NATIONAL WETLANDS INVENTORY

Map Report for West River North Dakota
for the 1:100,000 Map Units of:
Dickinson NW, SW, NE, SE;
Watford City NW, SW, SE;
Bismark NW, SW;

U.S. Fish and Wildlife Service
Denver, Colorado
September, 1992

TABLE OF CONTENTS

I. Introduction..... 1
II. Field Reconnaissance..... 1
III. Physical Description of Project Area..... 3
IV. Descriptions of Wetland Habitats in the Project Area..... 4
V. Water Regime Description.....10
VI. Imagery and Conventions.....11
VII. Map Preparation.....15
VIII. Special Mapping Problems.....15
IX. Map Acquisition.....16
X. Literature Cited.....17

Appendix A. Locator Map

I. INTRODUCTION

The United States Fish and Wildlife Service's National Wetlands Inventory (NWI) is producing maps showing the location and classification of wetlands and deepwater habitats of the United States. Classification of Wetlands and Deepwater Habitats of the United States by Cowardin et al. (1979) is the document used by the NWI to define and classify wetlands. Photointerpretation conventions, hydric soils lists, and wetland plant lists are also used to implement the Cowardin Classification system.

The purpose of this map report is to: (1) provide information on the production of NWI maps, including narrative on imagery and interpretation; (2) provide a descriptive crosswalk from NWI wetland codes on the map to common terminology and to representative plant species found on specific wetland sites; and (3) describe local geography, climate, and wetland communities.

II. FIELD RECONNAISSANCE

Field reconnaissance is a necessary procedure in order to accurately interpret aerial photography. Photographic signatures are correlated to the wetland habitat in the field. Collateral information including vegetative communities, soil types, and topographic setting are further evaluated to aid in the photointerpretation process. This information is evaluated for seasonality and conditions existing at the time of photography and at ground truthing.

Project Area

The West River North Dakota study area is located in the Great Plains-Shortgrass Prairie Province (Bailey, 1980). Field reconnaissance covered the area of each 1:100,000: Bismark NW, Bismark SW, Dickinson NW, Dickinson SW, Dickinson NE, Dickinson SE, Watford City NW, Watford City SW, Watford City SE (Appendix A).

Field Personnel

Bill Pearson	-	U.S. Fish and Wildlife Service
Eugene Beckwith	-	SDSU, National Wetlands Inventory team
Todd Hoernemann	-	SDSU, National Wetlands Inventory team
Mike Estey	-	SDSU, National Wetlands Inventory team
Michael Kjellsen	-	SDSU, National Wetlands Inventory team

Field Dates

8-15 September 1992

Aerial Photography

Primary Source Data (100%)
Type: NHAP Color Infra-Red High Altitude
Scale: 1:58,000

Bismark NW: 5/31/85, 6/22/85, 6/23/85, 10/1/85
Bismark SW: 5/31/85, 6/22/85, 6/23/85, 7/21/85, 10/1/85
Dickinson NW: 8/13/83, 8/14/83, 9/23/83
Dickinson NE: 7/6/84, 10/1/85
Dickinson SW: 8/13/83, 8/14/83, 9/23/83
Dickinson SE: 7/6/84, 10/1/85
Watford City NW: 8/13/83, 9/23/83
Watford City SW: 8/13/83, 8/14/83, 9/23/83
Watford City SE: 7/6/84, 10/1/85

Percent Coverage: All 288 USGS 7.5' quadrangles were covered with the NHAP photography.

Collateral Data

United States Geological Survey (USGS) Quadrangles
United States Soil Conservation Service (USSCS) Soil Surveys
Bailey's Description of the Ecoregions of the United States (1980)
Water Resource Data, North Dakota, Water Year 1990
National List of Plant Species That Occur In Wetlands: North Plains (Region IV)
Hydric Soils of the United States

III. PHYSICAL DESCRIPTION OF PROJECT AREA

Geography

Bailey, Description of the Ecoregions of the United States (1980), describes the western North Dakota project area as the Wheatgrass--Needlegrass Section of the Great Plains-Shortgrass Prairie Province. This region is characterized by rolling plains and tablelands of moderate relief. They are in a broad belt that slopes gradually eastward down from an altitude of 5,500 feet (1,520 m.) near the foot of the Rocky Mountains to 2,500 feet (760 m.) in the Central States. The plains are notably flat, but there are occasional valleys, canyons, and buttes.

