

study of management options

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VERMEJO RANCH



NEW MEXICO / COLORADO

Publication of this document should not be construed as representing either approval or disapproval of the Secretary of the Interior or the Secretary of Agriculture or the Governor of New Mexico. The purpose of this document is to provide information for further consideration of the area as a potential submission to the Congress in compliance with Section 8 of the General Authorities Act of 1970 as amended by Public Law 94-458.

STUDY OF MANAGEMENT OPTIONS

**VERMEJO RANCH
NEW MEXICO/COLORADO**

**UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Geological Survey
Heritage Conservation and Recreation Service
National Park Service**

**UNITED STATES DEPARTMENT OF AGRICULTURE
Forest Service**

STATE OF NEW MEXICO

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EXECUTIVE SUMMARY

RESOURCE CHARACTERISTICS AND SIGNIFICANCE

Vermejo Ranch is a 492,560-acre area situated primarily in north-eastern New Mexico. A total of 418,210 acres of the Ranch is in Colfax County, New Mexico; 70,350 acres are in Taos County, New Mexico; and approximately 4,000 acres are in Costilla County, Colorado. Vermejo Ranch is one of the largest ranches under single ownership in the United States.

The western part of Vermejo Ranch, the most rugged and scenic, is characterized by the high crests of the Sangre de Cristo Mountains. The mountains, which are snowcapped for most of the year, form a backdrop for the mountain meadows and wooded foothills below. Numerous small lakes and reservoirs and approximately 100 miles of mountain streams on the Ranch enhance the visual quality of the land.

Geology

Vermejo Ranch exhibits many varied and interesting features of geologic significance. The Ranch lends itself to a fourfold physiographic division as follows:

The Mountains, which occupy the western part, contain the scenic and rugged crests of the Sangre de Cristo Mountains and display interesting aspects of glaciation and volcanism.

The Wall, which lies along the eastern front of the mountains, comprises hard, resistant layers of steeply tilted rocks that trend nearly north-south and resemble stone walls that lie atop ridges and along valleys.

The Plateau, which is a broad dissected upland area, encompasses the largest part of the Ranch and features Vermejo Park, a broad breached upfold in the rocks, and the scenic expanse of meadows of Castle Rock and Van Bremmer Park along the western edge.

The Plains, which include the southeastern portion of the Ranch, is characterized by low relief and gently rolling grasslands.

Significant and representative geologic resources of the Ranch include the following:

Adams-Bartlett Pediment - a remnant of the geomorphic erosion surface that lies atop Adams-Bartlett Mesa and is especially significant because of the presence of two large scenic natural lake basins that were probably formed by wind action

Ash Mountain - a large dike of rhyolite that was emplaced as a molten mass and now forms an imposing bald ridge that extends about 6 miles along the mountain front

Volcanic sequence at Underwood Lakes - a well-preserved group of rocks that are representative of volcanoes that erupted about 22 million years ago from a caldera located several miles southwest of the Ranch

Fish and Wildlife

Vermejo is also an area of wildlife diversity where elk, deer, antelope, black bear, turkey, bobcat, coyote, squirrel, beaver, bald eagle, cougar, and other species occur in relative abundance. The elk herd is sufficiently large, and the percentage of trophy bulls is high enough to be considered of national significance. Vermejo Ranch is a major wintering area for the bald eagle, a federally listed endangered species. The American osprey, white-tailed ptarmigan, and brook stickleback are all state endangered species known to occur on the Ranch. Approximately 60 species of mammals, 200 species of birds, 33 species of reptiles and amphibians, and 15 species of fish are supported by the diverse habitats of the Ranch.

Vegetation

Vermejo Ranch contains examples of both the Southern Rocky Mountains and Great Plains ecosystems. The diversity of plant communities within the Ranch ranging from shortgrass prairie to alpine tundra reflects the extreme changes in elevation, a difference of 7,000 feet from southeast to northwest, combined with differences in aspect, precipitation, and soil characteristics, as well as other environmental factors. The complexity of the environment enhances the diversity of wildlife habitats, scenic quality, and recreational potential on the Ranch.

Forestry

Forests and woodlands cover nearly two-thirds of the 492,560 acres of Vermejo Ranch:

In 1960 the Pacific Lumber Company obtained for \$3.3 million the right to remove the merchantable timber on 337,000 acres of Vermejo Ranch under an agreement that will remain in effect until the year 2000. The timber is being harvested by the Amalia Lumber Company, which in 1975 established a modern sawmill in Amalia, about 15 miles west of the Ranch. Approximately 250-300 people are employed in the logging operations either at Amalia Mill or on the Ranch.

The U.S. Forest Service has estimated the annual allowable rate for removal of sustained-yield timber from Vermejo Ranch to be about 20 million board feet (An Economic Analysis of the Vermejo Ranch 1971). This is about 7 percent of New Mexico's total annual allowable rate for sustained timber removal. The rate of timber removal during the last two years has been estimated by the Ranch forestry staff to be about 30 million board feet annually, a rate apparently intended to remove the merchantable timber on the Ranch by the time the timber rights agreement expires. The negative aesthetic and watershed effects of the current rate of removal and logging practices have given rise to litigation in which the Ranch owners are seeking to require the lumber company to remove the timber with more precautions to prevent unnecessary environmental damage.

Grazing

Vermejo Ranch has a long history as a large cattle operation. It employs, along with the guest operations, approximately 42 full-time people. The Ranch is currently operated as a cow-calf operation; it produces its own hay for winter feed and includes grazing lands from high-elevation summer range to low-elevation winter range. In the past the Ranch has supported up to 19,000 cattle with obvious disastrous effects on vegetation and soils. The Ranch currently supports 4,000-5,000 head of cattle.

Coal, Oil, Gas, and Other Minerals

Coal is the most significant geologic resource of Vermejo Ranch. Coal-bearing strata underlying roughly half of the Ranch area contain bituminous coal beds of high metallurgical and thermal quality in multiple beds as thick as 15 feet. The explored reserves in the identified districts total about 800 million tons; potential and additional unexplored resources are estimated to exceed 1 billion tons. Kaiser Steel Corporation, which owns coal lands to the east of the Ranch, also owns nearly all of the coal rights on the Ranch. Kaiser Steel currently operates the York Canyon mine, which is an inholding located in the northeastern part of the Ranch. It includes both surface and underground mining operations and employs about 500 persons with a payroll of approximately \$10

million per year. Kaiser has conducted feasibility studies for development of some of the other coal districts and areas on the Ranch, and dependent on market conditions, additional mines are planned.

Oil and gas production has not occurred on the Ranch. Since the first well was drilled in 1926 at Vermejo Park, several other unsuccessful wells have been drilled. However, the southern part of the Raton Basin on the Ranch offers a favorable geologic setting for the generation and accumulation of hydrocarbons. Although indications to date have been subcommercial, significant reserves may yet be discovered.

The presence of base and precious metals on the Ranch is indicated by mineralization and by evidence of old mining activity in the southwestern portion of the Ranch, but no significant resources have been identified. The broad alluvial flat east of La Belle may offer some potential for placer mining. Anomalous amounts of uranium have recently been reported in geochemical stream-sediment and water samples taken from streams in Costilla Valley in the extreme western portion of the Ranch. Neither the economic potential indicated by these anomalous values nor their source is known at this time. Other than gravel deposits that might be used for road construction, no other significant mineral resources are known to be present on the Ranch.

Water

Within the boundaries of Vermejo Ranch there are approximately 100 miles of streams and 60 lakes, excluding stock ponds, which contain permanent or semipermanent water sources. Vermejo Ranch contains major parts of the watersheds of two streams, Costilla Creek and Vermejo River, which flow off the Ranch and supply water for use downstream.

Cultural Resources

A review of previous research on the Vermejo Ranch and north-eastern New Mexico was conducted to determine the significance of the cultural resources on the Ranch and the surrounding area. Although little research has been done within the Ranch boundaries, the area appears to have great potential for future investigation for the preservation of cultural resources.

There are extant cultural resources either on Vermejo Ranch or in the immediate vicinity that are representative of the history of the Maxwell land grant. Few cultural resource surveys--archeological, historical, or architectural--have been conducted on Vermejo Ranch;

consequently, no properties on the Ranch have been nominated to the National Register of Historic Places or the New Mexico State Register of Cultural Properties. However, a review of the literature indicates that many of the cultural resources may be eligible for nomination. The preservation and interpretation of significant resources would contribute to illuminating more fully the history of New Mexico, the Southwest, and the West.

Recreation

Vermejo possesses a resource base with sufficient variety to support a broad range of outdoor recreational pursuits. The primary potential recreational uses of Vermejo are camping, hiking, hunting, fishing, horseback riding, backpacking, photography, nature study, snowmobiling, skiing, sight-seeing, and studying Southwestern history. The projected population increase, data from the New Mexico and Colorado Statewide Comprehensive Outdoor Recreation Plans (SCORPs), and the nationwide popularity of recreational uses appropriate to Vermejo lead to the conclusion that Vermejo would attract visitors at a continually increasing rate.

SIGNIFICANCE OF THE RESOURCES TO PUBLIC AGENCIES

Vermejo Ranch meets the significance criteria for inclusion in the National Forest System and National Park System. The Ranch also meets the criteria of the U.S. Fish and Wildlife Service's "Unique Ecosystems Program" by virtue of its wildlife diversity and value to endangered species. The resource management objectives and the potential management agencies are summarized in chart form in the "Protection Options" section of this document.

THREATS TO THE RESOURCES

Under present ownership the Ranch has been afforded considerable protection from adverse land development activities. However, parcels of the Ranch could be developed quite profitably. The Vermejo Park Corporation has stated that it would consider selling the property. Because the counties do not maintain local zoning controls, there would be no guarantee that the property would be protected from incompatible land uses. 

The Ranch could be acquired by individuals who would not be as capable as Pennzoil in monitoring or enforcing private agreements concerning logging and mining operations. Logging and mining activities may have already altered or destroyed archeological resources. Another private owner might not protect and maintain the historic structures at the Ranch headquarters as well as the present owner does.

In general, sale of the Ranch especially for development as small recreation tracts would result in altered land uses with severe impacts on existing numbers, diversity, migration patterns, and interrelationships of wildlife and vegetation. Cultural resources could also be damaged. These negative effects would preclude future development of a comprehensive program for public use and appreciation of the resource.

PROTECTION OPTIONS

The Vermejo Park Corporation has demonstrated a commitment to preserving the natural and cultural resources of the Ranch. Public protection consists of subdivision regulations in all three counties; however, no zoning controls exist at present. The protection of the resources is virtually controlled by the owner.

No Action

If no public action is taken to acquire the Ranch, present trends in similar properties indicate that it would probably be divided and sold to several individuals and/or corporations. Under private ownership, the natural, cultural, and scenic resources would not be assured of any protection from adverse impacts. In addition, it is unlikely that any of the recommended management objectives would be met if the Ranch was divided and subdivided in the future.

The socioeconomic impacts resulting from the No Action option would depend on the activities of the new owners. If ranching operations were continued, it is possible that some of the 42 full-time employees would be rehired by the new owners. If some of the land is developed for homesites, employment and revenue from construction and retail activities would increase. Local tax bases would also increase as would demands on funds for public education, utilities, and other services.

If land use remains essentially unchanged, taxes to county and local governments would continue at current rates, with only incremental increases over time. If the Ranch was divided and subdivided, property taxes would increase more rapidly than at the present rate depending upon subdivision development and value of improvements.

Public Acquisition

Based on the resource evaluations and management objectives, acquisition of the entire Ranch is used as a framework for protection and appropriate use of all significant natural, cultural, and recreational resources.

The study team considered the possibility of eliminating sections of the Ranch from acquisition strategies; however, it was determined that the entire Ranch contains either important wildlife habitat, cultural, scenic, or recreational values. The study team also discussed the possibility of protecting some of the Ranch with less-than-fee acquisition alternatives. This option was rejected because any easement developed to protect the significant resources of the Ranch was estimated to be almost as costly as fee acquisition. In addition, this would not provide for public enjoyment or optimum protection of the resources.

The coal and timber rights on Vermejo Ranch are currently outstanding. Based on the high value of the coal, purchase of the coal rights was not considered to be a realistic option at this time. The timber rights could be acquired if it was deemed necessary for the protection of the other significant resources on the Ranch.

Public acquisition of the entire Ranch would maintain it in a single unit, protect it from adverse impacts accompanying subdivision, ensure continued protection of its significant resources, and allow for the implementation of one, all, or any combination of the resource management objectives.

The socioeconomic impacts resulting from public acquisition of Vermejo Ranch would include shifts in employment, changes in local economies, and increases in local tax revenues and expenditures. Overall, regional employment would probably increase as a result of federal or state protection of the Ranch. Increases in regional and national public use of the area would result in increased retail sales and growth.

Payments to local governments in-lieu-of taxes would be made under federal acquisition and management. These payments are authorized under Public Law 94-565, which applies to National Park Service and U.S. Forest Service acquisition of the Ranch. For the U.S. Fish and Wildlife Service, the payments could be slightly higher depending upon application of the Refuge Revenue Sharing Act (P.L. 95-469). Under state acquisition, no payments in-lieu-of taxes would be mandatory; however, the state of New Mexico would consider this procedure.

A preliminary cost estimate for acquisition was developed and is included as appendix E. Development and operations/maintenance costs were not estimated in detail. These would vary greatly depending upon such factors as what agency or agencies acquire and manage the Ranch, what interests are acquired, and what site specific planning is done. Depending upon these different factors, it is estimated that the annual long-term operation/maintenance costs would range between \$1 and \$2 million. More precise costs, along with an appraisal, would be included as a part of any legislative support package developed.

I N T R O D U C T I O N

PURPOSE OF THE STUDY

The purpose of the study was to develop a detailed description and analysis of the natural, cultural, and recreational resources of Vermejo Ranch and to evaluate their national and regional significance. Based on the significance of each resource, the team developed recommendations for their protection and management. Protection options were evaluated in terms of their impacts on the significant resources of the Ranch and their socioeconomic and public use implications. A preliminary land cost estimate was also developed.

CONSULTATION AND COORDINATION

The study was conducted by a multiagency team comprised of state and federal representatives. Resource data and analyses were provided by representatives of the U.S. Fish and Wildlife Service, U.S. Geological Survey, Heritage Conservation and Recreation Service, National Park Service, Bureau of Mines, U.S. Forest Service, and the state of New Mexico. The entire team developed the management recommendations and assessed the impacts and implications of the acquisition option. The National Park Service, as the lead agency in the study, directed and coordinated the team's investigations and the preparation of this document.

During the course of the study the team used existing literature and data, information resulting from discussions with representatives of Vermejo Park Corporation, Amalia Lumber Company, and Kaiser Steel (current owners), personal knowledge of the resources by team members, and a five-day field reconnaissance as the basis for the final report.

PRIOR FEDERAL INVOLVEMENTS AND STUDY HISTORY

In 1938, Harrison Chandler of the Times Mirror Corporation offered Vermejo Ranch to the National Park Service. At that time the property was investigated, but no action was taken. The Gourley Estate, a later owner, also offered to sell the property to the U.S. Forest Service in 1972. In response to this, the Senate proposed its addition to the adjacent Carson National Forest, but the House of Representatives failed to act on the proposal. At that time some members of the New Mexico legislature indicated their desire that Vermejo Ranch be considered for a public conservation area but failed to authorize its purchase. The Vermejo Park Corporation, a subsidiary of Pennzoil, would consider selling the Ranch.

Prior planning efforts include a research review of the Ranch completed by the National Park Service's Southwest Region in September 1975. The review resulted in a recommendation that a low-profile, low-cost reconnaissance study be undertaken to determine Vermejo's potential significance for possible inclusion in the National Park System. However, no action was undertaken to complete the study.

In 1976, an evaluation of Vermejo Ranch was undertaken by J. David Ligon, associate professor of biology of the University of New Mexico, resulting in the recommendation that three sites on the Ranch be designated as national natural landmarks. These sites were among the "Save Areas" chosen by Ranch owners for preservation in a natural state (see appendix A). Timbering in these areas has temporarily ceased.

In January 1979, a task force composed of representatives from the U.S. Fish and Wildlife Service, National Park Service, Heritage Conservation and Recreation Service, U.S. Forest Service, and state of New Mexico conducted a study of Vermejo Ranch to determine whether or not it was suitable for public protection. The conclusions of the task force study were as follows:

The natural and cultural resources of Vermejo Park are nationally significant in the context of national area designation criteria of the U.S. Forest Service, National Park Service, and U.S. Fish and Wildlife Service.

Public ownership is necessary for adequate protection of the natural and cultural resources of Vermejo Park.

The task force study was reviewed by the heads of the agencies involved and by the Department of the Interior's Deputy Assistant Secretary for Fish and Wildlife and Parks. Based on these reviews and subsequent meetings in Washington, it was decided in mid-March that a more extensive and detailed report on Vermejo Ranch would be initiated immediately and that the study would be completed by mid-July 1979.

The New Mexico Department of Game and Fish is currently developing a proposal for state or state/federal protection of the Ranch.

REGIONAL CONTEXT

LOCATION AND ACCESS

Vermejo Ranch is a 492,560-acre area (approximately 772 square miles) situated primarily in northeastern New Mexico (see Region map). A total of 418,210 acres of the Ranch is in Colfax County, New Mexico; 70,350 acres are in Taos County, New Mexico; and approximately 4,000 acres are in Costilla County, Colorado. Vermejo Ranch is one of the largest ranches under single ownership in the United States.

Interstate 25 serves Colfax County and connects with U.S. and state highways to provide access to Vermejo Ranch. One major access point to the Ranch is from the south via U.S. 64 northeast of Cimarron, New Mexico. Entry and exit are controlled by Ranch personnel. The headquarters is located 40 miles north of U.S. 64 over a maintained but unpaved Ranch road through Van Bremmer Canyon.

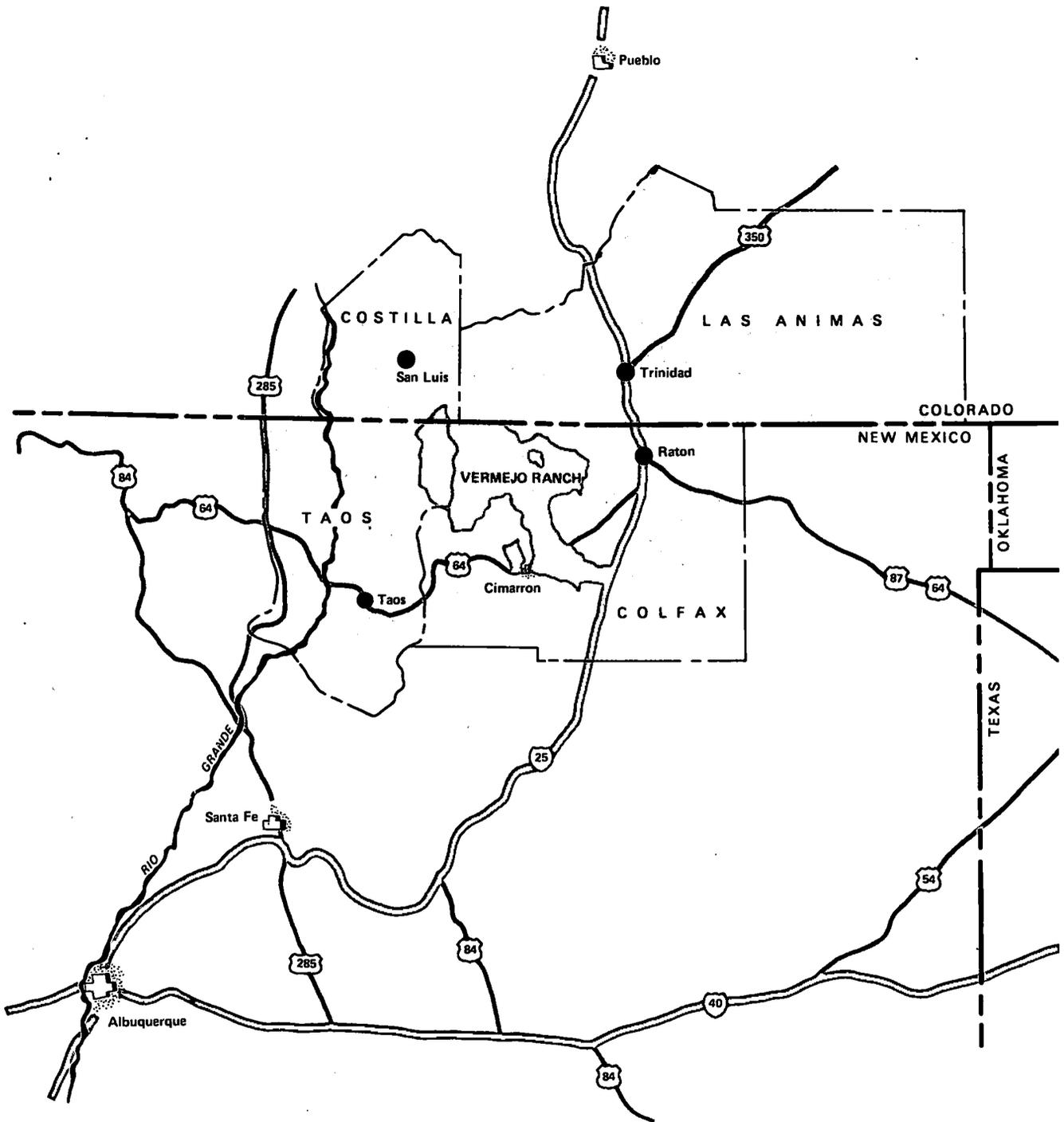
There is access from the east via New Mexico 555 from Raton. Starting at the Frontage Road in Raton, the first 26 miles of this two-lane, 45-mile route are being paved and improved with New Mexico and Economic Development Administration funds. The remainder of the road is controlled by Kaiser Steel Corporation for mining purposes, and public use is restricted. However, Ranch personnel and guests have the right to use the road.

Three other roads also provide access to the Ranch, but they are rarely used for Ranch or guest operations. The first is from the south up Ponil Canyon through the Philmont Boy Scout Ranch near Cimarron. The second is via Colorado 12 from Trinidad, Colorado, and a county road. This latter road, maintained by the county, dead-ends on private property adjacent to Vermejo's northern boundary. The third is from the northwest through the town of Amalia, New Mexico, and up Costilla Creek Canyon. This access is controlled by the Rio Costilla Cooperative Livestock Association, a group of independent ranchers.

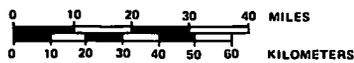
The closest public airport is south of Raton, but no regularly scheduled commercial service is available.

LANDOWNERSHIP AND LAND USE

Most of the land surrounding Vermejo Ranch is in private ownership primarily in large landholdings. The publicly owned areas are the Carson National Forest and the Elliott Barker Wildlife Management Area (owned by the state of New Mexico); both areas adjoin the



- — — STATE LINE
- — — COUNTY LINE
- COUNTY SEAT



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southwestern boundary of the Ranch (see Landownership and Land Use map).

Current land uses adjacent to Vermejo pose few conflicts with uses on the Ranch. The majority of adjacent land is used for grazing and for recreational hunting and fishing. Farming, coal mining, timber operations, and developed communities account for a small portion of the land use. The accompanying table shows landownership and land use of properties adjacent to Vermejo Ranch.

The Carson National Forest is operated under a multiuse concept, which allows hunting, fishing, camping, and other recreational pursuits, as well as mining, grazing, and timber harvesting. While some timber cutting is occurring on other properties surrounding Vermejo, available information shows it to be primarily of small scale and intermittent in nature. Along the extreme southeastern portion of Vermejo there are approximately 20 small landholdings. Because of a limited water supply, the area is not highly productive for agriculture, and most of the residents rely on employment in Raton or Cimarron for a steady income. There are currently two in-holdings in Vermejo Ranch. A 4,125-acre tract on which mining activity is taking place is owned by the Cherokee and Pittsburg Coal and Mining Company, and a parcel approximately 80 acres in size in the southeastern portion of the Ranch is owned and used for grazing by an individual rancher.

After several years during which Vermejo Park Corporation has actively pursued an improved working relationship with neighboring landowners, disputes and problems are at a minimum. Occasionally, though, difficulties arise due to trespassing onto Vermejo for hunting or for cattle grazing.

There do not appear to be any significant changes planned in land use surrounding Vermejo Ranch. The Rio Costilla Cooperative Livestock Association is studying the feasibility of developing a ski area in the Latir Mountain area near the Carson National Forest; however, it is unlikely that this would significantly affect Vermejo property because of difficult winter access over the mountains between the two landholdings. If the property in the Vermejo vicinity does not remain in the hands of the current owners, it could be subdivided for primary and second-home development at some time in the future.

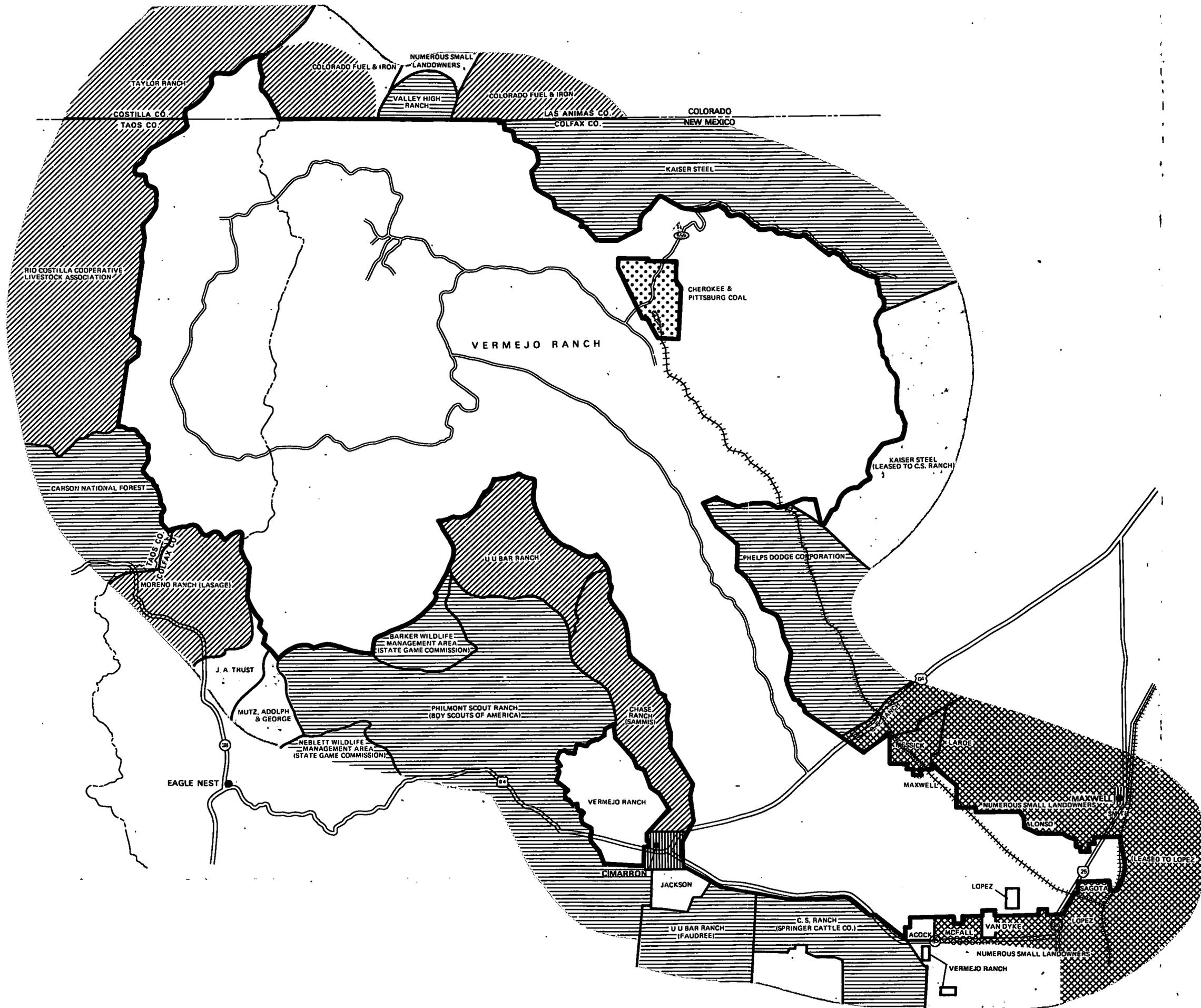
SOCIOECONOMIC FACTORS

In order to provide a regional overview of Vermejo Ranch, a four-county region was identified as shown on the Region map. As indicated previously, the major portion of the ranch is in Colfax

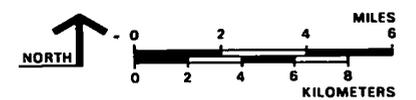
Land Ownership and Land Use Adjacent to Vermejo Ranch

| <u>Landowner</u> | <u>Grazing</u> | <u>Commercial Recreation¹</u> | <u>Non- Commercial² Recreation</u> | <u>Farming</u> | <u>Coal Mining</u> | <u>Town</u> |
|--|----------------|--|---|----------------|------------------------|-------------|
| Kaiser Steel | X ³ | | X | | | |
| Phelps Dodge Corp | X ³ | | X | | | |
| Messick | X | | | X | | |
| Maxwell | | | | | | X |
| LaRoc | X | | | X | | |
| Numerous Small Landowners | X | | | X | | |
| Smith | X | | | X | | |
| Sagota | X | | | X | | |
| Lopez | X | | | X | | |
| Van Dyke | X | | | X | | |
| McFall | X | | | X | | |
| Acock | X | | | X | | |
| C.S. Ranch | X | | X | | | |
| UU Bar Ranch (southern area) | X | | X | | | |
| Jackson Cimarron | X | | | | | X |
| Chase Ranch | X | X | | | | |
| UU Bar Ranch (northern area) | X | X | | | | |
| Philmont Boy Scout Ranch | X | | X ⁴ | | | |
| Barker Wildlife Management Area | | | X | | | |
| Neblett Wildlife Management Area | | | X | | | |
| Mutz, Adolph and George | X | | | | | |
| J.A. Trust | X | | | | | |
| Moreno Ranch | X | X | | | | |
| Carson National Forest | X | | X | | | |
| Rio Costilla Coop- erative Livestock Association | X | X | | | | |
| Taylor Ranch | X | X | | | | |
| Colorado Fuel and Iron | X ³ | X | | | | |
| Valley High Ranch | X | | X | | | |
| Cherokee and Pittsburg Coal (inholding) | | | | | X | |

- 1 Commercial recreation includes hunting, fishing, and camping on a lease arrangement or with payment of user trespass fees.
- 2 Noncommercial recreation includes hunting, fishing, camping, and other uses on a free or minimal cost basis.
- 3 Grazing rights leased to local ranchers.
- 4 Hunting not allowed.



- GRAZING
- COMMERCIAL HUNTING AND FISHING
- NONCOMMERCIAL HUNTING, FISHING AND CAMPING
- FARMING
- COAL MINING
- TOWN



LANDOWNERSHIP AND LAND USE
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 COSTILLA COUNTY, COLORADO
 UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

County, a smaller portion in Taos County, and 4,000 acres in Costilla County. A portion of the north boundary of the Ranch is contiguous to Las Animas County, Colorado. This four-county region is predominantly rural. The two largest communities in the area are Trinidad, Colorado, in Las Animas County, with a population of 9,901 in 1970, and Raton, New Mexico, in Colfax County, with a population of 6,962 in 1970. Raton is located east of the Ranch headquarters and contains a full complement of basic community facilities and services. Cimarron, a small community with a population of 927 in 1970, is located south of the Ranch headquarters. Over 80 percent of Vermejo Ranch is located in Colfax County, which had a population of 12,170 in 1970. In 1970, the populations of the other three counties were 17,516 in Taos County, 15,744 in Las Animas County, and 3,091 in Costilla County.

Projections prepared by the Bureau of Business and Economic Research at the University of New Mexico indicate that the population of Colfax County may increase to 14,300, an 18-percent increase from 1970 to 1990; the population of Taos County may increase to 24,500, a 40-percent increase from 1970 to 1990. Projections prepared by the Colorado State Division of Planning, Demographic Section, indicate that by 1990 the population of Costilla County would stabilize or increase slightly (from 3,091 to 3,700). In summary, Colfax and Taos counties are expected to record the largest increases in population growth in the three-county area. In 1975, county population densities in persons per square mile were Colfax, 3; Taos, 9; and Costilla, 3.

The economic base of Colfax County consists primarily of agriculture. Forestry, recreational activities, and especially mining are also important economic supports to the county. The major economic supports in Taos County are agriculture, grazing, timber production, and recreation. In 1970, government employment amounted to approximately 20 percent of the total labor force of both Colfax and Taos counties. The economic base of Costilla County consists of agriculture and mining. In 1970, unemployment rates for Costilla, Colfax, and Taos counties were 3.5, 8.1, and 8.4 percent, respectively.

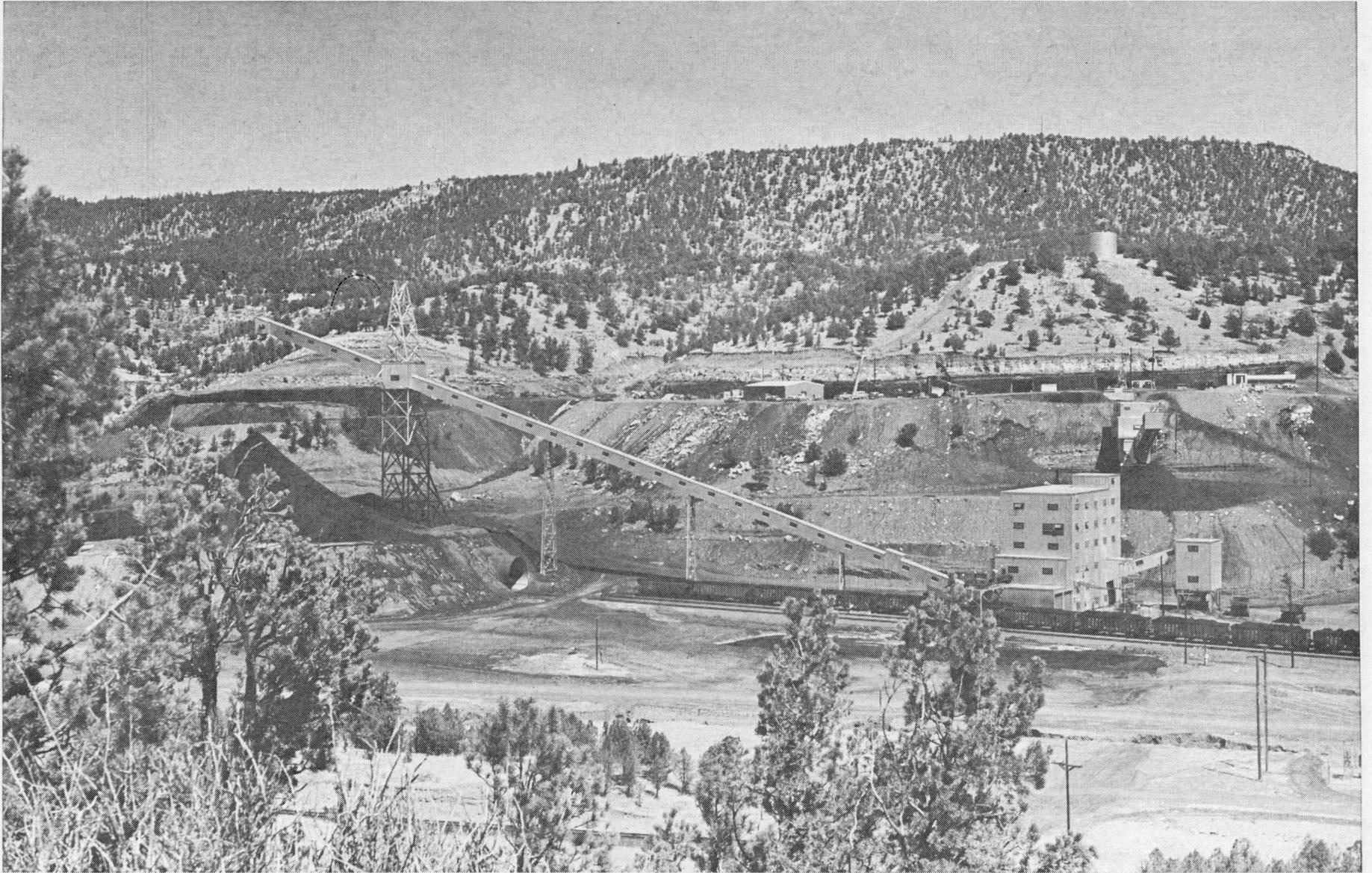
In 1969, the median family income amounted to \$4,703 in Costilla County. The median family income for the state of Colorado was \$9,552. The 1969 median family incomes were \$6,596 for Colfax County and \$5,307 for Taos County. The median income for the state of New Mexico amounted to \$7,840. Median incomes in the three counties, therefore, were significantly lower than statewide median incomes in Colorado and New Mexico.

The per capita incomes for the three counties in 1974 were as follows: \$2,860 in Costilla County, \$2,614 in Taos County, and \$3,289 in Colfax County. The state per capita incomes in 1974 amounted to \$4,884 in Colorado and \$3,601 in New Mexico.

Although past income economic indicators reveal the lack of economic strength in the three-county area, agriculture, mining, recreation, and timber production would continue to be key economic supports in the future, with Taos and Colfax counties probably recording the greatest increases in growth.



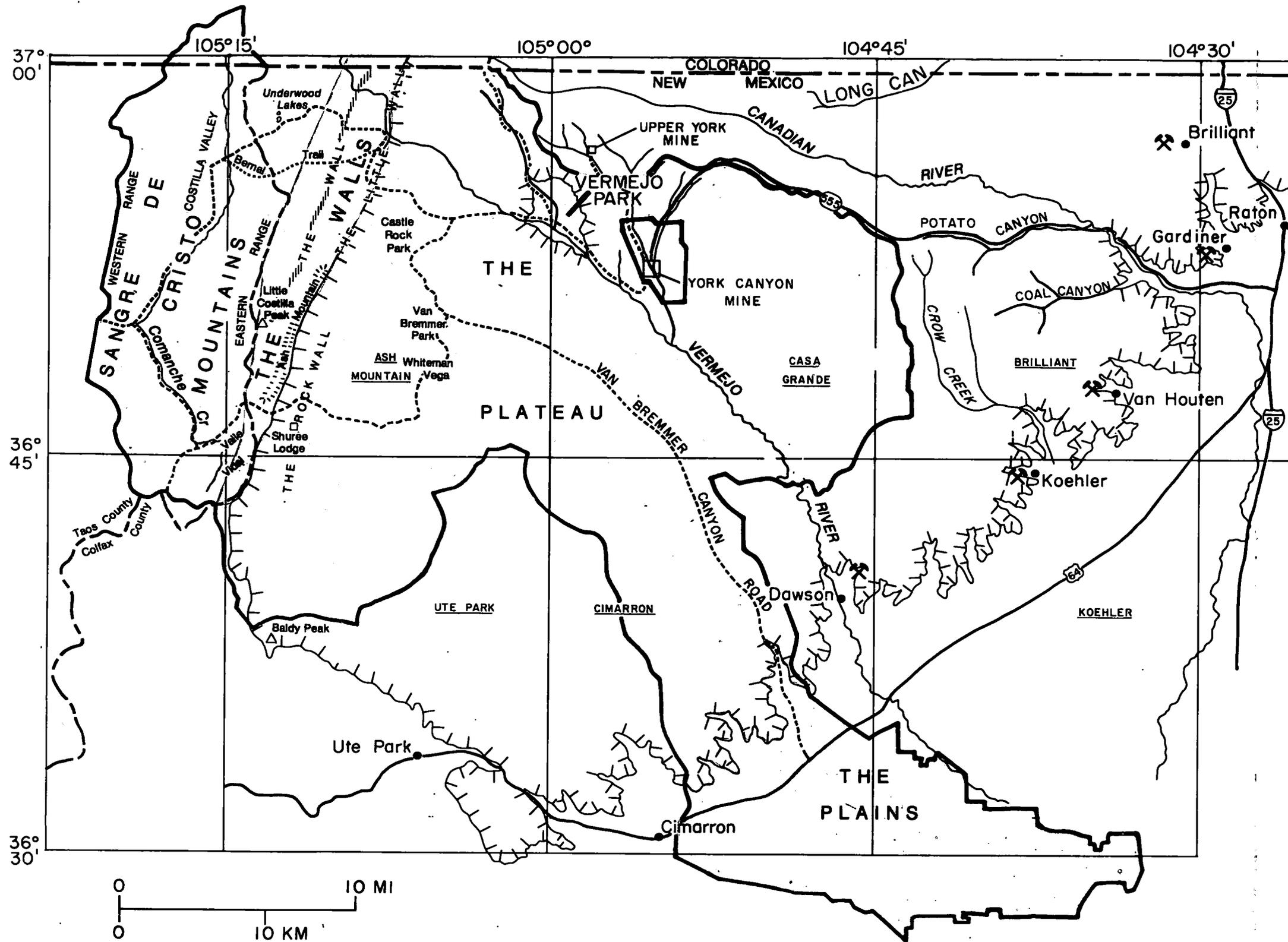
An aerial view to the northwest across Vermejo Park shows the Sangre de Cristo peaks in the background.



After entering the Ranch from New Mexico Route 555, underground coal mining operations are evident at the York Canyon Mine.



Continuing through the York Canyon mine area, evidences of good strip mining reclamation are present.



- TERTIARY ROCKS OF THE RATON COAL FIELD
- ROADS AND TRAILS
- USGS QUADRANGLE NAMES UNDERLINED
- GREY SHADES SEPARATE GEOMORPHIC DIVISIONS

LANDFORMS

VERMEJO RANCH

COLFAX AND TAOS COUNTIES, NEW MEXICO
 COSTILLA COUNTY, COLORADO

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

mine itself but the coal-washing plant and coal-storage silos, tailing ponds, roads and railroads, and other structures associated with the mine. Mining operations are currently confined to a fairly small area and are in fact not on Vermejo Ranch but on the Cherokee and Pittsburg tract. The presence of coal over much of the Ranch and the large coal reserves (both surface and deep deposits) indicate that other areas of the Ranch may be mined in the future. The time frame involved in the development, mining, and reclamation of these areas would be long term, especially where underground mining is required; however, the number of acres impacted at any given time may be fairly small. Much of this visual intrusion can be eliminated by reclamation, and the adverse visual impacts can be mitigated by controlling visitor access.

In summary, the landscape is typical of the Southern Rocky Mountains, and there is enough scenic variety to maintain the visitor's interest. Localized disruptions of the landscape (erosion, timber cutting, and coal mining) have been detrimental to the overall scenic quality of certain areas of the Ranch. Even so, sections of the Ranch, particularly the mountains and high-country meadows, are picturesque and have wilderness value.

GEOLOGY AND MAJOR LANDFORMS

Vermejo Ranch is characterized by a wide variety of geologic features including glacial valleys and moraines, overturned rock strata, major faults, and volcanic lava flows (see Landforms map). The rocks, which range in age from about 1½ billion years to very recent, present a structural and physiographic configuration that lends itself to a fourfold division.

The Mountains

The western part of Vermejo Ranch, the most scenic and rugged part, is characterized by the high crests of the Sangre de Cristo Mountains, which are divided into two ranges by Costilla Valley. The crest of the western range defines the western border of the Ranch, and the crest of Little Costilla Peak and the prominent ridges of the eastern range separate Taos and Colfax counties. The eastern range extends south to form the Cimarron Mountains.

The western Sangre de Cristo range contains peaks as high as 13,005 feet in elevation. These peaks are composed mostly of Precambrian granite, whose probable age is about 1½ billion years, and older metamorphic rocks that include predominantly amphibolite, quartzite, and granitic gneiss. Glacial valleys characterize the east side of the western Sangre de Cristo range. During the Pleistocene

RESOURCE CHARACTERISTICS, SIGNIFICANCE, AND MANAGEMENT OBJECTIVES

SCENIC QUALITY

The scenic quality of Vermejo has been both enhanced and degraded by its series of owners. The Ranch encompasses a wide variety of terrain and vegetative types--from shortgrass prairie to alpine tundra. The Sangre de Cristo Mountains, which are snowcapped most of the year, form a backdrop to the mountain meadows and wooded foothills below. Numerous small lakes and reservoirs and over 100 miles of mountain streams on the Ranch enhance the visual quality of the land. A portion of the Ranch's high country possesses wilderness values.

Previous owners of the property have left their mark on the landscape in various ways. Some of their alterations have contributed to the area's scenic quality. The Casa Grande complex is one example. Although the architecture is somewhat incongruous in a ranch setting, this complex of stone buildings and carefully tended lawns is a picturesque focal point of Vermejo Park. Many other Ranch buildings, including cabins and lodges, the Ranch headquarters, and the old stage depot at Pina Flor, are also picturesque elements of the landscape.

Other activities of past owners have had detrimental and widespread impacts on the scenic quality of the Ranch. Past overgrazing has resulted in gully and sheet erosion, and despite improved range management practices in recent years, many stream valleys still show erosion damage. The timber-cutting operation is a serious aesthetic problem. Clear-cut areas on steep slopes can be seen from miles away, and the scars will remain for many years until new stands of trees become established. Meanwhile, increased erosion from those areas may further damage downstream ecosystems and degrade scenic quality.

Coal mining (both underground and strip mining) has had a localized impact on scenic quality. New Mexico 555 from Raton passes through the York Canyon coal-mining area on its way to the Vermejo Ranch headquarters. Visitors arriving by this route pass directly through the strip-mining area, and the sights and sounds of that operation are readily apparent. The huge piles of overburden, heavy equipment moving around the area, and the noise and dust of the operation create a sense of upheaval and disorder, which is at odds with the generally peaceful quality of the surrounding countryside. Underground mining activities at York Canyon also have a large impact on visual quality--not the



2



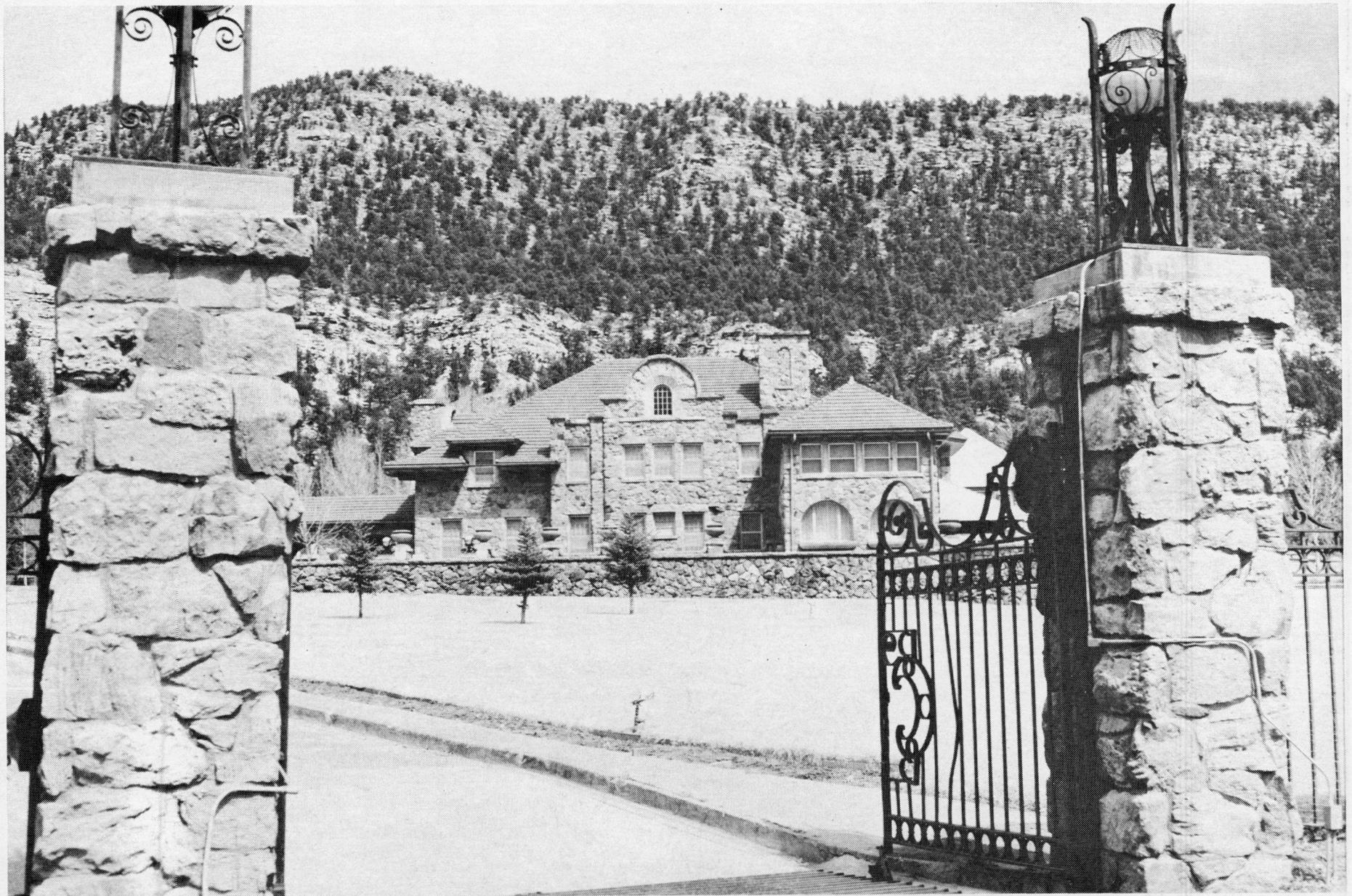


RANCH OFFICE

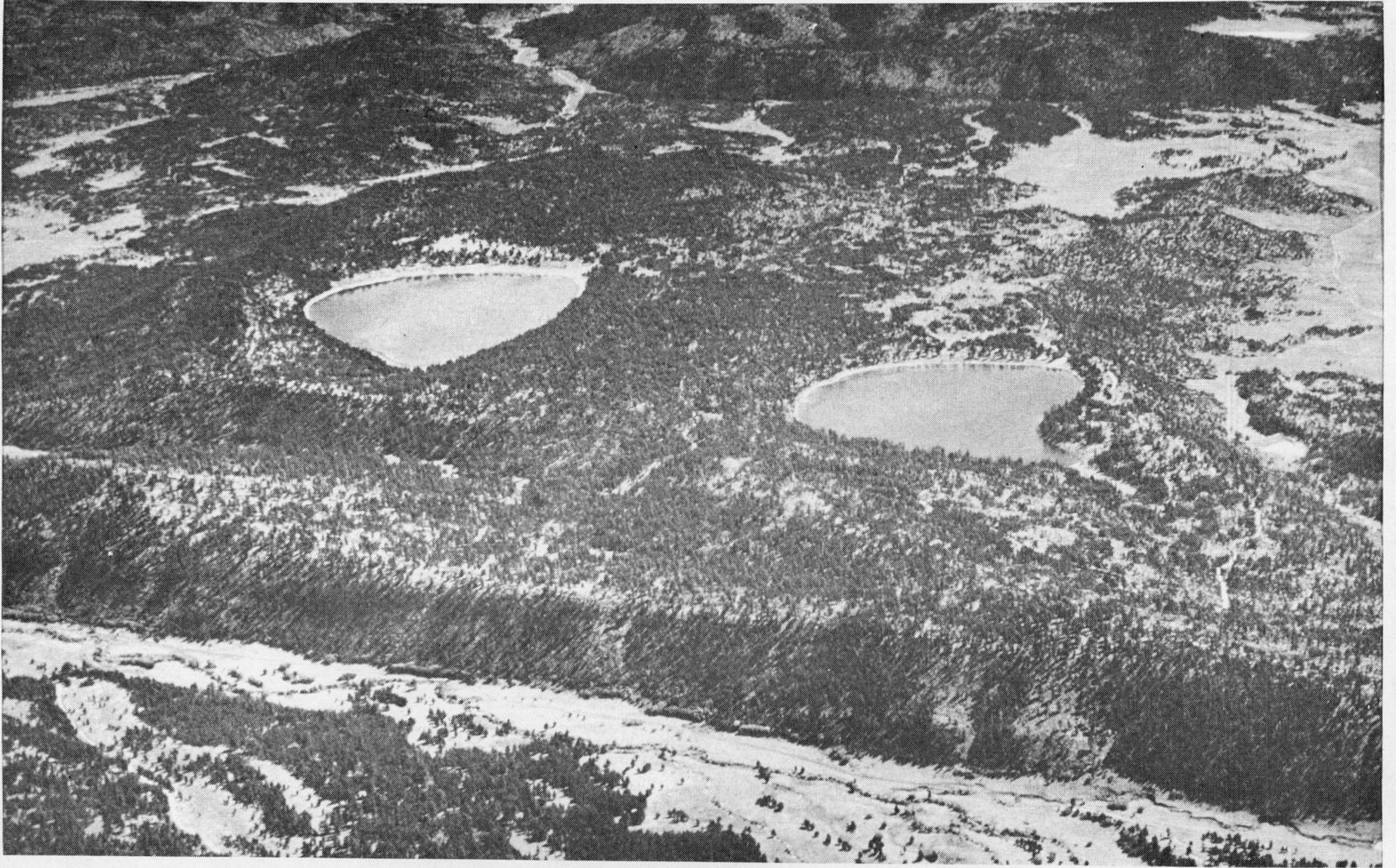




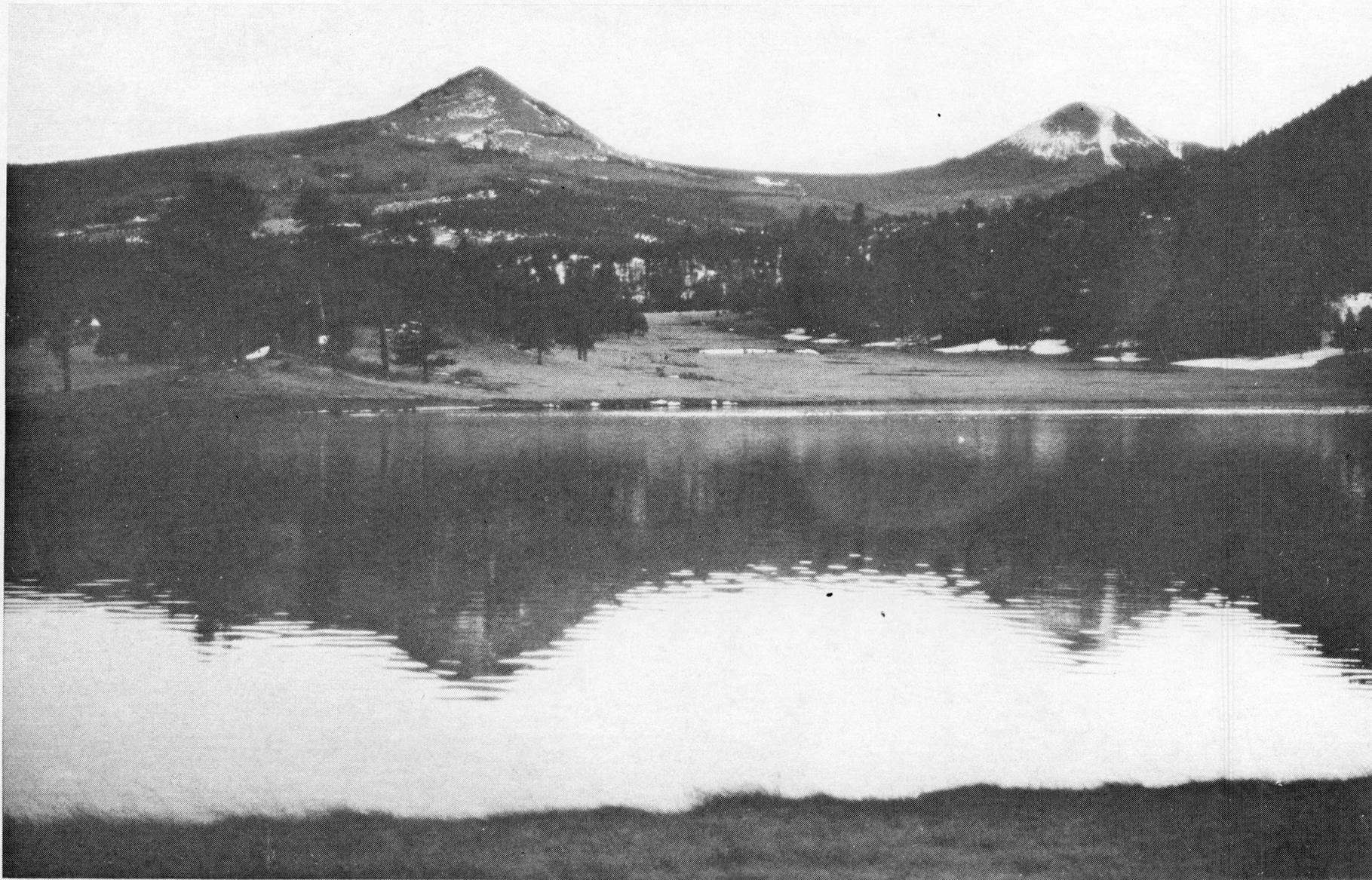
1. Looking northwest from Ranch headquarters, a portion of the Vermejo River valley in the foreground and peaks of the Sangre de Cristo range in the background can be seen.
2. Southwest of Ranch headquarters and south of the Castle Rock area, Mary's Lake is partially viewed at the left; Little Costilla Peak can be seen in the background.
3. Two miles northwest of Casa Grande is the old Adams Cattle Ranch headquarters (old Vermejo Park townsite), currently used for Vermejo Park Corporation ranching operations.
- 4.&5. Evidences of timber harvesting are visible on the west flanks of the eastern range of the Sangre de Cristo Mountains viewed from across Costilla Valley.



After passing through the York Canyon mine area, 6 miles upstream on the Vermejo River, Casa Grande and other guest Ranch structures can be seen.



West of Ranch headquarters are two natural lakes, Bartlett and Adams, located on the Adams-Bartlett plateau.



Munn Lake in the vicinity of Adams and Bartlett lakes provides the foreground for Ash Mountain (left) and Little Costilla Peak (right)

(glacial) Epoch, nearly all of the tributary valleys along the east side of the range were filled several times with thick rivers of ice. The bouldery moraines on the valley floors and at the valley mouths and the glacial cirques are well-preserved evidence of the Bull Lake and Pinedale glacial stages. Costilla Lodge and Beaver Lake rest on moraines deposited from a complex of glaciers that occupied the valley of Costilla Creek No. 2.

Costilla Valley lies between the two ranges of the Sangre de Cristo Mountains. The valley was formed by a large elongated block of the earth's upper crust that was dropped down in relation to the mountains on either side. As this block dropped the valley began to fill with debris washed from the rising mountains. This material, together with the outwash from the glaciers, filled the depression to form the broad valley as viewed today.

The eastern range is mostly of lower elevation, but Little Costilla Peak (elev. 12,584 ft.) dominates the view from the east. The peak is geologically significant because the Precambrian metamorphic rocks that form its crest are part of a mass of rock that was pushed from the west during mountain building and was thrust faulted over the underlying younger sedimentary rocks to the east. On the north and east sides of the peak the trace of this thrust fault can be seen from a distance of several miles. This fault can be followed down the south side of the mountain and along the east side of the broad meadows of Valle Vidal, where it appears that Precambrian granite has been thrust faulted to the east over rocks as young as the Pierre Shale. North of Little Costilla Peak the thrust fault passes through a series of ridges and spurs along the west side of the main ridge that locates the county lines. The main ridge consists of red sandstone and conglomerate beds of the Sangre de Cristo Formation that were steeply tilted up and overturned during thrust faulting.

About 6½ miles north of the peak the rock changes to a complex of volcanic rocks and related landslide deposits and fluvial sediments that overlie Precambrian granite and metamorphic rocks. These volcanic rocks are especially significant because they represent deposits emplaced during a long period of violent volcanic activity that occurred about 22 million years ago. These rocks, which are the volcanic sequence at Underwood Lakes, comprise a distinctive sequence of andesitic flows, unwelded and welded ash-flow tuffs, and basalt flows. The volcanic sequence can be examined on the ridges and mesas north of Underwood Lakes, where the welded tuff of the sequence, a distinctive silicified, pink-to-purple rock, forms a high, bare, rocky ridge.

On the high mesa north of the lakes, andesitic and basalt flows overlie the welded tuff; they resemble rocks that compose apparently younger thick flows that occur at the head of Costilla

River in the Colorado portion of the Ranch. The volcanic sequence at Underwood Lakes was faulted down and thus protected from the erosive forces that removed most of these rocks from the high surrounding region. These rocks can also be seen in cuts along the new logging road on the west side of Costilla Valley above the dam and along the east side of Costilla Valley below the dam. A related sequence also underlies most of the area south of Comanche Creek.

The Wall

Sedimentary rocks ranging in age from Permian to early Tertiary form nearly continuous ridges and valleys along the eastern flank of the mountains, where the rocks have been steeply tilted or overturned. The hard, resistant layers of these steeply tilted formations resemble stone walls that trend nearly north-south on top of ridges and along valleys at the face of the mountains.

The stratigraphic section shown on the accompanying chart describes the sequence of the rocks. The thick Sangre de Cristo Formation helps form the eastern range of the mountains. The overlying, less resistant rocks of the Johnson Gap and Chinle Formations, Entrada Sandstone, and Morrison and Ralston Creek Formations are also vertical to overturned and form a valley along the eastern front of the mountains. This valley terminates to the south beneath the imposing mass of Little Costilla Peak. The Dakota Sandstone and Purgatoire Formation, which overlie these rocks stratigraphically, are composed of resistant quartzitic sandstone that forms The Wall (called the "Stonewall" at Stonewall, Colorado, about 11 miles north of the Ranch). The Wall is a dominant and rugged high ridge that persists for about 15 miles across the Ranch from the northern boundary at Little Vermejo Creek south to the Valle Vidal, where it disappears beneath the overthrust Precambrian granite. The rocks that support the ridge were also overturned or tilted from their normal nearly horizontal or gently east-dipping position up to and then past a vertical attitude, so they actually are observed to dip to the west.

The Dakota Sandstone tells a significant part of the geologic story because it records the first evidence of the sea moving across the Ranch. Oceans had covered this part of the continent at times before, but rocks deposited during earlier periods were washed away or buried beneath the overthrust granite blocks. The shale of the Morrison Formation, which crops out on the west side of The Wall, was deposited on a broad, flat continental plain featuring huge swamps where dinosaurs lived. The Dakota Sandstone was deposited as a beach that advanced across the land when the sea made its final invasion into the Rocky Mountain region. The sediments that constitute the Graneros Shale, Greenhorn, Carlile, and

Generalized stratigraphic section of rocks in the Raton coal field
 [Position of Cretaceous-Tertiary Boundary from Pillmore, 1969]

| AGE | | FORMATION | GENERAL DESCRIPTION | APPROXIMATE THICKNESS (ft) (m) | | |
|-----------------------|---|-----------------------------------|---|--|---|----------|
| TERTIARY | PALEOCENE | POISON CANYON FORMATION | Sandstone, coarse to conglomeratic, beds 5 ft (1.5 m) to more than 50 ft (15 m) thick, interbeds of soft yellow-weathering clayey sandstone; thickens to west at expense of underlying rocks. | 500+ | (150+) | |
| | | RATON FORMATION | Sandstone, very fine grained to fine grained, with interbeds of claystone, siltstone, and coal; commercial coal beds in upper part. Lower few feet conglomeratic; intertongues with Poison Canyon to the west. Generally sharp erosional contact with underlying Vermejo Formation. | 0-2,000 | (0-610) | |
| CRETACEOUS | LATE CRETACEOUS | VERMEJO FORMATION | Sandstone, very fine grained to medium grained, interbedded with mudstone, carbonaceous shale, and coal; extensive thick coals top and bottom. | 0- 380 | (0-115) | |
| | | TRINIDAD SANDSTONE | Sandstone, very fine grained to medium grained; contains casts of <i>Ophiomorpha</i> sp. | 0- 130 | (0- 40) | |
| | | PIERRE SHALE | Black shale, limestone concretions, silty in upper part; grades up to sandstone. | 2,500+ | (760+) | |
| | | NIOBRARA FORMATION | Limestone and calcareous shale; consists of the Smoky Hill and Fort Hays Limestone Members. | 500+ | (150+) | |
| | | CARLILE FORMATION | Black shale, gray calcareous shale, and calcarenite; consists of the upper black shale unit, and Juana Lopez, Blue Hill Shale, and Fairport Members. | 250 | (76) | |
| | | GREENHORN FORMATION | Limestone and calcareous shale. Consists of the Bridge Creek Limestone Member and the Hartland and Lincoln Members. | 130 | (39) | |
| | | GRANEROS SHALE | Black shale and shaly limestone. | 110 | (33) | |
| | | EARLY CRETACEOUS | DAKOTA SANDSTONE | Quartzitic sandstone. | 145 | (44) |
| | | | PURGATOIRE FORMATION | Dark-gray silty shale of the Glencairn Shale Member equivalent and conglomeratic sandstones, about 50 ft (15 m) thick, that consist of granules and pebbles of pink and gray chert as large as 1 in. (2.5 cm) in diameter. | 70 | (21) |
| | | JURASSIC | LATE JURASSIC | MORRISON AND RALSTON CREEK(?) FORMATIONS | Red and green claystone, limestone, and sandstone with gypsiferous siltstone and claystone containing jasper. | 200- 300 |
| ENTRADA SANDSTONE | Fine-grained sandstone; chert granules at base. | | | 70- 95 | (21- 30) | |
| TRIASSIC | LATE TRIASSIC | JOHNSON GAP AND CHINLE FORMATIONS | Beds of limestone pebble conglomerate, siltstone, and sandstone of the Johnson Gap in upper two-thirds of unit. Red to grayish-purple siltstones and sandstones; white conglomeratic sandstone of the Chinle in lower part. | 190 | (58) | |
| PENNSYLVANIAN-PERMIAN | | SANGRE DE CRISTO FORMATION | Red and gray conglomerate and sandstone. | 1,000+ | (305+) | |
| PRECAMBRIAN | | | Gneiss, schist, quartzite, and granite. | | | |

Niobrara Formations, and the Pierre Shale were deposited in this broad continental sea, which remained in the area for many million years.

Finally, the land to the west began to rise and the sea moved out, leaving as evidence the Trinidad Sandstone, which was formed by the beaches of the retreating sea. Coal beds of the Vermejo Formation were deposited in swamps and lagoons behind the beach. Rocks of the Raton Formation were deposited into a large basin that subsided as it was filled by sediments from a land mass rising to the west. East of The Wall the basal conglomerate of the Raton Formation is tilted up but not overturned and forms a similar but less dominant and less extensive ridge called The Little Wall, which delineates the western margin of the Raton Basin and the western limit of the coal-bearing rocks of the Raton coal field. From the Colorado State line, The Little Wall extends south about 9 miles, nearly to Ash Mountain. Along the eastern flank of Ash Mountain the basal conglomerate is covered by debris and talus, but it continues south of Ash Mountain and forms a less spectacular ridge that crosses Ponil Creek in the vicinity of Shuree Lodge. This basal ridge-forming conglomerate thickens to the southwest and is not divided from the sandstones and conglomerates of the Poison Canyon Formation that forms the western part of the Cimarron Range north of Baldy Mountain, which lies south of the Ranch's southern boundary.

Between The Wall and The Little Wall, shales, limestones, and marls of the Upper Cretaceous marine formations that lie above the Dakota Sandstone form a wide linear valley that extends southward almost entirely across the Ranch. The Pierre Shale, which makes up most of this interval, is characterized by igneous intrusive bodies that occur along nearly its entire extent. In the northern part where they have been intruded into the otherwise nonresistant Pierre Shale, dikes, sills, and irregularly shaped masses of basalt form ridges and hills. At Leandro Creek, about 1 to 1½ miles west of Cressmer Lodge, a thick diorite sill (a tabular body of igneous rock) was intruded into the Niobrara Formation and forms a persistent ledge that can be traced to the south nearly 5 miles.

In the southern part of the valley the Pierre Shale stands nearly vertical and is intruded by a very thick tabular body of rhyolite that forms Ash Mountain, one of the most striking geologic and scenic features of the Ranch. The mountain is composed of broken fragments of hard siliceous rock that is barren of vegetation and does resemble a high mound of ashes when viewed from afar. This intrusive body forms an imposing ridge that dominates the landscape to the east of Little Costilla Peak for nearly 6 miles and can be traced 3 miles farther south into Valle Vidal. The east side of Ash Mountain is composed almost entirely of rubble, but the west side of the intrusive body forms a sheer cliff above the headwaters of

Middle Ponil Creek. Ash Mountain was probably emplaced about the same time that the Underwood Lakes volcanoes were erupted. Many of the gravels deposited on pediments and on stream terraces along the Vermejo River and its tributaries that lead from Ash Mountain are almost wholly composed of cobbles and boulders of the distinctive yellowish-orange-weathering Ash Mountain rhyolite. Rounded boulders of rhyolite as large as 3-5 feet in diameter can be seen on Adams-Bartlett Mesa and along Leandro Creek.

The Plateau

The central and largest portion of Vermejo Ranch occupies part of a large dissected upland that gradually rises in elevation to the west to merge with The Wall. The Plateau is cut by narrow valleys as deep as 400-500 feet and is characterized on the eastern and southern margins by bold escarpments that stand 500-1,000 feet above the Plains. The high cliffs and ridges that surround the Vermejo Park headquarters area are formed by the sandstones and conglomerate beds of the basal Raton Formation, which are exposed along the flanks of the Vermejo Park anticline. This anticline, which was dissected by the Vermejo River and Spring Creek, constitutes the most significant geologic feature of the Plateau portion of the Ranch. The scenic high cliffs of the Raton Formation, the tree-covered slopes of the underlying Vermejo Formation, and the white cliffs of Trinidad Sandstone surround about 9 square miles of broad meadows underlain by Pierre Shale. The anticline exhibits structural relief of more than 2,500 feet on the eastern flank and 500 feet of structural closure. Buried igneous rocks encountered in a test well drilled at Vermejo Park by Union Oil Company in 1926 indicate that at least part of the uplift was caused by intrusion of a large mass of molten rock, possibly as recent as 11 million years ago.

Broad meadows occur along the western edge of the Plateau portion of the Ranch at Castle Rock and Van Bremmer parks and Whiteman Vega. They were formed by stream erosion of friable arkosic granule sandstone beds of the Poison Canyon Formation in areas where these beds rest on harder sandstones of the Raton Formation. These parks and meadows were formed where the rocks are tilted and begin to dip more steeply and where streams cut laterally instead of vertically. Formation of the meadows was probably aided by development of natural closed depressions similar to Adams, Bartlett, and Mary's lakes. In these depressions alternate wetting and drying of soft arkosic sandstone weakened the sandstone cement and allowed high winds to blow the sand grains away.

The Plains

The character of the Ranch changes abruptly at the southeastern margin of the Plateau from the high cliffs and narrow, rugged, steep-walled canyons of the Plateau to the gently rolling grasslands of the Plains. Gravel-capped pediments that slope gently away from the high cliffs of the Plateau form low-sloping mesas that divide the alluvium-filled stream valleys of Ponil, Cerrososo, and Van Bremmer creeks, which meander away from the Plateau front. Soft, nonresistant Pierre Shale underlies the grassy Plains portion of the Ranch.

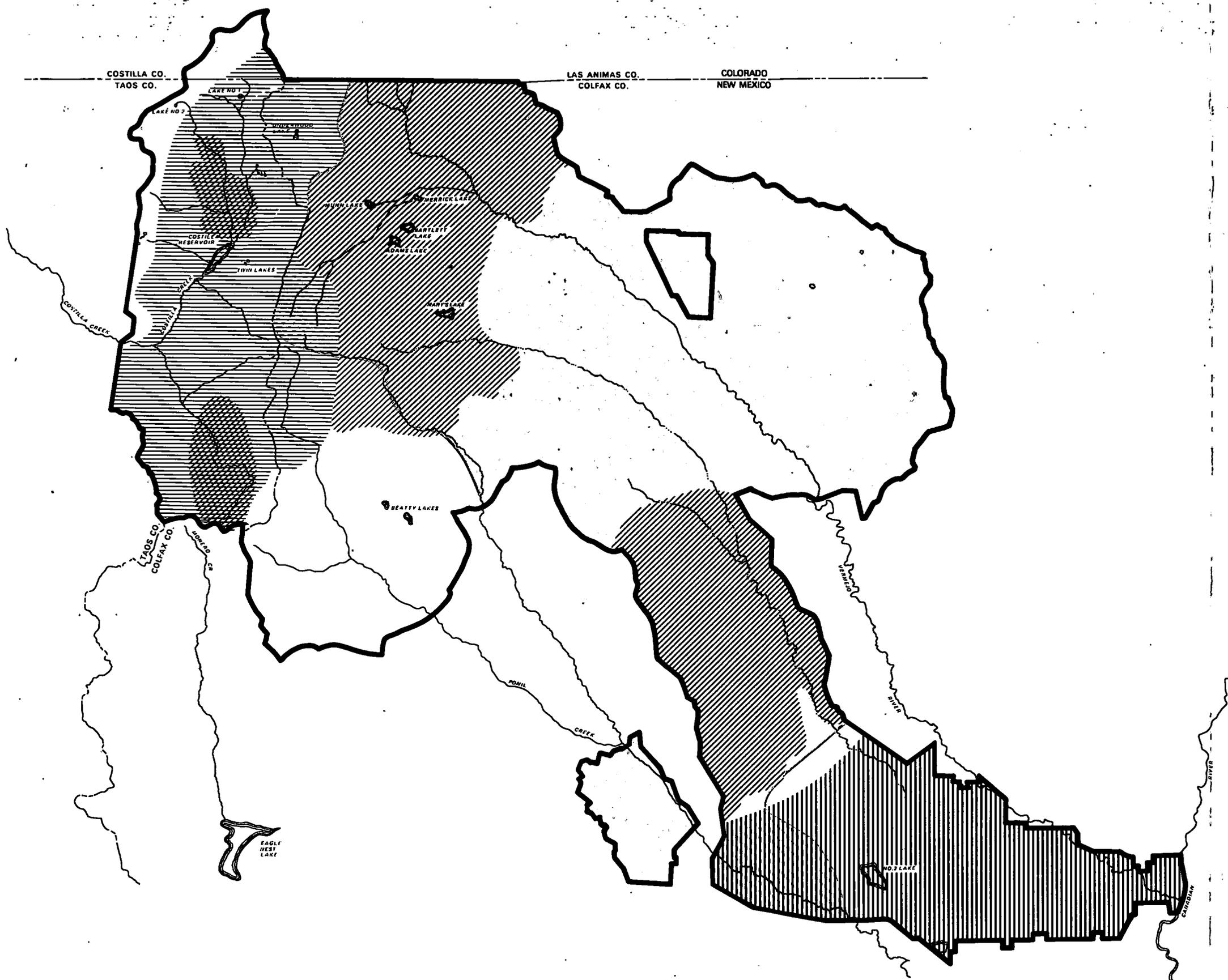
The Plains were formed by removal of overlying resistant rocks. Streams cut downward until they reached base level and then began to cut laterally. The gentle topography of the Plains reflects this lateral migration of the streams, which partly caused the easily eroded rocks of the Pierre Shale to be removed. Along the Plateau margin the Pierre Shale was washed away beneath the high cliffs formed by the overlying formations. The resultant eroded slopes were oversteepened and became unstable, causing the failure of large masses that moved downslope and formed nearly continuous landslide deposits along the front. These large landslides and piles of debris and rubble attest to the continually changing character of the land.

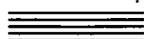
FISH AND WILDLIFE

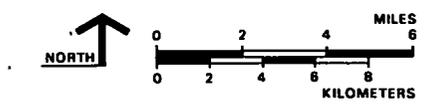
The diverse habitats of Vermejo Ranch support approximately 60 species of mammals, 200 species of birds, 33 species of reptiles and amphibians, and 15 species of fish.

Elk

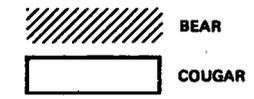
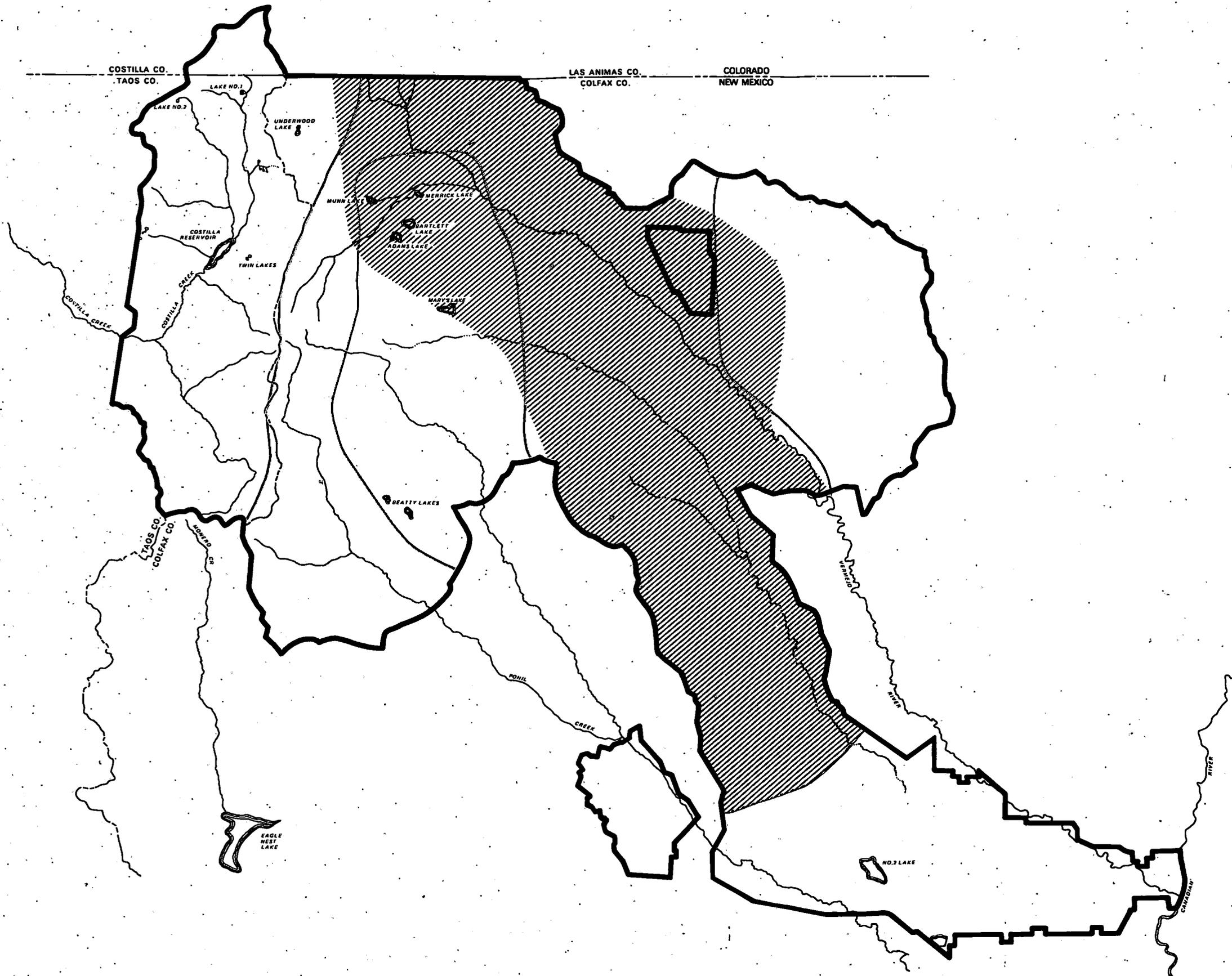
Elk are Vermejo's most numerous big game species, and there are approximately 5,000-7,000 elk on the property. The herd is sufficiently large, and the percentage of trophy bulls in the population is high enough to be considered of national significance. As indicated on the Wildlife Habitat - Ungulate Species map, most of the Ranch provides winter range for the elk herd. The higher country near the Taos-Colfax County line provides summer range and calving area. This habitat appears to be in good to excellent condition. If properly done, logging would improve elk habitat. However, if cover requirements are not maintained or if accelerated erosion occurs with poor logging practices, the elk population would be adversely affected. Similarly, unregulated coal-mining operations could adversely affect the population.



-  ANTELOPE RANGE
-  DEER WINTER RANGE
-  ELK CRITICAL WINTER RANGE
-  ELK CRITICAL SUMMER RANGE AND CALVING AREA



**WILDLIFE HABITAT
UNGULATE SPECIES
VERMEJO RANCH**
COLFAX AND TAOS COUNTIES, NEW MEXICO
COSTILLA COUNTY, COLORADO
UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE



**WILDLIFE HABITAT
PREDATOR SPECIES**
VERMEJO RANCH
 COLFAX AND TAOS COUNTIES, NEW MEXICO
 COSTILLA COUNTY, COLORADO
 UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

The average annual elk harvest from the herd during the previous five years was 304 animals. During this same period, 425 equaled or exceeded six points to the side. Figures indicate that trophy bulls contributed 47.7 percent of the total bull harvest on the property. Hunter success during the 1974-78 period was 75 percent. More consumptive use could be made of this herd, but a sound management plan would limit hunter access to maintain a large, viable herd with a high proportion of trophy animals. The Vermejo Ranch herd provides a unique, high-quality hunting experience for American elk hunters.

Deer

The deer herd on Vermejo has begun to recover from its downward trend of several years ago. Provided that fawn survival continues at the 1977 rate of 60 fawns per 100 does, the herd would recover to the carrying capacity of its habitat. As with the elk habitat, logging would improve deer habitat on the Ranch provided that cover requirements are met and erosion is not severe. Management of the herd must include hunting and control of cattle grazing. The deer range is shown on the Wildlife Habitat - Ungulate Species map.

Pronghorn Antelope

Antelope habitat on the Ranch consists of the shortgrass prairie south of New Mexico 64. This herd has remained fairly stable at 150 (summer) to 300 (winter) animals. Due to light hunting pressure many trophy-sized bucks are present in the herd. Under current management the herd should continue to exist at its present level. If management considerations included reduced cattle grazing and modified fencing arrangements, the herd could be expected to grow.

Bear and Cougar

Black bear and cougar are relatively abundant on Vermejo Ranch. Recent increases in the deer population have been favorable for cougar. The black bear population is expected to remain stable. The main population concentrations of black bear and cougar are shown on the Wildlife Habitat - Predator Species map.

Other Mammals

Other mammals on the Ranch include skunk, raccoon, gray fox, badger, bobcat, coyote, marmot, pika, beaver, muskrat, and possibly ring-tailed cat. Beaver is also present on the Ranch but

not in appreciable numbers because of the poor condition of riparian habitat (due to past overgrazing). If riparian areas were protected and willow, alder, and aspen were allowed to regenerate, the beaver population would undoubtedly increase. The only furbearers that are harvested to any extent are the bobcat and coyote.

Turkey and Waterfowl

Merriam's turkeys are abundant on the Ranch (see Wildlife Habitat - Bird Species map). Hunting pressure on the birds is moderate to light. Continued turkey abundance is anticipated, provided that spring moisture and temperature remain favorable for poult production and snow conditions do not cause undue winter stress.

The only appreciable numbers of waterfowl (mainly Canada geese and dabbling ducks) are found during migration on Lake No. 2 south of New Mexico 64. The lake receives virtually no hunting pressure. Some of the higher altitude lakes receive sporadic use by geese and mallards during fall migration, but they could not be considered highly productive waterfowl habitat.

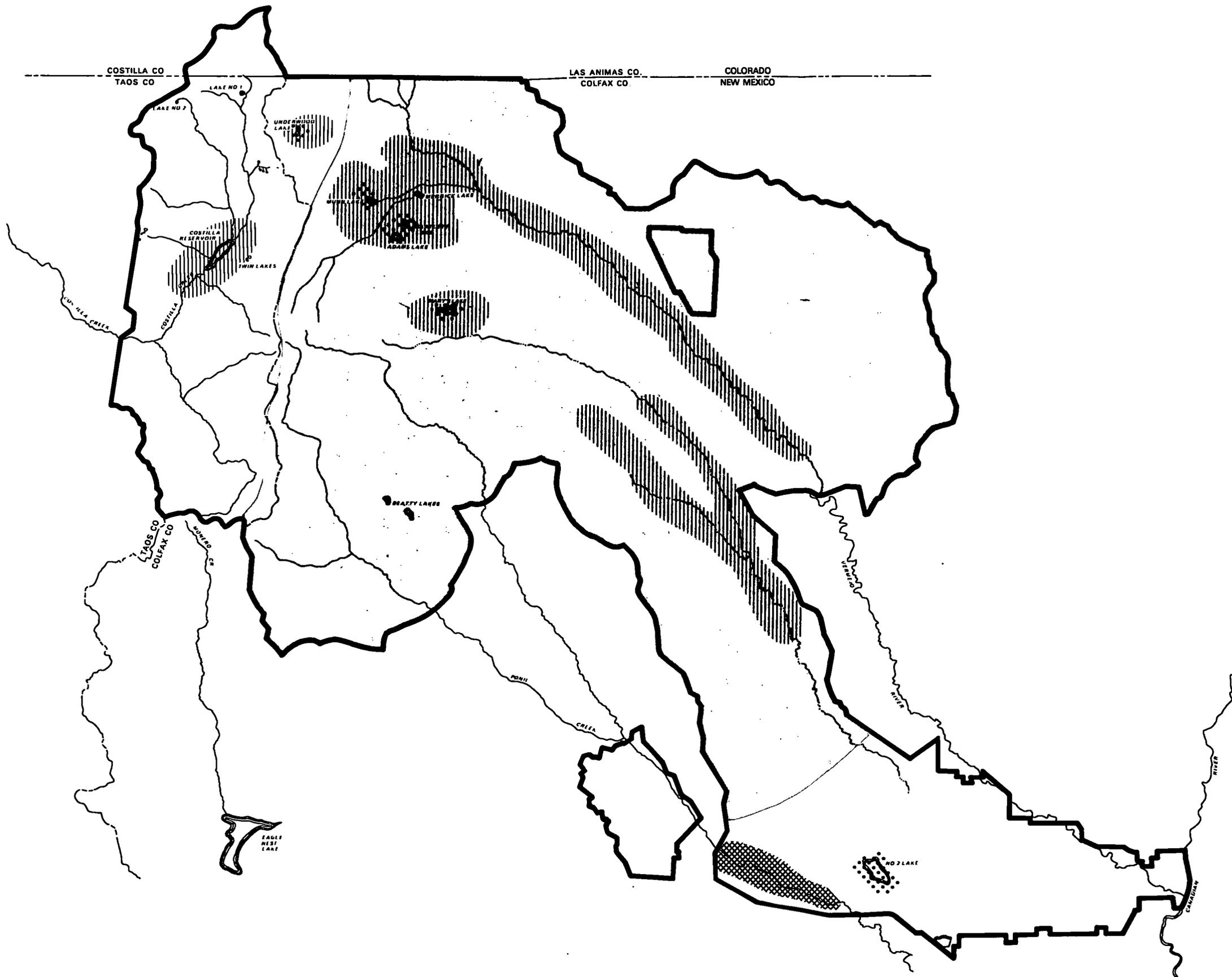
Endangered and Threatened Species

Vermejo is a major wintering area (November-April) for the bald eagle, a federally listed endangered species. During the past year 57 eagles were observed on the property, with approximately twice that number occurring in the surrounding habitat. The occurrence of eagles is closely associated with Vermejo's elk herds because they depend upon this species for carrion during the winter. Extensive lakes and streams provide fish for eagle subsistence prior to freeze-up and after spring thaw. Suitable habitat for this species is currently available, and future management of the area should strive to protect and enhance the eagle population. Numerous immature birds indicate that this group is productive, and the ratio of mature to immature eagles indicates a stable population.

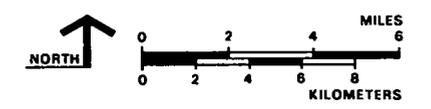
State listed endangered species known to occur on Vermejo Ranch include American osprey, white-tailed ptarmigan, and brook stickleback.

American osprey have recently been observed on the Ranch, and reproduction here is doubtful but may occur.

White-tailed ptarmigan have recently been observed in the alpine region of the Ranch. A management objective for the alpine habitat should include restoration and provision of suitable ptarmigan habitat primarily because it constitutes a very small segment both within the state and within the Ranch boundary.



-  TURKEY
-  PHEASANT
-  EAGLE
-  WATERFOWL (INCLUDING CANADA GOOSE)



**WILDLIFE HABITAT
BIRD SPECIES
VERMEJO RANCH**
COLFAX AND TAOS COUNTIES, NEW MEXICO
COSTILLA COUNTY, COLORADO
UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

The brook stickleback is a widespread species within its range of occurrence, but within New Mexico it occurs only on Vermejo Ranch. Poisoning on areas outside the Ranch in New Mexico in association with game fish habitat improvement practices may be responsible for the decline of the species. To assist this unique species, management objectives should include habitat restoration.

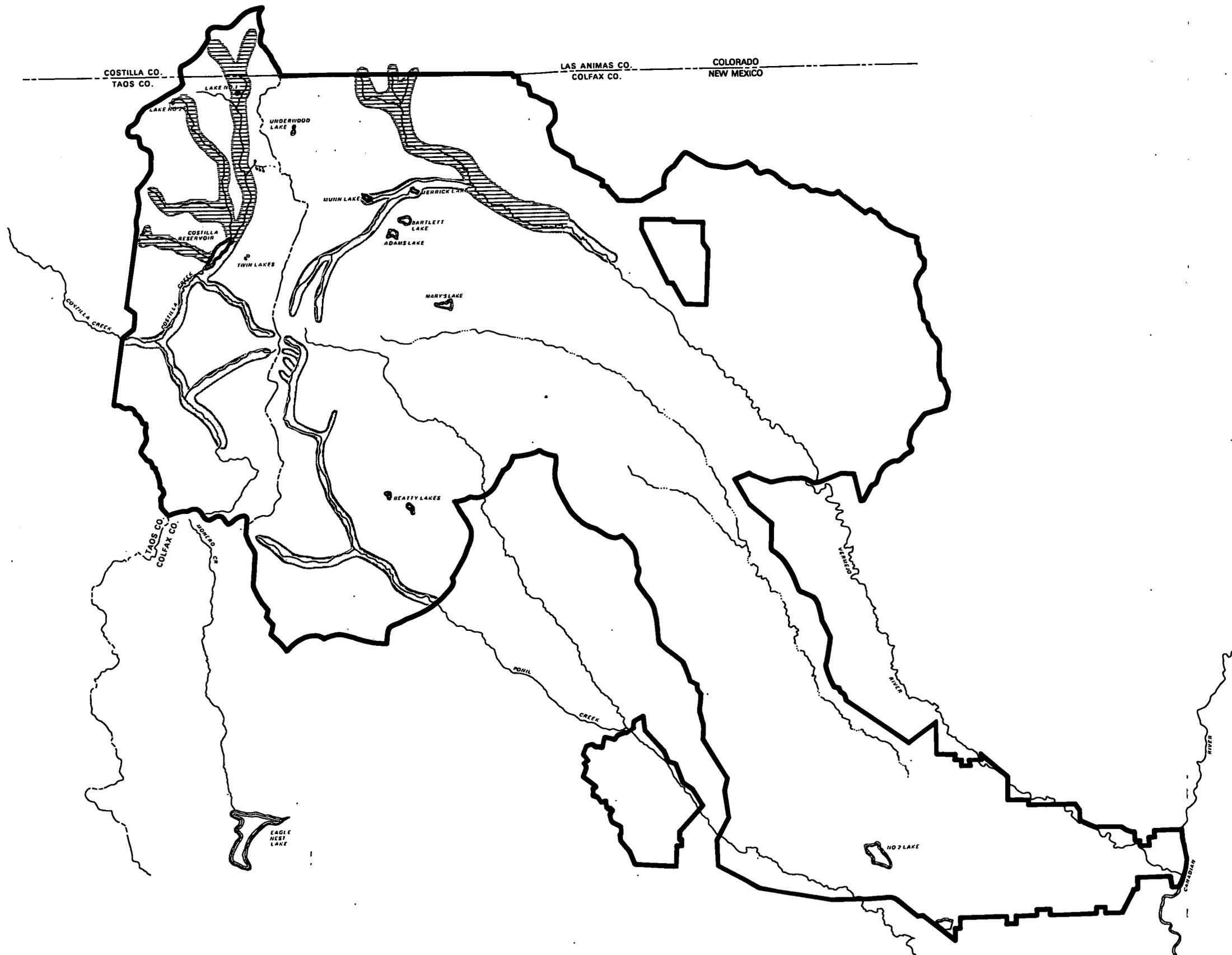
Although not verified on the Ranch, other state listed species within their known ranges on the property include marten, mink, river otter, red-headed woodpecker, Baird's sparrow, and redbelly dace.

Fishery Resources

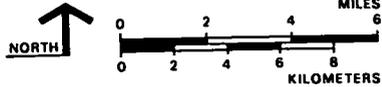
Within the confines of Vermejo Ranch, there are approximately 100 miles of streams and 60 lakes, excluding stock ponds, which contain permanent or semipermanent water sources. Fifteen species of fish are indigenous to Vermejo's waters. The Wildlife Habitat - Fishery Resources map shows the location of important land and stream fisheries. Rainbow, cutthroat, brook, and brown trout are the most important sport fish. Pure strains of the once abundant Rio Grande cutthroat trout are now uncommon due to introductions of related trout and habitat degradation. However, the occurrence of a pure strain of this native trout has been identified within Vermejo Ranch. Management of the area should include protection and isolation of this native species in an effort to preserve its integrity.

Fishing pressure on the Ranch is slight, with approximately 3,500-4,000 angler days per year. If the area was open for public fishing, it would probably receive between 17,000 and 25,000 angler days per year. This type of fishing pressure would not be conducive to the quality fishing experience that is now found on the Ranch.

The lake fishery on Vermejo Ranch is augmented through a "put, grow, and take" system because most of the more popular and accessible lakes have no natural spawn. The average lengths of rainbow trout taken from the major lakes are as follows:



 FISHERY RESOURCES
 SPAWNING AREAS



**WILDLIFE HABITAT
 FISHERY RESOURCES**
 VERMEJO RANCH
 COLFAX AND TAOS COUNTIES, NEW MEXICO
 COSTILLA COUNTY, COLORADO
 UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE

| <u>Lake</u> | <u>Length</u> <u>(inches)</u> |
|-------------|----------------------------------|
| Adams | 14.6 |
| Bartlett | 15.1 |
| Merrick | 14.8 |
| Bernal | 13.7 |
| Munn | 14.2 |
| Underwood | 15.1 |
| Shuree | 13.4 |
| Costilla | 14.3 |

The Glacier Lakes and Seven Lakes are populated with rainbow, cutthroat, and brook trout. The average length of fish caught in Glacier Lakes is 10.8 inches. More fishing pressure could be sustained on the lakes. Because the lakes are stocked and maintained, increased pressure would simply require more stocking. However, increasing fishing pressure would also detract from the quality of the fishing experience.

The stream fishery on Vermejo Ranch is of high quality and is essentially unused. The Wildlife Habitat map shows the locations of major trout streams and spawning regions. For the stream fishery to continue to function as a natural ecosystem, angler access would probably have to be rigidly controlled. However, this type of management could produce some of the highest quality stream fishing in the Southwest.

The greatest threat to Vermejo's fisheries is the possibility of poor logging practices on upper watersheds. Increased sedimentation and turbidity destroys spawning habitat and lowers aquatic productivity. Removal of riparian vegetation allows the water to warm to temperatures intolerable for trout reproduction. The use of lower watersheds by cattle has also reduced the amount of riparian vegetation and fostered erosion, which has reduced the trout productivity of lower stream reaches. The reestablishment of riparian vegetation, coupled with mechanical stabilization of streamways, could counteract this problem.

Elk Management

Management Objectives: Maintain a viable elk herd of national significance; provide highest quality hunting experience for American elk hunters.

Management Framework: Allow for maximum population of elk within the constraints imposed by habitat carrying capacity; maintain

current high-quality trophy elk hunting through controlled hunter access; accomplish potentially conflicting land uses such as timber harvesting, mineral extraction, cattle grazing, and public recreational usage with elk habitat maintenance as prime consideration.

Potential Management Agencies: U.S. Fish and Wildlife Service, State of New Mexico, U.S. Forest Service, National Park Service.

Other Game Species Management

Management Objectives: Maintain viable populations of a maximum diversity of indigenous game animals; provide for high-quality hunting experience.

Management Framework: Allow maximum diversity and population sizes of game animals within the constraints imposed by carrying capacities of the habitats; maintain population sizes at optimum levels through good forest management practices, environmentally sound mining practices, controlled grazing, and regulated hunter access.

Potential Management Agencies: U.S. Fish and Wildlife Service, State of New Mexico, U.S. Forest Service, National Park Service.

Nongame Species Management

Management Objective: Preserve and enhance the maximum diversity of nongame animals.

Management Framework: Provide for maximum habitat diversity through regulation of conflicting land uses; accomplish timber harvesting, mineral extraction, cattle grazing, and public recreational usage with maintenance of habitat diversity as prime consideration.

Potential Management Agencies: U.S. Fish and Wildlife Service, State of New Mexico, National Park Service, U.S. Forest Service.

Endangered and Threatened Species Management

Management Objective: Preserve and enhance populations of endangered species on the Ranch.

Management Framework: Preserve existing known habitat for endangered or threatened species; provide additional habitat where feasible to allow for population expansion; comply with federal and state regulations concerning endangered or threatened species.

Potential Management Agencies: U.S. Fish and Wildlife Service, State of New Mexico, U.S. Forest Service, National Park Service.

Lake Fishing Management

Management Objective: Maintain a highly productive lake fishery for public use and enjoyment.

Management Framework: Assure a continued supply of high-quality water by enforcing good watershed management practices pertinent to all land uses (especially logging, mineral extraction, cattle grazing, and road construction); continue a stocking program similar to the "put, grow, and take" system currently utilized by Vermejo Park Corporation; provide for maximum fishing enjoyment by such means as bait restrictions, minimum size rules, controlled access, etc.

Potential Management Agencies: U.S. Fish and Wildlife Service, State of New Mexico, U.S. Forest Service, National Park Service.

Stream Fishing Management

Management Objective: Maintain, enhance, or restore a near-pristine, self-sustaining stream fishery.

Management Framework: Assure that all land uses comply with good watershed management practices, thereby protecting streams from channel changes, widely fluctuating discharges, sedimentation, etc.; restore riparian vegetation where feasible by regulating land uses that are in conflict with good fisheries management; control public access to ensure that the fishery remains a near-pristine experience for serious anglers.

Potential Management Agencies: U.S. Fish and Wildlife Service, State of New Mexico, National Park Service, U.S. Forest Service.

VEGETATION

Vermejo Ranch is a complex area that contains examples of both Southern Rocky Mountain and Great Plains physiographic provinces. The diversity of plant communities within the Ranch reflects the extreme changes in elevation, a difference of 7,000 feet from southeast to northwest, combined with differences in aspect, precipitation, and soil characteristics, as well as other environmental factors. The complexity of the environment enhances the diversity of wildlife habitats, scenic quality, and recreational potential of the region. Nine major plant associations are represented on the Ranch

property. These have been combined into five major ecosystems for mapping purposes (see Vegetation map).

The areas of lowest elevation, located in the southeastern portion of the Ranch, are dominated by a grassland ecosystem (shortgrass prairie association) where blue grama and buffalo grass are the predominant species. Another association within the grassland ecosystem is the high-altitude meadow association. These meadows vary in size from small pockets to extensive valleys and are of major importance to wildlife and considerably enhance the scenic quality of the region.

To the north and west of the shortgrass prairie is an ecosystem containing an association of pinyon pine and Rocky Mountain juniper; pinyon pine is the more common species. The density of vegetation varies from open groves to almost solid stands.

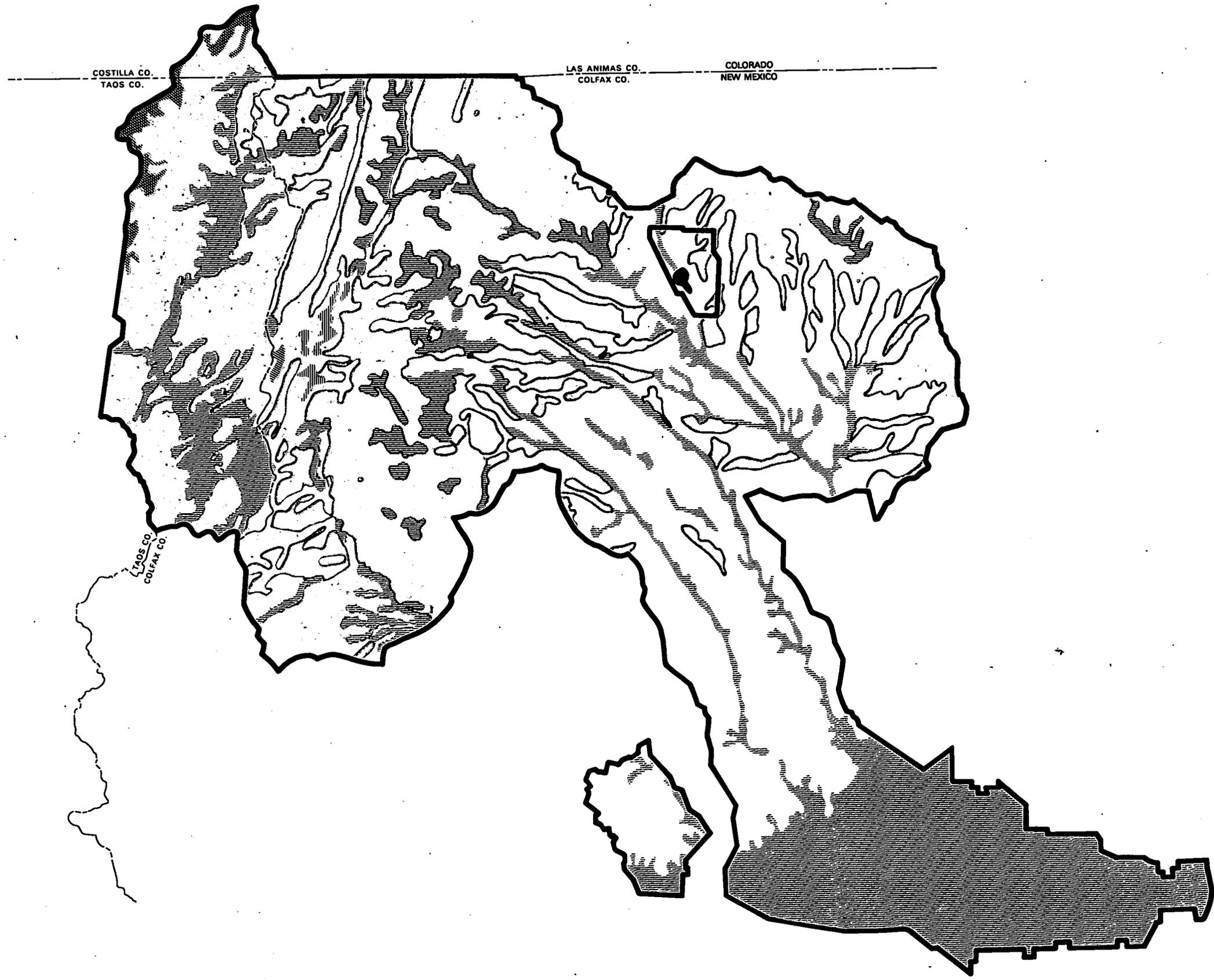
The ponderosa pine ecosystem includes two plant associations. Ponderosa pine occurs in association with Gambel oak as well as in fairly dense, nearly pure stands. The pine-oak association occurs on the drier, usually south-facing slopes; Gambel oak is the predominant species. Ponderosa pine stands are found in the moister areas, with Douglas fir occasionally intermixed on the cooler north-facing slopes.

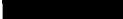
The mixed conifer-aspen ecosystem encompasses three major plant associations. Douglas fir and quaking aspen form dense stands over extensive areas. Aspen is a pioneer species, invading areas following disturbance. In many areas conifers are growing beneath the aspen canopy and will eventually dominate. Notable amounts of bristlecone pine are found within the mixed conifer-aspen ecosystem. Bristlecone pine forms nearly pure open stands on the Ranch. The highest elevations within the mixed conifer-aspen ecosystem are occupied by a dense Engelmann spruce-subalpine fir forest association. Engelmann spruce appears to dominate this association on the Ranch property.

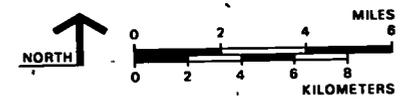
Tree line is reached somewhere between 11,600 and 11,800 feet; above this point an alpine ecosystem is established with many forbs, short grasses, mosses, and lichens. Vegetation varies from dense to very open and includes extensive bare rock areas. This alpine association is probably the most fragile and least accessible of all within the Ranch boundaries.

Management Objective: Restore, protect, and interpret the natural diversity and dynamics of the native ecosystems.

Management Framework: Conduct a detailed baseline inventory of existing vegetation, gather information on past disturbances, and study the dynamics of the ecosystems; evaluate vegetative data for



-  GRASSLAND ECOSYSTEM
-  PINYON-JUNIPER ECOSYSTEM
-  PONDEROSA PINE ECOSYSTEM
-  MIXED CONIFER-ASPEN ECOSYSTEM
-  ALPINE ECOSYSTEM
-  BARREN
-  STRIP MINE



VEGETATION
VERMEJO RANCH
 COLFAX AND TAOS COUNTIES, NEW MEXICO
 COSTILLA COUNTY, COLORADO
 UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

significant species and ecosystems; develop and execute plans to reach objective.

Potential Management Agencies: U.S. Fish and Wildlife Service, State of New Mexico, U.S. Forest Service, National Park Service.

FORESTRY

Forests and woodlands cover nearly two-thirds of the 492,560 acres of Vermejo Ranch. Of 142,000 acres on the Ranch classified as merchantable timber, the ponderosa pine ecosystem occupies 72,000 acres, and the mixed conifer-aspen ecosystem occupies 70,000 acres. The mixed conifer-aspen stands are denser, containing 397 million board feet of timber in trees over 8 inches in diameter at breast height, while the stands in the pine type contain only 168 million board feet in larger trees. These estimates are based on an inventory of the timber on the Vermejo Ranch (Solinsky 1966, a consultant for Duke City and Amalia lumber companies).

In 1960, the Pacific Lumber Company obtained for \$3.3 million the right to remove the merchantable timber on approximately 337,000 acres of Vermejo Ranch under an agreement in effect until the year 2000. The timber is being harvested by Amalia Lumber Company, which in 1975 established a modern sawmill at Amalia, about 15 miles west of the Ranch, to produce lumber and pulpwood chips from the Ranch timber.

The U.S. Forest Service has estimated the annual allowable rate for removal of sustained-yield timber from Vermejo Ranch to be about 20 million board feet (An Economic Analysis of the Vermejo Ranch, 1971). This is about 7 percent of New Mexico's total annual allowable rate for sustained timber removal. The rate of timber removal during the last two years has been estimated by the Ranch forestry staff to be about 30 million board feet annually, a rate intended to remove the merchantable timber by the time the timber rights agreement expires.

The value of the Amalia Mill is approximately \$15 million, and its seasonal employment ranges from 90 to 150 people, depending on whether it happens to be operating on one or two shifts. It can process nearly 50 million board feet of lumber annually.

About 150 people are employed in logging on Vermejo Ranch. Logging is done by several subcontractors, and payment is based on the volume of timber delivered to the mill.

During its operation on Vermejo Ranch, the Pacific Lumber Company released about 70,000 acres. In 1971 the U.S. Forest Service appraised the timber on the Ranch at \$7.4 million. Since 1977 the

merchantable timber has been removed from about 2,000 acres of the ponderosa pine ecosystem and 11,000 acres of the mixed conifer-aspen ecosystem; however, the value of the timber has been increased by generally rising prices and by development of logging roads on the Ranch (see Timber Rights map for cut areas). Neither an appraisal nor a timber cruise was made in connection with this study.

These released areas and areas on which Vermejo Park Corporation owns timber rights are shown on the map as areas "not subject to cutting" (173,475 acres).

The map also indicates an area of cutting rights of 40,000 acres granted in 1962 and expiring in 1981. There has been initial cutting on the 1981 tract, and Amalia does plan to cut this area before 1981.

Because logging intensity increased in 1977 with the opening of the Amalia Mill, substantial aesthetic losses have occurred, with large areas cleared of timber on very visible hillsides in the mixed conifer-aspen ecosystem. There are obvious road scars, and large volumes of logging residue have been left on the ground.

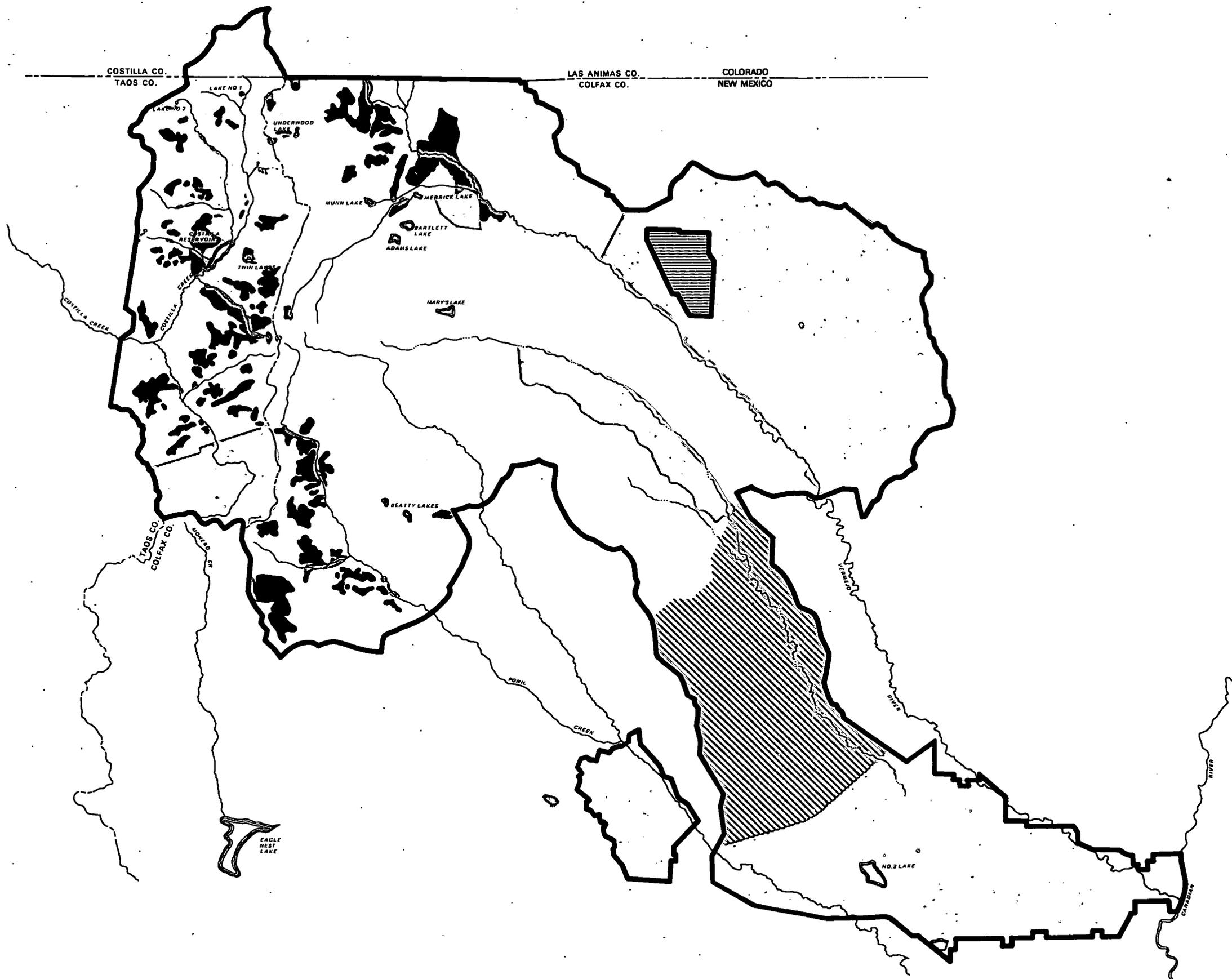
The negative aesthetic and watershed effects of the current rate of removal and logging practices have given rise to litigation in which the owners of the Ranch seek to require the lumber company to remove the timber with more precautions to prevent unnecessary environmental damage.

A temporary restraining order in effect until the trial on the merits has been issued requiring Pacific Lumber Company to follow state law in relation to removal of trees larger than 12 inches in diameter at breast height and to leaving seed trees of a certain quality. The order also prohibits additional logging near Cressmer Lodge and Merrick Lake, which are portions of the "Save Areas." A decision on logging practices is expected to result from court hearings to be held in October/November 1979.

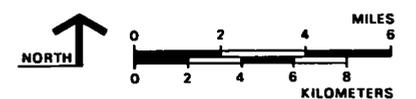
Management Objectives: Restore and maintain the aesthetic quality and ecological integrity of the forest; maintain or enhance stream-flow quantity, quality, and regimen; produce timber and manage the forestry resources with maximum consideration for the wildlife and recreational and scenic values of the Ranch.

Management Framework: Emphasize environmental forestry by controlling timber removal rate.

Potential Management Agencies : State of New Mexico, U.S. Forest Service, U.S. Fish and Wildlife Service, National Park Service.



- CUT AREA (AS OF FALL 1978)
- 1981 TRACT (CUTTING RIGHTS EXPIRE DEC. 31, 1981)
- NOT SUBJECT TO CUTTING
- KAISER STEEL CORPORATION
- OTHER AREAS SUBJECT TO CUTTING



TIMBER RIGHTS
VERMEJO RANCH
 COLFAX AND TAOS COUNTIES, NEW MEXICO,
 COSTILLA COUNTY, COLORADO
 UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

GRAZING

Vermejo Ranch has a long history as a large cattle operation. It employs, along with the guest operations, approximately 42 full-time people. The Ranch is currently operated as a cow-calf operation, producing its own hay for winter feed and including grazing lands from high-elevation summer range to low-elevation winter range. Vermejo now supports about 4,000 cattle year-round, with about 1,000 more from May to November.

In the past the Ranch has supported up to 19,000 cattle with obvious disastrous effects on vegetation and soils. For example, gully formation has partially been the result of overgrazing.

Management Objectives: Restore, enhance, and maintain range conditions; reduce erosion and gully formation; maintain cattle operations.

Management Framework: Manage grazing, increase vegetation growth, and reestablish preferred forage grasses.

Potential Management Agencies: State of New Mexico, U.S. Fish and Wildlife Service, U.S. Forest Service, National Park Service.

COAL, OIL, GAS, AND OTHER MINERALS

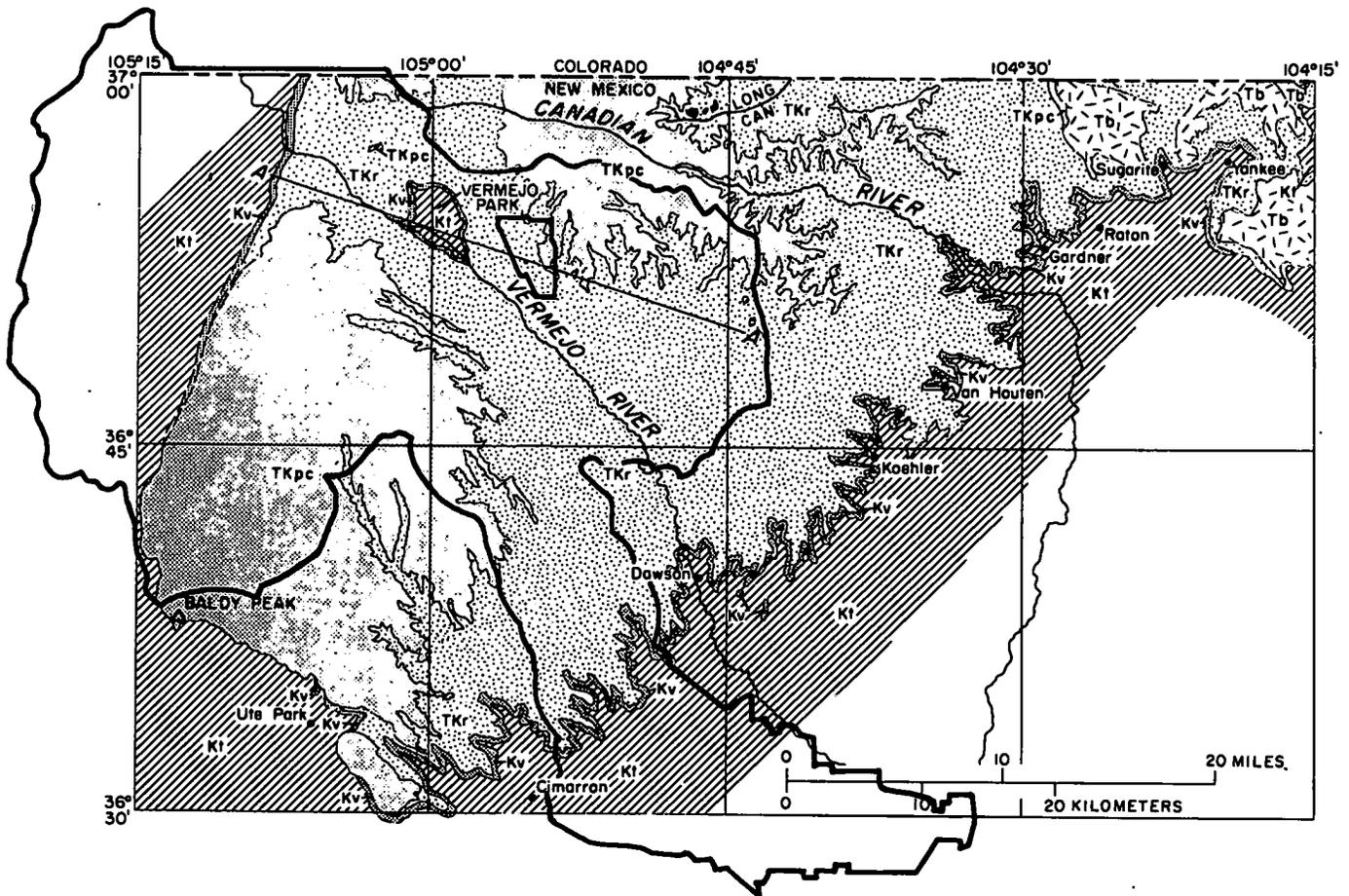
Coal

Coal-bearing strata of the Vermejo and Raton Formations constitute the Raton coal field. These rocks underlie about 240,000 acres of the Ranch.

Discussion of the commercial potential or feasibility of yet undeveloped coal deposits must be undertaken with consideration of unpredictable factors such as economics, market, demand, and the energy situation. The following discussion of the coal beds is presented to provide a picture of the production potential of these coal beds and the impact of their development on the area. The term "reserves" as used in this report refers to coal in place as indicated by widely variable surface and subsurface information without regard to economic consideration.

Coal Deposits: The most extensive and valuable deposits are the Raton and Vermejo coal beds, which occur in the Vermejo Formation, and a group of coal beds that lie in the upper part of the overlying Raton Formation. The stratigraphic position of the significant coal beds of the Raton and Vermejo Formations and the relationships of some of the districts are shown on the accompanying cross sections.

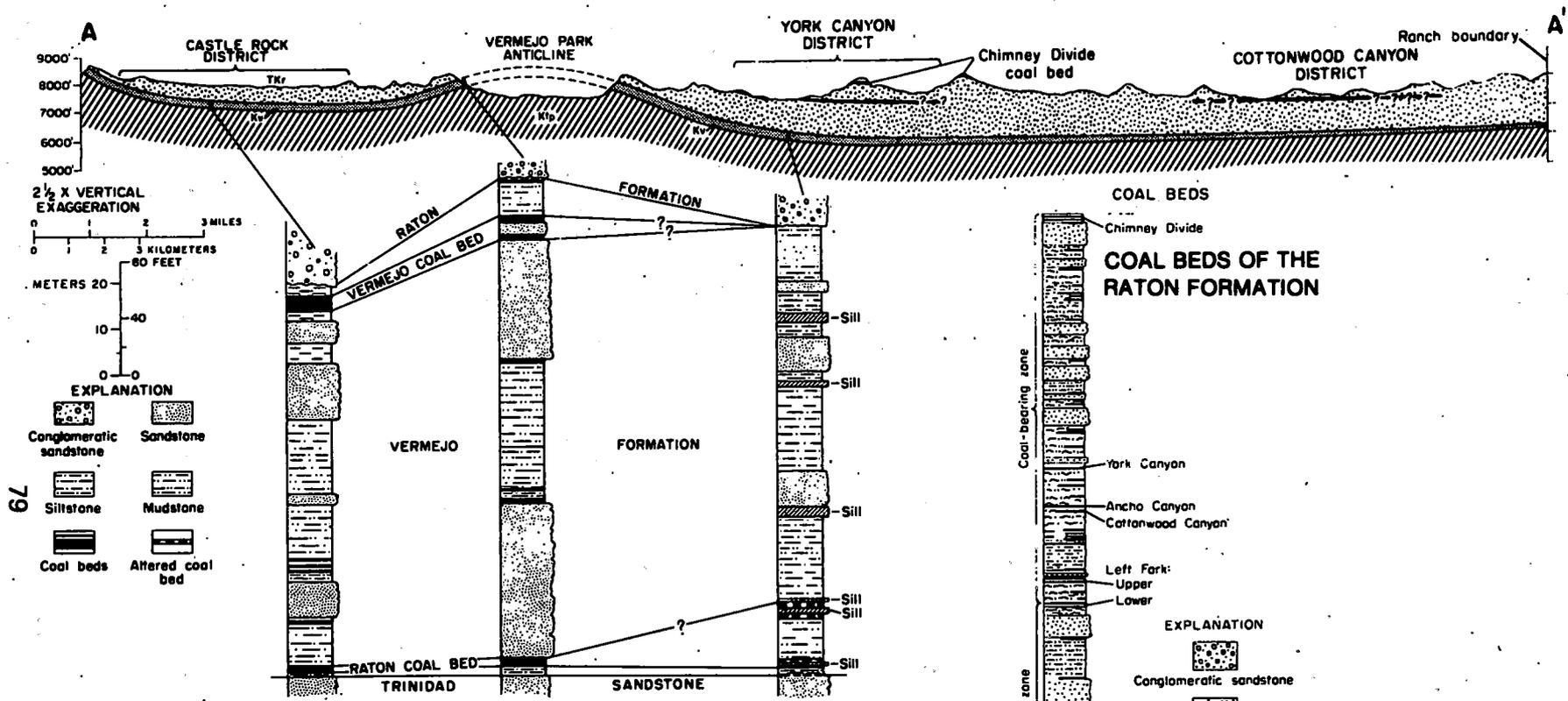
GEOLOGY OF THE RATÓN COAL FIELD



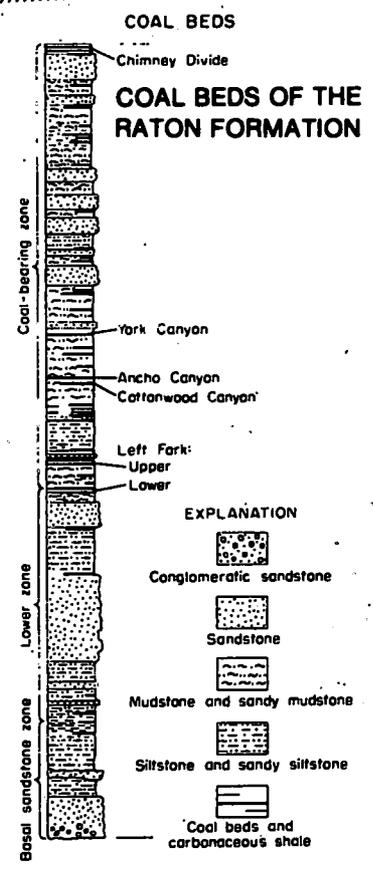
A-A: Indicates location of cross section on following drawing

- Kt Trinidad Sandstone and older rocks
- Kv Vermejo Formation
- TKr Raton Formation
- TKpc Poison Canyon Formation
- Tb basalt lava flows

Source: Pillmore, C.L., New Mexico Geological Society Guidebook 1976



COAL BEDS OF THE VERMEJO FORMATION



Coal beds of commercial thickness, considered here to be at least 3½ feet thick, occur throughout much of the Ranch that is underlain by coal-bearing formations. Though many of the beds are of sufficient thickness to be of commercial interest, they are of limited extent and are not considered separately in this report. The areas underlain by the beds considered to be of current and future commercial importance are described as districts or subdistricts (see Known Coal Reserves map). Certain parts of the Ranch known to contain coal beds of commercial thickness but of undetermined extent are discussed as areas.

Coal Deposits in the Vermejo Formation: Although other coal beds as thick as 3-4 feet occur in the Vermejo Formation on the Ranch, only the Raton bed, which lies at the base, and the Vermejo bed, which occurs near the top, are known to be of sufficient extent and thickness to be considered commercial at this time. The deposits of the Vermejo Formation underlie the Castle Rock district and two other areas.

The Castle Rock district contains the largest known coal deposits on the Ranch. The Raton and Vermejo coal beds underlie about 25,000 acres, or approximately 40 square miles, in the Castle Rock district.

This district extends for about 4 miles from the western margin of the coal field almost to Vermejo Park and has been traced in a north-south direction for about 10 miles. In the areas considered minable, the beds lie about 250 feet apart, range in thickness from 3½ to more than 12 feet, and based on extensive drilling data, constitute a coal reserve containing more than 500 million tons. The thickness of cover ranges from 0 along the outcrop to greater than 3,000 feet in the southwestern part of the deposit below the high mesas that lie to the east of Ash Mountain. According to mining experts, problems related to depth of cover can be solved by the use of yieldable arches and modern long-wall mining methods; however, the economics of using these methods is the guiding factor. Problems encountered in mining steeply dipping coal seams are more of a concern, but the greater part of the deposits occurs in areas where dips are gentle and mining is not expected to be difficult.

Extensive tests indicate that the coal contained in these beds is of very high metallurgical quality and has a high heating value. In the western United States medium-volatile metallurgical coal, which is an essential ingredient for making steel in most steel-making plants, is found only in two major deposits. The Castle Rock district, which is one of these deposits, contains in excess of 50 million tons of this premium coal. Preliminary feasibility studies being conducted indicate that predicted marketing conditions warrant development of the deposit for both metallurgical and

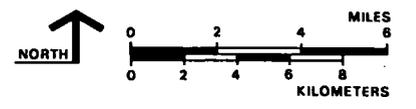
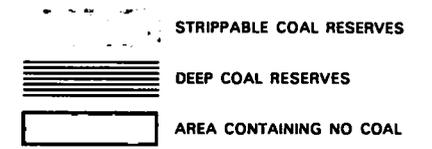
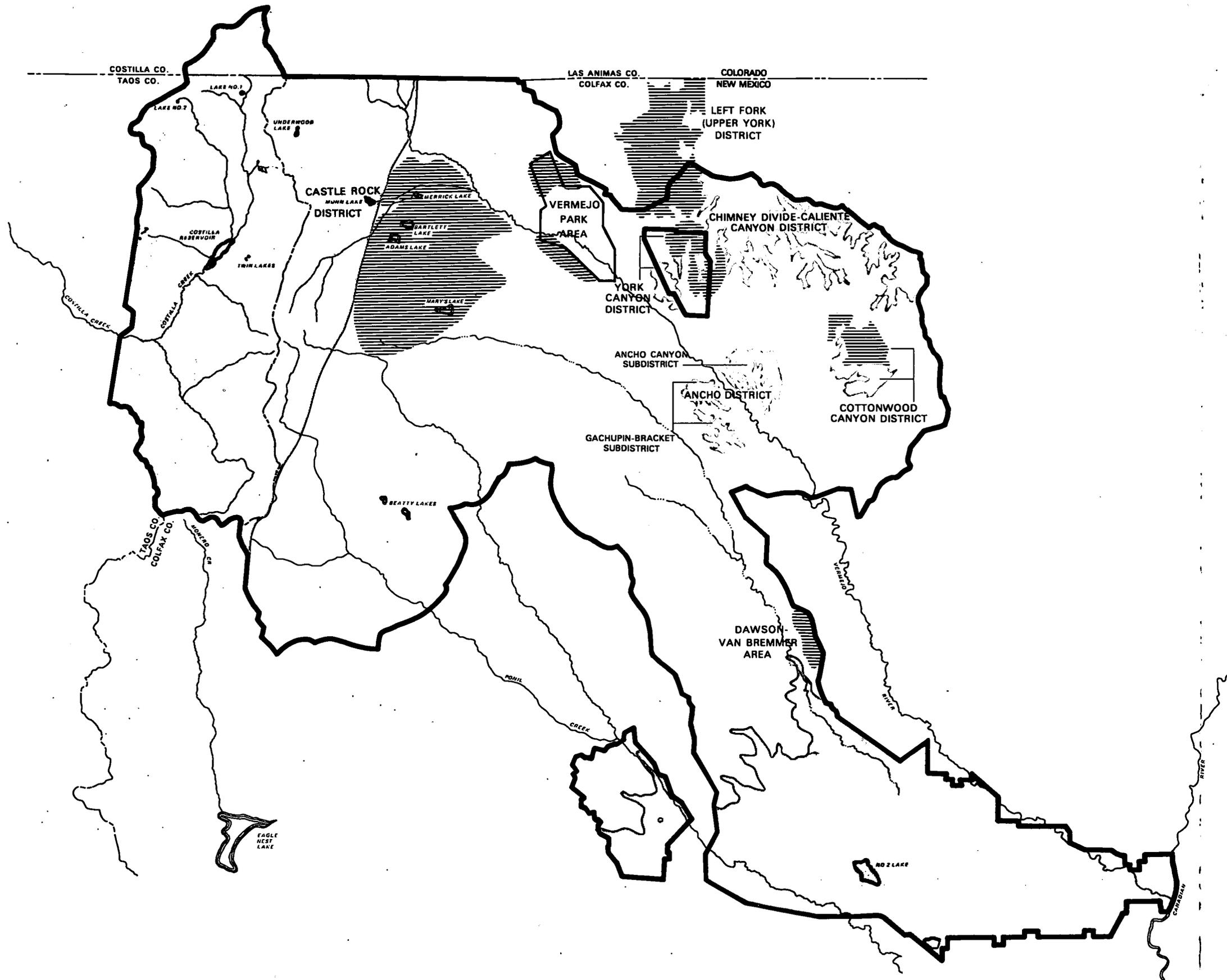
power-generating purposes. Depending on the future unpredictable conditions mentioned above, the district could be developed for large-scale mining. This scale of activity would require the following: potential work force of several thousand employees; construction of access roads to Cimarron, New Mexico, the nearest community; construction of power lines, water pipelines, mine entries, coal-washing plants, and loading facilities; construction of a railroad spur line up Gachupin Canyon to Castle Rock from the existing line that follows the Vermejo River up to the railhead at the currently operating York Canyon mine; and development of waste dump areas.

The Castle Rock district includes a very scenic part of the Ranch, and the visual, human, and environmental impacts caused by development of these mines could be considerable. This would be partially offset by the economic benefits that the industrial activity and large payroll would bring to northeastern New Mexico.

The Raton and Vermejo coal beds also crop out on the flanks of the Vermejo Park anticline at the Ranch headquarters. At the old Bartlett mine, where the Vermejo bed is about 6 feet thick, coal was mined for several years for local ranch use. Both coal beds locally reach a thickness greater than 8 feet, but they appear to be more lenticular than at Castle Rock. Subsurface investigations have not yet been undertaken, and the lateral extent of the beds to the north and south of the outcrop is unknown. If thick pods similar to those at Castle Rock are present, the Vermejo district could prove to be commercially important, especially to the south. Present plans do not include development of this area in the near future.

Although surface studies do not indicate the presence of coal of commercial thickness and extent in the Dawson-Van Bremmer area of the Ranch and in the Cimarron district to the west, preliminary subsurface data show that the Raton bed is as thick as 5 feet, and further tests are planned to determine the extent of the thick coal. The area lies adjacent to the Phelps Dodge Corporation's Dawson district, which has produced large amounts of coal in the past. It is of interest because of the relatively easy access to transportation and possible outcrop mine entry.

Intrusive activity appears to have destroyed some of the coal in the Vermejo Formation in areas lying to the east of Vermejo Park, and considerable drilling would be required to determine the extent of unaffected thick coal. A large area in the vicinity of Cerrososo and Van Bremmer canyons remains virtually unexplored for coal. Geophysical logs from scattered oil wells drilled in the upper part of these canyons indicate the presence of thick coal, but no complete evaluation has been made. If the thick coal trends of the Castle Rock and Vermejo Park districts, which are indicated by drilling and outcrop examination, persist into this area from the



KNOWN COAL RESERVES
VERMEJO RANCH
 COLFAX AND TAOS COUNTIES, NEW MEXICO
 COSTILLA COUNTY, COLORADO
 UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

Summary of Coal Reserves

| Coal Districts, Subdistricts, and Areas | Reserves (millions of tons) | Method of Mining | Time Frame for Operations |
|---|---------------------------------------|--------------------------------------|--|
| Castle Rock District | 500 ¹ | Underground | 1985 or later |
| Vermejo Park Area (Ranch headquarters area) | unknown | Underground | Undetermined ² |
| Dawson-Van Bremmer Area | unknown | Underground | Undetermined ² |
| York Canyon District | 16-17 ³ 11 ³ | Underground Strip | 1966 to present ⁴ 1969 to present ⁵ |
| Left Fork (Upper York) Canyon District | 12 ⁶ | Underground and Strip (undetermined) | 1980 1980 |
| Cottonwood Canyon District | 34 10 | Underground Strip | Not estimated ² |
| Ancho Canyon Subdistrict | 25 | Strip | Under study |
| Gachupin-Bracket Subdistrict | 11 | Strip | Under study |
| Chimney Divide-Caliente Canyon District | 50 | Strip | Not estimated |

1 50 million tons consist of medium-volatile metallurgical coal

2 No present plans for development

3 On Vermejo Park Corporation property only

4 May continue for 10-15 additional years based on predicted production levels

5 May continue 5-10 additional years based on predicted production levels

6 12 million tons on Vermejo Park Corporation property - total reserves estimated at 100 million tons

in the Van Bremmer and Cerrososo canyons. The quality, thickness, and areal extent of the beds that may occupy this area have not been determined as yet. Outcrop studies do not suggest that thick coal beds occur in either the Vermejo or Raton Formation to the south in the part of the Cimarron district that lies on the Ranch at the southern limit of the coal field.

Many other coal beds of commercial thickness occur in and around the outlined districts on lands encompassed by the Ranch, but outcrop examination does not indicate that they are of sufficient areal extent to warrant further exploration and development at this time. These beds may become significant in future years if demand escalates and supplies in known districts are exhausted.

From available literature and information received from Pennzoil, it appears that actual strip-mining operations would be on approximately 20,000 acres of Ranch land. All of this land would not be disturbed at the same time; after one area is strip-mined, it would be reclaimed. Kaiser Steel Corporation is currently spending approximately \$8,000 per acre to reclaim the land in the York Canyon area.

The accompanying table summarizes the coal reserves, method of mining, and time frame for operations. The known reserves on the Ranch are estimated to total 800 million tons. Many other known coal beds occur on the Ranch, but the extent of these reserves has not been determined.

Management Objectives: Extract coal with minimal degradation to the environment; maintain surface- and ground-water quality; meet or exceed state air-quality standards; open new mining areas with minimal disturbance to landform, vegetation, and wildlife habitat; reclaim strip-mining areas to original landform and restore vegetation; develop ancillary mining facilities respecting the environmental setting; construct facilities respecting landform features and colors as much as possible; construct road and rail facilities considering topography and visual quality.

Management Framework: Adhere to provisions of the Surface Mining and Reclamation Act of 1977 for protection of alluvial valleys and water quality; implement best management practices as set forth in federal and state regulations pertaining to water quality; conduct mining exploration, initiation, and operational stages with minimal degradation to the environment, including provisions for coordination of site planning between actual mining operations and ancillary support facilities, centralization of washing and transportation facilities, reclamation of strip-mined areas, and maintenance of air and water quality; implement mine shutdown stage leaving sites with minimal disturbance; continue air- and water-quality monitoring during all mining stages; construct

In the Chimney Divide district, the coal bed or its equivalents underlie a large area, and two separate subdistricts have been established: the Chimney Divide subdistrict, which includes the Salyer Ridge and Chimney Divide west of the east fork of Chimney Canyon; and the Caliente subdistrict, which includes the areas that lie to the east of the east fork of Chimney Canyon and the Caliente Canyon area. Because of the similarities of the subdistricts, they are not discussed individually.

The Chimney Divide coal bed or its equivalents crop out below the crests of the long fingerlike ridges and high drainage divides throughout an area of more than 50 square miles along the northeastern boundary of the Ranch. The bed area falls largely within the Ranch boundaries. The coal bed commonly consists of two beds about 2 feet thick separated by a shale parting as thick as 1 foot. The maximum thickness of coal in the zone is about 4½ feet. Total coal reserves for the district are estimated to exceed 50 million tons. Feasibility studies for development of this deposit are currently underway. The coal is of good metallurgical and steam quality. The coal bed is the highest bed in the sequence and lies near the top of the Raton Formation about 1,800 feet above the base. Development of the deposit would be dependent on demand and marketing conditions, but large-scale development is not expected at this time. The nature of the deposit might lend itself to small but continuing strip-mining operations. In this regard, rail spurs and washing plants in the other districts would probably be utilized.

Many other coal beds occur on the Ranch within and west of the known districts that are not currently considered of sufficient thickness and extent to define coal districts. Southwest of Vermejo Park, coal beds as thick as 5 feet occur at the heads of Pooler and Juan Baca canyons, but these beds cannot be traced on outcrop for any great distance, and subsurface data are not sufficient to define the limits of the beds.

These coal beds lie at about the same stratigraphic position as those in the Left Fork district to the northeast. A higher coal zone that is as thick as 9 feet underlies about 600 acres at the head of Juan Baca Canyon, but it does not contain sufficient reserves to warrant development at this time. West of Vermejo Park, a coal bed probably equivalent to the Left Fork, underlies ridges in the drainage area of Mestas Canyon. Again, the lack of data does not encourage development without further exploration. To the north of Vermejo Park in Spring Canyon a coal zone of potential commercial importance crops out, which includes about 5-6 feet of coal, underlies an area of undetermined extent, and warrants further investigation.

Geophysical records of oil wells drilled in 1972 suggest that other coal deposits of potential commercial value may underlie a large area

The work force and payroll would also be about the same, and housing would be off site. An access road down Sawmill Canyon from the present mine road would be required. If production warranted, a coal-washing plant would probably be built in this part of the Ranch where it could serve the Ancho district as well. A railroad spur would be built up Caliente Canyon from the existing line. If only limited operations were to be initiated, coal produced from these districts might reasonably be trucked to the present York Canyon mine for processing and loading onto railroad cars.

The Ancho district is composed of two subdistricts: the Ancho Canyon, which lies north of the Vermejo River; and the Gachupin-Bracket, which lies to the south.

In the Ancho Canyon subdistrict the coal zone underlies about 4,500 acres north of the Vermejo River and contains about 25 million tons of strippable coal. No underground mining is planned in this subdistrict. The coal zone lies mostly less than 100 feet beneath crests of ridges in this dissected portion of the Ranch. The coal occurs in a zone as thick as 15 feet that contains several shale partings.

This split-up nature of coal in the zone is expected to cause problems during mining. The maximum discrete bed thickness is about 3½ to 4 feet. Production from this district would probably be trucked to the York Canyon mine for washing and loading, or if a mine at Cottonwood Canyon was to be opened, the coal would possibly be moved by conveyor belt to the new processing facilities that could eventually be constructed there. Because the districts lie adjacent to the present rail line, little or no additional railroad construction would be required; however, access roads from either Cottonwood Canyon or York Canyon would need to be built. Housing would be off site, and the expected work force would be considered small compared to that at York Canyon and other proposed districts.

The Gachupin-Bracket subdistrict consists of about 2,000 acres, and like the Ancho subdistrict to the north, lies wholly within the Ranch boundaries. Here the Ancho coal zone is as thick as 9 feet and contains coal beds as thick as 5 feet that have thin-shale partings. Strippable reserves of the Ancho coal zone total about 9 million tons. A second coal bed, called the Bracket, lies about 40-60 feet above the Ancho and contains estimated strippable reserves of about 2 million tons. The southwestern and western limits of the subdistrict have not been completely defined, and underground reserves may eventually be proven and outlined. No underground operations are planned at this time. The other aspects of this subdistrict are similar to those stated for the Ancho Canyon subdistrict.

the Salt River power project and 200,000 tons to Magma Copper in Arizona. During the next several years the York Canyon underground mine is expected to produce about 12 million additional tons of coal.

Coal beds of the Left Fork (Upper York) district underlie 9,200 acres about 5 miles north of the York Canyon mine. Of this total, only about 1,350 acres underlie land within the Ranch boundary. The area of Ranch land involved lies directly north of the Cherokee and Pittsburg lease area. In this 1,350-acre portion, only coal of the upper seam is considered of minable thickness.

The Left Fork coal deposit consists of two beds that lie about 60 feet apart stratigraphically and about 900-950 feet above the base of the Raton Formation. These beds constitute the lowest commercial coal deposits in the Raton Formation. The beds range in thickness from about 3½ to 11 feet, and based on extensive drilling data, reserves exceed 100 million tons. Of this total, about 12 million tons of coal averaging about 5 feet thick fall within the Ranch boundaries. Reserves that could be strip-mined extend to the south toward the York Canyon strip mine and are being explored at the present time. A test mine was opened on the upper seam in 1969, and the coal proved to be of excellent quality. Current plans are for development of the mine to begin by 1980. The railhead at York Canyon would eventually be extended to the mine. The production rate from the Left Fork mine would be expected to approximate that of the York Canyon mine (approx. 1 million tons annually). Present plans call for use of most of the coal by Kaiser Steel's Fontana steel mill in California, but other market demands could be responded to. When the mine is in full operation, the work force and payroll would probably approximate that of the York Canyon mine. As mining operations at York Canyon are completed and phased down, coal production and processing operations would be moved up to the Left Fork district.

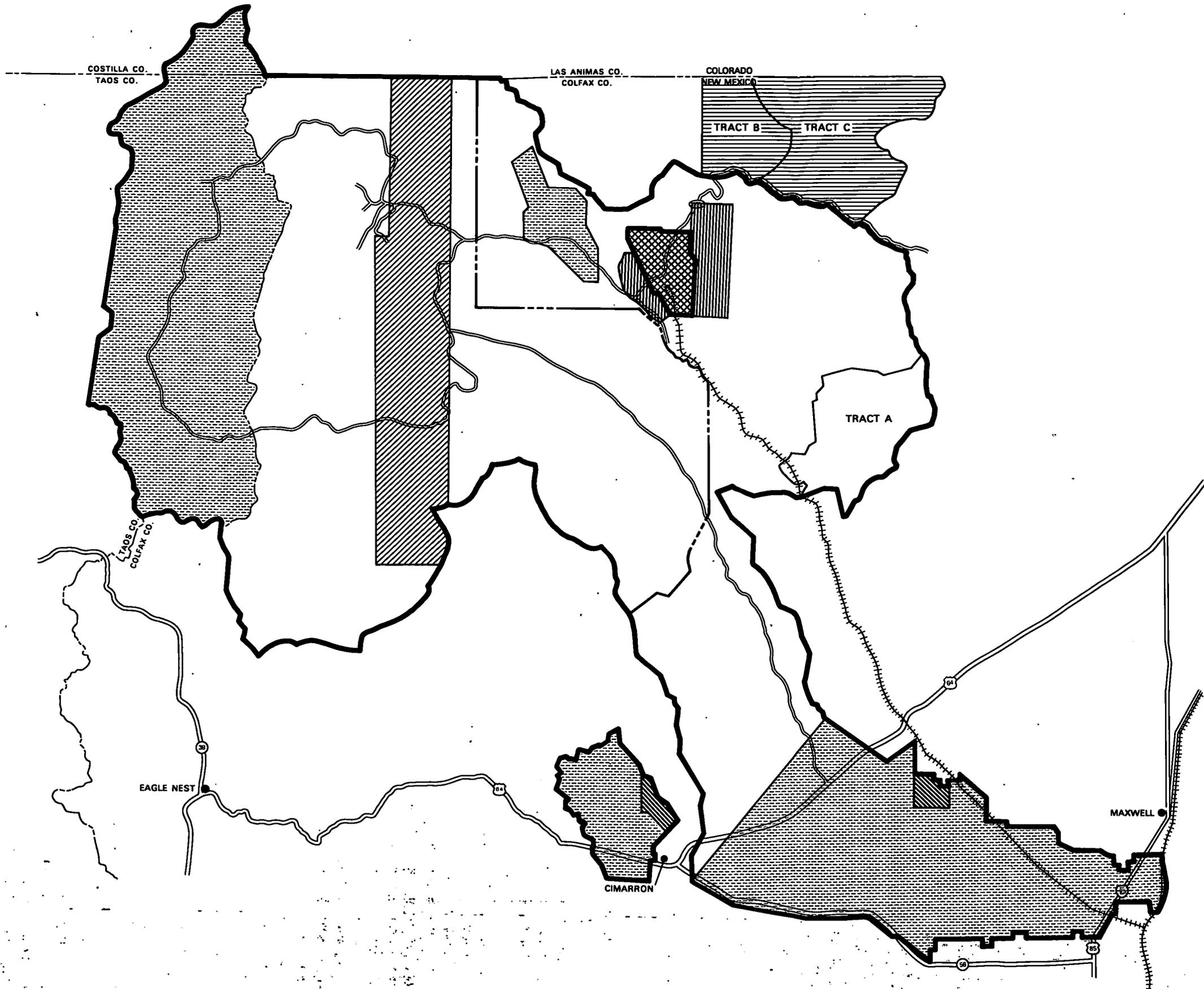
The Cottonwood Canyon district lies completely within the Vermejo Ranch boundary at the eastern edge, just south of the mine road, New Mexico 555. The Cottonwood Canyon zone underlies about 4,000 acres, ranges in thickness from about 3 to 9 feet, and includes discrete coal beds as thick as 4 to 5 feet. Reserves of this zone are estimated at 44 million tons, 10 million of which are considered strippable, depending on marketing conditions and equipment used. The complex multiple, thin-seam coal occurrence, along with the dissected hill-and-valley terrain of the eastern portion of the Ranch, does not lend itself to conventional strip-mining techniques. The reserve considered strippable would change if demand and price of coal increased sufficiently. The proposed site of the surface facilities would be at the junction of Sawmill and Cottonwood Canyons. If the mine was to go into operation, the production rate would be expected to approximate that of the York Canyon mine.

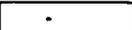
north, deposits even larger than those at Castle Rock may eventually be discovered, and the potential industrial activity would increase proportionately.

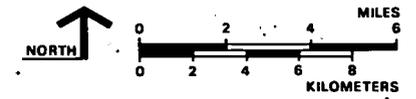
Coal Deposits in the Raton Formation: Coal beds of known commercial thickness and extent also occur in the Raton Formation, but they are limited to the upper part and are lenticular and less extensive than the Raton and Vermejo coal beds of the Vermejo Formation. Because the Raton Formation courses to the west and interfingers with beds of the overlying Poison Canyon Formation, only thin coal streaks occur along the western margin of the coal field. The thick coal deposits seem restricted to areas that lie east of a line that trends north to northwest about 2-3 miles west of Vermejo Park. The principal known coal districts are defined by coal beds that lie east of the Vermejo Park in the central part of the Raton coal field.

The York Canyon coal district lies mostly within the area of the Cherokee and Pittsburg tract, and both surface mining and underground mining are being carried out. The coal bed lies about 1,200-1,280 feet above the base of the Raton Formation, and it ranges in thickness from a few inches in the southeastern part of the outcrop to more than 12 feet near the main entry. It is consistently at least 6 feet thick throughout the bed area northeast from the mine entry. The deposit underlies about 8,000 acres, of which about 1,800 acres fall outside the lease area on Ranch land. The underground reserves for the Ranch part of the deposit are estimated at about 16-17 million tons of coal that averages about 5 feet thick and is considered minable using existing equipment. Along the west side of the district, the York Canyon coal bed and other thinner beds that overlie York Canyon are being strip-mined. A small part of the 1,300 acres considered strippable falls outside the lease area. Strippable coal reserves are estimated at 11 million tons.

The York Canyon mine was opened in 1966 with a daily production of 3,500 tons. To date, 10,168,000 tons of washed coal have been shipped from the mine. The strip mine was started in 1969 using only bulldozers and lift loaders. A dragline with a 42-yard bucket was put into operation in March 1978, and the total yearly production from the strip mine is now 700,000 tons. The York Canyon mine employs a total work force of about 500 people, with a payroll in excess of \$10 million excluding benefits, which average about an additional 35 percent. Of the total reserves in the ground, 15 percent is lost during mining, and an additional 28 percent is lost during coal washing. Two long-wall panels and four continuous mine sections are currently producing coal from the mine. The new silo facilities used since March 1, 1979, now allow loading of the strip-mined, unwashed coal, containing about 15-percent ash, directly into railroad cars. Of the total strip-mine production of 700,000 tons per year, 500,000 tons are committed to



-  COAL RIGHTS OWNED BY KAISER
-  COAL RIGHTS OWNED BY VPC
-  VPC COAL ROYALTY INTEREST AREA
-  VPC LAND PRESENTLY DESIGNATED FOR SURFACE MINING
-  LAND TO BE CONVEYED TO VPC BY KAISER
-  NO MINERALS HELD BY VPC
-  KAISER LEASES COAL FROM CHEROKEE AND PITTSBURG
-  UNSHADED AREA EAST OF THIS LINE SUBJECT TO 10 YEAR LEASE (ALL MINERALS)



**COAL AND OTHER
MINERAL RIGHTS
VERMEJO RANCH**
COLFAX AND TAOS COUNTIES, NEW MEXICO
COSTILLA COUNTY, COLORADO
UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

transportation systems causing minimal impact to natural and cultural resources.

Potential Management Entity: Kaiser Steel Corporation or another competent private operator should continue the mining operations at the Ranch.

Oil, Gas, and Other Minerals

To date there has been no oil and gas production on the Ranch. Since the first well was drilled in 1926 at Vermejo Ranch, several other unsuccessful wells have been drilled. However, lying in the southern part of the Raton Basin, the Ranch offers a favorable stratigraphic and structural geologic setting for the generation and accumulation of hydrocarbons. Although indications to date have been subcommercial, significant reserves may yet be discovered.

The presence of base and precious metals on the Ranch is indicated by mineralization and evidence of old mining activity in the southwestern margin of the Ranch, but no significant resources have been identified. The broad alluvial flat east of La Belle may offer some potential for placer mining. Other than gravel deposits that might be used for road construction, no significant mineral resources are known to be on the Ranch.

Coal and Other Mineral Rights

Vermejo Park Corporation owns the minerals under all of its surface acreage with the following exceptions (see Coal and Other Mineral Rights map):

Minerals under two small tracts totaling approximately 1,500 acres are owned by third parties.

Coal rights under the major portion of the Ranch are held by Kaiser Steel Corporation. VPC holds a royalty interest equal to \$.055 per ton mined in a portion of the Castle Rock district. This royalty is escalated based on a cost of living index. The Cherokee and Pittsburg Coal and Mining Company owns the mineral rights and the surface ownership in the tract, which includes the York Canyon mine; Kaiser leases the coal in this area.

A ten-year lease on all minerals except coal owned by Kaiser is held by a subsidiary of Pennzoil. This area covers approximately 197,524 acres in the eastern section of the Ranch.

In consideration for permitting Kaiser to conduct strip-mining operations, VPC and Kaiser entered into an agreement under the terms of which Kaiser conveys to VPC 2 acres for each 1-acre tract it may disturb for its strip-mining operations. At this time tract A (14,127 acres) has been conveyed by Kaiser to VPC for strip-mining rights on Ranch land. Tracts B (7,584 acres) and C (19,089 acres) may be conveyed to VPC in the future, depending upon the extent of strip-mining activities by Kaiser in the northeastern portion of the Ranch. After Kaiser has mined and reclaimed the land, the reclaimed land reverts to VPC.

Mineral rights on the Ranch owned by VPC or leased by a subsidiary of Pennzoil are as follows:

Status of Mineral Rights

| <u>Area</u> | <u>Surface</u> | <u>Oil & Gas</u> | <u>Coal</u> | <u>Other Minerals</u> |
|-----------------|----------------|----------------------|----------------|-----------------------|
| Colfax County | 404,083 | 402,596 | 117,521* | 402,596 |
| Taos County | 70,350 | 70,350 | 70,350* | 70,350 |
| Costilla County | 4,000 | 4,000 | 4,000 | 4,000 |
| Kaiser Tract A | 14,127 | 14,127 | -- | 14,127 |
| TOTAL | 492,560 | 491,073** | 191,871 | 491,073** |

*Areas lying outside known coal areas

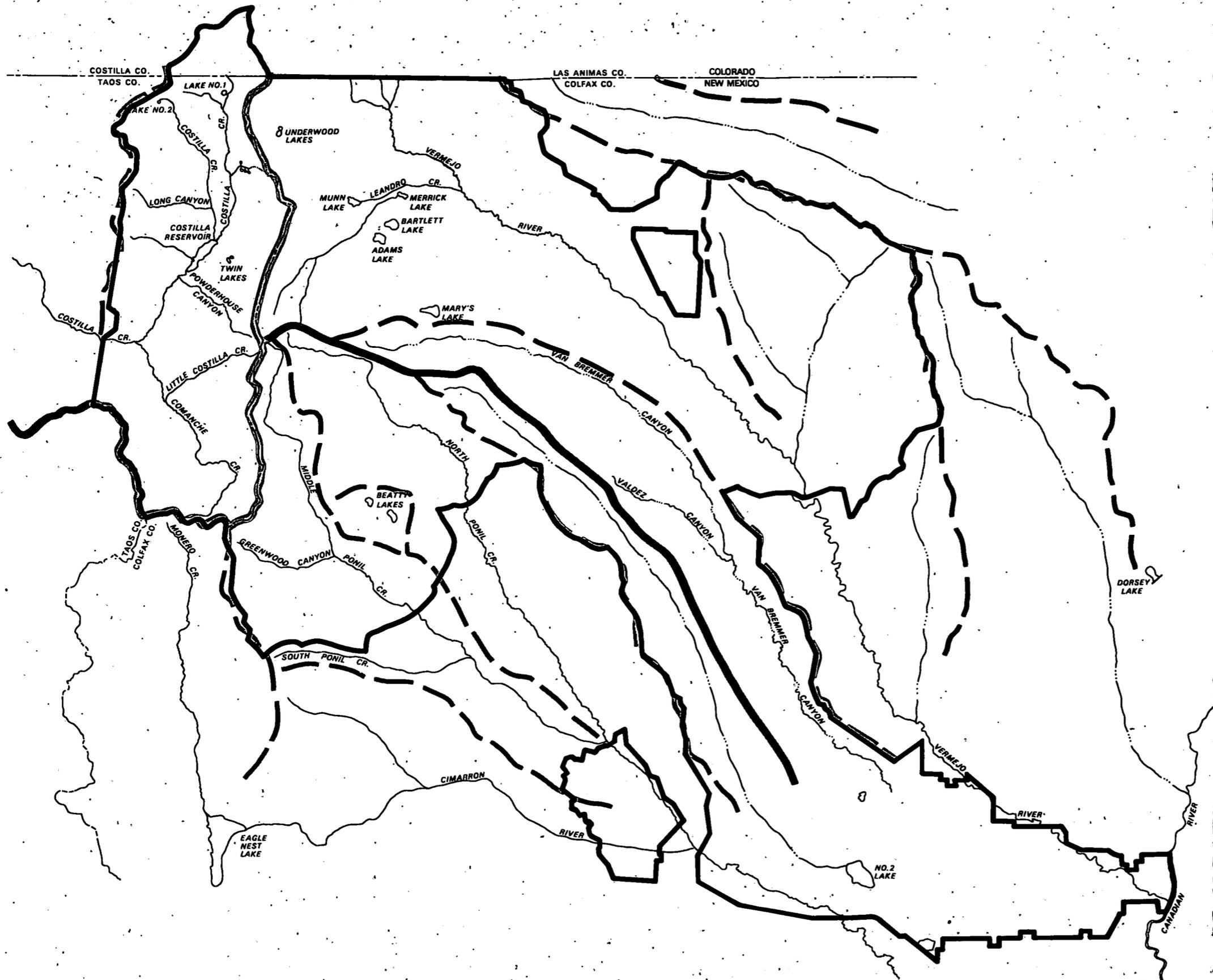
** Subject to lease

WATER

Vermejo Ranch contains most of the watersheds of two perennial streams--Vermejo River and Costilla Creek (see Watershed map). About half the flow of Vermejo River originates in the smaller part of its watershed above the Ranch in the mountains of Colorado. Drainage channels other than Ponil Creek, Vermejo River, and Costilla Creek are dry except after occasional summer storms or high snowmelt.

During 1975 the flow of Costilla Creek, just below Costilla Dam, was 11,000 acre feet. The 1975 flow of Vermejo River was 7,500 acre feet at Dawson, near the Ranch boundary, but past annual flows have been closer to 13,000 acre feet.

The Ranch holds water rights on Vermejo River and Costilla Creek with priorities ranging from 1873 to 1946 and has authorizing depletions of 1,300 acre feet annually on Costilla Creek and 3,700 acre feet annually on Vermejo River. In addition, it holds water



-  MAJOR DRAINAGE DIVIDE
-  MINOR DRAINAGE DIVIDE
-  PERENNIAL STREAM
-  INTERMITTENT STREAM
-  LAKE



WATERSHED
VERMEJO RANCH
 COLFAX AND TAOS COUNTIES, NEW MEXICO
 COSTILLA COUNTY, COLORADO
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rights to 2,400 acre feet on Ponil Creek, 400 acre feet on Cimarron Creek, unspecified amounts of water above Costilla Reservoir, and floodwaters or surplus flows in the Vermejo River watershed. These water rights authorize the Ranch to irrigate nearly 1,700 acres of hay and pasture land. In addition, over a thousand acre feet of water from Eagle Nest Lake are utilized in the lowland portion of the Ranch.

Portions of the ranch are affected by interstate river compacts. The Canadian River compact was entered into by the states of New Mexico, Oklahoma, and Texas in 1950. The Costilla Creek compact was entered into by the states of New Mexico and Colorado in 1944 and was amended in 1963. The priority rights held by Vermejo range from 1873 to 1946. Including flood or excess waters, VPC has priority water rights to over 18,000 acre feet.

Water use downstream on Vermejo River is mainly for irrigation and livestock watering by about 70 operators. Nearly 5,000 acres were irrigated in the Vermejo Conservancy District in 1974, but this declined to zero in 1978, owing to water shortages, which caused serious economic consequences for the district.

On Costilla Creek, the Rio Costilla Cooperative Livestock Association has rights to water stored in the Costilla Reservoir for the irrigation of about 8,000 acres of hay, barley, and other crops and for livestock watering by about 70 operators. Water rights of the Ranch vary in seniority and point of diversion but are adequate for the current land uses on the Ranch. Downstream appropriators also have senior water rights which, unless obtained, would probably preclude land uses on the Ranch requiring more water than is currently available. Points of diversion could probably be changed to concentrate water use at different places on the Ranch, subject to the approval of the state engineer.

The main water problem in the streams flowing from Vermejo Ranch is low flows. Costilla Reservoir has been emptied several years, most recently in 1977, and the reservoirs of the Vermejo Conservancy District have remained unfilled since they were built. However, logging and associated road construction during the past two years may have significantly increased sediment loads in the tributaries of the Vermejo and may create water-quality problems in the streams and reservoirs of the Ranch in future years. Such water-quality problems could seriously affect fish, wildlife, and recreational values of the Ranch.

At present there is litigation in the U.S. Supreme Court regarding water rights on the upper Vermejo River, the part of the watershed in Colorado. Colorado seeks permission to divert the water from its part of the Vermejo River watershed into the Purgatoire River. As nearly half of the flow of the Vermejo is from this part of its watershed, such diversion, if allowed, would reduce streamflow in

the Vermejo River and could impair environmental values related to the streams, lakes, and irrigated hay and pasture lands of the Ranch.

Management Objective: Enhance and maintain streamflow quality, quantity, and regimen.

Management Framework: Preserve watershed values by obtaining cooperation of the mining industry in applying the best available technology and in observing strict environmental controls in mining and reclaiming mined land; manage grazing to reduce damage to soil and vegetation and to enhance vegetation growth; manage timber operations to minimize damage to soils and ground cover.

Potential Management Agencies: State of New Mexico, U.S. Forest Service, U.S. Fish and Wildlife Service, National Park Service.

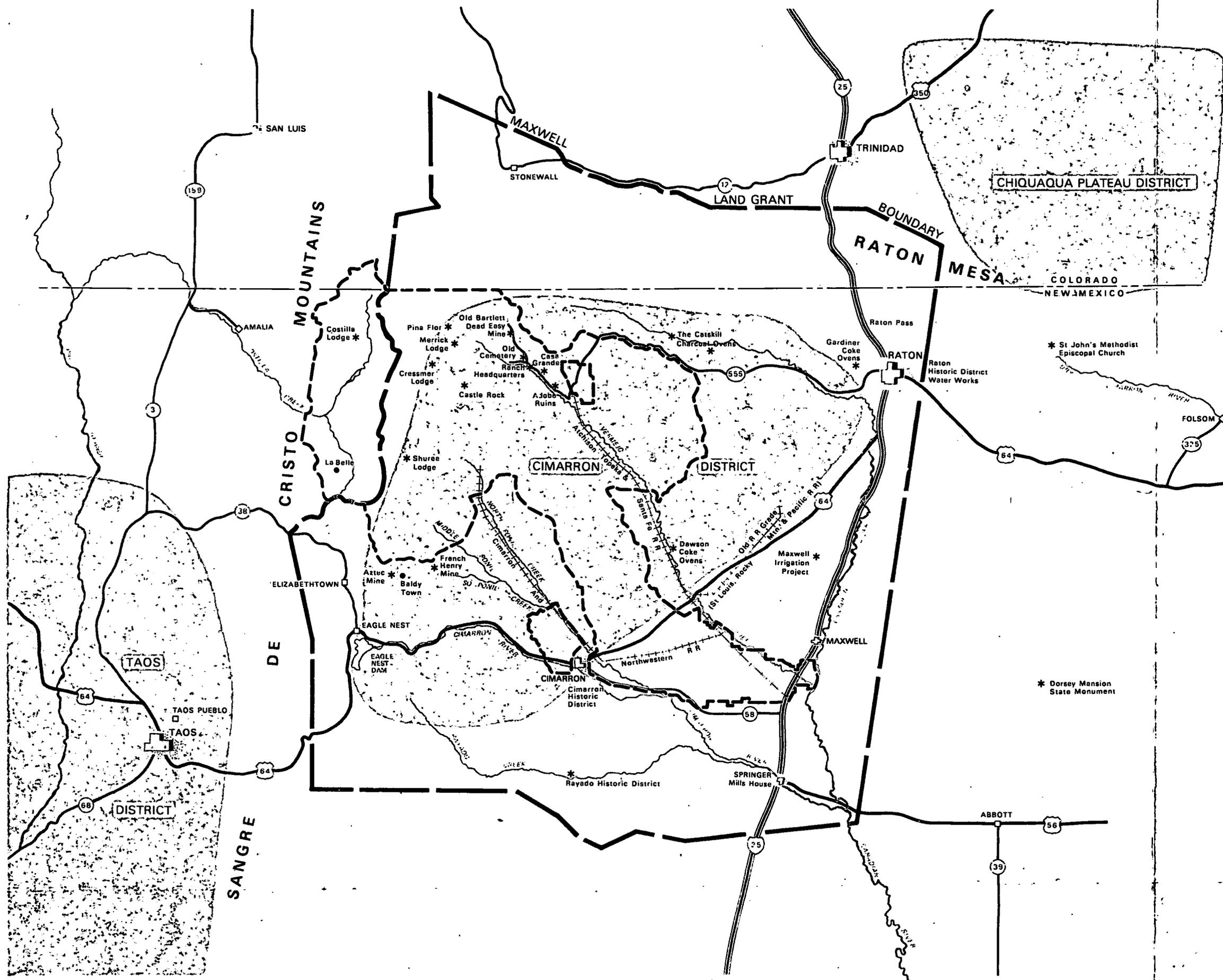
CULTURAL RESOURCES

Prehistory

A review of the archeological research on the Vermejo Ranch and northeastern New Mexico was conducted to determine the significance of the cultural resources for the Ranch and the surrounding area. Although little has been done within the Ranch boundaries, the area appears to have great potential for future research and for the preservation of cultural resources.

Although sites are known to exist within the Ranch boundaries, no specific site locations for prehistoric or historic occupations were identified through literature research. Lack of archeological work in the immediate area and limited detail for site locations in many of the published reports are primary factors for the sparse data base. The limited amount of information does not necessarily indicate a lack of sites or research potential. Some work has been done in the region, including excavation and survey in the Ponil drainage (Glassow n.d.; Lutes 1959), survey along the plateau/plains contact zone (Gunnerson 1959, 1969), survey on the Chiquaqua Plateau in southeastern Colorado (Campbell 1969), survey in the Dry Cimarron Valley (Anderson 1975), work in the Canadian River valley (Holden 1930), as well as survey in the Sangre de Cristo Mountains to the west and southwest of the study area (Wendorf 1960).

Occupants of the Cimarron District had interactions with three peripheral districts: the San Juan Basin and Rio Grande valley to the west, the plains to the east, and the Chiquaqua Plateau to the northeast (see Cultural Resources map). The developmental sequence for the Cimarron District generally follows that for the San Juan Basin, although there appears to be a "lag" in the



- OLD TOWN SITE
- * HISTORIC SITE
- ▭ ARCHEOLOGICAL DISTRICT
- RANCH BOUNDARY
- MAXWELL LAND GRANT BOUNDARY



CULTURAL RESOURCES
VERMEJO RANCH
 COLFAX AND TAOS COUNTIES, NEW MEXICO
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temporal sequence and in the shift from dependence on hunting and gathering to dependence on maize agriculture. In addition, there are none of the concentrated, permanent occupations nor the complex social organizations seen in the puebloan societies to the west of the Sangre de Cristos.

Adaptations shifted from reliance on big game hunting to the hunting and trapping of small animals and the gathering of edible wild plants. Although hunting and gathering remained important throughout the occupational sequence, subsequent subsistence strategies focused more on maize agriculture, especially from A.D. 700-1300. Increased dependence on agriculture from A.D. 1100-1300 was probably a result of migrations into the area from the San Juan Basin. This and other areas along the Rio Grande became overcrowded, resulting in limited access to natural resources and forced dependence on sedentary lifestyles. The Cimarron District was abandoned from A.D. 1300-1500 and was then used intermittently by groups from both the western plains and Rio Grande pueblos. Abandonment by Indian groups in the late 1800s occurred when railroad construction and Anglo and Hispanic settlement restricted resources and limited the territory that could be used by the local tribes.

Although little is known about the specific prehistory of Vermejo Ranch, predictions can be made about its potential significance based on what is known about the Ponil drainage, Cimarron drainage, and Chiquaqua plateau occupations. Northeastern New Mexico and southeastern Colorado have been occupied from Paleo-Indian times through the archaic and the agricultural phases to historic times. Vermejo Ranch was (and is) ecologically diverse and was probably as attractive to potential occupants as the Ponil drainage. Paleo-Indian sites might be expected along the plateau/plains contact zone. Archaic and hunter/gatherer sites, including food-processing areas, killing and butchering sites, campsites, etc., might be found in the high country, the upper reaches of all drainage systems, and the narrow canyons, especially where a diversity of resources are available. Later, agriculturally oriented sites might be expected in wider canyon bottomlands, near alluvial fans in side canyons, and along the plateau/plains contact zone.

The area has the potential for interpretation of several themes, including the earliest Americans, native villages, and Indian meets European. Most federal and state preservation and interpretation efforts have focused on large, highly visible ruins left by sedentary cultures. Vermejo Ranch area appears to be a prime location for the explanation and interpretation of hunting and gathering societies, their means of subsistence, and adaptive strategies for survival in a marginal environment. Because of the occupation by Pueblo groups from the west during apparent times of stress, it

would also appear valuable for the interpretation of adaptive shifts that take place in settlement patterns and subsistence strategies during such times of stress.

History

Charles Beaubien, a French Canadian, settled in Taos in the 1830s, became a prosperous trader, and acquired Mexican citizenship. In 1841, he and Guadalupe Miranda, secretary of the Provincial Government in Santa Fe, petitioned the governor of New Mexico for a large grant of land. Three days later Governor Armijo granted the petition, and approximately 2 million acres of land were given to Beaubien and Miranda with the direction "to make proper use of it as the law allows." During the Mexican-American War of 1846, Miranda fled to Mexico while Beaubien remained in Taos and declared his loyalty to the United States.

While living in Taos, Beaubien became friends with a fur trapper named Lucien B. Maxwell. Maxwell eventually married Beaubien's daughter and moved onto the grant in 1849. After Beaubien died Maxwell acquired the rights of various heirs and eventually controlled 1,714,765 acres. He built a huge home in Cimarron, which became a principal stop on the Santa Fe Trail and a base for prospectors, hunters, and trappers.

Maxwell allowed people to settle on the grant, and along the Vermejo River are the ruins of the homes and outbuildings of these settlers, most of whom were Spanish-Americans. Here they scratched out a living from their small farms and orchards and cared for goats and cows. Whenever Maxwell, whose major business had become supplying U.S. military forces in the West, needed hay, stock, or grain to fulfill a government contract, he would call on the settlers to bring in their surplus. At times Maxwell had some 500 people working the Ranch for him in this fashion.

Maxwell's investment in an 1866 gold mining venture in the southwestern portion of Vermejo Ranch was a financial failure and led to his sale of the area to an English syndicate, the Maxwell Land Grant and Railway Company. In 1880, title to the land was acquired by a Dutch group, the Maxwell Land Grant Company.

During this period of foreign ownership, violence was the order of the day. Settlers who occupied the land under Maxwell considered the land theirs, but the absentee owners tried to have them evicted as squatters. This era of killing and violence has become known as the Colfax County War and ended only after the U.S. Supreme Court, in *U.S. vs. the Maxwell Land Grant Company*, confirmed that title belonged to the Dutch company.

At the turn of the century William H. Bartlett, a wealthy grain speculator and industrialist from Chicago, purchased the portion of the original land grant known as Vermejo Park. In 1902, he also acquired title to a portion of another land grant, the Sangre de Cristo grant. Along with H. W. Adams, he developed the combined lands into a cattle ranching operation.

Bartlett invested substantial amounts of money in Vermejo Ranch. He had constructed a number of large lakes, which were stocked with game fish. By 1906 the cattle company had 6,000 head of cattle and produced grain and hay. A schoolhouse, a fish hatchery, numerous guest lodges, and a power generating plant were built. Elk were virtually nonexistent at Vermejo Park when Bartlett purchased the property so he brought in elk to reestablish the herd.

One of the major activities undertaken by Bartlett between 1907 and 1910 was the construction of three elaborate stone mansions. Here his guests, who came from throughout the country, were entertained royally. Two of these residences are preserved and well-maintained by the current owners; the third burned in 1955.

In 1926, Vermejo Park was sold to Harrison Chandler of the Los Angeles Times Mirror Corporation who organized the Vermejo Club. Its members included Douglas Fairbanks, Herbert Hoover, F.W. Kellog, Harvey Firestone, Cecil B. DeMille, Andrew Mellon, etc. The club booklet promoting membership placed emphasis on relaxation from everyday stresses and strains in the natural setting of Vermejo Park. A cabin nestled in the woods above Mary's Lake was built by Mary Pickford, a club member, and remains to remind visitors of this period of Vermejo Ranch's history.

The property changed owners again in the 1940s when W. J. Gourley, a businessman from Fort Worth, Texas, began purchasing land in the Vermejo area. Eventually he acquired a total of 479,000 acres. Gourley imported more elk from Wyoming to improve the hunting, introduced wild turkey, and improved several of the high-country fishing impoundments. He also introduced bison, and a small herd is on the Ranch today. In addition, the old Bartlett stone mansions were restored and renovated.

After the death of Mr. Gourley the Vermejo Park Corporation, a subsidiary of Pennzoil, purchased and currently operates Vermejo Ranch. The history of the lands owned by Lucien Maxwell is a microcosm of the exciting tale of the settlement of the trans-Mississippi West. American frontiersmen and Hispanic emigrants hunted and trapped in the high mountains and deep valleys. Some of them remained and attempted to prosper in this often inhospitable land. Others were lured to the area by the exaggerated reports of gold, and mining towns were established near the biggest strikes. As the mines were exhausted and extensive

placer mining proved impractical, residents began to drift away. Foreign investment companies were unable to attract colonists or generate any revenue from the few settlers living on the grant. So by the early 1900s at least the owners began to dispose of sections of the tract.

There are extant cultural resources either on Vermejo Ranch or in the immediate vicinity that are representative of the history of the Maxwell land grant (see Cultural Resources map). Few cultural resource surveys--archeological, historical, or architectural--have been conducted on either Vermejo Ranch or other parts of the Maxwell land grant. Consequently, no properties on the Ranch have been nominated to the National Register of Historic Places or the New Mexico State Register of Cultural Properties. However, a review of the literature indicates that many of the cultural resources may be eligible for nomination. The preservation and interpretation of significant resources would contribute to illuminating more fully the history of New Mexico, the Southwest, and the West.

Management Objectives: Preserve, protect, and interpret all significant cultural resources associated with Vermejo Ranch.

Management Framework: Conduct an archeological/historical survey for the entire property; evaluate all cultural resources, using above data base, and establish their individual and collective significance; develop plans/programs for protection and interpretation of those resources. Because of the vastness of Vermejo Ranch, any survey would be extremely expensive, and it might best be accomplished by remote sensing and/or a statistical sampling program over an extended period of time.

Potential Management Agencies: National Park Service, State of New Mexico, U.S. Forest Service.

RECREATION

Existing Recreational Use

Vermejo possesses a resource base with sufficient variety to support a broad range of outdoor recreational pursuits. The primary recreational uses of Vermejo are hunting and fishing with a lesser participation in horseback riding, hiking, backpacking, photography, and nature study. The Ranch is open to guests from mid-April through mid-December and again for a brief period in mid-January. The following chart shows the approximate seasonal distribution of the various recreational activities:

| Activity | Month | | | | | | | | | | | |
|------------------------------|-------|---|---|---|---|---|---|---|---|---|---|---|
| | J | F | M | A | M | J | J | A | S | O | N | D |
| Hunting | X | | | X | X | | | | | X | X | X |
| Fishing | | | | X | X | X | X | X | X | | | |
| Hiking/Backpacking | | | | X | X | X | X | X | X | | | |
| Horseback Riding | | | | X | X | X | X | X | X | | | |
| Photography and Nature Study | X | | | X | X | X | X | X | X | X | X | X |

In 1978 a total of 434 (34 percent) of Vermejo's visitors were hunters. According to published research and many experienced hunters, Vermejo Ranch offers the most outstanding elk hunting in North America. There is also hunting for antelope, deer, turkey, bear, and mountain lion (cougar). A complete breakdown on the number of hunters, size of harvest, and success ratio in all hunts can be found in appendix D. Generally, all hunting on the Ranch is conducted with guides and is carefully controlled.

Trout fishing is the most popular activity at Vermejo throughout the spring and summer. During 1978 almost 4,000 daily permits were issued to guests and employees. Twenty percent of the season's catch was from the creeks and streams, which have a self-perpetuating trout population, and the remaining fish were caught in the lakes that are stocked annually with trout.

Although the current recreational emphasis at Vermejo is on hunting and fishing, a small portion of the visitors engage in the other recreational activities that are available. Horses are maintained for guided day rides and overnight trail rides. The Ranch is also used for photography and nature study, and members of the staff provide advice and information about the varied plant and animal life. Winter recreational activities such as ice fishing, skiing, and snowmobiling are virtually nonexistent.

The stone buildings in the headquarters area can accommodate 55 guests; three outlying lodges (Cressmer, Costilla, and Shuree), which are open in the summer and fall, can accommodate another 60. A total of approximately 1,300 guests are accommodated on the Ranch annually.

The recreational uses of Vermejo are monitored and controlled closely by the guest operations staff. As a result, there is only

minimal negative impact on the site's resources. The harvesting of wildlife is also closely monitored. Because camping is controlled and all horseback activity is guided, the use of trails and campsites can easily be rotated and regulated. Four-wheel-drive vehicles are necessary on most Ranch roads, but cross-country driving is discouraged (although not always prevented), so that the primary compaction and vehicle damage areas are essentially the same as the road system. Control of hunting, hiking, and camping also helps to prevent the degradation of air and water quality.

The current fees charged for recreational pursuits at Vermejo range from \$15 per day for horseback riding to \$4,000 for a three-day trophy elk hunt including room and board and guide services). Room and board alone is \$55-\$60 per person per day, including unguided hiking, photography, and sight-seeing. Fishing, hunting, and other activities require an extra fee, often in addition to any required state licenses. The fees charged at Vermejo have essentially dictated that the Ranch operate as an exclusive retreat for those patrons who can afford it.

Potential Recreational Use

The spring, summer, and fall months are a busy time for Vermejo's guest/recreation operations, and this is likely to continue in the future. Vermejo could support a wide variety of developed and dispersed recreational facilities, including developed campgrounds and picnic areas, primitive campsites, bicycle trails, lodges, hiking and equestrian trails, and horse stables.

The size of Vermejo is an important factor in providing the quiet and solitude that most hikers and backpackers seek, while also allowing for developed recreational facilities. The ecological variety at Vermejo could be used to great advantage in designing trails, paths, and roads that provide numerous vistas and constantly changing scenery.

Because guest/recreation operations are now greatly curtailed during the winter months, increased use during this period would represent a significant management change. Winter recreational pursuits at Vermejo might include cross-country and downhill skiing, snowshoeing, sledding, snow camping, ice fishing, sleigh rides, skating, and snowmobiling, along with multiseasonal pursuits such as photography and nature study. Downhill and cross-country skiing are popular sports in New Mexico and Colorado. A ski area at Vermejo could be a successful venture, but further study must be done in order to determine the feasibility of such a development. The site with the best potential is west of Costilla Lodge near the western boundary of the ranch. The varied topography, vegetation, and microclimate make the Ranch well suited to a variety of winter activities.

A system of interpretive trails, scenic overlooks, visitor/interpretive centers, displays, and seasonal programs staffed by knowledgeable personnel might be appropriate developments at Vermejo. The variety of wildlife, topography, and ecosystems all merit interpretation. Because characteristics of both the Great Plains and Southern Rocky Mountain regions are evident on the Ranch, these two major physiographic provinces and their transition could be described. In light of current energy problems, the coal reserves at Vermejo take on national importance, and the interpretation of coal formation, extraction, and use could increase visitor awareness of the relationship between the variety of resources and their uses. Interpretation of the water resources, a vital facet of the development in the arid Southwest, could clarify the interrelationships between the natural and cultural history of Vermejo.

Vermejo's fish and wildlife are a renewable resource, and continued controlled harvesting is necessary. While the actual number of hunters and anglers may remain essentially the same in the future as it is now, the composition of the user group could be changed to allow broader public participation. The elk, antelope, bear, and mountain lion populations, along with 264 surface acres (the stocked portion of the total 2,000 surface acres on the Ranch) and 100 stream miles of trout fishery, provide some of the highest quality hunting and fishing in this region of the country.

Much greater use can be made of the Ranch's archeological and historical resources. The entire sequence from prehistoric nomadic users through Spanish and Mexican settlers, gold miners, land grant claimants, rich and famous members of the Vermejo Club, modern ranchers, hunting retreat guests, and coal miners provides a chance to interpret a continuum of uses, the intricacies of land grant law, and the sources of the multiethnic culture that is evident in modern New Mexico.

Increased outdoor recreational use would have a significant impact on Vermejo's resources. An increased number of people using the site during a greater portion of the year would inevitably have detrimental effects on wildlife, vegetation, air and water quality, soil compaction and erosion, and some of the intangible qualities such as quiet and solitude, which make Vermejo an especially desirable recreational site. In order to minimize these detrimental effects, it may be necessary to limit the number of visitors and types of visitor use, as well as to control use areas and times. The primary benefit of increased recreational use is allowing the general public access to a varied and high-quality recreational resource.

Recreation Demand

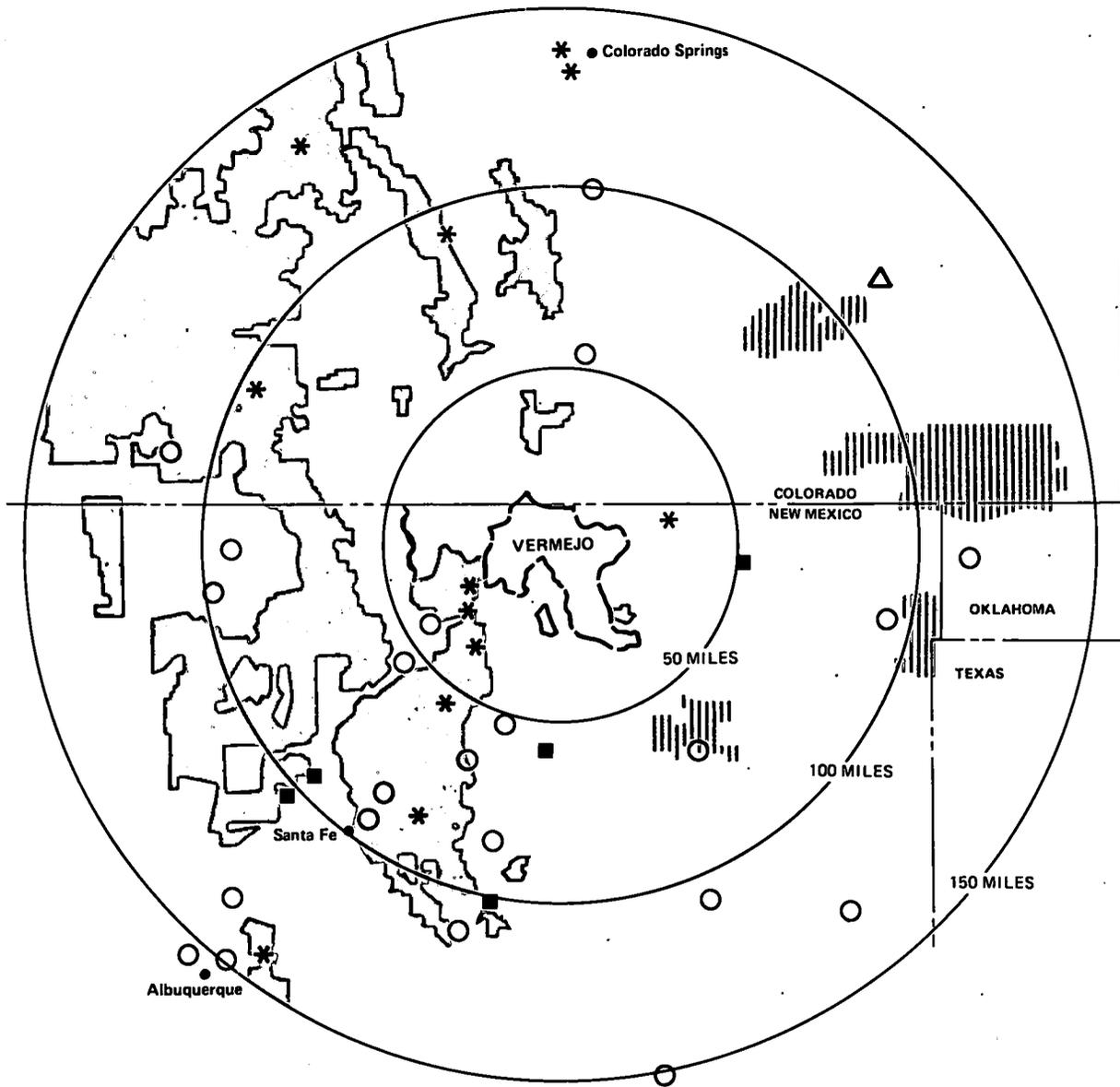
There are numerous federal, state, and private recreation areas within a 150-mile radius of Vermejo Ranch, including portions of 7 national forests, as well as 4 national wildlife refuges, 2 national grasslands, 5 national monuments, 1 national wild and scenic river, 22 state parks and recreation areas, and 12 private ski areas (see Regional Recreation Areas map). The facilities and recreational activities vary considerably from one area to another, but those most closely approximating the potential recreational pursuits at Vermejo include the national forests, national grasslands, some of the national monuments, and the Rio Costilla Cooperative Livestock Association land. Camping, picnicking, hiking, hunting, fishing, pleasure driving, winter sports, nature study, and regional history study are all popular activities at recreational areas in Vermejo.

The 1976 New Mexico SCORP shows an increasing statewide need at least through the year 1990 for developed parklands, bicycle trails, campsites, hunting areas, offroad vehicle use areas, and picnic sites. The calculated needs include out-of-state participation, an important factor in a state where tourism is a major industry. The most popular recreational activities revealed in an out-of-state visitor survey include (in order of participation) sight-seeing, pleasure walking, camping, picnicking, hiking, backpacking, pool swimming, and fishing.

New Mexico is a "Sunbelt State," and as such, its population continues to increase dramatically. In a study entitled "Estimates and Projections of the Population of New Mexico by County: 1975-1990" (University of New Mexico 1979), the state's population is expected to be 1,539,000 by 1990--almost a 35-percent increase over the 1977 estimated population of 1,190,000 and a 29-percent increase over the 1975 figure.

The statewide recreation demand summary in the 1976 Colorado SCORP, based on telephone, automobile, and airline surveys, revealed that the most popular activities were hiking, bicycling, fishing, pleasure driving, playing games, pool swimming, downhill skiing, camping, picnicking, and horseback riding. Recreation participation in Colorado is 66-percent resident and 34-percent nonresident.

In 1978, Vermejo's superb hunting and fishing opportunities, scenery, and facilities drew guests from at least 29 states. The most frequently represented states for bull elk hunting in 1978 were Texas (35 percent) and California (10.8 percent). Among other guests at the Ranch, most came from Texas (47.4 percent), New Mexico (16.7 percent), and Oklahoma (11.1 percent). Visitors also came from seven foreign countries--Guatemala, Switzerland, England, Canada, Australia, Mexico, and South Africa. The



-  NATIONAL FOREST
-  NATIONAL WILDLIFE REFUGE
-  NATIONAL GRASSLAND
-  NATIONAL HISTORIC SITE
-  NATIONAL WILD RIVER
-  NATIONAL MONUMENT
-  STATE PARK
-  SKI AREA



REGIONAL RECREATION AREAS

VERMEJO RANCH

COLFAX AND TAOS COUNTIES, NEW MEXICO
COSTILLA COUNTY, COLORADO

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

following table shows nationwide participation in selected recreational activities, based on the 1977 National Outdoor Recreation Survey (Heritage Conservation and Recreation Service). All of these activities are either current or potential activities at Vermejo Ranch.

| <u>Activity</u> | <u>Percentage Participating Five or More Times Per Year</u> |
|---|---|
| Pleasure driving | 57 |
| Walking or jogging | 57 |
| Picnicking | 49 |
| Bicycling | 39 |
| Sight-seeing | 36 |
| Fishing | 36 |
| Nature walks, bird-watching, wildlife photography | 36 |
| Offroad vehicle use | 20 |
| Hiking or backpacking | 16 |
| Hunting | 14 |
| Camping (developed areas) | 12 |
| Sledding | 12 |
| Camping (primitive areas) | 9 |
| Horseback riding | 8 |
| Snowmobiling | 5 |
| Downhill skiing | 4 |

The same 1977 survey also indicated ten activities with high-growth potential nationwide, including five potential or current activities at Vermejo--downhill skiing, horseback riding, cross-country skiing, camping (primitive area), and snowmobiling.

The projected population increase, data from the New Mexico and Colorado SCORPs, and the nationwide popularity of recreational uses appropriate to Vermejo lead to the conclusion that Vermejo Ranch would attract visitors at an increasing rate. They would come primarily from the surrounding states, but there is also the likelihood of attracting visitors nationwide, as long as the quality of the resource-based recreation is maintained at a high level.

The recreational values at Vermejo Ranch are a combination of resources; including forests, wildlife, ecological and topographical diversity, watershed, and cultural resources. The individual resources must be managed wisely to ensure continued high-quality recreational experiences. The carrying capacity of a specific resource or a particular requirement for wise management may thus require the curtailment of all or certain recreational activities in specific portions of the Ranch. The management objectives for

recreational activities at Vermejo Ranch are necessarily broad and deal with the major facets of recreation appropriate on the Ranch.

Recreational Hunting and Fishing

Management Objective: Provide high-quality hunting and fishing experiences for the general public.

Management Framework: Manage game species to maintain or improve upon the current population, health, and high-quality harvesting potential; develop an equitable use permit system to allow selective harvesting by the general public as part of the resource management program.

Potential Management Agencies: State of New Mexico, U.S. Fish and Wildlife Service, U.S. Forest Service, National Park Service.

Interpretation

Management Objective: Provide interpretation of Vermejo's cultural and natural resources for the general public.

Management Framework: Survey and identify cultural and natural resources; provide adequate protection for significant cultural and natural features; develop and maintain appropriate programs, displays, and trained personnel for guided and self-guided interpretation.

Potential Management Agencies (Cultural Resources): National Park Service, State of New Mexico, U.S. Forest Service.

Potential Management Agencies (Natural Resources): National Park Service, U.S. Forest Service, State of New Mexico, U.S. Fish and Wildlife Service.

Other Recreational Activities

Management Objective: Provide quality year-round, resource-based recreational opportunities for the general public.

Management Framework: Develop a recreational use plan for developed and dispersed recreational activities, avoiding conflicting activities, planning for transportation and circulation, and maintaining the scenic, natural, and cultural resources of Vermejo Ranch; establish and maintain appropriate day and overnight use areas, trails, circulation systems, and support facilities for recreational activities.

Potential Management Agencies: National Park Service, U.S. Forest Service, State of New Mexico, U.S. Fish and Wildlife Service.

SIGNIFICANCE TO FEDERAL AND STATE AGENCIES

NATIONAL PARK SERVICE

Natural Resources

The National Park Service defines nationally significant natural resources as having "exceptional values or qualities illustrating or interpreting the geological and ecological themes of our Nation." Vermejo qualifies as nationally significant on the basis of the following guidelines for natural resource values:

The Ranch still retains for the most part its integrity, and portions represent an unspoiled example of natural history.

The Ranch possesses high ecological and geological diversity. The geological setting of Vermejo Ranch is exceptional among the existing units of the National Park System because it contains substantial portions of two adjoining physiographic regions: the Great Plains and the Southern Rocky Mountains. An abrupt change in geologic structure from nearly horizontal to steeply dipping rocks occurs as one proceeds from east to west on Vermejo Ranch. This abrupt structural change, which marks the dividing line between the two physiographic regions occurs in the eastern foothills of the Sangre de Cristo Mountains. No other unit of the National Park System, including Rocky Mountain National Park, contains such a dramatic transition from the Great Plains to the Southern, Middle, or Northern Rocky Mountains. The Ranch also provides a wide range of terrestrial habitats, which results in a diversity of wildlife.

The Ranch also meets criteria for national recreation area status as follows:

The area is spacious (492,560 acres) and contains significant natural and cultural features, as well as excellent hunting and fishing, and thus provides significant and diverse recreational opportunities.

The recreational opportunities are such that the area would receive regional, national, and some international visitation.

The scale of investment, development, and operation would be sufficiently high enough to warrant state or federal involvement or participation.

In relating the Ranch resources to National Park System natural history themes, the following information applies:

The Ranch west of The Wall generally lies in the Southern Rocky Mountains natural region as defined in Part Two of the National Park System Plan: Natural History.

Vermejo Ranch would provide and complement representation of the following natural history themes of the Southern Rocky Mountains natural region, which have little, no, or some representation:

Landforms

Mountain systems (prime significance-some representation)

Works of volcanism (significant-little or no representation)

River systems and lakes (significant-some representation)

Geologic history

Permian-Cretaceous (significant-little or no representation)

Aquatic ecosystems

Streams (significant-some representation)

The Ranch area located east of The Wall is located in the Great Plains natural region and complements several natural history theme gaps, including the following:

Landforms

Plains, plateaus, and mesas (prime significance-little or no representation)

Cuestas and hogbacks (significant-little or no representation)

Eolian landforms (significant-little or no representation)

River systems and lakes (significant-little or no representation)

Geologic history

Paleocene-Eocene (prime significance-some representation)

Land ecosystems

Dry coniferous forest (significant-some representation)

Grassland (prime significance-some representation)

Aquatic ecosystems

Streams (significant-little or no representation)

Cultural Resources

The National Park Service has organized American prehistory and history into themes and subthemes. The history of Vermejo Ranch and the tangible remains from that past exemplify a number of these themes and subthemes.

Under the theme of Society and Social Conscience, the subthemes of Environmental Conservation and Recreation in the United States are both represented at Vermejo. The former subtheme concerns the history of public and private management of the nation's land, water, and air resources, including plant and animal life, while the latter concerns the leisure activities of Americans, including sports and games. The leisure activities of the Vermejo Club and the hunting and fishing activities of the guests of Bartlett, Gourley, and Pennzoil represent the Recreation in the United States subtheme, which is currently unrepresented in the National Park System. The activities of the various owners of Vermejo Park to preserve the landscape and to manage and maintain the elk, bison, and deer herds and fish represent the Environmental Conservation subtheme. John Muir Home, administered by the National Park Service, does represent this theme. However, there are no areas in the system that represent this theme in terms of private initiative in preserving the environment and wildlife and nothing that represents conservation efforts since 1900.

Also under the theme of Society and Social Conscience is the subtheme of American Ways of Life. At Vermejo a number of different ways of life are represented. These include the lifestyles of the Spanish-Americans on the land grant under Maxwell and the lifestyles of the wealthy who either owned or were guests of the owners at the stately mansions in Vermejo Park. Combined, these two social ways of life represent just how different Americans lived at opposite ends of the economic strata at various periods in our history.

Under the theme of Westward Expansion, 1763-1898, there is the subtheme of The Cattleman's Empire. A facet of this subtheme is the Far West. This subtheme and facet are now poorly represented

in the National Park System. The cattle-ranching activities at Vermejo Ranch show this facet by telling the story of how the cattle industry adopted its operations to meet the demands of the harsh mountain climate of the West. Another facet of this subtheme is the Southern Plains, which is unrepresented in the National Park System.

The Mining Frontier, another subtheme under Westward Expansion, is also represented at Vermejo Ranch. Both placer and deep mining were conducted here, with single individuals or firms engaged in this work. Ruins of the mining town of La Belle are still extant. This subtheme is currently underrepresented in the National Park System.

Other major themes or subthemes represented by Vermejo's history include Western Trails (the abandoned stage station on the route from Dawson, New Mexico, to Tercio, Colorado), the development of American law (land grant litigation and the effect of Spanish law on the development of American law), and aboriginal inhabitants (archeological sites).

The cultural resources of Vermejo Ranch have the integrity and the potential to contribute to the understanding of the legal, political, and social history of our nation.

U.S. FOREST SERVICE

Vermejo Ranch is highly qualified as a national recreation area because of its unique array of outstanding combinations of outdoor recreational opportunities, aesthetic and historic attractions, and location and proximity to potential users.

Water-oriented recreational uses are extremely limited and important in the Southwest, and Vermejo offers more surface areas of trout water than all the national forests in New Mexico combined. Vermejo is considered to have the most outstanding elk hunting in the world. The unique wildlife population combined with a large bald eagle population and the deer, bear, turkey, antelope, and many other wildlife species further add to its attraction.

The area has several potential 5,000- to 20,000-acre wilderness areas. It also has many potential sites for camping and picnicking along with unlimited opportunities for hiking, backpacking, and sight-seeing.

The history of the area is unique and would add to its quality as a national recreation area.

Vermejo Ranch is located within driving distance of large population centers in Texas, Oklahoma, Kansas, Colorado, and New Mexico, which are also some of the fastest growing areas in the U.S. This is further justification for national recreation area designation.

U. S. FISH AND WILDLIFE SERVICE

Vermejo Ranch currently meets all the criteria of the U.S. Fish and Wildlife Service's "Unique Ecosystems Program" by virtue of its wildlife diversity and value to endangered species.

The topography of the property is such that five major ecosystems are represented within its boundaries. Therefore, the diversity of flora and fauna is much greater here than would be expected on a tract of similar acreage with less topographic variation. The fauna of the area includes approximately 200 species of birds, 15 species of fish, 33 species of amphibians and reptiles, and 60 species of mammals.

Vermejo Ranch supports the largest elk population in New Mexico and provides the best trophy elk hunting in North America. It is estimated that approximately one-third of the northern New Mexico winter elk range occurs on Vermejo Ranch. Aquatic habitats on the property provide a significant trout fishery.

Vermejo Ranch is of unquestionable importance to the bald eagle, a federally listed endangered species. At least 57 of the birds are known to winter here from October to May. The American osprey, white-tailed ptarmigan, and brook stickleback, all state endangered species, are also known to occur on the Ranch.

STATE OF NEW MEXICO

The state of New Mexico concurs in the determination of national resource significance of Vermejo Ranch and is currently preparing an acquisition and management plan for the area. The area would be acquired by the state to preserve the significant natural and historical resources for public enjoyment and use and to eliminate or mitigate threats to existing resource values. State management objectives for the area would be to maintain forest and range productivity and to provide high-quality recreational opportunities.

In the event of acquisition of the Ranch by the state of New Mexico, the 4,000 acres in Colorado would have to be sold separately by the Vermejo Park Corporation.

A N A L Y S I S O F T H E E N V I R O N M E N T

THREATS TO THE RESOURCE

General Threats

Under present ownership the Ranch has been afforded considerable protection from adverse land development activities. However, parcels of the Ranch could be developed quite profitably. The Vermejo Park Corporation has stated that it would consider selling the property. Under other ownership portions of the Ranch might be subdivided and sold for seasonal home sites or developed for commercial recreational activities. Because the counties do not maintain local zoning controls, there would be no guarantee that the property would be protected from incompatible land uses.

The Ranch could be acquired by individuals who would not be as capable as Pennzoil in monitoring or enforcing private agreements concerning logging and mining operations. Logging and mining activities may have already altered the physical characteristics of the environment and may have also altered or destroyed archeological resources. Another private owner might not protect and maintain the historic structures at the Ranch headquarters as well as the present owner does.

In general, sale of the Ranch, especially for development as small recreation tracts, would result in altered land uses with severe impacts on existing numbers, diversity, migration patterns, and interrelationships of wildlife and vegetation. Cultural resources could also be damaged. These negative effects would preclude future development of a comprehensive program for public use and appreciation of the resource.

Specific Threats

The Cherokee and Pittsburg Coal and Mining Company owns approximately 4,125 acres within the existing Ranch boundary in the York Canyon area, which is leased to the Kaiser Steel Corporation. The York Canyon underground mine, which is located in this holding, is currently producing about 1,000,000 tons of metallurgical coal annually. The mine is served by a spur of the Santa Fe Railroad, which extended its line in 1966 up the Vermejo River for 38 miles, 10 of which are on Ranch property. The line ends in the lower portion of York Canyon where unit train loadout facilities for the mine are located.

Kaiser Steel is also conducting a limited strip-mining operation adjacent to the York Canyon mine. However, it appears that actual strip-mining operations on the Ranch would not exceed 20,000 acres

of land. All of this land would not be disturbed simultaneously because after an area is strip-mined it is reclaimed. The total area of potential strip mining is located east of the York Canyon district and north of the Gachupin-Bracket subdistrict, amounting to approximately 83,000 acres in the northeastern corner of the Ranch. In consideration for permission to strip-mine in the strippable areas, Kaiser Steel has agreed to convey 2 acres of land to Vermejo Park Corporation for each acre strip-mined on the Ranch.

The strip-mining operation may temporarily interfere with wildlife migration patterns and habitats on the affected lands. However, the land most likely to be mined is some of the least valuable habitat on the Ranch. Impacts on wildlife from strip mining in this area would be moderated by reclamation of mined lands. In addition, the acreage that Kaiser has agreed to convey to Vermejo Park Corporation is similar in habitat to that which would be mined.

Potentially, 25,000 acres of land in the Castle Rock area could be subject to deep mining, which would require rail facilities to the area and other ancillary support mining facilities. The Castle Rock area is of prime importance as winter range for Vermejo's elk herd. While deep mining should not appreciably lower the physical habitat quality of most of the area, the mine's transportation and support facilities may create a certain amount of stress on the wildlife populations.

As indicated earlier, in 1960 the Pacific Lumber Company obtained cutting rights covering approximately 337,000 acres on the Ranch. Under the existing agreement and circumstances, approximately 215,000 acres may be cut. With a continuation of current logging practices, considerable damage may occur to the landscape, such as unsightly scars and increased erosion. Questions of timber-harvesting practices and procedures are currently in litigation, and hearings on the matter are set for October/November 1979.

Timber harvesting is generally considered beneficial to elk habitat provided that sufficient cover is maintained. However, logging practices that result in accelerated erosion rates on steep slopes would lower overall habitat productivity. A good elk management plan for Vermejo would include timber-harvesting methods that maintain cover requirements for the animals and utilize logging practices that protect soil stability. The current logging operation, therefore, may be considered both a potential benefit and a threat to the elk herd.

If improper logging operations are conducted, it would pose a greater threat to Vermejo's fisheries than to its elk population. Sediment-laden runoff from upper watersheds would lower stream

quality on most of Vermejo's high-country trout streams. This would result in lowering or eliminating the stream's value as spawning areas and may alter stream suitability to the point where trout can no longer survive.

Previous overgrazing on Vermejo Ranch resulted in a large amount of severe gully and sheet erosion. Vermejo Park Corporation has improved range management practices to the point where some of the gullies are now stabilized. Failure to continue sound range management practices would allow additional erosion, siltation, and sedimentation, thereby adversely affecting the outstanding fishing waters and detracting from the natural scenic qualities of the Ranch.

Fragmentation and misuse of the elk summer-winter range, resulting from multiproperty ownerships or unregulated mineral and timber practices, would cause the elk herd to decline. This decline would tend to displace the eagle population, which feeds on elk remains during the winter.

CURRENT MEASURES FOR PROTECTION

As owner, Vermejo Park Corporation has demonstrated a commitment to preserving the natural and cultural resources of the Ranch. This is demonstrated in part by their actions to protect the significant historic buildings at the Ranch headquarters. The structures at the headquarters have been carefully maintained to preserve the original architecture.

Vermejo Park Corporation has initiated court actions against Pacific Lumber Company to ensure that good logging practices are followed. It has also demonstrated a commitment to protect the resource by working with Kaiser Steel Corporation on reclamation of strip-mining areas.

In addition, the owner has attempted to maintain a balance between cattle and elk in order to protect the grazing resource. To protect the diverse wildlife populations and habitats on the Ranch, the owner has controlled domestic grazing and regulated hunting and fishing.

Public measures for protection of the Ranch consist of subdivision regulations in all three counties; however, no zoning controls exist at present. Due to the lack of local zoning controls the present owner could develop land uses with little local public input, which could lead to extensive development on the Ranch. Taos County is currently preparing a land use plan scheduled for completion by December 1979. Zoning regulations are also expected to be prepared and adopted by the county.

In summary, few current public measures exist for protection of the Vermejo Ranch resources other than federal and state public health and environmental laws that apply to the use and development of private lands. Therefore, the end result is that the owner basically controls the protection of the resource.

LOCAL ISSUES AND CONCERNS

If Vermejo Ranch is publicly acquired, impacts on the local economies and on recreational use are expected to be local and regional concerns. County governments would be concerned with the loss of the local property tax base.

Under NPS or USFS management, the payments in-lieu-of taxes would be \$369,419 annually for the first five years after acquisition and \$325,004 annually thereafter. Payments may be slightly higher under USFWS management, as described in the "Protection Options" section.

If land use remains essentially unchanged, taxes to county and local governments would continue at current rates, with only incremental increases over time. In 1978, Vermejo Park Corporation paid property taxes amounting to \$44,415. Of this total, Colfax, Taos, and Costilla counties received \$38,747, \$4,821, and \$847, respectively.

Public use of the area would increase demands for commercial support facilities and services (food, lodging, recreational equipment, gasoline, etc.) in the communities near the study area. If the Ranch is acquired by a government agency, there may be additional housing demands for employees, resulting in impacts on local community infrastructures and school systems.

A major support to the local economy, which would continue under public or private ownership, is the employment and payroll associated with the mining that occurs on the Ranch. These activities contribute greatly to the economy of the local counties and are essential to their economic health. Kaiser Steel Corporation currently employs about 500 persons with a gross payroll of \$10 million annually. In 1978, this company paid to the state \$375,000 in severance taxes, \$280,000 in natural resource excise taxes, and \$72,000 in energy conservation taxes. In 1979, property taxes of approximately \$425,000 were also paid to Colfax County for land and improvements at the existing York Canyon mine. Nearly all of the employees live in the Raton area and commute to the mine. When the upper York Canyon mine is under full operation, the work force and payroll would approximate that of the current York Canyon operation. If the Castle Rock area is mined, its mining activity is expected to be larger than York Canyon. Consequently, the

P R O T E C T I O N O P T I O N S

NO ACTION

Introduction

Vermejo Park Corporation, the current owner, has indicated that it would consider selling the Ranch. Given the estimated cost of the property (see appendix E), it is unlikely that a single individual or U.S. corporation would purchase the entire Ranch. If no public action is taken to acquire it, the Ranch would probably be divided and sold to several individuals and/or corporations. In light of current real estate trends, the Ranch would probably be subdivided many times in the future.

Impacts

Under the No Action option, the natural, cultural, and scenic resources of the Ranch would not be assured of any protection from the adverse impacts specifically described in the "Threats to the Resources" section. Also, it is unlikely that any of the management objectives would be met if the Ranch was to be divided and subdivided in the future (see Resource Management Objectives chart following this section). In addition, the resources would not be protected under pertinent federal laws and executive orders (see appendix F).

Any socioeconomic impacts resulting from the No Action option would depend on the activities of the new owners. If ranching operations were continued, it is possible that a portion of the full-time employees involved in current cattle operations would be rehired by the new owners. If some of the land is developed for home sites, employment and revenues from construction and retail activities would increase. Local tax bases would also increase, as would demands on funds for public education, utilities, and other services.

As indicated earlier, the Ranch would probably be sold in one or more tracts and possibly subdivided. If this occurs, property taxes would increase more rapidly than at the present time, depending upon subdivision development and value of improvements.

PUBLIC ACQUISITION

Introduction

Based on the resource evaluations and management objectives, acquisition of the entire Ranch is used as a framework for

protection and appropriate use of all significant natural, cultural, and recreational resources of Vermejo Ranch. The study team considered the possibility of eliminating sections of the Ranch from acquisition strategies; however, it was determined that the entire Ranch contains either important wildlife habitat, cultural, scenic, or recreational values.

The study team also discussed the possibility of protecting some of the Ranch with less-than-fee acquisition alternatives. This option was rejected because any easement developed to protect the significant resources of the Ranch was estimated to be almost as costly as fee acquisition. In addition, it would not provide for public enjoyment or optimum protection of the resources.

As discussed previously, the coal and timber rights on Vermejo Ranch are outstanding. Based on the high value of the coal, purchase of the coal rights was not considered to be a realistic option at this time. Pacific Lumber Company, the owner of the timber rights, was willing to sell the remaining timber rights to the federal government in 1972. These rights could be acquired if it was deemed necessary for the protection of the other significant resources on the Ranch. There are no other major outstanding rights known that might affect the value of the resources.

Impacts

Public acquisition of the entire Ranch would maintain it as a single unit, protect it from the adverse impacts accompanying subdivision, ensure continued protection of its significant resources, and allow for the implementation of one, all, or any combination of the resource management objectives (see Resource Management Objectives chart). If federal funds are used to acquire or manage the resources, they would be protected by relevant federal laws and executive orders listed in appendix E.

Conflicts may arise, however, between the various resource management objectives. For example, it is likely that mining and timber activities could temporarily impair the scenic and recreational qualities of some areas of the Ranch. At certain times of the year hunting and wildlife management programs may adversely impact other recreational or interpretive programs. Mining activities, certain timbering practices, and recreational development could adversely affect wildlife migration patterns and habitat. These potential conflicts would need to be studied by the managing agency or agencies, and development and management plans would have to be formulated to avoid or mitigate conflicting programs.

Several team members suggested that one approach for resolving conflicts among resource management objectives would be to create a commission to coordinate management of the Ranch and adjacent

lands. Such a commission could include representatives of Pacific Lumber Company, Kaiser Steel Corporation, local landowners, and local, state, and federal governments. The commission could be involved in both the planning and administrative decision-making processes in which resource management conflicts would be addressed and resolved. The commission could establish appropriate land use regulations, reclamation standards, logging practices, and grazing and recreational carrying capacities for the protection and appropriate use of the Ranch's significant resources. However, the study team was not able to reach a consensus on the appropriateness of this approach.

The socioeconomic impacts resulting from public acquisition of Vermejo Ranch would include shifts in employment, changes in local economies, and increases in local tax revenues and expenditures. Overall, regional employment would probably increase as a result of federal or state protection of the Ranch. However, the present employees, approximately 42 full time and 40 seasonal, would be displaced if the federal government were to hire exclusively from Civil Service registers. Local seasonal employees currently involved in the guest operations on the Ranch might be rehired by private concessioners either on or outside the Ranch, since an increase in ancillary development is likely to result from public use of Vermejo. Employment connected with the timber operations on the Ranch (approximately 250-300) could be significantly decreased if timber rights are purchased or harvest rates are reduced.

Increases in regional and national public use of the area would inevitably result in increased retail sales and growth. The economic base and character of local communities would expand to include gateway activities and characteristics, including rapid growth, ancillary development, increased demand for public services, and increased property taxes.

Payments to local governments in-lieu-of taxes would be made under federal acquisition and management. These payments are authorized under P.L. 94-565, which applies to NPS and USFS acquisition of the Ranch. Under section 3 of this law, "acquired lands" payments would be equivalent to the annual property taxes paid under private ownership and would continue for a period of five years. All three counties would also be eligible for entitlement payments. The estimated payment in-lieu-of taxes by county are as follows:

Colfax County

| | |
|--|-------------------------------------|
| Entitlement payments | \$274,910 annually |
| Acquired lands payment (same as annual prop. tax) | \$ 38,747 annually for first 5 yrs. |

Taos County

Entitlement payments : \$47,941 annually
Acquired lands payment : \$ 4,821 annually for first 5 yrs.
(same as annual prop. tax)

Costilla County

Entitlement payments : \$2,153 annually
Acquired lands payment : \$ 847 annually for first 5 yrs.
(same as annual prop. tax)

Payments would be made as estimated assuming that appropriations are sufficient in future years to fund full in-lieu payments. Changes in P.L. 94-565 may make local government eligible for increased payments; however, it is not certain that these increases would be fully appropriated by Congress in the first years following these changes.

P.L. 95-469, the Refuge Revenue Sharing Act, as amended on October 17, 1978, provides that the Secretary of the Interior shall make an annual payment to each county (for any governmental purpose) in which any lands managed by the U.S. Fish and Wildlife Service are located. For fee (acquired) lands, the new law provides a payment of (a) 75¢ per acre, (b) 3/4 of 1% of fair market value, or (c) 25% of net receipts, whichever is greater. Based on 75¢/acre, the payment would be \$313,657 to Colfax County, \$52,762 to Taos County, and \$3,000 to Costilla County.

However, these payments could be slightly higher depending on the market value or net receipts. Under state acquisition, no payments in-lieu-of taxes are mandatory; however, this procedure would be considered by the state of New Mexico.

RESOURCE MANAGEMENT OBJECTIVES

| RESOURCE | RECOMMENDED MANAGEMENT OBJECTIVE(S) | LIKELIHOOD OF MEETING MANAGEMENT OBJECTIVE(S) | | POTENTIAL MANAGEMENT ENTITIES* (Under Option 2) |
|---|---|---|--|---|
| | | <u>Option 1</u> <u>No Action</u> | <u>Option 2</u> <u>Public Acquisition</u> | |
| <u>Wildlife</u> Elk | Maintain viable elk herd of national significance; provide high-quality hunting experience for the public | unlikely | likely | U.S. Fish and Wildlife Service, State of New Mexico, National Park Service, U.S. Forest Service |
| Other Game Species (turkey, antelope, deer, cougar, bear, and waterfowl) | Maintain viable populations of a maximum diversity of indigenous game animals; provide high-quality hunting experience for the public | unlikely | likely | National Park Service, U.S. Fish and Wildlife Service, State of New Mexico; U.S. Forest Service |
| Nongame Species | Preserve and enhance the maximum diversity of nongame species | unlikely | likely | U.S. Fish and Wildlife Service, State of New Mexico, National Park Service, U.S. Forest Service |
| Endangered or Threatened Species | Preserve and enhance populations of endangered species | unlikely | likely | U.S. Fish and Wildlife Service, State of New Mexico, U.S. Forest Service, National Park Service |
| Lake Fisheries | Maintain a highly productive lake fishery for public use and enjoyment | unlikely | likely | U.S. Fish and Wildlife Service, State of New Mexico, U.S. Forest Service, National Park Service |
| Stream Fisheries | Maintain, enhance, or restore a near pristine, self-sustaining stream fishery | unlikely | likely | U.S. Fish and Wildlife Service, State of New Mexico, National Park Service, U.S. Forest Service |
| <u>Vegetation</u> | Restore, protect, and interpret the natural diversity and dynamics of the native ecosystems | unlikely | likely | U.S. Fish and Wildlife Service, U.S. Forest Service, National Park Service, State of New Mexico |

*Based on expertise and legislative mandates

| RESOURCE | RECOMMENDED MANAGEMENT OBJECTIVE(S) | LIKELIHOOD OF MEETING MANAGEMENT OBJECTIVE(S) | | POTENTIAL MANAGEMENT ENTITIES* (Under Option 2) |
|-------------------------------|---|--|--|---|
| | | <u>Option 1</u> <u>No Action</u> | <u>Option 2</u> <u>Public Acquisition</u> | |
| <u>Forestry</u> | Restore and maintain the aesthetic quality and ecological integrity of the forest; maintain or enhance streamflow quantity, quality, and regimen; produce timber and manage the forestry resources with maximum consideration for wildlife and recreational and scenic values | unlikely | likely | State of New Mexico, U.S. Forest Service, National Park Service, U.S. Fish and Wildlife Service |
| <u>Grazing</u> | Restore, enhance, and maintain, range conditions; reduce erosion and gully formation | unlikely | likely | State of New Mexico, U.S. Fish and Wildlife Service, National Park Service, U.S. Forest Service |
| | Maintain cattle operations | likely | likely | U.S. Forest Service, State of New Mexico, U.S. Fish and Wildlife Service |
| <u>Coal</u> | Continue coal extraction with minimal degradation to the environment; reclaim strip-mining areas to original landform and restore vegetation; develop ancillary mining facilities respecting the environmental setting | likely | likely | Kaiser Steel Corporation |
| <u>Water</u> | Enhance and maintain streamflow quantity, quality, and regimen | unlikely | likely | National Park Service, U.S. Forest Service, State of New Mexico, U.S. Fish and Wildlife Service |
| <u>Prehistory and History</u> | Preserve, protect, and interpret all significant cultural resources associated with the Ranch | unlikely | likely | National Park Service, State of New Mexico, U.S. Forest Service |
| <u>Recreation</u> | Provide high-quality hunting and fishing experiences for the general public | unlikely | likely | State of New Mexico, U.S. Fish and Wildlife Service, U.S. Forest Service, National Park Service |
| | Interpret Vermejo's cultural resources | unlikely | likely | National Park Service, State of New Mexico, U.S. Forest Service |
| | Interpret Vermejo's natural resources | unlikely | likely | National Park Service, State of New Mexico, U.S. Forest Service, U.S. Fish and Wildlife Service |
| | Provide a wide range of quality year-round, resource-based recreational opportunities for the general public | unlikely | likely | National Park Service, State of New Mexico, U.S. Forest Service, U.S. Fish and Wildlife Service |

A P P E N D I X E S

- A: National Natural Landmark Brief
- B: Scientific Names of Significant Wildlife Species Mentioned in Text
- C: Scientific Names of Dominant Plant Species Mentioned in Text
- D: 1978 Season - Vermejo Ranch Hunting/Fishing Participants and Success Ratio
- E: Preliminary Cost Estimate
- F: Federal Laws and Executive Orders

A P P E N D I X A

National Natural Landmark Brief

Sites: Vermejo Park Ranch: (1) Cressmer Recreational Unit, (2) Trophy Elk Unit, (3) Lake No. 2 Area, Colfax County, New Mexico.

Descriptions: (1) Cressmer Recreational Unit - 3,700 acres. Five lakes provide feeding areas for bald eagles and ospreys. (2) Trophy Elk Unit - 2,333 acres. Large undisturbed montane meadows with associated wildlife. (3) Lake No. 2 Area - 900 acres. Examples of alpine-tundra habitat and high forest scenic grandeur.

Owner: Pennzoil Corporation, Houston, Texas.

Proposed By: Mr. John Goss and Mr. Gary Wolfe, Great Plains Natural Region Ecological Theme Analysis, Evaluation Form NM-D-14.

Significance: The lakes of the Cressmer Recreational Unit are significant primarily as feeding grounds for concentrations of bald eagles. The brook stickleback, a species threatened in New Mexico, occurs in one of the lakes.

The Trophy Elk Unit provides an unspoiled example of high elevation meadow together with surrounding forest and associated wildlife.

The Lake No. 2 Area offers spectacular scenery and holds a population of the white-tailed ptarmigan (a species endangered in New Mexico).

Both high elevation spruce-fir forest and alpine tundra habitat are present.

Land Use: These areas are currently used for sportfishing and hunting. These activities are carefully regulated and should not lessen the value of the areas. Cattle grazing poses some problems in the Cressmer Recreational Unit but has little or no effect on the other areas.

Dangers to Integrity of the Area: A real danger to these areas exists in the form of potential logging activity. Pacific Lumber Company currently holds timber rights to these sites. Pennzoil wishes to designate the areas discussed here as "Save Areas" to be preserved in their natural state. Current negotiations between Pennzoil and Pacific are designed to provide Pennzoil with the timber rights for these areas. If the negotiations are successful, lumbering would not occur and the integrity of the areas would be

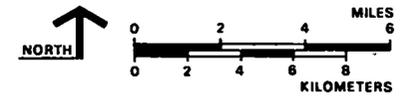
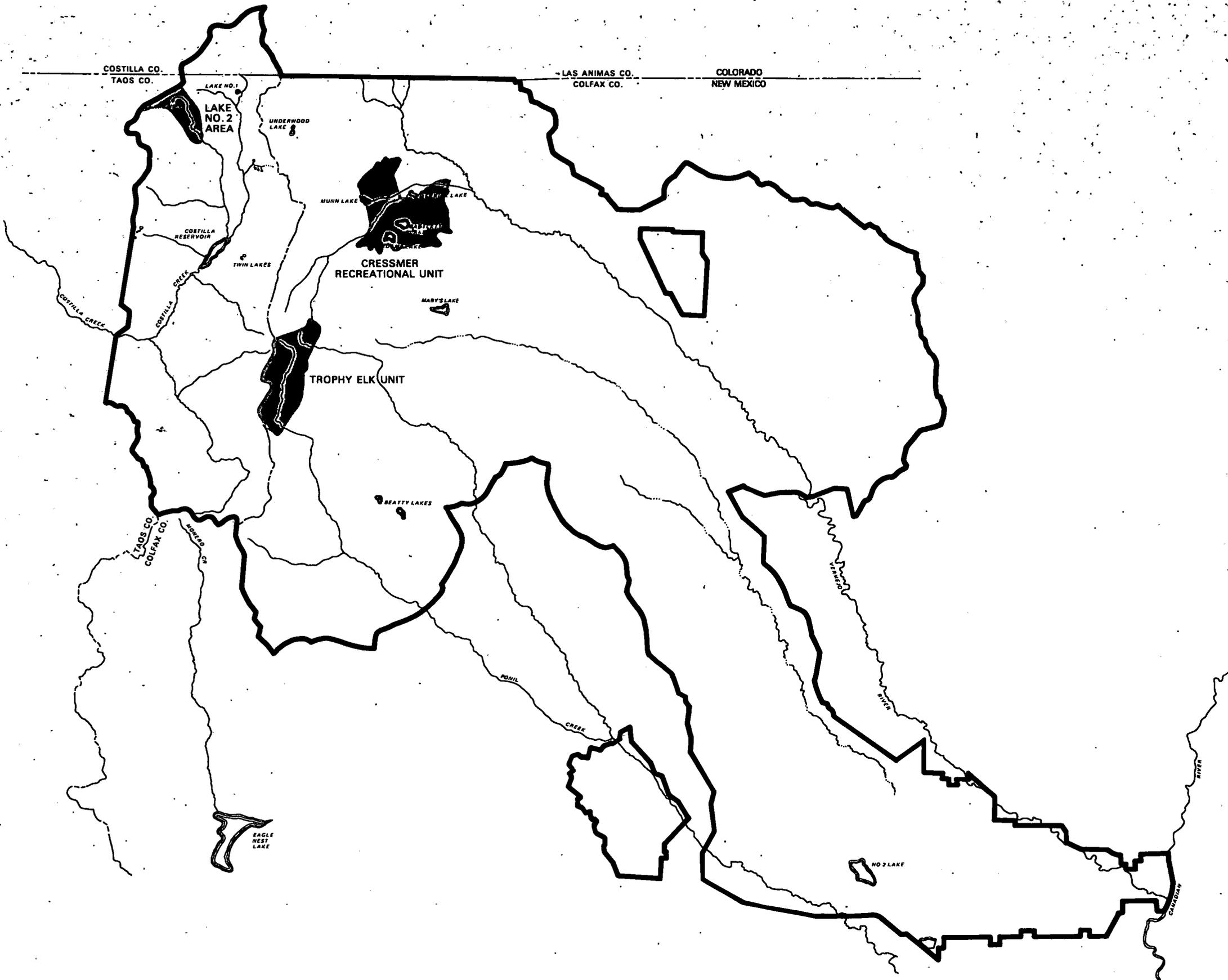
maintained. If they are not, the areas are clearly threatened and are of doubtful worth as potential natural landmarks.

Special Conditions: A meaningful decision on these sites cannot be completed until the control of the timber rights is determined.

Studied by: J. David Ligon, Associate Professor of Biology, University of New Mexico, Albuquerque, N.M. 87131.

TEAM NOTE:

1. This statement was prepared and submitted in 1977.
2. Amalia Lumber Company has agreed to temporarily not harvest timber from these areas.



**POTENTIAL NATIONAL
NATURAL LANDMARKS**
VERMEJO RANCH
COLFAX AND TAOS COUNTIES, NEW MEXICO
COSTILLA COUNTY, COLORADO
UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

APPENDIX B

Scientific Names of Significant Wildlife Species Mentioned in Text

| | |
|------------------------|---------------------------------|
| American bison | <u>Bison bison</u> |
| American osprey | <u>Pandion haliaetus</u> |
| Badger | <u>Taxidea taxus</u> |
| Bald eagle | <u>Haliaeetus leucocephalus</u> |
| Beaver | <u>Castor canadensis</u> |
| Black bear | <u>Ursus americanus</u> |
| Blue-winged teal | <u>Anas discors</u> |
| Bobcat | <u>Felis rufus</u> |
| Brook stickleback | <u>Eucalia inconstans</u> |
| Brook trout | <u>Salvelinus fontinalis</u> |
| Brown trout | <u>Salmo trutta</u> |
| Canada goose | <u>Branta canadensis</u> |
| Cougar | <u>Felis concolor</u> |
| Coyote | <u>Canis latrans</u> |
| Cutthroat trout | <u>Salmo clarki</u> |
| Elk | <u>Cervus canadensis</u> |
| Gray fox | <u>Urocyon cinereoargenteus</u> |
| Mallard duck | <u>Anas platyrhynchos</u> |
| Merriam's wild turkey | <u>Meleagris gallopavo</u> |
| Mule deer | <u>Odocoileus hemionus</u> |
| Muskrat | <u>Ondatra zibethicus</u> |
| Pika | <u>Ochotona princeps</u> |
| Pintail duck | <u>Anas acuta</u> |
| Pronghorn antelope | <u>Antilocapra americana</u> |
| Raccoon | <u>Procyon lotor</u> |
| Rainbow trout | <u>Salmo gairdneri</u> |
| Ring-tailed cat | <u>Bassariscus astutus</u> |
| Shoveler duck | <u>Spatula clypeata</u> |
| Spotted skunk | <u>Spilogale putorius</u> |
| Striped skunk | <u>Mephitis mephitis</u> |
| White-tailed ptarmigan | <u>Lagopus leucurus</u> |
| Yellowbelly marmot | <u>Marmota flaviventris</u> |

A P P E N D I X . C

Scientific Names of Dominant Plant Species Mentioned in Text

| | |
|------------------------|------------------------------|
| Blue grama | <u>Bouteloua gracilis</u> |
| Bristlecone pine | <u>Pinus aristata</u> |
| Buffalo grass | <u>Duchloe dactyloides</u> |
| Douglas fir | <u>Pseudotsuga menziesii</u> |
| Engelmann spruce | <u>Picea engelmannii</u> |
| Gambel oak | <u>Quercus gambelii</u> |
| Pinyon pine | <u>Pinus edulis</u> |
| Ponderosa pine | <u>Pinus ponderosa</u> |
| Quaking aspen | <u>Populus tremuloides</u> |
| Rocky Mountain juniper | <u>Juniperus scopulorum</u> |
| Subalpine fir | <u>Abies lasiocarpa</u> |

A P P E N D I X D

1978 Season - Vermejo Ranch Hunting/Fishing
Participants and Success Ratio

| Game Species | Number of Hunters ¹ | Animals Harvested | Success Ratio |
|---------------------|--------------------------------|-------------------|---------------|
| Elk | 458 | 354 | 77% |
| Deer | 43 | 31 | 72% |
| Antelope | 9 | 9 | 100% |
| Turkey ² | 53 | 23 | 43% |
| Bear/Lion | 25 | 20 | 80% |

| | Daily permits issued | Average daily catch |
|-------|----------------------|---------------------|
| Trout | 3,939 | 13,798 3.5 fish |

¹ Includes both paying guest and employees
² 1979 spring hunt figures

A P P E N D I X E

Preliminary Cost Estimate

A preliminary cost estimate for land, improvements, and water rights has been developed. This estimate ranges from \$68 million to \$75 million as of May 1979. When technical costs, overhead, escalation, and relocation payments are added, the total estimated costs range from \$82 million to \$90 million. The value of outstanding rights to the coal and timber are not included in this estimate.

It should be noted that this is only an estimate, and no full-scale appraisal was done in connection with this study.

A P P E N D I X F

Federal Laws and Executive Orders

| | |
|-------------------------------------|---|
| Endangered Species Act: | 16 U.S.C. 1531 |
| Fish and Wildlife Coordination Act: | 16 U.S.C. 661 |
| Executive Order 11593: | Protection and Enhancement of the Cultural Environment |
| Executive Order 11787: | Exotic Organisms |
| Executive Order 11870: | Environmental Safeguards on Activities for Animal Damage Control on Federal Lands |
| Executive Order 11989: | Offroad Vehicles on Public Lands |
| Executive Order 11988: | Floodplain Management |
| Executive Order 11990: | Protection of Wetlands |
| National Environmental Policy Act: | 42 U.S.C. 4321 |
| National Historic Preservation Act: | 16 U.S.C. 470 |

B I B L I O G R A P H Y

- ANDERSON, ADRIENNE
1975 "Least Cost Strategy and Limited Activity Site Location, Upper Dry Cimarron Valley, Northeastern New Mexico." Ph.D. dissertation. Boulder: University of Colorado, Department of Anthropology.
- BARTLETT, WILLIAM H.
1897-1920 "William H. Bartlett, Correspondence and Business Papers." Albuquerque: University of New Mexico Library.
- CAMPBELL, ROBERT G.
1969 "Prehistoric Panhandle Culture on the Chiquaqua Plateau, Southeastern Colorado." Ph.D. dissertation, University of Colorado. Ann Arbor, MI: University Microfilms, Inc.
- CASTETTER, EDWARD F.
1956 "The Vegetation of New Mexico." New Mexico Quarterly: vol. 26. pp. 256-88.
- COLORADO DEPARTMENT OF NATURAL RESOURCES
1976 Colorado Comprehensive Outdoor Recreation Plan. Denver.
- COLORADO STATE UNIVERSITY
1975 Ecological Theme Analysis and Inventory of Potential Natural Landmarks of the Great Plains Natural Region. Fort Collins.
- DART, AL
1977 Cultural Resources Impact Statement. New Mexico State Highway Department Project BRS-1443(7). Santa Fe: Museum of New Mexico, Anthropology Division.
- EDDY, FRANK W.
1966 Prehistory in the Navajo Reservoir District, Northwestern New Mexico. Paper in Anthropology. no. 15, pts. 1 and 2. Santa Fe: Museum of New Mexico.
- ELMORE, FRANCIS H.
1976 Shrubs and Trees of the Southwest Uplands. Globe, AZ: Southwest Parks and Monuments Association.
- GALLEY, FRED W.
1972 "Appraisal of the Timber Rights Owned by the Pacific Lumber Company on the Vermejo (W.S.) Ranch.

- GLASSOW, MICHAEL A.
n.d. "Prehistoric Agricultural Development in the Northern Southwest: A Study of Changing Patterns of Land Use." Santa Barbara: University of California, Department of Anthropology.
- GUNNERSON, DOLORES A.
1974 The Jicarilla Apaches, A Study in Survival. DeKalb, IL: Northern Illinois Press.
- GUNNERSON, JAMES H.
1959 "Archeological Survey in Northeastern New Mexico." El Palacio. vol. 66, no. 5. pp. 145-54.
1969 "Apache Archeology in Northeastern New Mexico." American Antiquity. vol. 34, no. 1. pp. 23-39.
- HASLANGER, ANNE
n.d. A History of Vermejo Park. Raton, NM: Vermejo Park Corporation.
- HOLDEN, W.C.
1930 The Canadian Valley Expedition of March, 1930. Bulletin of the Texas Archeological and Paleontological Society. vol. 2.
- HUBBARD, JOHN P., MARSHALL C. CONWAY, HOWARD CAMPBELL, GREGORY SCHMITT, AND MICHAEL D. HATCH
1978 Handbook of Species Endangered in New Mexico. Santa Fe: New Mexico Department of Game and Fish.
- KIRKPATRICK, DAVID T., AND RICHARD I. FORD
1977 "Basketmaker Food Plants from the Cimarron District, Northeastern New Mexico." The Kiva. vol. 42, no. 3-4. pp. 257-69.
- KUCHLER, A.W.
1964 Manual to Accompany the Map, Potential Natural Vegetation of the Conterminous United States. Special Publication 36. New York: American Geographical Society.
- LANGIN-HOOPER, JERRY
1979 Colorado Population Reports, Population Estimates and Projections. Denver: State Division of Planning, Demographic Section.
- LUTES, EUGENE
1959 "A Marginal Prehistoric Culture of Northeastern New Mexico." El Palacio. vol. 66, no. 2. pp. 59-68.

- MORGAN, TERRANCE L. AND DAVID E. BRAXTON
 1978 Uranium: Hydrochemical Band to Stream Sediment Reconnaissance of the Raton NTMS Quadrangle, New Mexico. LA-7344-MS. Los Alamos, NM: Los Alamos Scientific Laboratory.
- MURPHY, LAWRENCE R.
 1972 Philmont: A History of New Mexico's Cimarron County. Albuquerque: University of New Mexico Press.
- NEW MEXICO GEOLOGICAL SOCIETY
 1976 Guide to Vermejo Park, Northeastern New Mexico, eds. Rodney C. Ewing and Barry Salt. Dues. to 27th Field Conference.
- NEW MEXICO STATE PLANNING OFFICE
 1976 Outdoor Recreation: A Comprehensive Plan for New Mexico. Santa Fe.
- PEASON, JIM BERRY
 1961 The Maxwell Land Grant. Norman, OK: University of Oklahoma Press.
- PILLMORE, C.L.
 1969 "Geology and Coal Deposits of the Raton Coal Field, Colfax County, New Mexico." Mountain Geologist. vol. 6. pp. 125-42.
- RECREATION ADVISORY COUNCIL
 1963 Federal Executive Branch Policy Governing the Selection, Establishment, and Administration of National Recreation Areas. Circular no. 1. Washington, DC: U.S. Government Printing Office.
- SOLINSKI, FRANK AND DEAN
 1966 "Timber Inventory of the Vermejo Ranch."
- U.S. CONGRESS, SENATE
 1979 Congressional Record. Senate Bill 539, by Mr. Domenici. vol. 125, no. 25. pp. S2067-68. March 5, 1979. Washington, D.C.: U.S. Government Printing Office.
- U.S. DEPARTMENT OF AGRICULTURE, FOREST SERVICE
 1966 New Mexico's Forest Resource, by Grover A. Choate. Resource Bulletin Int. 5.
 1971 "An Economic Analysis of the Vermejo (W.S.) Ranch."

U.S. DEPARTMENT OF AGRICULTURE, FOREST SERVICE, AND
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND
MANAGEMENT

1978 A Cultural Resources Overview of the Middle Rio Grande Valley, New Mexico, by Linda S. Cordell. Albuquerque: Southwestern Region, USFS, and Santa Fe: New Mexico State Office, BLM.

U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS

1971a U.S. Census of Population: 1970. General Social and Economic Characteristics, Final Report, Colorado. PC(1)-C7. Washington, D.C.: U.S. Government Printing Office.

1971b U.S. Census of Population: 1970. General Social and Economic Characteristics, Final Report, New Mexico. PC(1)-C33. Washington, D.C.: U.S. Government Printing Office.

1977 County and City Data Book. Washington, D.C.: U.S. Government Printing Office.

U.S. DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY

1963 "Geology and Fuel Resources of the Southwestern Part of the Raton Coal Field, Colfax County, New Mexico," by A.A. Wanek. Coal Investigations Map C-45. 2 sheets.

1969 "Geologic Map of the Casa Grande Quadrangle, Colfax County, New Mexico, and Las Animas County, Colorado," by Charles L. Pillmore.

1972 Potential National Natural Landmarks in the Great Plains: Geological Categories of History of Landforms and History of Lifeforms. Washington, D.C.: U.S. Government Printing Office.

U.S. DEPARTMENT OF THE INTERIOR, HERITAGE CONSERVATION AND RECREATION SERVICE

1977 Data Book: 1977 National Outdoor Recreation Survey. Washington, D.C.: U.S. Government Printing Office.

U.S. DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE

1972a Part One of the National Park System Plan: History. Washington, D.C.: U.S. Government Printing Office.

1972b Part Two of the National Park System Plan: Natural History. Washington, D.C.: U.S. Government Printing Office.

UNIVERSITY OF COLORADO

- 1975 Colorado Regional Profile, Spanish Peaks. Boulder: Graduate School of Business Administration, Business Research Division.

UNIVERSITY OF NEW MEXICO, BUREAU OF BUSINESS AND ECONOMIC RESEARCH

- 1976 Estimate^s of the New Mexico Population by County, by John L. Temple. Albuquerque.

- 1979 Estimates and Projections of the Population of New Mexico by County: 1975-1990, by Lynn Wombold. Albuquerque.

VERMEJO PARK CORPORATION

- 1978 "Vermejo Park."

VERMEJO PARK CORPORATION AND KAISER STEEL CORPORATION

- 1977 "Indenture Agreement."

WENDORF, FRED

- 1960 "The Archéology of Northeastern New Mexico." El Palacio. vol. 67, no. 2. pp. 55-65.

W.S. RANCH COMPANY AND PACIFIC LUMBER COMPANY

- 1960 "Agreement to Sell Timber Rights to Pacific Lumber Company."

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