NATIONAL WETLANDS INVENTORY

MAP REPORT OF ASHTON PHOTOINTERPRETATION YELLOWSTONE NATIONAL PARK

FOR THE 1:100,000 MAP UNITS OF:

ASHTON NE, ASHTON SE, ASHTON NW, ASHTON SW, BOZEMAN SE, BOZEMAN SW

U.S. Fish and Wildlife Service
Denver, Colorado
May, 1995

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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. Photo interpretation 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 Yellowstone National Park study area is located in the Rocky Mountain Forest Province. Field reconnaissance covered the area of each 1:100,000: Ashton NE, Ashton SE, and partial areas of Ashton NW, Ashton SW, Bozeman SE and Bozeman SW. (Locator Map A).

Field Personnel

Chuck Elliott	-	U.S. Fish and Wildlife Service
Bill Pearson	-	U.S. Fish and Wildlife Service
Jaymee Fojtik	-	U.S. Fish and Wildlife Service
Lynn Wilson	-	Geonex, Inc.
Mary Hektner	-	U.S. National Park Service
Don Despain	-	U.S. National Park Service
Jim McGrath	-	U.S. National Park Service
Leslie Krieger	-	U.S. National Park Service

Field Dates

July 18 - 22, 1994

Aerial Photography

Primary Source Data (100.0%)
Type: NHAP Color Infra-Red High Altitude
Scale: 1:58,000

Ashton NE; 8/12/82, 9/8/82, 9/9/82, 8/27/83, 9/16/83

Ashton SE; 8/12/82, 9/8/82, 9/9/82, 8/27/83, 9/15/83, 9/16/83, 9/17/84

Ashton NW; 7/27/80

Ashton SW; 7/27/80

Bozeman SE; 8/22/84, 9/17/84, 9/18/84, 9/30/84, 9/30/88,

Bozeman SW; 9/18/84, 9/30/88

Collateral Data

United States Geological Survey (U.S.G.S.) Quadrangles

Bailey's Description of the Ecoregions of the United States

National List of Plant Species That Occur In Wetlands: Northwest (Region IX)

Wyoming General Soil Map

Hamiltons Guide Yellowstone National Park

United States Fish and Wildlife Service Wetland Plant Keys

Cowardin Classification of Wetlands and Deepwater Habitats of the United States

U.S. National Park Service Lake Contour Data for Yellowstone National Park

Vegetation Map of Yellowstone National Park by Don Despain

III. PHYSICAL DESCRIPTION OF PROJECT AREA

Geography

The study area, Yellowstone National Park, is situated in the northwestern portion of Wyoming and is located in the Rocky Mountain Province. Altitude in the Park ranges from 5,300 to 11,000 feet with an average elevation at 7,500 feet. There are 3,472 square miles within its borders. The Park is surrounded by rugged mountain ranges and National Forest. Gallatin National Forest borders the north and northwest and Custer National Forest on the northeast. The Targhee National Forest borders the west and southwest while the Teton National Forest borders the south.

Yellowstone National Park is an elevated plateau surrounded by snowcapped mountains. This area has a generous variety of natural phenomena. Geysers, mudpots and thermal areas are found throughout the Park with Old Faithful being one of the most famous geysers. Pitchstone and Madison Plateaus are located in the western portion of the Park. These plateaus were formed by lava ash that was exploded out of the earth during the great volcanic eruptions.

Numerous waterfalls and canyons are found throughout the Park. These include Upper and Lower Falls, located in the Grand Canyon of the Yellowstone, Lewis Falls and Firehole Falls in Firehole Canyon. The Yellowstone, Gibbon and Lewis Rivers are just a few rivers that flow throughout the Park. Yellowstone Lake is the largest lake in North America located at this elevation. It covers 139 square miles and has a shoreline of 110 miles. Average depth is 139 feet with 365 feet being the deepest point.