Climate

The climate is a semiarid continental regime in which maximum rainfall comes in summer, but the total supply of moisture is low. Ninety-five percent (95%) of basin collected run-off comes from the spring snowmelt. Evaporation usually exceeds runoff. The frost-free season is usually fewer than one-hundred (100) days and the precipitation is approximately ten (10) inches (200 mm). The average annual temperature is 45°F (8°C) throughout most of the region. Winters are cold and dry; the summers warm to hot.

Vegetation

Steppe, sometimes called shortgrass prairie, is a formation class of short grasses usually bunched and sparsely distributed, and is characteristic of this province. Scattered shrubs and trees occasionally appear in the steppe, and exist as all gradations of cover from semidesert to woodland formations. Since ground cover is scarce, much soil is exposed. Many species of grasses and herbs grow in this province.

Soils

In this climate regime, the dominant pedogenic process is calcification; salinization is dominant in poorly drained sites. Soils contain a large excess of precipitated calcium carbonate and are rich in bases. Molisols are typical. Humus content is small because vegetation is sparse.

IV. DESCRIPTION OF WETLAND HABITATS IN PROJECT AREA

Riverine

The major river drainages of the Yellowstone River and the Missouri River are classified R2UBH. The Green River, the Knife River, the Cannonball River, the Little Missouri River, the Heart River, Spring Creek, and Cedar Creek are classified R2UBF.

Many intermittent streams exist on the study area. Intermittent streams are classified as R4SBA or R4SBC.

Lacustrine

Most of the lakes on the project area are impounded. The classifications are $L1UBG_h$, $L2ABF_h$, or a combination of these classifications on larger impoundments. The predominant aquatic bed vegetation is Lemna spp.. Many of these lakes are bordered by persistent emergent vegetation. Natural lakes on the study area are usually shallow basins which are classified L2ABF, L2USC, or L2USA.

Palustrine:

The majority of wetlands on the study area are palustrine. Palustrine wetlands are located in basins, river floodplains, and many drainages. Some wetlands have been drained or tilled for agricultural purposes, but most wetlands are located on untilled prairie.

Emergents (PEMA, PEMC, PEMF) and aquatic bed (PABF) are the dominant cover types with smaller areas of scrub-shrub (PSSA) and forested (PFOA). Field checksites were documented where problem areas existed due to inconsistent wetland photosignatures. Vegetation observed in these wetland habitats were grouped according to class and water regime. The following plant species were identified on check sites or field sites and represent only a fraction of all wetland plant species occurring on the project area.

Palustrine Temporary Emergents: PEMA
Hordeum jubatum, foxtail barley
Agropyron smithii, western wheatgrass
Eleocharis spp., spikerush
Spartina pectinata, prairie cord grass
Kochia spp., fireweed
Helianthus spp., sunflower
Solidago spp., goldenrod
Melilotus spp., sweetclover
Stipa spp., needlegrass
Equisetum spp., horsetail
Polygonum spp., smartweed
Sium suave, water parsnip
Sonchus arvensis, sow thistle
Salicornia spp., glasswort
Distichlis spp., salt grass

Palustrine Seasonal Emergents: PEMC
Scirpus spp., bulrush
Typha spp., cattail
Eleocharis spp., spikerush
Phalaris arundinacea, reed canary grass
Mentha spp., mint
Sagittaria spp., arrowhead
Rumex spp., dock
Spartina pectinata, prairie cord grass
Juncus spp., rush
Polygonum, smartweed
Carex spp., sedge
Sium suave, water parsnip
Triglochin spp., arrowgrass
Sparganium eurycarpum, giant burreed

