A

COLORADO WETLAND INVENTORY
U. S. FISH AND WILDLIFE SERVICE
1:100,000 MAP NARRATIVE REPORT
-DENVER NE-

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, 1978, to delineate and classify photointerpretable wetlands within the eastern five-sevenths of Colorado.

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 Colorado wetland maps are available at the U. S. Fish and Wildlife Service's Regional Office located in Denver, Colorado. An integral part of all final wetland maps is the completion of narrative reports for each 1:100,000 quadrangle inventoried. The following narrative report provides both basic and specific data which aids the user in understanding not only the general area of the Denver NE quadrangle but also representative details of its wetland habitat.

MAP PREPARATION

Contractor for this wetland inventory was Colorado Division of Wildlife, 317 West Prospect, P. O. Box 2287, Fort Collins, Colorado 80526. Richard Hopper was the contract officer. Photo interpretation was done by the subcontractor, Colorado State Forest Service, Foothills Campus, Colorado State University, Fort Collins, Colorado 80523. Photo-interpreters were Thomas Owens, Charles Storrs, and Alexander Kosinski. Preparation of this narrative report was completed by Thomas Owens. Regional Wetland Coordinator was Charles Elliott, U. S. Fish and Wildlife Service, Denver Federal Center, P. O. Box 25486, Denver, Colorado 80225.

Wetland delineation and classification for Denver NE 1:100,000 quadrangle was done on 1:80,000 black and white aerial photographs taken in June and July 1975, and July 1976. Photography covered 100 percent of the quadrangle. Wetland classification was done in accordance with Cowardin, et al., December 1979. Specific mapping conventions developed at National Wetland Inventory headquarters were used to assist in photo interpretation. Field checking for the quadrangle was done February 23, 1979.

Map users are cautioned that mapping with aerial photography has limitations. Wetlands are identified and classified through stereoscopic examination of photography on the basis of tone, texture, pattern, site, size, local ecology, and cultural patterns. Aerial photographs reflect conditions during the year and season they are taken. In addition, the 1:80,000 black and white photography used on this project was photographed for purposes other than wetland mapping. The small scale precludes delineating very small wetlands (less than 1/4 acre) and narrow linear wetlands (less than 15 feet wide). Black and white emulsion makes distinguishing between classes of vegetation (and non-vegetation) difficult. Some imagery was not photographed during the best season for wetland delineation and classification. If photographed too early or too late in the season, moist (dark) tones are not evident. The photography was four to five years old when it was interpreted and land use changes have occurred, especially in the rapidly growing Denver area.

Any discrepancies noticed regarding wetland omissions, inclusions, or errors should be given to the U. S. Fish and Wildlife Service Regional Wetland Coordinator who is located in Denver, Colorado, and whose address is on the previous page.

Special Mapping Problems

This quadrangle has many small depressions scattered across the plains. There are two types of depressions: wetlands with emergent species and non-wetlands without emergents. Non-wetland depressions without emergents are often dark in tone and conspicuous on the imagery, which is due to slightly more moisture and lusher vegetation than surrounding areas, but have no lighter toned ring. Depressions with wetland species (usually) have a lighter toned ring in them which shows the extent of inundation after rain. Depressions receive water from local summer thunderstorms, are dry most of the time, and are not part of drainage systems. These wetlands are locally important, but are often difficult to see on the imagery, unless flooded after a thunderstorm.

AREA DESCRIPTION

Bailey's Ecoregions

Denver NE 1:100,000 quadrangle falls into one province in Bailey's Description of the 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-Shortgrass, Grama-Buffalo Grass Section (3113L) and is characterized by bunched short grasses, with scattered trees and shrubs.

Hammond's Land-Surface Forms

Denver NE falls into two of Hammond's Land-Surface Forms which systematically characterizes United States' topography (Ecoregions and Land-Surface Form Map, 1975). Both Land-Surface Forms are in the Interior Division (III) and Rocky Mountain Piedmont Subdivision (13). Covering 20 percent on the southern edge are Tablelands with Moderate Relief (III-13B3c) which have 50 to 80 percent of area gently sloping, local relief 300 to 500 feet, and 50 to 75 percent of gentle slope on upland. The rest of the quadrangle is in Irregular Plains (III-13B2b) characterized by 50 to 80 percent of area gently sloping, local relief 100 to 300 feet, and 50 to 75 percent of gentle slope in lowland.

