# COLORADO WETLAND INVENTORY
# U. S. FISH AND WILDLIFE SERVICE
# 1:100,000 MAP NARRATIVE REPORT
# -DENVER 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, 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 Wildilfe 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 SE 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. Photointerpretation was done by the subcontractor, Colorado State Forest Service, Foothills Campus, Colorado State University, Fort Collins, Colorado 80523. Photointerpreters were Thomas Owens 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 delineations and classification for Denver SW 1:100,000 quadrangle was done on 1:80,000 black and white aerial photographs taken in June and September 1975, June and September 1976, and October 1977. 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 photointerpretation. Field checking for the quadrangle was done on September 5, 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 that was 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 Front Range 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.

## AREA DESCRIPTION

### Bailey's Ecoregions

Denver SE 1:100,000 quadrangle falls into two provinces 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 data. The quadrangle's northeastern corner falls into the Great Plains Shortgrass Province, Grama-Buffalo Grass Section (3113L). This province is characterized by bunched short grasses, with scattered trees and shrubs. It covers 3 percent of the quadrangle. The balance (97 percent) is in Rocky Mountain Forest Province, Ponderosa Pine, Douglas-Fir Section (3113M). This province is characterized by well-marked vegetation zones, whose distribution is controlled by altitude and latitude.

### Hammond's Land-Surface Forms

Denver SE falls into four of Hammond's Land-Surface Forms, which systematically characterizes the topography of the United States (Ecoregions and Land-Surface Form Map, 1975). The northeastern corner is in the Interior Division (III), Rocky Mountain Piedmont Subdivision (13), Irregular Plains (III-13B3b), which has 50 to 80 percent of area gently sloping, local relief 100 to 300 feet, and 50 to 75 percent of gentle relief in lowland. This form covers

3 percent of the quadrangle. On the eastern edge are Tablelands with Moderate Relief (III-13B3c). This form has 50 to 80 percent of area gently sloping, local relief 300 to 500 feet, and 50 to 75 percent of gentle slopes on upland, and covers 2 percent of the quadrangle. The balance is in the Rocky Mountain Division (IV), Southern Rocky Mountain Subdivision (14). In the southwestern corner is Plains with Low Mountains (IV-4B5b), which is characterized by 50 to 80 percent of area gently sloping, local relief 1,000 to 3,000 feet, and 50 to 75 percent of gentle slope on lowland. This form covers 29 percent of the quadrangle. The balance (66 percent) is covered by High Mountains (IV-4D6) which has less than 20 percent of area gently sloping and local relief over 3,000 feet.

## Hydrologic Mapping Units

Denver SW has four hydrologic mapping units (Hydrologic Unit Map of Colorado, 1974). Hydrologic units are part of an effort by the U. S. Geologic Survey to provide a series of uniform, Nationally consistent maps which accurately delineates hydrographic boundaries for Federal and State water resource agencies. Units are designated by eight-digit numbers tied to computer files (Catalog of Information on Water Data) which contains information on water data activities (Langford and Kapinas, 1979). In the northeastern corner 2 percent is covered by 14010002, which is in the Upper Colorado Region. In the southeastern corner 1 percent is covered by 11020001, which is in the Arkansas-Red-White Region. The balance is in the Missouri Region. In the southwest 44 percent of the quadrangle is covered by 10190001, while 53 percent in the northeast is covered by 10190002.

## Geography

South Park is in the southwestern corner of Denver SW. South Park is a high, flat to hilly region that is treeless, except on ridgetops. It is from 5 to 20 miles wide, east to west, and is 25 miles long from its northern edge to the southern boundary of the quadrangle. Its elevation runs from 9,000 to 10,000 feet above sea level. Vegetation consists of brush, grasses, and forbs, along with emergent vegetation and willows along river bottoms, and conifers and aspen on ridgetops.

In the northeastern corner is a small section of plains. Plains' elevation is from 5,000 to 6,000 feet and topography is level to rolling. Vegetation is short grass prairie with cottonwoods and willows along streams.

