WYOMING - MONTANA COAL REGION WETLAND INVENTORY
U. S. FISH AND WILDLIFE SERVICE
1:100,000 MAP NARRATIVE REPORT
-HARDIN SE-

INTRODUCTION

In 1974, the U. S. Fish and Wildlife Service directed its Office of Biological Services to complete an inventory of the Nation's wetlands. As part of this overall objective an effort began in September 1977 to delineate and classify photointerpretable wetlands within the Powder River Basin of Wyoming and Montana. Wetland maps at 1:100,000 scale and wetlands overlay maps at 1:24,000 scale are produced at National Wetland Inventory headquarters in St. Petersburg, Florida. Final Wyoming-Montana wetland maps are available at U. S. Fish and Wildlife Regional Office in Denver, Colorado. An integral part of all final wetland maps is the completion of narrative reports, which are available for each 1:100,000 inventoried. The following narrative report provides both basic and specific data which aids the user in understanding not only the general area of Hardin SE quadrangle, but also representative details of its wetland habitat.

MAP PREPARATION

Contractor for this project was Martel Laboratories, Inc. of St. Petersburg, Florida. Aerial photographic interpretation was performed by Alexander Kosinski and Charles Storrs. This report was prepared by Thomas Owens and Alexander Kosinski. Regional Wetland Coordinator is Charles Elliott, U. S. Fish and Wildlife Service, P. O. Box 25486, Denver, Colorado 80225.

Wetland delineation and classification for Hardin SE 1:100,000 wetland map was done on color infrared aerial photographs taken in July and August 1976, at a scale of 1:31,680. Limited field checking was conducted in late summer and early autumn of 1977.

Map users are cautioned that mapping with aerial photography has limitations. Through stereoscopic examination of photography wetlands are identified and classified on the basis of color, tone, texture, pattern, site, size, local ecology, and cultural patterns. Aerial photographs reflect conditions during the year and season they were taken. In addition, most wetlands on this map were delineated using high altitude aerial photography, which presents limitations. Small wetlands are too diminutive at this scale to delineate. This is also true for many stream channels whose width was less than the width of a pen line. Resolution limitations inherent in high altitude imagery cause problems in accurately recognizing ground conditions.

Any noted discrepancies regarding wetland omissions, inclusions, or errors should be given to the U. S. Fish and Wildlife Regional Wetland Coordinator, who is located in Denver, Colorado.

AREA DESCRIPTION

Bailey's Ecoregions

Hardin SE 1:100,000 quadrangle falls into one province and section in Bailey's Ecoregions of the United States, 1978, which classifies land into a hierarchal system based upon bioclimatic, geologic and geomorphic criteria. The province is Great Plains Short Grass Steppe in the Semi-Arid Steppe Division and the section is Grama-Needlegrass Wheatgrass (3111L).

Hammond's Land Surface Forms

Hammond's Land Surface Forms systematically characterizes topography of the United States. Hardin SE quadrangle is in the Interior Division (III), Upper Missouri Broken Lands Physical Subdivision (10). All of the map is classified as Open High Hills (III-10C4b) characterized by 20 to 50 percent of area gently sloping, local relief 500 to 1,000 feet, and 50 to 75 percent of gentle slope in lowland.

Hydrologic Mapping Units

Hydrologic mapping units are part of an effort by the U. S. Geological Service to provide a series of uniform, Nationally consistent maps which accurately delineate hydrographic boundaries for Federal and State water agencies. Units are designated by eight-digit numbers, which are tied to a computer file (Catalog of Information on Water Data) and contains information on water data activities (Langford and Kapinas, 1979). All hydrologic mapping units in Hardin SE are in the Missouri Region (10). 10100003 covers 12 percent in the northwestern corner and 10090102 covers 35 percent in the northeastern corner. 10090207 covers 3 percent in the southeastern corner and 10090101 covers 50 percent in the southwestern corner.