Climate

The climate in the Park varies with altitude. Winters are cold, summer days are hot with cool nights. Average annual temperatures range from 10°F to 55°F. Precipitation ranges from 17 inches per year in the northern section of the Park to 70 inches in the south. Most of the Park averages 30 to 50 inches with a considerable portion falling as snow.

Vegetation

Vegetation in the Park varies with different zones. The uppermost zone is characterized by alpine meadows. The subalpine zone consist of subalpine meadows and forest of Englemann spruce and subalpine fir. The montane zone is characterized by lodgepole pine which covers nearly three-fourths of the Park. The lower elevations on the plateaus in the Park are typically sagebrush deserts.

Soils

In Yellowstone National Park four soil associations can be found.

Rock outcrop - Cryoboralfs - Cryoborolls Association: This association can be found in the mountains to the north. These very steeps soils are developing in residuum and transported materials from igneous bedrocks. This association consists mainly of Rock outcrop, Lithic and Typic Cryoboralfs, and Lithic and Typic Cryoborolls.

Cryochrepts - Cryumbrepts Association: This association is located on the Pitchstone Plateau. These steep soils are developing in residuum and transported materials from volcanic bedrock. This association consists mainly of Andic Pergelic and Typic Cryochrepts and Andic Pergelic and Typic Cryumbrepts.

Cryoboralfs - Cryoborolls - Rock outcrop Association: This association is located in the mountains to the south and the northwestern corner of the Park. These steep soils are developing in residuum and transported materials from sedimentary bedrock. This association consists mainly of Lithic and Typic Cryoboralfs; Lithic, Typic, and Argic Cryoborolls; and Rock outcrop.

Cryoborolls - Cryaquolls Association: This association is located in the valleys of the Park. These nearly level to rolling soils are developing in alluvium and loess. This association consists mainly of Typic, Argic, Pachic, Argic Pachic, and Aquic Cryoborolls and Typic Cryaquolls.

IV. DESCRIPTION OF WETLAND HABITATS IN PROJECT AREA

Riverine

Major rivers flowing through the Park are the Yellowstone, Lamar, Lewis and Gibbon Rivers. These are classified as R3UBH. Some sections of the Yellowstone River are also classified as R3ABH. These sections were field checked and have the aquatic bed signature. Sections of rivers where boulders are present and can be seen on the photography will be classified R3RBH. A small section of the Pelican Creek was classified R2UBH.

Smaller streams in the Park will be classified R3UBG and R3UBF. Signature may be camouflaged by tree canopy.

Riverine bars and flats will be classified R3USC, R3USA and R2USC, R2USA.

Intermittent streams will be classified R4SBC and R4SBA.

Lacustrine

Data and contour maps provided by Park personnel will be used to determine the littoral and limnetic zones.

Yellowstone Lake and Turbid Lake are examples of the L1UBH classification. Yellowstone Lake has a L2UBG border.

L1ABH, L2ABH and L2ABG classifications are used on lakes according to signature and information. Shrimp Lake and Swan Lake are examples.

Unconsolidated shore in the lacustrine system will be classified L2USC and L2USA.

Palustrine

Numerous emergent meadows were found in the study area. These are classified PEMC and PEMB. There are a few areas classified PEMA and PEMH. A few areas were field checked as PEMF.

Emergents associated with thermal areas and hot springs are classified PEMJ. Mineral deposits around these springs are classified PUSJ with the spring or pool itself classified PUBH.

Ponds that have no contour information and have an open water or aquatic bed signature will be classified PABF and PABG. Beaver ponds, will have a PABGb classification.

Areas of scrub-shrub are classified PSSC and PSSB. Wet forested area are classified PFOA, PFOB and PFOJ.

Field check sites were documented where problems existed, i.e., wetland areas that were not readily recognizable on the photography. Vegetation observed in these wetland habitats were grouped according to class and water regime. The following plant species were identified on check sites and represent only a small percentage of all wetland plant species occurring in the project area.