The rest of the quadrangle is mountains, which are part of the Front Range. Topography is rolling to steep with elevations over 13,000 feet. There are a few precipitous alpine areas in the north-

western corner, where the Continental Divide runs through, but most mountainous areas are forested with conifers and aspen. On lower south-facing slopes forest gives way to brush and short grasses. All three forks of the South Platte River (North Fork, Middle Fork, and South Fork) flow through Denver SW. These streams are important water sources for the Denver region.

Ranching is an important economic activity, especially in South Park. Development of mountain properties into vacation homesites is an increasing activity since this quadrangle is close to the populous Denver-Colorado Springs area. Other benefits the mountains provide are watershed, recreation, wildlife, and forestry.

## Geology

The Rocky Mountains were uplifted during the Laramide Orogeny 60 to 70 million years ago at the start of the Tertiary Period. Uplifting forced older, underlying rocks away in other areas. The result was exposure of Precambrian rocks (570 million years ago plus) over most of the mountains (Chronic and Chronic, 1972). The southeastern corner of Denver SW is part of the Pikes Peak Batholith, a huge outcrop of granite centered around Pikes Peak to the south. On the northern and western flanks of the Pikes Peak batholith are other Precambrian rocks: gneisses, schists, and migmatites (Tweto, 1979).

Outwash from the mountains was deposited in adjacent lowlying areas--South Park and the eastern plains. These areas are covered with Tertiary sandstones, conglomerates, and shales as well as Qauternary (three million years ago to the present) glacial outwash such as gravels and alluvium (Tweto).

Above 8,000 feet glaciers were active during the last glacial period creating spectacular high mountain scenery in the northwest corner of Denver SW. Glaciers carved steep cirques and U-shaped valleys which were filled with terminal moraines as glaciers retreated. This process left stair-stepped valleys which were filled in by strings of lakes (Owens, 1980). As glaciers melted swollen streams cut deeply across the uplifted ridges and carved deep valleys and canyons (e.g. South Platte River) (Chronic and Chronic, 1972).

Gold mining occurred near Fairplay, beginning in 1859. A dredge was built in 1922 to process gravel along the South Platte and operated until 1952.

## Soils

Soil is an important element of wetlands; it is one criterion used to define wetland. "The substrate of wetlands is predominately

undrained hydric soil" (Cowardin, 1979). The National Wetland Inventory, in cooperation with the U. S. Soil Conservation, is preparing a list of hydric soils to accompany the Cowardin, et al., wetland classification system.

There is no detailed soil survey for alpine soils in this quad. However, a survey (Retzer, 1962) was completed for an alpine area to the north that has similar geology to Denver SW's alpine areas, and so the information can be used in this quadrangle.

Hard alpine bedrock which is resistant to erosion combines with steep slopes and short growing season to create shallow, rocky soils. Shallow soil and coarse bedrock allows snowmelt water to flow underground, creating numerous seeps and springs, and few alpine streams (Owens, 1980).

Wetland soils above timberline include peat where terrain is level and water can pond. Chemical action in peat produces fine grained substrate which is poorly drained. Peat, which is 10 to 20 inches thick and acidic, is formed from herbs and woody vegetation. Wet soils flow down slopes. Where the slopes level out and soil flow slows, the soil thickens, which further ponds water. Other alpine wetland soils are associated with areas below snowfields and springs. These poorly drained soils are on slopes from 5 to 70 percent, and receives water most of the growing season (Retzer).

Below timberline wetland soils are found along streams and in drainages. These soils are formed from alluvial and outwash materials and are variable in texture. They are subject to flooding for brief periods of time and the water table is near the surface. They are deep, poorly drained, nearly level soils (Heil, et al., 1977).

Plains' soils are deep and level to rolling. Soils associated with river bottom wetlands are described as clayey, poorly drained soils with high water tables. Soils associated with flood-irrigated meadow wetlands are poorly drained, deep clays. Some have high water tables and some are very alkaline (Williams, et al., 1978).

## Climate

As elevation increases, temperatures become cooler and precipitation increases; however, climate varies widely within short distances due to steep topography. Change in climate can be noted by the difference between Cheeseman Reservoir (elevation 6875 feet) and Bailey (elevation 7733 feet). Elevation in this quadrangle rises above 13,5000 feet and climate becomes relatively more severe accordingly.