Topography

Hardin SE's topography is a result of erosion upon layers of alternating shales and sandstones. These layers differ in permeability, which coupled with high relief, directly influences drainage density. When impermeable shale is exposed, water infiltration is poor and runoff is high, which favors development of many headward eroding streams and gully channels. If relief is high, headward eroding streams and gullies cut deep valleys. If drainages are closely spaced, vegetation cover is sparse, and rain occurs in thunderbursts, then badland topography will result. When permeable sandstone is exposed, rainfall is more

completely absorbed, causing less runoff and a less intricate, more widely spaced drainage pattern develops. Instead of ridge and valley terrain typical of shale, sandstone expresses itself as a relatively smooth, flat to rolling hill topography.

Geology

All surface bedrock in Hardin SE is sedimentary, consisting of alternative layers of sandstone, siltstone, and shale. Older Paleocene Age Fort Union Formation is exposed in the northern part of the map, while younger Eocene Age Wasatch Formation is exposed on the map's southern edge. Modern alluvium is found along the map's flood plains.

The Fort Union Formation was deposited during subtropical Paleocene environment and contains wide deposits of coals where ancient swamps once existed. Accumulation of eroded sediments from the Rockies on swampy ground resulted in alternating layers of carbonaceous shale and fine grained sandstone intermingled with coal seams.

The younger Wasatch Formation was deposited during the Eocene, a time when basin filling continued, but with a gradual diminuation of coal swamps as the climate changed to humid temperate conditions. The Wasatch Formation consists of fine- to coarse-grained sandstones with interbedded shales, and less coal in more recent strata. Pink, yellow, and red silts are characteristic of the Eocene strata, which are often eroded into badland topography.

Where coal seams outcrops have ignited from lightning, spontaneous combustion, or man-made fires, beds of baked rock called clinker or "scoria" are found. Reddish clinker beds are sandstone and shale beds that have been subjected to melting and baking by heat and gases rising from underlying burning coal seams. Depending on availability of oxygen, clinker zones may follow the coal outcrop underground and extend for almost a mile.

Soils

Soil is an important element of wetlands; it is one criterion used to define wetlands. "The substrate (of wetlands) is predominately undrained hydric soil" (Cowardin, 1979). The National Wetland Inventory, in cooperation with the U. S. Soil Conservation Service is preparing a list of hydric soils to accompany the Cowardin, et al., wetland classificaton system.

Soils of Hardin SE are a result of semi-arid climate with its associated vegetation and organisms acting upon Tertiary sandstones and shales. These soils are light gray-brown, often possessing a limecarbonate (caliche) layer at shallow depths. The zone of altered bedrock is three feet below the surface or less, with slopes having thinner soil cover and bedrock outcrops. Soils developed on steeply

sloping uplands and ridges are easily eroded, resulting in dissected, broken ground. Loamy soils derived from clinker beds have developed on steep slopes, are easily eroded, and have low agricultural potential. Loams developed from sandstones and shales on steep slopes are also easily eroded and have low agricultural productivity. Loams developed from sandstones and shales on steep slopes are also easily eroded and have low agricultural productivity. Soils on gently sloping uplands have moderate to high erodibility and moderate agricultural productivity. Near large streams soils that have developed on alluvium are alkaline, have wind erodibility, and are subject to flooding.

Climate

Hardin SE is a temperate and semi-arid climate and experiences wide variation in temperature and precipitation between winter and summer. The growing season averages about 120 days per year. Average annual precipitation is 10.6 inches. Two-thirds of annual precipitation occurs between March and August of an average year. One-third occurs as snow, which annually averages 40 inches. Snowfall is generally well distributed through winter and spring, but December usually receives heaviest accumulations. Summer-time hailstorms occur, which are capable of causing serious crop damages. Prevailing winds are from the northwest, which have their highest velocities in spring.

Mean Monthly Temperature January	19.0°F.
Mean Monthly Temperature July	70.0°F.
Lowest Minimum Temperature January	-40.0°F.
Highest Maximum Temperature July	105.0°F.