Palustrine Semi-permanent Emergents: PEMF
Typha spp., cattail
Scirpus spp., bulrush

Palustrine Semi-permanent Aquatic Bed: PABF
Lemna spp., duckweed
Potamogeton spp., pondweed
Ceratophyllum spp., coontail

Palustrine Temporary Scrub-shrub: PSSA
Populus spp., cottonwood
Salix spp., willow
Cornus stolonifera, red osier dogwood

Palustrine Temporary Forested: PFOA
Fraxinus spp., ash
Populus spp., cottonwood
Acer negundo, boxelder
Elaeagnus angustifolia, Russian Olive

OBSERVED WETLAND VEGETATION TABLE

A. EMERGENT

Angropyron smithii	western wheatgrass
Carex spp.	sedge
Eleocharis spp.	spikerush
Equisetum spp.	horsetail
Helianthus spp.	sunflower
Hordeum jubatum	foxtail barley
Juncus spp.	rush
Kochia spp.	fireweed
Melilotus spp.	sweetclover
Mentha spp.	mint
Phalaris arundinacea	reed canary grass
Polygonum spp.	smartweed
Rumex spp.	dock
Sagittaria spp.	arrowhead
Scirpus spp.	bulrush
Solidago spp.	goldenrod
Spartina pectinata	prairie cord grass
Stipa spp.	needlegrass
Typha spp.	cattail
Sium suave	water parsnip
Sonchos arvensis	sow thistle
Salicornia spp.	glasswort
Distichlis spp.	salt grass
Triglochin spp.	arrowgrass
Sparganium eurycarpum	giant burreed

B. AQUATIC BED

Lemna spp.	duckweed
Potamogeton spp.	pondweed
Ceratophyllum spp.	coontail

C. SCRUB-SHRUB

Populus spp.	cottonwood
Salix spp.	willow
Cornus stolonifera	red osier dogwood

D. FORESTED

Acer negundo	boxelder
Elaeagnus angustifolia	Russian Olive
Fraxinus spp.	ash
Populus spp.	cottonwood

Table 1. NWI WETLAND CLASSIFICATION CODES, COWARDIN DESCRIPTION AND COMMON TERMINOLOGY

NWI CODE WATER REGIME	COWARDIN DESCRIPTION	COMMON DESCRIPTION	VEGETATION
R2UB (G)	Riverine, lower perennial, unconsolidated bottom	Meandering rivers, low gradient	Unconsolidated bottom
R2US (A,C)	Riverine, lower perennial, unconsolidated shore	Mud, sand, or gravel bars	Unconsolidated shore
R3UB (F,G,H)	Riverine, upper perennial unconsolidated bottom	Mountain streams, major drainage areas	Unconsolidated bottom
R4SB (A,C)	Riverine, intermittent, streambed	Small streams, creeks, or irrigation ditches	Streambed
L2AB (F,G)	Lacustrine, littoral aquatic bed	Shallow lake marshes	Hippuris vulgaris (marestail) Lemna spp. (duckweed)
L2US (A,C)	Lacustrine, littoral, unconsolidated shore	Dry alkaline lake beds	Unconsolidated shore
PUB (F,G,H)	Palustrine, unconsolidated bottom	Open water	Unconsolidated bottom
PAB (F,G,K)	Palustrine, aquatic bed	Deep basins, impoundments, excavated tanks, or sewage treatment settling ponds	Hippuris vulgaris (marestail) Lemna spp. (duckweed)