At Cheeseman Reservoir, average annual precipitation is 15.8 inches, with 61 inches of snow. July's average maximum temperature is 85.0°F, average minimum temperature is 48.5°F. January's average maximum

is 46.3°F, average minimum is 10.5°F. The average growing season is 120 days (SCS data, 1978).

Bailey receives 16 inches of precipitation per year, with 71 inches of snow. July's average maximum temperature is 76.5°F, average minimum is 37.3°F. January's average maximum is 41.9°F, minimum is 9.5°F (Benci and McKee). Average growing season is 105 days (SCS data).

## WETLANDS

### Community Description

#### Lacustrine System

Two lake types are found within Denver SW (information in this section comes from field notes taken September 5, 1979). One type is alpine lake (L1OWZ). Alpine lakes are deep, cold, and above timberline. They are found below glacial cirques and in glacial valleys above terminal moraines. Alpine glacial valleys have little soil and vegetation; as a result alpine lakes have low fertility. Alpine lakes have low algae populations and few fish. Shorelines and bottoms are rocky with little vegetation. Often alpine lakes are less than 20 acres, but due to their rocky shores, they are classed as lakes. Their water regime is permanent, and comes from snowmelt.

The second lake type found within Denver SW is reservoir. Reservoirs are found throughout the quadrangle from plains to timberline. Water levels fluctuate as much as 30 feet 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 do retain some water throughout the year.

#### Riverine System

In the mountains, most streams delineated are fast-flowing, permanent streams (R3OWZ), and called upper perennial rivers. These streams are characterized by a high gradient, bottoms with rocks, cobble, or gravel, and high dissolved oxygen concentrations.

On the plains and in South Park, these streams become lower perennial rivers (R2OWZ). Lower perennial streams are characterized by slower-moving water, sand or mud bottoms, and lower dissolved oxygen concentrations.

Another type of river delineated is irrigation canal (R2OWKY, R2OWKZ, R4SBKY). Canals that are 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 sometimes flow year round; generally they flow during the growing season to get water to irrigated fields.

A final stream type delineated is intermittent stream (R4SBW). This stream type is delineated on the eastern plains where it is large enough to delineate (over 15 feet across). In the mountains, Intermittent streams are too small to map. Intermittent streams have a sandy substrate that is very well drained. They flow during snowmelt and after local summer thunderstorms.

Palustrine System

Small artificial impoundments (POWZ) are common on this quadrangle. These impoundments are found in small drainages and valleys and are used to provide water for flood irrigation and livestock. The water regime is permanent; however, water is drawn down through the growing season for irrigation. Impoundments are often found with flood-irrigated fields.

Another type of impoundment is beaver pond (POWF). Beaver ponds are important wetlands found on small mountain streams and drainages. Beaver dams back water up, creating open water habitat and large scrub/shrub-emergent areas (PSS/EMC, PSS/EMW).

Vegetation in scrub/shrub-emergent areas includes Salix spp., Alnus spp., Juncus arcticus, Carex scopularum, Carex scoparia, Eleocharis acicularis, Scripus americanus, Typha spp. (species identification was according to Harrington, 1955; Fassett, 1957; Weber, 1976; Nelson, 1977). Water regimes become drier farther from ponds. Extensive areas are affected by beaver dams. Long strings of dams, as many as 20 or 30 in one areas, were built, creating many ponds and long strings of scrub/shrub-emergents.

Other stands of scrub/shrub-emergents are associated with undammed streams and also drainages below flood-irrigated fields. Often these scrub/shrub-emergent areas are flooded during spring runoff and remain moist most of the growing season. Species are the same as beaver dam associated scrub/shrub-emergent areas. Extensive stands of shrubs are found in broad bottoms of glacier carved valleys. Slow, meandering streams, beaver ponds, and the shrub areas create diverse wetland habitat.

Palustrine wetlands are associated with alpine lakes in valley bottoms (PEMC, PEMB, PSS/EMB). The water table is high due to nearness of lakes. Vegetation includes Salix spp., Betula glandulosa, Caltha leptosepala, Anemone spp., Eleocharis spp., Carex spp.

