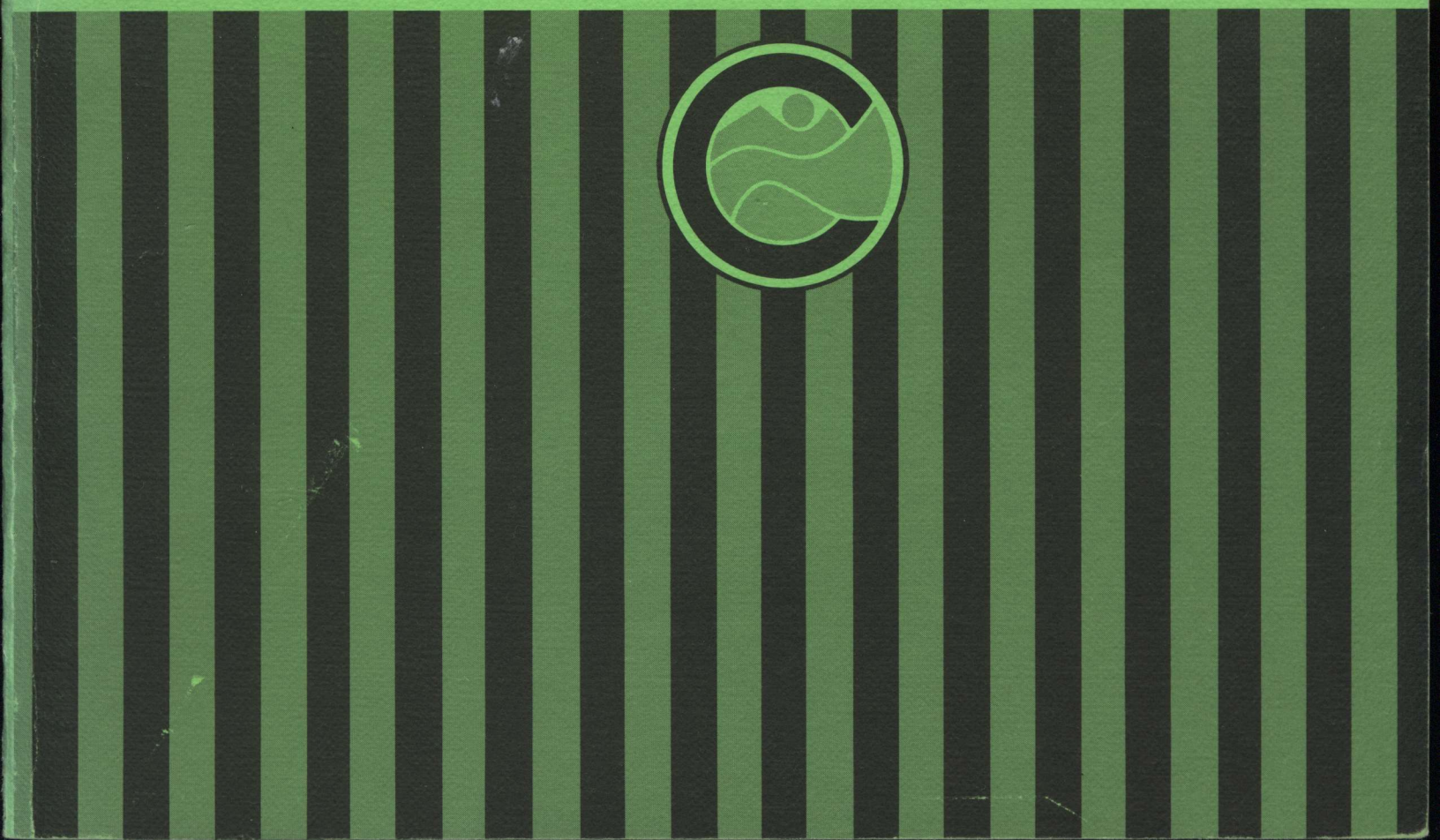
R. Clark

MOUNTAIN RECREATIONAL COMMUNITIES AND LAND USE

"The Summit County Experience"
by
Dr. Wilbert J. Ulman

Published by
THE
COLORADO
LAND USE
COMMISSION



MOUNTAIN RECREATIONAL COMMUNITIES

AND LAND USE

"THE SUMMIT COUNTY EXPERIENCE"

PREPARED FOR THE
COLORADO LAND USE COMMISSION

BY

DR. WILBERT J. ULMAN

LAND USE-ENVIRONMENTAL COORDINATOR

edited by Gilbert F. McNeish
Staff Director - December, 1973

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The Colorado Land Use Commission is pleased to publish this special study in the spirit of the legislative mandate contained in Senate Bill 11, which created the Commission in 1970.

That mandate directed the Commission to apply "new and innovative measures to encourage planned and orderly land use development."

By documenting burgeoning development, and its resultant impact upon one of Colorado's most spectacular mountain recreational areas, the Commission hopes to vividly dramatize the necessity for timely and effective land use planning to conserve the unique qualities of Colorado for its citizenry and for the nation.

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Abstract

In response to growing demands for outdoor recreation and associated vacation-home development, Summit County has become one of the most rapidly developing mountain regions in Colorado. Development has accelerated steadily over the past decade despite the intervening Continental Divide, which once buffered this scenic alpine basin from the heavily populated Front Range Corridor cities to the east. On March 8, 1972, the opening of the Eisenhower Tunnel under the Continental Divide placed the area within relatively easy commuting distance to Denver.

In addition to improved accessibility, the area owes its development to a vast potential for recreational development. Over 75 per cent of the county lies within the national forest. A number of streams and two large reservoirs provide abundant water-based recreation. Skiing, however, is the major recreational activity with four ski resorts already developed in the county. Three of these resorts are considered major, four-season resorts, two of which have opened since 1970. The U.S. Forest Service, having surveyed its recreation capabilities, classifies at least eight additional sites in the county as potentially developable. The area's growing preference among skiers is indicated by the fact that the annual rate of increase in skier visits to Summit County resorts has surpassed that of the state as a whole.

Dillon Reservoir and the three major ski resorts have become nuclei for intensive second-home development. Land subdivision and construction have surpassed local capabilities of providing public services. Subdivisions have increased from sixteen in 1960 to 106 in 1972, with assessed valuations increasing nearly five-fold over the same period. Current estimates indicate at least forty million dollars will be invested in development during 1973.

Existing zoning and areas currently planned for zoning could ultimately support a population of nearly 191,000 persons on less than fifteen per cent of the total private land in the county. Impending high densities are indicated by the vast proliferation of condominiums. In 1972, over 88 per cent of all development involved multi-family residential construction.

The county master plan is a decade old and does not provide an adequate framework for dealing with current problems. Further goals and growth policies remain undefined and development continues without benefit of comprehensive direction or systematic concern for environmental impact.

Current trends point toward continued high density development and increased environmental and esthetic deterioration. Increasing sewage loads, which fluctuate drastically in response to seasonal recreation crowds, are polluting the area's water resources. Dillon Reservoir, the recipient of the bulk of stream discharged effluent, is threatened with cultural eutrophication. Solid waste generation is also mounting, and is projected to increase by over eight times in 1980.

Summit County is nearly a closed basin and severely prone to temperature inversions. Increased traffic flows to and through the county expected with the completion of Interstate-70 and the Eisenhower Tunnel assure declining air quality.

The findings of the study reveal the lack of capacity of rural local governments in general, to effectively deal with the major problems of long-range planning, rapid development, and protection of the environment in the face of accelerated development pressures. Increasing population densities, rising crime, lagging public services, traffic congestion and increasing environmental decay signal the approach of urbanization.

Rapid acceleration in land development activities, coupled with the county's inability to simultaneously react with sufficient planning and regulatory measures, are the primary factors preventing a balance between economic growth, environmental protection, and timely provision of public services; not dissimilar from problems being experienced in other regions and communities throughout the nation. Over twenty years of uncontrolled growth at Lake Tahoe, California, exemplifies this fact. However, solutions to these complex problems must originate at the local level.

This study is an investigation of the evolution of Summit County from a rural alpine landscape to one suggestive of an intensely developed, densely populated recreational settlement. The purpose of the study is to analyze in depth the effects of recent land-use changes in Summit County from agriculture and mining to intense recreational and second-home development. Trends and patterns of development will be discussed with respect to their impact on the environment of the Blue River Basin. Included in the final analysis are projections of what might be expected to occur if present trends continue. In microcosm, the Summit County experience may be exemplary of the future of Western Colorado.

Throughout the analysis, the study area is alternately referred to as either Summit County or the Blue River Basin because of the conformity of the drainage divide of the basin with the political boundaries of the county.

CHAPTER I
Introductions

Orientation

The Blue River Basin is located in the west-central part of Colorado about 75 miles west of Denver (Plate 1). Except for the extreme northwestern corner, the drainage divide of the basin conforms to the political boundaries of Summit County. It is bounded on the east and south by the Williams Fork Mountains and the Continental Divide, and Gore Range on the west. Morphologically, the area is a northerly trending basin drained by the headwaters of the Blue River and two main tributary streams: Snake River and Tenmile Creek. The long axis of the basin is formed by the Blue River which rises near the Continental Divide to the south and flows northwest to its confluence with the Colorado River at Kremmling. Dillon, located where the Snake River and Tenmile Creek join the Blue River, is the approximate geographic center of the basin. South of Dillon, the upper Blue, the Snake and Tenmile Creek have carved three relatively steep V-shaped valleys, and terrain is increasingly rugged with elevation. North of Dillon, the terrain is much more gentle where the Blue widens and meanders over the valley floor, which is about three-quarters of a mile wide. Only small intermittent streams join the Blue throughout the lower basin.

Relief ranges from 7,750 feet at Green Mountain Reservoir to 14,267 feet at Torreys Peak. Historically, accessibility to the basin has been hampered by the surrounding mountains. Although thirteen passes have provided access to the area, only four are paved and considered passable by normal vehicular traffic. Loveland Pass (11,992 feet) provides access from densely populated piedmont cities to the east via U. S. Highway 6 which extends through the central part of the basin, continuing west over Vail Pass (10,603 feet). Traffic from southern points must cross either Hoosier Pass (11,542 feet) on Colorado Highway 9 or Highway 91 over Fremont Pass (11,318 feet).

About eighty per cent of the traffic through the basin is east-west traffic originating in the Denver Metropolitan Area 75 miles east of Dillon (Plate 6). Recreation-seeking urban dwellers funnel into and through the basin year-round in quest of outdoor recreation on the west slope of the Rocky Mountains. Interstate-70 will be the first major transcontinental route across Colorado and will provide relatively easy access to the basin. A tunnel, 1.69 miles long, under the Continental Divide eliminated the slow, arduous travel over Loveland Pass, reducing travel time from Denver to the basin by almost an hour. Completion of the Eisenhower Tunnel will undoubtedly accelerate development of the Blue River Basin, which in the past depended upon a modest mineral industry and ranching for its major revenues .

Climate

The consistent pattern of climate in the basin is one of long, cold

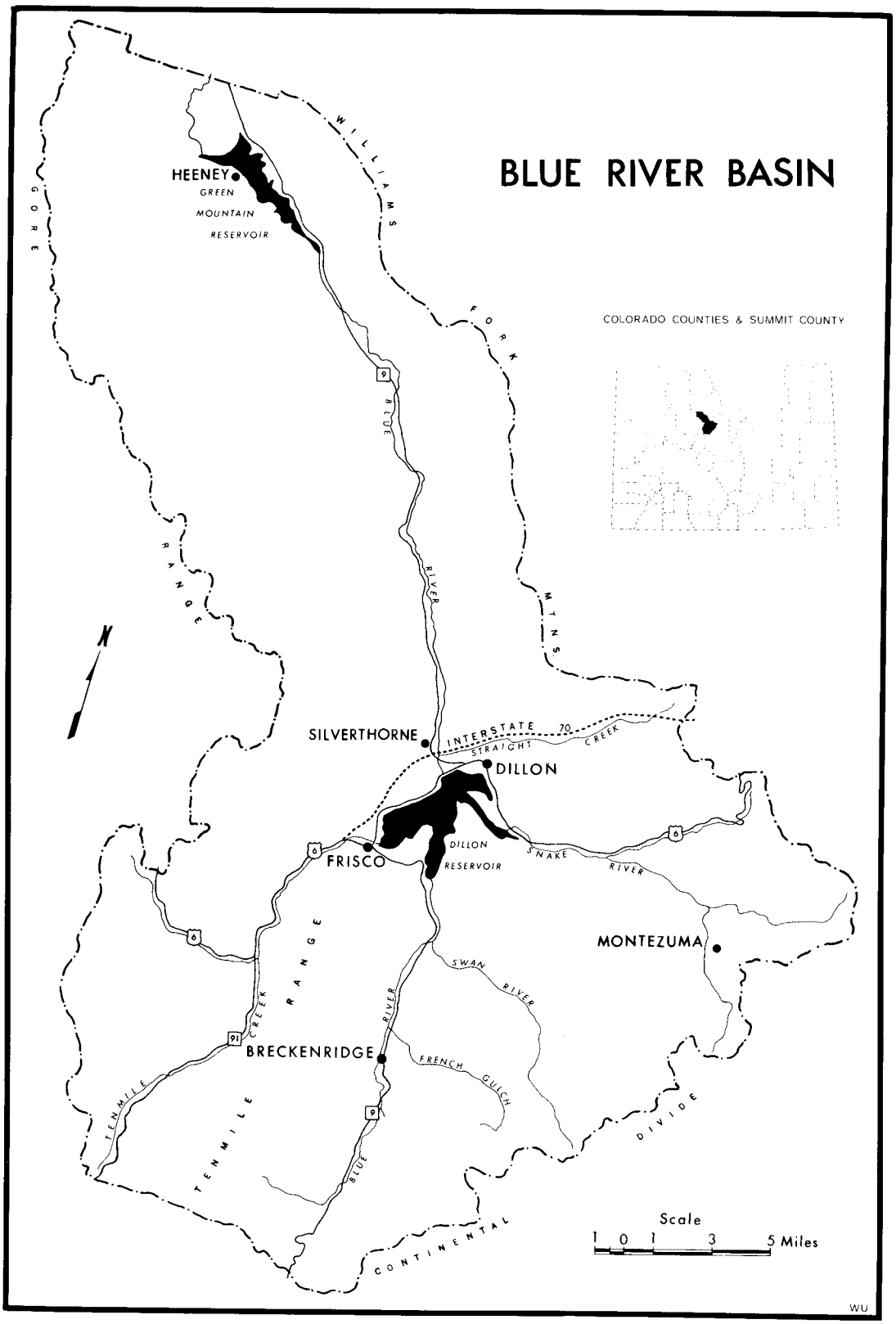

BLUE RIVER BASIN
COLORADO COUNTIES & SUMMIT COUNTY
HEENEY
GREEN MOUNTAIN RESERVOIR
WILLIAMS FORK MTNS
GORE RANGE
BLUE RIVER
SILVERTHORNE
INTERSTATE 70
STRAIGHT CREEK
DILLON
DILLON RESERVOIR
FRISCO
SNAKE RIVER
MONTEZUMA
SWAN RIVER
TENMILE CREEK
TENMILE RANGE
BRECKENRIDGE
FRENCH GULCH
TENMILE
BLUE
CONTINENTAL DIVIDE
Scale
1 0 1 3 5 Miles
WU

Plate 1

winters and short, cool summers. Elevations range from 7,750 feet to over 14,000 feet; consequently, climate varies throughout the area, according to altitude.

Temperatures in the basin are strongly influenced by the surrounding mountains, which generate cold air drainage so that temperature inversions are common throughout the year. Below freezing temperatures have been recorded at Breckenridge, Dillon and Green Mountain in every month and the frost-free period at Dillon averages seven days a year (Colorado Yearbook, 1962-1964:422).

Annual precipitation, which ranges from 15.6 inches in the valleys to approximately 23 inches in the alpine zones, varies extremely over the years. Precipitation occurs throughout the year, with at least an inch or more falling every month. Consequently, the main streams of the basin flow year-round.

Water Resources

Although precipitation is relatively abundant in all seasons, stream discharges for the Blue River and its tributaries fluctuate drastically throughout the year (Plate 3). Peak flows are reached during May, June, and July, in response to the melting snowpack on surrounding slopes. The annual water yield of the basin averages 428,000 acre-feet. Yield per square mile is more than three times that of any other river basin in the Colorado river system (McCall-Ellingson, 1970:44).

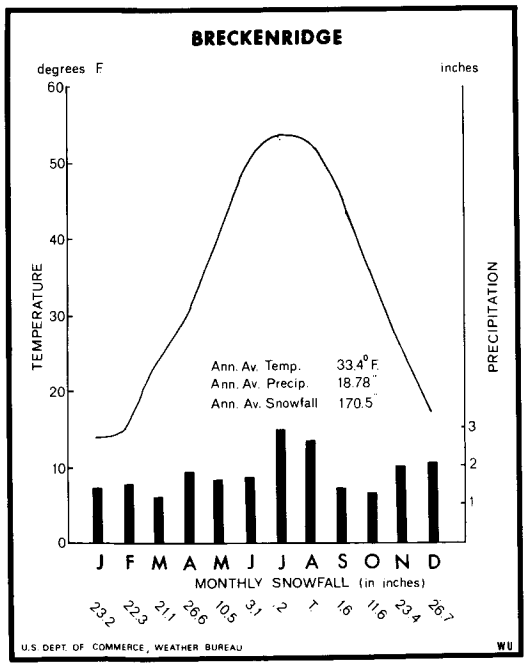
Water has been an important resource in the basin since the white man first entered the area. Miners depended upon water along the streams in placer operations. Sluice boxes replaced the crude panning methods and more water was needed. Where streams were not available, ditches were dug to transport water to the rich gravels. In the Breckenridge area alone, over one-hundred miles of ditches were built for mining purposes (Blauvelt, 1962:30). Later, hydraulic mining required large diameter pressurized hoses to flush gravel deposits from slopes. Finally, water was impounded for gold

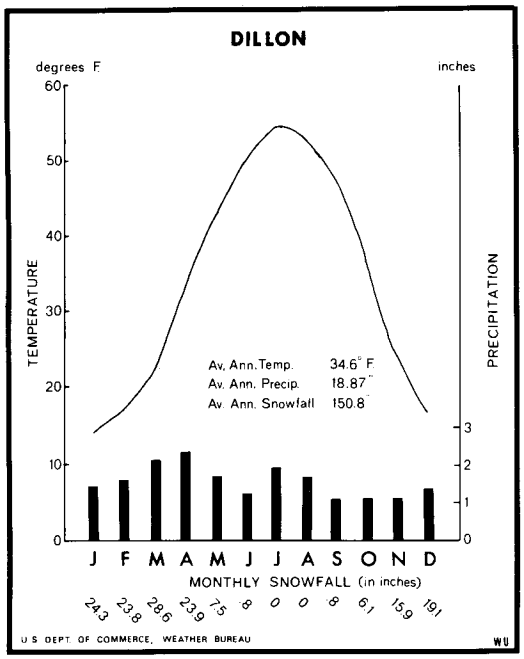
Table 1

Colorado River Drainage Basin Water Yields

Drainage Basin	Water Area	Average Annual Yield/ Sq. Mile
Area of Colorado River Basin	243,000 sq. mi.	70 acre-feet
Area of Upper Colorado River Basin	107,000 sq. mi.	145 acre-feet
Area of Colorado in Colorado River Basin	42,400 sq. mi.	262 acre-feet
Area of Blue River Basin	595 sq. mi.	720 acre-feet

Source: McCall Ellingson





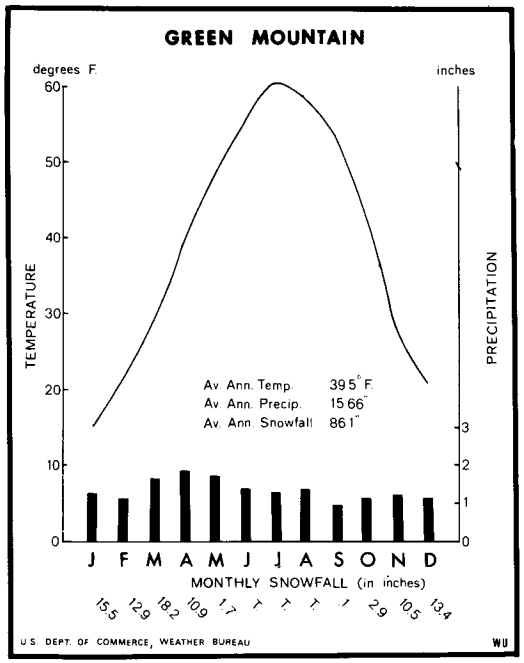


Plate 2. Summit County Climatic Stations

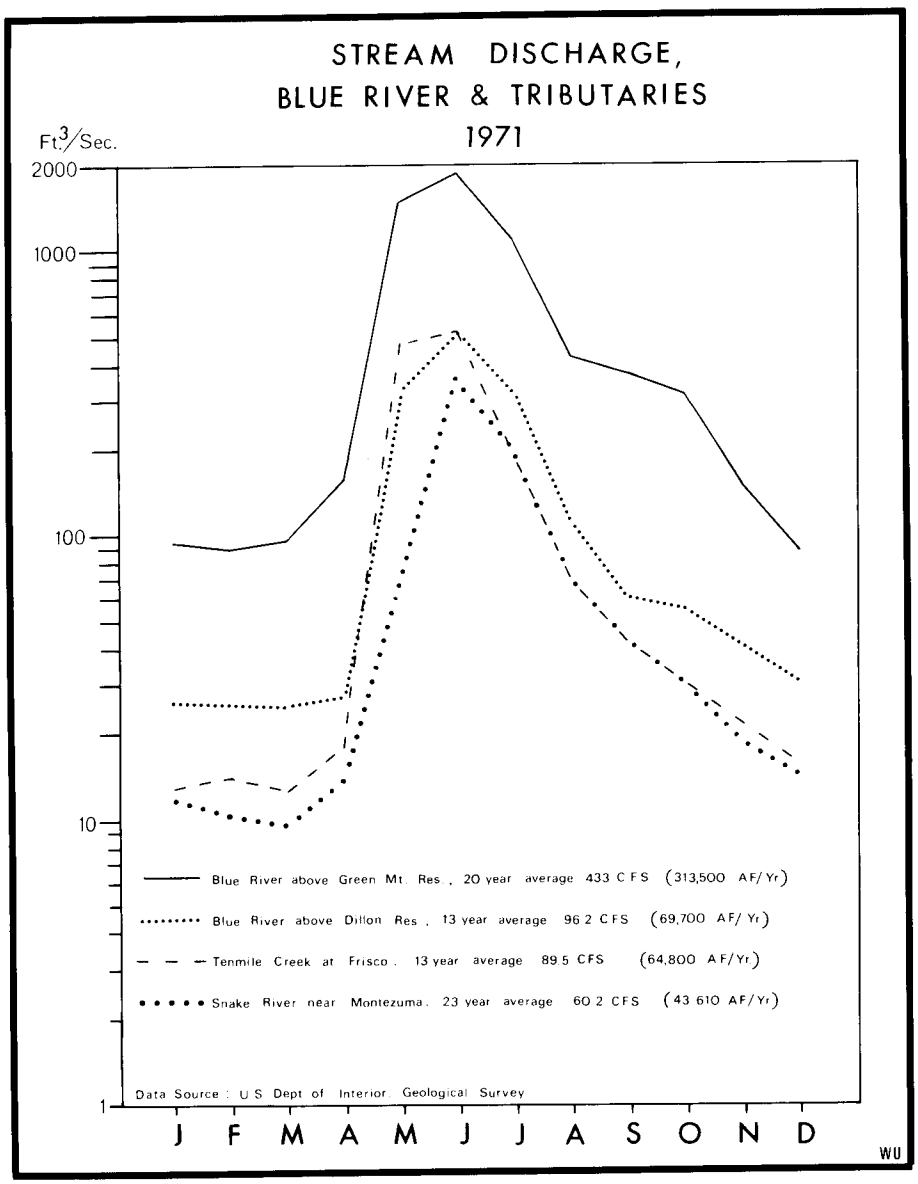

STREAM DISCHARGE,
BLUE RIVER & TRIBUTARIES
1971
Ft.3/Sec.
2000
1000
100
10
1
Blue River above Green Mt. Res., 20 year average 433 CFS (313,500 AF/Yr)
Blue River above Dillon Res., 13 year average 96.2 CFS (69,700 AF/Yr)
Tenmile Creek at Frisco, 13 year average 89.5 CFS (64,800 AF/Yr)
Snake River near Montezuma, 23 year average 60.2 CFS (43,610 AF/Yr)
Data Source: U.S. Dept of Interior, Geological Survey
J F M A M J J A S O N D
WU

Plate 3

dredges which spewed out the still barren gravel tailings that cover thousands of acres of the Blue, Swan and French valleys.

Over the years,water resources have assumed new priorities. Clear mountain streams provided ample domestic and irrigation supply for the basin's few hundred permanent inhabitants. Significant development of the Blue River Basin water resources began with the Colorado-Big Thompson Project in the mid-1930's. This marked the first large scale effort of diverting west-slope water from the headwaters of the Colorado River to a growing population and agricultural base on the Colorado Piedmont. Green Mountain Reservoir, a part of the project, was completed in 1942. Downstream water rights senior to the Colorado-Big Thompson project had to be satisfied and Green Mountain Reservoir functions as a replacement storage facility to satisfy these prior rights. The reservoir has a surface area of 2,130 acres and at full capacity stores 154,600 acre-feet. Incorporated in the dam is a power plant with a 21,600 kilowatt generating capacity (Bureau of Reclamation, 1961:129). Green Mountain Reservoir is administered by the Bureau of Reclamation and managed as a recreation area.

Colorado's east-slope population has increased rapidly since World War II with resultant soaring demands for water. To satisfy the needs of a growing Denver Metropolitan Area, the Blue River Diversion project was initiated to tap more unappropriated west-slope water. The project, which consisted of construction of Dillon Reservoir and Harold D. Roberts Tunnel, began in 1959. The town of Dillon occupied the site where the reservoir was to be built and had to be moved to its present site east of the dam. Dillon Reservoir covers 2,970 surface acres and at full capacity stores 254,036 acre-feet (Denver Board of Water Commissioners). Water is pumped from the reservoir under the Continental Divide through the Roberts Tunnel and empties into the North Fork of the South Platte River. The tunnel--10 feet 3 inches in diameter and 23.3 miles long--is the world's longest major underground tunnel (Denver Board of Water Commissioners). When completed in 1963, the reservoir nearly doubled Denver's raw water storage facilities. The Forest Service manages Dillon Reservoir for the Denver Water Board, providing a variety of water based recreational activities.

In recent years, deep snows that once hindered mining and transportation have become a primary asset. A growing ski industry has become the impetus for intensive land development and population growth. With continued development within the basin and growing demands of piedmont residents, the basin's unappropriated water is expected to diminish rapidly. Annual appropriations now total 233,000 acre-feet; Denver receives 168,000, Colorado Springs 9,600, Colorado-Big Thompson 52,000, and Summit County 4,200. In drought years the basin water yield drops from a normal 428,000 acre-feet to 312,000 (McCall Ellingson, 1971:44). Future growth in Summit County as well as the Denver area will depend on the availability of local water resources.

Agricultural Trends

There are a total of 381,891 acres of land in Summit County, of which over 76 per cent (291,116 acres) are public domain. Of the remaining 90,775 acres in private ownership, 41,103 acres are used for agriculture.

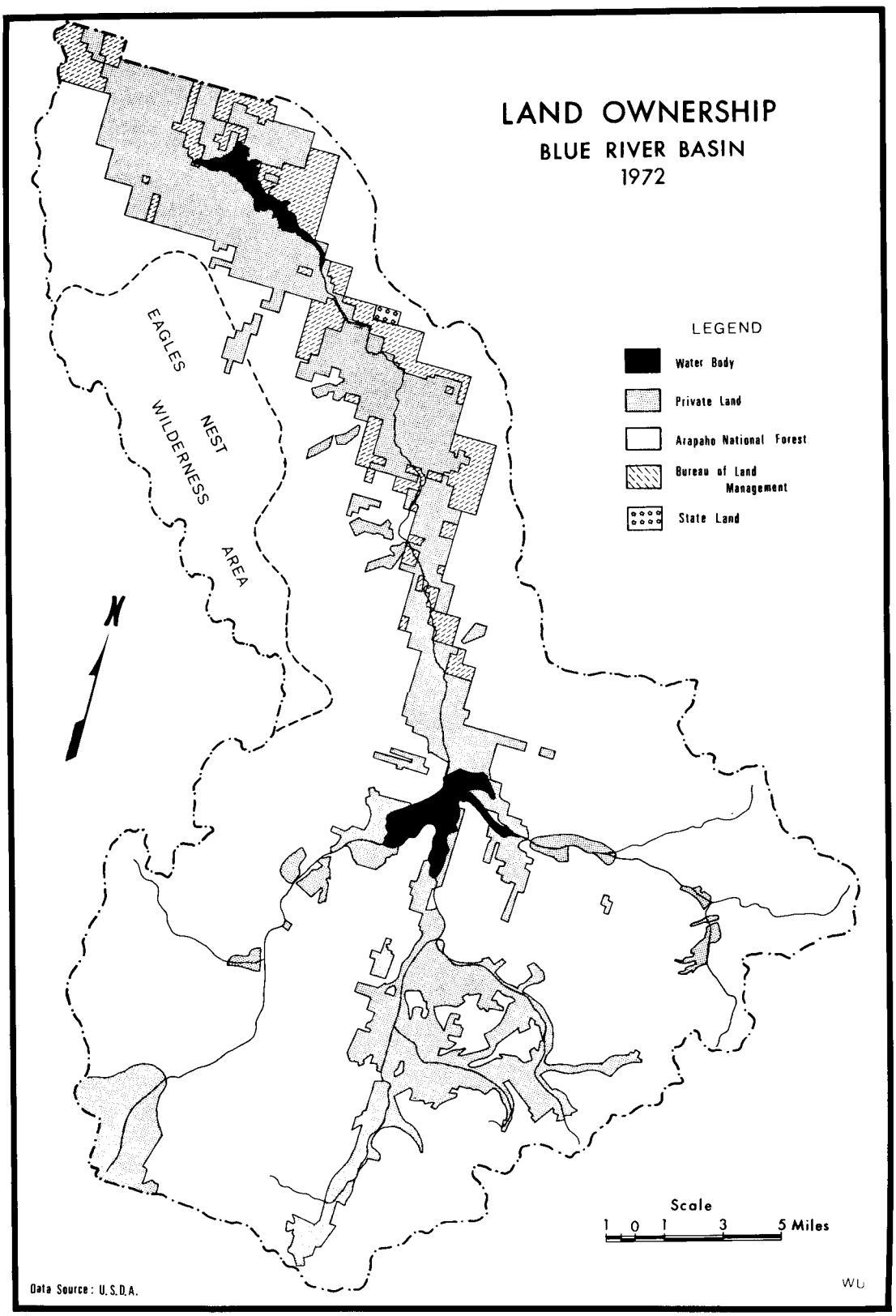

LAND OWNERSHIP
BLUE RIVER BASIN
1972
LEGEND
Water Body
Private Land
Arapaho National Forest
Bureau of Land Management
State Land
EAGLES NEST WILDERNESS AREA
N
Scale
1 0 1 3 5 Miles
Data Source: U.S.D.A.
WU

Plate 4

Homesteaders settled in the area late in the nineteenth century and raised cattle on a small scale (Blauvelt, 1962:52). Harsh climate and rugged terrain have limited agriculture almost exclusively to ranching in the northern half of the basin. North of Dillon the valley bottom broadens to about three-quarters of a mile and is undulating in character, dissected by numerous low erosion terraces.