Hydrologic Mapping Units

Five hydrologic mapping units are found in Denver NE (Hydrologic Unit Map of Colorado, 1974). Hydrologic units are part of an effort by the United States Geological Survey to provide a series of uniform, Nationally consistent maps which accurately delineate hydrographic boundaries for Federal and State water resource agencies. Units are designated by eight-digit numbers tied to a computer file (Catalog of Information on Water Data) which contains information on water data activities (Langford and Kapinas, 1979). All units in Denver NE are in the Missouri Region (10). 10190002 covers 5 percent in the southwestern corner, while 10190004 covers 1 percent on the western edge. 10190003 covers 50 percent in the west, 10190010 covers 18 percent in the east-central portion of the quadrangle, and 10190011 covers 26 percent on the eastern edge.

Geography

Denver NE is covered by plains which have level to rolling topography and mesas scattered through the quadrangle's southern portion. Elevations are from 5,000 to 6,000 feet and vegetation is short grass prairie with cottonwoods and willows along streams.

The South Platte is the quadrangle's major river. It flows to the northeast from the western edge. There are several large reservoirs in the Denver area which receive water from streams flowing from the mountains. These reservoirs store water for municipal, industrial, and agricultural users, serve as wildlife habitat, and are focal points for recreation.

Denver and its suburbs lie on the western edge of the quadrangle. Denver is the governmental, financial, and business center of Colorado and adjoining states. The rapidly growing metropolitan area is covering farmland and ranchland and increasing its water demands.

Geology

Denver NE is covered with sedimentary deposits of different ages washed down from the mountains. The oldest are late Cretaceous (70 to 135 million years ago) and early Tertiary (3 to 70 million years ago) sandstone, shale, mudstone, conglomerate, and local coal beds which lie in the western and southern portions of the quadrangle. After the Laramide Orogeny uplifted the Rocky Mountains 30 million years ago, more sediments were deposited on the plains of Denver NE. Tertiary sandstone and shale are extensive. Large areas of Denver NE are covered by Quaternary (present to 3 million years ago) deposits of gravel and sand which were washed down from the mountains during glacial melting. Quaternary eolian deposits consisting of dune sand and silt are extensive. Broad areas along streams consisting of modern alluvium were deposited by the rivers (Chronic and Chronic, 1972; Tweto, 1979).

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, et al.). 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.

Two major wetland soil types are found in Denver NE: soils associated with drainages and soils associated with flood-irrigated meadows.

Wetland soils in drainages vary greatly. These soils range in texture from gravels and sands to loamy clays, in permeability from excessively drained to impermeable. In the western portion of the quadrangle where streams have a more continuous flow of water insured by reservoirs, wetland soils in drainages are generally flooded every year, have textures ranging from sandy to loamy, and have water tables less than 3 feet from the surface. They are used for pastures where possible. Native vegetation includes willows, cottonwoods, grasses, sedges, rushes, and in low pockets cattails. Further east, where streams are intermittent, wetland soils are sandy and gravelly, unstable, excessively drained, subject to occasional flooding, and have a low water table. Native vegetation includes cottonwoods and annual forbs (Larsen and Brown, 1971; Sampson and Baber, 1974).

Flood-irrigated soils are found near streams or reservoirs where there is a ready supply of water. These soils may not have been wetland soils originally, but since they have been flooded the water table is less than 3 feet from the surface and they support tall grasses, sedges, rushes and cattails in low pockets (Larsen and Brown, Sampson and Baber).

Climate

Denver NE's climate is semi-arid and continental, with cold dry winters and cool, relatively dry summers. Denver receives 15.5 inches of precipitation annually, 62 inches of this coming as snow. January's average maximum temperature is 44.0°F, average minimum is 16.8°F. July's average maximum temperature is 87.8°F, average minimum is 58.8°F (Benci and McKee, 1977). The growing season is 140-155 days (SCS data, 1978).

WETLANDS

Community Description

Lacustrine System

One lake type is found within Denver NE which is reservoir (L1OWKZ) (information in this section comes from field notes taken February 23, 1979). Reservoirs are found on the western edge of the quadrangle. Water levels fluctuate as much as 30 feet and the areal extent of the open water changes significantly during the year because of filling in spring with snowmelt and drawing down during summer for agricultural irrigation. The exposed shoreline is composed of rocks, gravel, sand, and mud. Reservoirs normally retain some water throughout the year.