An important wetland type is flood-irrigated meadow (PEMKC). Flood-irrigated hay meadows are found along streams and below springs. Extensive flood-irrigated meadows are found in South Park. 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. Hay meadows have not been cultivated and vegetation is natural. Meadows are hayed or grazed by cattle. Vegetation includes Juncus arcticus, Eleocharis acicularis, along with grasses and forbs. Note that many flood-irrigated fields are cultivated; these were not delineated.

Natural wet meadows (PEMB) are found below mountain seeps and springs. These meadows remain moist for a large part of the growing season, but because they are sloped, water does not stand on them. Vegetation includes Carex scopularum and Eleocharis acicularis.

Above timberline, steeply sloped wetlands (PSS/EMB) occur below snowfields and springs which supply water throughout much of the growing season. Moisture flows underground through the coarse alpine soils which keeps these areas wet. These wetlands are common and extensive above timberline. Characteristic vegetation is dwarf willows and emergents. Species include Salix glauca, Salix planifolia, Carex nigricans, Carex drummondiana, and Juncus arapahoensis (Komarkova, 1979).

Forested wetlands (PFOW, PFOC, PFO/EMW, PFO/EMC, PFO/SSW, PFO/SSC) are found throughout the quadrangle along streams, in drainages, and near beaver ponds. Tree species include Populus sargentii on the plains and Populus angustifolia in the mountains. Understory species are the same as those mentioned with beaver dam scrub/shrub-emergent areas.

On the plains a few intermittent wetlands were delineated (PFLY). These basins do not receive enough water to remain wet year round. They often have saline soils. Vegetation consists of forbs and grasses.

## Wetland Values

South Park has large areas of flood-irrigated hay meadows which are important for wildlife and livestock (information for values section is from Hopper, 1980). Ranchers cut hay from hay meadows to feed cattle, while elk feed on haystacks in winter. There is a sizable duck population in South Park that use the wet meadows for breeding. Species include mallards, green-winged teal, cinnamon teal, and pintail. Shorebirds are common in hay meadows. Beaver are found in willow bottoms below hay meadows.

There are two large reservoirs in Denver SW's portion of South Park: Antero and Tarryall Reservoirs. Antero Reservoir is rated as a major coldwater fishing reservoir (Stream and Lake Evaluation Map, Colorado, 1979). Both reservoirs are breeding areas for Canada

geese, and pelicans were observed on Antero Reservoir (field notes, September, 1979). Antero Reservoir is an important duck molting area. No waterfowl winter in South Park because it is too high and cold. Both reservoirs form part of the water supply, for Denver and its suburbs.

Several major coldwater fishing streams flow through Denver SW (Stream and Lake Evaluation Map, Colorado). They are Tarryall Creek, Michigan Creek, South, Middle, and North Forks of the South Platte. These streams also form part of the Denver metro area water supply.

A major bighorn sheep herd in Colorado is found in the Tarryall Mountains. Lungworm has reduced their numbers. A good herd is found in the Rampart Range in the southeastern corner.

Alpine wetlands have several functions. Colorado mountains receive high amounts of snow in winter. When the spring melt begins, tremendous volumes of water flows off the mountains. Wetlands act as sponges, absorbing some of the meltwater, reducing flood danger in the spring and spreading runoff through the growing season. Ptarmigan and bighorn sheep use alpine wetlands for food and cover. Alpine lakes are popular fishing, camping, and hiking.

Below timberline, blue grouse use willow draws for food and cover. Beaver dam small streams, creating open water and shrub areas. Mallards and green-winged teal use beaver ponds for nesting.

The gold dredge near Fairplay required large amounts of water to process gravel. The South Platte supplied the water.

## Wetland Loss and Vulnerability

Wetland loss is a serious problem in South Park. Ranchers have been using water from creeks to spread water over their meadows to grow hay. As was discussed earlier, wet meadows are important for many types of wildlife. Denver area cities have been buying water rights from ranchers for municipal water uses at much higher prices than ranchers could ever make from raising cattle. These past and future losses of wet meadows will reduce agricultural and wildlife Productivity.

Subdividing mountain lands into small plots for vacation homes for Denver area people is a big enterprise in Denver SW. This process increases the number of people in the mountains and preserts several problems to wetlands. Increased road construction and house construction fills in and destroys wetlands. Wells are dug to provide water for the new houses, this reduces the supply of ground water to the wetlands. Increased human activity disturbs wildlife in the mountains.