Most homesteads on the valley bottom adjoin the national forests so that transhumance typifies ranching methods. Bottom lands are sown in hay and alfalfa. Semi-arid conditions necessitate irrigation and numerous ditches channel runoff water from the surrounding slopes to hay meadows. Cattle are driven onto higher slopes in spring to graze until early October. In late August and September the hay is cut and stacked in the meadows for winter use. Following the hay harvest, the cattle return to the lowland meadows to forage on the stubble and stacked hay over the winter months.

Summer pasturage is dependent to a great degree on public land management policies of the Forest Service and the Bureau of Land Management (BLM). Progressively strict grazing regulations on national forest lands in the past have been responsible for a decline in ranching (Blauvelt, 1962:68). A limited private land base coupled with strict grazing policies on public lands have forced ranchers to expand their private base of operations or go out of business. The result has been an increase in ranch size and a decrease in the number of ranches and cattle.

Agricultural trends indicated in Table 2 clearly show developing changes in land use over the past four decades. Progressively fewer farms of increasing size, a drastic increase in hay harvested, and declining numbers of cattle on farms all clearly indicate the effects of pressures on grazing privileges being exerted by public land management agencies. The Bureau of Land Management administers about twenty thousand acres of land

Table 2

Agricultural Trends in the Blue River Basin

Year	No. of Farms	Total Acreage in Farms	Avg. Size of Farm/ acres	Total No. of Cattle	Acres of Hay Harvested
1930	61	32,231	528	8,690	3,478
1940	59	42,098	713.5	7,330	3,634
1950	42	38,153	908.4	7,160	3,272
1959	34	50,772	1,493.3	6,336	3,533
1969	25*	27,600	1,104	4,219*	9,550

*Of the 25 farms total, only 20 reported cattle totaling 4,219 head.

(Colorado Agricultural Statistics and U.S. Census of Agriculture)

Table 3

Trends in Stock Grazing on National Forest Lands
in Summit County

	Dillon Grazing Dist.			Lower Basin Part Kremmling Grazing Dist.		
	Cattle	Sheep	Total Animals	Cattle	Sheep	Total Animals Permitted to Graze
1940	1,020	18,223	19,243	N/A	---	19,243
1945	711	12,432	13,143	N/A	---	13,143
1950	755	11,481	12,236	N/A	---	12,236
1960	522	8,050	8,572	N/A	---	8,572
1966	852	7,129	7,981	1,407	---	9,388
1970	145	4,399	4,544	877	---	5,421
1971	200	2,553	2,753	817	---	3,570

Source: U.S. Forest Service

in the basin, half of which is public domain. About 71.5 per cent of all the land in the basin is controlled by the Forest Service (274,278 acres).

The Multiple Use and Sustained Yield Act of 1960 has been used to formulate guidelines in public land management. Uses of the national forests included outdoor recreation, forage, timber, fish and wildlife, and watershed protection. Among the shortcomings of the Multiple Use Act was the conflicting nature of the above uses and the failure of the act to provide standards for determining priority of use. Recent emphasis on watershed protection and recreational use of the national forests has decreased the number of grazing allotments in the basin.

Grazing permits have declined constantly since 1940 when over nineteen thousand head of stock grazed public lands throughout the county. By 1971 a 73 percent reduction lowered the total to 3,570 animals. For all practical purposes, ranching in the basin is finished. According to Jim Hagemeier, a Forest Service spokesman, all but a few of the working ranches in the area have either been sold or optioned for sale to speculators or land developers.

Mining History

The Gold Rush of the late 1850's to the Front Range Mineral Belt lured prospectors over Hoosier Pass and into the Blue River Basin. Placer gold was discovered in 1859 in French and Georgia Gulches. A camp formed at the confluence of French Creek and the Blue River, became Breckenridge, and by 1860 thrived with a population of eight thousand (Blauvelt, 1962:26).

Placers were panned on most of the streams of the upper basin, but were richest along French and Swan Gulches and the Blue River. At the eastern end of French Gulch, Harry Farncomb found a deposit so rich he had to hire a crew to protect his claim. Pure wire gold, described as being rope-like, enriched his claim and one nugget was reported to have weighed thirteen pounds (Huckabay, 1970:19).

Mineral production and their resurging demands dictated the economic viability of the basin residents for nearly a hundred years. Most of the mineral production included gold, silver and lead. Placer mining, which began in 1859, lasted until 1863, when accessible gold deposits were so depleted that further operations were unprofitable. Most miners moved on leaving the basin with a population of 250 in 1870 (Blauvelt, 1962:27).

The last and most productive era of gold mining began in 1898 when placer mining, with the aid of newly gained technology, took new form. Dredges, which could scour gold from the valley alluvial deposits as deep as fifty feet, were brought into the basin. Dredges often operated four abreast floating upstream on small lakes created by their diggings. Dredging continued until about 1938, by which time over 35 million dollars in placer gold was produced. Summit County produced more placer gold than any other part of the state, about 41 per cent of the total (Blauvelt, 1962:41).

The effects of early mining activity still scar the landscape throughout the upper basin. Abandoned mines dot the area and their adits and discolored tailing dumps are visible from most roads. The worst destruction,

however, was caused by dredging operations which reversed the natural order of valley alluvium. Large cobbles, to one foot in diameter, were dredged up and deposited on top of fine gravel, sand and weathered clay soils. Miles of sterile rock mounds largely devoid of vegetation now dominate the valley bottoms of the upper basin.

From 1859 when gold was discovered in the upper Blue River Basin, the area's natural resources provided a fluctuating basis for economic development. Resurging booms in mining repeatedly lured thousands who left when the mineral deposits played out or were no longer in demand. The population of the basin has never approached the eight thousand level of 1860. Brief flurries of mining activity during both World Wars temporarily stimulated the basin economy. At best, agriculture has been marginal and is about to disappear altogether.

Changing needs and demands of a growing state and national population have again placed demands on the Blue River Basin's natural resources and the area's economy is in the incipient stages of another boom. The area's physical attributes and esthetic beauty are now the chief resources in demand to satisfy a growing national hunger for outdoor recreation.

CHAPTER II
The Recreation Era, Colorado and the Blue River Basin

National Recreation Trends

Modern America is moving into a post industrial age of leisure. In slightly over a hundred years the average workweek has reduced by over half. Farmers and laborers worked an average of 72 hours in 1850, 60 in 1900, 44 in 1940; and the current trend is to a 35 hour week. Many firms, private as well as governmental, have either changed to or are trying the four-day week. From 1940 to 1960 average leisure time increased by 155 hours per year with 75 hours gained from shorter workweeks, 48 hours gained through paid vacation increases and 32 hours gained from paid holidays (Godbey, 1971:33).

Constantly increasing technological advances since the Industrial Revolution have not only loosened the bonds of toil but also provided higher standards of living. Per capita disposable incomes have increased (in 1958 dollars) from about $1,236 in 1929 to $2,200 in 1965 (Clawson, 1969:5). Furthermore, the population is becoming increasingly mobile. Per capita travel increased from about 480 miles in 1900 to over 6,000 miles in 1960 (Thompson, 1970:5).

The prosperity of our technological society is expected to continue. Projections to the year 2000 indicate population will have increased to 350 million with a disposable per capita income of four thousand dollars.

(Clawson, 1963:8). Leisure time is expected to keep pace with income and increase 145 per cent, from 453 billion hours in 1950 to 1,113 billion hours in 2000 (Thompson, 1971:4). Also, increased mobility, promoted by the above two factors, is projected to reach nine thousand miles per person per year (Clawson, 1963:5-34).

The combined effects of increasing leisure time, prosperity, and mobility have generated a progressively growing demand for outdoor recreation in this country. Recreation specialists, social workers, and others, claim that outdoor recreation plays a definite role in the physical and emotional health of a society. The stresses of increased urbanization, another manifestation of technology, is also often credited as the cause of society's rush to the out-of-doors.

Recreation has become an important part of the nation's economy. In the late 1960's a major investment firm calculated that consumer spending on leisure had reached $150 billion per year. Furthermore, it was reported that government and voluntary agencies and industrial concerns were spending about $6,250 million annually on recreation programs (Kraus, 1971:62).

Recreation Space

Reflected in the growing demand for outdoor recreation is the critical need for recreational space. In the past, most recreation was restricted to land having little or no economic value or areas where it would not interfere with other uses. Now, however, recreation is competing with formerly dominant land uses.

Longer paid vacations, shorter workweeks, and earlier retirement, suggest that future needs will be greatest in the realms of intermediate and resource-based areas. The recent well-documented problems confronting Yosemite and Yellowstone national parks are indicative of the stress inflicted by our leisure society upon the nation's developed outdoor recreation resources.

To restore the swiftly decaying original value to these and other over-developed and overused sites, more such areas are destined to be developed. Fortunately, this country has a vast reserve of public domain to facilitate these needs. Located almost entirely in the sparsely populated West, these lands offer the most logical choice to recreational developers whose development schemes are more often than not dictated by land values.

Historically, most of the western states have been slow to develop. Marginal agriculture hampered by dry climate, rough terrain, and inadequate roads have been a barrier to economic progress. The wilderness-like character of the West has in recent years, however, acquired a new potential: that of satisfying the nation's growing demands for outdoor recreation.

Colorado — Playground of the Nation

Colorado is rapidly acquiring the reputation of "playground of the nation," and with good reason. The state is centrally located in the nation and has an abundance of recreational resources in a beautiful setting that may be enjoyed year-round.

Although Colorado's population is growing faster than that of the nation as a whole, most of the population has settled on a narrow strip of the piedmont abutting the eastern edge of the Southern Rocky Mountains: commonly referred to as the Front Range Corridor. The eastern half of the state is dominated by crop and grazing land. It is the western half, however, that holds the key to Colorado's future growth.

Western Colorado offers a variety of recreation, unequaled in quality and scope by eastern states and shared by few western states. Dominated by rugged terrain, the western part of the state boasts 1,143 mountains with peaks over 10,000 feet; 53 of which are over 14,000 feet (Colorado Yearbook, 1964:609). By way of contrast, California, which is also known as a mountain state, has only 42 peaks that reach 10,000 feet; 12 of which exceed 14,000.

Recreational water abounds in Colorado. As of May 1972, the Division of Game, Fish and Parks reported 194,000 surface acres of water available for public use. Reclamation reservoirs, of which there are 248, provide the bulk of water-based recreation with 101,809 acres. Natural lakes, mostly in the high mountains, provide 15,347 acres. Nearly 3,000 streams totaling 7,100 miles in length furnish 18,328 acres (Lynch). Four species of trout; Rainbow, Cutthroat, Brown and Brook, and Kokanee Salmon may be fished from the lower lakes and reservoirs of the Piedmont to the high-country streams.

Big game is found throughout the state. Antelope and white tailed deer are predominant in the eastern plains. In the mountainous western part of the state, great herds of mule deer and elk plus bighorn sheep, Rocky Mountain Goat, and bear may be found. Colorado also boasts a wealth in upland game and water fowl.

The most important factor in Colorado's potential as a recreational state, however, is the availability of land for public use. Also, most of this available land is located in the scenic mountainous western part of the state. Public domain lands account for 36.3 per cent of the total land in Colorado. Within this reserve of public land are eleven national forests comprising over 14 million acres; national parks and monuments constitute another 500 thousand acres; and the Bureau of Land Management administers control over an additional 24 million acres (Public Land Law Review Commission, 1970:328). In addition to this, the Division of Game, Fish and Parks has nearly 100 thousand acres for public use, most of which are in the western half of the state (Colorado Division of Game, Fish and Parks, 1971: 17).

Tourism in Colorado

Economic benefits generated by Colorado's recreational resources are particularly noteworthy. Tourism ranks as the state's third largest industry, after manufacturing and agriculture, and is growing. In 1950 tourists visiting Colorado spent $3,712,110 in the state (Cobb, 1969). A recent study conducted by the Denver Research Institute on tourism showed that in 1968, six million tourists spent 32 million visitor-days and $473 million in Colorado. The report also indicated that the bulk of visitors came from the Great Plains States (Bickert et al., 1969:103).

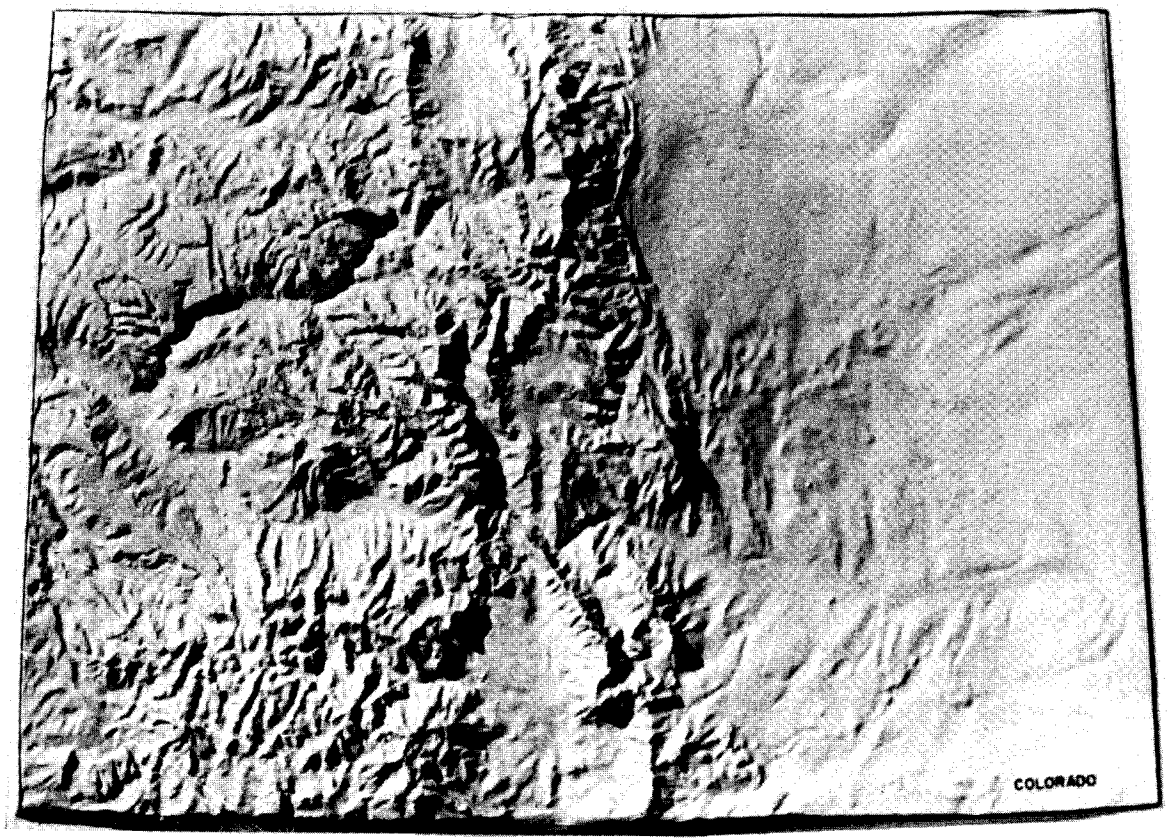


Plate 5

If the multiplier effect of tourist expenditures, which has been calculated at 3.2 to 4.3, is applied the state's tourist dollars become much more significant (Thompson, 1970:20). Even using the low value of 3.2, the net earnings generated by tourist expenditure for 1968 would be well in excess of $1,500 million. Furthermore, there are currently 33,000 jobs in the state that are associated with tourism, 23,000 of which are due directly to out-of-state tourists (Bickert et al., 1969:103).

Publicity and promotional schemes are a dominant factor in attracting tourists to Colorado. Annually, at least since 1966, the state has spent an average of almost half-a-million dollars a year on a nationwide sell-Colorado campaign. The aforementioned study on tourism pointed out the impact of such publicity schemes. Of the visitors vacationing in Colorado in 1968, 52 per cent had noticed advertising on Colorado recreation in National Geographic, Holiday, and Colorado magazines (Bickert et al., 1969:14).

Table 4

State Expenditures for Tourism Promotion

Fiscal Year	Expenditures
1966-67	$461,394
1967-68	462,652
1968-69	493,271
1969-70	506,950
1970-71	488,874
1971-72	538,874
1972-73	413,505

Source: Colorado Division of Commerce and Development and State Budget Committee

Crowded conditions in the state's Forest Service campgrounds and national parks during the summer months attest to the success of these campaigns. Last year (1971) 8,410,000 tourists spent an estimated $600 million in Colorado. Although the total number of tourists visiting the state in 1972 declined slightly to 8,365,000, total expenditures increased to $624 million (Colorado Division of Commerce and Development, 1972).

Another interesting outgrowth of tourism is that it introduces thousands of new people to the area who eventually relocate here. The results of a recent Gallup vacation index showed Colorado ranked second, behind California, as a state in which to relocate. The expressed desire to live here was a function of some prior exposure to the state (Bickert et al., 1969:59).

The Blue River Basin as a Recreation Satellite

By virtue of its inherent qualities, proximity to population, and accessibility, the Blue River Basin comprises one of the finest year-round recreation regions in Colorado. From Denver, which is served by an international airport, travel time to the basin is about one and one-half hours.

Scenic quality and recreation opportunities are abundant. Cool summers, normal to the basin elevation, offer a refreshing change from the hot, parched plains. Open meadows dominate the basin floor yielding to coniferous forests, interspersed with aspen groves on the surrounding slopes. Small wild animals and songbirds are frequent sights.

Relics of the early gold mining era are abundant and provide a touch of frontier charm. A historical section has been designated in Breckenridge to preserve the old false-fronted western buildings lining Main Street, as well as a host of other old dwellings. Montezuma and Tiger, two exceptionally well-preserved old mining towns, are only minutes from Dillon, the center of the basin.

The bulk of summer tourists spend their time almost exclusively in the lower elevations of the basin, camping and fishing. In winter, recreational activity shifts to the slopes and skiing. Typical of Clawson's intermediate based sites, heaviest use falls on weekends. Campgrounds crowded beyond capacity during the summer weekends are almost deserted the following Monday. Big crowds start filtering in on Fridays and leave by Sunday evening. Crowded conditions are also typical during the winter ski season weekends when congested slopes, long lift lines, and jammed parking lots are familiar sights. During the week, on the other hand, lift lines are reduced to only a few minutes wait, if any, and in many instances some lifts are closed for want of riders.

Easier Accessibility to the State's Hinterlands

According to Clawson, the willingness of ordinary people to enjoy outdoor recreation depends upon the costs of doing so (Clawson, 1963:56). Thus, the number of visitors to a recreation area depends directly upon the distance involved in traveling to the area and the number of people approximate to the area. The cost in money, time, and travel is directly related to distance.

Time, travel, and consequent costs are also a function of accessibility. In the past, accessibility to Colorado's west slope remained limited by a number of winding, two-lane roads. During peak summer periods, bumper-to-bumper traffic is common in areas of high-density use. Icy roads and high passes make winter travel through the mountains especially arduous. Even under winter conditions, bumper-to-bumper traffic is often the rule in the vicinity of ski areas, especially on weekends.

This situation is being rectified. Colorado's first transcontinental

Fig. 1. The last remaining gold dredge in Summit County; located about five miles east of Breckenridge on French Creek.

Fig. 2. Wellington mine entrance on French Creek; reputedly one of the richest mines in the basin and still operational.

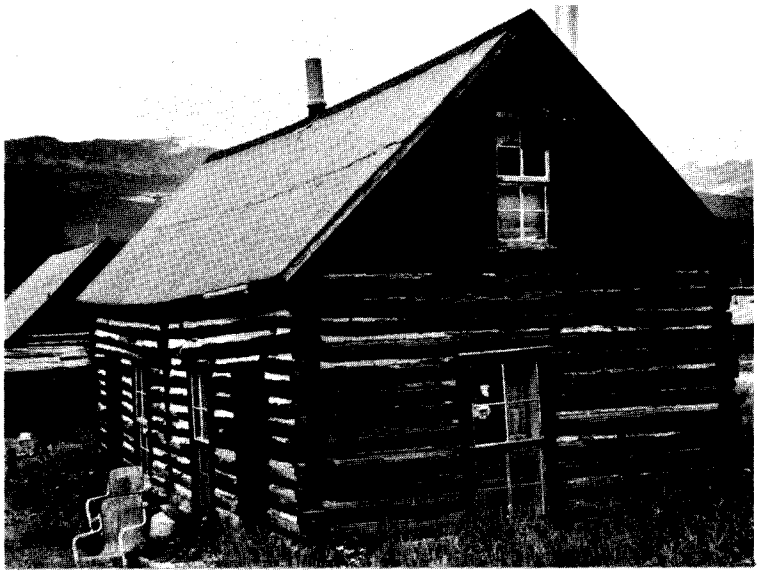


Fig. 3. Early miner's cabin in Breckenridge has been refitted with a metal roof and is currently occupied.

Fig. 4. False front buildings mark the main street of Breckenridge. Breckenridge Peak-8 ski area lies in the background.

Fig. 5. The old mining town of Montezuma appears deserted, but many of the old buildings are occupied and some new development is in progress -- upper right.

Fig. 6. Shortly after this photo was taken, a number of transients occupying the old town of Tiger were evicted by the Forest Service.

east-west four-lane freeway, Interstate-70, is currently under construction. Obviously, from the small amount of commerce formerly emanating from the west slope, tourism is a prime motive in constructing the road. I-70 will be a particular boon to recreationists in the Denver Metropolitan Area. Travel time and distance, and therefore costs, to the state's hinterlands will be effectively reduced.

In March 1973 four lanes of freeway connected Denver to the Blue River Basin. The Eisenhower Tunnel, which had experienced a number of setbacks and delays in construction, was finally opened to traffic. Construction on the tunnel began five years ago and completed 24 months later than planned. The total cost of the 1.69 mile bore under the Continental Divide is estimated to be $110 million. The March 1973 opening date marks completion of the first boring and traffic will be restricted to two lanes throughout its course. A second bore is expected to begin sometime after completion of the first tunnel. Colorado Highway Department projections indicate that by 1975 the tunnel is expected to carry an average 7,800 vehicles daily and about 17,000 on a peak Sunday. By way of comparison, the current annual daily average traffic over Loveland Pass is 4,900 vehicles. Traffic by 1990, during the month of August, is expected to increase to 16,977 vehicles daily and 38,641 on a peak Sunday (Tippets et al., 1964).

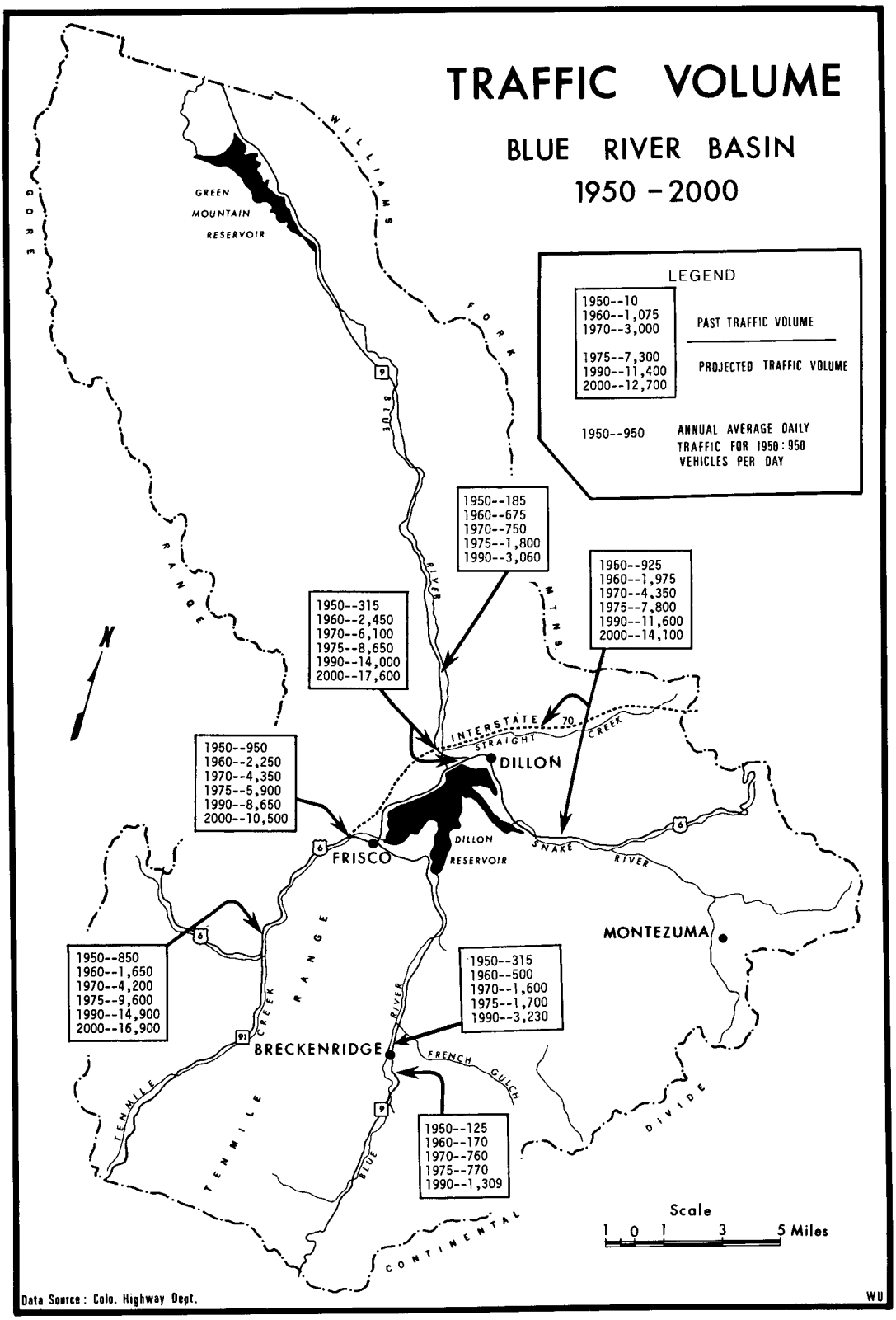
Currently under consideration is a plan which will reduce accessibility to about thirty minutes. The plan, called the Colorado Mountain Aviation System, was proposed by the Federal Aviation Administration (FAA) officials as an alternative to expanding the state highway system and supplement existing transportation systems serving towns and recreational communities in the mountains. In support of the plan, the FAA cited the scheme as crucial to development of Colorado mountain communities dependent largely upon a growing number of tourists and skiers over the next decade. FAA officials predicted skier visits to Colorado resorts would increase by over three and one-half times in the next ten years (Von Stroh, 1972).

If the plan is approved, airstrips will be needed in key mountain communities to accommodate short take-off and landing aircraft (STOL). A microwave system to assist navigation and landing operations in near zero visibility is currently being developed. Year-round recreation communities developing or already developed are prime targets of the scheme and the Breckenridge-Dillon recreational complex was specifically cited as an area to be included.

Denver would serve as the eastern gateway to the system with Salt Lake City the western portal. Breckenridge alreadyhas an airstrip which would require little modification to handle STOL aircraft. Long distance commuting to escape the decaying cities is becoming more common. Serviced by an all-weather four-lane interstate highway and scheduled commuter flights, commuters focusing on Summit County are almost certain to increase in number.

Water-Based Recreation

Well-endowed with water, the basin resources include 5,545 surface acres in the two reservoirs, 69 small, high mountain lakes and about 80 miles of fishable streams (Soil Conservation Service, 1968). German Brown trout are


TRAFFIC VOLUME
BLUE RIVER BASIN
1950 - 2000
LEGEND
1950--10
1960--1,075
1970--3,000
PAST TRAFFIC VOLUME
1975--7,300
1990--11,400
2000--12,700
PROJECTED TRAFFIC VOLUME
1950--950
ANNUAL AVERAGE DAILY TRAFFIC FOR 1950 : 950 VEHICLES PER DAY
GREEN MOUNTAIN RESERVOIR
WILLIAMS FORK RANGE
BLUE RIVER
1950--185
1960--675
1970--750
1975--1,800
1990--3,060
1950--925
1960--1,975
1970--4,350
1975--7,800
1990--11,600
2000--14,100
1950--315
1960--2,450
1970--6,100
1975--8,650
1990--14,000
2000--17,600
INTERSTATE 70
STRAIGHT CREEK
DILLON
1950--950
1960--2,250
1970--4,350
1975--5,900
1990--8,650
2000--10,500
FRISCO
DILLON RESERVOIR
SNAKE RIVER
MONTEZUMA
1950--850
1960--1,650
1970--4,200
1975--9,600
1990--14,900
2000--16,900
TENMILE RANGE
1950--315
1960--500
1970--1,600
1975--1,700
1990--3,230
BRECKENRIDGE
FRENCH GULCH
TENMILE CREEK
BLUE RIVER
1950--125
1960--170
1970--760
1975--770
1990--1,309
CONTINENTAL DIVIDE
Scale
1 0 1 3 5 Miles
Data Source : Colo. Highway Dept.
WU

common in both reservoirs as well as the Blue River. These waters are also stocked with Rainbow Trout and Kokanee Salmon. Brook and Cutthroat trout reproduce naturally in the high alpine lakes and small tributary streams. Tim Kelley's fishing and hunting guide rates the basin waters as excellent during the spring, declining to good and fair during later parts of the year (Tim Kelley, 1971:222).

The two large reservoirs, especially Dillon, are hubs of recreational activity in the basin during the milder seasons. Dillon Reservoir has about 25 miles of shoreline with strategically-located public campgrounds and picnic facilities. A small marina at the town of Dillon provides limited services for sail and motor boaters. Current plans provide for expansion of the marina to handle a capacity of about three hundred boats, which would include two hundred moorings. An ultimate capacity of seven hundred boats on the lake at any one time has been established by the Forest Service, which administers recreation policy on the Reservoir for the Denver Water Board. Also included in future expansion plans are a yacht club, restaurant, lounge, restroom facilities, docks, and spectator areas. In wintertime, snowmobiling and ice fishing are also permitted on both reservoirs. Water skiing, which is allowed at Green Mountain, is prohibited at Dillon Reservoir.