WETLANDS

Community Descriptions

Hardin SE has wetland types reflective of semi-arid climate with ridge and gully terrain that is interrupted by expanses of rolling terrain. This quadrangle is characterized by many artificial impoundments and "intermittent wetlands," almost all of which are in the Palustrine System.

Palustrine System

Artificial Impoundments

Many gullies, intermittent streams, and natural springs are dammed. These water storage structures create many wetlands on this map. These wetlands are classified as Palustrine Open Water (POW), Palustrine Emergent (PEM), Palustrine Flat (PFL) or combinations of these classes. Size varies from less than one-half acre catch basins to reservoirs of dozens of acres.

Palustrine Open Water impoundments are semi-permanently flooded and provide a reliable source of water throughout the growing season most years. These wetlands have little or no vegetation.

Palustrine Flat impoundments are usually unvegetated and contain silty mineral substrates. However, some flats contain vegetation in low densities or in widely scattered clumps. Species included western wheatgrass (Agropyron smithii), spikerush (Eleocharis spp.), and bulrush (Scirpus spp.).

Palustrine Emergent impoundments possess higher densities of hydrophytic vegetation than do flats. Water regime influences species composition. Western wheatgrass is dominant where surface flooding ranges from intermittent to temporary. Spikerush, either in pure stands or mixed with western wheatgrass, is present at sites with temporary to seasonal flooding. Bulrush is associated with seasonal to semi-permanent flooding.

Local factors, such as fluctuations in the quantity of spring meltwater runoff, variability of flow from natural springs and seeps, and the unpredictability of thunderstorms recharge, play an important role in the diversity of water regimes in all three classes of impoundment wetlands.

Intermittent Wetlands

Intermittent wetlands are naturally occurring wetland features that show up on flat to rolling topography as saucer-shaped shallow depressions. These depressions often occur in groups, which may contain dozens of depressions scattered over square miles.

Terminology used by ASCS refer to these depressions as "clay overflows." Some depressions appear to have developed from gradual accumulation of clay colluvium. This clay is deposited by runoff from eroding shale scarps into basins.

Other shallow depressions seem to occur near the transition zone between two differing rock types; specifically sandstone and shale. It appears that the permeable uppermost sandstone layer is weathered thinly enough in spots to permit breakdown of underlying shale. This deterioration of shale produces clay, which compacts differentially when exposed to moisture, creating a shallow basin as it settles. The basin collects more rainfall as it deepens, further hastening the weather process. At the same time it serves as a collection basin for fine silts and surface clays washed in by runoff from surrounding uplands. In both cases clay is the common denominator in the genesis of these shallow depressions. Intermittent wetlands are classified as either Palustrine Emergent, Palustrine Flat, or combinations of them.

Palustrine Flats have substrates of silt-clay. Both non-vegetated and pioneer sparsely vegetated (less than 10 percent area coverage) varieties are present on this quadrangle. Some non-vegetated flats are disturbed by cattle trampling. Vegetation includes western wheatgrass and spikerush. Flats are often saline. Water regimes range from intermittently through seasonally flooded.

Palustrine Emergent depressions fall into three categories: (1) homogeneous pure stands of vegetation, (2) vegetation occurring in distinct concentric rings that differ in species composition or density, (3) vegetation existing in a random patchwork of amorphous shapes, also differentiated by species composition or density. Western wheatgrass is usually dominant, since most depressions are intermittently flooded. Where surface flooding is temporary to seasonal, spikerush and bulrush are in association with western wheatgrass. Saline conditions are common.