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# USER REPORT: DENVER NE, SE, COLORADO NATIONAL WETLANDS INVENTORY MAPS

## A. INTRODUCTION

The U.S. Fish & Wildlife Service's National Wetlands Inventory is producing maps showing the location and classification of wetlands and deepwater habitats of the United States. The Classification of Wetlands and Deepwater Habitats of the United States by Cowardin et al. is the classification system used to define and classify wetlands. Photo interpretation conventions, hydric soils lists and wetland plant lists are also available to enhance the use and application of the classifications system.

## B. PURPOSE

The purpose of the notes to users is threefold: (1) to provide localized information regarding the production of NWI maps, including specific imagery and interpretation discussion; (2) to provide a descriptive crosswalk from wetland codes on the map to common names and representative plant species; and (3) to explain local geography, climate, and wetland communities.

## C. STUDY AREA

### Geography:

The study area covered by Denver NE, SE base maps is located in east central Colorado (see Appendices). Bailey (1980) divides the study area into two Provences, the Great Plains-Shortgrass Steppe Provence and the Rocky Mountain Forest Provence. The Cherry Creek Watershed area comprises the Great Plains-Shortgrass Steppe Provence. This accounts for approximately 85% of the study area. The Rampart Range, located in the southwestern section makes up the remaining area.

The study of the Cherry Creek Watershed is the basis for this project. Cherry Creek flows from its headwaters in the Black Forest north into Cherry Creek Reservoir. Wetlands in the watershed are found in basins, below springs, along rivers and around impoundments. These areas are being threatened by potential urban expansion and agricultural development.

Basin and springfed wetlands can also be found throughout the study area. These are also decreasing in size or disappearing due to development. Relief in the drainage area ranges from just under 6,000 feet to over 7,000 feet.

The Rampant Range to the southwest comprises the remaining mapping area. Streams in these mountains flow west to east and some beaver activity is present. Elevations here range from 6,500 feet to over 9,500 feet.



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Climate:

The climate of the Cherry Creek Watershed is of a semiarid, continental type. Winters are cold and dry, while summers are cool and relatively dry. Although most of the rainfall occurs in spring and summer evapotranspiration rates start to increase rapidly in early May. By mid July this rate exceeds the amount of moisture received as rain. Most of the precipitation comes from moisture brought in from the east. Prevailing winds from the west lose most of its moisture in passage over the high mountains and contributes only a small part of the precipitation. Rainfall amounts vary from 15-20 inches.

Precipitation in the Rampart Range falls mainly in the winter. The base of these mountains receive only 10-20 inches of rainfall. At the higher elevations precipitation increases to 40 inches with most of this being snow.

Vegetation:

Vegetation in the Cherry Creek area is made up of a mixture of short grasses. These grasses can be found in wet meadows, draws and along streams. Willows are found in draws and lining streams. A few cottonwoods can still be found along major creeks. Sagebrush and upland grasses dominate the drier areas.

The mountains contain a variety of vegetation. Species of trees in these forests are ponderosa pine and Douglas-fir. Several variety's of scrub oak can also be found. Grass mixed with sagebrush often covers the ground under open ponderosa pine forest.

Soils:

Differences in physical, chemical, and mineralogical properties of material have influenced soil formation in the Cherry Creek area. The four soil orders found here are the Entisols, Aridisols, Mollisols and the Alfisols. Sandy wet alluvial land can be found along the major drainageways in the northern part of the area. Loamy alluvial land can be found in swales or on flood plains of smaller drainages. Sandy alluvial land can be found in broad swales and on small drainageways of sandy uplands. In the south loamy wet alluvial land can be found in swales and on creek bottoms.

In the mountains soils range from Mollisols and Alfisols in the higher elevations to Aridisols in the foothills. Because of recent glaciation there are areas of Inceptisols.