Table 1. NWI WETLAND CLASSIFICATION CODES, COWARDIN DESCRIPTION AND COMMON TERMINOLOGY

NWI CODE WATER REGIME	COWARDIN DESCRIPTION	COMMON DESCRIPTION	VEGETATION
PEM (A,B,C,F)	Palustrine, emergent	Basins, depressions, marshes, meadows, springs, seeps, or drainage areas	Agropyron smithii (western wheat) Beckmania syzigachne (American sloughgrass) Carex spp. (sedges) Distichlis spicata (inland saltgrass) Eleocharis spp. (spikerush) Equisetum spp. (horsetail) Hordeum jubatum (foxtail barley) Juncus spp. (rush) Phalaris arundinacea (reed canary grass) Phleum pratense (timothy) Poa pratensis (Kentucky bluegrass) Polygonum spp. (smartweed) Rumex spp. (dock) Sagittaria spp. (arrowhead) Spartina pectinata (prairie cord grass) Nasturtium officinale (water cress)

Table 1. NWI WETLAND CLASSIFICATION CODES, COWARDIN DESCRIPTION AND COMMON TERMINOLOGY

NWI CODE WATER REGIME	COWARDIN DESCRIPTION	COMMON DESCRIPTION	VEGETATION
PEM (continued) (A,B,C,F)			Scirpus americanus (common threesquare) Scirpus validus (softstem bulrush) Typha spp. (cattail)
PSS (A,B,C)	Palustrine, scrub-shrub	Willow thicket, river banks or drainage areas	Salix spp. (willow) Rosa spp. (rose) Ribes spp. (currant)
PFO (A,C)	Palustrine, forested	Cottonwood, river banks, floodplains, or drainage areas	Populus deltoides (eastern cottonwood) Salix spp. (willow) Fraxinus spp. (ash) Acer negundo (boxelder)
PUS (A,C)	Palustrine, unconsolidated shore	Salt flats	Unconsolidated shore

V. WATER REGIME DESRIPTION

(A) Temporarily Flooded- Surface water present for brief periods during growing season, but water table usually lies well below soil surface. Plants that grow both in uplands and wetlands are characteristic of this water regime.

(B) Saturated- The substrate is saturated to the surface for extended periods during the growing season, but surface water is seldom present.

(C) Seasonally Flooded- Surface water is present for extended periods, especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is extremely variable, extending from saturated to a water table well below ground surface.

(F) Semipermanently Flooded- Surface water persist throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land's surface.

(G) Intermittently Exposed- Surface water is present throughout the year except in years of extreme drought.

(H) Permanently Flooded- Water covers the land surface throughout the year in all years.

VI. IMAGERY

Most of the NHAP Color Infra-Red Emulsion is good quality. The exception is 13 August 1983 photography which is very light and has poor clarity. The photodates ranged from May through October. The 1983 photography is normal to slightly wetter than normal. The 1984 photography is very wet and required the extensive use of adjoining photography and field sites as collateral data to accurately classify wetlands. The 1985 photography ranges from normal to slightly dry wetland conditions. In general, the wetland photosignatures on 1985 photos correlated well for all photo dates.

Ground truthing revealed that wetland water conditions were normal for September. Most wetland basins contained normal vegetation and/or water for early September. Wetland photosignatures correlated well with in field wetland classifications with the exception of the extremely wet photography (7/6/84).

Field reconnaissance provided the following mapping conventions for all the imagery based on seasonal and climactic conditions. These conventions will cover general conventions, wetland basins, riverine and vegetated linears, oxbows, impoundments, and miscellaneous signatures.

GENERAL CONVENTIONS FOR WEST RIVER NORTH DAKOTA WETLANDS

- All open water impoundments are classified ABF_h unless they are 15-19 acres in size and the water signature justifies ABG_h classification.

- All open water dugouts, except for waste water treatment facilities, are classified UBF_x and occasionally G_x if they are very large. Excavations exhibiting a AB photosignature are classified as such.

- Aquatic bed photosignatures are classified ABF, ABG, or ABH. There are no ABC classifications.

- Intermittent versus perennial riverine classifications were determined by photosignature coupled with other collateral data and in field observations. USGS quads had no bearing on riverine system classification.

- R2G versus R2H were determined by the North Dakota water resource data.

- Beaver ponds are all classified $PABG_b$.