Several Palustrine system classes are associated with permanent streams and the Tongue River Reservoir: forested wetlands (PFO), scrub/shrub wetlands (PSS), and emergent wetlands (PEM). Forested wetlands are dominated by cottonwoods (Populus angustifolia) and willows (Salix spp.). Forested wetlands are found where the water table is high along water courses and are temporarily to seasonally flooded. Scrub/shrub wetlands are found in similar situations and dominant plants are willow and salt-cedar (Tamarix pentandra). Emergent wetlands in drainages are usually wetter than the first two types mentioned. The water regime is seasonal to semi-permanent. Vegetation includes cattail (Typha spp.), spikerush (Eleocharis spp.), bulrush (Scirpus spp.), and sedge (Carex spp.).

Lacustrine System

Two Lacustrine classes are in Hardin SE: flats (L2FL) and open water (L1OW). Both are found in the Tongue River Reservoir. Open water found here is over 2 meters deep, is over 20 acres in extent, and is usually permanent. Flats are along the edges of open water, are seasonally flooded, and have pioneer vegetation such as willows or smartweed (Polygonum spp.).

Riverine System

Riverine Lower Perennial Open Water (R2OW) and Riverine Lower Perennial Beach-Bar (R2BB) are delineated along the Powder River. Lower Perennial streams have slow moving water, substrates of sand and silt, low dissolved oxygen levels, and well developed floodplains. Open water is delineated in the main channel where there is a permanent flow of water. Beach-bar is delineated on the sides of the main channel where old channels exist. Beach-bars are flooded during high water and are exposed during low water. The substrate is sand, silt or gravel and only pioneer vegetation is found on them. This vegetation is usually washed away during the next high water.

Wetland Values

The function of impoundments is to store water for cattle and sheep. Grazing is the main agricultural land use in this area because of low precipitation and shallow soils. Where farmland does exist, the principle crops of wheat, oats, barley, and hay are grown with dry land farming methods.

Intermittent wetlands are grazed by livestock if they are vegetated.

Water storage impoundments constructed for domestic livestock and used by local wildlife such as birds (meadowlark, horned lark), rodents (mice, voles), small herbiverous mammals (rabbits, hares), and fur-bearing predators (coyote, fox) may include these impoundments in their home territories and use them as their source of drinking water. In periods of drought, a single isolated impoundment may be valuable as the only source of water available for miles around.

Standing water present in intermittent wetlands during periods of shorebird migration is used by birds as resting and feeding areas. Waterfowl use larger open water impoundments or flooded intermittent lakes as migration habitat and breeding areas. Floodplains are used by whitetail deer for food and habitat.

Tongue River Reservoir is a fishing reservoir and is used by waterfowl for breeding and migration. It was built as a flood control structure and supplies water for agricultural irrigation.

Hanging Woman Creek and the Tongue River are rated as "high priority" fishery resources" by the Fish and Wildlife Service. This means these have "priority" habitat for highly valued species and/or outstanding habitat for less highly valued species (Stream Evaluation Map, Montana, 1980).

Wetland Loss and Vulnerability

Increased development in coal strip mining and its associated facilities has begun in Hardin SE. Low sulfur coal exists in vast deposits in eastern Montana and much of this coal occurs in Hardin SE. Coal mining operations currently in the planning state are expected to disturb thousands of acres by the end of this century.

In Hardin SE boundaries of known strippable coal incorporate a large number of intermittent lakes and impoundments which are in the Palustrine system. Wetlands will be lost if strip mining operations include them within their sites.

Many coal seams in Hardin SE are important aquifers. Disturbance of these aquifers during coal operations will reduce water quality. Increased erosion, sedimentation, and discharge of toxic wastes in ground water that is pumped from the mine will be detrimental to stream water quality and consequently ground water quality. Regional impact of mining on ground water table has not been determined.

Large scale surface mining will alter existing rock and soil patterns, which will change geochemical characteristics. Geochemistry is the vital factor controlling distribution of soil types, vegetation, water quality, and to some extent, air quality.

Petroleum and natural gas exploration will be developed faster in the future. However, where currently operating wells are situated near wetlands, the only disturbance appears in the immediate vicinity of the well. Intermittent lakes near wells show no evidence of disturbance.

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