## D. WETLAND CLASSIFICATION CODES AND WATER REGIME DESCRIPTIONS

Table 1 - NWI Classification for Denver NE and SE, Colorado

| NWI CODE WATER REGIME | NWI DESCRIPTION | COMMON DESCRIPTION | CHARACTERISTIC VEGETATION |
|---|---|---|---|
| R2UB (H,G) | Riverine, lower perennial, unconsolidated bottom | Rivers | Unconsolidated bottom |
| R2US (C,A) | Riverine, lower perennial, unconsolidated shore | Flats and sandbars | Sand or mud |
| R3RB (H) | Riverine, upper perennial, rock bottom | Mountain rivers or streams | Bedrock and rubble |
| R4SB (F,C,A) | Riverine, intermittent, stream bed | Streams or irrigation canals | Sand, mud or cobble-gravel |
| L1UB (H,G) | Lacustrine, limnetic, unconsolidated bottom | Lakes or reservoirs | Unconsolidated bottom |
| PUB (H,G,F) | Palustrine, unconsolidated bottom | Ponds, dugouts and stock ponds | Unconsolidated bottom |
| PAB (G,F) | Palustrine, aquatic bed | Vegetated ponds, beaver ponds | Lemna sp. (duckweed) |
| PEM (F,C,A) | Palustrine, emergent | Meadows, depressions, floodplains or swales | Typha latifolia (cattail)<br>Scirpus acutus (hardstem bulrush)<br>Polygonum spp. (smartweed)<br>Scirpus americanus (american three square)<br>Carex spp. (sedges)<br>Juncus balticus (balticrush)<br>Carex nebrascensis (nebraska sedge)<br>Eleocharis macrostachia (spikerush)<br>Verbascum sp. (mullein)<br>Eleocharis acicularis (least spikerush) |
| PSS (C,A) | Palustrine, scrub-shrub | Shrub wetlands | Salix spp. (willow) |
| PFO (A) | Palustrine, forested | Forested wetlands | Populus deltoides (cottonwood) |

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 surface for extended periods during the growing season, but surface water is seldom present.

(C) Seasonably 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 the 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 land surface throughout the year in all years.

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

(U) Unknown -- The water regime is not known.

## F. MAP PREPARATION

The wetland classification that appears on the Denver National Wetlands Inventory (NWI) Base Map (Table 1) is in accordance with Cowardin et al (1977). The delineations were produced through stereoscopic interpretation of 1:58,000 scale color infrared photography. The photography was taken during October 1984.

Field checks of areas found within Denver NE and SE 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 field personnel.

Collateral data included USGS topographic maps, SCS soil survey, climate, vegetation, 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 have gone unidentified. Since the photography was taken during a particular time and season, there may be discrepancies between the map 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 Martel Laboratories, Inc., St. Petersburg, Florida.

## H. MAP ACQUISITION

To discuss any questions concerning these maps or to place a map order, please contact:

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

To order maps only, contact:

National Cartographic Information Center
U.S. Geological Survey
National Center
Reston, VA 22092