Riverine System

On the plains permanent streams are called lower perennial rivers (R2OWZ). Lower perennial streams are characterized by slower-moving water, sand or mud bottoms, well-developed flood plains, and lower dissolved oxygen concentrations.

Another type or river delineated is irrigation canal (R2OWKZ, R2OWKY, R4SBKY). Canals large enough to be delineated (over 15 feet across) are feeder canals; that is, those that carry water to and from reservoirs and to irrigation ditches. Canals occasionally flow year round; their peak flow is during the growing season to get water to irrigated fields.

A final stream type delineated is intermittent stream (R4SBW). This stream type is the most common stream type on the eastern plains where there is no permanent water source to supply moisture. Intermittent streams have a sandy substrate that is very well drained. They flow after snowmelt and after local summer thunderstorms.

Palustrine System

An important palustrine type is flood-irrigated meadow (PEMKC). Flood-irrigated meadows are found along streams and below springs.

Ditches were built along the meadows' upper edges to allow water to flow from upper sources and spill out over the meadows. Standing water can be found for short periods early in the growing season; soil remains moist for extended periods through the growing season. Flood-irrigated meadows have not been cultivated and vegetation is native. Meadows are hayed or grazed by cattle. Vegetation includes Juncus arcticus, Eleocharis acicularis (species identification was according to Harrington, 1955; Fassett, 1957; Weber, 1976; Nelson, 1977), along with grasses and forbs. Many flood-irrigated fields are cultivated; these were not delineated.

Scrub/shrub and scrub/shrub-emergent areas are found along streams in this quadrangle (PSSW, PSSY, PSS/EMW, PSS/EMY). The water regime is dependent upon the amount of water flowing in the stream. In the western portion, where water is relatively plentiful, the water regime tends toward the seasonal regime. In the east, where moisture is scarce, water regimes are drier. Shurb species are Salix spp.; understory emergents include Juncus arcticus, Carex spp., Eleocharis acicularis, as well as grasses and forbs.

Forested wetlands (PFOW, PFOY, PFO/EMW, PFO/EMY, PFO/SSW, PFO/SSY) are found throughout the quadrangle along streams. The water regime situation is the same as that of scrub/shrub areas. Tree species include Populus sargentii, Salix spp. Understory species are the same as those mentioned with scrub/shrub-emergent areas.

On the plains numerous areas (PFLW, PEMW) are delineated which are small dugouts or impoundments constructed to supply water to livestock. These flats are dependent upon local precipitation for their water supply and do not receive enough moisture to remain wet year round. They often have saline soils. Vegetation consists of sparse stands of Distichilis spicata, Sporobolus airoides, forbs, and grasses.

Intermittent depressions (PEMW) are also delineated on the plains that are the result of: wind deflation or blowouts, solution-subsidence (leaching water removes limestone and subsequent deflation), or differential compaction of Tertiary sediments of the plains (Thornbury, 1965). Delineated depressions are generally a few feet in depth and from one hundred to several hundred feet across. There is not sufficient moisture in spring after snowmelt to supply them with moisture; they are filled with water after local summer thunderstorms and hold water for a few days. They are dry most of the time, but do receive enough moisture to support stands of Eleocharis spp., as well as upland vegetation.

Wetland Values

An important wetland value is flood-irrigated meadow production of hay for cattle (information in values section is from Hopper, 1980).

Flood-irrigated hay meadows produce hay at a much higher rate than dryland meadows do. A hay meadow will consistently produce 4,000 pound per acre annually of air-dried herbage, while the best upland range sites will produce is 1,800 pounds per acre in a good year (Sampson and Baber). Wildlife also benefit from wet-hay meadows: ducks nest in them and shorebirds use them for forage and cover.

Reservoirs around Denver are part of a major winter concentration area for 50,000 to 70,000 Canada geese. These wetlands are part of wintering mallard range as well as being stopovers on a migratory route and summer habitat for many species of waterfowl and shorebirds.

Reservoirs were built to store water for industrial, municipal, and agricultural uses. They are also used for fishing, camping, and boating; urban reservoirs are very popular. Cherry Creek Reservoir is rated as a major fishing resource (Stream and Lake Evaluation Map, Colorado 1979).