Twelve improved Forest Service operated campgrounds in the Basin incorporate a total of 676 camping units. Camping methods vary but usually involve the use of tents, trailers, or truck-mounted campers. Campgounds are also available at Green Mountain Reservoir. Although this reservoir is maintained by the Bureau of Reclamation, the Colorado Department of Natural Resources administers at the site a state recreation area which includes five separate campgrounds.

Since 1966, Forest Service recreation facilities at Dillon Reservoir averaged an annual user-increase of 46.5 per cent (Table 5). Declining increases since 1970 indicate facilities are reaching saturation. Campgrounds, the heaviest used facilities in the area, show the greatest gains in user-days. Dillon Reservoir is an ideal spot for camping and the Forest Service is currently improving campgrounds in the area with flush toilets.

Completion of I-70 and the Eisenhower Tunnel is expected to accelerate growing demands for recreation at Dillon Reservoir. Heavy demands will be a strong factor in additional development of the area, both in the private sector and by the Forest Service. Heaviest pressures are most likely to occur during summer seasons, with increased activity in camping, fishing, and a growing interest in boating. Improved accessibility may also necessitate greater emphasis on day-use facilities such as picnic areas. Ice fishing and a growing interest in snowmobiling will dominate winter use of the reservoir.

The Ski Boom

Most of the resource development currently underway in the Blue River Basin is either directly or indirectly associated with skiing. In 1960 there was only one ski resort in the area, Arapahoe Basin, which opened during the 1940's and has catered almost exclusively to day skiers from Denver. Since then, however, the popularity of skiing in Colorado has flourished.

Table 5

Dillon Reservoir Recreation Site
Visitor Use Trends

	1966	1967	1968	1969	1970	1971
Frisco Boat Launch		2,100	5,500	9,800	10,800	32,600
Snake River	400	1,600	3,300	5,800	6.400	11,300
Dillon	600	4,800	5,100	9,000	9,900	2,100
Frisco Bay	500	2,100	3,000	5,300	6,500	18,700
Blue River	300	2,400	3,100	5,400	6,000	12,700
Giberson Bay		2,100	2,800	5,000	5,500	10,000
Windy Point			2,700	4,800	5,300	7,600
Peak One	8,100	21,200	39,700	57,500	63,300	49,800
Prospector	16,600	14,800	23,300	49,600	54,600	52,500
Heaton Bay	16,700	44,900	54,000	77,100	84,800	114,700
Rainbow Lake				900	1,000	5,400
Officers Gulch	11,200	10,300	6,800	23,000	25,400	7,400
Total Visitor Days	55,000	106,900	150,600	265,500	279,500	324,800
Pct Inc.		94.3%	40%	76.2%	5.2%	16.2%
Average annual increase	46.5%					

Source: U.S. Forest Service

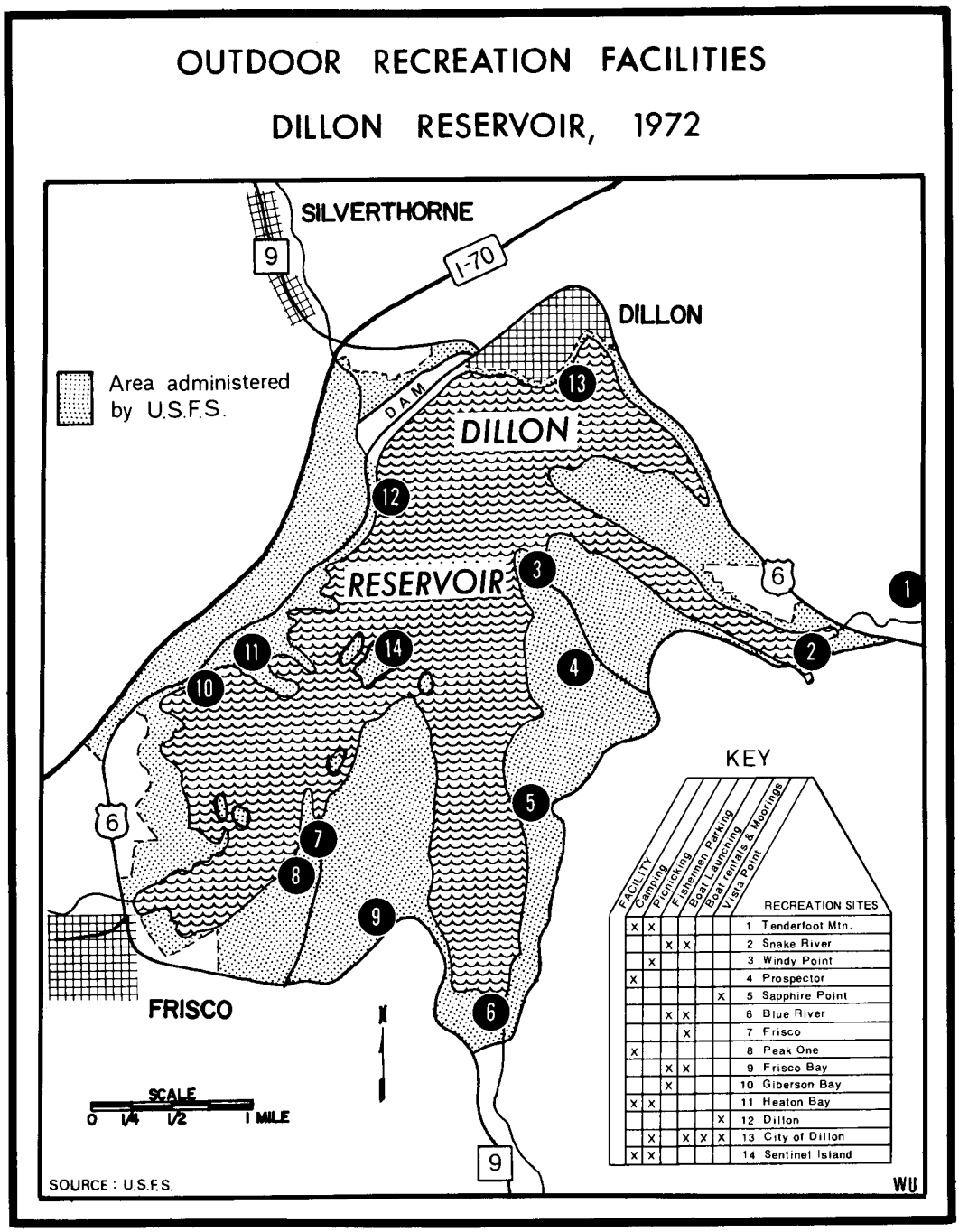

OUTDOOR RECREATION FACILITIES
DILLON RESERVOIR, 1972
SILVERTHORNE
I-70
DILLON
Area administered by U.S.F.S.
DAM
DILLON
RESERVOIR
FRISCO
SCALE
0 1/4 1/2 1 MILE
SOURCE : U.S.F.S.
WU
KEY
FACILITY
Camping
Picnicking
Fishermen Parking
Boat Launching
Boat rentals & Moorings
Vista Point
RECREATION SITES
1 Tenderfoot Mtn.
2 Snake River
3 Windy Point
4 Prospector
5 Sapphire Point
6 Blue River
7 Frisco
8 Peak One
9 Frisco Bay
10 Giberson Bay
11 Heaton Bay
12 Dillon
13 City of Dillon
14 Sentinel Island

Plate 7

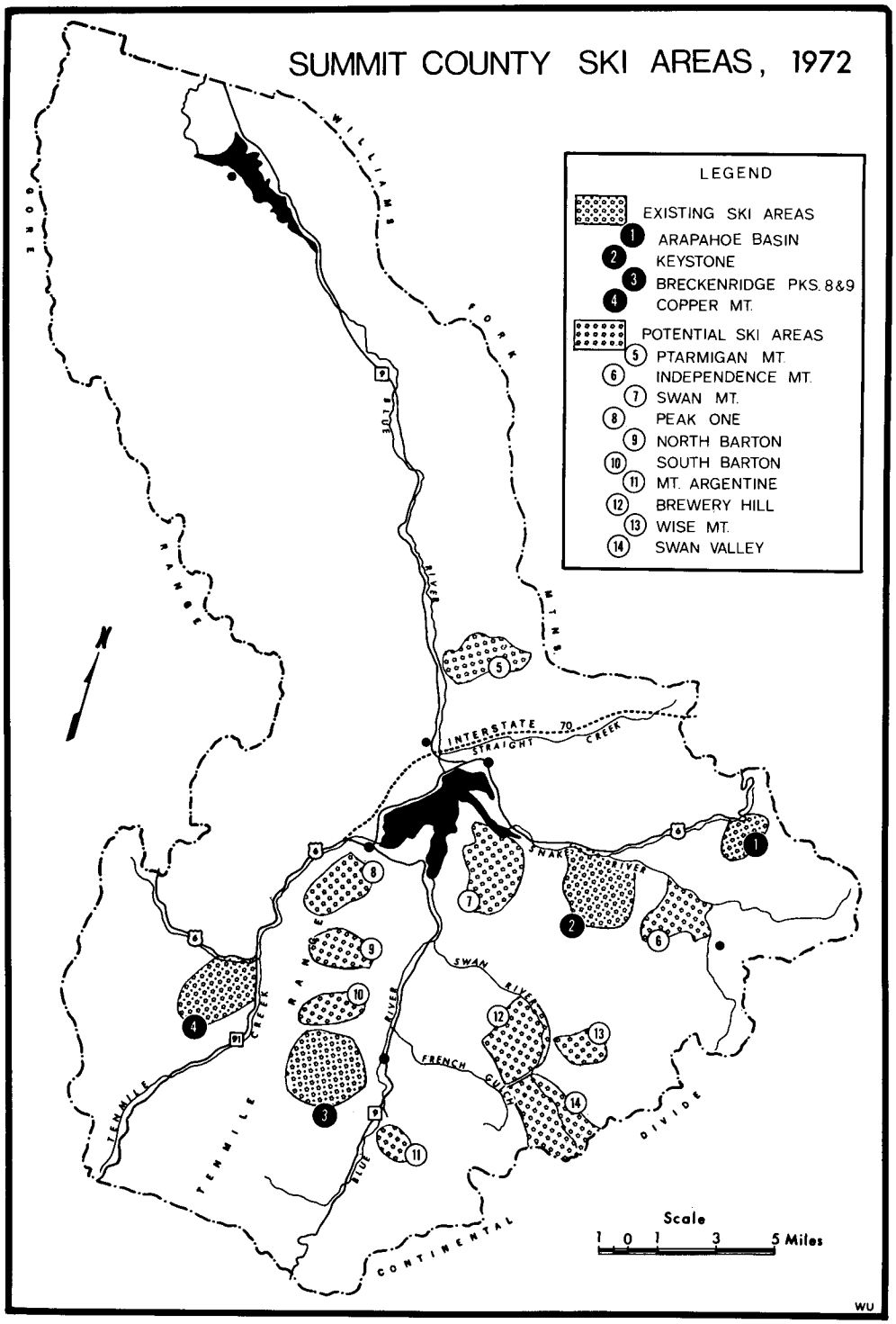

SUMMIT COUNTY SKI AREAS, 1972
LEGEND
EXISTING SKI AREAS
1 ARAPAHOE BASIN
2 KEYSTONE
3 BRECKENRIDGE PKS. 8&9
4 COPPER MT.
POTENTIAL SKI AREAS
5 PTARMIGAN MT.
6 INDEPENDENCE MT.
7 SWAN MT.
8 PEAK ONE
9 NORTH BARTON
10 SOUTH BARTON
11 MT. ARGENTINE
12 BREWERY HILL
13 WISE MT.
14 SWAN VALLEY
WILLIAMS FORK
BLUE RIVER
INTERSTATE 70
STRAIGHT CREEK
SNAKE RIVER
SWAN RIVER
FRENCH GULCH
TENMILE CREEK
TENMILE RANGE
TENMILE DIVIDE
CONTINENTAL DIVIDE
Scale
1 0 1 3 5 Miles
WU

Plate 8

Table 6

Ski Site Inventory
Summit County, Colorado

Appraiser[1] Rating	Site	Lift Capacity[2]	Slope Capacity
G	Brewery Hill	3,000-5,000+	6,000-10,000
G	Swan Valley	3,000-5,000+	6,000-10,000
1-O	Copper Mountain	4,500	9,000
G	Independence Mountain	3,500	7,000
2-O	Keystone	4,500	9,000
M	Mt. Argentine	1,000	2,000
G	North Barton	2,000+	4,000+
1-3-G	Peak Nine	2,000+	4,000+
U	Peak One		
G	Ptarmigan Peak	2,000-3,000	4,000-6,000
M	South Barton	2,000+	4,000+
U	Swan Mountain		
U	Wise Mountain		
4-O	Arapahoe Basin	3,000	6,000
4-O	Breckenridge	4,300	8,600

Legend

1. (1) Under Development
   (2) Expansion of Existing Area
   (3) Study Permit
   (4) Existing

(O) Outstanding
(G) Good
(M) Marginal
(U) Unacceptable

2. Skier capacity as capability of each skier making at least two runs per hour

Source: U. S. Forest Service

Successful ski area operation hinges upon physical factors; mountains having steep to gentle gradients and north to east exposure; proximity to large population centers; good accessibility and adequate snow cover over most of the winter months. Ski area promoters and developers have discovered these criteria in abundance in the Blue River Basin. The Dillon Chamber of Commerce touts a potential seventeen ski areas in the basin. Forest Service inventories and appraisals reveal a total of fourteen, a number of which have already developed. Existing and potentially developable ski sites in the basin promise to offer skiers a greater choice than any other region in the state.

Elevations in the area are more than adequate to insure a good snow cover throughout the winter. Most of the basin floor lies above 8,500 feet and surrounding slopes add another 4,000 feet of relief. Snowfall, even at the lower elevations, normally exceeds 86 inches annually and prevailing low temperatures retard melting until about the first week of May.

Eight decades of mining in the upper Blue River Basin produced about $70 million in minerals. Within the single decade of the 1970's, investors will spend over $250 million on ski resort development on top of millions already spent during the past decade. Expenditures on ski runs, lifts, and lodges represent only a fraction of the total investment. These facilities will form the nuclei of future resort development, most of which will be oriented to supporting the ski business.

Breckenridge Lands, Inc., a subsidiary of Rounds and Porter Lumber Company of Wichita, Kansas, started the current boom in ski area development in the mid 1950's, when they bought a total of 5,500 acres of land in and around Breckenridge (Huckabay, 1970:26). Planned development over a ten year period included a ski area and numerous support facilities in Breckenridge. Construction of Peak-8 ski area commenced in 1961 and the area opened for business the following year. After completion, Peak-8 facilities included 44 ski trails, 10 lifts, a lodge, restaurant, cafeteria, night club, theater, nursery, and ski shop.

During the decade of the 60's, ski popularity throughout the nation mushroomed. In Colorado, the annual rate of increase soared to nearly twenty per cent (Table 13). Traditionally, ski resort profitability has been seasonal in nature; dependent upon winter tourism. Many closely-associated shops and businesses would close after the season ended and employees would leave. A recent phenomenon of the Colorado recreation industry is the four-season resort centered around a ski site, but also geared to tap the lucrative summer tourist market.

In 1970, the Breckenridge Corporation announced expansion of its facilities at Peak 8. Construction began in the same year on Four Seasons Village, a $52 million complex offering complete year-round recreation and to be finished in five years. Located adjacent to the heart of Breckenridge, the new resort is based at the foot of a new ski area, Peak-9. When completed Peak-9 will include 935 acres of runs and trails on 3,500 acres of national forest land overlooking Breckenridge and the upper basin (The Breckenridge Corp.).

Recreation activities featured by the Four Seasons complex will include

Fig. 7. The scarred slopes of Arapahoe Basin Ski Area (top photo) and Breckenridge Ski Area (bottom photo) stand out in stark contrast to the natural setting of the alpine environment.

skiing, swimming, ice skating, tobogganing, snowmobiling, snow-shoeing, cross-country ski and snowmobile tours, sleigh riding and ice fishing. Summer activities feature archery, horseback riding, and trap and skeet shooting, in addition to that recreation already existing elsewhere in the basin. Construction is currently well underway on Four Seasons Village and Peak-9 opened to skiers in the 1971-72 season. Ski run development on Peak-10, a neighboring peak to the south, is rumored to follow completion of Peak-9 development.

Paralleling events at Breckenridge, the construction of Keystone, located six miles east of Dillon, began in 1969, with the bulk of financial backing provided by Ralston-Purina Company. Similar in nature to the Four Seasons Village, Keystone also is planned as a complete, year-round resort area featuring winter recreation.

Keystone opened for skiers in the 1970-71 season with surprising success; ticket sales totaled 76,300 (Table 13). Stimulated by the first year's success, the owners expanded operations over the following summer to handle five thousand skiers per day, a doubling of slope capacity. Currently, 380 acres of trails are served by four high capacity lifts. Two lodges serve the area, one at the base, boasting seven fireplaces and another multi-leveled structure at the summit. When completed, Keystone will handle fifteen thousand skiers per day (Nelson, 1973).

Guided by a master plan, development and completion of Keystone will be over a fifteen year period, involving ultimate investments of over $100 million (Nelson, 1973). The complex will evolve about a village centered on several cascading ponds along the Snake River. During the summer of 1972, one of the largest snowmaking projects undertaken in Colorado was installed at Keystone. Poor snow conditions on the lower slopes at the beginning and end of the season are expected to be eliminated and the season extended by several weeks. In addition to hosting a variety of winter sports activities, skiing will be featured. Summer activities will evolve about water related sports along the Snake River and Dillon Reservoir, in addition to an 18-hole golf course.

Max Dercum, a former professor of forestry at Penn State, was the prime mover in developing Keystone. Ecological considerations were stressed during trail and ski run clearing to alter the environment as little as possible. Ski runs were cleared mainly by hand, with heavy equipment used only on gentler slopes. Cement was hauled up the slopes and poured by helicopter in construction of ski lift towers.

About three miles east of Keystone ski area at the base of Independence Mountain, are another 103 acres owned by Keystone International. Independence Mountain was recently considered for development as a site for the 1976 Olympic alpine events. Forest Service records (Table 13) show that Keystone's second year was even more successful than the first when the number of skier-days doubled over the previous season. With such continued success, it is highly possible that Keystone International will continue expansion and eventually develop its holdings at the base of Independence Mountain.

Copper Mountain, another multi-million dollar super-resort complex, is also currently under construction in the basin. Copper Mountain, Inc. and

Fulenwider Management and Development Corporation of Denver are co-owners of the project. Located six miles west of Frisco at Wheeler Junction, Copper Mountain will evolve on a 320 acre plot completely surrounded by national forest land. Based on investments, Copper Mountain promises to be as luxurious as either Keystone or Four Seasons Village. Construction of ski runs began in 1971 and opened for skiing in December of the same year. Although lifts were not operational at the time, snow cats hauled skiers up the slopes.

Tentative completion is scheduled for 1978, by which time $100 million will have been invested (Copper Mountain, Inc.). A planned capacity of ten thousand skiers per day will have access to fifty trails and fourteen lifts. Included in the master plan are: lodges with twelve hundred rooms, one thousand condominium units, conference center, golf courses, swimming pools, tennis courts, soccer field, baseball field, a dude ranch, and a six thousand-car parking lot. A commercial core area of 170 thousand square feet will provide space for an assortment of stores, shops and offices. Entertainment and dining facilities include a number of restaurants, bars and cocktail lounges. Plans also call for 550 employee housing units (Copper Mountain, Inc.).

Ski participation trends over the past decade have been more than impressive, showing an average gain of 19.8 per cent annually, both statewide and in Summit County (Table 13). Of the eleven sites surveyed by the Forest Service, one has already been developed (Peak-9) and seven others are rated as acceptable (Appendix III). While the average of all Colorado ski areas declined during the past two seasons, those in Summit County increased substantially, indicating a growing preference among skiers for resorts in the basin over those elsewhere in the state. If the current trend continues, additional ski sites are almost certain to be developed in Summit County.

Recreational development of Summit County, while being beneficial to ski area operators, developers, and residents in general, is also supplementing federal, state, and county revenue to an increasing degree. In 1964 revenues collected by Arapahoe National Forest totaled $35,471, derived mostly from timber sales and grazing fees (Table 7).

Table 7

Revenue Sources, Arapahoe National Forest

Year	Timber	Grazing	Minerals	Recreation	Total
1946	$17,968	$14,943	---	---	$ 35,471
1955	76,838	16,810	---	---	103,724
1965	34,202	16,042	$ 20	$ 37,393	91,276
1968	96,911	17,545	7,791	50,361	175,169
1971	42,256	14,711	65	109,369	170,022

Source: U.S. Forest Service

Despite fluctuation in timber and grazing funds, total revenue increased nearly five-fold by 1971. Prior to 1965 revenues collected from recreational

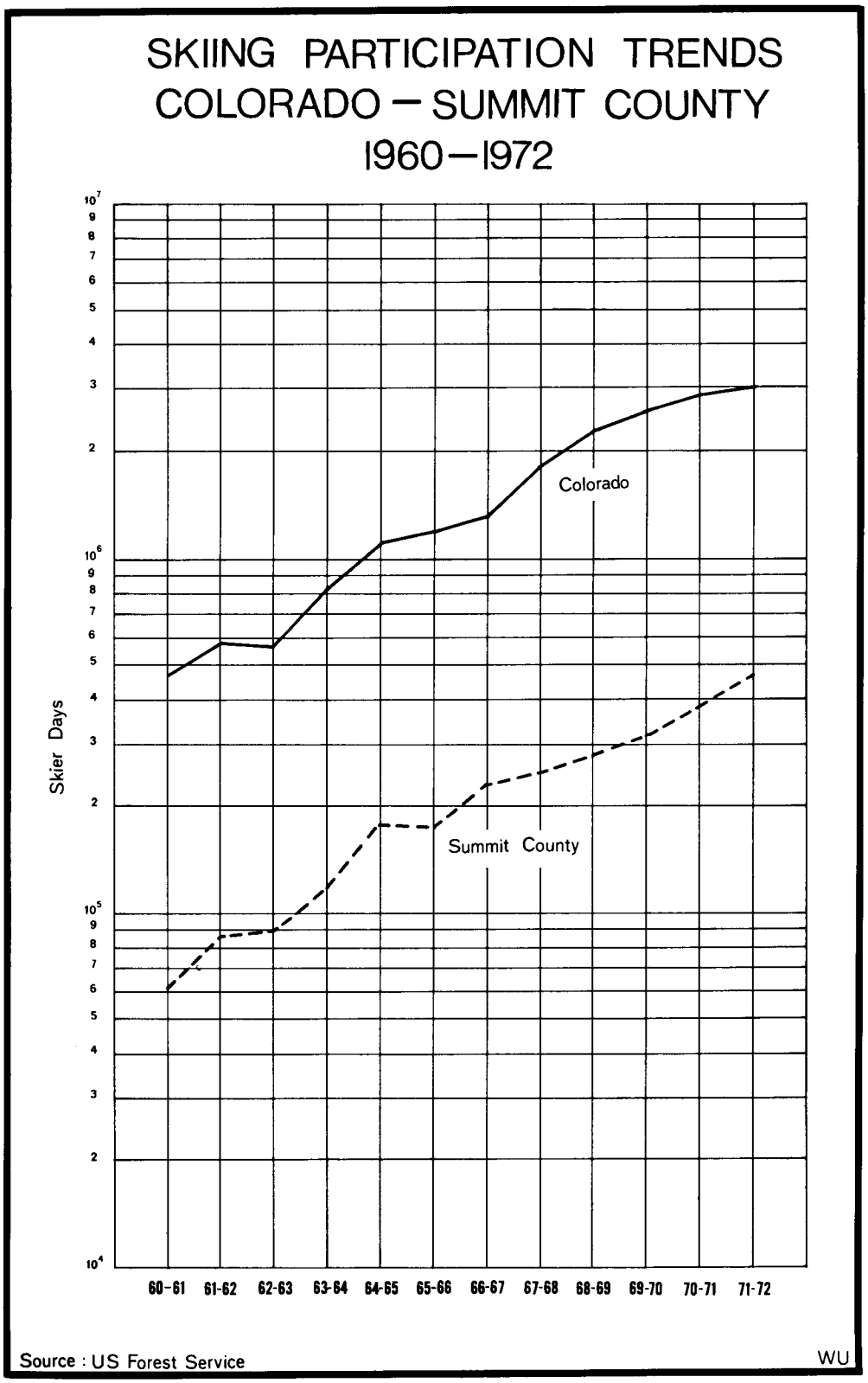

SKIING PARTICIPATION TRENDS
COLORADO – SUMMIT COUNTY
1960–1972
Skier Days
Colorado
Summit County
60-61
61-62
62-63
63-64
64-65
65-66
66-67
67-68
68-69
69-70
70-71
71-72
Source : US Forest Service
WU

Plate 9

use of the forest was insignificant and normally included under miscellaneous income. In the past seven years, dividends from recreation have increased dramatically and now eclipse all other sources.

Approximately 25 per cent of the total revenue collected is returned to the state for distribution to county governments (Table 8). Dividends to Summit County have more than tripled since 1963. However, it must be remembered over 75 per cent of the county is public domain and exempt from the tax rolls. A comparison of Forest Service dividends paid to the county with potential taxes from the 274,278 acres of national forest lands within the county might prove interesting.

Table 8

Colorado National Forest Fund Payments

Total Annual Funds Paid to:			
	State Total	Arapahoe National Forest	Summit County
1963	$263,981.30	$19,275.13	$ 5,367.49
1964	211,611.61	15,091.22	4,202.50
1965	196,259.52	22,819.10	6,304.51
1966	not available		
1967	272,848.42	29,581.76	8,805.61
1968	330,424.81	43,792.17	13,035.62
1969	706,712.74	73,056.13	21,758.05
1970	494,555.40	59,825.83	17,968.52

Payment to State = 25% of total funds collected. County allocations based upon county acreage within national forest.

The future of skiing in Colorado and especially in the Blue River Basin promises expansion. Despite the recent lull in the national economy, participation in skiing continues to increase. Colorado's population, growing faster than that of the nation, is developing almost exclusively along the Front Range Corridor, and urban areas along this strip are eventually projected to coalesce. Colorado's growing population, situated in such proximity to the mountains, will certainly take full advantage of its recreational resources for years to come. Even though ski-area entrepreneurs have recently reoriented resort development to entice vacationers, summer as well as winter, the local market continues to provide the majority of skiers.

A recent study conducted by the Denver Research Institute revealed Colorado residents accounted for 64.9 per cent of all visits to ski areas within the state during the 1967-68 season (Bickert et al., 1969:72). Nearly 40 per cent of in-state visits originated in the Denver Metropolitan Area. Almost half of the out-of-state skiers came from Northeast and North Central States with the Midwest contributing 8.7 per cent (Plate 11).