Palustrine Temporary Emergents: PEMA

Angelica sp.	angelica
Apocynum cannabinum	dogbane
Deschampsia cespitosa	tufted hairgrass
Gentiana sp.	gentian
Juncus sp.	rush
Phleum pratense	timothy
Poa sp.	bluegrass
Sium suave	water parsnip

Palustrine Seasonal Emergents: PEMC

Calamagrostis canadensis	blue joint reedgrass
Carex sp.	sedge
Carex rostrata	beaked sedge
Equisetum sp.	horsetail
Juncus sp.	rush
Juncus balticus	baltic rush
Marchantia sp.	liverworts
Phleum alpinum	alpine timothy
Pedicularis groenlandica	elephants head
Sphagnum sp.	sphagnum moss

Paulstrine Permanent Emergents: PEMH

Eleocharis flavescens	tropical spikerush

Palustrine Seasonal Scrub-shrub: PSSC

Salix sp.	willow

Palustrine Temporary Forested: PFOA

Abies lasiocarpa	subalpine fir
Picea engelmannii	Engelmann spruce
Pinus contorta	lodge pole pine

OBSERVED WETLAND VEGETATION
(Grouped According to Class)

A. EMERGENT

Angelica sp.	angelica
Apocynum cannabinum	dogbane
Calamagrostis canadensis	blue joint reedgrass
Carex sp.	sedge
Carex garberi	elk sedge
Carex nebrascensis	nebraska sedge
Carex rostrata	beaked sedge
Deschampsia cespitosa	tufted hairgrass
Drosera sp.	sundew
Eleocharis flavescens	tropical spikerush
Equisetum sp.	horsetail
Gentiana sp.	gentian
Juncus sp.	rush
Juncus balticus	baltic rush
Marchantia sp.	liverworts
Mimulus guttatus	yellow monkey flower
Pedicularis groenlandica	elephants head
Phleum alpinum	alpine timothy
Phleum pratense	timothy
Poa sp.	bluegrass
Scirpus sp.	bulrush
Sium suave	water parsnip
Sphagnum sp.	sphagnum moss
Triglochin maritima	arrowgrass
Typha sp.	cattail

B. AQUATIC BED

Lemna sp.	duckweed
Nymphaea sp.	waterlily

C. SCRUB-SHRUB

Potentilla fruticosa	shrubby cinquefoil
Salix sp.	willow

D. FORESTED

Abies lasiocarpa	subalpine fir
Acontium columbanium	lodge pole pine
Picea engelmannii	Engelmann spruce
Pseudotsuga menziesii	Douglas fir

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

NWI CODE WATER REGIME	COWARDIN DESCRIPTION	COMMON DESCRIPTION	VEGETATION
R3UB (F,G,H)	Riverine, upper perennial, unconsolidated bottom	Mountain streams, major drainage areas	None
R3RB (H)	Riverine, upper perennial, rock bottom	Mountain streams	None
R3US (A,C)	Riverine, upper perennial, unconsolidated shore	Gravel, cobble flats	None
R3AB (H)	Riverine, upper perennial, aquatic bed	Mountain streams	Submerged aquatics
R2UB (H)	Riverine, lower perennial, unconsolidated bottom	Meandering rivers, low gradient	None
R2US (A,C)	Riverine, lower perennial, unconsolidated shore	Mud, sand flats	None

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

NWI CODE WATER REGIME	COWARDIN DESCRIPTION	COMMON DESCRIPTION	VEGETATION
R4SB (A,C)	Riverine, intermittent, streambed	Small streams, creeks	None
L1UB (H)	Lacustrine, limnetic, unconsolidated bottom	Deep lakes	None
L2UB (F,G)	Lacustrine, littoral, unconsolidated bottom	Shallow lakes	None
L1AB (H)	Lacustrine, limnetic, aquatic bed	Deep lakes	Aquatic bed
L2AB (G,H)	Lacustrine, littoral, aquatic bed	Shallow lakes	Aquatic bed
L2US (A,C)	Lacustrine, littoral, unconsolidated shore	Flats	None
PUB (H,K)	Palustrine, unconsolidated bottom	Thermal ponds, hot springs, geysers, water filtration ponds	None
PUS (J,A,C)	Paulstrine, unconsolidated shore	Thermal mineral areas, basins	None
PAB (F,G,K)	Palustrine, aquatic bed	Ponds, deep basins, beaver ponds, sewage treatment settling ponds	Aquatic bed