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

## LITERATURE CITED


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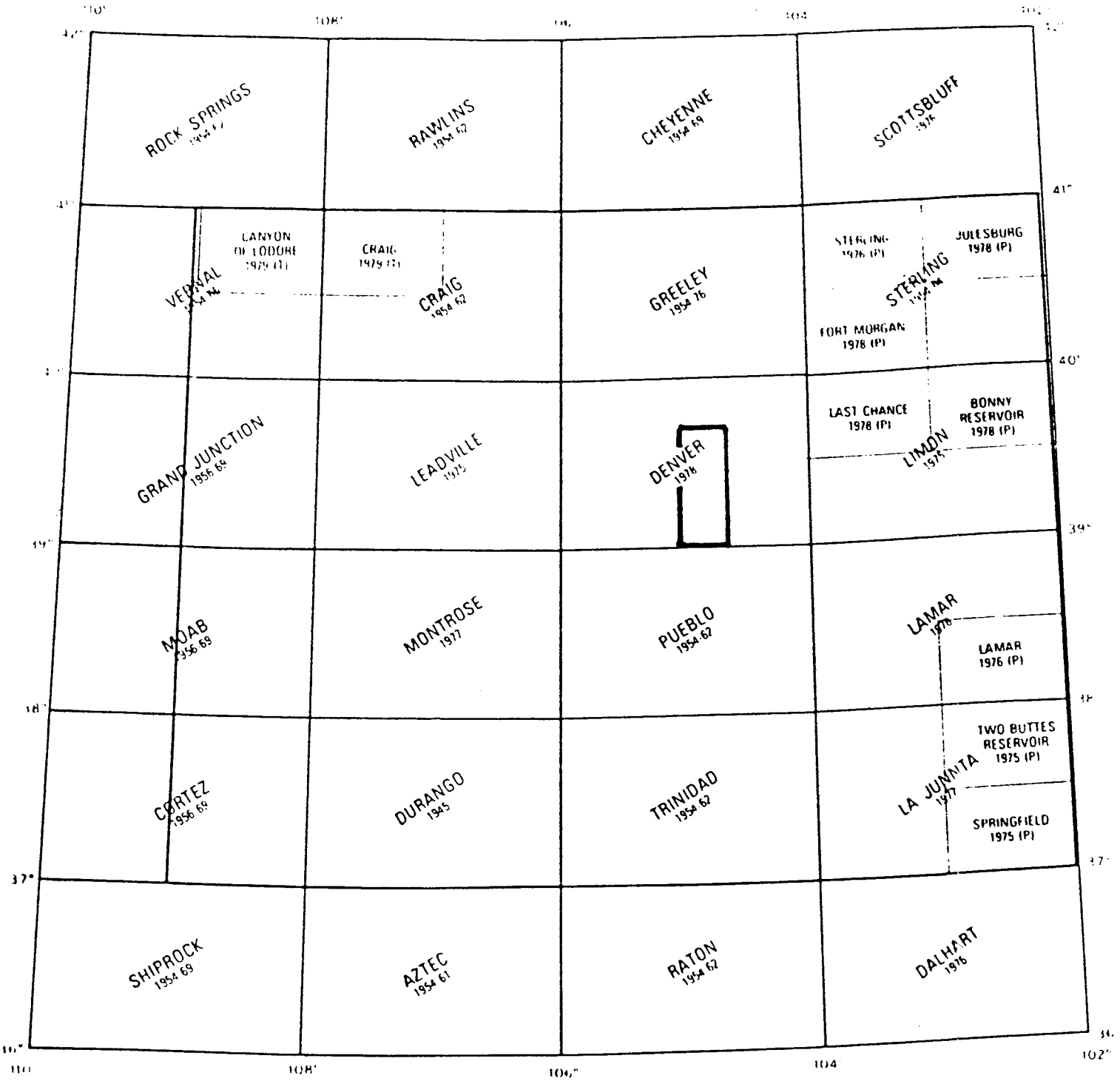
