UNITED STATES
DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

MISSOURI RIVER BASIN INVESTIGATIONS

LAND PLANNING AND CLASSIFICATION REPORT of the Public Domain Lands

in

SOUTH PLATTE RIVER AREA

Colorado - Wyoming - Nebraska

Region III
Billings, Montana
May, 1949

(FOR ADMINISTRATIVE USE ONLY)

This report was compiled as part of the program of the Department of the Interior for the development of the resources of the Missouri River Basin.

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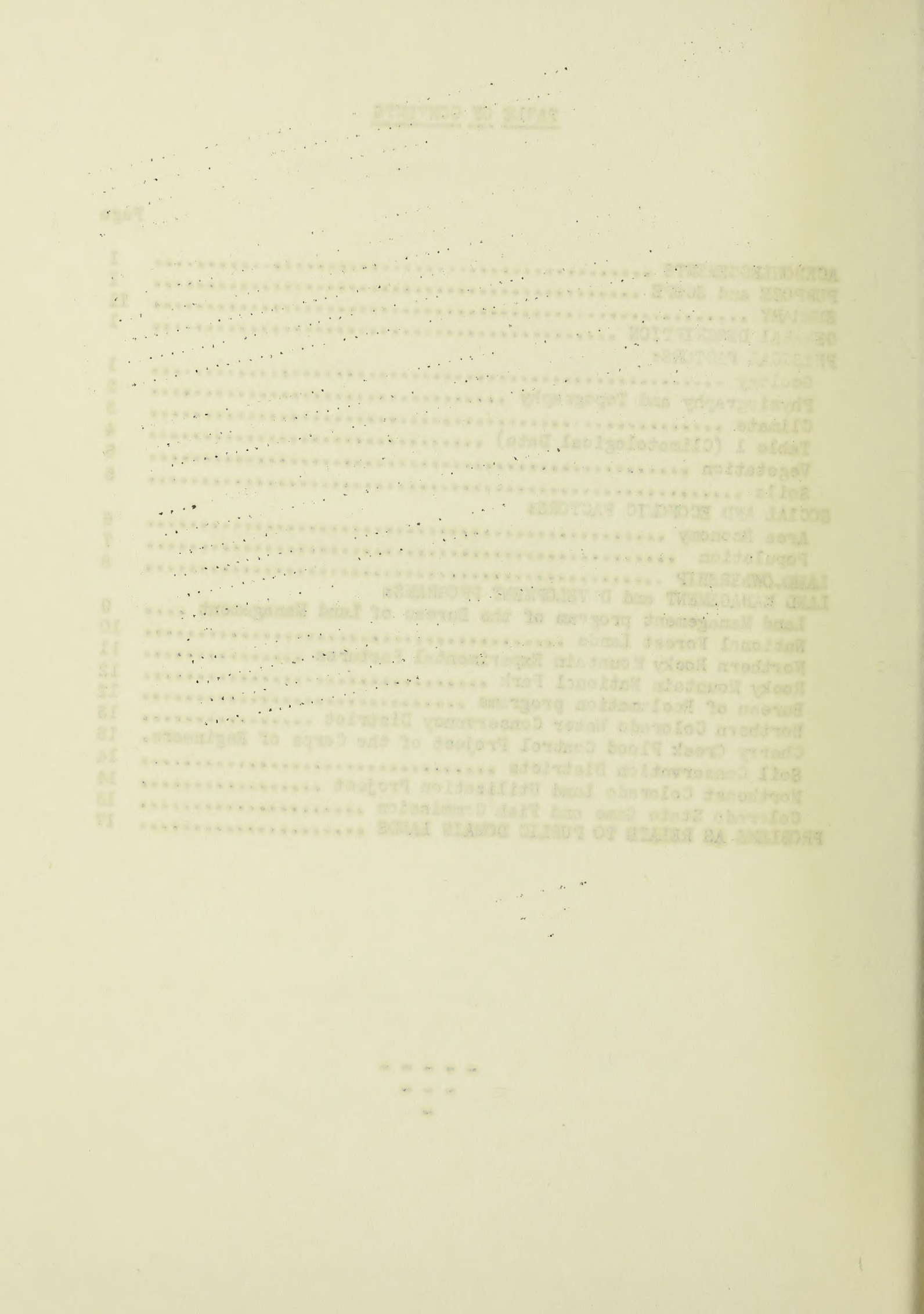

ACKNOWLEDGEMENTS

Information for this report was gathered from many sources including a review of reports and bulletins published by the Colorado A and M College, the University of Wyoming, the Colorado State Land Board, the State Planning Commission and the Water Conservation Board of Colorado. Also maps and statistics of the Bureau of Reclamation, the National Park Service and the Bureau of Land Management, United States Department of the Interior; Bureau of the Census and Weather Bureau, United States Department of Commerce; and the Soil Conservation Service and Forest Service, United States Department of Agriculture, were consulted. Grazing district data were supplied by the district grazier, Royal Gorge Grazing District #5, Colorado.

John Q. Peterson, Range Examiner, performed the field work and gathered the basic information and J. Elliott Hall, Land Economist, assembled and prepared the report. Drafting was under the supervision of William C. Anderson, Engineering Draftsman, and the project in all its aspects was under the direction of R. D. Nielson, Land Economist in charge of Missouri-Basin Studies, Region III, Bureau of Land Management, Billings, Montana.

PURPOSE and SCOPE

The purpose of this report is to describe in a general way the physical and economic features of the South Platte River Drainage area, to show the location and extent of the public domain lands within the area and their relationship to the numerous existing and proposed land development and management programs and to serve as a guide in the detailed studies that will follow to determine the maximum utilization of the public lands consistent with sound conservation practices, and to provide for their most effective service under the comprehensive resource development program.

Field work has consisted of a reconnaissance examination of the area with particular focus on the public domain lands preparatory to more intensive investigations.

SUMMARY

The South Platte River Drainage Basin extends from the Continental Divide in central Colorado, to near the town of North Platte in Nebraska and covers a total area of 24,000 square miles in Colorado, Wyoming and Nebraska. Approximately two-thirds of the area is within the high plains and the remainder is composed of foothills, mountains and intermountain valleys. The elevation ranges from about 14,000 in the Rocky Mountains to about 3,000 feet at the lower end of the basin in Nebraska.

