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

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 wetland 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 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 the New Castle SW 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 Alexander Kosinski and Thomas Owens. Regional Wetland Coordinator is Charles Elliott, U. S. Fish and Wildlife Service, P. O. Box 25486, Denver, Colorado 80225.

Wetland delineation and classification for New Castle SW 1:100,000 wetland map was done on color infrared areial photographs. Most of this map was covered by NASA high altitude photography taken on May 2, 1975 at scales of 1:107,000 and 1:108,000. 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; this 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 located in Denver, Colorado, and whose address is on the previous page.

AREA DESCRIPTION

Bailey's Ecoregions

New Castle SW quadrangle falls into one province in Bailey's Ecoregions of the United States, 1978, which classifies lands 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. The northeast 12 percent of the map falls in the Wheatgrass-Needlegrass Section (3112L), with 88 percent occurring in the Grama-Needlegrass-Wheatgrass Section (3111L).

Hammond's Land-Surface Forms

Hammond's Land-Surface Forms systematically characterizes topography of the United States. New Castle SW is in the Interior Division (III), Upper Missouri Broken Lands Physical Subdivision (10). Ninety-three percent of the map is classed as Plains with Hills (III-10B3b) which has 50 to 80 percent of area gently sloping, local relief 300 to 500 feet, and 50 to 75 percent of gentle slope in lowlands. On the northern and western edges 7 percent is classed as Tablelands of Moderate Relief (III-10B3c) characterized by 50 to 80 percent of area gently sloping, local relief 300 to 500 feet, and 50 to 75 percent of gentle slope on upland.

Hydrologic Mapping Units

Hydrologic mapping units are part of an effort by the U. S. Geological Survey 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) which contains information on water data activities (Langford and Kapinas, 1979). All hydrologic mapping units are in the Missouri Basin Region (10). 10120105 in the southeast portion of the map covers 30 percent of the map, 10120102 in the southwest-central, central, and northeast central portions of the map covers 25 percent of the map. 10120101 in the northeast, north-central, and northwest portions of the map covers 35 percent of the map, 10180007 mapping unit in the southwest covers 7 percent, and 10120103 in the northeast

covers 2 percent of the map. 10090204 in the east central part of the map, 10120104 in the west-central portion of the map, and 10090202 in the northwest corner cover 1 percent.

Topography

New Castle SW'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; this 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 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 New Castle SW is sedimentary, consisting of alternating layers of sandstone, siltstone, and shale. The Lance Formation is the oldest exposed deposit in New Castle SW and was deposited late in the Cretaceous Period when a sea was shrinking eastward. As this sea was displaced eastward, it moved its associated alluvial and coal swamp deposits along with it. This formation borders the Fort Union Formation. Older Paleocene-age Fort Union Formation is exposed in the southwestern one-third of the map, while younger Eocene-age Wasatch Formation is characteristic of the remainder of the map.

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 temperature 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; these are often eroded into badland topography.

Where coal seam outcrops have ignited from lightning, spontaneous combustion, or manmade fires, beds of baked rock called clinker or "scoria" are found. Reddish clinker beds are sandstone and shale beds 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 and 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 Classification System.

Soils of New Castle SW 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 and often possess a limecarbonate (caliche) layer at shallow depths. The zone of altered bedrock is three feet or less below the surface with slopes having thinner soil cover and bedrock outcrops. Soils developed on steeply-sloping uplands and ridges are easily eroded and result in dissected, broken ground. Loamy soils derived from clinker beds 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. Soils on gently sloping uplands have moderate to high erodibility and moderate agricultural productivity. Near large streams, soils developed on alluvium are alkaline, have wind erodibility, and are subject to flooding.

Climate

New Castle SW 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 13 inches. Two-thirds of annual precipitation occurs between March and August in an average year. One-third occurs as snow, which annually averages 50 inches. Snowfall is generally well distributed through winter and spring, but December usually receives heaviest accumulations. Summer hailstorms occur and are capable of causing serious crop damage. Prevailing winds are from the northwest and have their highest velocities in spring.

Mean Monthly Temperature January	21.5°F
Mean Monthly Temperature July	73.0°F
Lowest Minimum Temperature January	-30.0°F
Highest Maximum Temperature July	105.0°F

WETLANDS

Community Descriptions

New Castle SW 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 shown on this map. These wetlands are classified as Palustrine Open Water (POWF), Palustrine Emergent (PEM), Palustrine Flat (PFL), or combinations of these. 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 during most years, provide a reliable source of water throughout the growing season. These wetlands have limited aquatic 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 (Scripus spp.).