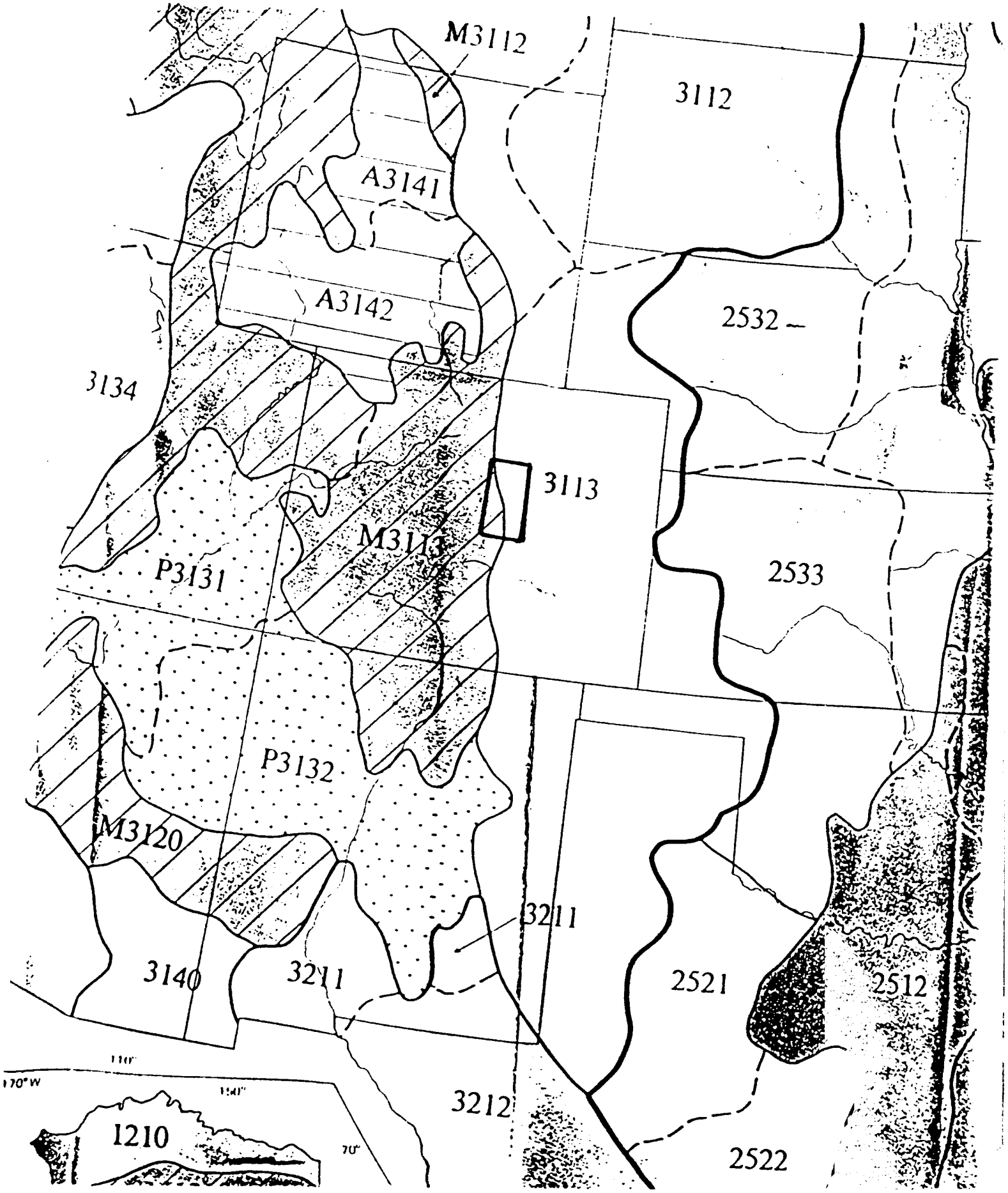
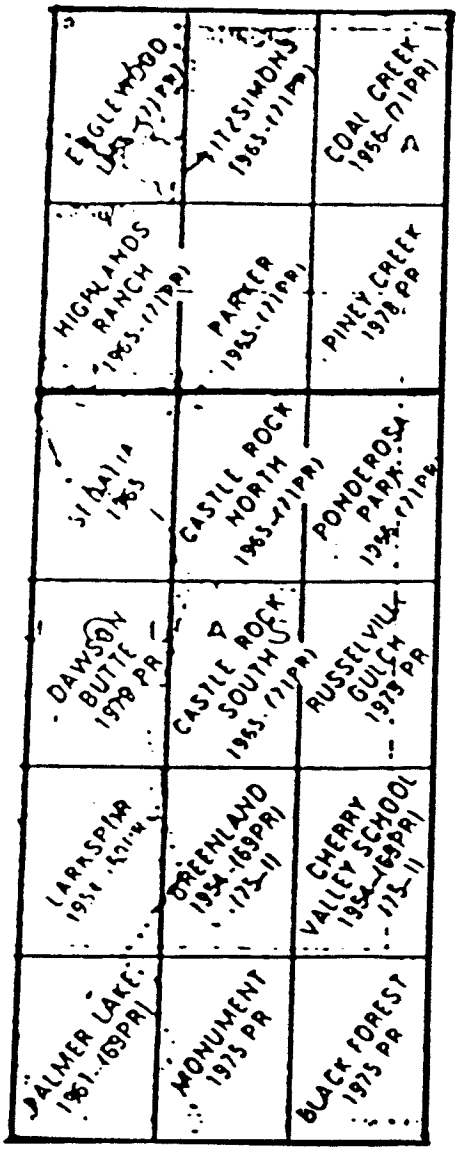
GC:wp

LOCATOR MAP (A)



LOCATOR MAP (C)



LOCATOR MAP (B)