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,H,J)	Palustrine, emergent	Basins, depressions, marshes, meadows, springs, seeps, or drainage areas	Angelica sp. (angelica) Apocynum cannabinum (dogbane) Calamagrostis canadensis (blue joint reedgrass) Carex sp. (sedge) Carex garberi (elk sedge) Carex nebrascensis (nebraska sedge) Carex rostrata (beaked sedge) Deschampsia cespitosa (tufted hairgrass) Drosera sp.(sundew) Eleocharis flavescens (tropical spikerush) Equisetum sp.(horsetail) Gentiana sp. (gentian) Juncus sp.(rush) Juncus balticus (baltic rush) Marchantia sp. (liverworts) Mimulus guttatus (yellow monkey flower) Pedicularis groenlandica (elephants head) Phleum alpinum (alpine timothy) Phleum pratense (timothy) Poa sp. (bluegrass)

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,H,J)	Palustrine, emergent	Basins, depressions, marshes, meadows, springs, seeps or drainage areas	Scirpus sp.(bulrush) Sium suave (water parsnip) Sphagnum sp. (sphagnum moss) Triglochin maritima (arrowgrass) Typha sp. (cattail)
PSS (C,B)	Palustrine, scrub-shrub	Willow thicket, river banks, or drainage areas	Potentilla fruticosa (shrubby cinquefoil) Salix sp. (willow)
PFO (A,B,C,J)	Palustrine, forested	River banks, floodplains, seeps, thermal areas	Abies lasiocarpa (subalpine fir) Picea engelmannii (Engelmann spruce) Pinus contorta (lodge pole pine) Pseudotsuga menziesii (Douglas fir)

V. WATER REGIME DESCRIPTION

(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 persists 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.

(J) Intermittently Flooded - The substrate is usually exposed, but surface water is present for variable periods without detectable seasonal periodicity.

(K) Artificially Flooded - The amount and duration of flooding is controlled by means of pumps or siphons in combination with dikes or dams.

VI. IMAGERY

Overall the emulsion of the NHAP color infra-red photography is of high quality. There are a few exceptions however. Emulsion on roll 259 varies and photo 259-5 was re-ordered. The upland wetland breaks were very hard to discern, emulsion bright orange.

Scattered throughout the study area are small areas that are blurred on the photography. This did not however interrupt the photo interpretation.The majority of our photography was flown in 1982, 1983, 1984 and 1988. Ground truthing revealed field conditions dryer than those portrayed on the imagery.

PHOTOGRAPHIC CONVENTIONS

Riverine System

Permanent rivers in the study area will be classified R3UBH, R3RBH and R2UBH. Signature will be open water. Examples are Yellowstone River which is both R3UBH and R3RBH and part of Pelican Creek which is an example of R2UBH. Submerged aquatic bed found in the Yellowstone River is classified R3ABH. Signature is light pink to white. Smaller streams will be classified R3UBG and R3UBF. These may be camouflaged by tree canopy. Topographic information along with photo signature will be used to locate these.

Intermittent streams with little or no water present on photography will be classified R4SBC and R4SBA.

Sand and cobble or mud flats along perennial rivers will be classified R3USA and R3USC or R2USA and R2USC. Signature will vary from white to blue grey.

Lacustrine System

Data and contour maps provided by Park personnel will be used to determine the littoral and limnetic zones.

Yellowstone Lake will be classified L1UBH with a L2UBG border based on information received. Signature is open water.

L1ABH, L2ABH, and L2ABG will be used based on contour information and photo signature, which may be open water or a pink tone within the open water.