Palustrine Emergent impoundments possess high densities of hydrophytic vegetation than do flats. Water regime influences species composition. 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 melt-water runoff, variability of flow from natural springs and seeps, and the unpredictability of thunderstorm recharge play an important role in water regime diversity in all three classes of impoundment wetlands.

Intermittent Wetlands

Intermittent wetlands are naturally occuring 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 scatteres over many 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 into basins by runoff from eroding shale scarps.

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 and creates a shallow basin as it settles. The basin collects more rainfall as it deepens, thus 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 substrate 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 ranged from intermittently through seasonally flooded.

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

Minor Types

Riverine Open Water (R2OW, R3OW) is mapped where the channel is large enough to delineate.

There is one example of the Lacustrine class on this map and consists of a large open water impounded area (L2OW).

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, wheat, oats, barley, and hay are grown with dryland farming methods. Livestock graze vegetated intermittent wetlands.

All streams in New Castle SW are rated as low-production trout waters; often incapable of sustaining a fishery (Wyoming Stream Fishery Classification, 1976). The Fish and Wildlife Service does not find any streams of even limited value in this quadrangle (Stream Evaluation Map, 1978).

Water storage impoundments constructed for domestic livestock use are also 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 for 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 are used by birds as resting and feeding areas. Waterfowl use seasonal and semi-permanent impoundments of flooded intermittent lakes for not only migration habitat but also for breeding areas.

The Wyoming Game and Fish Department's 1:500,000 scale big game Critical Habitat Overlay indicates a pronghorn antelope (Antilocapra americana) migration route roughly along Horse Creek east of its junction with Antelope Creek, veering northeast at the northern edge of the map as it moves toward Porcupine Creek.

Several Palustrine Flat (PFL) and Palustrine Emergent (PEM) impoundment wetlands are associated with this migration route. A second route is southeast of Pine Tree, Wyoming, between Simons Draw and Pine Tree Draw. This area has several Palustrine Emergent impoundment wetlands plus more than a dozen Palustrine Emergent intermittent lake wetlands. Another migration route exists northeast of Turnercrest in the vicinity of Bates Creek. This route is also associated with impoundment wetlands and intermittent lake wetlands. Southwest of New Castle SW, a fourth antelope migration route exists in association with wetlands.

Three separate whitetail deer (Odocoileus virginianus) year-long habitat zones are indicated as being present in the quadrangle, according to the Wyoming Game and Fish Departments 1:500,000 scale maps of wildlife distribution entitled Whitetail Deer-Thunder Basin (Sheets 1 and 2 of 4). These year-long habitat zones correspond exactly to various stream and river drainages in New Castle SW.

One habitat zone is along Box Creek and the eastern portion of Lightning Creek. This zone includes several Palustrine Emergent (PEM) and Palustrine Flat (PFL) wetlands.

Another whitetail deer year-long habitat zone occurs along Antelope Creek extending east of Ross, Wyoming to the eastern edge of the map. A number of Palustrine Emergent (PEM) and Palustrine Flat (PFL) impoundment wetlands are associated with this habitat zone.

Wetland Loss and Vulnerability

Increased development in coal strip mining and its associated facilities has begun in New Castle SW. Low sulfur coal exists in vast deposits in east-central Wyoming and much of this coal occurs in this quadrangle. Coal mining operations currently in the planning stage are expected to disturb thousands of acres by the end of this century.

In New Castle SW, boundaries of known strippable coal incorporate a large number of intermittent wetlands and impoundments which are in the Palustrine System. Wetlands included in strip mining operations will be destroyed.

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, and water quality.

Many coal seams in New Castle SW 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 pumped from the mine will be detrimental to stream water quality and consequently ground water quality.

A large portion of the length of R71W (Range 71 West) in the northern part of the New Castle SW contains known strippable coal reserves. Within the zone of known strippable coal reserves occurs a pronghorn antelope migration route, and several year-long habitat areas for whitetail deer, both having wetlands associated with them. If this area is strip-mined, the migration route and the habitat areas, along with the associated wetlands, will be vulnerable to loss.

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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