PHOTOGRAPHIC CONVENTIONS FOR BASIN WETLANDS

Temporary Basins

Temporary emergent basins can often be distinguished by their indistinct edges. However, these borders are quite distinct within agricultural areas of crops and haying. Depending on date of photography, temporary photosignatures exhibit a variety of gray, red, and dark red/purple tones, although some dates of photography show an open water signature for temporary basins.

The 1983 photography is normal to slightly wetter than normal. Most temporary basins are light gray to slate gray with indistinct edges. Some basins appear white with scattered areas of emergent red signatures. In field observations indicated extensive emergent in these areas. The appearance of white on the photography is due to the poor emulsion and reflectance on these dates of photography. Comparison of adjoining photos and field sites helped identify these areas accurately.

On 6 July 1984 imagery (which is extremely wet) temporary emergent basins exhibit a photosignature of slate gray to a variety of vegetated dark red and/or purple tones. Most wetlands have a mixture or a mottle of these tones, with others having a single even tone photosignature. Some of the temporary basins on 1984 photography have extremely strong signatures which are difficult to distinguish from seasonal wetlands. Adjoining photos and field site information aided in classifying these basins correctly. Temporary wetlands in agricultural fields have an unvegetated slate gray to open water photosignature. Only the very strong photosignatures in the central portion of these basins are wetlands.

The 1985 imagery presents approximately normal water conditions on all dates of photography (May-October). Temporary basins are gray to a red/gray slightly mottled appearance on the May and June photography. The July and October temporary photosignatures are a somewhat mottled gray to red/brown.

Temporary oxbow basins are common along riverine and palustrine drainages. These areas exhibit gray and red signatures and have the characteristic crescent shape.

Unconsolidated shore temporary wetlands are a white basin with well defined edges. These wetlands are similar to blowout areas. However, blowout areas have diffuse and convoluted peripheries. Topographic maps and soil surveys provide valuable collateral data in these areas.

Seasonal Basins

The 1983 seasonal emergent wetlands are densely vegetated basins with a deep red, dark gray/brown mottled photosignature. The majority of these wetlands contain varying amounts of water.

On 6 July 1984 (very wet photography) imagery seasonal emergent basins exhibit an open water photosignature. Within the open water areas are varying amounts of red/gray to red/purple vegetated signatures. Many of these basins appear semi-permanent on the photography but field reconnaissance confirmed these basins to be seasonal.

May and June 1985 photography shows vegetated seasonal basins with red/gray or red, gray, and purple mottled photosignatures. Many of these wetlands have areas of open water dispersed throughout the basin.

Photosignatures of seasonal basins on the July and October photography have a gray/brown to red/brown mottled appearance.

Seasonal lacustrine littoral basins, which often show light blue open water on the photography, are classified with the unconsolidated shore class.

Palustrine unconsolidated shore seasonal wetlands have a dark gray photosignature with a distinct light gray to white border.

Seasonal oxbow basins are common along riverine and palustrine drainages. Photosignatures are open water, dark red, dark gray or red/purple with distinct borders and the characteristic crescent shape.

Semipermanent Water Regimes

Natural semipermanent basins are uncommon in this area. The majority of semipermanent wetlands are impounded. Most unvegetated semipermanent impoundments are in the aquatic bed class. However, the periphery of some impoundments and in some cases the entire impoundment contain semipermanent emergent vegetation. Semipermanent vegetation is predominantly cattails. The photosignature is the typical emergent clumping with mottled tones of white/gray to red/gray.

Most natural palustrine emergent semipermanent wetlands exhibit an open water signature with some emergent clumping within the basin or on the periphery of the wetland. Even the dryer dates of photography have the characteristic clumped vegetation intermixed with open water. Some larger (> 20 acres) playa type lakes, which show open water on the photography, are classified as lacustrine littoral with the aquatic bed class, unless seen differently in the field.

Semipermanent oxbows along major rivers are also uncommon. These oxbows exhibit open water or a gray/white clumped signature and are classified semipermanent with an aquatic bed and/or emergent class.