Unconsolidated shore on these lakes will be classified L2USA and L2USC. Signature will be white or blue grey.

Palustrine System

Seasonal emergents, PEMC made up the majority of emergents seen in the Park. Signatures varied from orange to pink/orange with shades of green, brown, beige and yellow mottling. October photography had a pale grey/blue signature for PEMC emergents. Saturated PEMB emergents have the same signature as seasonal emergents but are found on a slope.

Temporary emergents, PEMA were infrequent in the Park. Signature ranged from light pink to light orange with a somewhat even texture and little to no mottling present.

Permanent PEMH, and semi-permanent PEMF emergents were seen in very few places. The PEMH emergents would need to be documented by ground truthing and not by signature. Semipermanent emergents signatures are a very textured mixture of blues, pinks, greens, browns and/or yellow.

Intermittently flooded, PEMJ emergents are adjacent to thermal and hot springs areas. Signatures are a pink or green/brown mixed with a white signature.

Aquatic bed signatures in this system will be classified PABF, PABG and PABH. These will be found as ponds or as pockets, oxbows and in floodplains.

Beaver ponds are classified PABGb, although very few are found within the Park. Sewage disposal ponds are classified PABKx. Signatures for all the above mentioned will be either open water or a pink tone within the open water.

Intermittently flooded, unconsolidated shore PUSJ are associated with thermal and hot spring areas. Signature is a bright white. As thermal areas become inactive the signature becomes mixed with a grey tone. These are upland and will not be delineated. Temporary PUSA and seasonal PUSC unconsolidated shore areas are uncommon in the Park. The signature for these are white or a bluish white respectively. These are not associated with thermal areas.

Scrub-shrub vegetation was found mainly in the southern half of the Park along rivers and in meadows of floodplains. These are seasonal PSSC with a pink/orange signature. In some signatures the texture that is typical for shrubs was very faint and hard to discern from emergents. Photo overlap is very helpful here. Saturated shrubs PSSB are on slopes. Signatures range from pink, to orange to red.

Forested areas were especially difficult to delineate. The emergent understory is the key to wet forest in the Park. The same forested vegetation void of an emergent understory is upland. Tree signature is the same as surrounding upland areas. The emergent signature through the canopy will be the determining factor. This signature ranges from pink to orange. On the October 1988 photo's the emergent signature is a pale grey/blue and very hard to distinguish wetland forest areas. Some areas that were ground truthed had a forest canopy that was so dense the emergent understory could not be seen on the photography. Some forested areas may not be delineated due to a lack of photo signature.

VII. SPECIAL MAPPING PROBLEMS

The emulsion of the 1:58k NHAP photography was of good quality overall. Problems did exist with rolls 259 and 467. The bright orange emulsion on roll 259 made the upland/wetland breaks difficult. Roll 467 was taken in late October and had a pale grey blue return which made emergent wetland signatures almost invisible to detect. Overlap was used to help locate these where available.

Forested wetland throughout the study area were sometimes difficult to detect. This was not due so much to photo emulsion rather it was the tree canopy that was the problem. The emergent understory was the determining factor for wet forested areas and this was obscured at times by the dense canopy coverage. Some areas may have been unintentionally missed during photo interpretation.

VIII. 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 during 1982, 1983, 1984 and 1988.

Field checks of areas found within Ashton NE, Ashton SE, Ashton NW, Ashton SW, and Bozeman SE, Bozeman SW photography were made prior to the actual delineation of wetlands. Field check sites were selected to clarify varying signatures found on the photography. These photographic signatures were then identified in the field using vegetation types and soil types, as well as additional input from Park personnel.

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 drafting were completed by Geonex, Inc., St. Petersburg, Florida with quality control conducted by the United States Fish and Wildlife Service.

IX. 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.

ashton.rpt
LW/tea.nwi

X. LITERATURE CITED

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APPENDIX A
LOCATOR MAP
ASHTON PI
YELLOWSTONE NATIONAL PARK PROJECT AREA