Over 36,000 acre-feet per year of water is diverted from western slope streams into the South Platte River where it runs through Denver NE. These diversions increase the flow of water in the South Platte and its water supply to reservoirs and users (League of Women Voters of Colorado, 1975).

Forested wetlands along streams are important wildlife habitat. Whitetail deer and bobwhite quail use these areas. Semi-permanently flooded cattail stands provide critical habitat for pheasants.

On the eastern plains intermittent depressions, streams, and windmills are important for wildlife such as antelope, and livestock as the only water sources in this semi-arid region.

Wetland Loss and Vulnerability

The Denver urban area is growing at a tremenedous rate. Rural land is being developed for residences, businesses, and industry. Wetlands are being lost in this urbanization.

Increased population in the Denver region will have an effect on wetlands in other quadrangles. Urban water users can afford higher water costs than agricultural users can, and so financially pressed ranchers are selling their water rights to Denver area cities. Water is being diverted from flood irrigation for agriculture, especially in South Park. Loss of water for irrigated fields reduces wet meadow and scrub/shrub habitat, diminishing its productivity for agriculture and wildlife.

Interbasin water diversion has both beneficial and detrimental effects. Recipients of diverted water have increased stream flow and increased water supply for urban and agricultural users, with attendant benefits for wetlands and wildlife. On the other hand, basins that lose water incur decreased stream flow and decreased water supplies for urban and agricultural users, decreasing water supplies to wetlands, reducing their benefits for wildlife.

REFERENCES

Bailey, Robert. 1978. Description of the Ecoregions of the United States. USDA Forest Service. Intermountain Region. Ogden, Utah. 77pp.

Benci and McKee. 1977. Colorado Monthly Temperature and Precipitation Summary for Period 1951-1970. Climatology Report 77-1. Department of Atmospheric Science. Colorado State University. Fort Collins, Colorado.

Chronic, John and Halka. 1972. Prairie, Peak, and Plateau. Colorado Geological Survey Bulletin 32. 126pp.

Cowardin, Carter, Golet, Laroe. 1979. Classification of Wetland and Deep-Water Habitats of the United States. USDI Fish and Wildlife Service, National Wetland Inventory. St. Petersburg, Florida. 100pp.

Fassett, Norman. 1957. A Manual of Aquatic Plants. University of Wisconsin Press. Madison, Wisconsin. 405pp.

Fish and Wildlife Service Staff. 1979. Stream and Lake Evaluation Map, State of Colorado. USDI Fish and Wildlife Service. Salt Lake City, Utah.

Geological Survey Staff. 1974. Hydrologic Unit Map of Colorado. USDI Geological Survey. Reston, Virginia.

Harrington, H. D. 1955. Manual of Plants of Colorado. Swallow Press. Chicago. 666pp.

Hopper, Richard. 1980. Personal Communication.

Komarkova, Vera. 1979. Alpine Vegetation of Indian Peaks Area, Front Range, Colorado. J. Cramer. Germany. 891pp.

Larson, Lynn S. and Brown, Joseph B. 1971. Soil Survey of Arapahoe County, Colorado. USDA Soil Conservation Service. 77pp.

League of Women Voters of Colorado. 1975. Colorado Water. Denver, Colorado. 33pp.

National Wetland Inventory Staff. 1975. Ecoregions and Land-Surface Form Map for Denver 1:250,000 Quadrangle. USDI Fish and Wildlife Service National Wetland Inventory. St. Petersburg, Florida. 100pp.

Nelson, Ruth. 1977. Handbook of Rocky Mountain Plants. Skyland Publishers. Estes Park, Colorado. 331pp.

Sampson, John L. and Baber, Thomas G. 1974. Soil Survey of Adams County, Colorado. USDA Soil Conservation Service. 72pp.

Soil Conservation Service Staff. 1978. Temperature Extremes and Freeze Data. USDA Soil Conservation Service. Fort Collins, Colorado.

Thornbury, William D. 1965. Regional Geomorphology of the United States. John Wiley and Sons. New York.

Tweto, Ogden. 1979. Geologic Map of Colorado. USDI Geological Survey. Denver, Colorado.

Weber, William. 1976. Rocky Mountain Flora. Colorado Associated University Press. Boulder, Colorado. 479pp.