CONVENTIONS FOR LINEAR WETLANDS

Linear wetlands are common. Delineation is determined by open water and/or emergents within the channel. On summer photography temporary palustrine linear wetlands with scrub-shrub and/or forested subclasses appear light red with a gray understory. Scrub-shrub and/or forested linears appear gray on the fall photography. Linear wetlands on the study area have a very limited floodplain. Most forested wetlands are confined to the linear channel and do not extend into the surrounding riparian area, except for floodplains associated with major river systems. Temporary emergent linears are red/gray to deep red on all dates of photography. However, on the 1984 photography the signatures are deep red with small pools of water located within the linear channel. Photointerpretation of these areas took into account relative strength of the photosignature coupled with other collateral data such as watershed size and gradient.

Seasonal wetlands have similar photosignatures on all dates of photography, except for variations in percent of water in the channel. Seasonal emergent linears have an open water channel or pools of water connected by a bright

red, red/purple, or red/brown mottled, vegetated linear.

Semipermanent palustrine linears are uncommon on this study area. Photosignatures are aquatic bed or a clumped gray/red mottled signature indicative of cattails. The semipermanent areas are usually polygon size and located within seasonal linear channels.

Waterways and runoff areas can be distinguished as upland by their pink photosignature and lack of discernable channel. These areas are often associated with agricultural land use.

Excavated linear wetlands are located within roadside ditches, particularly along roads which divide playa basins. These areas will usually be classified seasonal, however, some areas have a temporary or semipermanent water regime. Water regime photosignatures for excavated wetlands are the same as previously discussed for linear wetlands.

Linear intermittent riverine systems are classified by signature and watershed size. R4SBC linears generally exhibit an open water, unvegetated, streambed signature. Linears with a white substrate signature are classified R4SBA. Some R4SBA linears have small intermittent pools of water in the channel. Close examination of check sites and field sites aided in determining proper classifications of linear wetlands.

Perennial rivers are classified lower perennial with water regimes of F through H. Water regimes are determined by photosignature coupled with the USGS Water Resources Data. Riverine sandbars with non-persistent vegetation are classified R2USA and braided channels associated with the main river channel are classified R2USC.

SATURATED

No saturated areas were observed during field reconnaissance.

MISCELLANEOUS

This section addresses obscure conventions that are uncommon throughout the work area.

Many vegetated and/or forested linears have a red photosignature similar to a temporary wetland signature. During field reconnaissance these areas were determined to be upland. Subtle differences in tone, watershed size, gradient of the linear, and in-field data were used to help distinguish these areas as upland.

On the western Bismark quads, some seasonal and temporary basins appear to have an unconsolidated shore class. However, these basins were vegetated (inland saltgrass) when visited in the field. The unconsolidated shore appearance of these wetlands was determined to be reflectance. Most of these basins showed (very faint) varying amounts of vegetation on the photography. Basins which contain thirty percent vegetative cover on the photos are classified emergent.

VII. MAP PREPARATION

Wetland delineation and classification is in accordance with Cowardin et al (1979). Further wetland mapping guidance is provided by NWI photographic and cartographic conventions in concert with National consistency. Delineations are produced through stereoscopic interpretation of 1:58,000 scale color infrared photography. NHAP photography was taken summer and fall of 1983, 1984, and 1985.

Field check sites were evaluated within Bismark NW, Bismark SW, Dickinson NE, Dickinson SE, Dickinson NW, Dickinson SW, Watford City NW, Watford City SW, Watford City SE project areas prior to the actual classification and delineation of wetlands. Field check sites were selected to clarify varying photosignatures. Wetland photosignatures were identified in the field using vegetation types, soil types, and additional input from field personnel. Checksite wetlands have an asterisk (*) subsequent to the alphanumeric label. Wetlands visited but not checksited have the water regime in the alphanumeric label underlined.

Collateral data included USGS topographic maps, SCS soil surveys, USGS water resources data, vegetation, climate, and ecoregional information.

