land Form Geography: An Application to Broad-Scale Land Form Mapping. Annals, Assoc. Amer. Geog. v. 54. pp. 11-23.

Herdendorf, C.E., S.M. Hartley, and M.D. Barnes, eds. 1981. Fish and Wildlife Resources of the Great Lakes Coastal Wetlands Within the United States. Volume five: Lake Michigan. U.S. Fish and Wildlife Service, Washington, D.C. FWS/OBS-81/02-v5. 1592 p.

Appendix B

SPECIAL MAPPING PROBLEMS

Problem 1: Manitowoc SE was one of the first NWI maps done in Michigan. The photointerpretors were in a learning mode during the inventory of this map area.

Resolution: N/A

Problem 2: It was often difficult to accurately identify specific water regimes from the 1:80,000 black and white photography.

Resolution: Combined water regimes (Z, W, Y) were used where necessary.

Appendix C

WETLAND COMMUNITIES*

MAP SYMBOLS	LOCAL NAME	DOMINANT VEGETATION	WATER REGIME
PFOC PFOY	Swamp	Populus tremuloides Fraxinus spp. Acer rubrum Salix spp.	Saturated Seasonal
PFO/SSB PFO/SSY	Swamp	Fraxinus spp. Acer rubrum Populus tremuloides Alnus spp. Cornus spp. Salix spp.	Saturated Seasonal
PSSB PSSC PSSY	Swamp	Alnus spp. Salix spp. Cornus spp.	Saturated Seasonal Semi-permanent
PSS/EMY	Swamp	Cornus spp. Salix spp. Alnus spp. Carex spp. Juncus spp.	Saturated Seasonal
PEMB	Wet meadow	Carex spp. Juncus spp.	Saturated
PEMC PEMF PEMY	Marsh	Typha latifolia Carex spp. Juncus spp.	Saturated Seasonal Semi-permanent
Pf	Farmed wetland	Misc. grasses and sedges	Variable
POWH	Pond	Open water	Permanent

*Plant species listed here were found in adjacent 1:100,000 areas and are believed to be representative of species also present in the Manitowoc SW map area.

Appendix D

NATIONAL WETLAND INVENTORY
Information and Legend
For Map Products

Classification System: The U.S. Fish and Wildlife Service uses the "Classification of Wetlands and Deepwater Habitats of the United States", December, 1979, by L. M. Cowardin, et al., to delineate and identify wetlands. This system is hierarchical and structured around a combination of ecological, biological, hydrological and substrate characteristics which permits universal use across the United States, its territories and possessions. It consists of five systems: Marine, Estuarine, Riverine, Lacustrine (lake) and Palustrine (swamps, bogs, marshes) and proceeds in a hierarchical manner through subsystem, class, and subclass. It also contains provisions to use water regime, water chemistry, soil, and special modifiers to provide additional levels of detail.

Figure 1 is an illustration of the classification system to the class level.

Use of Wetland Legend: Wetland data are displayed on overlays or maps by a series of letters and numbers (alpha numerics) with the first letter representing the system and subsequent alpha numerics representing, in a sequential manner, the subordinate levels of detail down to the modifiers. Where classes and subclasses have been mixed, they are separated by a diagonal line.

Examples

a. Classification of wetlands to water regime and special modifier:

System:	Lacustrine
Subsystem:	Limnetic
Class:	Unconsolidated Bottom
Subclass:	Mud
Water Regime:	Intermittently Exposed
Special Modifier:	Diked/Impounded

L 1 UB 3 G h

b. Mixing of wetland classes and subclasses:
PFO2/EM1F = Palustrine, Forested, Needle-leaved deciduous (PFO2) mixed with Palustrine, Emergent, Persistent (PEM1) with semipermanent water regime (F).

WETLAND LEGEND*

- [ ] System
- [ ] Subsystem
- [M] Marine
  - [1] Subtidal
  - [2] Intertidal
- [E] Estuarine
  - [1] Subtidal
  - [2] Intertidal
- [P] Palustrine
  - [ ] No Subsystem
- [R] Riverine
  - [1] Tidal
  - [2] Lower Perennial
  - [3] Upper Perennial
  - [4] Intermittent
  - [5] Unknown Perennial**
- [L] Lacustrine
  - [1] Limnetic
  - [2] Littoral
- [U] Upland

*Should be used in conjunction with "Classification of Wetlands and Deepwater Habitats of the United States," by L. M. Cowardin et al.
**Not included in "Classification of Wetlands and Deepwater Habitats of the United States." Created specifically for National Wetland Inventory mapping effort.

Wetland Legend (continued)

[ ] Class

[ ] Subclass

CLASSES AND SUBCLASSES

- AB Aquatic Bed
  - 1 Algal
  - 2 Aquatic Moss
  - 3 Rooted Vascular
  - 4 Floating Vascular
  - 5 Unknown Submergent**
  - 6 Unknown Surface**
- EM Emergent
  - 1 Persistent
  - 2 Nonpersistent
- FO Forested
  - 1 Broad-Leaved Deciduous
  - 2 Needle-Leaved Decidous
  - 3 Broad-Leaved Evergreen
  - 4 Needle-Leaved Evergreen
  - 5 Dead
  - 6 Deciduous**
  - 7 Evergreen**
- ML Moss/Lichen
  - 1 Moss
  - 2 Lichen
- OW Open Water/ Unknown Bottom**
- RB Rock Bottom
  - 1 Bedrock
  - 2 Rubble
- RF Reef
  - 1 Coral
  - 2 Mollusk
  - 3 Worm
- RS Rocky Shore
  - 1 Bedrock
  - 2 Rubble
- SB Streambed
  - 1 Bedrock
  - 2 Rubble
  - 3 Cobble/Gravel
  - 4 Sand
  - 5 Mud
  - 6 Organic
  - 7 Vegetated
- SS Scrub/Shrub
  - 1 Broad-Leaved Deciduous
  - 2 Needle-Leaved Deciduous
  - 3 Broad-Leaved Evergreen
  - 4 Needle-Leaved Evergreen
  - 5 Dead
  - 6 Deciduous**
  - 7 Evergreen**
- UB Unconsolidated Bottom
  - 1 Cobble/Gravel
  - 2 Sand
  - 3 Mud
  - 4 Organic
- US Unconsolidated Shore
  - 1 Cobble/Gr
  - 2 Sand
  - 3 Mud
  - 4 Organic
  - 5 Vegetated

**Not included in "Classification of Wetlands and Deepwater Habitats of the United States." Created specifically for National Wetland Inventory mapping efforts.

MODIFIERS TO WETLAND CLASSIFICATION

WATER REGIME MODIFIERS

Nontidal

A	Temporary
B	Saturated
C	Seasonal
D	Seasonally Flooded-Well Drained
E	Seasonally Flooded-Saturated
F	Semipermanent
G	Intermittently Exposed
H	Permanent
J	Intermittently Flooded

Nontidal Combined

Z	Intermittently Exposed/ Permanent (G,H above)**
W	Intermittently Flooded/ Temporary (A,J above)**
Y	Saturated Semipermanent/ All Seasonals (B,C,D,E F above)**

Nontidal and Tidal

U	Unknown**
K	Artificial

Tidal

L	Subtidal
M	Irregularly Exposed
N	Regularly Flooded
P	Irregularly Flooded
R	Seasonal - Tidal
S	Temporary - Tidal
T	Semipermanent - Tidal
V	Permanent - Tidal

WATER CHEMISTRY MODIFIERS

Coastal Salinity

1	Hyperhaline
2	Euhaline
3	Mixohaline (Brackish)
4	Polyhaline
5	Mesohaline
6	Oligohaline
0	Fresh

Inland Salinity

7	Hypersaline
8	Eusaline
9	Mixosaline
0	Fresh

pH Freshwater

a	Acid
t	Circumneutral
l	Alkaline

**Not included in "Classification of Wetlands and Deepwater Habitats of the United States." Created specifically for National Wetland Inventory mapping Effort.

OTHER MODIFIERS

Special

b	Beaver
d	Partially Drained/ Ditched
f	Farmed
h	Diked/Impounded
r	Artificial
s	Spoil
x	Excavated

Soils

q	Organic
n	Mineral

Statement to Users: The overlays/maps were prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands were identified on the photographs based on vegetation, visible hydrology, and geography in accordance with "Classification of Wetlands and Deepwater Habitats of the United States." The aerial photographs typically reflect conditions during the specific year and season when they were taken. In additon, there is a margin of error inherent in the use of aerial photographs. Thus, a detailed on-the-ground and historical analysis of a single site may result in a revision of the wetland boundaries established through photographic interpretation. In additon, some small wetlands and those obscured by dense forest cover may not be included on this map. Federal, State, and local regulatory agencies with jurisdictions over wetlands may define and describe wetlands in a different manner than that used in this Inventory, There is no attempt, in either the design or products of this Inventory, to define the limits of proprietary jurisdiction of any Federal, State, or local government or to establish the geographical scope of the regulatory programs and proprietary jurisdictions that may affect such activities.

To Order NWI Topical Wetland Overlays/Maps: A National Wetland Inventory Order Form is required and can be obtained by writing to the address on the letterhead.