The basic industry of the basin as a whole is centered around farming and stockraising. The basin embraces one of the largest single blocks of irrigated land in the intermountain empire and also comprises an important segment of the nation's hard winter wheat belt. Other important industries of the area are mining, forestry, recreation, manufacturing, shipping, and livestock commission and packing houses. Denver, the principal city of the area, is one of the largest livestock trading centers of the United States.

Approximately 80 percent of the lands in the basin are in private ownership with about 20 percent of the lands in Federal ownership. The national forest lands constitute most of the federally owned lands in the area. The Federal and State land development and management programs in the area are as follows: part of one Taylor Grazing District, one public domain administrative program, all or parts of four National Forests, one experimental range station, one experimental forest, most of the Rocky Mountain National Park, three projects of the Bureau of Reclamation, flood control project of the Corps of Engineers, about 19 Soil Conservation Districts, one land Utilization project, one Federal Game Refuge, nine State Game Refuges and several military reservations.

The public domain lands administered by the Bureau of Land Management comprise an area of 140,000 acres. There are 18,962 acres within Colorado Grazing District No. 5 and the remainder lies outside of any established grazing district. The grazing district lands lie in a rather consolidated block in the extreme southwestern portion of the area in Park County, Colorado. These public lands within the South Platte Drainage outside of the grazing district comprise 121,000 acres, of which about 116,500 acres are in Colorado, 4,500 acres in Wyoming and only 1.50 acres in Nebraska. Within the eastern portions of Gilpin, Clear Creek, Boulder and Park Counties, Colorado, the public lands are in a relatively compact pattern but elsewhere the public lands lie in small and incontiguous parcels.

Detailed examination and classification of all public lands in the South Platte Drainage Basin is necessary to determine their proper management and utilization. Preliminary reconnaissance of the area with particular emphasis on the public lands indicates that even though these lands comprise a small portion of the total drainage basin, they are an important resource of the area. Some of the public lands in the area are within the boundaries of Federal and State land management projects and are primarily valuable for use in connection therewith. Detailed studies will be necessary to ascertain the relationship and place of these lands and all other public lands in the area to the various existing and proposed land development programs.

Other problems relating to the management or disposition of the public domain lands are complex ownership and operating patterns, particularly in Park County, Colorado; multiple use of land for grazing, minerals and recreation in Park, Gilpin, Clear Creek and Boulder Counties, Colorado; and, improvements on public lands such as spring developments, soil and moisture conservation works such as check dams and water spreading devices; and, various other range use facilitating projects necessary for their maximum utilization. The detailed studies will obtain the basic data which is prerequisite to the solution of these and other public land problems.

SOUTH PLATTE RIVER DRAINAGE BASIN

GENERAL DESCRIPTION

The South Platte River Drainage Basin extends from the Continental Divide in Colorado to the middle plains of southwestern Nebraska and includes all the drainage area of the South Platte River and its tributaries between its headwaters in Colorado and its junction with the North Platte River near the city of North Platte, Nebraska. Its gross area is about 24,000 square miles of which 19,012 square miles are in Colorado, 1,977 square miles are in Wyoming, and 3,011 square miles are in Nebraska (See map appendix).

The South Platte River has its source in South Park in Park County, Colorado where it is formed by many tributaries from the surrounding mountains. After cutting through Eleven Mile Canyon above Lake George and then striking northward through 30 miles of mountainous territory, it emerges into the foothills at South Platte City, where it is joined by the North Fork River. From here it flows generally northward through Denver to Greeley from whence it follows an irregularly east and northeast course to join the North Platte River at North Platte, Nebraska. Enroute from the Front Range foothills it is joined by a number of snow-fed tributaries from the west and, in crossing the Colorado piedmont many drainages, primarily rain-fed and of lesser importance enter the main stem at various intervals downstream.

The mountainous areas of the basin contain a number of high, intermountain valleys most prominent of which is South Park. South Park, with an average elevation of nearly 10,000 feet, and an area of about 800 square miles in central Colorado is entirely surrounded by lofty mountain ranges which form a sharp contrast to the grassy plain which they enclose.

The drainage area of the South Platte River is noted for its extremes in topography, rainfall, and resources. The monotonous relief of the plains section gives way to spectacular mountainous terrain in the west, whereas the plains are sparsely settled and the population there is predominantly rural, the foothills section, particularly in Colorado, is relatively thickly populated. More than two-thirds of the entire population of the entire area resides in Denver, the principal city, and parts of eight counties within reasonable proximity to Denver.

The area is rich in natural resources which include timber, minerals, forage, wildlife, scenic attractions and a rich, productive soil.

PHYSICAL FACTORS

Geology

The rocks exposed in the area include strata ranging from pre-Cambrian to newer formations of the Tertiary and Cretaceous ages. These include the Arikaree and White River formations with gravel, sand and clay; the Laramie formation of sandstone, shale and coal; the Pierre shale formation of dark shale and sandy shale and the Niobrara formation of limestone and limy shale. Pre-Cambrian members include the granites, gneiss, quartzites and schists of the Rocky Mountains.

The Quarternery deposits of the plains in the northeastern part of the area consist most widely of wind-blown sands which cover sizable tracts along South Platte River. In places these sands are heaped into dunes, separated by shallow, marshy depressions. Along the river and its larger tributaries in the plains section of the area there are extensive low-lying terraces and flood plains which are more or less covered with deposits of silt, sand and gravel. Elsewhere the poorly resistant shales of the Laramie or Pierre formations are so deeply weathered as to be entirely obscured by a thick mantle of soil. As a consequence there are vast areas of the plains section of the basin in which no outcrop of solid rock is exposed.

Physiography and Topography

The area is in part within the southern Rocky Mountain Province and in part within the Great Plains Province. Prominent mountain ranges characterize the western part of the basin. They include the Colorado Front Range and the Rampart Range in Colorado and the southern end of the Laramie Range in Wyoming. The southern Rocky Mountain province consists mainly of broad, elevated strips of granite forming mountain masses, except in South Park, where it is a plateau 10,000 feet high. In the vicinity of Georgetown, Colorado the landscape is dominated by remnants of an original high plateau which reaches an elevation of 11,500 feet. The Georgetown district occupies a central portion among the high mountains which stand above the South Park peneplain. Longs Peak, Mount Evans, Arapahoe Peak and Pikes Peak in Colorado within or adjacent to this area, are among the highest peaks of the continental United States.

Between the mountains and the plains is a long, narrow series of hogbacks or foothills that attain altitudes of 5,700 to 6,600 feet and stand 300 to 500 feet above the adjacent valleys. The plains section, which slopes gently eastward and northeast from an altitude of 5,500 feet in Colorado and 6,000 feet or more in Wyoming, includes parts of the Colorado piedmont as well as the high plains of Colorado, Wyoming and Nebraska. The western part of the Colorado piedmont is occupied by low rounded hills and irregular basins. Many of these basins are shallow, undrained depressions, some occupied by lakes and ponds. As the high plains in the eastern and northern parts of the basin are approached from the west, altitudes descend abruptly in some places and gradually in others but level off to an average of about 3,000 feet at the eastern end of the basin.

The area includes approximately the northern one-third of the plains region in Colorado and portions of the plains in western Nebraska and southwestern Wyoming. The major part of the mountainous area is enbraced within the eastern slope of the Continental Divide and occupies what is locally known as the Front Range. About two-thirds of the basin area, including most of the region east of the 105th Meridian, consists of high, rolling plains.

Climate

Due primarily to the diversified topography, there is a wide range in climatic features in the area. Three of the distinct climatic areas are the plains, foothills and mountains. (See table 1).

The climate of the plains is distinctly continental. It is characterized by low relative humidity, a considerable amount of sunshine, light rainfall, hot summers, cold winters, high winds, and great variations in temperature and rainfall from year to year. Most of the precipitation falls during the period April through September. The prevailing winds of the plains are from the north or northwest in winter and from the south or southeast in summer. High velocities are often attained because of the comparatively level and treeless character of the terrain.

The climate of the foothills differs from the plains in that it has less wind movement, less severe changes in temperatures from day to day and warmer temperatures in the winter months. Severe cold waves which are common to the plains, seldom occur in the foothills of the western part of the area. The winter snow fall is less than in the mountainous areas. The day to day weather is comparatively uniform as compared to the plains and mountainous area.

The mountain region of the area is characterized by higher precipitation than the foothills, most of which occurs in the form of snow. The extreme maximum temperatures are closely related to elevation. Summer temperatures in the mountains seldom reach 100 degrees and frosts may occur every month during the year.

The growing season or frost-free period in the plains and foothills regions of the area is usually adequate for the production of grains and forage crops as well as a variety of specialty crops such as sugar beets, cabbage, beans and potatoes. The mountainous region, for the most part, does not have a long or dependable enough growing season for sustained crop production. However, some of the fruit orchards of the area are located below or at the mouths of some of the larger canyons. These areas have been selected because of their comparative freedom from frost, particularly during cold spells in other portions of the area.

Table 1 - Climatological Data of the South Platte River Drainage Basin 1/

State and Station	Elevation (feet)	Temperature Maximum °F	Temperature Minimum °F	Average Frost Free Period (days)	Average Annual Precipitation (inches)	Average Precipitation May thru September (inches)
Colorado						
Denver	5,283	105	-29	171	13.99	7.54
Ft. Collins	4,985	102	-38	145	15.20	8.86
Ft. Morgan	4,319	109	-36	145	13.75	9.18
Estes Park (near)	8,000	98	-35	98	17.94	10.00
Idaho Springs	7,543	91	-29	125	15.44	9.34
Cherman	6,890	99	-35	137	15.87	10.10
Georgetown	8,550	-	-	-	14.95	-
Hartsel	8,900	-	-	-	10.90	8.39
Julesburg	3,415	108	-38	140	17.14	11.73
Wyoming						
Pine Bluffs	5,050	109	-38	132	16.05	10.28
Nebraska						
Kimball	4,700	110	-36	137	16.51	10.38
Sidney	4,102	110	-33	142	16.23	10.60
Lodgepole	-	108	-36	135	17.24	11.17

1/ Yearbook of Agriculture, Climate and Man 1941, U. S. Department of Agriculture.

Table 1 - Chemotherapy Data of the South Plants Delivery Beds by

Vegetation

Natural vegetation of the South Platte Drainage Basin includes grasses, forbs, shrubs, woodland and conifer forest, ranging from the short grass type of the plains to alpine forests. Many of the higher peaks and ridges extend even beyond timber line; such areas are conspicuous by the absence of any definable vegetation whatever.

The plains shortgrass type is made up largely of buffalo grass, grama grass, and numerous associated species, including western wheat grass, triple-awn grass, needle grass and June grass. Shrubs include sagebrush, yellow bush and certain of the salt brush species. Oak brush, pinion and juniper occupy low woodland areas while the alpine and sub-alpine types include aspen, lodgepole pine, yellow pine and fir. Sandhill areas present a vegetative aspect which resembles the tall grass-prairie type with mixtures of sagebrush, weeds and grama grasses. Big and little bluestem are the predominant tall grasses in this type although sand reed grass, sand dropseed and June grass also occur in association with the brush and grass cover. Much of the plains area that still remains in native vegetation consists of buffalo-grama sod. All of the herbaceous growth and much of the shrub and woodland growth is regarded as important for both livestock and wildlife.

Soils

The soils of the South Platte Drainage Basin have been developed primarily from sandstones and shales, igneous, sedimentary and metamorphic rocks and on the material of alluvial fans and terraces carried down from the mountains. In addition, small areas have alluvial soil and dune sand soil. The alluvial soils are water laid materials lying principally along the South Platte River. The dune sand soil lies in small and scattered areas and ranges from a fine to medium sand usually underlain by clay at varying depths.

The soils of the foothills and plains are primarily fine sandy loam, loam, silt loam, heavy clay loam and silty clay loam. The soil of the mountainous areas are not uniform, varying considerably in color, texture and depth in very short distances. Cultivation of the mountainous area is in most cases restricted because of climate or topography. All of the soils of the area, except the dune sand areas and certain alluvial soils of river flood plains are considered to be capable of crop production where precipitation, topography and the frost-free period are favorable.

Reconnaissance soil surveys have been made on a substantial portion of the area under discussion. Generally the soil itself is not a limiting factor on the production of adaptable crops or of native forage but the amount and distribution of moisture are the factors which must be reckoned with in farming and ranching operations within the basin. Many of the present irrigated areas are confronted with occasional shortages of water.

SOCIAL AND ECONOMIC FACTORS

Area Economy

Industrial development is centered around Denver where manufacturing, trade, shipping and processing of both agricultural and non-agricultural products engage a considerable part of the population. The outlying areas for a distance of 50 to 60 miles northward from Denver are basically agricultural areas where specialized crops as well as staple crops such as corn, wheat, potatoes and alfalfa are grown under irrigation. Here the land is used rather intensively and there is a considerable interest in the feeding and fattening of livestock and the processing of mill feeds, sugar refining and packing of specialized crops such as tomatoes.

The piedmont and plains section, as well as the intermountain valleys are devoted mainly to farming and stockraising. In the latter areas, such as South Park, the irrigable land is devoted almost entirely to the production of wild and tame hay. In the plains, most of the cultivated land is devoted to winter wheat and corn except on irrigated lands where the crops are highly diversified. Throughout the area are lands that are devoted almost exclusively to grazing and it is estimated that two-thirds of the 24,000 square miles of the basin is used for this purpose.

Good moisture conditions and prices since 1940 have been instrumental in the increase in agricultural products. Large areas of buffalo grass sod have been plowed up in recent years and planted to wheat in the plains section of this basin. Higher prices for both crops and livestock have influenced land prices in all sections of the basin. Unemployment is low and production is maintained at an unusually high level. Estimated receipts in 1949 for crops and livestock will probably exceed one-half billion dollars.

The mountains within the area, particularly in Colorado attract thousands of tourists. Both summer and winter sports attractions are present in the area. Hunting, fishing and recreation, together with skiing offer year-round outdoor activities. The tourist business in the entire state of Colorado has been evaluated at about $75,000,000 annually, a large part of which can be attributed to the resources of the South Platte Drainage.

The Rocky Mountains, lying in the headwaters of the South Platte Basin, contain some of the outstanding mining districts of Colorado. Mineral deposits occur in many areas of this part of the basin, and past production has been enormous, totalling 100 million dollars or more in gold, silver, copper, lead and zinc. Counties having the largest production are Boulder, Clear Creek, Gilpin, and Park, with minor production from Jefferson and Larimer. Douglas County has produced some placer gold.

Of particular interest to the Bureau of Land Management is the Central City, Idaho Springs and Georgetown districts in Clear Creek and Gilpin Counties and the Nederland and Sugarloaf districts in Boulder County, where considerable areas of public domain still remain in the lode mining regions, and in Park County where placer ground is being operated in the vicinity of public lands.

Other metallic minerals in lesser amounts include uranium, manganese, tungsten and nickel. Investigations are now under way to determine the extent and possible value of the pitchblende, or uranium bearing deposits. Considerable gold has been recovered from placer deposits in Park and Clear Creek Counties and dredging is still under way in the vicinity of Fairplay.

Coal underlies large areas of Boulder, Weld, Jefferson, Adams, Arapahoe and Larimer Counties and has been intensively mined in some localities. It is present also in Park County near Como, where it was formerly mined.

Petroleum is being produced in Boulder, Larimer and Weld Counties and active prospecting is underway in Boulder, Larimer, Park, Morgan and other counties of the basin. Daily production at present is estimated at 300 barrels only from the above fields.

Fluorspar has been produced in considerable quantity in Jefferson County, and mica is also reported in Park, Larimer and Jefferson Counties.

Good highway and railroad facilities and airlines serve the area. Principal railroads whose trunk lines radiate from Denver are: Atchison, Topeka and Santa Fe; Chicago, Rock Island and Pacific; Chicago, Burlington and Quincy; Denver and Rio Grande and Union Pacific. The Nebraska and Wyoming parts of the basin are served by the main line of the Union Pacific between Omaha and Ogden. Running almost parallel to the Union Pacific in this area is U. S. Highway No. 30, one of the most heavily travelled of our transcontinental highways.

Population

On the basis of 1940 census figures and by interpolation of census figures for that year in counties which have only a part of their area within the South Platte Basin, the population of the area is estimated to be slightly upwards of 1,000,000. Whereas in 1940 the population of Denver County was 322,413, present estimates indicate an increase of nearly 150,000 inhabitants since 1940. On the other hand, it is believed that populations have not increased greatly in many of the counties that are entirely situated in the plains region. Many of these counties showed rather sharp decreases in population during the period 1930 to 1940. Cheyenne and Laramie County in Wyoming are notable exceptions to this trend. Present estimates indicate that there are about 35,000 inhabitants in Cheyenne. This rather startling growth in recent years is in no way attributed to agricultural development, because there has been no appreciable increase in the agricultural population in that part of the basin.

Principal cities and towns in the basin are Denver, Longmont, Loveland, Ft. Collins, Greeley and Sterling, Colorado; Cheyenne, Wyoming and Sidney, Nebraska. The bulk of the population is concentrated near the foothills region of Colorado where most of the irrigation development of the South Platte Basin has taken place.

Land Ownership

The 15,366,400 acres in the South Platte Basin are divided into principal categories of ownership as follows:

Federal		
National Forests		2,392,395 acres
National Parks (Rocky Mountain)		162,636 "
Military	1/	64,160 "
Title III Lands (Land Utilization)		201,840 "
Public Domain	2/	140,000 "
Total Federal		2,961,031 "
State		
Colorado		880,880 "
Wyoming	1/	98,660 "
Nebraska	1/	72,960 "
Total State		1,052,500 "
County and Municipal		
Colorado		203,374 "
Wyoming	1/	7,680 "
Nebraska	1/	6,400 "
Total County & Municipal		217,454 "
Private		11,135,415 "
Total South Platte Basin		15,366,400 "

1/ Estimated

2/ Includes 3,165 acres in power site withdrawals; 3,880 acres in Reclamation withdrawals and 1,360 acres in Stock driveway withdrawals.

Except for about 50,000 acres within the Pole Mountain Unit of the Medicine Bow National Forest in Wyoming, all of the National Forest lands in the South Platte River Drainage, are in Colorado. All National Park lands are within the Rocky Mountain National Park in Colorado. Approximately 4,000 acres of the military lands are in Wyoming and the remaining 60,160 acres are in Colorado. All of the Title III land utilization lands are in Colorado.

As shown in the above ownership tabulation, the public domain lands comprise only a very small portion of the total land area of the South Platte Drainage Basin. Within some areas in Colorado, the public lands are somewhat concentrated, particularly in Gilpin, Clear Creek, Boulder and Park Counties but outside of these areas, the public lands lie in small and scattered tracts throughout most of the area.

Land Management and Development Programs

Land Management program of the Bureau of Land Management

Within the South Platte River Drainage Basin there are 18,962 acres of public domain lands within Colorado Grazing District No. 5 in Park County. (See map appendix). This land has been under the administration and management of the Grazing Service, now Bureau of Land Management, since the establishment of the grazing district in 1940 under the provisions of the Taylor Grazing Act. The intent of this act was "to stop injury to the public grazing lands by preventing overgrazing and soil deterioration, to provide for their orderly use, improvement, and development, to stabilize the livestock industry dependent upon the public range, and for other purposes". The Secretary of the Interior was authorized, in his discretion, to establish grazing districts embracing vacant, unappropriated, and unreserved public lands in the United States.

The grazing district lands within the South Platte River Drainage Basin are used by eight licensed livestock operators. The class and numbers of permitted stock are 2,450 cattle, 30 horses and 24,600 sheep which is a total of 7,400 animal units. The public lands are used in connection with adjacent privately owned lands and division fences are being completed by the permittees. The predominant use of the Federal range is during summer months, however, until recently one livestock operator with 5,000 sheep used the range during the winter months. No range survey of the grazing district lands has been accomplished but utilization checks and field observations indicate the present livestock and wildlife use of the lands is approximately in accordance with its present capability.

In addition to the livestock use of the public land, there are an estimated 500 antelope in the general area which utilize the Federal range. It is estimated that the antelope secure about 25 percent of their annual feed requirements from the grazing district lands.

The public domain lands which are located outside of the established Grazing District, comprise about 121,000 acres. Approximately 116,500 acres are located within Colorado, about 4,500 acres in Wyoming and only 1,50 acres in Nebraska. Approximately one-half of these public lands is leased for grazing purposes under Section 15 of the Taylor Grazing Act. Leases are ordinarily issued for a period of ten years, depending principally upon the amount, location and permanency of the lessees holdings and operations. Stockmen owning or controlling adjoining privately owned lands are given a preference right to lease the public lands.

National Forest Lands

Substantially all of the Roosevelt and parts of the Arapahoe, Pike and Medicine Bow National Forests are situated within the South Platte River Drainage Basin. The three first-mentioned forests are in the State of Colorado, and the Medicine Bow is in Wyoming. Only a small portion of this latter forest is within the South Platte River Drainage. This is known as the Pole Mountain Unit situated in southeastern Albany County near the extreme southern end of the Laramie Mountains. Principal tributaries to the South Platte River which rise in this unit of Medicine Bow National Forest are Lodgepole, Crow and Dale Creeks. A small portion of the unit is also drained by Horse Creek, a tributary of the North Platte River. The total area of national forest lands by states and counties within the South Platte River Drainage is as follows:

State and County		Acres
Colorado		
Boulder County		212,555
Clear Creek County		182,288
Douglas County		157,845
El Paso County	1/	3,800
Gilpin County		72,884
Jefferson County		121,280
Larimer County		815,743
Park County	1/	705,000
Teller County	1/	73,000
Total Area Colorado		2,342,395
Wyoming		
Albany County	1/	50,000
Total Area Wyoming		50,000
Total Area South Platte Basin		2,392,395

1/ Estimated

Pole Mountain Federal Game Refuge, comprises all of the land within the Pole Mountain Unit of the Medicine Bow National Forest lying in the southwestern portion of Albany County, Wyoming. Mule deer are the principal game within the refuge.

Northern Rocky Mountain Experimental Pastures

Within the South Platte River Drainage Basin in Colorado are two livestock and range experimental areas operated by the Rocky Mountain Forest and Range Experiment Station with headquarters at Fort Collins, Colorado. These are known as the Central Plains Experimental Range and the Manitou Experimental Forest and embrace approximately 20 and 25 sections within their respective boundaries.

The Central Plains Experimental Range is the field work center for range research on short grass ranges of the Central Plains. It is located in Township 10 North, Range 65 and 66 West, 6th Principal Meridian in Weld County and is within the boundaries of Land Utilization Project Site No. 1 administered by the Soil Conservation Service. The cattle grazed in these experimental pastures are owned by individual members of the Crow Valley Association. The owners deliver their cattle to the experimental range in May and receive them back in November. The experimental range is typical of range lands of the Central Great Plains in climate, soil and vegetation. The average annual precipitation is about 13 inches of which 65 to 75 percent occurs during the growing season, May through September. Wide variation from the average may occur in any year. Blue grama, buffalo grass and bluestem wheat grass are the dominate forage grasses. These specie are supplemented by a few nutritious perennial herbs and shrubs. Blue grama and buffalo grass furnish 60 percent or more of the feed on the native ranges of this area.

Three rates of stocking are used with four pastures receiving each stocking rate as follows: Heavy use - four pastures stocked so that approximately 60 percent of the forage is used by early November; Moderate use - four pastures stocked so that approximately 40 percent of the forage is used by early November; Light use - four pastures stocked so that approximately 20 percent of the forage is used by early November.

The effects of this degree of stocking this range on the condition of the vegetation after eight years of treatment show that heavy use resulted in lower condition of the range. Two pastures improved and two maintained their condition under moderate use, and all four pastures improved their condition under light use. The economic returns, however, show that best results are obtained through moderate use and that the increased return per section of land per year from moderate use of forage as compared to heavy use of forage was $53.26. There is no public domain within the boundaries of this experimental range.

The Manitou Experimental Forest, comprising approximately 16,000 acres, lies partly within and partly without the boundaries of Pike National Forest. It has been in operation about 15 years and has to do mainly with experimental studies on summer grazing of cattle. The area contains certain lands outside the forest boundaries which belong to Colorado A and M College. Negotiations are under way looking to an exchange of lands between Colorado A and M College and the Forest Service whereby the Forest Service will give up timber lands for the grazing lands within this experimental range. There are 243.89 acres of public domain within this experimental area. This public domain is situated in three separate tracts within Township 11 South, Range 69 West, 6th Principal Meridian. In the detailed classification of public domain lands within the South Platte Drainage Basin, it will be ascertained whether the said 243.89 acres should be transferred to the Forest Service for their use and administration in connection with this experimental forest.

Rocky Mountain National Park

There are 162,636 acres of land within the South Platte Drainage in the Rocky Mountain National Park under the administration of the National Park Service. That portion of the national park in the South Platte Drainage lies in the extreme northwest corner of Boulder County and the southwestern part of Larimer County in Colorado about 70 miles northwest of Denver. The remaining land within Rocky Mountain National Park, 90,493 acres, lies west of the Continental Divide in the drainage area of the Colorado River.

Rocky Mountain National Park attracts a large number of people and has been third among all national parks in the number of annual visitors. Several mountain peaks within the park are over 13,000 feet in elevation, some of the highest in the United States. The principal tourist attractions of the park are hunting, fishing, dude-ranching, mountain climbing, skiing and scenery.

Additional recreational areas within the South Platte Drainage Basin will result upon the completion of Colorado-Big Thompson Project in Colorado. The reservoirs and other developments created in connection with the project will provide fishing, boating, camping and other recreational activities.

Bureau of Reclamation programs

The Colorado-Big Thompson Project in Colorado was authorized and initiated prior to the passage of the Missouri Basin Act and is the largest irrigation development in the South Platte River Drainage Basin. The purpose of the project is to supply supplemental water for the irrigation of approximately 600,000 acres of land now under cultivation and develop electrical energy for sale in Colorado, Wyoming and Nebraska. The cultivated land to receive supplemental water consists of a relatively solid block adjacent to the towns of Greeley, Longmont, Loveland and Fort Collins and a narrow strip ranging from about 3 to 12 miles in width along the South Platte River from about 10 miles west of Greeley to the Colorado-Nebraska State line.

The important feature of this project is the diversion of water through tunnels from the western slope of the Continental Divide in the Colorado River headwaters to the eastern slope. Several reservoirs will be used, both on the western and eastern slopes of the divide for the storage of excess run-off and storage of water preparatory to release for irrigation. Pump lifts will be required to lift the water to various storage reservoirs. From the storage reservoirs on the eastern slope the water will be rediverted through existing canal systems lying within the Northern Colorado Water Conservancy District.

The Narrows Reservoir has been authorized for construction on the South Platte River about 7 miles northwest of Ft. Morgan, in Morgan County, Colorado. The purpose of the dam and reservoir is principally for flood control. The Bureau of Reclamation also plans sufficient conservation storage capacity to provide regulation of return flows from the Colorado-Big Thompson and Blue River-South Platte Projects, sedimentation, and fish and wildlife conservation. Under the present plans the reservoir will have a storage capacity of 660,000 acre-feet.

Investigations are being carried on relative to the proposed Blue River-South Platte Project in Colorado. The Bureau of Reclamation plans call for the diversion of 450,000 acre feet of water from the Upper Colorado River Basin on the western slopes of the Continental Divide to the eastern slopes in Colorado. The water would be used for municipal needs for the City of Denver and adjacent communities; to supplement present supplies of water for 309,000 acres of land presently irrigated; the irrigation of 91,000 acres of new land; to generate power and the material benefits from flood control, fish and wildlife conservation and recreation.

Northern Colorado Water Conservancy District

The Northern Colorado Water Conservancy District covers approximately 2,000 square miles, embracing substantially all of the area which will receive supplemental water for irrigation under the Colorado-Big Thompson Project. The district lands lie in a narrow strip along the South Platte River from about 12 miles west of Greeley to Julesburg at the Nebraska-Colorado state line. In addition it includes a compact block lying adjacent to the towns of Greeley, Fort Collins, Loveland and Longmont.

Within and adjacent to the water conservancy district are a number of storage and catchment reservoirs, the largest and most important of which are Milton Reservoir near Platteville, Riverside and Empire reservoirs near Masters, Jackson Lake Reservoir near Weldona, Prewitt Reservoir near Marine and Point of Rocks, about 12 miles north of Sterling. The Carter Lake and Horse Tooth Reservoirs which are being developed in connection with the Colorado-Big Thompson Project of the Bureau of Reclamation are located in the western portion of the conservancy district.

Cherry Creek Flood Control Project of the Corps of Engineers

The Corps of Engineers is now constructing Cherry Creek Dam about six miles southeast of Denver. The primary purpose of the dam and reservoir is to provide protection to the City of Denver and adjacent areas against floods on Cherry Creek. In addition the dam will be of sufficient height to allow for the storage of irrigation water. The drainage area above the Cherry Creek Dam site is 386 square miles, according to records of the Army District Engineer at Denver. The area to be covered by the impounded waters is 3,970 acres. A spillway approximately 12,300 feet in length will extend from Cherry Creek Dam to west Tollgate Creek Drainage, which is located eastward from the dam and is part of Sand Creek Drainage which enters the South Platte below the City of Denver.

Cherry Creek rises in the Black Forest in the northern part of El Paso County. Upwards of three-fourths of its channel mileage is in Douglas County, which county it crosses near its eastern side. The mouth of Cherry Creek is located in the middle of the business district of Denver. Within this drainage basin are short-grass grazing areas which appear to be in excellent condition. Also, there are corn, wheat and related dry-farm crops and a certain amount of irrigated acreage within Cherry Creek Basin above the proposed dam. Daniels Park and a fenced buffalo pasture are also situated within this basin about 20 miles south of Denver. The area, therefore, has certain recreational, wildlife, and other esthetic values in addition to farming, grazing and some small amount of timber growth, as well as the paramount factor of flood control. Forest Service officials at Colorado Springs pointed out that of 14 major floods which have damaged the City of Denver since 1880, 90 percent have come from the Cherry Creek Drainage Basin.

The drainage area is at the western margin of the Great Plains in Colorado and is subject to the wide variations in climate and rainfall. Precipitation characteristic of the area, particularly near the source of Cherry Creek, is in the form of torrential rains which occur mainly during summer months. 70 to 75 percent of the precipitation is received during the growing season, approximately May 1 to October 1. There is one tract of public domain described as $E\frac{1}{2}$ $W\frac{1}{2}$, Sec. 13, Township 11 South, Range 65 West, 6th Principal Meridian containing 160 acres within Cherry Creek Drainage.

Soil Conservation Districts

Established Soil Conservation Districts in Colorado within the South Platte River Drainage Basin total 19 and are situated in whole or in part in 13 Colorado counties. Counties in which the Soil Conservation districts are located are Adams, Arapahoe, Boulder, Clear Creek, Douglas, Elbert, El Paso, Jefferson, Larimer, Logan, Phillips, Sedgwick and Weld.

The gross acreage within the boundaries of established Soil Conservation Districts is 3,572,162 acres. The total number of land owners is 9,660 and the number of cooperators within these districts is 1,518. The lands in farms in 16 of these districts embrace 910,777 acres of range land, 567,096 acres of dry-farm land, and 591,042 acres of irrigated land. Data on such acreages for Sedgwick, West Greeley and Big Sandy Soil Conservation Districts were not obtained.

All of the land in Nebraska within the South Platte Drainage Basin is within Soil Conservation Districts except those lands within Perkins, Kimball and Bonner Counties.

Southeastern Laramie County Soil Conservation District, embracing 274,510 acres in the extreme southeastern portion of Laramie County, is the only district in Wyoming within the South Platte Drainage.

Northeast Colorado Land Utilization Project

The Northeast Colorado Land Utilization Project had its beginning with the dust bowl era of the 1930's. It is located in Weld County, Colorado in Townships 8 to 11 North, Ranges 56 to 66 West, 6th Principal Meridian. This project is subdivided into two units known as Briggsdale I and Briggsdale II and contains a gross area of approximately 750,000 acres as of June 1948. The Department of Agriculture, through the Soil Conservation Service or its predecessor agency, has purchased approximately 200,000 acres of land within the project. The purchased lands were obtained at an average price of about $5 per acre.

During the calendar year of 1947, 157 cattle operators were permitted to utilize a total of 54,614 animal unit months of feed from the project land. The grazing fee for 1947 was 52 cents per animal unit month. The grazing rate per animal unit month for 1948 was 73 cents and for 1946 it was 26 cents.

Cattle are operated during a 6 months summer period in fenced pastures that are well supplied by wells with attendant tanks, troughs, etc., and in certain places by water holes and surface water in certain of the small creeks which cross the project. Pastures range in size from 2,000 to 12,000 acres, and the operators run in a community plan; that is, they mix their cattle together in one large pasture. The number of cattle owned by the operators ranges from about 30 head to 400 head. A large reseeding program has been carried forward and is still being continued. The Land Utilization Project, under the general supervision of a district conservationist, but under the direct supervision of a project conservationist, cooperates with two associations; namely, the Crow Valley Cooperative Livestock Association in Briggsdale I and the Pawnee Cooperative Livestock Association in Briggsdale II.

During the 1948 grazing season, association members will pay to the Government approximately $5 per animal unit for a six-months period, of which 42 cents is turned over to the Association for its administrative costs. Among administrative costs are employment of range riders and fence and well improvement men, who keep the improvements in good order and care for the livestock on the range. Range riders are paid $180 per month during summer and $80 per month during winter.

The public domain acreage within the Land Utilization Project totals approximately 6,700 acres, of which about 2,500 acres are leased for grazing and approximately 4,200 acres are unleased. Prior to March 25, 1949 only 1,053 acres of the 6,700 acres of public domain land within the land utilization project boundaries were withdrawn for administration by the Soil Conservation Service in connection with the project.

By Executive Order 10046 dated March 25, 1949, the remaining public lands within the project were withdrawn from all forms of appropriation under the public land laws except the mining and mineral leasing laws and reserved for use, administration and disposition in accordance with the provisions of Title III of the Bankhead-Jones Tenant Act and jurisdiction thereover was transferred to the Department of Agriculture.

Colorado State Game and Fish Commission

Several years ago a number of State game refuges were established by law in the State of Colorado. Nine, or parts thereof, of these are situated within the South Platte River Drainage area. These nine refuges and areas are as follows:

Name	Acres
Colorado Antelope Refuge	69,120
Bueck Game Refuge	40,960
Bijou Valley Game Refuge	21,760
Buffalo Peaks Game Refuge	64,213
Denver Mt. Parks Game Refuge	470,400
Colorado Game Refuge	546,800
Empire Bird Sanctuary	3,580
Julesburg Game Refuge	12,000
Pikes Peak State Game	25,000
Total area	1,253,833

Although these refuges are not exactly administered as such since they overlap many other areas of both private and public land management programs, they do serve as control points over which the State Game and Fish Department exercise opening and closing dates; type, sex, and number of kill, as well as the prosecution of certain specific game conservation programs.

In addition, the Colorado Department of Game and Fish has launched upon a land acquisition program in certain localities for the specific purpose of wildlife conservation, recreational and hunting grounds, and protection of selected species of animals and birds. During 1948 the Department of Game and Fish acquired by lease and purchase some 14,000 acres in three separate areas within Logan and Sedgwick Counties in Colorado for specific conservation, recreation and management purposes. The description of these three areas is as follows:

> 210 acres in Section 19, Township 10 North, Range 43 West, 6th Principal Meridian, for the protection and propagation of upland birds and for resting and nesting of migratory water fowl.
>
> 250 acres in Sections 10, 15 and 16, Township 11 North, Range 46 West, 6th Principal Meridian for migratory bird feeding grounds and for cover protection for upland game birds. Of this acreage access to the South Platte River, together with a small area of about 10 acres of land lying adjacent to the river on its south side in the southeast corner of Section 16 is leased from the State Land Board for shooting grounds.
>
> Approximately 13,500 acres in Townships 9 and 10 North, Ranges 48 and 49 West, 6th Principal Meridian were acquired recently by purchase and by lease from the State Land Board for the primary purposes of protecting and propagating antelope and upland game birds on all areas within the boundaries of the project which are outlying from the South Platte River. Areas along the South Platte River are proposed for duck shooting purposes mainly. The leases in this project from the State Land Board consist of about 5,200 acres in Township 10 North, Ranges 48 and 49 West. The purchased lands comprise 8,280 acres within these two townships and were acquired at an average cost of about $15 per acre.

Status records of the Colorado Game and Fish Commission show the following lands to be public domain in which that agency is interested: Section 22, Township 10 North, Range 48 West, $NW\frac{1}{4}NE\frac{1}{4}$ and $N\frac{1}{2}SE\frac{1}{4}$ 120 acres. The status information furnished to the Missouri Basin program by Region IV does not list the above described land as public domain. However, should the same be determined to be public domain, consideration should be given to the matter of transferring this land to the Game and Fish Department through exchange or otherwise, because it appears that said public domain, should be included within the boundaries of the above described project. According to officials of the Colorado Game and Fish Department, this 120 acres are now enclosed within the fenced part of the project, the fence line running along the south and west sides of the above described 120 acres.

Wildlife resources and the attendant activities that are involved principally, hunting and fishing, are among the highly important assets of the state's natural resources. In this regard the South Platte Basin is especially important. Big game, waterfowl and pheasants are perhaps the most dominant of all wildlife native in the South Platte Basin in Colorado. A comparison of the importance of several species of wildlife in this basin in Colorado is shown below and was furnished by the State Game Manager.

South Platte Drainage Game Census
Colorado - 1948

Deer Population 1/1/48	17,400 Breeding herd
Deer Population 10/1/48	23,200 Hunting herd
Elk Population 1/1/48	3,980 Breeding herd
Elk Population 10/1/48	4,776 Hunting herd
Antelope 1/1/48	3,000 Breeding herd
Antelope 1/10/48	3,900 Hunting herd
Bear (Black)	1,200
Sheep (Mountain) 1/1/48	1,800 Breeding herd
Sheep (Mountain) 10/1/48	2,160 Hunting herd

Pheasant kill, 1947, was 195,090; Approximately 25 percent of flock is killed by hunting. Duck kill, 1947, was 204,760. Approximately 10 to 15 percent of flock is killed by hunting. Goose kill, 1947, was 1,093. Approximately 20 percent of goose flock killed by hunting. Rabbit kill, 1947, was 143,460. Approximately 10 percent of the rabbit population is removed by hunting.

In connection with the classification of scattered tracts of public domain in the South Platte River Drainage Basin, particularly in the plains section thereof, it will be well to ascertain the programs of the Game and Fish Department and the specific public domain lands which may be needed or desired in furtherance of wildlife conservation in the area.

PROBLEMS AS RELATE TO PUBLIC DOMAIN LANDS

Detailed examination and classification of all public domain lands within the South Platte River Drainage area are necessary to determine their land and water resources. This information is fundamental to ascertain the highest use to which the lands can be placed, either in Federal or State land management programs or in private ownership.

Approximately 60,000 acres, which is about 42 percent of all public domain lands in the entire South Platte River Drainage area, are located in and adjacent to South Park, in Park County, Colorado. (See map appendix). South Park lies in the headwaters of the South Platte River and is comprised of vast broad hay land areas and adjacent flat grazing lands. Elevations within the park area reach 10,000 feet. About 19,000 acres of the public domain lands within the area are within Colorado Grazing District No. 5 and the remaining 41,000 acres are outside any grazing district.

The public domain lands in South Park are generally well watered by creeks and springs. Preliminary investigation indicate there are certain developments which are needed on the public domain lands to improve distribution and management of livestock thereon. These include spring developments, which have been somewhat abused by uncontrolled use and small check dams and water spreading improvements to aid in natural revegetation, as well as to arrest gully erosion which is active in some parts of the area.

In the South Park area, there are large blocks of state-owned lands which are more or less intermingled with the public domain lands. To facilitate operating units in the area and effectuate more proper management and control over the public domain lands in the area, consideration should be given in the detailed study to the feasibility of the exchange of lands between the State and Bureau of Land Management.

The public domain lands in South Park area outside of the grazing district are similar in character to those public lands within the district and are substantially as well consolidated for effective management and control. Consideration should be given to the possibility and feasibility of the inclusion of all public lands in the area within a grazing district.

The only remaining areas in the South Platte River Drainage area where the public domain lands lie in a relatively consolidated pattern are in parts of Gilpin, Clear Creek and Boulder Counties, Colorado. Available information indicates some of the lands are quite heavily mineralized and some support considerable timber, especially those lands in Clear Creek County. Most of these are not under grazing lease or any other authorized use, except those covered by mining claims. The detailed classification of these lands as to their timber, watershed, grazing, or mineral potentialities will provide a basis for their proper management and utilization.

The Colorado State Fish and Game Commission has taken an aggressive attitude toward the acquisition of lands for game management and recreational purposes. Some of the public lands may be primarily suitable for administration by this agency. Other public lands lie within the boundaries of the Manitou Experimental Forest Project. Detailed classification will serve as a basis for the determination of whether these lands should be included in these land programs.

Substantially all the area in the State of Colorado along the Continental Divide is within a large and important recreational area and habitat for big game. The authorized and proposed reservoir to be created in connection with the programs of the Bureau of Reclamation and Corps of Engineers will develop additional recreational facilities in the area. Certain public lands in the area are suitable for recreational uses and consideration should be given to the classification of these lands suitable for such use for development under the Small Tract Law.

Cadastral engineering surveys are necessary for the identification and description of lands, and to furnish precise horizontal control as a prerequisite to many phases of the planning and construction programs, in connection with the comprehensive development program of the Missouri River Basin. These basic surveys are necessary in relation to topographic

mapping, to the construction of dams, reservoirs, and other appurtenances, and for land classification and the subdivision of unit areas when open for settlement. This service is available to all Federal agencies on a reimbursable basis but will require the proper coordination of all agencies involved to establish areas in which surveys or resurveys are necessary and determine priorities on such work.

The original surveys of the area were in general made in early days when permanent monumentations of corner positions were not considered as essential as it is today. These old surveys were executed under the contract system, with very little inspection, and were often fraudulent or poorly made. A large percentage of the original corners have become obliterated and lost, and the original marks, such as wooden stakes, pits, mounds and other accessories have all but disappeared. In addition, the early surveys were made without the scientific instruments of today, making a rerunning of the lines advisable to bring them to a higher standard of closure. Consequently the early work is in such condition as to require a high order of technical skill in executing the necessary resurveys. The contract system of executing cadastral surveys was abolished in 1910, when the present system of employing cadastral engineers under Civil Service was adopted. The Bureau of Land Management is the only agency authorized by law to make these surveys and resurveys of the public land.

APPROVED:

R. D. Nielson

R. D. Nielson, Land Economist, in charge of Missouri Basin Studies.

DATE: May, 1949

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MISSOURI RIVER BASIN INVESTIGATIONS
BILLINGS, MONTANA

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
DIVISION OF PLANNING

SOUTH PLATTE RIVER AREA

PUBLIC DOMAIN MAP

COLO.–WYO.–NEB.

LOCATION MAP

LEGEND

POWER SITES	RECLAMATION WITHDRAWAL	STOCK DRIVEWAY
PUBLIC DOMAIN	EXPERIMENTAL PASTURE	PROPOSED RESERVOIR SITES
NATIONAL FORESTS	EXPERIMENTAL FOREST	EXISTING MAJOR RESERVOIRS
NATIONAL PARKS	MILITARY RESERVATION	HIGHWAYS (HARD SURFACE)
NE COLORADO TITLE III LAND	SOIL CONSERVATION DISTRICT	KNOWN AND UNDEFINED GEOLOGIC STRUCTURES
AREA MANAGED BY COLORADO FISH AND GAME COMMISSION	IRRIGATED LAND	RAILROADS
COLORADO GAME RESERVE	ARABLE LAND	NORTHERN COLORADO WATER CONSERVANCY DISTRICT

NORTHERN COLORADO WATER CONSERVANCY DISTRICT & SOIL CONSERVATION DISTRICT

12 6 0 6 12 18 24
SCALE IN MILES

BILLINGS DRAFTING OFFICE MAY 1949