The user of the map is cautioned that, due to the limitation of mapping primarily through aerial photointerpretation, a small percentage of wetlands may be unidentified. Since the photography was taken during a particular time and season, there may be discrepancies between the maps and current field conditions. Changes in landscape which occurred after the photography was taken would result in such discrepancies.

Aerial photointerpretation and quality control was completed by the South Dakota Cooperative Fish and Wildlife Research Unit, SDSU, Brookings, S.D. with final quality control conducted by the FWS.

VIII. SPECIAL MAPPING PROBLEMS

The photosignatures generally correlated well with the wetlands observed. The 1983 photography showed normal water conditions but the emulsion was very light with poor clarity. The 1984 photography was extremely wet. A slightly conservative approach was employed when determining wetland water regimes on 1984 photos. Adjoining photography was used as collateral data to clarify photosignatures on 1983 and 1984 photos. All dates of photography for 1985 approximated normal water conditions and wetlands are classified as such. Soil surveys and USGS topographic maps were used extensively in all aspects of delineation. Overall, the consistency of tones and breaks in the imagery promote accurate photographic interpretation.

XI Map ACQUISITION

To discuss any questions concerning these maps, please contact:

Regional Wetland Coordinator
U.S. Fish and Wildlife Service - Region 6
Denver Federal Center
P.O. Box 25486
Denver, CO 80225

To order maps call 1-800-USA-MAPS.

Maps are identified by the name of the corresponding USGS 1:24,000 scale topographic quadrangle name. Topographic map indices are available from the USGS.

X. LITERATURE CITED

Bailey, R.G., 1980. Description of The Ecoregions of The United States. United States Department of Agriculture, Forest Service.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRue, 1979. Classification of Wetlands and Deepwater Habitats of The United States. United States Department of Interior, Fish and Wildlife Service, FWS/PBS-81.

Hydric Soils of the United States, 1987. U.S. Department of Agriculture, Soil Conservation Service.

National List of Plant Species That Occur in Wetlands: North Plains (Region 4), 1988. United States Department of Interior, Fish and Wildlife Service.

Soil Survey of Adams County, North Dakota, 1987. U.S. Department of Agriculture, Soil Conservation Service.

Soil Survey of Billings County, North Dakota, 1944. U.S. Department of Agriculture, Bureau of Plant Industry, Soils, and Agricultural Engineering.

Soil Survey of Bowman County, North Dakota, 1975. U.S. Department of Agriculture, Soil Conservation Service.

Soil Survey of Dunn County, North Dakota, 1982. U.S. Department of Agriculture, Soil Conservation Service.

Soil Survey of Golden Valley County, North Dakota, 1989. U.S. Department of Agriculture, Soil Conservation Service.

Soil Survey of Grant County, North Dakota, 1988. U.S. Department of Agriculture, Soil Conservation Service.

Soil Survey of Hettinger County, North Dakota, 1990. U.S. Department of Agriculture, Soil Conservation Service.

Soil Survey of McKenzie County, North Dakota, 1942. U.S. Department of Agriculture, Bureau of Plant Industry, Soils, and Agricultural Engineering.

Soil Survey of Mercer County, North Dakota, 1978. U.S. Department of Agriculture, Soil Conservation Service.

Soil Survey of Morton County, North Dakota, 1951. U.S. Department of Agriculture, Soil Conservation Service.

Soil Survey of Oliver County, North Dakota, 1978. U.S. Department of Agriculture, Soil Conservation Service.

Soil Survey of Slope County, North Dakota, 1978. U.S. Department of

Agriculture, Soil Conservation Service.