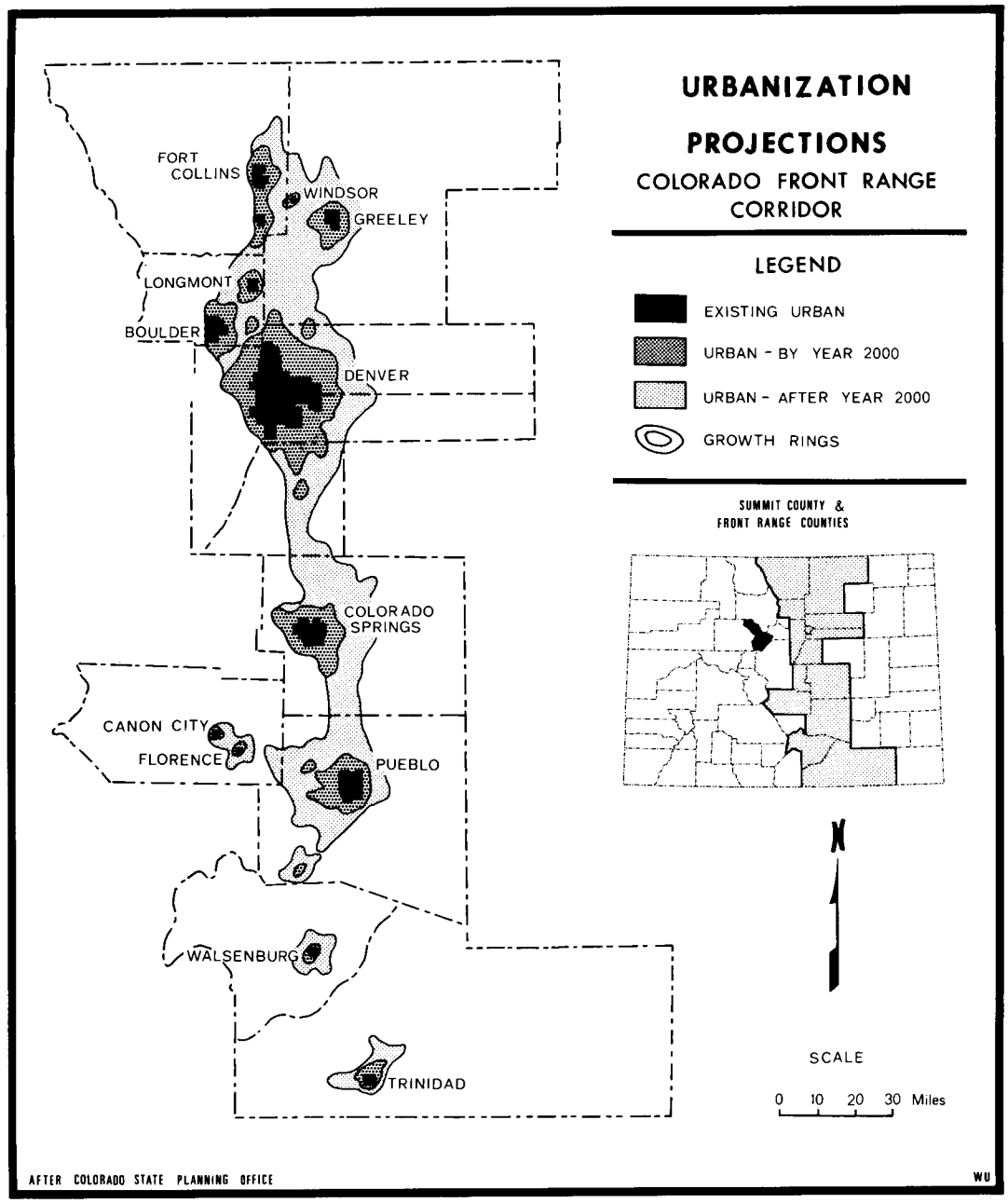

URBANIZATION
PROJECTIONS
COLORADO FRONT RANGE
CORRIDOR
LEGEND
EXISTING URBAN
URBAN - BY YEAR 2000
URBAN - AFTER YEAR 2000
GROWTH RINGS
SUMMIT COUNTY &
FRONT RANGE COUNTIES
FORT COLLINS
WINDSOR
GREELEY
LONGMONT
BOULDER
DENVER
COLORADO SPRINGS
CANON CITY
FLORENCE
PUEBLO
WALSENBURG
TRINIDAD
N
SCALE
0 10 20 30 Miles
AFTER COLORADO STATE PLANNING OFFICE
WU

Plate 10

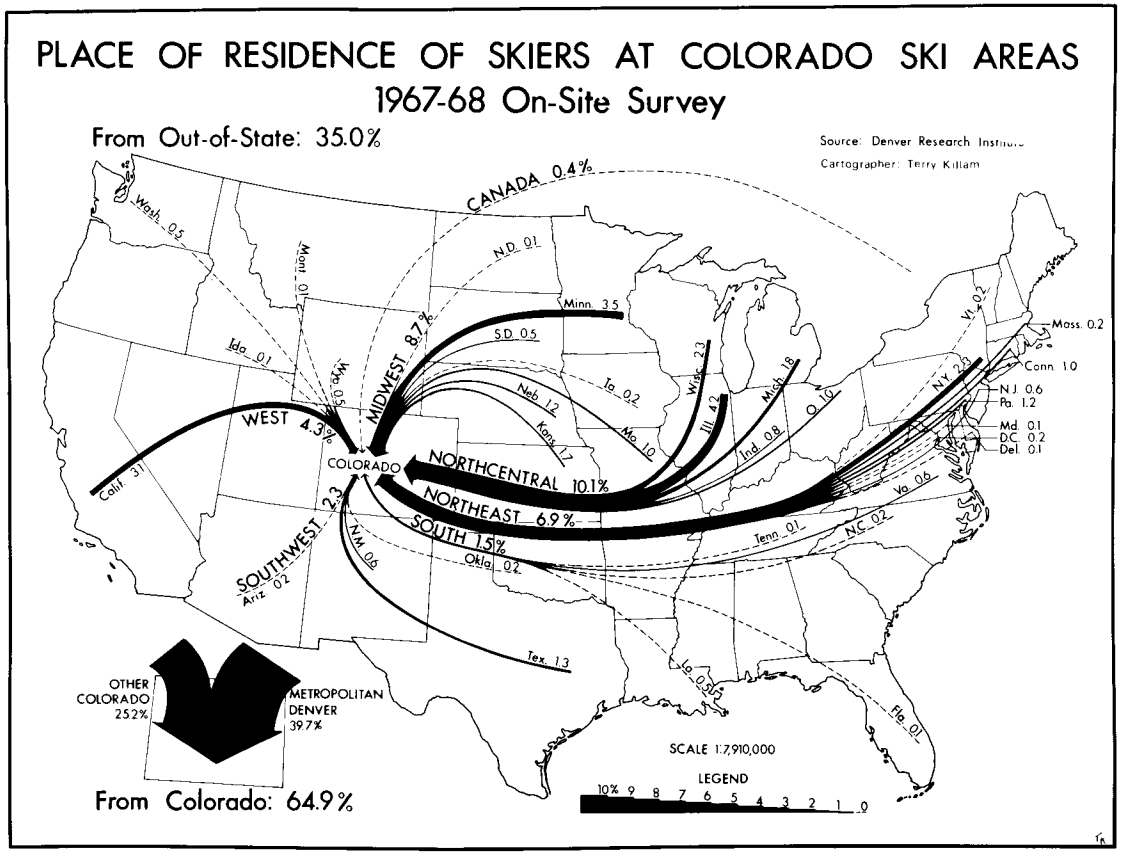

PLACE OF RESIDENCE OF SKIERS AT COLORADO SKI AREAS
1967-68 On-Site Survey
From Out-of-State: 35.0%
Source: Denver Research Institute
Cartographer: Terry Killam
CANADA 0.4%
Wash. 0.5
Mont. 0.1
N.D. 0.1
Minn. 3.5
S.D. 0.5
Ida. 0.1
Wyo. 0.5
MIDWEST 8.7%
Nebr. 1.2
Iowa 0.2
Kans. 1.7
Mo. 1.0
Wisc. 2.3
Ill. 4.2
Mich. 1.6
O. 1.0
Ind. 0.8
WEST 4.3%
Calif. 3.1
COLORADO
NORTHCENTRAL 10.1%
NORTHEAST 6.9%
SOUTH 1.5%
SOUTHWEST 2.3%
Ariz. 0.2
N.M. 0.6
Okla. 0.2
Tex. 1.3
Tenn. 0.1
N.C. 0.2
Va. 0.6
W.Va. 0.2
Vt. 0.2
Mass. 0.2
Conn. 1.0
N.Y. 2.5
N.J. 0.6
Pa. 1.2
Md. 0.1
D.C. 0.2
Del. 0.1
La. 0.3
Fla. 0.1
OTHER COLORADO 25.2%
METROPOLITAN DENVER 39.7%
From Colorado: 64.9%
SCALE 1:7,910,000
LEGEND
10% 9 8 7 6 5 4 3 2 1 0

Plate 11

Recreational development in the Blue River Basin during the past decade is unprecedented and still in the incipient stage. Dramatic signs of major change are visible on the landscape. The once sleepy mining towns of the basin are assuming a new character, typical of rapid development and a promise of continuing growth.

CHAPTER III
Changes on the Landscape

Land Sales Boom — The Beginning

Closely associated with the postwar rise in popularity of outdoor recreation has been an increasing demand for recreational land. Initially, commercial needs were predominant. In recent years, however, millions of acres of open land, particularly in the Western States, have been parcelled and sold to private individuals. During the past five years Colorado has experienced an unprecedented boom in mountain property sales. Nowhere in the state is the rush to the mountains and its attendant problems better exemplified than in the Blue River Basin.

Land redevelopment and the beginning of growth started feebly during the late 1940's when John Randall and a few other Breckenridge residents began buying property for resale as vacation cabin sites (Huckabay, 1970: 26). Any type of development was welcomed in the area since the local economy was in a depressed state following the cutback in mineral production at the end of World War II. The post-war recreation boom had not yet gathered momentum and consequently Randall's effort had little stimulating effect on the basin's economy.

Except for development of Arapahoe Basin Ski Area, little change occurred in the area throughout most of the decade of the 1950's. However, the groundwork for the impending land boom in Summit County was laid in 1955 when Breckenridge Lands, Inc. (BLI), a subsidiary of Rounds and Porter Lumber Company of Wichita, Kansas, began buying up property in and around Breckenridge for future development. After plans for Peak-8 Ski Area and associated development were formulated, construction began in 1958. The following years plans were initiated for the town of Blue River, which incorporated in 1964. Thus, the development of Peak-8 Ski Area and associated support facilities provided the impetus to development of the Breckenridge area.

Growth in the Dillon area is a result of the development of Dillon Reservoir. Denver's location on the arid, lee side of the Rockies, with only the South Platte as a surface water source, necessitated importation of water for future needs. The Denver Water Board, well aware of Denver's future requirements, began buying up large tracts of land at tax sales in the vicinity of Dillon during the early 1940's (Blauvelt, 1962:96). A dam

and reservoir were proposed for the area to provide a storage unit for trans-mountain diversion of water to Denver.

Construction of the project got underway in 1956 with the boring of the Harold D. Roberts Tunnel under the Continental Divide. Depth below the surface reached a maximum of 4,465 feet. Completion of the tunnel required six years and cost $59.3 million (Denver Board of Water Commissioners).

Dillon Dam, an earth-fill structure, was completed in 1963. The dam, 231 feet high and over a mile long with a base width of 1,100 feet, was built about three-quarters of a mile north of Dillon. Completion of the Blue River Diversion System nearly doubled Denver's raw water storage facilities and cost almost $78 million (Denver Board of Water Commissioners). Dillon Reservoir is one of the largest water bodies in Colorado, with 3,300 surface acres and 24.5 miles of shoreline.

Since Dillon would lie under about two hundred feet of water after the reservoir was filled, the town had to be moved. The Denver Water Board furnished a site for the new town along the north shore of the reservoir. Key businessmen and officials from the old town formed the Dillon Improvement Association and commissioned a Denver planning firm to design the new town layout. Development began in 1958 and by 1961, before water and sewage facilities were completed, 75 per cent of the newly subdivided town lots were sold (Huckabay, 1970:50).

Construction of Dillon Reservoir completely changed the face of the basin. It marked the death of a sleepy, old mining town of the gold rush era and its rebirth as an orderly, modern resort community in the midst of a rapidly developing recreation region.

Dillon's population declined dramatically with the town's relocation. Many residents decided to move to either Frisco, Silverthorne, or Breckenridge rather than start over in the new town. Census records reveal a 77.6 per cent population loss from 1960, when the town's population was 814, to 1970, when only 182 resided there (U.S. Census, 1960, 1970).

Completion of the reservoir, added immensely to the area's ultimate growth possibilities. The basin was already well endowed with winter recreation potential and the addition of the large water body provided the necessary ingredient for year-round recreation. Dillon Reservoir, centrally located and within fifteen minutes' drive of every developable ski area in the basin, was to become the nucleus for summer recreation.

Skiing — The Major Attraction

Even though the theme of current development in the region is as a year-round resort area, skiing remains the major contributing factor to the basin's booming development. This fact was borne out by a perception study, completed in 1970, regarding area residents' attitudes towards development in the upper basin (Huckabay, 1970:34). Year-round recreation and Dillon Reservoir were consistently chosen by residents as the second and third factors most responsible for development. Skiing and winter recreation were also selected most often by resident owners questioned regarding their reason

for purchasing property in the area. Again, year-round recreation was second most important and quality of life, third. The attraction of the area to skiers over the past several years has been great. Gradually, developing resorts in the basin will take their place with or possibly even surpass such ski-boom towns as Aspen and Vail.

Developer Attitudes

The Breckenridge-Dillon area has been cited by developers as the fastest growing recreational area in Colorado, surpassing even the popular meccas of Aspen and Vail (Summit County Journal, May 5, 1972). In October 1971, Bruce Wilkinson, a Denver Post real estate writer, cited comments of a number of experienced mountain real estate developers regarding the future of Breckenridge and Dillon (Wilkinson, 1971).

One developer assessed the area as one frequently discussed as having a good future for recreational development. Another cited the area's prime location and accessibility to the heavily populated Front Range Corridor. Wilkinson's report further disclosed that the area is currently regarded by some investors as the "hottest" in the country in condominium development. Most buyers are from the Denver area in search of second homes amid a variety of outdoor recreation possibilities, yet within easy driving distance. One new project at Dillon reported sixty per cent of its condominium sales were to Denver residents, whereas in most of the state's developing resort areas out-of-state buyers predominate (Wilkinson, 1971).

Furthermore, developers have stressed the importance of Dillon Reservoir to the basin's year-round recreation potential:

> "... no matter what else most of the other mountain resort communities develop to please Colorado visitors, when the skiing ends they're pretty well through for the year." (Wilkinson, 1971).

The value of water-based recreation is almost beyond measure, and the lacustrine-related activities available at Dillon Reservoir appeal to a large segment of the public not involved in winter sports.

Second-Home Development

Recreational communities are a direct by-product of national growth in participation in outdoor recreation. Rising incomes, increased leisure time, and greater mobility have spread to large segments of our population. Since World War II, this new-found affluence first manifested itself in widespread second-car ownership and more recently in a rising demand for second homes. The average annual rate of second-home construction has risen from about 20,000 units per year during the 1940's to 55,000 per year throughout the 1960's (Bureau of Census, 1969). Today, trade sources report the number is increasing at the rate of 150,000 to 200,000 units per year (U.S. News and World Report, 1972).

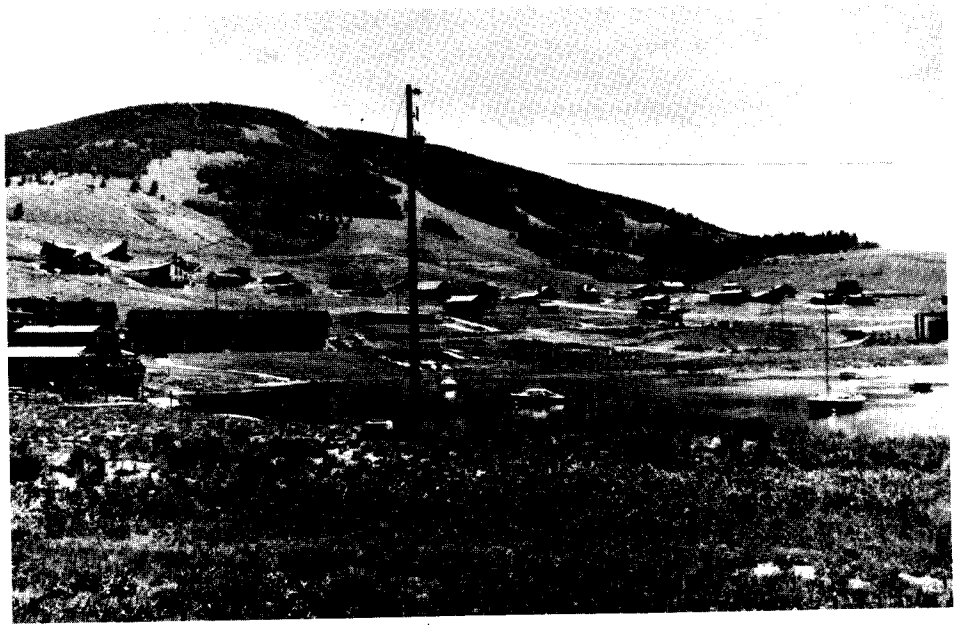


Fig. 8. A tract of custom vacation homes look down on the future site of Dillon marina, soon to be enclosed by rows and tiers of condominiums.

Fig. 9. Initial development at Summit Cove is marked by a variety of structures including condominiums, A-frames, chalets, and a package sewage treatment plant in the foreground. Before development this open meadow provided winter forage for a small elk herd.

Recent studies show that vacation homes are not randomly distributed, but generally concentrate with reference to two main factors: proximity to primary residence and the availability of facilities for active recreation (Tombaugh, 1971; Ragatz, 1971).

With the rising popularity of skiing, the upsurge in demand for recreation land and the general westward shift in population, the Rocky Mountains are suddenly faced with dramatic changes in land use: a large scale conversion of open land to congested areas of second-home communities and urban-like resort centers.

There is scarcely an area in Colorado's high country that has not felt the effect of the new land rush. The Blue River Basin, particularly vulnerable because of its natural attributes and proximity to the state's population, has been a beehive of activity over the past two summer seasons. Subdivisions are being planned and developed so fast that the County Clerk's office has difficulty keeping track of them. Each week over the past six months county and town officials have been besieged with reviewing some type of developmental plans for approval. Construction of some type is visible almost everywhere in the upper basin.

In 1960 there were only 16 subdivisions in the area, with a total of 895 lots, all zoned single family residential. No condominiums had been built. By 1968 subdivisions had increased to 80 and lots totaled 4,500 (Summit County Planning Department, 1972). A recent inventory of the County Clerk's subdivision plat maps showed subdivisions have increased to 106 with 6,781 lots. Since the time (June 1972) the inventory was made, an additional number of subdivisions have either been approved or recommended for approval.

Building permit values have soared. The County Planner estimated permit values for 1970 at about $4.5 million. The total doubled to $10 million in 1971 and redoubled to $20 million in 1972.*

Barometers of Growth

Perhaps the best barometer with which to measure development in the basin over the past decade is that of assessed valuation. Assessed valuation increased annually throughout the 1960's with the greatest gain occurring after 1967, and a new five-fold increase by 1972. The greatest gains in assessed valuations over the years have occurred in land, improvements, and public utilities. In 1969, the Colorado Tax Commissioner registered the following gains over 1960 valuation: land, 69.1 percent; improvements, 193 per cent; and public utilities, 100 per cent (Colorado Tax Commission). Since 1969, valuations have more than doubled again.

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* Prior to April 1972, Summit County had no Planning or Building Departments and construction values of past years are based on average values of the total single family units constructed.


LEGEND
National Forest
Private Land
Subdivions
Town Limits
Dillon Reservoir
Contour Interval - 200 Ft.
SUBDIVIDED LAND
UPPER BLUE RIVER BASIN,
1972
SCALE
1 0 1 2 Miles
WU

Plate 12

Table 9

Assessed Property Valuation
Summit County 1960 - 1972

Year	Grand Total Assessed Valuation	Per Cent Increase Over Previous Year	Total Mill Levy
1960	5,878,560		41.655
1961	6,458,580	10.0	46.48
1962	7,084,030	9.7	48.50
1963	7,269,100	2.6	49.43
1964	7,559,140	4.8	48.90
1965	8,085,125	6.9	49.74
1966	9,199,740	13.8	47.80
1967	9,913, 35	7.8	51.90
1968	10,965,985	10.6	54.21
1969	11,825,900	7.0	64.48
1970	13,605,320	15.0	79.89
1971	18,983,500	28.7	86.88
1972	25,524,000	34.5	104.0

Source: Colorado Tax Commission

The upsurge in land subdivision and development not only has promoted growth, but also has strengthened the area's sagging economy. From 1960 to 1970, total employment increased by over four times bringing more families to the area and nearly doubling school enrollment, with 834 students enrolled for the Fall 1972 session (Colorado Department of Education).

Median income increased over the decade by 50 per cent, raising the average family income in the County to nearly $1,000 above the state average of $9,555. Of the 63 counties in Colorado, Summit County ranks first in the percentage of families with incomes over $10,000, with 49.1 per cent (Colorado Interstate Gas Company). Increased activity in the building trades

Table 10

Socio-Economic Indicators of Growth
in Summit County, 1960 - 1970

	1960	1970
Population	2,073	2,665
Total Housing Units	993	2,198
Public School Enrollment	470	732
Telephone Service	303	1,346
Total Employed	823	1,247
Auto Registration	1,624	(1965) 1,921
Families with Incomes over $10,000	70	376
Median Income	$6,928	$10,492
Total Assessed Valuation	$5,878,565	$13,605,320

Source: Bureau of Census 1960-1970, and Colorado Tax Commission

with high paid craftsmen is primarily responsible for this phenomenon.

A population increase of only 28.6 per cent is not reflected in the 119 per cent increase in housing units for the decade. Most homes being built in the area are expensive single-family dwellings or condominiums, designed to attract the second-home buyer. Many local residents cannot afford the luxury of these developments and inexpensive rentals are almost nonexistent. This dilemma has resulted in a serious low-cost housing shortage, which, in effect, has suppressed permanent population growth. Thus far, nearly all development is being designed for the part-time resident--the vacationer, the skier--with little mind or concern for the permanent residence.

This is also true of stores and restaurants in the area, whose high prices are typical of resort areas. Numerous local residents interviewed, employed both in private industry and local government, disclosed that if they had to make purchases on the local economy they could not afford to live there. In all cases the remedy was three or four trips a month to Denver for shopping.

Land Values and Construction Costs

Land values in the basin have skyrocketed over the past five to ten years. The average price for undeveloped land in most mountain regions of Colorado is usually between $500 and $1,000 per acre (Brown et al., 1972: 176). In the upper Blue River Basin it is $8,500 and up. A five hundred-acre cattle ranch about eight miles east of Dillon recently sold for $2.5 million (Office of Summit County Clerk, 1972). Yet, much of this land lies on steep slopes and is developable only at considerable expense.

Property near communities where services and utilities are available is more valuable than distant properties. A two-acre parcel off Interstate-70 near Frisco recently sold for $82,000 (Office of Summit County Clerk, 1972). Residential lots vary in price, with respect to several factors: proximity to Dillon and Breckenridge, view, and available utilities. Practically all lots now sold by developers are one-quarter acre in size and range from $10,000 to $15,000. Half-acre sites are available, but only through resale and range in price from $5,000 to $15,000. The largest lots readily available are two-acre parcels ranging from $9,500 to $15,000. The relatively lower prices for the larger lots reflect several undesirable features: commonly, poor locations on steep slopes; accessible by steep, crudely graded roads lacking county maintenance; and, completely lacking in public utilities of any kind. The smaller quarter-acre lots, on the other hand, are served by paved roads and all utilities.

Commercial property commands an even higher price, depending again on proximity to the main part of town. In Breckenridge, commercial land goes for $1.50 to $7.00 per square foot, or from $65,340 to $304,920 per acre. Commercial development, which until recently lagged behind residential and recreational, is growing rapidly. Major oil companies have moved into the area and are building service stations at key locations, especially around interchanges. A supermarket chain has also purchased a parcel near the Silverthorne interchange for construction of a food market and shopping

center. The Dillon-Silverthorne interchange, because of its central location to the basin, is destined to be the site of heavy commercial developments in future years.

Long, cold winters and short, cool summers limit construction to about four and one-half months during the year. Nearly all building material must be trucked in from Denver. On numerous occasions construction crews were observed working on weekends and as late as seven p.m. Such adverse building conditions are reflected in construction costs. In the Boulder and Denver area, construction costs range from $18 to 19 per square foot. Around Breckenridge and Dillon, contractors' costs average $22 per square foot; however, the buyer pays from $30 to $40 per square foot in the final sales price.

Land values and building costs will surely increase as development continues. Only 23 per cent of the county land base is privately owned. Roughly half of all private holdings are located in the lower half of the basin, north of Dillon Dam. The remaining half lies scattered throughout the upper basin, with the majority concentrated along the upper Blue River. Mining claims located on steep slopes and sheer rock faces make up much of the private land holdings in the upper basin. Developers first focused on the narrow, flat valley floors and gentle slopes. This source was soon depleted and subdivisions have since crept to within a few hundred feet of treeline.

Faced with a diminishing supply of developable land and escalating land values, developers attempt to establish the highest possible density of construction per acre, thereby ensuring the greatest possible return on investments. To accomplish this, developers have turned almost exclusively to design and construction of condominiums and density has reached a high of sixty units per acre in Breckenridge.

As of July 1972, there were 47 condominiums, with 1,367 dwelling units, either under construction or completed in the upper basin. High density condominium development requires minimal land and insures maximum land investment returns. An excellent example is the previously mentioned two-acre plot near Interstate-70 and Frisco, which was recently purchased for $82,000. The two acres are to be further subdivided into 24 lots for construction of 60 condominium units creating an ultimate density, in this case, of 105 persons per acre (Summit County Grantee Book). Considering the location, these units should easily command an average price of $30,000.

Condominiums offer distinct advantages to the second-home owner. Initially, the condominium owner is spared the troublesome process of buying an individual lot in a subdivision and having a home built. Dollar for dollar the condominium buyer normally ends up probably better off than if he were to buy a single-family residence. Purchasers automatically become members of a condominium association, which, for a monthly fee, takes care of all utilities, ground, maintenance, snow shoveling, and repairs. The association also acts in the owner's behalf in rental negotiations. Many condominium owners occupy their units for only a few weeks of the year; at other times the units are offered for rent to tourists and skiers. Minimum rentals average $40 per day, with the more lavish ones renting for as high as $70 per day.

Fig. 10. Looking northward from Dillon Dam, Silverthorne still appears relatively undeveloped except for the I-70 interchange and related commercial development.

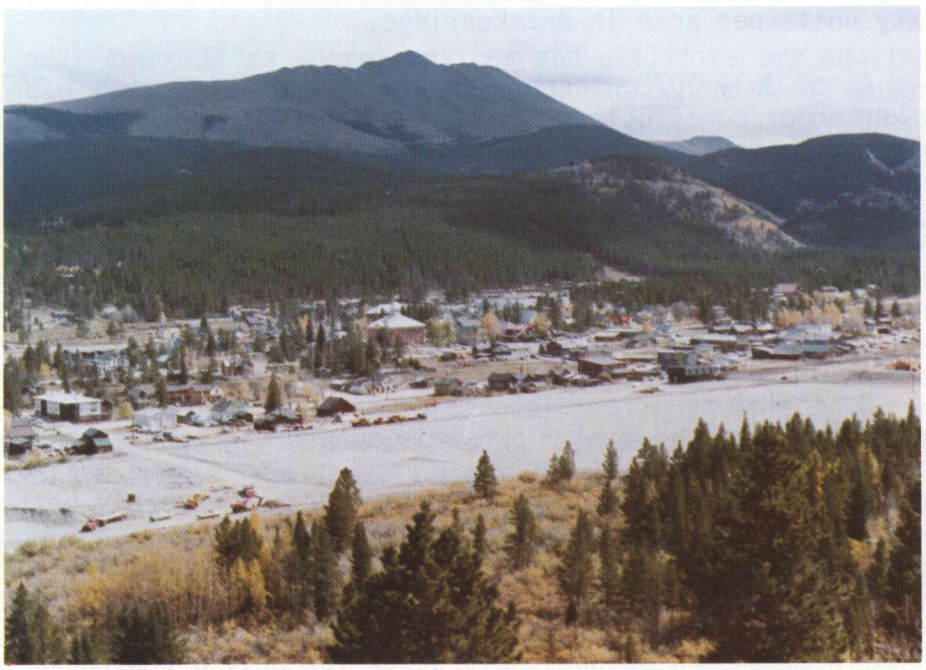


Fig. 11 Breckenridge, as seen from the Peak-8 Ski Area approach road. Dredge tailings in the foreground have been graded in preparation for land development.

Furthermore, the average second-home owner's property is left unattended and unguarded for most of the year, vulnerable to vandals and burglars. Not so with the condominium owner, whose unit is under constant surveillance by association representatives.

Architecture

The simple frame cabin of yesteryear is seldom seen anymore, except in remote areas of the basin occupied by transients or boarded up in the historical section of town. Contemporary second-home construction, whether it be a single-family structure or condominiums, all have one thing in common--they include most and usually all the conveniences and comforts of a modern home. With all the recreational facilities available, today's vacationer has little inclination to chop and haul wood or pump water or tolerate the inconvenience of an outhouse. Most homes even have covered parking spaces often occupied with a variety of family cars, four-wheel drive vehicles, snowmobiles, or boats.

The theme in architecture seems to be variety. Styles include the rambling ranch type, A-frame, Swiss Chalet, and luxury log cabin. Many simple, unimaginative designs resembling cracker boxes are also in evidence. Widespread use of wood, masonry blocks, fieldstone, and concrete offer a diversity of building materials.

Subdividing the Land

Limited private land in the basin has not only pushed real estate values up, but has also been a factor in decreasing subdivision lot size. In 1960, few lots were under an acre in size and most had private wells and septic tanks. By the mid-1960's, half-acre lots predominated sales (Huckabay, 1970:41), and now subdividers have gone almost exclusively to quarter-acre lots.

Each year land development reduces the basin's already declining agricultural use (Colorado Department of Agriculture). Today, the total stands at 33,299 acres, a decline of almost 35 per cent (Table 11). Residential tracts are rapidly replacing the former open hay meadows and grazing lands. Table 11 reflects the change in land use in Summit County. Columns one and two are indicative mainly of trends in the upper basin, where nearly all development thus far has occurred. Little change has occurred to date in the lower basin, where most of the land is still agricultural.

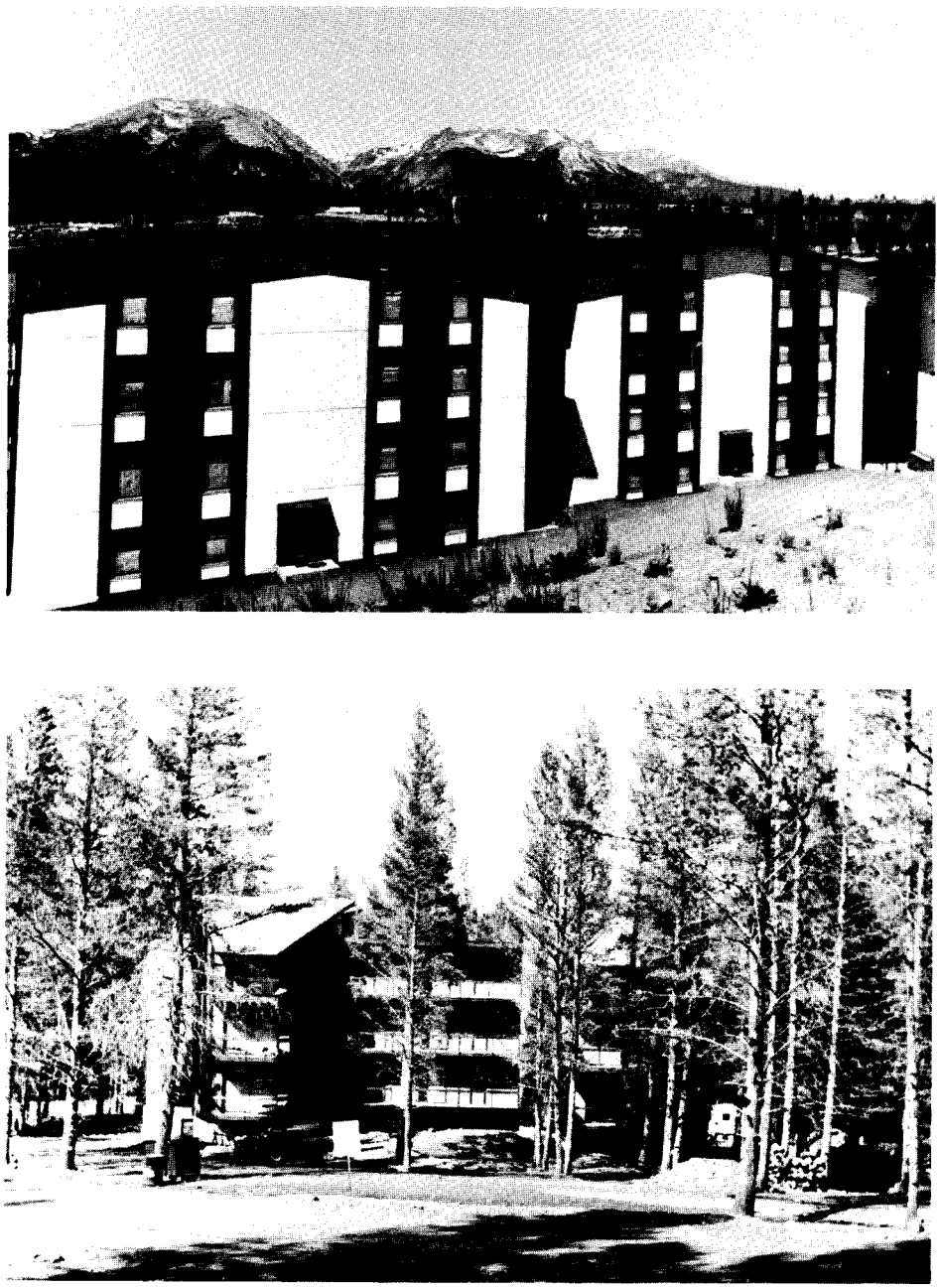


Fig 12 A contrast in architectural style and development practices. The condominium structures in the top photo are located on Dillon Reservoir. Those in the bottom photo are adjacent to the Breckenridge ski area approach road.

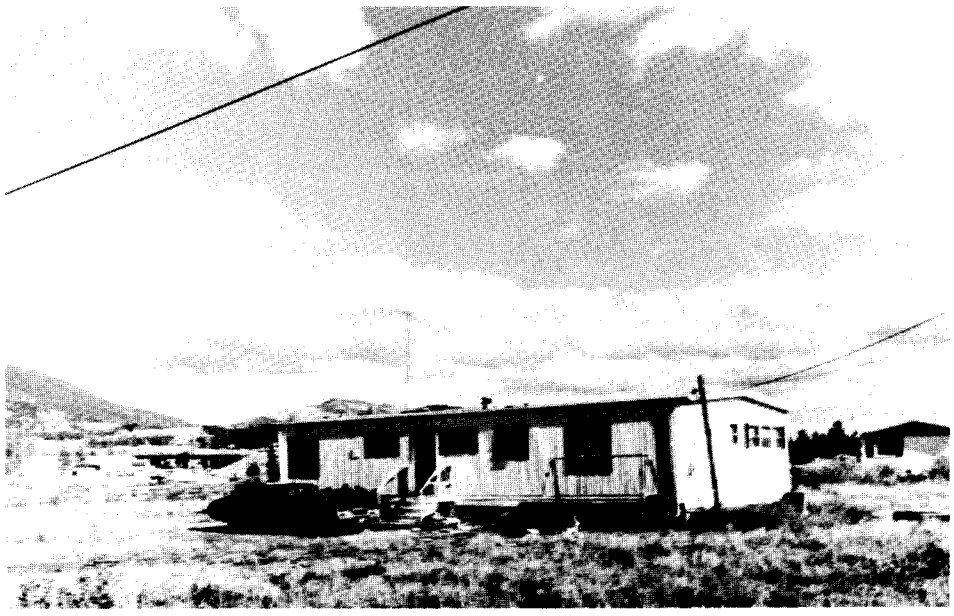


Fig. 13. Indiscriminate use of trailer houses and modular homes (bottom photo) is evidenced throughout the basin. Note condominium building in rear of trailer house in upper photo.

Fig. 14. An old miner's cabin near the headwaters of the Blue River is being dismantled by an individual who stated he was working for a local contractor who wanted the old lumber to provide a decorative atmosphere to condominiums. Note pile of wood in foreground.

Table 11

Land Use Changes in Summit County
1966 - 1972

Year	Residence Parcels Platted	Commercial Parcels Platted	Meadow and Irrigated Pasture Acres	Grazing Land Acres
1966	2,140	235	5,631	39,990
1967	2,581	235	5,476	34,210
1968	2,600	302	6,200	34,841
1969	3,250	149	5,893	35,210
1970	8,649	480	6,498	28,965
1971	9,622	576	4,940	29,430
1972	9,655	824	6,689	26,610

Source: Colorado Tax Commission

Planning and Zoning

Orderly development and environmental integrity are traditionally sought through strict zoning, guided by a master plan. Where development is proceeding rapidly, such as in the basin, the master plan is critical to guide zoning policy. With the current trend in land development in the basin leading to a high density sprawl of urban-like residential tracts, definite goals and guidelines must be set.

Some subdivision activities in the area show little appreciation for the fragile mountain environment in which they are developed. In many cases, lots are located on terrain so steep that expensive terracing or cantilevering is needed for building purposes. Many land developers gain experience in urban areas and urban associated techniques of land development will not work in mountainous areas. The result of such application is evident in many parts of the upper basin, in typical urban style residential tracts.

Land development in Summit County is progressing well into the second decade, yet an updated county or regional master plan has not yet been officially adopted. Although a master plan was recently completed for the upper basin, where most development has occurred, it has not been officially adopted.

In many cases throughout the county, residential zoning is defined as follows: low, medium, or, high density, which usually means from one to twenty-five units per acre depending on the designation and has reached a high of sixty in Breckenridge. Blanket zoning such as this is simplistic and unworkable in mountainous areas where in the same fifty-acre parcel a developer may be confronted with variation in slope, streams, poorly drained wetlands, thin soils, and exposure, among other concerns. Yet, if his parcel is zoned to accommodate a certain number of units per acre he fully expects to develop to that density, regardless of environmental limitations.

Planned Unit Development (PUD)

Planned unit development (PUD) is perhaps the best method of zoning devised to control development in mountainous areas, and cope with the many problems involved. PUD differs widely from the normal subdivision concept. Whereas subdivisions are normally limited to single-family residential development, PUD may involve a mixture of uses including both single and multi-family residential, commercial, civic and recreational. The area involved in a PUD is much larger and development evolves over a long period of time. During this period, which may be from five to ten years, plans may need to be changed from time to time to meet changing requirements, technology, financing, and even concept. Esthetic quality is heavily emphasized throughout the planning by careful attention to meaningful open space, road design, parks, existing physical features, and natural vegetation as well as construction design. Development is designed to conform with and not detract from the natural surroundings.

In mountain environments where slope, vegetation and soil stability are critical, PUD is an especially effective method of development. Through imaginative, skillful planning, high density is permissible in areas of low impact danger, while more fragile areas are left intact. Local relief and existing vegetation may be used effectively in screening developed areas.

Of all zoned areas to date in Summit County, PUD accounts for only a small per cent. Scale of development and cost, unfortunately, prohibit all but well-financed developers from taking on such a project. After a sizable initial investment in land, PUD developers must be prepared to continue investing over a period of years before substantial returns are realized. Small developers can hardly afford to tie up funds for this length of time. The size and scope of PUDs in Summit County are indicated, by way of example, in the following cases:

Table 12

Characteristics of PUDs in Summit County: A Sampling

Summit Cove

Total area	640	acres
Proposed number of units	1,800	
Condominiums	1,424	
Single family	376	
Commercial core	20	acres
Mobile home park	200	spaces

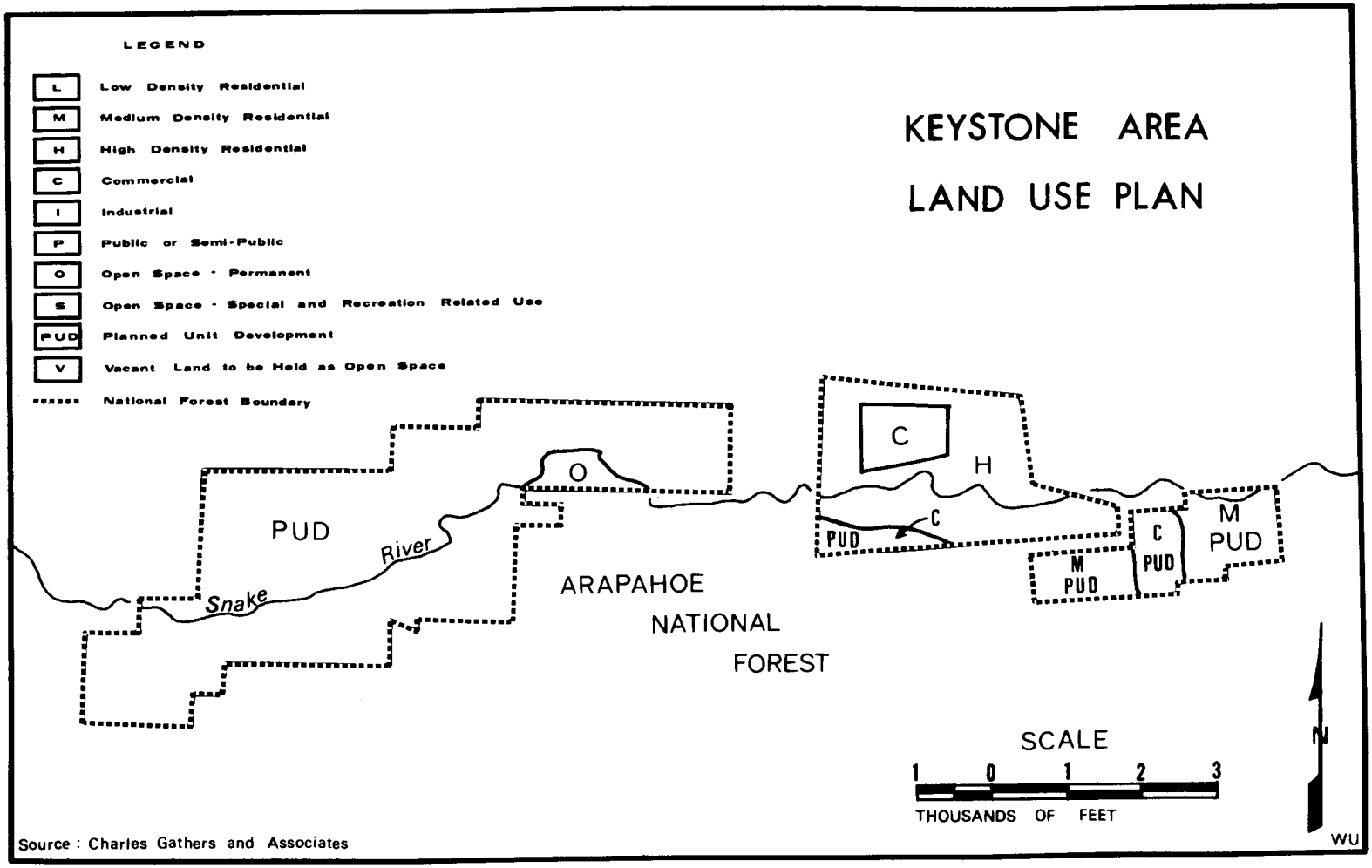

LEGEND
L Low Density Residential
M Medium Density Residential
H High Density Residential
C Commercial
I Industrial
P Public or Semi-Public
O Open Space - Permanent
S Open Space - Special and Recreation Related Use
PUD Planned Unit Development
V Vacant Land to be Held as Open Space
National Forest Boundary
KEYSTONE AREA
LAND USE PLAN
PUD
River
Snake
O
ARAPAHOE
NATIONAL
FOREST
C
H
C
PUD
M
PUD
C
PUD
M
PUD
SCALE
1 0 1 2 3
THOUSANDS OF FEET
N
Source : Charles Gathers and Associates
WU

Plate 13

Table 12 - Exemplary PUDs in Summit County continued

Four Seasons Village

Total area	114 acres
Lodges and condominiums	3,000 rooms
Commercial core	200,000 sq. ft.

Resort accommodations include: European-style hotel, cocktail lounges, thirteen restaurants, convention center (1,000 seats), heated swimming pools, and a live theater. Estimated $52 million investment phased over five years.

Keystone

Total area	375 acres
Condominium units	1,412
Lodge rooms	403
Single-family units	168
Employee housing units	200
Commercial core	54,000 sq. ft.

Estimated $100 million investment phased over 15 years.

Copper Mountain

Total area	280 acres
Condominium units	1,000
Lodge rooms	1,200

Features also include employee housing, conference center restaurants and cocktail lounges, and a large commercial core.

For sheer magnitude, however, no development in the basin is comparable to Baca Grande. Baca Grande is located west of Breckenridge at the base of Peaks 8 and 9 Ski Areas, and involves development of approximately 360 acres. The area is already zoned for 1,131 units and an additional 700 units are under construction. The proposal calls for a minimum of 1,900 units and a maximum of 4,200 (Meridian-Baca Grande Corp.). Baca Grande, depending upon allowed development, will ultimately contribute from 6,650 to 14,700 residents to the area.

PUD not only restricts development to areas most capable of withstanding high impact, but also reduces the need for installation and distribution of gas, electric, and telephone services. Road construction and maintenance is also minimized, thereby lessening vegetation and soil disturbance. Also, PUD provides an alternative to sprawling residential development. However, PUD also has undesirable features. While preventing sprawl, it promotes high population densities. Core areas, similar to the typical urban shopping center, stimulate commercial growth. In some cases the remote locations of PUDs necessitate special schools and police and fire protection to serve the local population.

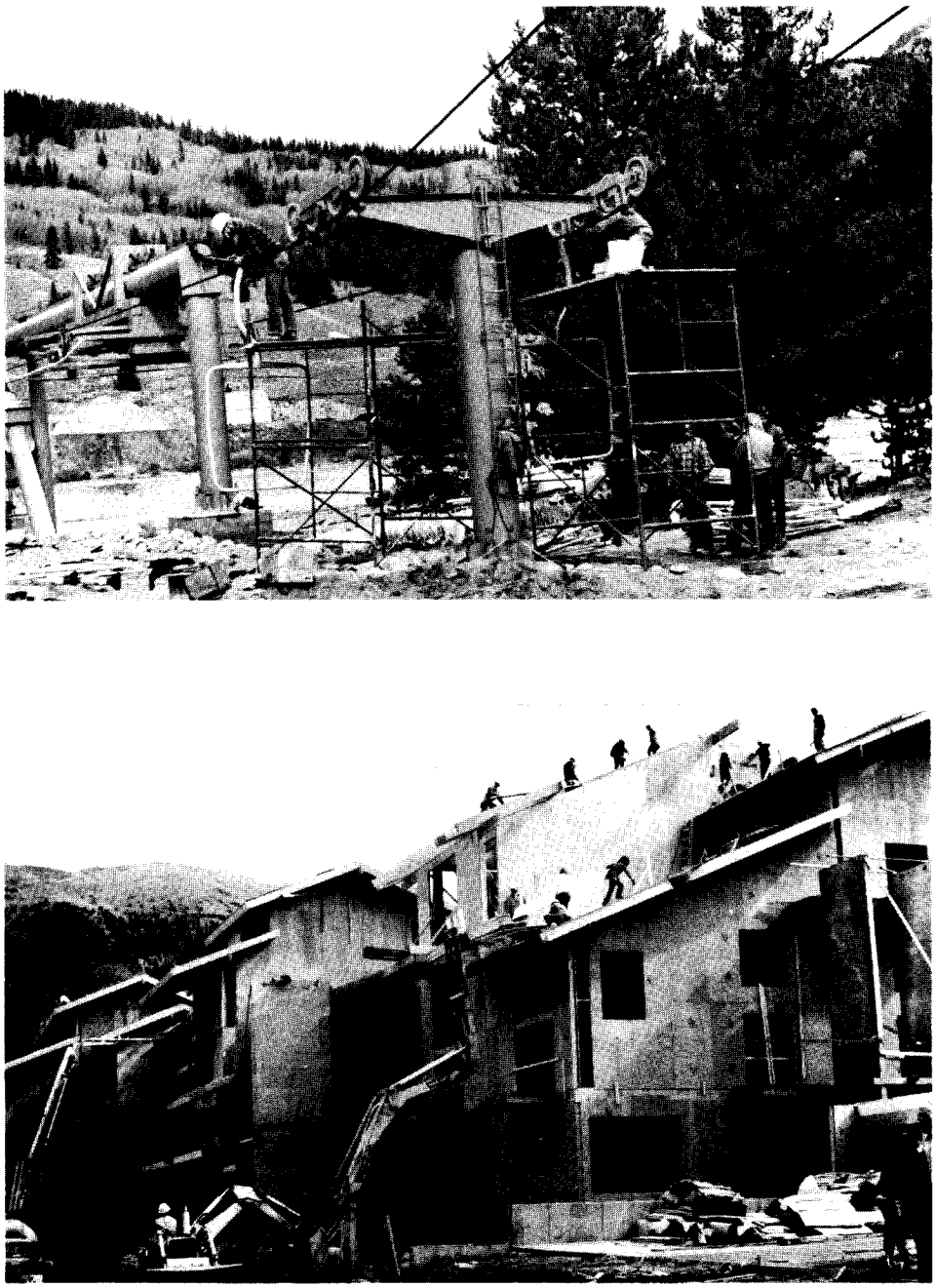


Fig. 15. Copper Mountain Ski Resort takes shape as workmen bolt chair frames to a new ski lift cable (top photo), and one of many new ski base condominiums near completion.

Promotional advertisement on second-home and vacation property in the basin has increased sharply during the past two years. The out-of-state market, particularly and Midwest and East Coast, is sought by newspaper, magazine, television, and direct mail advertisements offering to sell land in the West. They customarily cite investment advantages and phenomenal profits resulting from skyrocketing land values (Buchanan, 1972).

Condominium developers have been especially active in advertising on the local markets through The Denver Post, Rocky Mountain News, and television commercials. Almost every week for the past year, the Sunday Empire Magazine section of The Denver Post has carried advertisements, frequently in full-page color, on condominiums in Breckenridge or Dillon.

Scale models of condominiums, intricately made down to the last detail, are appearing more and more in heavily-trafficked areas of the Denver Metropolitan Area. These displays, normally seen in banks, large business buildings, and at Stapleton Airport, are encased in glass and well stocked with free literature of interest to potential buyers.

Since the 1850's Summit County has experienced a number of boom eras, all connected with relatively brief periods of mining activity. The County was totally unprepared, however, to cope with the pace of development that characterized the decade of the 1960's, and is still continuing. Zoning laws, subdivision regulations, and master plans were of little concern to the local communities who depended mainly upon marginal ranching, some mining, and an occasional tourist passing through. Understaffed and poorly financed local governments knew little of land development and the impending consequences of poor environmental planning. Furthermore, the area's economy needed a boost.

Land developers and recreation entrepreneurs, spurred on by growing demands from our leisure-oriented society, brought a new prosperity to the basin. Local ranchers, operating under tightening national forest grazing policies, turned their lands over to developers. Growing crowds of skiers and campers boosted local business and the Forest Service also showed a big profit.

The theme of development, totally recreation-oriented, with the accent on ski resorts and second-homes, is creating problems associated with densely populated cities: sewage and garbage disposal problems, traffic congestion, air and water pollution, and overall environmental decay. Only through a reversal of present trends can stress be reduced, thereby preserving some measure of environmental quality.

CHAPTER IV
An Analysis of Growth and its Impact

The problems inherent in the current land-use changes and development schemes of the Blue River Basin are reflective of the times, the natural resources of the state, and a cultural response to affluence.

Planners throughout the mountainous counties of Western Colorado, especially rapidly developing recreation regions, could profit measurably by reviewing the history of mistakes made during the course of the chaotic development of the Lake Tahoe Basin of north-central California. Hampered by competing interests of two states and five counties, it took over twenty years of uncontrolled growth and immeasurable damage to the area's outstanding natural beauty to implement a scheme to control development and growth.

The Colorado Land Use Commission is currently developing a land use planning program for the entire state, with some special attention to rapidly developing areas. Currently, however, the State has little direct and systematic control on land development.

Unguided growth, encouraged by little or no controls on either the local or state levels, have left a wake of considerable environmental damage in Summit County. Urban-like population densities are a reality with the ever decreasing subdivision lot sizes and intense condominium construction. Development is still accelerating and problems of sewage and solid waste disposal are looming. Inevitable traffic densities and congestions in this nearly closed basin pose an ultimate threat not only to human welfare, but to plant and animal life as well. This chapter will examine these problems in detail, with a preview of what might be expected in the following decades.

Population Growth and Densities

One of the more important outgrowths of rapid development in Summit County is a rapidly expanding population. Population trends in the county have been erratic since 1860, responding to rises and declines in mineral booms. Now the area is responding to yet another boom--recreation.

Estimating current and future populations with accuracy is difficult under normal circumstances and nearly impossible in booming mountain recreation communities. The main difficulty lies in distinguishing the part-time resident from the permanent resident. Proximity to Denver marks the area as a second-home mecca. Occupancy by the owners may range from several weeks of the year to every weekend, depending on the location of the owner's primary residence. To add to the confusion, some second-home owners not only

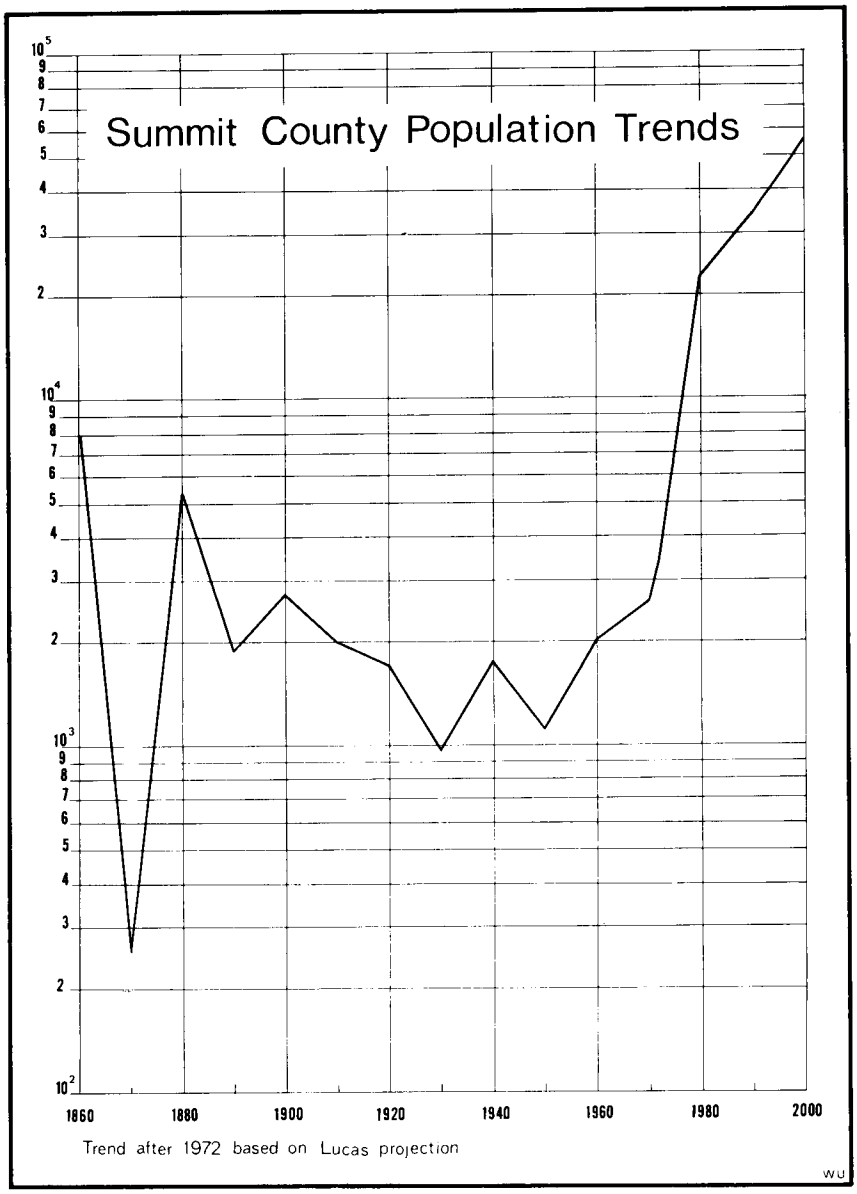

Summit County Population Trends
10^5
9
8
7
6
5
4
3
2
10^4
9
8
7
6
5
4
3
2
10^3
9
8
7
6
5
4
3
2
10^2
1860
1880
1900
1920
1940
1960
1980
2000
Trend after 1972 based on Lucas projection
WU

Plate 14

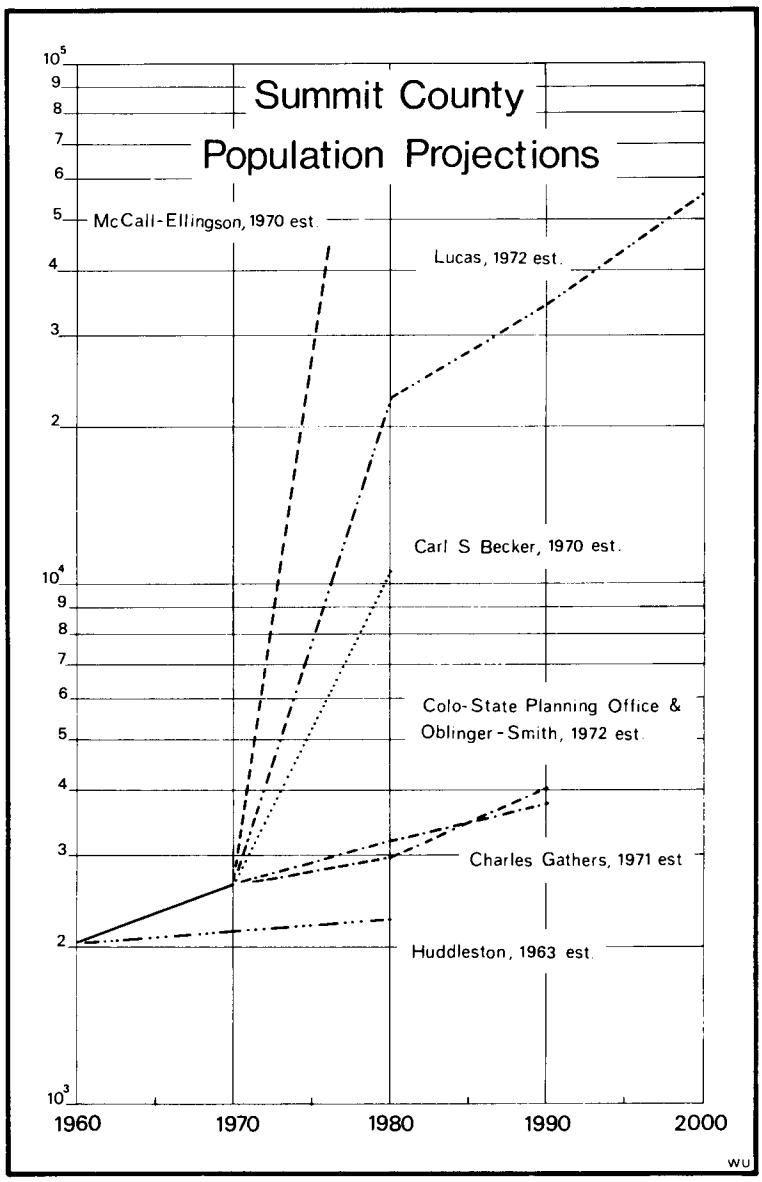
take mail delivery at their secondary residence, but register their automobiles and also register to vote in the county. Furthermore, the county hosts a sizable number of transients who occupy abandoned mining cabins wherever they may be found and usually work at odd jobs as the need arises.

With such inherent weaknesses taken into account, estimates of current population and future projections will be analyzed. In 1970, the U.S. Census reported a total of 2,665 residents in the county, an increase of 30 per cent above the 1960 count (U.S. Population Census). Now, only two years later, some estimates show the population as having doubled. In 1971, the State Division of Planning had projections with estimated Summit County population to increase 12 per cent to 3,000 by 1980, and another 30 per cent from 1980 to 1990. The conservative nature of this estimate is seen in a later estimate (July 1972) which showed current population at 3,743; a 40 per cent increase since the 1970 census (Colorado Division of Planning, 1972).

A number of planning firms, in drafting various studies for the county, have also attempted to estimate future populations. The results range from ultra-conservative to figures reflecting complete development. The earliest projection found was made by Sam Huddleston, a Denver planner, who in 1963 prepared a master plan for Summit County. Huddleston's estimate, appearing before development was in full swing, showed the 1980 population to be 2,300 (Huddleston, 1963). Another Denver planning firm, the Carl S. Becker Company, in preparation of a finance study of the county in 1970, projected a 1980 population of 11,711 (Becker, 1970). A subsequent master plan prepared in 1971 by Charles Gathers and Associates, planners of Denver, estimated a population of 3,200 by 1980 and 3,800 by 1990 (Charles Gathers & Assoc., 1971). The Oblinger-Smith Corporation, planning and design consultants of Denver, based findings and recommendations for a county water and sewer facility plan on projections supplied by the State Division of Planning, which estimated 1980 population at 3,000 and 1990 at 4,000 (Oblinger-Smith, 1972). A projection of 44,000 population by 1980 was forecast by the McCall-Ellingson Engineering Consultants of Denver in a 1970 engineering report on a proposed county sewer system (McCall-Ellingson, 1970). The latter study assumed total development of all available land within the sewage service area.

The most recent and significant estimate of future population growth in the county was prepared by Therese Lucas, consultant to HWH Associates of Denver, and is a part of the State Land Use Planning Program being prepared by the Colorado Land Use Commission. Ms. Lucas based her projections on a ratio of support industry population to recreationists and assumes a continued growth of winter and summer oriented recreation within the State. This estimate indicates the following progression of growth: 1980--22,500, 1990--34,240, and in 2000 a total of 55,800 (Lucas, 1972). The methodology and recency of the Lucas projections deem the results as the most appropriate choice for future purposes. Therefore, any estimates appearing hereafter which relate to population growth will be based on the Lucas projection.

The importance of accurate population growth estimates in directing community or regional development cannot be over-emphasized. They provide planners information critical to comprehensive planning; school boards with data necessary to meet future enrollments and classroom needs; and enable utilities to keep pace with community needs. Provisions for sewage facilities and water service are also sensitive to growth.


Summit County
Population Projections
McCall-Ellingson, 1970 est.
Lucas, 1972 est.
Carl S Becker, 1970 est.
Colo-State Planning Office &
Oblinger-Smith, 1972 est.
Charles Gathers, 1971 est
Huddleston, 1963 est.
10^5
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10^4
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3
2
10^3
1960
1970
1980
1990
2000
WU

Plate 15

Equally important, and directly associated with the basin's permanent population is the impending growth of tourism and its direct effects. Most facilities developed to accommodate the permanent population must also be designed to handle peak loads brought on by a growing army of winter and summer recreationists.

The continued growth of tourism in the basin, as well as Colorado, depends mainly upon two factors: preclusion of any kind of serious setback in the national economy and continued increase in State population. For a number of years the increase of population in Colorado has almost doubled the national increase. At past rates of increase (25.8 per cent from 1960 to 1970) Colorado's population should double in 27 years.

Skiing Trends

Other than a severe economic setback, there is little reason to believe the rising postwar demands for outdoor recreation will not continue. If Colorado is to maintain its role in meeting these needs, widespread expansion of existing facilities will be called for. Summit County, owing to its vast ski resort potential, proximity to Denver, and present development trends, will evolve into one of the biggest ski meccas of the State, and possibly the entire nation.

The growing impact of county ski resorts upon the ski industry of the State is indicated in the ski visitor trend table. Visitor trends for both county and State increased at an average annual rate of 19.8 per cent since 1961. The trend for the State, however, reached its zenith in the 1967-68 season, when a 29 per cent gain was reported over the previous season. Since then the annual rate of increase has declined to a low of nine per cent during the 1971-72 season.

Summit County resorts, on the other hand, have shown a constant rate of increase over the entire period. Throughout this duration two resorts, Arapahoe Basin and Breckenridge, have been primarily responsible for the gains; with Keystone recently finishing its second year of operation and Copper Mountain just opening its doors for the current season. In the past season (1971-72) 14.7 per cent of the State's total visits occurred in Summit County (Table 13). The opening of Copper Mountain, acclaimed by the Forest Service as the best ski mountain in the state, and the installation of snowmaking facilities at Keystone, should be effective in capturing an even larger share of the ski market.

Continued success of skiing in the basin means continued land subdivision and condominium construction. Speculators, land developers, and ski resort entrepreneurs keep tabs on the ski market much the same as stockholders view trends in the stock market. As in all facets of a supply and demand economy, if visitor trends continue upwards in the basin, pressure for more ski resorts will surely develop, thereby increasing potential peak populations. If skier visitor trends in the basin continue to increase at a rate of 19.8 per cent annually, the total could reach 1.2 million by 1980 and over 2 million by 1990.

When all proposed expansion for the four existing areas in the county

Table 13

Ski Visitor-Day Trends at Blue River Basin Ski Areas
(thousand of visits)

Ski Area	60-61	61-62	62-63	63-64	64-65	65-66	66-67	67-68	68-69	69-70	70-71	71-72
A-Basin	60.5	70.5	54.1	62.9	91.5	89.7	119.8	131.0	140.6	144.8	107.2	94.7
Brecken-ridge		16.8	34.1	55.3	87.8	83	108	115.9	136.6	168.8	200.6	221.5
Keystone											73.6	148.6
Copper Mt.												.7
Total	60.5	87.3	88.2	118.2	179.3	172.7	227.8	246.9	277.2	313.6	381.4	465.5
% Inc.		27.7	1	34	51.6	-3.6	31.3	8.3	12.2	13.1	21.3	22
Colorado	462.2	583.5	562.5	817.5	1,125.	1,187.5	1,383.5	1,796.7	2,273.9	2,658.9	2,914.8	3,719.2
% Inc.												

Blue River Basin rate of increase	19.8% annually
Colorado rate of increase	19.8% annually
National rate of increase	16.7% annually

Source: U.S. Forest Service

is completed, slope capacity will total about 35,000 to 40,000 skiers on a peak day. Further ski area development in the basin will evolve about potential sites already surveyed and rated by the Forest Service. Of the eleven surveyed sites included in this report, one area, Peak-9, is currently under development, leaving a potential of ten. Five of the ten are rated as good; two, marginal; and three, unacceptable.

If all seven acceptable sites are developed to the average slope capacity of the four existing sites (8,500 skiers) an additional 59,500 skiers per day could be accommodated. This would then boost the total, including the existing sites, to 94,500 potential skiers on a peak day. Thus, if development in the basin continues at past rates, population densities could ultimately surpass those in the Denver Metropolitan Area. Currently, the overall average peak-day density of the basin is about 34.4 persons per square mile. Assuming projections for 1980 are correct, density will increase to 155 persons per square mile in the next eight years.

So far, population distribution is fragmented and discontinuous, with Breckenridge, Dillon, Frisco, and Silverthorne functioning as nuclei. Additional small fragmented communities will evolve about Copper Mountain and Keystone and numerous subdivisions scattered throughout the county such as Summit Cove and Wildernest. As densities continue to build within these sprawling enclaves, they will eventually overlap and merge into what might well be the State's biggest "skiburb."

Master Planning

Much of the land in the county has been zoned without a master plan attuned to current problems. Within the past year Dillon, Frisco, and Silverthorne all adopted plans, but Breckenridge, the town most in need of one, has yet to follow suit. Breckenridge approved a plan to guide zoning and population densities within its sewage and water service area, but no master plan for the town proper. Moreover, for all practical purposes, the county is also without a master plan.

In 1962, Sam Huddleston, a Denver planner was commissioned to draft a master plan for the county. Funds for this purpose were available through the 701 Housing Act administered by the Department of Housing and Urban Development (HUD). The plan was finished in 1963 and presented to the county, complete with zoning and subdivision regulations. In addition to the three County Commissioners, the presentation was well attended by local land owners and developers.

According to Roger Hansen, who was formerly employed by Huddleston and assisted in the presentation, there was overwhelming opposition to the zoning and subdivision regulations by land owners, developers, and some Commission members. Hansen described the plans as being fairly general and not especially prohibitive to developers or land owners. Zoning was designed mainly to prevent dense development on the meadows and open areas, where subdivision was limited to five acre minimum size lots. In areas of denser vegetation, such as aspen groves and coniferous stands, developers could subdivide down to 2.5 acres and one acre respectively. In the final analysis the plan was accepted, but without benefit of zoning or subdivision regulations.

Seven years later in 1970, the issue of a master plan was revived. Citizens felt the old plan was no longer sensitive to current problems and through the local citizens organization raised $6,000 to finance a new one. After planning consultants were interviewed, the County Commissioners awarded the job to Charles Gathers and Associates of Denver. The Regional Planning Commission recommended a local firm, the Harris Street Group. However, the Commissioners felt that $18,000 and two years needed for the Harris' proposal was too much and too long. Gathers accepted the job for $5,800. In September 1971 the Gathers' plan was completed and presented to the Commissioners. Today, the new plan has still not been formally adopted and the Huddleston Plan of 1963 remains filed with the State.

Land development in the southern part of the basin seems to have progressed well beyond the point where a master plan would be most beneficial. However, it could be useful in preventing the same mistakes in the northern half. Unfortunately, little mention is made of the northern sector. Instead, the plan is concerned mainly with the heavily traveled, already developed areas south of Silverthorne.

Local citizens, aroused over the delay in acceptance of the new plan, will not let the issue die. Some doubt that the Gathers plan will ever be officially adopted and, according to the president of the Summit citizens group, collection of additional funds to finance another master plan is being considered.

Local Citizens Challenge Growth

In an effort to slow down growth and make county officials more aware of local residents' wishes, the citizens have become more vocal. In September 1972, the Summit Citizens Association, comprised of about seven hundred dues-paying members, presented the Regional Planning Commission with a list of grievances (Summit County Journal, 9-29-72). The spokesman for the group stated "it was time to stop making arbitrary decisions for out-of-county and out-of-state developers and land speculators at the expense and wishes of residents and voters of Summit County (Knuffke, 1972). The letter also called for a moratorium on development until a master plan was adopted.

In response, the county manager stated that he realized some of the subdivisions approved in the past were "land speculators nightmares" but added "land owners have every right to pursue them" (Summit County Journal, 9-29-72). He further added that a moratorium would dry up money sources now available to finance loans in the area. The county manager also pointed out that Breckenridge had made significant commitments on water and sewer systems and questioned how the town could justify such expenditures if growth was halted. Furthermore, a proposed chain supermarket is planning to locate near Silverthorne and it was doubted they would follow through if a moratorium were imposed. It was also pointed out at an earlier County Commissioners' meeting that since the county did have a master plan filed with the State Planning Office (the 1963 Huddleston plan) the courts would take a dim view of a moratorium (Summit County Journal, 9-15-72).

During a subsequent Regional Planning Commission meeting held in

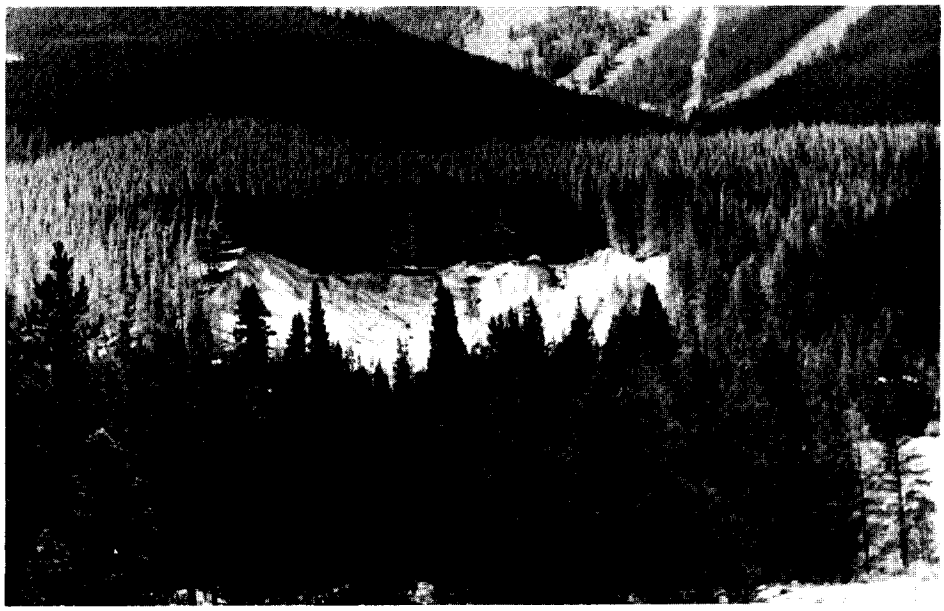


Fig. 16. A two-year-old slump scar west of Breckenridge marks the site of future development of Lake Placer subdivision.

Fig. 17. One of the roadbeds in Quandary Village subdivision.

October, debates over future subdivision continued (Knuffke, 1972). The new district forest ranger challenged the Commissioners with "--who are we protecting here, the developers or the people of the county?" One of the Commissioners replied "--we are representing the people, but some of them are developers. If we say no more, there will be no more jobs, no influx of people." The same Commissioner added later, "We should not penalize these people (the developers) just because we do not have proper tools." The last remark probably in reference to the lack of a county master plan. In reference to controlling development, the Commissioner philosophized, "I think the leveling-off time for Summit County is not far away, when someone in Chicago looks at Summit County and decides it's not to his benefit to come here for more elbow room, freedom, fresh air" (Summit County Journal, 9-15-72).

One of the more obvious phenomenons evolving in Summit County is that of high density development, especially along thoroughfares where strip development is also occurring. Both situations are generated by the location of the severely limited private land base along relatively flat valley bottoms where most travel corridors are also located.

In some areas of the county, zoning has reached as high as 25 units per acre and as high as 60 units per acre within incorporated town limits. The projected population density map of the Breckenridge service area shows two areas involving about a square mile each where ultimate development will accommodate over twenty thousand persons (Plate 16). Eventually the total area, about twelve square miles, could develop to over 121,000 population, with an average density of over 10,000 people per square mile. In reality, local densities could reach twice that amount because of undevelopable steep slopes.

Alpine areas are extremely susceptible to environmental damage from development; however, high density development, when restricted to existing population centers or PUDs, is vastly preferable to single-family residential sprawl. In certain instances in the past, development activities have taken place without benefit or requirement of land capability and physical hazards information. Development has occurred on both steep and unstable slopes. In one case, condominiums are being built in the immediate vicinity of a two-year-old slump zone which involved downslope movement of about six acres of unconsolidated glacial till.

Near Hoosier Pass, at the southern end of the county, land subdivision has approached tree line. Visual inspection of this particular site revealed little further development of any consequence (Figs. 16 and 17). Crude one-lane roads bladed along steep mountain flanks with an occasional faded, sold sign tacked to the trees, were the only evidence to indicate the area was a subdivision. Some of the roads extended to only a few hundred feet below timberline, and lots appeared on slopes so steep that climbing them by foot was extremely difficult. In many places the roads had deteriorated to large chuck holes strewn with boulders and gullies. Negotiating the roads was possible only by the use of a four-wheel drive vehicle provided by a local realtor.

Increasing land values and construction costs are encouraging introduction of increasing numbers of modular homes. In fact, one subdivision development

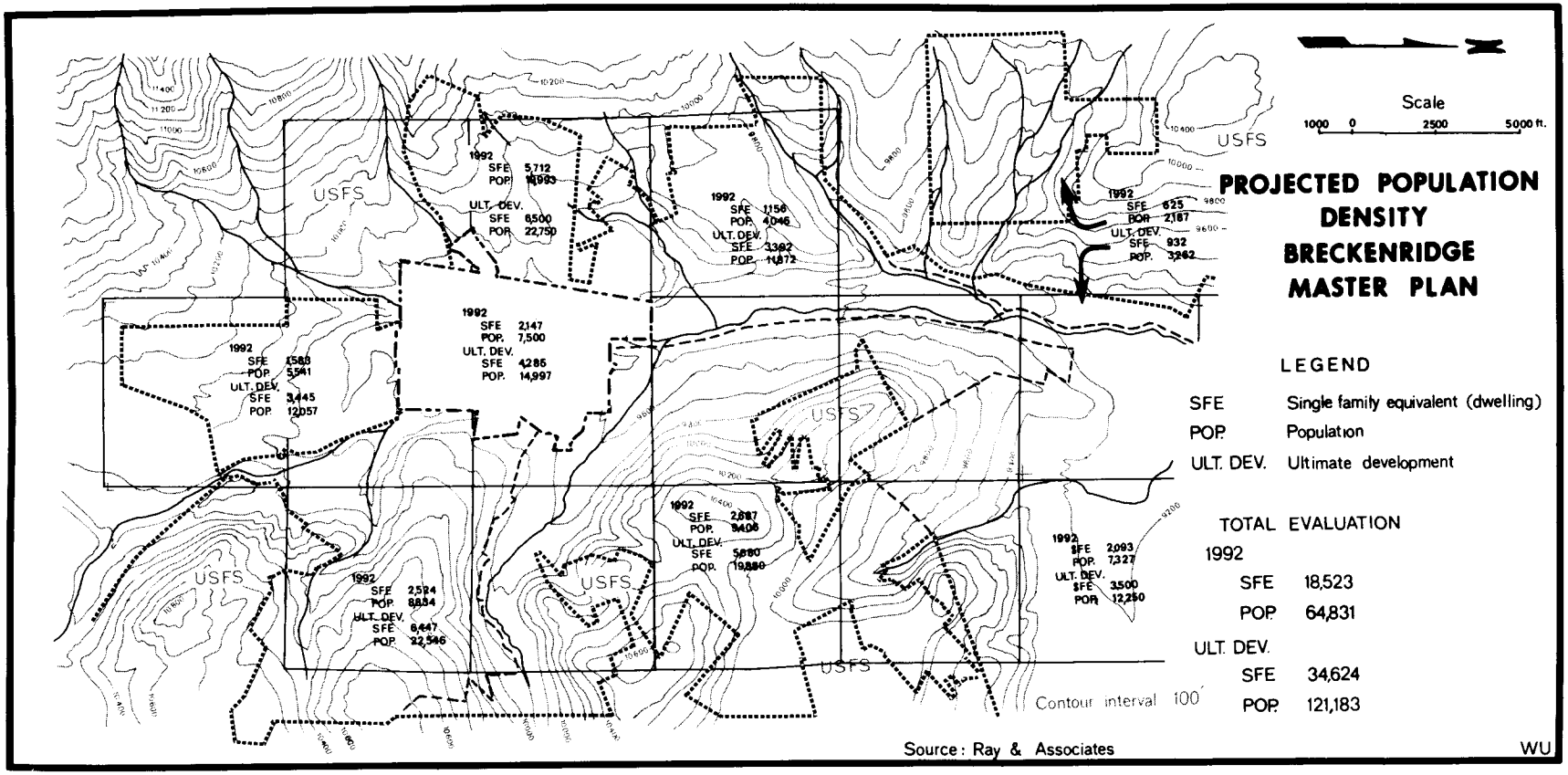

USFS
1992
SFE 5,712
POP. 14,993
ULT. DEV.
SFE 6,500
POP. 22,750
1992
SFE 1,156
POP. 4,046
ULT. DEV.
SFE 3,382
POP. 11,872
1992
SFE 625
POP. 2,187
ULT. DEV.
SFE 932
POP. 3,262
1992
SFE 2,147
POP. 7,500
ULT. DEV.
SFE 4,285
POP. 14,997
1992
SFE 1,588
POP. 5,561
ULT. DEV.
SFE 3,445
POP. 12,057
1992
SFE 2,524
POP. 8,834
ULT. DEV.
SFE 6,447
POP. 22,546
1992
SFE 2,687
POP. 9,408
ULT. DEV.
SFE 5,680
POP. 19,880
1992
SFE 2,093
POP. 7,327
ULT. DEV.
SFE 3,500
POP. 12,250
Scale
1000 0 2500 5000 ft.
PROJECTED POPULATION DENSITY
BRECKENRIDGE MASTER PLAN
LEGEND
SFE Single family equivalent (dwelling)
POP. Population
ULT. DEV. Ultimate development
TOTAL EVALUATION
1992
SFE 18,523
POP. 64,831
ULT. DEV.
SFE 34,624
POP. 121,183
Contour interval 100'
Source: Ray & Associates
WU

Plate 16

Fig. 18. An occasional faded sold sign tacked to a tree and crude roads gorged along the mountain flank are stark reminders of early subdivision development at Quandary Village.

Fig. 19. Patches of Crumholz above the road in Quandary Village subdivision indicate the elevation of this development to be near tree line.

currently underway near Breckenridge, will ultimately comprise about 400 single-family modular units.

Problems generated by a decade of development are visibly evident. Hardly a stream in the upper basin has been spared. Natural courses have been altered, re-channeled, or dammed to add the charm of a lake or brook to complement some development. Streams are often clogged with sediment and construction debris stemming from careless construction practices. "Bridges" through the county are mostly pipe culverts, which restrict natural flow and often become clogged during intensified spring runoff, flooding surrounding areas. Only the highways and main street of the towns are paved. Subdivision streets change from avenues of dust in dry periods to chuck-hole-laced mud courses when it rains.

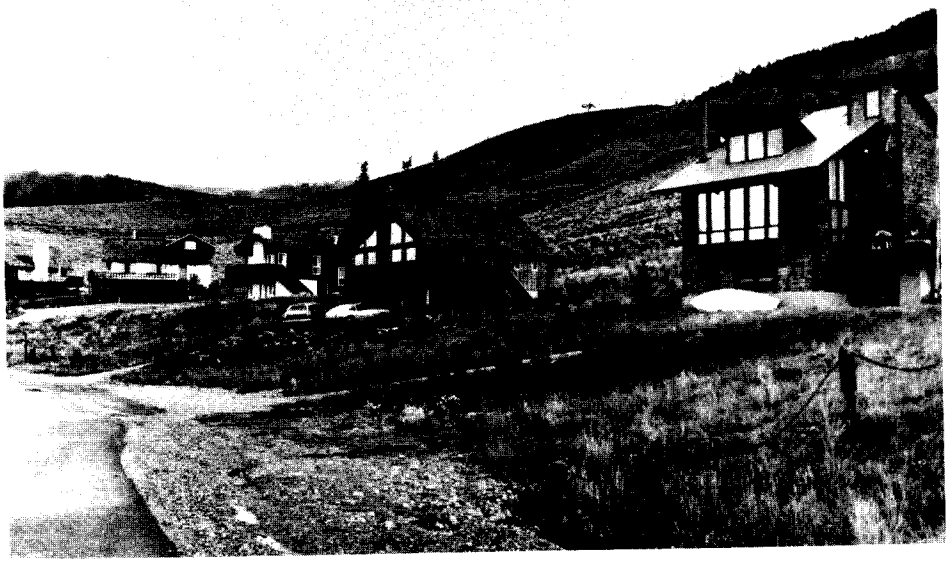
Developers and proponents of development, continually emphasize the benefit of growth to a community: more jobs, higher wages, better schools and services, and better living conditions in general. However, the needs of a growing population are immediate, especially in a rapidly growing recreation community such as Summit County, where services were just barely adequate before development began. Response to these needs is slow, because the benefits of an enlarged tax base usually lag development two or three years.

Directly associated is the effect of high absentee ownership. The absentee owner, present in the area only a few weeks of the year, demands and expects the same services as the permanent resident. Although he derives fewer benefits from property taxes than permanent residents do, his contributions to the community are otherwise limited. Gas, electric and telephone services must be made available for him all year. Furthermore, road maintenance, police and fire protection are provided the same as for permanent residents.

The pace of development in the past decade has left public service and utility companies hard-pressed to keep abreast. As of December 1972 there were only 992 natural gas customers (Public Service Co.). The time and expense necessary in expanding the current gas distribution network has forced widespread use of bottled gas. Telephone service generally requires several weeks at best, and occasionally much longer. The local Wildlife Conservation Officer disclosed that he has waited over a year and is still without phone service. Population pressures have boosted school enrollment to the point where two additional elementary schools are currently being built, one in Breckenridge and the other in Silverthorne.

Fire Protection

Fire protection throughout the county is provided on a voluntary basis. All fire trucks are surplus military vehicles, designed for brush fires. Fire insurance, reflective of poor protection and high hazard, ranges from class eight and nine in Breckenridge, Frisco, and Dillon to class ten for the county. Class ten is the highest and compares with rural classification throughout the State (State Farm Fire and Casualty Insurance Co.).



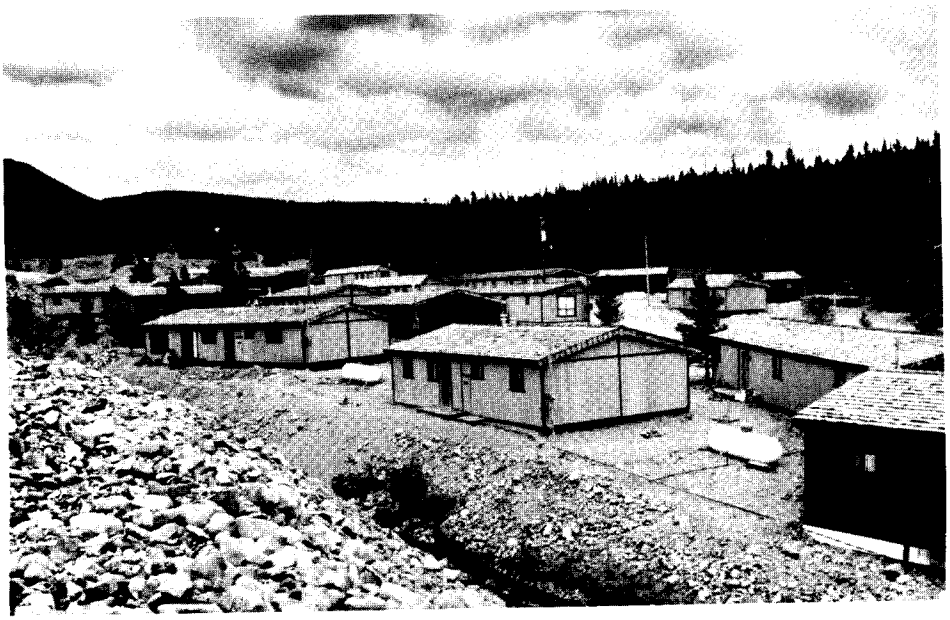


Fig. 20. A comparison of second-home subdivision development. Those in the top photo are located in the north Dillon addition. The lower photo is of Vacation Village, north of Breckenridge.

Fig. 21. French Creek (top photo) and the Blue River (bottom) appear sterile as their courses have been shifted to facilitate new development.

Fig. 22. Muddied water and construction debris in French Creek remind the passerby development of Vacation Village is in progress upstream.

The constantly increasing number of multi-storied condominium buildings, especially those situated in dense stands of lodgepole pine, constitute a growing hazard to life and property. Antiquated military-surplus fire trucks would be grossly ineffective in combating a two or three alarm conflagration, involving several closely grouped condominium buildings. A fire of this magnitude would call for heavy pumpers, capable of discharging large volumes of water, snorkel trucks for shooting water down on top of multi-storied buildings, and sophisticated life supporting rescue apparatus, not to mention a well trained body of fire fighters.

The increase in population and widespread use of woodframe construction contributes to the fire hazard. Two major fires have recently occurred. The most serious was a fifteen-unit condominium structure, which burned to the ground on the evening of October 25, 1972. The building was in the final stages of construction and fortunately unoccupied. The Breckenridge Fire Chief, in citing the needs of his department, stated that had the building been occupied lives would have been lost (Summit County Journal, 11-10-72). Upon arrival of the fire department, the whole structure was engulfed and fire fighting efforts were limited to protecting nearby buildings.

Police Protection

Local police agencies are in little better shape than the fire department. The County Sheriff's Department consists of a seven-man force, including three dispatchers. Breckenridge has a three-man force and Dillon and Silverthorne combined have one. Increasing crime has accompanied population growth over the past few years. In an interview Sheriff Holt disclosed that from December 1969 to July 1971 crime in the county had increased 536 per cent.

The burden of growing needs and demands generated by the county's race toward urbanization must ultimately be borne by the taxpayers. Tax assessments have increased annually since 1960, when the total mill levy was 41.65. Since then, it has increased by over 2.5 times, to a current levy of 104 mills (Colorado Tax Commission). Furthermore, taxes are certain to increase substantially in the future.

Solid Waste Problems

Since most of the county is national forest land, the Forest Service has provided landfill sites for solid waste disposal. However, the Forest Service is running out of suitable sites. Mr. Gary Vertrees, the Summit County Sanitarian, stated that new Environmental Protection Agency (EPA) regulations on landfills on public lands may preclude any further use of Forest Service lands for such purposes.

Vertrees added, EPA guidelines are almost impossible to conform to in the county, because of long winters and deep snow accumulations. Alternative disposal methods have been considered, however, no feasible alternative has yet been proposed. One method provided for dumping the trash into the molybdenum tailing ponds north of Climax. The tailing ponds would then contribute not only a great amount of dissolved minerals to Tenmile Creek but

Fig. 23. One of a series of stair-stepped molybdenum tailing ponds at the head of Tenmile Canyon (top photo). The mineral rich slurry is left to evaporate out or leach to the ground water. Iron oxide stains along the banks of Tenmile Creek below the tailing ponds attest to the high mineral content of the clean appearing water.

also decayed trash matter.

In other communities where disposal sites are lacking, trash grinders are used. This does not solve the problem, but allows more efficient use of available sites. According to a 1968 survey, the average person in the United States generates 5.32 pounds of solid waste per day. In urban areas the average increased to 5.72 pounds and in rural areas 3.93 pounds per day (Ralph J. Black, et al.).

Table 14

Average Solid Waste Collected
(Pounds per person per day)

Solid Waste	Urban	Rural	National
Household	1.26	0.72	1.14
Commercial	0.46	0.11	0.38
Combined	2.63	2.60	2.63
Industrial	0.65	0.37	0.59
Demolition, construction	0.23	0.02	0.18
Street and alley	0.11	0.03	0.09
Miscellaneous	0.38	0.08	0.31
TOTALS	5.72	3.93	5.32

Source: Ralph J. Black, et al.

Assuming that the Lucas population projection is correct, Table 15 suggests future volumes of solid waste to be generated. By 1980 some forty to sixty tons of trash will accumulate per day, increasing to nearly three times that amount by the turn of the century. It is also important to remember that the estimates are based on a permanent population projection and do not include trash generated by transients, who far outnumber permanent residents during peak seasonal recreation periods. A limited private land base escalating in value compounds the problem and economic considerations may ultimately dictate exportation of solid waste completely out of the county.

Table 15

Solid Waste Projection

Year	Est. Pop.	Pounds Per Day		
		Urban	Rural	National
1970	2,665	15,244	10,473	14,178
1980	22,500	128,500	88,425	117,700
1990	34,200	196,024	134,406	181,946
2000	55,800	319,176	219,294	296,856

Sewage Disposal Problems

A matter of even greater urgency is that of sewage disposal. Prior to 1962 all sewage in the basin was disposed of either by pit toilets, septic tanks, or raw discharge into the streams. Sewage treatment was first introduced into the county in 1962, when a new plant was constructed with relocation of Dillon to its present site. Since then the population of the area has outgrown the plant, which was originally designed for a population of four hundred. Until 1968, when a new plant was installed at Breckenridge, the town dumped its sewage untreated, into the Blue River. In the same year a treatment plant was also installed at Frisco. The two plants were designed to service populations of fifteen hundred and seven hundred respectively. Three years later in 1971, the Summit County plant went on the line. Design capacity of the county plant was for one thousand population, and it too was located near Frisco.

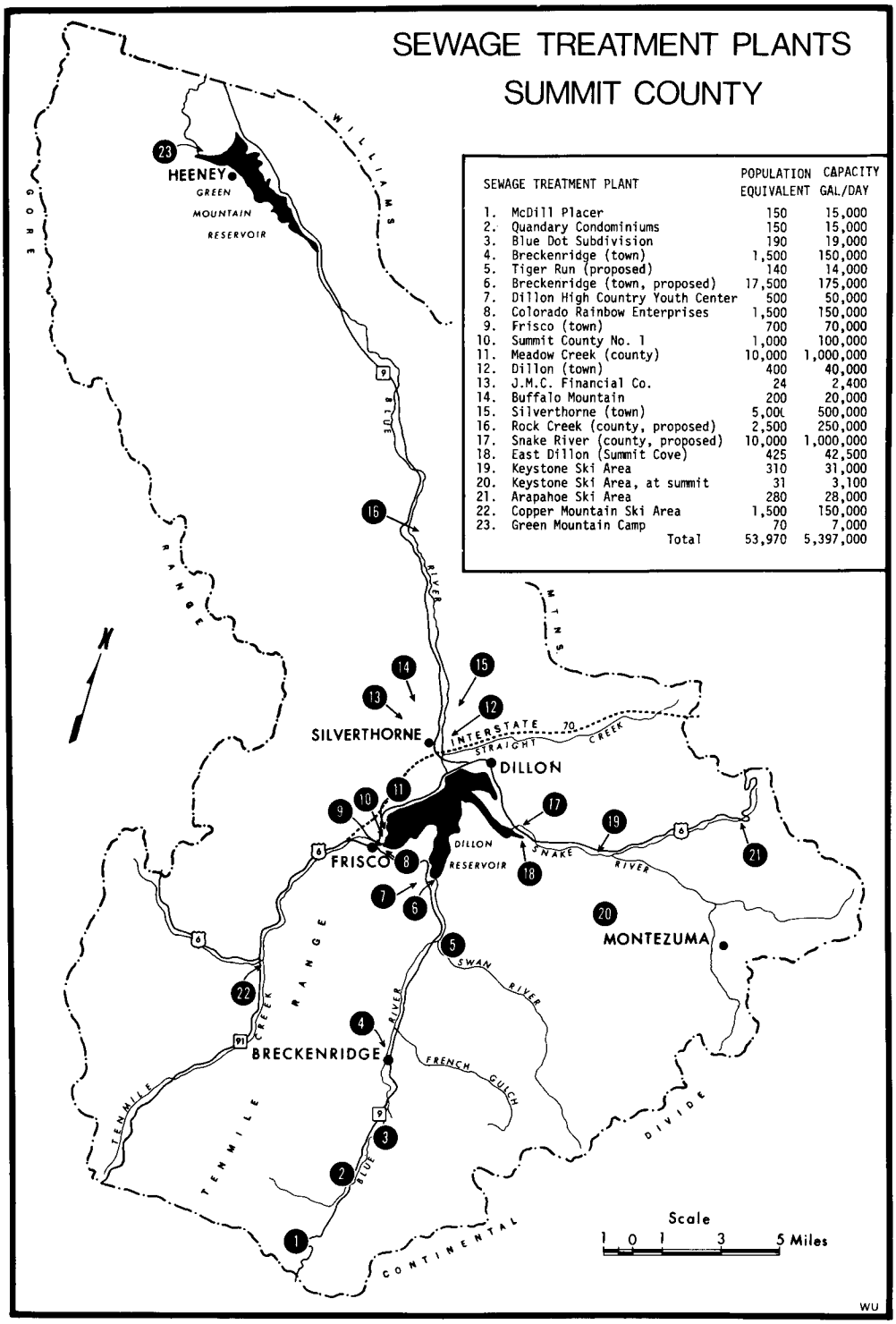
Even though combined capacity of the public plants reflects a capability exceeding current needs, such is not the case. Rapid development and attendant population growth coupled with peak sewage loads generated by recreationists have created a growing demand for greater sewage disposal capabilities.

As the myriad subdivisions, ski resorts, and condominiums evolved, there were no interceptor lines to carry raw sewage to the existing public plants. Also, during the latter 1960's and early 1970's accelerated growth within the towns soon overtaxed the small community plants. To satisfy immediate needs and comply with State and local health regulations, developers began installing their own treatment plants. Today a total of 23 sewage plants, either in operation or proposed are scattered throughout the county.

Septic Tanks

Despite the proliferation of treatment plants, disposal by septic tank and leaching field is common. Where lot size permits and intercepters are unavailable, septic tanks are still being installed. According to Mr. Gary Vertrees, the County Sanitarian in 1972, about 150 to 200 septic tank permits are issued annually (September 17, 1972). Silverthorne, which evolved from a sprawl of shacks and trailer houses to house temporary construction workers during construction of Dillon Dam, still has no treatment facility. As early as 1963, water wells in the community were contaminated (Huddleston, 1963:25).

A 1970 engineering report on a county-wide sewage system showed general soil conditions in Summit County to be unfavorable for sewage disposal by septic tank (McCall-Ellingson, 1970:15). Soil depths on slopes are usually inadequate for proper percolation, allowing effluent to seep partially filtered into the fractured bedrock. High clay content of the valley soils also creates an impervious barrier to proper percolation. Furthermore, severe winter climate normal to the basin's elevation, impairs septic tank operation by retardation of bacterial action. It is worth noting that septic



SEWAGE TREATMENT PLANT		POPULATION EQUIVALENT	CAPACITY GAL/DAY
1.	McDill Placer	150	15,000
2.	Quandary Condominiums	150	15,000
3.	Blue Dot Subdivision	190	19,000
4.	Breckenridge (town)	1,500	150,000
5.	Tiger Run (proposed)	140	14,000
6.	Breckenridge (town, proposed)	17,500	175,000
7.	Dillon High Country Youth Center	500	50,000
8.	Colorado Rainbow Enterprises	1,500	150,000
9.	Frisco (town)	700	70,000
10.	Summit County No. 1	1,000	100,000
11.	Meadow Creek (county)	10,000	1,000,000
12.	Dillon (town)	400	40,000
13.	J.M.C. Financial Co.	24	2,400
14.	Buffalo Mountain	200	20,000
15.	Silverthorne (town)	5,000	500,000
16.	Rock Creek (county, proposed)	2,500	250,000
17.	Snake River (county, proposed)	10,000	1,000,000
18.	East Dillon (Summit Cove)	425	42,500
19.	Keystone Ski Area	310	31,000
20.	Keystone Ski Area, at summit	31	3,100
21.	Arapahoe Ski Area	280	28,000
22.	Copper Mountain Ski Area	1,500	150,000
23.	Green Mountain Camp	70	7,000
	Total	53,970	5,397,000

Plate 17

denied any such trade and furthermore would refuse to sell the property in question or allow it to be used for a sewage treatment facility.

Further concern over the new Breckenridge site was expressed by the EPA regarding the site of a treatment plant below the high-water level of the reservoir (Dodson, 1972). Esthetic degradation of the area is also a concern. The plant is to be housed in a 26 foot high metal Butler-building in an area devoid of screening vegetation. Situated so close to the reservoir, effluent would be discharged almost directly into the water body without benefit of further purification from stream action.

Also under construction is a half-million gallon-a-day plant to replace Dillon's overloaded facility. Silverthorne and Dillon jointly back the project, which will serve a population of five thousand (EPA, 1972b). EPA funds for the new operation have been approved and construction is currently in progress, with completion expected in 1973. The new plant is located on the Blue River about three miles downstream from Dillon's old Silverthorne plant, which is to be retired upon completion of the new facility.

Although grant funds have already been awarded to finance construction of the Dillon-Silverthorne plant, payments are being temporarily withheld pending litigation procedure to halt the project. According to an EPA official, a developer who owns property across the river from the site initiated court action to stop construction (Campbell, 1972). At the onset, attempts were made to persuade the towns to locate the project downstream. This would have required additional pipeline, which the developer wanted to pay for by soliciting financial help from local property owners. When this approach failed, suit was filed against the towns on the basis of creating a nuisance in the area.

According to the County Sanitarian, who had recently made an inspection of the site, operational problems may also be forthcoming. Vertrees stated that inspection of the lagoon revealed what he thought to be ground water seeping through the bentonite sealer covering the base of the lagoon. The lagoon had recently been sealed and water had already started collecting in the impoundment. Vertrees based his opinion on the fact that it had not rained prior to his inspection, since the lagoon was sealed. He said infiltrating ground water would dilute the rich sludge mixture of the lagoon, thereby retarding bacterial activity. Effluent then discharged to the river would have a higher BOD_5 demand.

Vertrees added further that in October design capacity of the new facility had been reached, and no additional new taps were being sold. To facilitate expected growth in the area, additional expansion funds to enlarge the yet unfinished plant will be needed. According to an EPA spokesman, expansion funds for a treatment plant are acquired much easier while the facility is still in one of the phases of construction. If government funds are lacking, developers in the area could be forced to provide their own plants.

Plans for expanding the Frisco plant are also in process. An aerated lagoon now in use, designed to service a population of seven hundred, will

be expanded to accommodate two thousand taps. A $200,000 bond issue to help finance the operation was approved in a June 13, 1972 election and additional funding will be sought through the EPA.

Frisco's plant is located about one mile south of the county plant, which will also need to be revamped or enlarged to facilitate the county-wide sewage plan. Combining operation of both plants under one sanitation district has been suggested (Bertram, 1972). Recently, the EPA announced further grants for sewage treatment plant development would be withheld until a regional master plan for the county was produced, indicating the scale of expected future development (Colorado Department of Health, 1972). For this reason, funding assistance by the agency may be temporarily or permanently withheld.

Considering the fact that the already outgrown Frisco plant and the malfunctioning county plant were both built at about the same time, in proximity to one another, and with EPA funding, the question arises: Why was consolidating not thought of at the outset? Perhaps if the EPA had required a master plan in 1968 the resulting duplication of efforts and current expansion programs might have been avoided.

Sewage treatment problems in Summit County are rapidly getting out of hand. The regional concept put forth by the county is ideal in that the entire county would be serviced by only four plants, circumventing the need for a host of small package plants and individual community facilities. However, this would have slowed the pace of development throughout the county.

Treatment plants now proliferate the basin, growing in numbers as development progresses. It is relatively easy for developers to install their own package plants. The costs of such service are borne by lot or home buyers who must also assume operation and maintenance responsibilities once the development is complete.

None of the plants throughout the county has a fulltime operator. If a malfunction occurs, the problem must await a routine check for correction. Recent development and associated sewage treatment problems in the basin have generated increasing concern on the part of the Denver Water Board. Repeated grant requests to finance a growing number of plants in an area where water quality is thought to be degenerating has prompted the EPA to curtail additional grants pending proof of regional planning.

Withdrawal of government funds places a hardship on county and municipal governments whose tax base is as yet inadequate to cope with rising local needs. However, it does little to retard or slow development when it is relatively easy for the developer to acquire approval for installation of package plants. Some conscientious developers in the area have postponed plans for private plant installation, counting on the eventual implementation of the county plan. Keystone, for example, is planning a three to five million dollar commercial complex to be developed in 1973. If adequate sewage treatment facilities are not available or forthcoming, Keystone also may be forced to install its own plant as nearby Summit Cove developers have already done.

Water Pollution

Colorado water quality standards specify that all waters of the State be "free from materials attributable to municipal, domestic, or industrial wastes or other controllable sources that produce objectionable odor, color, taste, or turbidity in the water, or objectionable aquatic life, which may result in eutrophication or other conditions that interfere with the classified use of the water" (EPA, 1972a).

According to a recent study, the quality of Summit County's surface waters is in general compliance with State water quality standards (EPA, 1972a). Summit County standards are more stringent, however, and require secondary treatment of municipal waste waters followed by phosphorous removal. County standards further specify 98 per cent removal of BOD_5, 99 per cent removal of suspended solids, and 95 per cent reduction of phosphates. Existing municipal treatment plants have failed to comply with county standards (EPA), 1972).

Enforcement of county water quality standards, however, would further aggravate the unsolved problems of increasing solid waste accumulation and disposal. Advanced treatment is necessary to meet county standards.

According to Black and Veatch (1971:4-15) advanced treatment creates a sludge by-product at the rate of 3,406 dry pounds per million gallons of treated effluent. If dehydration facilities are unavailable, the sludge must be moved for disposal in a wet state. This increases the weight by about four times to 13,624 pounds per million gallons. On the basis of established population projections, sludge accumulation through advanced treatment will increase at the following rates.

Table 16

Sludge Accumulation through Advanced Sewage Treatment

Year	Population Estimates	Dry Pounds	Wet Pounds
1970	2,665	920	3,678
1980	22,500	7,664	30,654
1990	34,200	11,649	46,594
2000	55,800	19,005	76,021
Ult.*	190,989	64,714	258,856

*Ultimate, reflects population values existing once presently zoned and planned areas in the county develop as introduced in Chapter V.

Furthermore, it must again be remembered the above projections to the year 2000 represent permanent population and do not consider peak use periods.

Waste loadings to the basin waters are increasing annually and all waste discharged to upper basin streams eventually enter Dillon Reservoir. Existing treatment capacity of all upper basin plants now totals approximately .5 MGD, capable of serving a population of 5,000. Proposed plants when completed will increase the total to 5.2 MGD, a tenfold increase. At this time, treatment facilities will be adequate to serve a population of 52,000 in the upper basin. In mid-1972 the County Manager announced that existing subdivisions in the upper basin, once fully developed, could support a population of 150,000. In terms of sewage treatment capability, this population would require a 30-fold increase over present facilities and a resultant 30-fold increase in waste loading to upper basin waters.

The amount of waste loading Dillon Reservoir can absorb and still maintain acceptable water quality depends on the quantity and quality of effluent discharged to upper basin streams. In a balanced lake ecology, nutrient input and losses are normally equalized by the food chain and direct losses from the system. Disturbance of the system by man's activities results in nutrient enrichment and overfertilization of the waters: a process known as cultural eutrophication.

In a disturbed watershed, man's action greatly intensifies nutrient enrichment. Besides direct discharge of sewage effluent from treatment plants, nutrients also enter the streams from decomposing solid waste from refuse dumps. Surface runoff induced by vegetation disturbance or removal further enriches surface enters. Nutrient particles adhering to sediment surfaces are thus transported downslope to enter the streams. For example, the EPA (1972a) reports that at Lake Tahoe the nutrients entering a disturbed watershed were nearly twice that of one undisturbed. Because of lack of data, enrichment from surface erosion was not included in this analysis.

Overfertilization of a reservoir promotes algal growth and a resultant loss of fish and other higher aquatic organisms. As the algae dies and sinks to the bottom and decays, offensive odor and taste is imparted to the water. Mackenthum (1964:42) states that both weed and algal nuisances develop in enriched waters; recreational use is impaired and often postponed indefinitely in waters that formerly offered multiple forms of recreation. He further states that industrial or municipal water treatment is hampered or made inefficient by extensive aquatic growths resulting in lowered property values and loss of resort trade.

A water quality analysis model devised by the EPA (1972a) indicates present nutrient loadings at Dillon Reservoir are still below the potential for eutrophication. Increasing population densities, continued vegetation removal for land development and ski area construction are all indicators of declining water quality in the future. Unless existing county water quality standards are strictly enforced, eutrophication of Dillon Reservoir is a serious possibility. At stake is not only the future recreational value of Summit County's water resources, but also the value of Dillon Reservoir as a culinary water supply for a growing Denver Metropolitan Area.

Air Pollution

An assessment of development impact upon Summit County must of necessity

include mention of air pollution. Normally air pollution is a matter of concern to urban dwellers and not to residents of alpine valleys such as the Blue River Basin. However, research indicates the presence of a combination of factors capable of generating serious air pollution problems.

Nearly all large urban centers in the nation experience some degree of air pollution in today's automobile-oriented society. The problem becomes acute in areas of high inversion frequency and especially where temperature inversions last several days, such as in Denver. In Denver, prolonged heavy smog conditions are most frequent during winter months when inversion frequency is also greatest. A build-up of cold air on the higher slopes drains to the basin floor, giving rise to lower temperatures at lower elevations or an inverted temperature gradient. Inversions may occur throughout the year, but are most common and occur most frequently following long, cold winter nights. Normally, the condition dissipates at around 10 or 11 a.m., as the sun warms the lower layers of air. However, inversions occasionally last several days or more depending on weather and local atmospheric conditions.

The Blue River Basin, almost completely enclosed by mountains rising over three thousand feet above the valley floor, is extremely susceptible to frequent and prolonged inversions, expecially during winter months. To establish inversion frequency with a reasonable degree of accuracy, constant temperature records from a number of elevations must be compared with those on the valley floor, over an extended period of years. Only in this manner can inversions of short duration as well as those lasting several days be detected. Unfortunately, long term temperature data for the area are limited to daily maximum and minimum readings.

However, examination of existing temperature data for the past five years reveals some interesting facts. Daily mean temperatures for Dillon (el. 9,605 ft.) and Climax (el. 11,300 ft.) were compared throughout the past five ski seasons. The results of the comparisons are shown in Table 17, which indicates the number of days in each month when mean daily temperatures at Climax were higher than those recorded at Dillon. Thus, it can reasonably be assumed that inversions existed for the indicated periods, and a minimum inversion frequency is established.

Decreasing totals from 38 days during the 1967-68 season to 13 during the past season probably reflect slight temperature variations associated with normal meteorological changes and not necessarily long-term trends. The decreasing trend could continue or reverse itself in any given year. Although the frequency as shown in the table is not particularly alarming, it must be remembered that these figures reflect only the 24-hour inversions and not those of shorter duration described earlier.

A matter of greater concern than inversion frequency is that of prolonged inversion duration. In every ski season except 1970-71 a number of inversions lasted for more than one day and in January 1968 prolonged inversions occurred on five separate occasions, in one case lasting five days. During such prolonged periods, pollutants emitted to the atmosphere accumulate creating a thick smog.

Table 17

24-Hour Inversion Frequency*
Total Number of Days of Month Inversions Existed

Ski Season	67-68	68-69	69-70	70-71	71-72
November	4	$6^{3,2}$	$7^{2,3}$	3	2
December	2	3^{2}	$8^{3,2,2}$	5	$7^{2,3}$
January	$17^{2,5,4,3,2}$	3^{2}	3^{2}	7	3^{2}
February	$9^{2,2,3}$	$10^{3,3}$	3^{3}	2	1
March	5	$8^{2,2,3}$	3	0	0
April	1	0	1	0	00
Season Total	38	30	25	17	13

*The above inversion frequency was computed by comparing daily mean temperatures for the months and years indicated at Dillon (El. 9,065 ft.) and Climax (el. 11,300 ft.). The smaller offset numbers indicate how many consecutive days (24-hour periods) inversions existed during any one month; for example, in November of the 1968-69 ski season inversions existed for a total of six days. In one instance the inversion lasted for three consecutive days and in another, two days.

According to traffic volume estimates released by the Colorado Highway Department, traffic in the Blue River Basin is expected to nearly double by 1975 and re-double in 1990 (Plate 6). The increasing popularity of recreation in Western Colorado, served by only one major interstate highway (I-70), may prove these projections conservative.

On the basis of state traffic projections and projected automobile emission factors published by the Environmental Protection Agency, estimates of daily automobile pollution were calculated for Summit County.

Vehicular emission factors differ according to a number of variables including: engine size, age of vehicle, speed of operation, mechanical condition, and elevation. Table 18 reflects sea level conditions and would naturally be conservative with respect to actual conditions in Colorado. Because of the difficulty of incorporating all of the involved variables in testing procedures, accurate curves reflecting emission changes with elevation are not available as yet. However, emissions are known to increase with elevation.

Table 18

Projected Emission Factors for Gasoline Powered Engines*

	1970	1975	1980	1985	1990
Hydrocarbons urban	16.4	9.7	2.5	.91	.72
rural	11.6	6.6	2.1	.76	.47
Carbon Monoxide urban	100.0	68.0	22.0	8.1	5.2
rural	52.0	35.0	14.4	5.4	3.1
Nitrogen Oxide urban	8.3	6.7	3.1	1.3	.9
rural	8.3	6.7	3.8	1.6	1.1

Source: Environmental Protection Agency

*Emission factors presented in grams per vehicle-mile. Declining values indicate increasing air quality standards and more efficient vehicle pollution control devices.

Changes in elevation normally require carburetor adjustment to compensate for differences in barometric pressure and oxygen intake ratio to fuel ratio for proper engine operation; otherwise with increased elevation more fuel is used, but not necessarily consumed in combustion. Under such conditions engine efficiency is reduced and exhaust emissions increased.

Although spot checks have been made, emission factors for the Denver area are yet to be calculated. A spokesman for the State Health Department thought emissions at Denver could possibly increase by a factor of 1.5 to 1.7 above those of sea level. Elevations in Summit County are on the order of three thousand feet higher than those in Denver and emission factors could logically be expected to exceed those in Denver. However, in the absence of accurate data showing the effect of elevational changes, sea level emission factors will be used in the following calculations. Traffic volume at the geographic center of the basin, the Dillon-Silverthorne interchange, was used in the calculations. From this point eastward it is approximately ten miles out of the Basin. Most of the heavy traffic originates and ends in the Front Range urban centers; an average of twenty miles travel was allocated per vehicle. Thus, miles traveled per day in 1970 totaled 122,000; 173,000 projected for 1975; and 280,000 for 1990.

By application of emission factors in grams per vehicle-mile to actual miles traveled per day, the weight of pollutants added to the atmosphere daily is estimated. Emission factors for both urban and rural conditions are included in the table. Because of the nature of stop-and-go, short distance driving predominant in the area, much of the county would be classified as urban. For those who disagree, the projection includes both urban and rural.

Vehicular emissions include hydrocarbons, carbon monoxide, and oxides of nitrogen. Total emission for 1970 was 33,540 pounds per day under urban conditions and 19,339 for rural; for 1975, 32,190 pounds daily for urban and

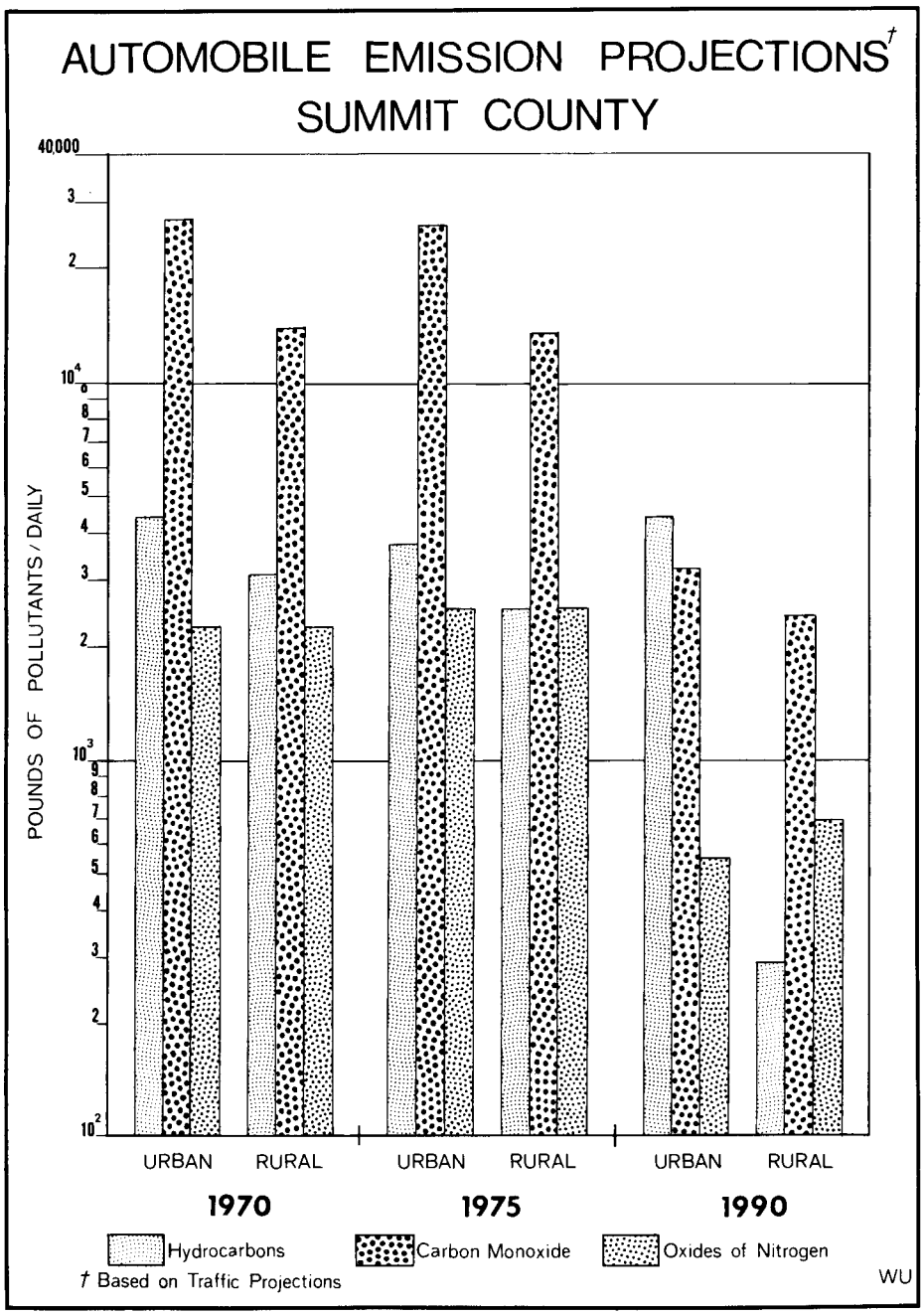

AUTOMOBILE EMISSION PROJECTIONS†
SUMMIT COUNTY
POUNDS OF POLLUTANTS / DAILY
40,000
3
2
10^4
8
7
6
5
4
3
2
10^3
9
8
7
6
5
4
3
2
10^2
URBAN
RURAL
URBAN
RURAL
URBAN
RURAL
1970
1975
1990
Hydrocarbons
Carbon Monoxide
Oxides of Nitrogen
† Based on Traffic Projections
WU

Plate 18

18,421 for rural; and in 1990 urban conditions are calculated at 4,210 and rural 2,883 pounds daily.

Assuming the State traffic projections to be correct and assuming further that future automobile emissions decline in accordance with Environmental Protection Agency and federal automobile emission standards, increased traffic volumes will be more than offset by declining emissions per vehicle. However, during periods of prolonged inversions coincident with heavy ski season traffic, severe smog conditions are almost a certainty. If, for example, during the 1974-75 ski season an inversion lasted a period of five days as it did in January 1968, each day 32,190 pounds of combined hydrocarbons, carbon monoxide, and oxides of nitrogen would be contributed to the basin's stagnating atmosphere. By the fifth day, the accumulated amount would exceed 80 tons.

To further aggravate the situation (not included in the above calculations) is an increasing use of wood-burning fireplaces, which produce sulfur dioxide and suspended particulate matter. Few dwellings currently being constructed in the county, either condominium or single-family, are without a fireplace. Firewood sales in the area are increasing substantially with a growing portion of locally harvested timber from ski-trail clearance or timber management in the national forest being cut for firewood.

The highest incidence of fireplace burning would logically coincide with heavy weekend ski traffic. During periods of peak weekend occupancy, wood smoke generated from domestic heating could contribute significantly to overall air pollution. To make matters worse, prevailing winds in the basin are out of the north-west, which would cause air-borne pollutants to concentrate in the densely developing southern half of the basin.

CHAPTER V
Conclusion

Three factors are primarily responsible for the current developmental boom in Summit County: Interstate-70, Dillon Reservoir, and the area's vast skiing potential. Investment trends in construction are increasing. In 1970, money spent on construction totaled $8 million; $8 to 10 million in 1971; $20 million in 1972; and $40 million is estimated for 1973 (Summit County Planning Department).

Data recently compiled by the County Planning and Building Departments indicate growth and development have barely begun. Aside from a total of 90 active subdivisions in the county, 12,962 singe-family equivalent units were tallied on 4,920 acres of land (Summit County Planning Department). Also, the data indicate an alarming trend in high density development; in 1972 over 88 per cent of development involved multi-family dwellings. Assuming a population equivalent of 3.5 persons per dwelling, peak population equivalent now totals 45,367.

In addition, 1,790 acres have been approved for residential development

in unincorporated areas with an average R-6* zoning which would support 8,892 units. Plans for development of another 3,600 acres are underway. It was reported that 12,000 units will be requested on this acreage. Moreover, the five towns in the county also have zoning for an additional 21,000 units.

On the basis of 3.5 persons per dwelling, total zoned and planned areas in the county could ultimately support a population of 190,989. Impending high densities are further illustrated by the fact that the total acreage involved in the existing and proposed development constitutes less than fifteen per cent of all private land in the basin.

Zoning appears to be questionable in the absence of a master plan outlining land-use goals and growth objectives. Unless the county soon initiates a plan cognizant of current and future growth problems, it may come too late to prevent further dense growth already apparent in the county.

An increasing number of communities across the nation are currently being confronted with growth pains. The traditionally-held concept that growth is good is now being challenged by more and more towns, especially those close or easily accessible to metropolitan areas. Exemplary case studies of Ramapo, New York, and Petaluma, California, indicate the problem is felt nationwide. A third example, the Tahoe Basin, may well typify complexities associated with growing recreation regions.

Ramapo, New York

Ramapo is a town in Rockland County, New York. The town lies a short distance from the suburbs of New York City and is accessible by a newly constructed thruway crossing the Hudson River. The thruway brought commuters, widespread development, and a rapidly growing population. Population increased from 35,000 in 1960 to 76,702 in 1970 and is expected to increase to 120,000 by 1985 (American Society of Planning Officials, 1972).

In 1969, Ramapo adopted a new approach to regulating its growth. Zoning ordinances were amended to create a new kind of special permit use labeled "Residential Development Use." Under the new ordinance a special permit is required for residential development of any kind. Special permits are granted only if standards are met for minimum facilities and services to the new development. Required services include: sewage, drainage, parks or recreation, schools, roads, and firehouses.

A point system of values is assigned to each factor and a minimum of fifteen development points must be satisfied before a special permit is granted for a development proposal. The town has adopted an overall development plan and, if services needed for residential development are lacking, they will be included under an 18-year program of capital improvement (American Society of Planning Officials, 1972). The new ordinance places the responsibility of providing public services to new developments squarely on the developers.

*R-6 zoning implies the equivalent of 6 single-family residential units per acre.

Ramapo landowners and developers brought suit against the planning board claiming the ordinance was destructive of the value and marketability of property. The highest court of New York, in a split decision, upheld Ramapo, proclaiming:

> "Where it is clear that the existing physical and financial resources of the community are inadequate to furnish the essential services and facilities which a substantial increase in population requires, there is a rational basis for phased growth and hence, the challenged ordinance is not violative of the Federal or State Constitutions." (Golden Vs. Planning Board of town of Ramapo, New York State, 2nd District, 1971.)

Ramapo's special permit ordinance could be effective in bringing developer interests more in line with community interests in land development. Urban land is ideally suited to development when supplied by essential public services and facilities, but more expensive for developers to acquire. Developers usually prefer to bypass this expensive urban land in preference to undeveloped land on the urban fringe. Thus, the cost of providing services to a new development is spread to the larger community or postponed until future improvements catch up. The decision by New York's highest court, in effect, notified the state legislature that times were changing, necessitating new approaches to land development in which the state must share an active role. In the meantime, the precedent has been set for a community to act on its own.

Petaluma, California

Similar in many respects to Ramapo, Petaluma, California, has also taken effective steps to control growth and protect its environment. Until the mid-1960's, Petaluma was a quiet, picturesque, small town with a population of 19,050 (McGivern, 1972). Once known as the "egg capital of the World," the town's main industry remains poultry production.

A four-lane freeway connects Petaluma with San Francisco forty miles to the south and provides commuters fast and easy access to Bay Area cities. From 1965 to 1970 Petaluma's population increased from 19,050 to 24,500 and to 29,500 by the end of 1971 (McGivern, 1972). The town was rapidly developing into a bedroom community with an estimated sixty to seventy per cent of new residents commuting to the Bay Area (McGivern, 1972).

To ensure a balanced tax base and prevent an extensive sprawl of residential tracts, large blocks of land along U.S. 101 were annexed, serviced with water and sewers, and zoned industrial. Local residents, as well as town administrators, were becoming concerned with the sprawling effect of residential development upon the area's environment and the town's capability to continue providing public services. In 1970, the Public Works Department gave notice that present facilities could support only one more year of development (McGivern, 1972).

Early in 1971, the town took the first step in controlling growth by placing a moratorium on further development, rezoning and annexation. The

freeze lasted for more than a year, during which time planning consultants were hired to assist in establishing basic goals and land-use policies.

Representative community input was gained through questionnaires sent out to local citizens identifying community needs. Interested citizens were encouraged to participate further by joining one of six committees to discuss and plan: commercial areas, residential areas, unincorporated areas, recreational areas, environmental land-use, and industrial areas. Each committee was chaired by a planning commissioner (McGivern, 1972). Out of these meetings came the Environmental Design Plan, designating specific land uses to achieve policy goals. It also proposed that the majority of new developments occur as planned unit developments.

In addition, a Residential Development Program for the years 1973 to 1978 was adopted. This plan established building limits or quotas for each section of the town to assure uniform development over the town as a whole and limit development in any one year to five hundred residential units. Ten per cent of the annual development quota was allocated to low or moderate cost housing (McGivern, 1972).

After policies and ordinances were established, the method of enforcing control was put into effect by adoption of the Residential Development Control System in August 1972. Similar to Ramapo's Special Permit Ordinance, Petaluma's control system is also based upon a point system. Two sets of categories are used. The first set of factors is based on a scale of zero to five points each and consider water, sewage, drainage, fire protection, schools, and streets. The second category considers public welfare and amenities with zero to ten points for each factor. Factors of the second category include: harmony with the existing development, the amount of landscaping and screening needed, efficiency of the site for traffic safety and privacy, consideration of public or private open space, expansion of footpaths, bicycle paths, or equestrian trails and greenbelts, provision of needed public facilities, orderly and contiguous development as opposed to "leap-frog" development, and ability to meet the policy of eight to twelve per cent low and moderate income dwellings (McGivern).

A proposal for development must accumulate at least 25 points of the first category on public service or a minimum of 50 points under the second category governing quality of design, public welfare and amenities. The development control program went into effect in September of 1972; it is still too soon to determine success or failure of the program. If nothing more, Petaluma's attempts to control growth completely stopped development for over a year, and served notice that developers would have to become more responsive to community needs in the future.

Lake Tahoe, California

As evidenced by the Tahoe experience, regional planning is much more difficult and complex than that of a single community. Political interests of various local communities and county governments as well as state and federal governments emerge. The Tahoe Basin has been fraught with political as well as tremendous private pressure and might well be considered the classic nightmare of the planning profession.

Lake Tahoe was recognized for its unique scenic quality and recreational value as early as the late 1800's, when wealthy residents from Sacramento and San Francisco began frequenting the area. In 1920, a group of private landowners petitioned to have 75 per cent of the basin dedicated as a national park. The Park Service denied the request with a counter request for the remaining 25 per cent to be included. In 1939, a bill was introduced to the California Legislature to establish a California-Nevada Compact to control future development of the area. The bill was sent to committee and was never heard of again (Agena, 1972).

Serious deterioration of Tahoe began with the affluence following World War II, when the area became a year-round recreation mecca for the growing California cities to the west. Gambling was introduced in 1955 on the Nevada side, with development of large hotels and casinos. In 1960, California hosted the Winter Olympics at Squaw Valley, which resulted in extensive development in the basin and worldwide attention was focused on one of the nation's most scenic natural lakes. Interstate-80 was completed at about the same time and travel time to Sacramento and San Francisco was cut in half (Agena, 1972).

From 1960 to 1967 annual visitors to the basin's national forest areas rose from 279,000 to 1,780,000. Assessed property and commercial values increased from $20.8 million in 1960 to $119.8 million by 1970. Air passengers entering the area from the Southshore Airport increased from 12,692 in 1961 to 102,954 by 1969. Revenues from gambling, one of the major attractions to the area, rose from $14.4 million in 1958 to $62.5 million in 1968 (Agena, 1972). The price of all this success has been environmental decay and the problem or urbanization.

In the late 1950's, concern over massive development in the basin led to formulation of the Tahoe Area Council. The council sponsored projects to study shoreline erosion and sewage problems. Questionnaires were sent out to local residents, which revealed a strong desire among local citizens for stricter control on development (Agena, 1972).

The Tahoe Regional Planning Commission (TRPC) was established in 1961 and drafted the 1980 Plan. The purpose of the plan was to set standards for uniform zoning ordinances and land-use regulations. However, the agency lacked official power and was ineffective in binding local governments to the plan.

Local conservation groups were successful in promoting legislation which led to development of the California-Nevada Joint Tahoe Study Committee in 1965 (Agena, 1972). The committee was directed to study various methods of regulating damage such growth was causing. The plan failed from lack of power or inclination of local governments to enforce growth controls.

Upon recommendation of the Joint Study Committee, a bill was passed in the California Legislature establishing a California Tahoe Regional Planning Agency. The ten-member agency was to include a governing body, which would protect the agency from local pressures and political interests. Opposition to the bill was immediate and political pressure initiated in the Senate resulted in a number of amendments effectively weakening the bill. Concurrent legislation passed in Nevada ensured power to local interests. Governor

Reagan of California further modified the bill by cutting the at-large membership from four to two, thereby completely tilting scales in favor of local interests. In a showdown, local governments could now enjoy a comfortable majority.

In May 1971, the agency presented its plan to the public. It limited the basin population to 134,000, considerably less than current peak weekend populations. Future development was to be guided by land capability. Geomorphic units were established to represent all of the environmental factors operating in a given area. Fifty-nine variables, based on topography, geology, climate, soils, vegetation and hydrology were coded into a data bank at Berkeley. Natural processes in each of the units were identified by the use of soil-landform types established by the Soil Conservation Service. The four indicators of greatest importance are: soil drainage, sheet erosion, gully erosion, and vegetative soil group. These factors, along with the original 59 variables, were considered in drafting ten-acre cell units. From these, capability levels were assessed, and seven types of land uses were assigned: conservation, limited resources, resource, recreation use, limited services, urban use and urban services. A land capability map, subsequently developed for the entire drainage basin, completed the plan (Agena, 1972).

With six of the ten voting members on the governing committee representing local governments, the plan floundered from the start. Public reaction at the unveiling of the plan was one of rejection, again on the grounds that it violated individual property rights. Overwhelming local opposition fostered development of an alternate plan, less restrictive to developers. The Forest Service was commissioned to resurvey the area and the results indicated a complete revision of the original survey and land-use capability map was needed. The credibility of the original map was thereby severely jeopardized. Developers were quick to learn of this and began appealing to the credibility of the survey when proposals were turned down. If a developer owned property in a restrictive zone he could then hire licensed professionals to conduct a survey. If the results indicated the land could tolerate the proposed development, the developer is granted a hearing before the agency for an almost assured project approval (Agena, 1972).

With the diverse political and private interests and pressures operating in the Tahoe Basin, it is likely population growth and environmental protection can only be achieved by federal intervention. The federal government created the Tahoe Agency, establishing definite time limits for adoption of a suitable plan to limit growth and protect the environment. If the time limit is exceeded, the federal government could legally step in. The Bureau of Outdoor Recreation has already drafted a plan for Tahoe called "Strategies to Save a Lake," which is said to be even more restrictive than that of the Tahoe Regional Planning Agency (Agena, 1972).

It is somewhat unrealistic to imagine that growth in Summit County should suddenly stop. The problem is not concerned with stopping growth, but recognizing the limits of growth. It seems doubtful that effective constraints on growth will be initiated by understaffed and underfinanced local governments. The solutions to many problems involved in regional planning require cooperation from all levels of government. Otherwise, the history of development in the Blue River Basin and similar Colorado mountain

areas may be an image of the Tahoe experience.

The Role of the Federal Government in Land Use Controls

Although most federal government agencies are not directly involved in local planning, a limited amount of assistance is available. Funds for planning some facilities are available through the Housing and Urban Development 701 Housing Act. EPA participation is limited to maintaining water quality and financing sewage treatment plants. Such provisions, however, actually encourage growth by removing one of the main obstacles to growth; in this case proper sewage treatment facilities.

The federal agency most directly concerned and capable of indirect assistance is the Forest Service. In direct control of over seventy per cent of the total land in the county, as well as administering activities on Dillon Reservoir, the Forest Service is in the prime position to influence development.

Unrestricted use of public lands in the county will promote greater development on private lands. Additional ski areas will not only entice more people into the basin, but also extend residential development. The net effect will be a reduction in watershed quality and a decline in overall wildlife populations sensitive to human intrusion.

The Forest Service could be of great assistance in several ways. First, by placing a temporary moratorium on further ski area development until the county has finalized an acceptable regional plan to guide and control growth and development, and to secure the existing environmental amenities. New enclaves of dense development would thus be postponed until policies and goals were known.

Goals and objectives of local governments depend a great deal upon how the public lands are managed. A second alternative for the Forest Service is to develop a five to ten year master plan. The plan could include provisions for development of new recreation areas at certain intervals as public needs increase, and attuned to the needs of local government. Recreation is one of the main factors promoting growth in the basin and most recreation activity occurs on the national forest land. Controlling this growth factor cooperatively with local and State government could mitigate the problems of land-use planning in the private sector.

The Public Land Law Review Commission recommended that where the tax base of a state or county was reduced by the presence of public lands, some compensation should be considered. This recommendation could solve a difficult problem for the Forest Service as well as one for Summit County. The disorganized patchwork pattern of mining claims in the upper basin has left a number of isolated tracts of Forest Service land surrounded by private land in areas where heavy development is occurring. These islands are difficult, if not impossible, to maintain and are of little value to the Forest Service.

Granting these isolated tracts to the county would not only compensate the county for its limited taxable land base but could be a means of solving

the severe low-cost housing problem. Long-term, low-cost leases extended to private developers specifying land uses to be restricted to low and moderate income housing development could be instrumental in solving the current critical housing shortage for permanent residents.

Role of the State Government in Land Use Controls

Rapidly developing rural areas throughout Colorado have received little direct financial assistance from the State for land-use planning. Alarming trends in population growth and concern over the environment, however, have initiated some legislative reaction.

In 1970, the State General Assembly enacted the Colorado Land Use Act, which established the Colorado Land Use Commission and instructed it to develop a land-use planning program for Colorado, involving all levels of government.

The first of a two-volume Interim Land Use Plan, dealing with policies and legislation, was produced in December of 1972. Volume I presents a proposed land-use management system for the State, emphasizing that planning and its implementation requires a partnership among all levels of government to solve the rising land use problems (Colorado Land Use Commission, 1972). The Commission also proposed a State coordinating planning council; local government land use planning requirements and assistance; subdivision requirements for counties, municipalities and home-rule cities; population density controls; and special district controls (Colorado Land Use Commission, 1972). The Commission further requested that it be empowered to regulate areas and activities of critical and immediate concern to the State.

Other significant State legislation includes Senate Bill 91 enacted in 1971, Senate Bill 93 also enacted in 1971, and Senate Bill 35 passed in 1972. Senate Bill 91 outlines further instructions for the Land Use Commission, and provides it temporary emergency powers enabling the Commission to initiate cease and desist orders whenever it is determined that there is in progress, or proposed, a land development activity which constitutes a danger of irreparable injury, loss, or damage of serious and major proportions to the public health, welfare, or safety. It also stated that land use decision-making authority should remain at the lowest level of government possible (Colorado General Assembly, 1971b). Senate Bill 93 established a program of State planning aid to local governments, with an initial appropriation of $200,000 to be made available to areas in critical need of planning (Colorado General Assembly, 1971a).

Senate Bill 35 has been the most significant local government-oriented legislative act passed to control development, and provides local government with enforcement tools. Under this act, developers are required to submit proof to county commissioners of the land's capability and suitability for a proposed development prior to filing a subdivision plan. Factors considered include geology, water, soils, vegetation, and slope. Also required is specific information on total development, including: number of dwelling units, parking spaces, amount of water needed and sewage treatment requirements, and estimated costs of financing streets and utilities. Provisions for open space requirements are also included (Colorado General Assembly, 1972).

The Colorado Department of Health is another State agency which could effectively assist in controlling excessive growth and environmental damage. Nearly any development, especially in mountain communities, has a profound effect on surface and subsurface waters. Adoption and enforcement of more stringent water quality standards throughout the State would result not only in cleaner waters and healthier aquatic life, but would also significantly reduce environmental damage which promotes water pollution.

Recent land use legislation enacted by the State reflects a growing involvement at the State level in a broad range of land use decisions. These acts are providing necessary guidelines for local governments to control growth and assure orderly development.

The Role of Local Government in Land Use Controls

Regulating growth and development and protecting the Blue River Basin environmental system is a responsibility that must ultimately be borne at the local level. Successes and failures of other communities and regions such as Ramapo, New York; Petaluma and Livermore, California; and the Tahoe Basin are invaluable guides to policy.

Initially the county, including all levels of local government and residents, must decide what is needed and desired so that goals may be set and policies formulated. Continued development requires that residents must decide which direction of growth is preferable.

Formulation of one regional government, the City of Summit, and elimination of all local town governments might be desirable. This would not only eliminate competition between local town interests, but would also eliminate duplication of efforts in water and sanitation services, police and fire protection as well as a host of administrative positions.

All further large-scale developments should be regulated by PUD zoning to ensure development occurs only in areas where impact will be minimal. The introduction and use of all small package sewage treatment plants should be curtailed. Implementation of the county-wide sewage treatment plan could phase out the existing package plants and enhance the basin's surface water quality, providing county sewage treatment standards are met. But most importantly, future developers must assume greater responsibility for providing necessary public amenities arising from their developments.

Unfortunately, with approximately seventy per cent of our nation crowded into urban areas we have become a landless society. The present trends indicate the vast majority of Summit County residents will live in condominiums. Thus removed from the land, a kinship with the land becomes increasingly difficult.

Growing population pressures, not only in Summit County but throughout the nation, dictate the necessity of reassessing the current attitude toward private land ownership. The traditional attitude of complete freedom or limited constraints on the use of land is still prevalent in this country and must give way to a new land ethic. The words of Aldo Leopold (1949) aptly provide insight to this need:

"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect. There is no other way for land to survive the impact of mechanized man, nor for us to reap from it the esthetic harvest it is capable, under science, of contributing to culture."

REFERENCES CITED

BOOKS AND ARTICLES

Agena, Kathleen.
1972 Tahoe. Planning, the American Society of Planning Officials Magazine. January, P.3-16.

Allen, Gerald L.
1970 Colorado ski and winter recreation statistics, 1969. Boulder, Business Research Division, University of Colorado.

American Society of Planning Officials
1972 Ramapo. Editorial. Planning, The American Society of Planning Officials Magazine. July, P. 108-109.

Bechter, Dan M.
1972 Ski area profitability. Monthly Review, Federal Reserve Bank of Kansas City, March, P. 3-9.

Bickert, C.E., Oldham, J.L. and Ryan, J.L.
1969 A profile of the tourist market in Colorado - 1968. Denver. Industrial Economics Division, Denver Research Institute, University of Denver.

Black and Veatch, Consulting Engineers.
1971 Process design manual for phosphorus removal: U.S., Environmental Protection Agency. Kansas City, Missouri. 53p.

Brown, B.B., Byron, G.A. III, Erickson, D.R., Lindauer, J.L., Ruttum, M., Walker, S.P., and Howe, C.W.
1972 Economic and environmental impact of the 1976 Winter Olympics alpine events. University of Colorado. 179p.

Burby, Raymond J.
1967 Lake-oriented subdivisions in North Carolina: decision factors and policy implications for urban growth patterns, developer decisions. Center for Urban and Regional Studies, University of North Carolina, Chappel Hill.

Clawson, Marion.
1963 Land and water for recreation. Chicago, Rand McNally.

Clawson, Marion and Knetsch, J.L.
1969 Economics of outdoor recreation. Published for Resources for the Future. Baltimore, John Hopkins Press. 328p.

Clawson, Marion.
1971 Suburban land conversion in the United States. Published for Resources for the Future. Baltimore, John Hopkins Press.

Colorado Investor.
1972 Land use in Colorado: a special report. Denver, Mountain Empire Publishing Company. 145p.

Crampson, J.L.
1960 Local area statistics: Summit County, Bureau of Business Research, University of Colorado, Boulder.

David, E.J.L.
1969 The exploding demand for recreation property. Land Economics 45:206-217.

Godbey, Geoffrey.
1971 Leisure: nearing the receeding horizon. Parks and Recreation Vol. VI No. 8, August, P. 33-88.

Kelley, Tim.
1970 Tim Kelley's official Colorado and Wyoming fishing and hunting guide. Ninth ed. Boulder. 362p.

Kraus, Richard.
1971 The economics of leisure. Parks and Recreation, Vol. VI No. 8, August, P. 62-86.

Leopold, Aldo.
1949 A Sand County Almanac. New York, Oxford University Press.

Mackenthun, K.M., Ingram, W.M., and Porges, R.
1964 Limnological aspects of recreational lakes. U.S. Dept. of Health, Education and Welfare. Public Health Service publication No. 1167. Washington, D.C. G.P.O. 176p.

McGivern, William C.
1972 Putting a speed limit on growth. Planning, the American Society of Planning Officials Magazine. November, P. 263-265.

Ragatz, Richard Lee.
1970 Vacation housing: a missing component in urban and regional theory. Land Economics, Vol. 46, P. 118-126.

Robinson, Duane, and Clayton, Donald.
1971 Ecological man and leisure man. Parks and Recreation, Vol VI No. 8, August, P. 81-82.

Thompson, Phyllis.
1970 The use of mountain recreational resources: a comparison in the Colorado Rockies and Swiss Alps. PhD. dissertation, University of Colorado, Boulder. 384p.

Tombaugh, Larry W.
1970 Factors influencing vacation home locations. Journal of Leisure Research, Vol. 2. P. 54-63.

U.S. News and World Report.
1972 Leisure boom: biggest ever and still growing. U.S. News and World Report, Vol. 16, P. 42-45.

PUBLIC DOCUMENTS

United States

Bureau of Census
1969 Second homes in the United States. Series 1-1-121 (No. 16). Washington, D. C. G.P.O.

Bureau of Census
1971 General population characteristics: Colorado 1970-1971. Washington, D. C. G.P.O.

Bureau of Reclamation
1961 Reclamation Project Data. U.S. Department of Interior. Washington, D. C. G.P.O.

Economic Development Administration
Tourism and recreation. Washington, D.C. G.P.O. 147p.

Environmental Protection Agency
1971 Application for federal grant for sewage treatment works. Construction grants project file, No. W.P.C.-Colo.-293. E.P.A., Region VIII, Denver. (Mimeographed).

Environmental Protection Agency
1972a Water quality management analysis of Summit County, Colorado. Denver, U.S., E.P.A. Region VIII, (Mimeographed).

Environmental Protection Agency
1972b Application for federal grant for sewage treatment works. Construction grants project file, No. W.P.C.-Colo.-314. E.P.A., Region VIII, Denver. (Mimeographed).

Forest Service
1946-1971 Annual fund collection records for Arapahoe National Forest, 1946 to 1971. Arapahoe National Forest Headquarters, Golden.

Forest Service
1963-1970 Colorado annual national forest fund payment records, 1963 to 1970. Arapahoe National Forest Headquarters, Golden

Forest Service
1940-1971 Grazing allotment records, 1940 to 1971. Arapahoe National Forest Headquarters, Golden.

Forest Service
1960-1971 National forest ski area use records, 1960 to 1971. Forest Service Region II headquarters, Denver.

Forest Service
1970-1971 Ski area lease permits. Arapahoe National Forest Headquarters, Golden.

Forest Service
1966-1971 Visitor use records for Dillon Reservoir. Arapahoe National Forest Headquarters, Golden.

Forest Service
1972 Planning considerations for winter sports resort development. Rocky Mountain Region, Denver, 55p.

Geological Survey
1971 Water resources data for Colorado, Part I, surface water records. Denver, 396p.

Herrington, Roscoe B.
1967 Skiing trends and opportunities in the western states. U.S.D.A. Forest Service research paper INT-34. Intermountain Forest and Range Experimental Station, Ogden, Utah.

Public Land Law Review Commission
1970 One third of the nation's land: a report to the President and Congress. Washington, D. C. G.P.O. 342p.

Retzler, J.L.
1962 Soil survey of Fraser Alpine area, Colorado. U.S.D.A. series 1956, No. 20. Washington, D. C. G.P.O. 47p.

Soil Conservation Service
1968 An appraisal of outdoor recreation potential in Grand and Summit counties, Colorado, Denver, 87p.

Weather Bureau
1962 Climatic summary of the United States: Colorado. Washington, D. C. G.P.O.

Zisman, S.B., Ward, D.B., and Powell, C.B.
1968 Where not to build, a guide for open space planning. Technical Bulletin No. 1, U.S. Department of Interior, Bureau of Land Management, Washington, D. C. G.P.O. 160p.

Colorado

Department of Agriculture
1925-1972 Colorado agriculture statistics. 1925-43, 1948-49, 1951-57, 1960, 1970, 1971 and 1972. Colorado Crop and Livestock Reporting Service and U.S.D.A. Statistical Reporting Service, Denver.

Department of Agriculture
1960 Colorado agricultural statistics. U.S. Census, U.S. Department of Commerce.

Department of Commerce and Development
1972 1971-72 Colorado travel market fact sheet. (Unpublished report). Denver, Colorado Department of Commerce and Development.

Department of Education
1972 Pupil membership and related information 1971-72. Unpublished report. Denver, Colorado Department of Education.

Department of Game, Fish and Parks
1970 1970 Colorado comprehensive outdoor recreation plan. Denver, 161p.

Department of Game, Fish and Parks
1971a 1970 Colorado comprehensive outdoor recreation plan. Department of Natural Resources, Denver, 161p.

Department of Game, Fish and Parks
1971b 1970 Colorado big game harvest. Department of Natural Resources, Denver, 148p.

Department of Health, Water Pollution Control Division
1969 Status report of domestic wastes. Denver.

Department of Health, Air Pollution Control Division
1972 Minutes of regular meeting of Colorado Water Pollution Control Commission. Minutes No. 101. September 19, 1972. Denver. (Mimeographed).

Department of Highways
1950-1971 Traffic flow maps for the years 1950, 1960, 1970, and 1971. Denver.

Department of Highways
1972 Colorado traffic projections: 1975, 1980, 1990, and 2000. Denver.

Division of Planning
1972 Preliminary estimate of Colorado population for U.S., Census, P.C. 26 series. Denver.

Environmental Commission
1972 Colorado: options for the future. Final report of the Colorado Environmental Commission. Denver, 78p.

General Assembly
1971a Senate Bill 93. Denver, May 6, 1971.

General Assembly
1971b Senate Bill 91. Denver, June 2, 1971.

General Assembly
1972 Senate Bill 35. Denver, May 5, 1972.

Land Use Commission
1972 Interim land use plan, volume I. Denver, 23p.

Rold, John W.
1969 The Colorado Geological Survey's role in environmental geology. The Governor's Conference on environmental geology. Special publication No. 1 Colorado Geological Survey. Denver, P. 20-23.

State Planning Office
1965 Colorado Yearbook 1962-1964. Denver, 1064p.

State Planning Office
1969 The Colorado Front Range Corridor. Denver, Colorado State Planning Office. 30p.

Tax Commission
1960-1972 Annual reports to the governor, 1960-1972. Denver, Colorado Tax Commission.

Water Conservation Board and U.S.D.A. Soil Conservation Service
1965 Water and related land resources, Colorado River Basin in Colorado. Denver, 183p.

Summit County

Office of the County Clerk
1960-1972 Subdivision plat maps. Breckenridge, Colorado.

Office of the County Clerk
1972 Summit Grantee Book. Breckenridge, Colorado.

Planning Department
1972 Estimate of development in Summit County, May 1, 1972. Breckenridge, Colorado.

NEWSPAPERS

Buchanan, John
The land rush is on. Mountain Living: Sunday supplement to the Empire Magazine, Denver Post, May 21, 1972, P. 9.

Haselbush, Willard
Keystone plans unveiled. Denver Post. November 28, 1971, P. 2D.

Wilkinson, Bruce
Breckenridge-Dillon potential high. Denver Post, October 27, 1971, P. 40.

Knuffke, Darrell
Philosophies aired, Gold Run sails, Wildwood sinks at regional planning session. Summit County Journal, October 27, 1972, P. 1.

Summit County Journal
Breckenridge development outpaces Aspen's growth rate. May 5, 1972, P. 6.

_____
Summit real estate school graduates first class. July 14, 1972, P. 1.

_____ Editorial. September 15, 1972, P. 2.

_____ Summit Citizens' Association lists gripes at R.P.C. September 29, 1972, P. 1.

_____ Editorial. November 10, 1972, P. 2.

_____ Summit's unhealthy for the living and the dead are neglected, Dr. says. December 1, 1972, P. 2.

MISCELLANEOUS

Beck, R.W. and Associates, Planning Consultants, Denver
1971 Feasibility report: sewer and water facilities, Dillon recreation area. Arapahoe National Forest. Denver, a report contracted for by the U.S. Forest Service.

Carl S. Becker Company. Management and Planning Consultants
1970 Summit County finance study. Denver.

Bertram, William H. Senior Engineer Waste Water Branch. U.S. Environmental Protection Agency
1972 Proceedings of Summit County and Frisco Sanitation District meeting. April 19, 1972, Denver. (Mimeographed).

Black, R.J., Muhich, A.J., Klee, A.J., Hichman, H.L., and Vaughn, R.
1968 The national solid waste survey, an interim report. Paper presented at the 1968 annual meeting of the Institute for Solid Wastes of the American Public Works Association, Miami Beach, Florida, Oct. 24.

The Breckenridge Company
Four Seasons development plan. Breckenridge, Colorado.

Blauvelt, John F.
1962 Summit County, Colorado: a geographic appraisal of resource development. Unpublished masters thesis. University of Colorado, Boulder.

Campbell, Leonard W.D. Counsel, U.S. Environmental Protection Agency, Region VII.
1972 Letter to Charles Murray, Director, Air and Water Programs, Colorado Department of Health, August 4, 1972, on proposed waste water treatment facility Project No. C-080314, Silverthorne, Colorado. U.S., E.P.A. Region VIII, Denver, (Mimeographed).

Chancellor Corporation
Lake Placer development plan. Office of the County Planner. Breckenridge.

Cobb, Louis R.
1969 Statistics on tourism in Colorado, 1950 to 1968. (Unpublished study). Colorado Department of Commerce and Development, Division of Administration and Publicity, Denver.

Colorado Interstate Gas Company
1972 1972 Colorado marketing manual. Colorado Springs, 100p.

Copper Mountain, Inc.
Copper Mountain fact sheet. Fulenwider Management and Development Company, Denver.

Denver Board of Water Commissioners
Blue River diversion system. Dillon Reservoir and Harold D. Roberts Tunnel. Fact sheet. Denver.

Dodson, Max H. Water Resource Planner, U.S. Environmental Protection Agency, Region VIII, Denver.
1972 Proceedings of meeting attended by representatives of E.P.A., Denver Water Board, and Colorado Division of Planning. June 27, Denver. (Mimeographed).

Gathers, Charles, and Associates, Planning Consultants, Denver
1970 Summit County, Colorado: report on planning program as a step toward a comprehensive plan. Denver. Unpublished report contracted for by Summit County.

Henshaw, Richard F., District Engineer, Water Pollution Control Division, Colorado Department of Health
1972 Inspection report of Summit County Meadow Creek sewage treatment plant. February 28, 1972. (Mimeographed).

Huckabay, James L.
1969 The role of perception in recent development of the upper Blue River Valley, Summit County, Colorado. Unpublished masters thesis, University of Colorado, Boulder. 107p.

Huddleston, Sam L., Planning Consultant, Denver.
1963 Summit County, Colorado: the master plan. A plan contracted for by Summit County. Denver.

Lynch, T.M. Fish Manager, Colorado Department of Game, Fish, and Parks
1972 Personal letter, May 5, 1972.

Lucas, Therese C.
1972 Draft technical paper No. 2. Colorado projections 1980, 1990, 2000, and methodology. Unpublished report prepared for the Colorado Land Use Commission. November 16, 1972, Denver.

Meridian-Baca Grande Corporation
Baca Grande development plan. Office of the County Planner. Breckenridge.

McCall-Ellinson, Consulting Engineers, Denver
1970 Engineering report on a proposed county sanitary sewer system. Unpublished report. Denver.

Nelson, Craig C., Assistant Treasurer, Keystone International, Inc.
1973 Personal letter, March 19, 1973.

Oblinger-Smith Corporation, Planning Consultants, Denver
1972 Water and sewer facility plan for Summit County, Colorado. Unpublished report. Denver.

Peerless Development Corporation
Summit Cove development plan. Office of the County Planner. Breckenridge.

Public Service Company of Colorado
1972 Summary of gas and electric customers by county. Denver.

ROMCOE
1971 ROMCOE land use packet, No. 1. Rocky Mountain Center on Environment. Denver. November.

Simon, Clay R. Vice President-General Manager, Keystone International, Inc.
1972 Letter to E.P.A. Region VIII, September 29, 1972. (Mimeographed).

State Farm Fire and Casualty Insurance Company
Personal lines manual. Regional office, Greeley.

Tippets-Abbett-McCarthy-Stratton. Engineering and Architecture
1964 Traffic study relating to the proposed Straight Creek highway tunnel (Letter report to the State of Colorado, Department of Highways, December 17, 1964). New York, New York.

Von Stroh, Gordon E.
1972 A study of the potential for expanding short haul/ S.T.O.L. air service in the Colorado Mountains, Denver, Unpublished report contracted by F.A.A. to College of Business Administration, University of Denver, 108p.

Waltz, James P.
1971 Paper delivered at the National Ground Water Quality Symposium at Colorado State University. Fort Collins, August 26.

INTERVIEWS

Brewer, Barney
Real Estate Broker, Breckenridge, Colorado, June 14, 1972.

Brown, Stanley K.
Public Relations Officer, Colorado Division of Highways, Denver, February 5, 1973.

Cleveland, Vern
Engineer, Leach and Arnold Contractors and Builders, Boulder. December 14, 1972.

Dodson, Max H.
Water Resources Planner, U.S., Environmental Protection Agency, Region VIII, Denver, July 12, 1972, November 22, 1972.

Guage, David
Air Pollution Control Division, Colorado Department of Health. Denver, November 23, 1972.

Hagemeier, James
Forest Ranger, Dillon District, Arapahoe National Forest, Dillon, Colorado, May 16, 1972, September 17, 1972.

Hansen, Roger
Executive Director, Rocky Mountain Center on Environment. Denver, November 4, 1972.

Henshaw, Richard
District Engineer, Water Pollution Control Division, Colorado Department of Health. Denver. April 16, 1972.

Holt, Bob
County Sheriff, Summit County. Breckenridge, Colorado. January 24, 1972, July 9, 1972.

Luce, Daryl
Wildlife Conservation Officer. Colorado Department of Game, Fish, and Parks. Breckenridge, July 7, 1972.

Morreau, Warren
Executive Vice President, Charles Gathers and Associates, Planning Consultants. Denver. November 11, 1972.

Seidner, Irving
President, Summit County Citizens' Association. Breckenridge, Colorado. October 4, 1972, December 16, 1972.

Thompson, Arthur
Colorado Division of Planning. Denver. December 8, 1972.

Vertrees, Gary
Summit County Sanitarian, Breckenridge, Colorado. June 8, 1972, July 26, 1972, September 17, 1972.

Way, George
Real Estate Broker, Breckenridge, Colorado, May 16, 1972, June 8, 1972, July 26, 1972, September 17, 1972.

Woolsey, Lee
County Manager, Summit County, Colorado, Breckenridge, Colorado. January 24, 1972.

MAP REFERENCES

Charles Gathers and Associates
Breckenridge area land use plan Denver 1:6 640.

Charles Gathers and Associates
Dillon-Silverthorne area land use plan. Denver 1:6 640.

Charles Gathers and Associates
Frisco area land use plan. Denver 1:6 640.

Charles Gathers and Associates
Keystone area land use plan. Denver 1:6 640.

Colorado Department of Game, Fish, and Parks
Green Mountain Reservoir. Denver 1:24 000.

Colorado State Planning Office
Urbanization projections of the Colorado Front Range Corridor. Denver 1:2 090 880.

Keystone International, Inc.
Keystone ski area. Dillon, Colorado 1:26 390.

Keystone International, Inc.
Keystone development plan. Dillon, Colorado 1:22 000.

Killam, Terry
Place of residence of skiers at Colorado ski areas. Boulder.

Ray and Associates
Projected population density, Breckenridge Master Plan. Boulder, 1:15 000.

Ray and Associates
Breckenridge service area land use master plan. Boulder. 1:15 000.

Ray and Associates
Breckenridge zoning districts, 1972. Boulder.

U.S. Forest Service
Outdoor recreation facilities, Dillon Reservoir. Denver 1:62 000.

U.S. Forest Service
All base maps portraying Summit County in this study were derived from planimetric maps prepared by the U.S.F.S., Region 2, Denver, 1:30 000.

U.S. Geological Survey
Summit County relief and drainage. Denver. 1:500 000.

Wright-McLaughlin Engineers
Frisco land use plan, 1972. Denver. 1:15 600.