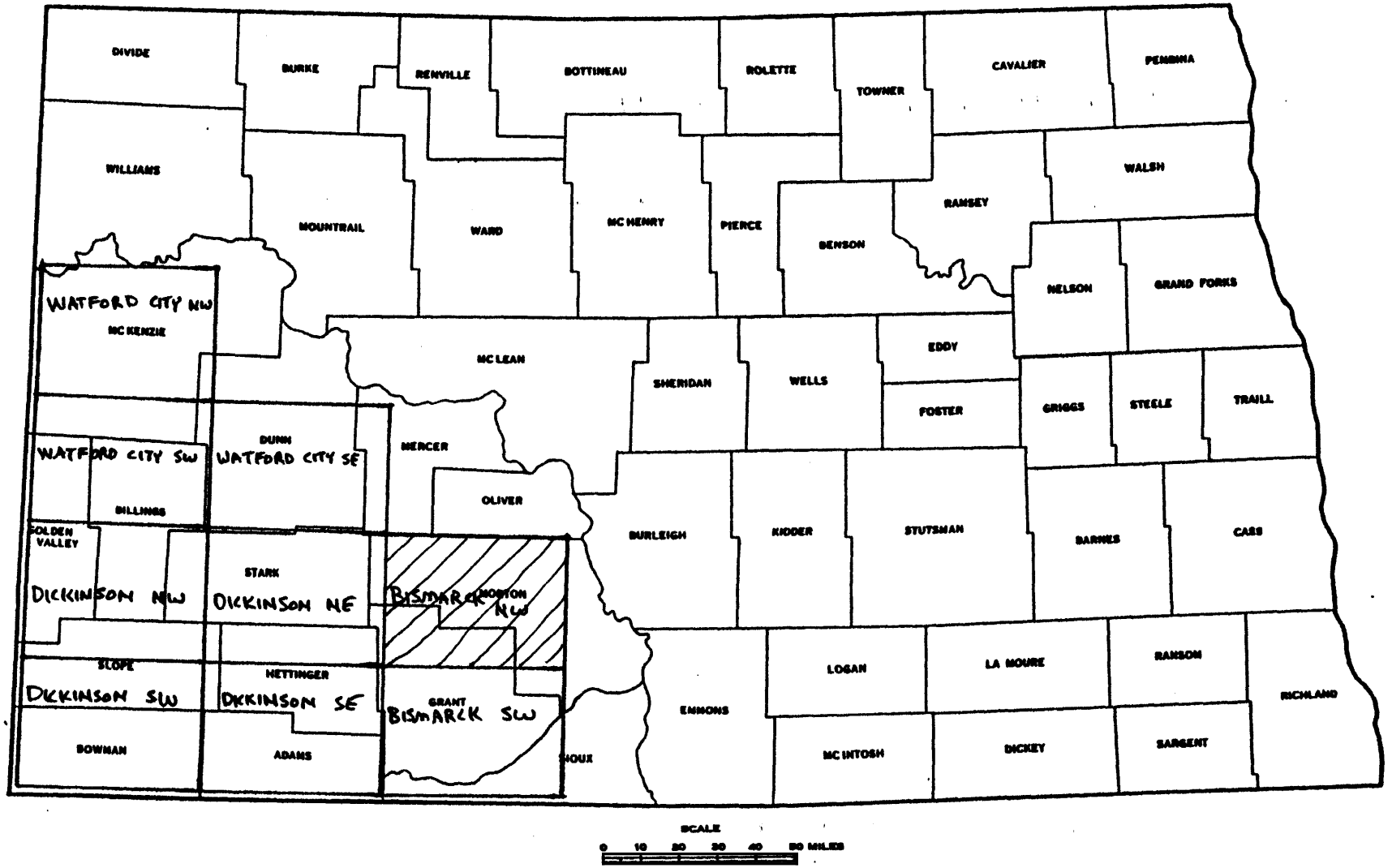
Soil Survey of Stark County, North Dakota, 1968. U.S. Department of Agriculture, Soil Conservation Service.

Water Resources Data North Dakota, 1990. U.S. Department of Interior, Geological Survey. Prepared in cooperation with the state of North Dakota and with other agencies.

7.5 Minute, 7.5 X 15 Minute, and 1:250,000 USGS Topographic Maps.

Appendix A: Locator Map

NORTH DAKOTA



U. S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS