

**NEW MEXICO
STATE LAND TRUST
ASSESSMENT: 1990**

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PREFACE and ACKNOWLEDGEMENTS

This document was produced by over 40 resource professionals drawn from state universities and selected governmental agencies in New Mexico. It represents an independent look at the State Land Office and the Land Trust it manages. The document is not intended to represent any type of consensus by the many authors and reviewers who participated in its development. As might be expected when such a large group attempts to define the nature and extent of complex natural resource issues and conflicts, there will be differences of opinion. In editing this report, we have attempted to present an objective look at all sides of those issues which are controversial.

Although this is not a State Land Office report, many professionals from that office provided invaluable background information and data which served as the basis for much of the subsequent analysis.

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I. INTRODUCTION

BACKGROUND

In October 1989 the Commissioner of Public Lands, William R. Humphries, contacted university presidents from around the state asking for assistance in developing an assessment and analysis of trust resources. The intent was to have a group of professionals, drawn largely from academia, prepare a narrative report discussing the resource base and the complexities associated with trust resources management. The Water Resources Research Institute (WRRI) agreed to coordinate and furnish staff support for the project. The WRRI, in consultation with the State Land Office (SLO), assembled a professional assessment team selected primarily from the state universities. This team authored initial drafts of various sections of the report and after group discussions suggested revisions and additions. Data in this report came from SLO files unless otherwise referenced. The WRRI integrated the individual work products into a single document and made arrangements for additional review by team members, SLO staff and others. Contributors to this report are listed in the Preface and Acknowledgements section.

PURPOSE OF THIS DOCUMENT

This document is intended to initiate a series of continually updated assessments on the State of New Mexico's land trust assets. The worth of these assets is estimated presently at about \$48 billion. The growing complexities of resource and trust management added to the challenge of maximizing income while caring for the trust assets require increasingly sophisticated information. This information is needed to determine values and relationships, both now and in the future as well as to understand changing economies and other factors impacting resources and/or income. This document is not intended to be a comprehensive and definitive treatise on how to manage trust assets; it is doubtful such a document could ever be produced. It should, however, serve as a valuable and convenient reference where one can find under a single cover information and narrative discussion useful in formulating resource management strategies specific to state trust lands. This report should be used as an ongoing discussion document and reviewed and revised regularly.

II. HISTORICAL PERSPECTIVE

THE FERGUSSON ACT

In 1848, Mexico and the United States signed the Treaty of Guadalupe Hidalgo which ceded the territory encompassing what is now New Mexico to the United States. The territorial boundaries were described as extending from the border of the state of Texas on the east to the California Territory on the west. Upon establishment of the Arizona Territory from the western portion and the creation of the Colorado Territory from the northern portion, the present boundaries of the state of New Mexico were established in 1863.

Near the turn of the century, a group of willful and aggressive leaders attempted to develop New Mexico. One of them, Harvey B. Fergusson, Delegate at Large from the New Mexico Territory, sought for passage of a statehood resolution during his term. However, his resolution like those of his predecessors, was defeated. Recognizing both the hopelessness of obtaining statehood at that time and the declining availability of choice land, Fergusson proposed a bill authorizing lands be donated to the New Mexico Territory for certain communal purposes. In a stirring speech before the Committee on Territories on February 2, 1898, he laid the groundwork for the introduction and passage of the Fergusson Act of 1898 (Statutes at Large 484, Ch. 489).

The act gave sections 16 and 36 in every township to the territory of New Mexico for support of its schools and other public uses such as a university and college of agriculture, an insane asylum, a school of mines, schools for the blind and for the deaf, normal schools, a miner's hospital, the governor's palace, and a capitol; establishing permanent reservoirs for irrigation; and increasing the Rio Grande's surface flow in New Mexico. In the event any of these sections were mineral lands or had been sold or appropriated under mining or homestead laws, the territory was entitled to make alternative selections from other unappropriated, surveyed, non-mineral public lands. The act provided 5,589,185 acres of the public domain to be selected by the territorial governor, the territorial surveyor general, and the territorial solicitor acting as a commission, under the direction of the secretary of the interior.

On January 16, 1899, Miguel A. Otero, governor of the New Mexico Territory urged the legislature that the territory pass appropriate laws to activate the federal grant. Following his message, the Territorial Legislature enacted Council Bill #51 of the Territorial Laws of 1899, which accepted the grant and created the Board of Public Lands consisting of the governor, the solicitor general, and the commissioner of public lands, the latter to be appointed by the governor.

Because the act was passed late in the legislative session, there was no time for the governor to appoint the commissioner of public lands with the Territorial Council's consent. Therefore, Governor Otero, acting alone, appointed as commissioner of public lands, Alpheus A. Keen who served in this capacity through 1906.

The Fergusson Act, hailed as a splendid gift to the territory, turned out to be an exceedingly difficult piece of legislation to interpret and actually administer. The Board of Public Lands was responsible for leasing, selling and managing the lands. The commissioner was responsible for receiving all revenues and keeping separate accounts of the various funds. Detailed instructions for leasing guided the board, and it was forbidden to grant or sell lands for less than their appraised value. No more than 160 acres was to be sold to any individual nor more than 640 acres was to be leased to any individual, corporation or association.

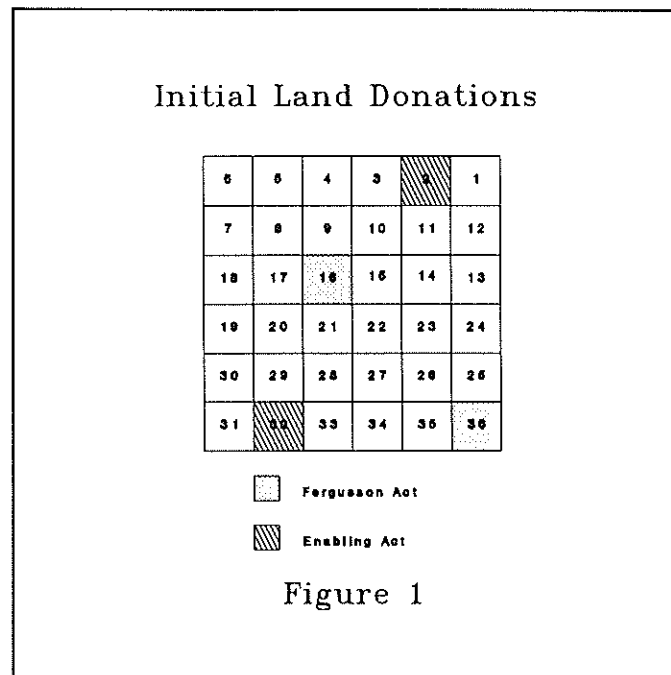
Inadequate funding hindered the board in its early years. It was authorized to sell 25 percent of saleable lands to cover initial administrative costs and activate its funds. However, the lands did not sell, and leasing proved unproductive because potential lessees were primarily stockmen who needed more than 640 acres. In June 1906 the Fergusson Act was amended, permitting the Secretary of Interior to approve grazing leases in excess of the 640-acre limit. The 160-acre limit for land sales was later abolished by the Enabling Act.

The first meeting of the Board was held March 27, 1899, and Commissioner Keen began setting up the Territorial Land Office. The records show he started a system, commonly known as the "tract book system," which accounted for the state trust lands on an institutional basis. The system was changed in 1933-34 to contain a full record of the selected and acquired institutional lands, described by subdivision in township and range order.

THE ENABLING ACT

The Enabling Act, which established statehood and a constitutional convention, was finally passed by Congress on June 20, 1910. After the delegates drafted a constitution, the document was submitted for a vote on January 21, 1911. By presidential proclamation, the New Mexico Territory officially became the state of New Mexico on January 6, 1912. One of the articles of the new constitution provided that a Commissioner of Public Lands take control, care and custody of the trust lands as agent for the state.

The Enabling Act confirmed the donations of sections 16 and 36 made by the Fergusson Act and increased them by over three million acres by setting aside sections 2 and 32 in every township for support of common schools (see Figure 1) and granting additional acreage for the support of various beneficiaries.



An allocation of one million acres, designated as "Railroad Bonds Grant," in payment of bonds issued by Santa Fe and Grant counties was approved. An additional 250,000 acres were also granted to the "County Bond Grant" to defray interest which had been paid by Grant, Luna, and Hidalgo counties on invalid bonds. The act provided that upon retirement of the bonds and interest indebtedness, any lands remaining in these grants would be administered for the support of the common schools.

The Enabling Act specified that five percent of all revenues derived from sales of public domain land within the state were to be deposited into the state permanent fund. Section 10 of the act placed certain restrictions and limitations on the use and disposition of trust lands. Some of the major points embodied in these restrictions were:

- The lands and all funds derived therefrom were declared to be held in trust.
- There could be no commingling of funds; consequently, income from the various lands was to be held in separate accounts and each beneficiary credited with the land appropriated to it.
- Any land or natural products of the land had to be appraised prior to selling and could not be sold for less than the true value.
- Lands or their natural products could be sold only at public auction, after proper advertisement in the newspapers.
- Any sale or contract handled contrary to these restrictions is considered null and void and the attorney general of the United States is charged with enforcing the act.

Over the years there have been changes to the Enabling Act. However, since this can be accomplished only by an act of Congress and ratified by a constitutional amendment, it is difficult to realize such changes. The most important of the few amendments which have been passed was Article 24, which removed restrictions on the disposition of minerals as imposed by the original act. It also gave the state legislature control over the minerals. Other federal acts, since the enabling act have granted small amounts of acreage to the state. These include the Bear Canyon Dam site on the Mimbres River and the Fort Stanton Hospital.

By adopting the Constitution, New Mexicans accepted the terms of the Enabling Act and the covenants attached to the various land grants. The act specifically stated that the granted lands are held in trust, therefore trust law guides all transactions involving granted lands and any disposition of the land must be under only those terms that return the highest benefit and good to the beneficiaries. The strong and varied restrictive covenants suggest that Congress intended no multiple uses of the land except under those conditions that would bring optimum revenue to the beneficiaries favored in the grants. In carrying out the constitutionally set duties, the

Commissioner must attempt to maximize revenues and concurrently protect and perpetuate the resources for long-term sustained economic yield.

In summary, the granting acts, in chronological order, are as follows:

- The Fergusson Act of June 21, 1898, conveyed sections 16 and 36 from each township for common schools. It also included several quantity grants.
- An Act of Congress, dated February 18, 1909, (c. 150 Sec. 1, 35 Stat. 638) extended the terms of the Carey Act of August 18, 1894, granting additional acreage to the state of New Mexico for an irrigation project.
- On March 17, 1922, 4,743.23 of these acres were patented under the act to aid in the support of Carrie Tingley Crippled Children's Hospital.
- The statehood Enabling Act of June 20, 1910, conveyed sections 2 and 32 from each township, plus several more quantity grants.
- The Act of May 28, 1928, (s. 2535, Chap 812) granted an additional 250,000 acres for reimbursement to the counties of Grant, Luna, Hidalgo, and Santa Fe and the town of Silver City and the city of Santa Fe for payments made on invalid railroad bonds.
- The Act of March 31, 1932, (s. 1590, Vol. 47. Part 1) granted 76,000 acres of land to be selected for the support of Eastern New Mexico Normal School (now known as Eastern New Mexico University).

III. OVERVIEW

The SLO's overall program objective is to manage the resources and assets of trust lands to maximize income while protecting and conserving the resources and assets of the trust. The sole purpose of the trust and role of the trustee is to provide income to the legal beneficiaries of the trust.

There is great misunderstanding by people about state trust lands. So called "state lands" or "trust lands" are considered by many, if not most New Mexicans, to be **public lands** and available for general public use and enjoyment. This is **not** the case. They are not for public **use** but rather for public **benefit**. Public benefit is realized by directing income from state trust lands to designated beneficiaries, mainly public schools. Income from these lands significantly offsets the need for tax revenues to support these public institutions. The term "school sections," still used by many rural residents in the state, is perhaps a more accurate description regarding the purpose of these lands.

THE BENEFICIARIES

Each parcel of trust land is essentially assigned to a specific beneficiary institution (or group of institutions), such that income from that parcel ultimately goes to the assigned institution. Some three-quarters of all the surface and mineral acreage of the trust is assigned to public schools (common schools). The remaining acreage of the trust estate is assigned to the other beneficiary institutions. Table 1 lists the beneficiaries and their respective interests in the surface and mineral acreage. A more graphic representation of relative beneficiary income is shown in Figure 2. This chart illustrates the percent distribution of \$258.96 million in interest earned from permanent fund investments for the fiscal year ending June 30, 1990.

TRUST HOLDINGS

Of New Mexico's 77.8 million surface acres, 12 percent is state trust lands, 34 percent is federal government land, 10 percent are Indian lands, and 44 percent is privately owned. Figure 3 presents a graphic representation of land ownership.

TABLE 1. BENEFICIARIES

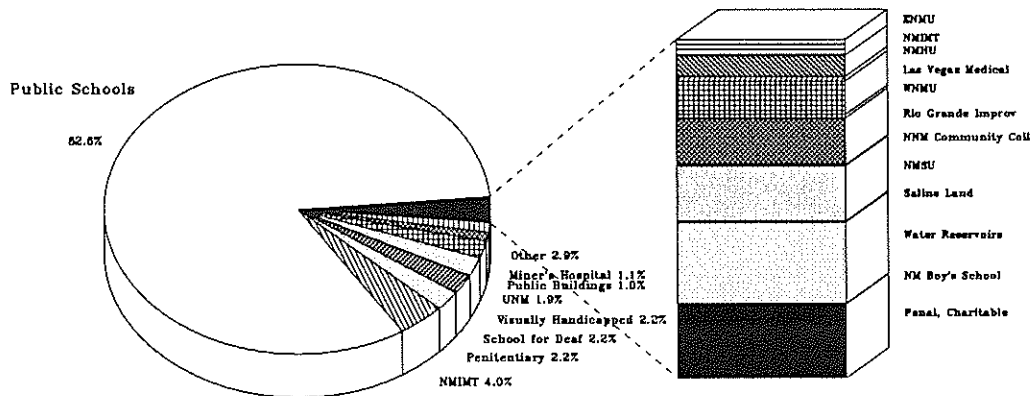
<u>BENEFICIARY</u>	<u>SURFACE</u>		<u>MINERAL</u>	
	Acreage	%	Acreage	%
Public Schools	6,955,096	(75.5)	10,029,328	(76.5)
University of New Mexico	254,888	(2.8)	344,116	(2.6)
New Mexico State University	201,166	(2.2)	267,668	(2.0)
New Mexico Inst. of Mining & Tech.	164,664	(1.8)	221,358	(1.7)
New Mexico Military Institute	141,614	(1.5)	160,685	(1.2)
Eastern New Mexico University	126,871	(1.4)	105,835	(0.8)
Western New Mexico University	66,389	(0.7)	123,610	(0.9)
Highlands University	66,389	(0.7)	123,610	(0.9)
School for Visually Handicapped	107,140	(1.2)	122,984	(0.9)
School for the Deaf	90,433	(1.0)	110,652	(0.8)
Northern N.M. Community College	66,389	(0.7)	57,059	(0.4)
Las Vegas Medical Center	105,847	(1.2)	169,238	(1.3)
Miners' Colfax Medical Center	107,868	(1.2)	127,913	(1.0)
Carrie Tingley Hospital	2,980	(.03)	3,341	(.03)
New Mexico Boys' School	49,863	(.5)	69,699	(.5)
State Penitentiary	114,616	(1.2)	167,202	(1.3)
Rio Grande Improvements	54,049	(.6)	89,189	(.7)
Public Buildings	88,726	(1.0)	131,977	(1.0)
Water Reservoirs	377,147	(4.1)	512,300	(4.0)
Charitable, Penal & Reform	<u>74,864</u>	(.9)	<u>166,071</u>	(1.3)
TOTAL:	<u>9,216,999</u>		<u>13,103,835</u>	

In addition to the 9.2 million acres of surface ownership, the SLO also has 13.1 million acres of mineral rights. The subsurface resources represent the vast majority of the trust assets. No detailed inventory of trust assets has been done, but rough estimates by SLO staff indicate a total worth of about \$48 billion. A breakdown of these assets is shown in Figure 4.

INCOME

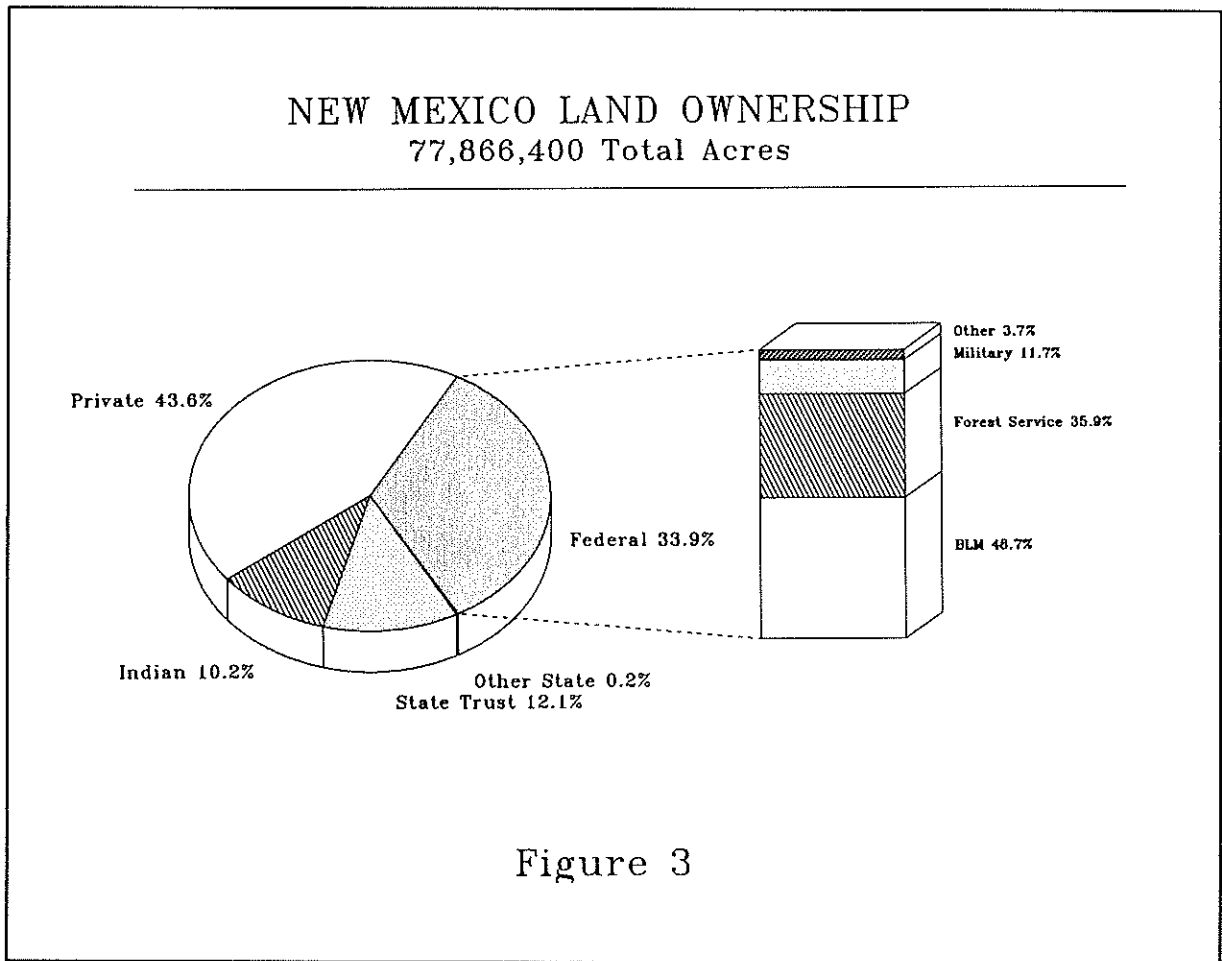
The SLO manages, controls, leases, and sells trust assets to develop income for the beneficiaries. Revenues are earned by leasing lands for grazing, agriculture, commercial use,

PERMANENT FUND INCOME TO BENEFICIARIES Fiscal Year 1990



oil and gas production, mining, and other surface and subsurface activities. In addition to income from leases themselves (rentals), the SLO usually receives bonuses at the time of initial leasing and royalties based on the extraction and sale of minerals. Income is also received from the principal and interest from land sales.

The largest revenue stream from the land is from oil and gas royalties to the Permanent Fund. This amounted to \$104.92 million during FY1989-90. By law, all mineral royalties and income from land sales must be deposited into the Permanent Fund. The present balance in this fund is slightly over \$2.9 billion. Monies from this fund are invested under the direction of the State Investment Council which includes the Commissioner of Public Lands as an ex-officio member. Only the earnings from these investments, not the corpus of the fund, are allowed to be distributed to the beneficiaries. The largest revenue stream to the beneficiaries comes from



Permanent Fund earnings which for FY 1990 totalled \$258.96 million. It is noteworthy that earnings paid to beneficiaries from the fund currently exceed income to the fund. The revenue flow chart shown in Figure 5 indicates the path and amounts of income from the land to the beneficiaries. For FY 1990 the total beneficiary income totalled \$278.65 million. SLO administrative costs run about five percent.

Total revenues received every year, as one might expect, are largely a function of revenues generated from oil and gas (Figure 6). The decline of this industry during the 1980's had a very negative affect on SLO revenues as can be dramatically seen in Figure 7.

TRUST LAND ASSETS
\$48 Billion

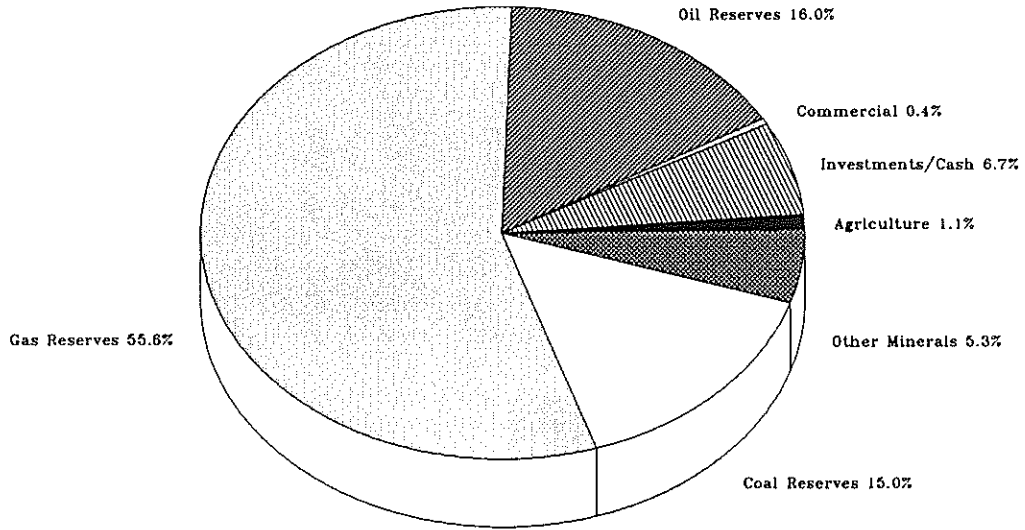


Figure 4

Revenue Flow Chart FY-1990

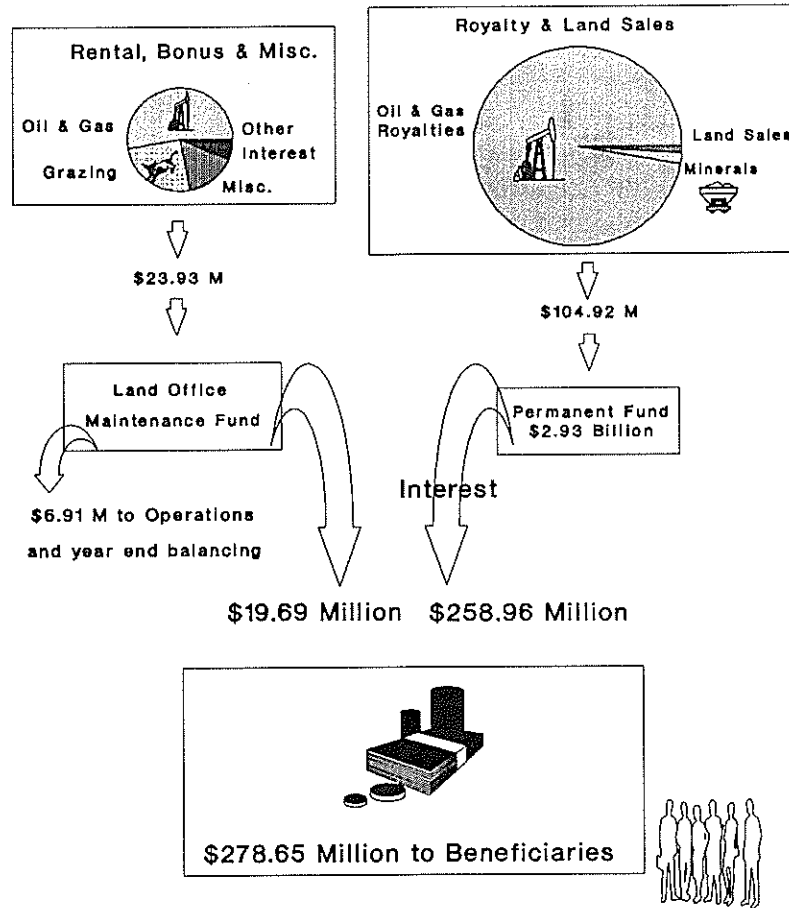


Figure 5

State Land Office Revenue by Source
FY 89-1990 \$128.85 Million Total

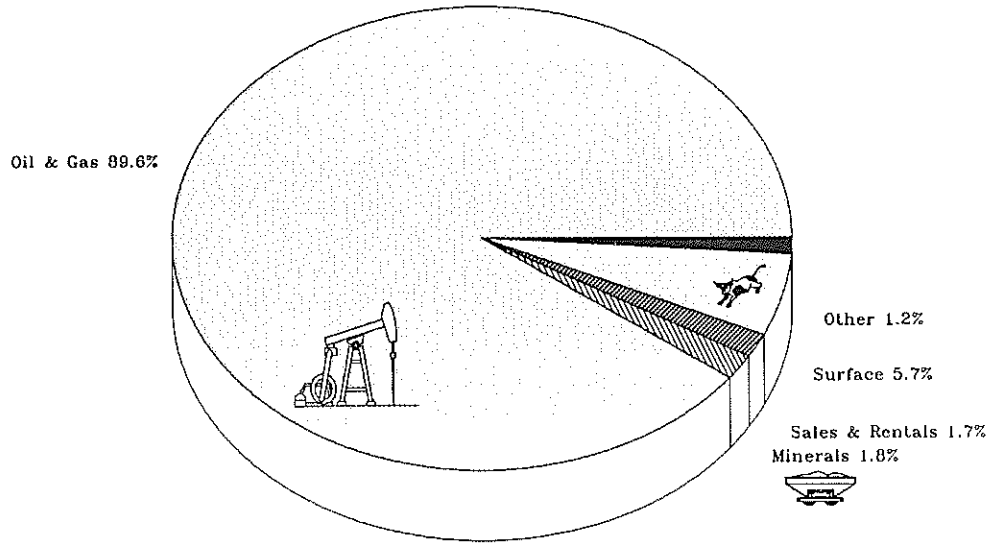


Figure 6

Trust Land Revenues FY82-89

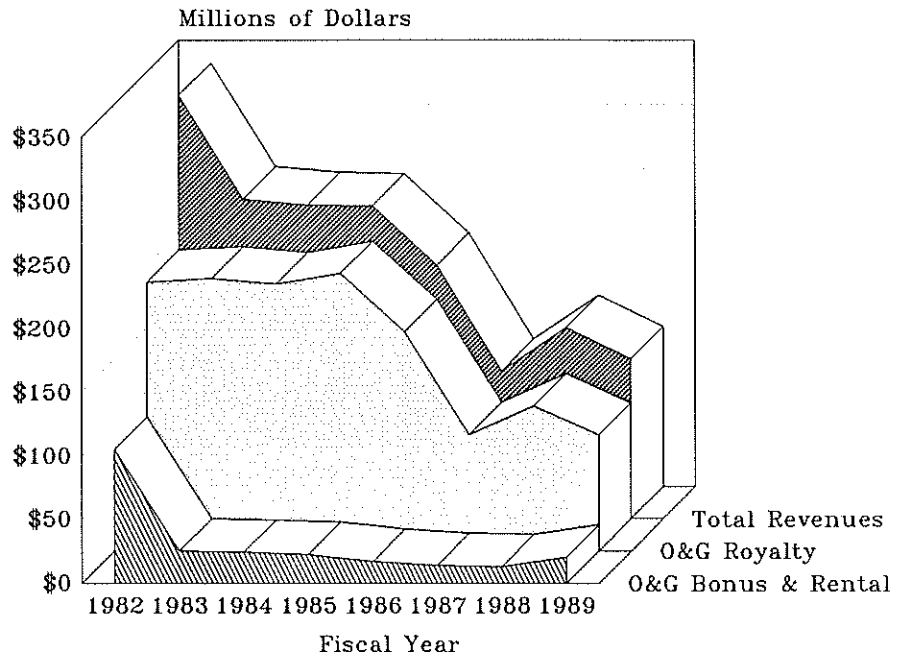
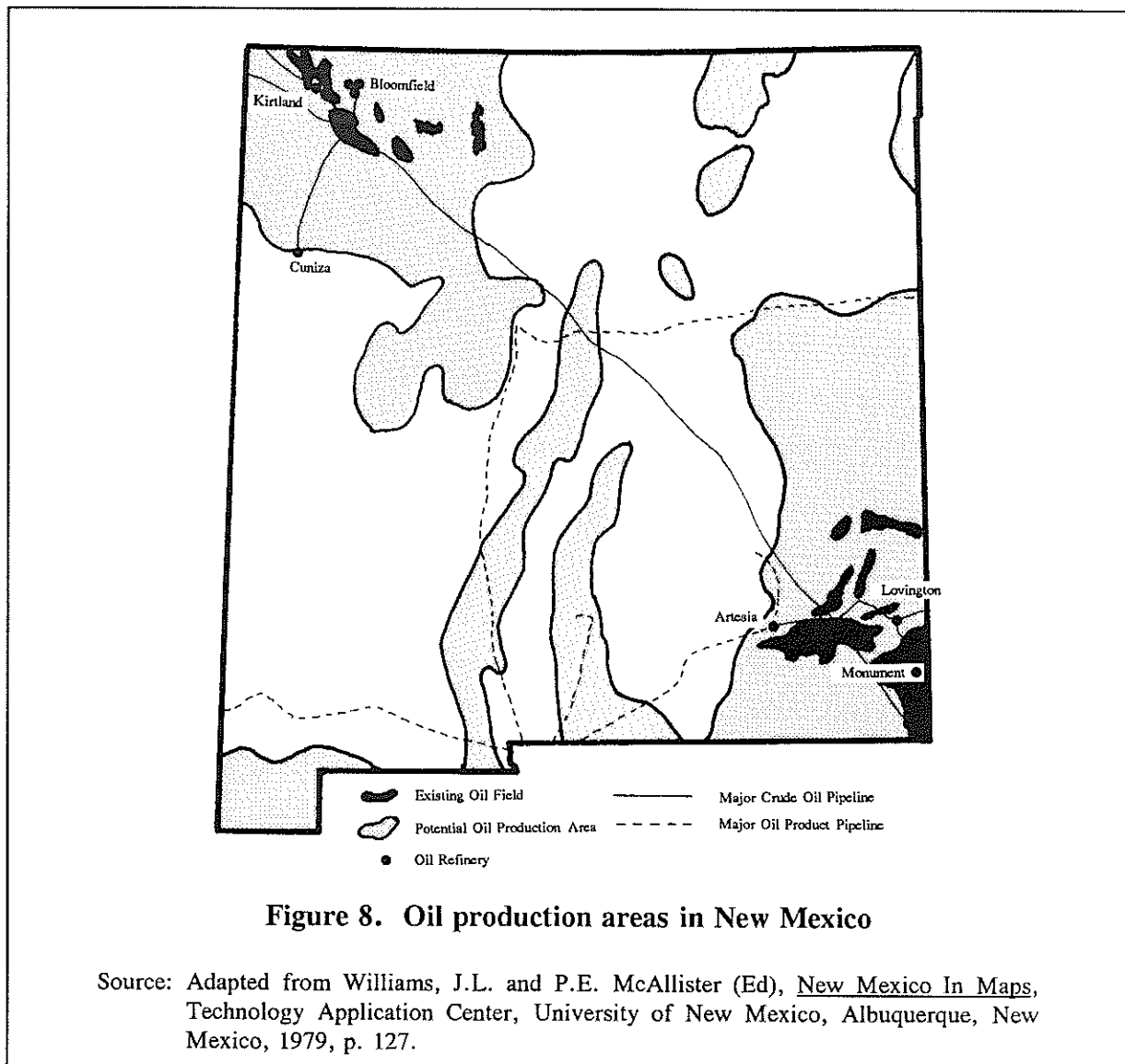


Figure 7

IV. RESOURCES OF THE TRUST

OIL AND NATURAL GAS

New Mexico ranks seventh in the nation in oil production and fourth in natural gas production (Figure 8). Although oil and gas production is expected to decline, it will continue to be one of the state's most important industries over the next few decades and trust lands will continue to play a key role in its development.



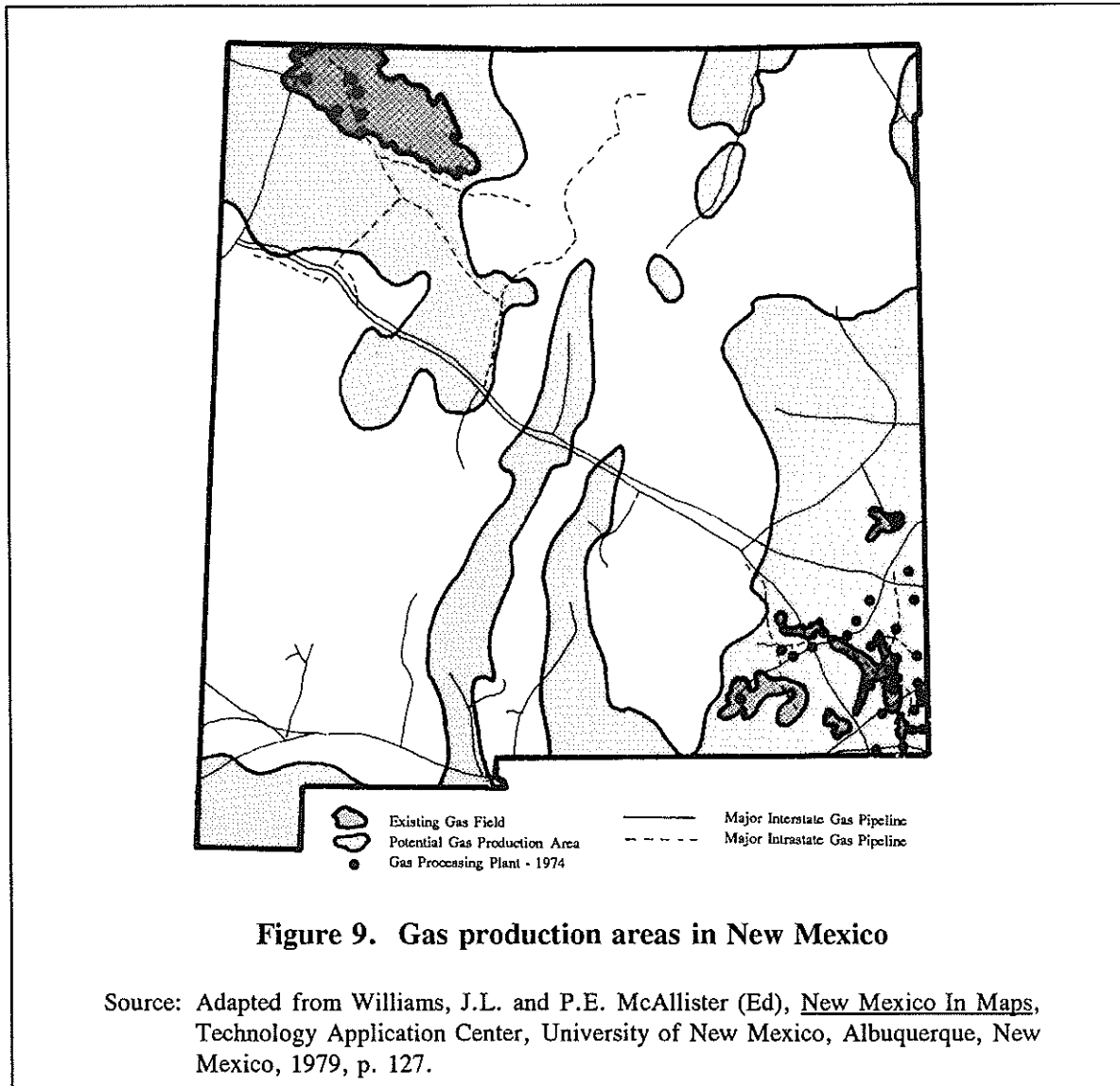
Oil and natural gas have contributed the bulk of the \$2.9 billion in revenues to the permanent fund. Over the past several years, annual contributions have averaged around \$100 million per year. Approximately 41 percent of the oil production in New Mexico is from trust lands. Although reserves on trust lands have never been calculated, it follows that production mirrors reserves and therefore, approximately 41 percent of the state's reserves will be found on state trust lands. The latest U.S. Department of Energy estimates indicate that New Mexico's oil reserves are 921 million barrels (US Dept of Energy, 1989); thus the state trust lands reserves are estimated to be around 380 million barrels.

The oil production from trust lands is roughly 29 million barrels per year which translates into royalty revenues of about \$63 million per year or about two-thirds of the total permanent fund revenues from trust lands.

Natural gas is the second most important mineral commodity found on state trust lands. As with oil, no detailed calculations have been made of reserves found on state trust lands, but it is estimated that reserves are between 3.5 and 5.5 trillion cubic feet (Figure 9). As much as one-half of that estimate could be coal-seam gas in the San Juan Basin. Production amounts to approximately 22 percent of the total state production or 173 billion cubic feet per year, resulting in royalty revenues of around \$33 million per year.

Reservoirs in producing fields may contain producible oil and gas that has not been extracted and was bypassed by production mechanisms. They may also contain oil and gas that is isolated in heterogeneous reservoirs and cannot be tapped by existing wells. A certain percentage of the oil and gas is immobile and not extractable with current technology.

Carbon-dioxide flooding is the final stage of the oil-recovery process that is applicable to important reservoirs in southeastern New Mexico. Carbon-dioxide floods have been initiated in several large oil pools in west Texas, but only two pilot floods have been initiated thus far in southeastern New Mexico. Large-scale carbon-dioxide flooding will eventually commence in the area provided oil prices are sufficiently high and state revenue structures (such as severance tax rates and royalty rates) exist which will make these projects economically attractive.



COAL

New Mexico has vast low-sulfur coal resources--approximately 186 billion tons (of which 11.5 billion tons are surface-minable), ranging from high-heat-content coking quality to noncoking lower-rank sub-bituminous grade (NM EM&NR, 1989). There are 13 major coal fields in the state (Figure 10 and Table 2). With the exception of the Raton Basin, trust lands are fairly evenly distributed in the coal-bearing areas, so the coal resources on state trust lands are significant. Although no formal assessment has ever been made, a rough estimate is somewhere around 360 million tons.

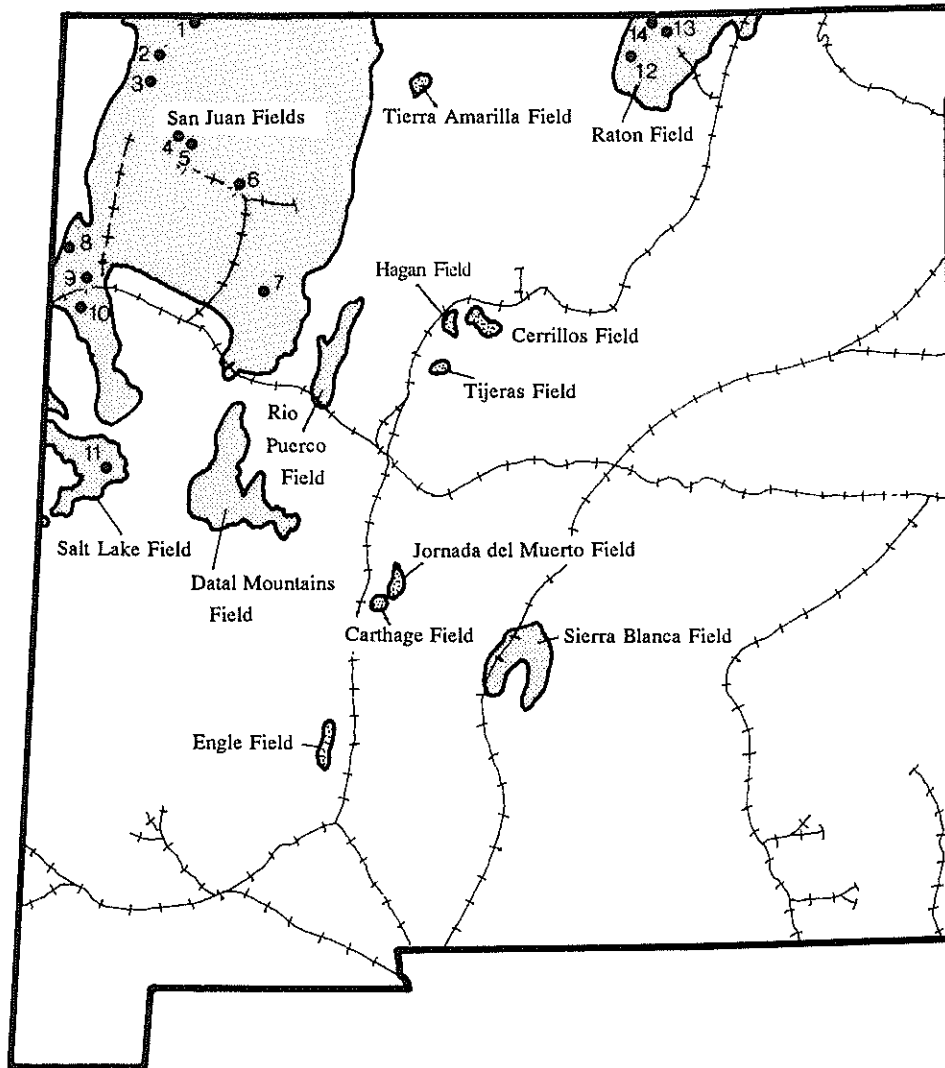


Figure 10. Coal Fields and Mines in New Mexico

- | | | |
|-----------------------------------|----------------------------------|---------------------------------|
| Active and Permitted Mines | | |
| 1. La Plata | 6. Gallo Wash (inactive) | 11. Fence Lake No. 1 (inactive) |
| 2. San Juan | 7. Lee Ranch | 12. Cimarron |
| 3. Navajo | 8. McKinley | 13. York Canyon |
| 4. De-Na-Zin (inactive) | 9. Carbon No. 2 (in reclamation) | 14. York Canyon Surface |
| 5. Gateway (inactive) | 10. Mentmore (in reclamation) | |

Source: New Mexico Bureau of Mines and Mineral Resources, Socorro, New Mexico.

Table 2. Estimated remaining coal resources in New Mexico by field

Coal Area	Strippable Resources	Deep Resources	Strippable and Deep Resources Combined	Total
(millions of tons, measured and indicated combined)				
San Juan Basin				
Fruitland Formation	5,716.0	154,177.0		159,893.0
Menefee Formation	3,076.0	12,000.0		15,076.0
Crevasse Canyon Formation	1,981.3	1,422.0		3,403.3
San Juan Basin Total	10,773.3	167,599.0		178,372.3
Raton Basin			4,709.0	4,709.0
Cerrillos Field	47.0			47.0
Hagan Field			17.0	17.0
Tijeras Area		2.0		2.0
Datil Mountain Area	158.5	83.4		241.9
Salt Lake Area	477.6	99.6		577.2
Carthage Field			0.4	0.4
Jornada del Muerto Area	22.7	30.4		53.1
Sierra Blanca Field			1,644.0	1,644.0
Engle Area	13.8	24.9		38.7
Total	11,492.9	167,839.3	6,370.4	185,702.6

Source: New Mexico Energy, Minerals, and Natural Resources Department, 1989, Annual Resources Report--1989 Update, Santa Fe, New Mexico, table 35, (data from New Mexico Institute of Mining and Technology, Bureau of Mines and Mineral Resources, 1989).

Of the seven currently operating mines in the state, only one is located on state trust lands. Production and royalties are highly variable, depending upon whether or not mining is being conducted on trust lands at a given time. Royalties paid over the last five years averaged \$2 million per year.

HUMATE

Humate is typically a coal-related commodity defined as either carbonaceous mudstones found in a coal-bearing sequence or weathered coal at the outcrop. Humate resources amount to 5 to 7.5 billion short tons in the Menefee Formation as estimated by the N.M. Bureau of Mines and Mineral Resources. Humate is mined primary for its humic acid content. Uses for humate include drilling-mud additives and soil additives. Recently, it has been proposed for use

in lining radioactive-waste disposal sites because the humic acid tends to attract and absorb radioactive material (Figure 11).

POTASH

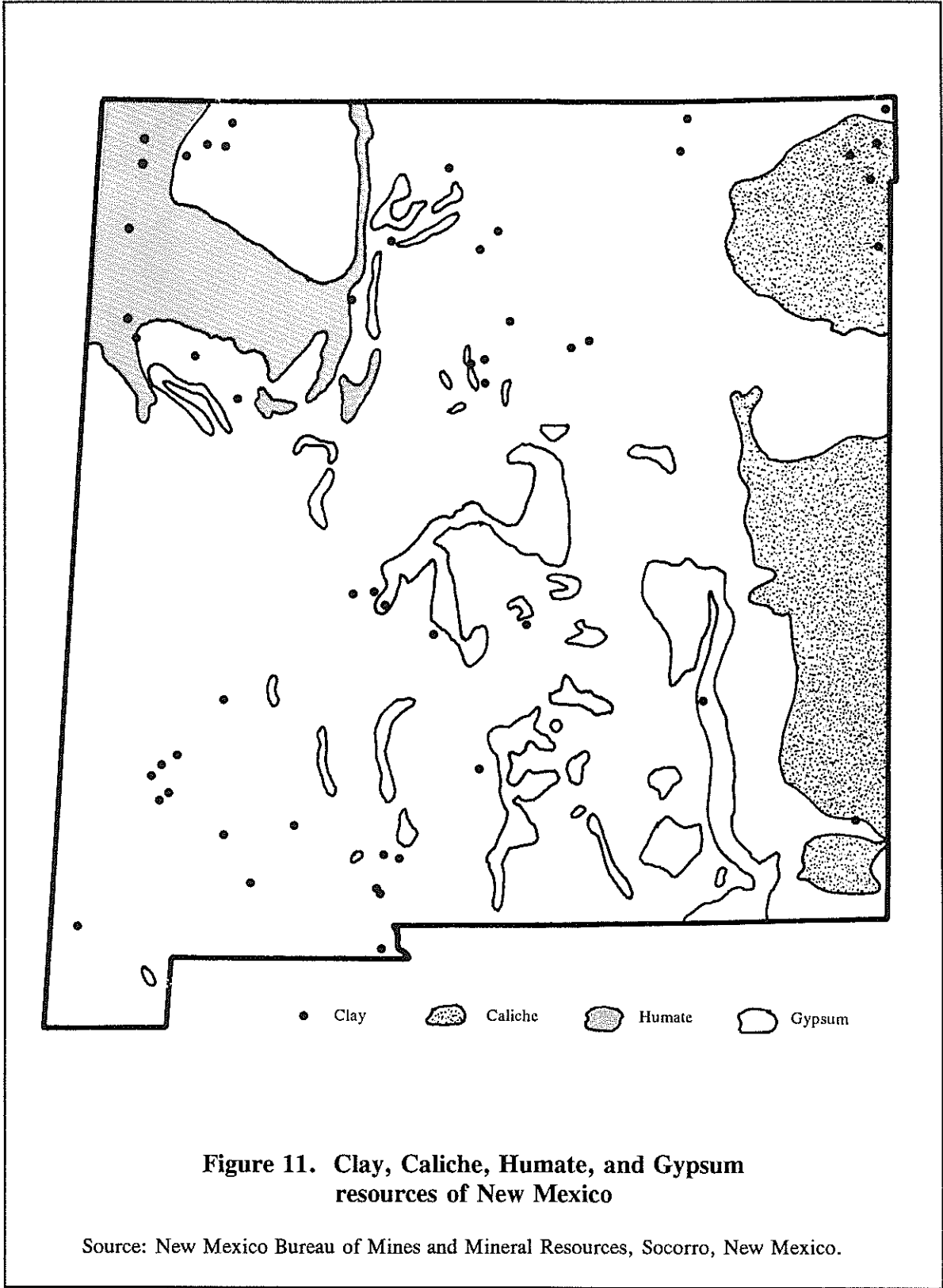
Substantial potash deposits exist in southeastern New Mexico, which has been the leading potash producing area in the United States for more than 40 years (Figure 12). Potash production began to decline in the early 1980s, but has rebounded significantly in the last two to three years. Potash deposits found on trust lands have never been formally assessed, but there are significant resources. Most producers have reserves for an estimated 20 to 40 years.

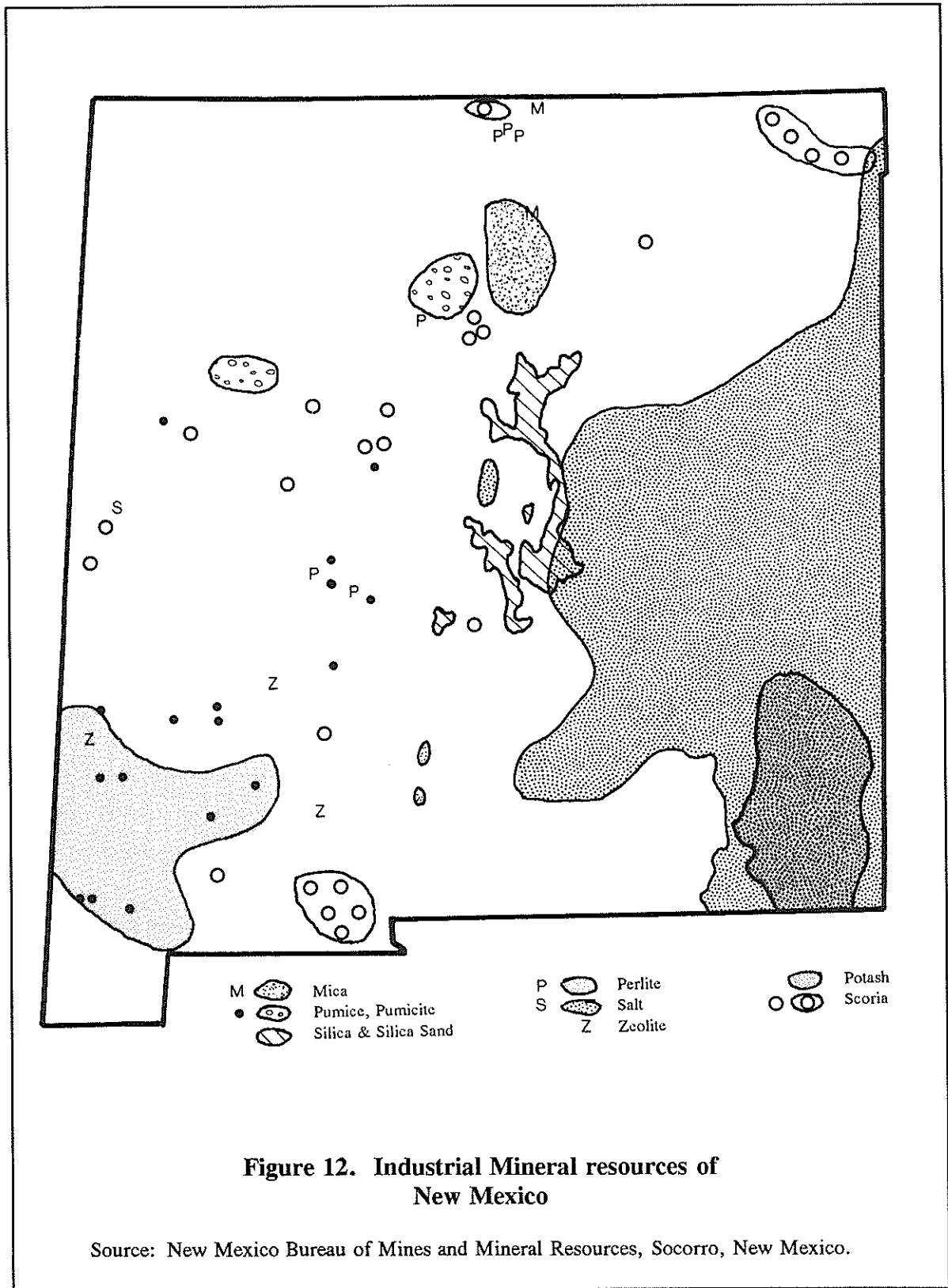
Potash producers in New Mexico currently operate four mines that encompass some state trust lands. Employment at these mines is relatively high in relation to the production and revenues received from them.

The SLO has also always followed the federal government where potash development was concerned, since most mines incorporate a large share of federal lands with a smaller proportion of state trust and fee lands in their mining unit. In addition, until recent times the SLO did not have the technical resources to use in evaluating the industry's performance. Data bases and advice, however, are available from the U.S. Geological Survey (USGS), Bureau of Land Management (BLM) and the N.M. Bureau of Mines and Mineral Resources.

Royalties from potash are highly variable, depending upon the current price and demand, and whether or not mining is being conducted on state trust lands at a given point in time. Over the past ten years, they have ranged from a low of \$155,000 in FY 1983 to a high of \$1.45 million in FY 1989.

Potash mined in southeastern New Mexico generated substantial revenues for the state during the 1950s and into the mid-1970s. Although the industry has declined since that time, it once contributed significantly to the economic base of Eddy and Lea counties. The potash industry generated a total of \$1,515,089 in bonuses, rentals, and royalties for the state in FY 1989. While potash from competing foreign suppliers is produced at a lower cost than in New Mexico, there are reasons for optimism about the future of the potash industry in New Mexico. Should the industry collapse, however, problems may result because of surface disposal of salt tailings. It is doubtful that ground-water supplies would be greatly impacted, but some review





of current and past waste production as well as the hydrogeology of the potash mines is warranted.

SAND AND GRAVEL

Sand and gravel is one of the most important industrial mineral commodities exploited in New Mexico (Figure 13). According to the U.S. Bureau of Mines, 8.8 million tons of construction sand and gravel, with a value of \$31.4 million, were mined in New Mexico in 1988. For the corresponding time period, royalties from all sand and gravel leases on state trust lands were \$287,000. The market share of sand and gravel coming from state trust lands is very small.

As with many other mineral commodities, the SLO does not have accurate estimates of sand and gravel resources located upon trust lands. During the last year, the SLO has begun to renew only those sand and gravel leases that are producing, or those containing a minimum annual royalty clause. This policy change has resulted in a revenue increase, and at the same time has cut the labor devoted to lease processing. Royalty revenues increased 22 percent between FY 1989 and FY 1990, partially as a result of the new leasing policy. During the same time, the number of leases was reduced by over 50 percent, resulting in a labor savings of approximately one man-year.

OTHER INDUSTRIAL MINERALS

Other industrial minerals known to exist in New Mexico include barite, caliche, limestone, clay, gypsum, mica, perlite, pumice, salt and scoria (Figure 11, 12, 14, and 15). All these minerals are leased on a fixed-term lease form commonly called the "sand and gravel" lease form by the SLO.

METALLIC MINERALS

Leases for mining metals, such as copper, molybdenum, uranium, gold, silver, iron, lead, and others are commonly issued on the "general mining" lease form. These leases provide for a fifteen-year term, with advance royalties in lieu of production being paid in the last five years. Historically, the SLO has derived relatively little in revenues from these leases. During

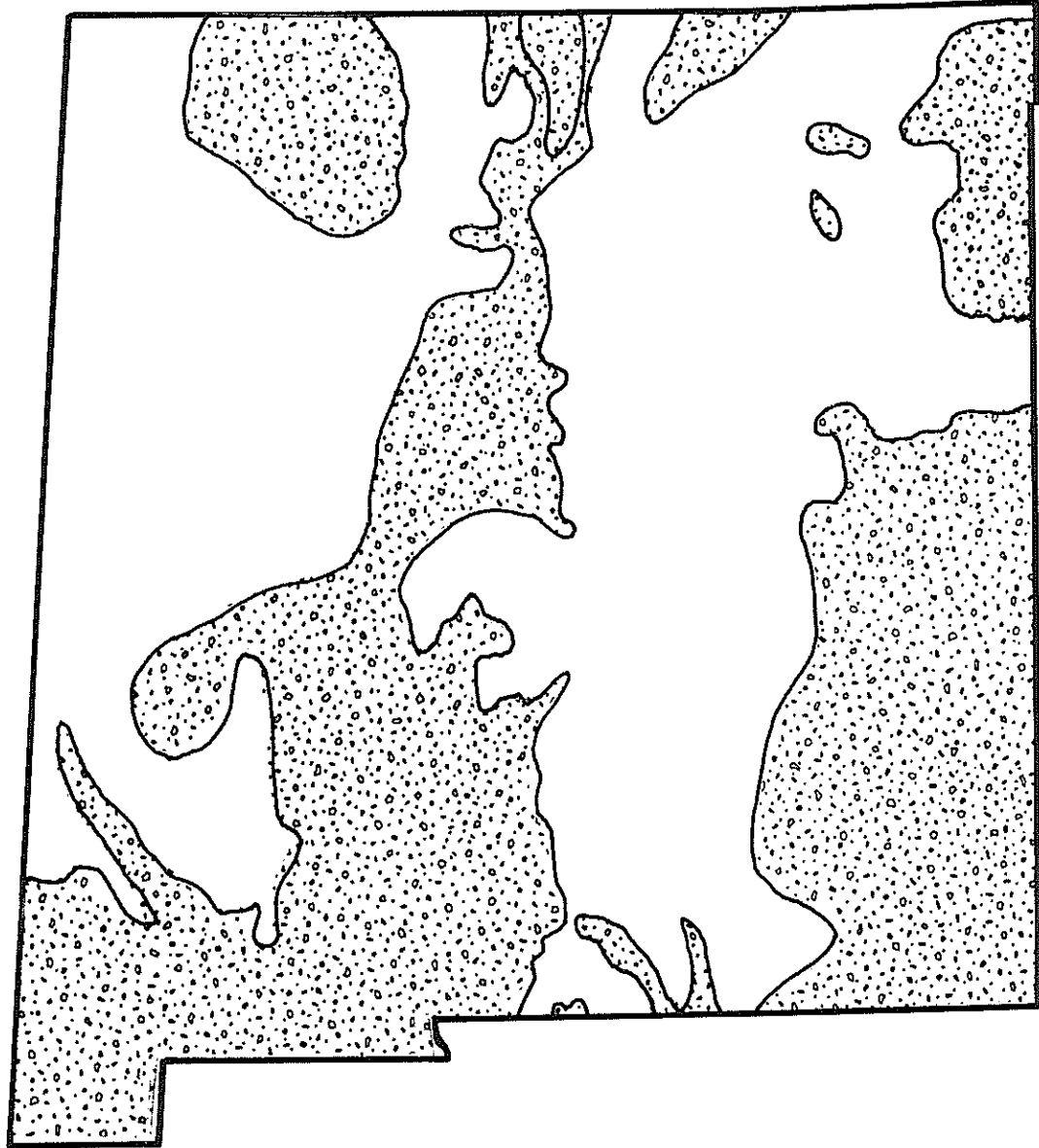
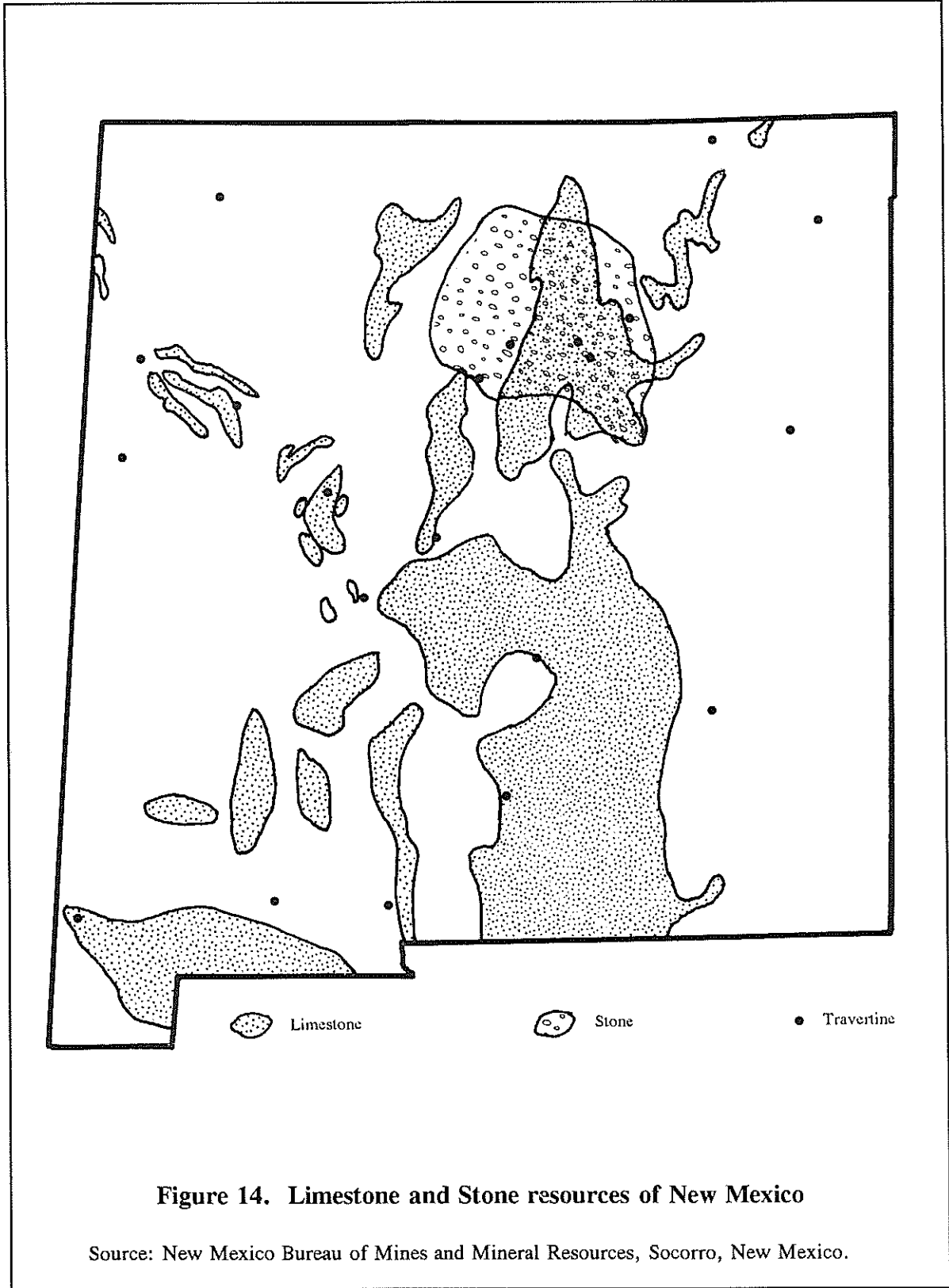
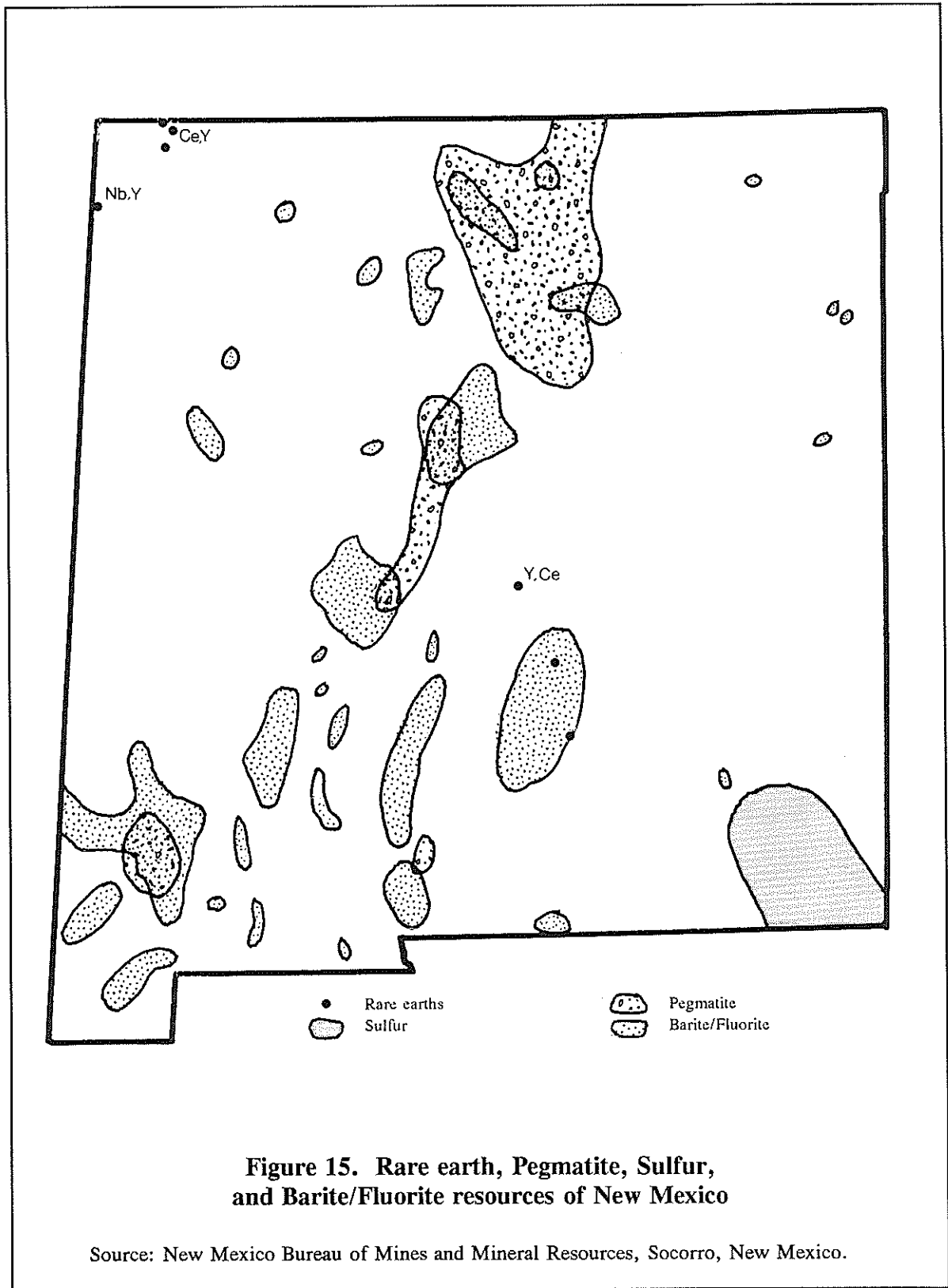


Figure 13. Sand and Gravel resources of New Mexico

Source: New Mexico Bureau of Mines and Mineral Resources, Socorro, New Mexico.





the uranium boom of the early 1980s, annual rental and royalty revenues approached one-half million dollars for several years, but since then have declined to the current level of \$24,000 for fiscal year 1988-89. Actual royalties paid for material severed from the ground have been non-existent in recent years. The SLO considers the probability of a major discovery of new metallic minerals on trust lands to be low.

CARBON DIOXIDE

State trust lands are an important source of carbon dioxide in New Mexico. The Bravo Dome Carbon Dioxide Unit in northeastern New Mexico contains 28.5 percent trust lands. The operator, Amoco Production Company estimates reserves to be 13 trillion cubic feet for the total unit.

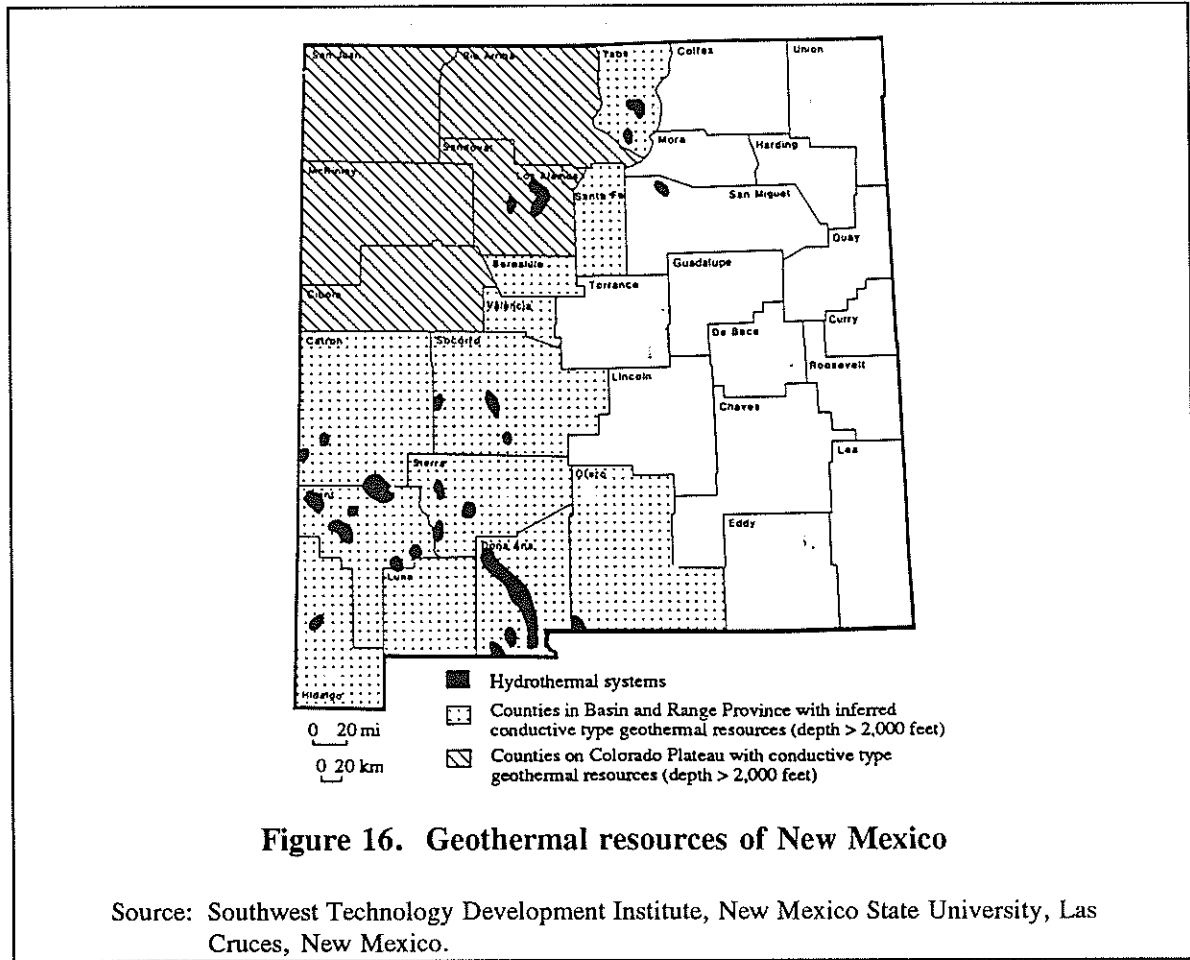
Although production has not risen to the levels forecasted ten years ago, production and revenues are still quite significant. In 1988, carbon dioxide production from state trust lands totaled 38.4 billion cubic feet, and royalty revenues were \$5.2 million, or 5.5 percent of the total oil, gas, and carbon dioxide royalty revenues.

There may be significant amounts of carbon dioxide reserves available for exploitation as a by-product of methane development in the Fruitland Formation in the San Juan Basin. This carbon dioxide could have significant value in the future, but little is known about its potential today.

GEOHERMAL

Geothermal resources or reserves are widely distributed in the western two-thirds of New Mexico. Most reserves are found in the Basin and Range Province in southwestern and south-central New Mexico. Other important reserves occur in the Jemez Mountains region of north-central New Mexico (Figure 16). Deeply seated aquifers beneath the Colorado Plateau and Basin and Range Province represent another, but currently untapped, low-temperature (less than 200°F), geothermal resource of enormous volume.

Proven New Mexico geothermal resources generally occur in fresh to brackish ground water with total dissolved solids less than 10,000 ppm. Currently utilized reservoirs produce water less than 3,000 ppm total dissolved solids at temperatures of less than 200°F.



In 1990, the total use of geothermal energy in New Mexico is equivalent to about 120,000 MBtu annually. To date, there is no production of electrical power derived from geothermal resources in the state. Geothermal reservoirs are being tapped for commercial purposes in six New Mexico counties: Grant, Dona Ana, Hidalgo, Taos, Sandoval, and Sierra. In the Lower Animas Valley of Hidalgo County, approximately 17 acres of greenhouse space is heated with geothermal energy, including the largest geothermally heated greenhouse complex in the nation. Residences and hunting lodges are heated with geothermal energy in Gila Hot Springs (Grant County). In the Village of Jemez Springs (Sandoval County), commercial space and water heating and spa heating have been successful uses of geothermal energy for many years. Spa, bath house, and swimming pool heating have also been effective uses of geothermal resources in Ojo Caliente, Taos County. Truth or Consequences in Sierra County, originally

named Hot Springs, has long been known for its natural hot baths and spas as well as residential and commercial space heating using geothermal resources.

In Dona Ana County, the New Mexico State University campus in Las Cruces has been a pioneer in large-scale geothermal energy development. Since 1982, substantial quantities of natural gas have been saved by using geothermal energy to provide water, space, and swimming pool heating. This system is the second largest use of geothermal energy on a university campus in the United States. The nation's first geothermally heated greenhouse research facility became operational at New Mexico State University in 1986. Near Radium Springs, north of Las Cruces, a state-of-the-art 8.5 acre geothermally heated commercial greenhouse began operation in 1987.

GRAZING RESOURCES

More than 90 percent of the land area of New Mexico is in native vegetation grazed by domestic livestock and wildlife. There are over 3,000 species of these native plants. There are six major rangeland areas in New Mexico (Figure 17). The kinds of plants that grow on a range, their quality and quantity, determine its value.

Over 50 percent of land in New Mexico is supervised by four major land management agencies (Bureau of Land Management, Forest Service, Bureau of Indian Affairs, and SLO). These agencies typically utilize a "grazing capacity" which is the sustainable stocking rate that does not result in damage to vegetation and related resources. Under these capacities, the forage on the land area could be grazed at a rate which would permit the range, under average rainfall and management conditions, to improve or to maintain itself indefinitely in "good condition."

Private range lands can be influenced by the "grazing capacities" established by these agencies. Many ranch units include lands leased from the BLM, Forest Service, or SLO in such amounts that ranch grazing allotments are influenced by these agencies. Figure 18 is a map of grazing capacities developed from public land management agencies.

WILDLIFE

Wildlife is a public-owned asset held in trust by the state. It is administered by the Game and Fish Commission and managed by the Department of Game and Fish. Most wildlife on

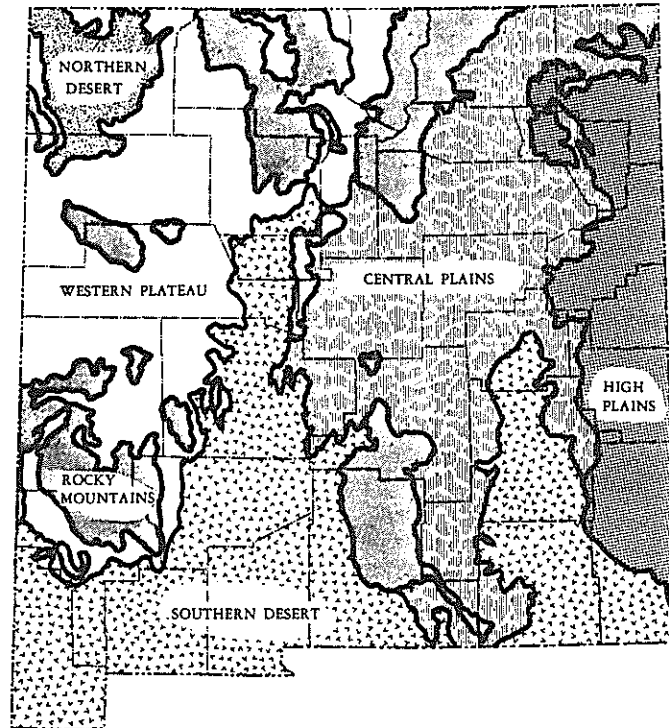


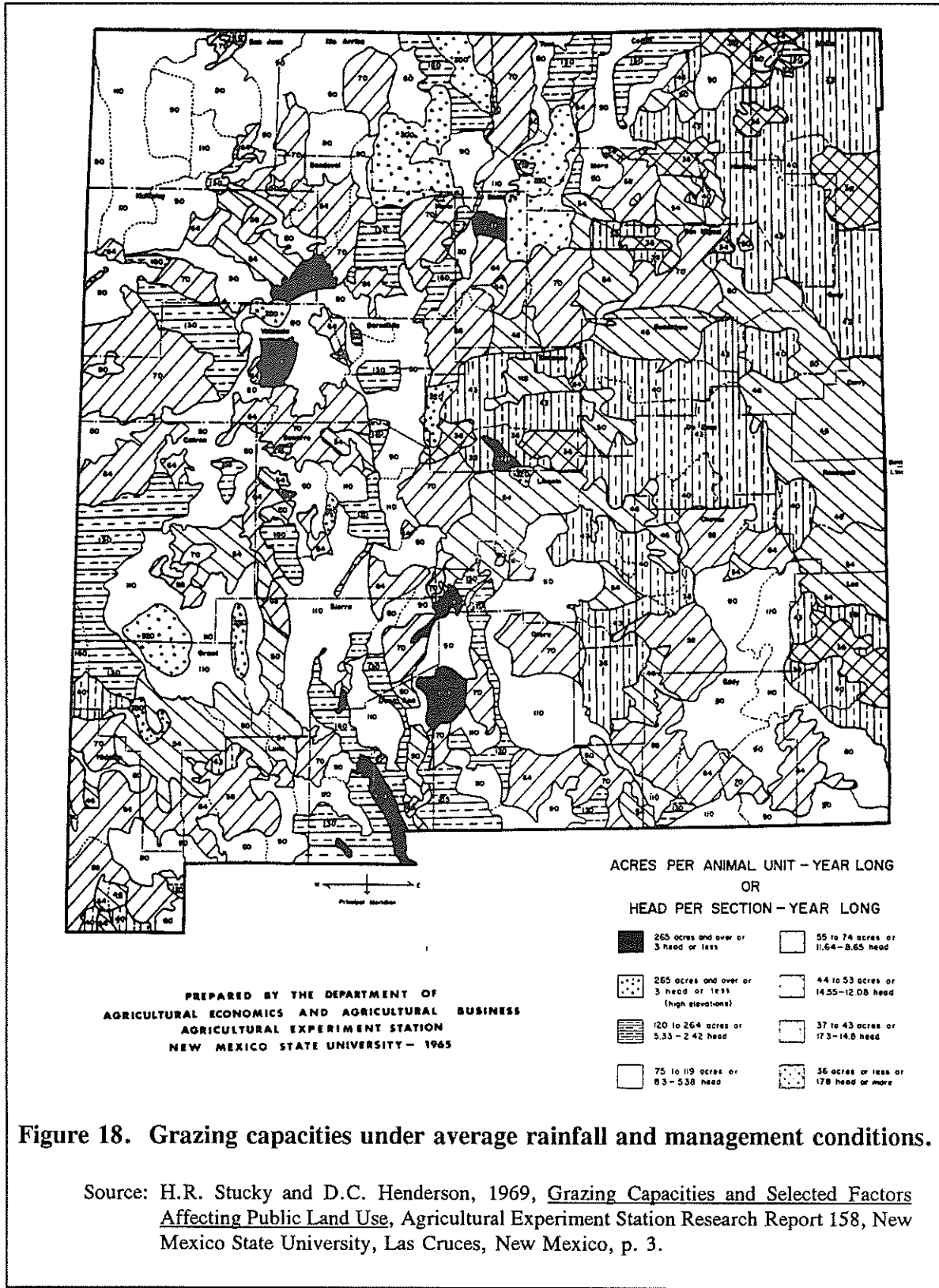
Figure 17. New Mexico rangeland areas.

Source: Gay, C.W. and D.D. Dwyer, New Mexico Range Plants, Cooperative Extension Service Circular 374, New Mexico State University, Las Cruces, New Mexico, p. 1.

New Mexico's state trust lands can be included in one of three categories: game animals, non-game animals, and endangered species. Each group poses different considerations and conflicts in their management.

Game Animals

Game animals are statutorily classified as such through legislative action. These animals include deer, elk, antelope, and other wildlife for which a New Mexico hunter's license is required. Under the present system, access to hunting wildlife on trust lands is possible through an agreement between the SLO and the N.M. Game and Fish Commission. At times, the agreement has involved direct payment to the SLO and at other times it has involved in-kind payment for the law enforcement supplied by N.M. Department of Game and Fish. Little game management has been done specifically by the SLO on state trust lands. Typically, the greatest benefits for wildlife on state trust lands are derived from the presence of waterings made



available by ranchers. Other management such as brush control, habitat manipulation, and any type of population analysis or manipulation is usually done for reasons other than wildlife habitat enhancement. Forage is allocated for the wildlife resource when the SLO calculates carrying capacities, as well as other resource considerations.

Non-game Animals

Non-game animals on state trust lands are in essence not managed. They live there because the habitat is available and they are able to coexist with other land uses. Non-game animals include a wide variety of wildlife from song birds and raptors to small rodents, and all invertebrates.

Endangered Species

Endangered species on state trust lands provide an issue on a resource that has not yet been confronted. This will be discussed in a later section.

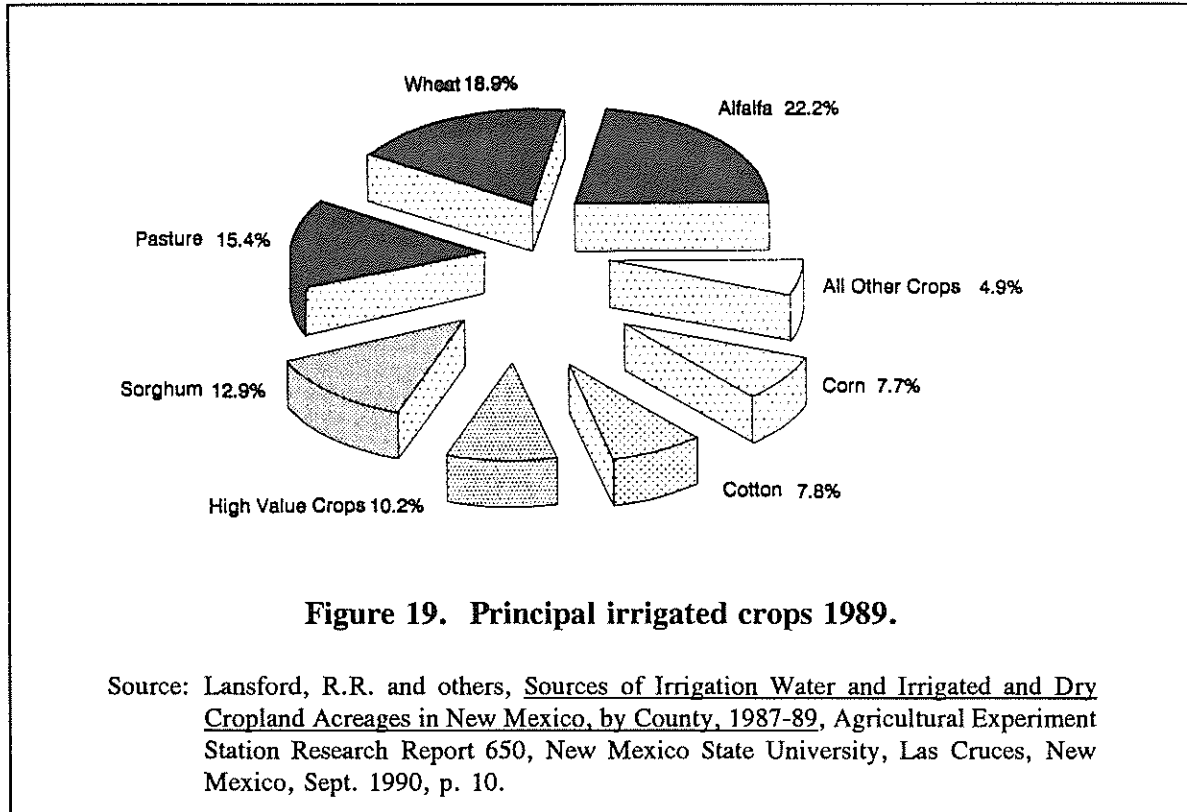
CROPLANDS

The total irrigated cropland acreage in New Mexico in 1989 was 1,461,780 acres. Of this 993,880 acres were actually planted and irrigated, the remaining acreage was devoted to conservation programs (Lansford and others 1990). The principal irrigated crops are presented in Figure 19. There are 25,522 acres under irrigation on state trust lands or just under 2 percent of the total irrigated cropland.

The total dry cropland in New Mexico in 1989 was 1,126,630 acres. Of this 769,060 acres were actually cropped with the remaining acreage in conservation programs (Lansford and others, 1990). There were 35,396 acres on state trust lands or about 3 percent of the total dry cropland.

FORESTRY

Approximately 24 percent of New Mexico is covered by either forest or woodland and 5 percent of that acreage is state trust land. Historically, state forest and woodland trust lands have been inventoried as a portion of a cooperative resource inventory completed by the Forestry and Resource Conservation Division (State Forestry) in conjunction with the US Forest Service. This inventory information is updated on a ten-year cycle during periodic reassessments. The

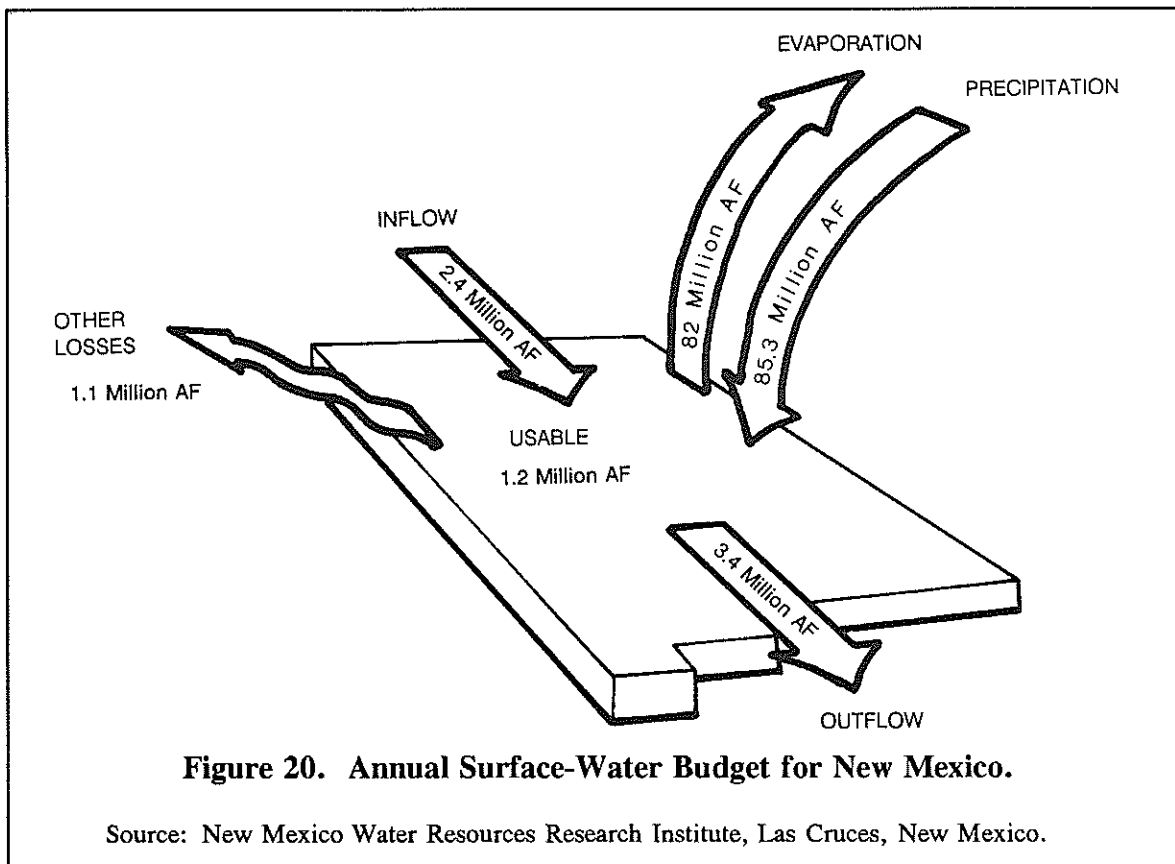


SLO has used the State Forestry’s technical assistance in developing and administering timber sales since the mid 1960s and in establishing fuelwood sales in the 1970s.

WATER

Surface water supplies for the state come from inflowing streams and precipitation. Figure 20 depicts the surface water budget for New Mexico. Of about 85.3 million acre-feet which annually falls on the state (slightly over 12 inches per year averaged over the entire state), approximately 97 percent returns to the atmosphere as evaporation or transpiration. After accounting for stream inflows and outflows and assorted water losses, New Mexico is left with a useable surface water supply of slightly over 1 million acre-feet per year. With rare exception, nearly all surface waters in the state are fully appropriated.

Ground water volumes in the state are estimated at nearly 20 billion acre-feet but 75 percent of this amount is brackish or saline. Nearly 90 percent of the fresh ground water lies within "declared underground water basins," an administrative designation indicating that

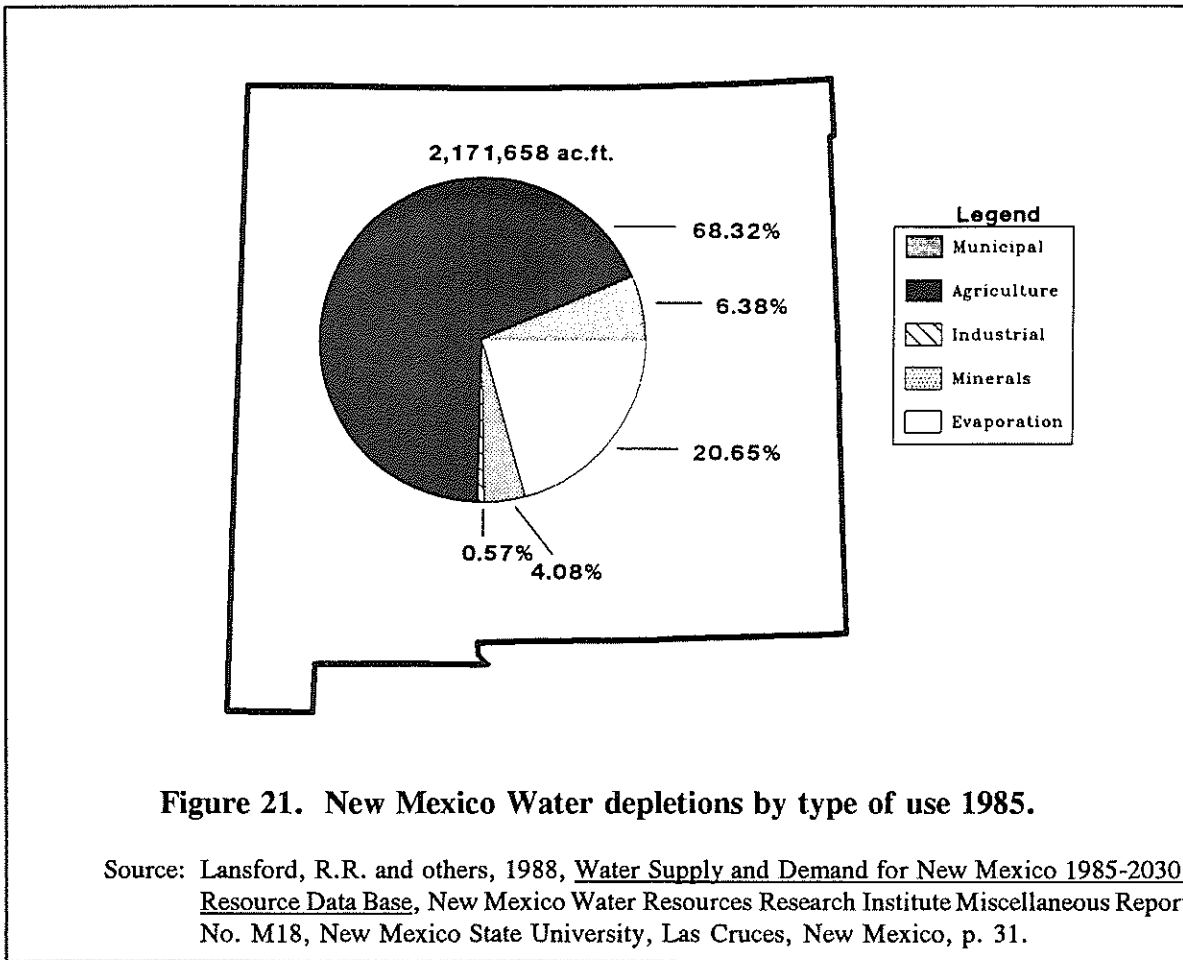


additional ground water development in these areas might adversely affect the resource. More than 90 percent of the State's population draw their supply from wells.

A state-wide breakdown of water depletions from all supplies is shown in Figure 21 (Lansford and others 1988). As can be seen, over 68 percent of the depletions (consumptive use) are for agricultural uses. Evaporation losses amount to over 20 percent and are normally assigned to agriculture as well.

The water use in the state varies from basin to basin (Figure 22) (Lansford and others 1988). Depletions of both surface and ground water are summarized in Table 3 for 1985 and projected to the year 2030 for these river basins.

Due to New Mexico's dry climate and the distance of most state trust lands from a perennial stream, ground water is the main supply source for trust lands. Although site specific inventories could be expanded, many areas were surveyed during the county ground water studies conducted by the N.M. Bureau of Mines and Mineral Resources in cooperation with the

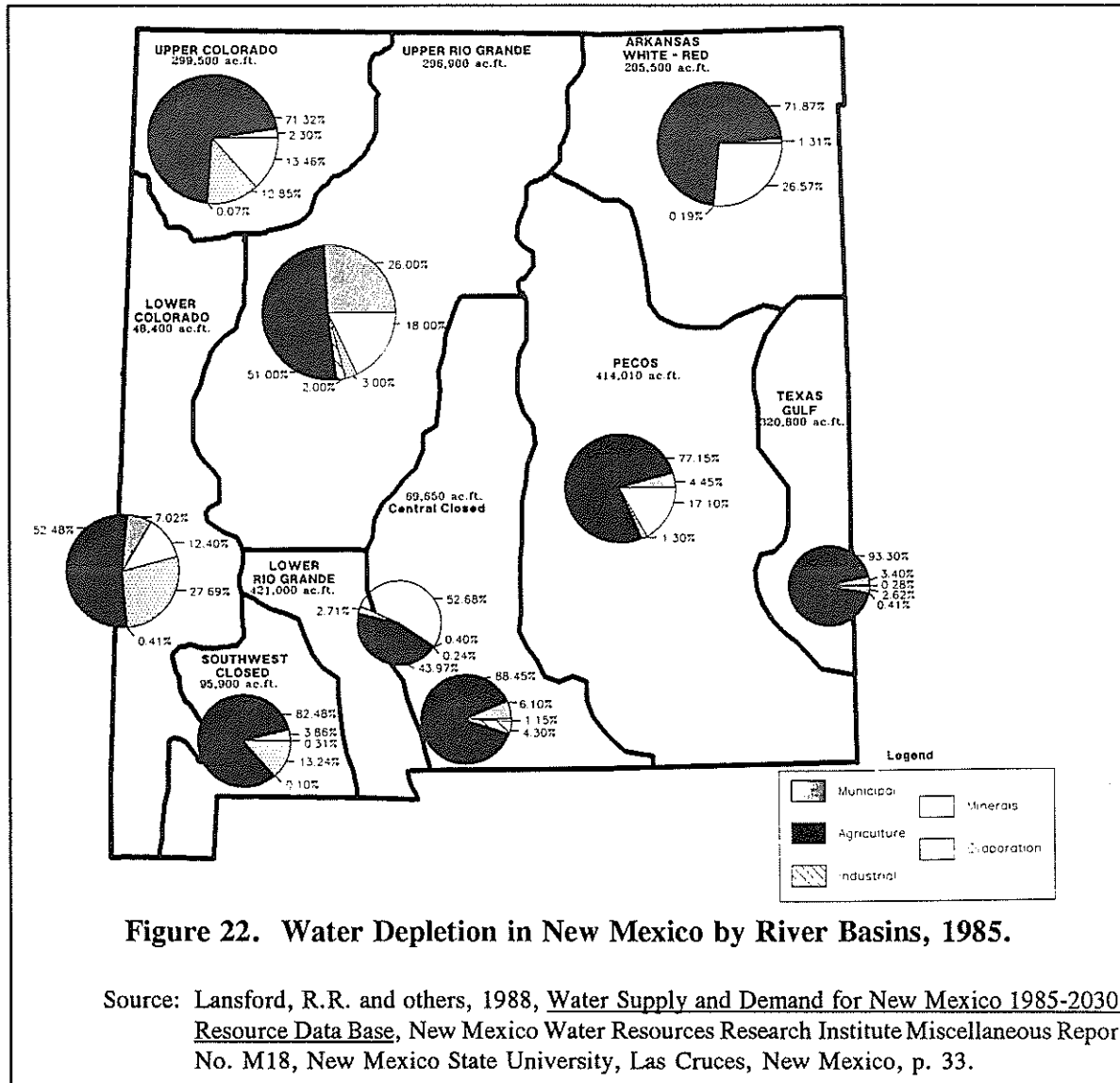


State Engineer Office (SEO) and the USGS. These surveys included all or part of nineteen counties.

COMMERCIAL RESOURCES AND DEVELOPMENT

Resources which fall into this category include the following types of property:

- Business Lease Properties - These are properties which are user or market ready today due to existing utilities and access and that have active market or user interest.
- For Sale Properties - Properties held for sale, usually for special purposes, such as landfills, homesteads, rights-of-way, municipal and school district uses, and typically do not benefit from extensive and competitive market demand. They are usually located in areas that tend to experience little property value appreciation.



- Commercial Development Properties - Properties, usually large holdings, located at the edge of existing developed areas and typically in the path of growth. They are characterized by little existing infrastructure (utilities and roads) and because of their size, lack significant user or developer, that is, non-speculative, demand. These properties require, to varying degrees, master planning of land uses, infrastructure, and services to address specific user and or developer market opportunities. Master planning of these properties is a value-added process.
- Special Use Properties - Properties, because of their unique locations or physical characteristics, ideally suited for a specific and usually limited purpose such as a communication site. Disposition of the property is through either lease or sale.

Table 3. Surface and ground water available for depletion in New Mexico by basin for the years 1985 and 2030

River Basin	1985			2030		
	Surface	Ground	Total	Surface	Ground	Total
(approximate values in thousands of acre-feet)						
Arkansas/White Red	312	112	424	312	112	424
Texas Gulf	2	340	342	2	150	152
Pecos	200	235	435	200	235	435
Central Closed	10	205	215	10	205	215
Upper Rio Grande	300	95	395	300	95	395
Lower Rio Grande	342	80	422	342	80	422
Upper Colorado	670	4	674	670	4	674
Lower Colorado	95	62	157	95	62	157
Southwest Closed	11	176	187	11	176	187
Total	1,942	1,309	3,251	1,942	1,119	3,061

Source: New Mexico First, Water: Lifeblood of New Mexico, Report of the Second New Mexico Town Hall, May 15-18, 1988, Albuquerque, New Mexico.

- Salt-Water Disposal Properties - Properties whose surface lands are necessary to service the oil and gas industry.

Existing revenue sources for commercial properties fall into the following categories:

- Business Leases - The SLO manages 350 business leases negotiated for up to five years with an annual rental of \$500 or 7% to 10% of the leased properties market value, whichever is higher. Long-term business leases must be set up through a public auction process, and advertised for ten consecutive weeks.
- Land Sales - Land sales are generally not initiated by the SLO and are not considered a priority revenue source. Land sales are considered after staff submit a formal recommendation to the Commercial Resources Division stating that a sale rather than a lease would benefit the trust. All land sales are advertised for ten consecutive weeks and auctioned at the closest county courthouse where the property is located. Numerous studies support the land sales as the costs for administering rental lands can exceed the revenue generated. HJM-6 Land Sales is a new program that allows an SLO lessee to request the sale of up to 40 acres if the lessee's primary place of residence is located within the acreage requested. One such sale has taken place and 27 requests are pending.

- Communication Sites - The SLO manages 55 communication site leases, which consist of repeater stations, microwave towers, and FM-AM radio towers.
- Salt-Water Disposal Easements - The SLO manages 83 salt-water disposal easements which allow for the underground disposal of salt water produced in connection with the oil and gas operations. The average fee is currently \$250, but may be raised to \$500 sometime during 1990.
- Purchase Contracts - The SLO manages 461 purchase contracts, which carry nearly \$12.5 million in future income value, principal only, and represent 1.2 million acres of state trust lands. This revenue source generates approximately \$500,000 annually in interest revenues. It will diminish substantially within the next five years due to the high number of maturing contacts. As these purchase contracts mature, their principal balance due is placed in the state permanent fund whereby they continue to earn interest. An average of 10 to 15 purchase contracts are being paid off before their maturity annually. This activity further diminishes SLO annual revenues from this source.

RECREATION AND TOURISM

Although recreation and tourism are commonly thought of as non-commercial uses of trust land, the State Park and Recreation Division of the Energy, Minerals and Natural Resources Department has three business leases of trust lands for state park use. The state park areas partially located on trust lands are Bottomless Lakes, Oasis, and City of Rocks. The park division pays the SLO an annual lease and collects user fees from park visitors.

Over the years, these three leases have represented the only sanctioned recreational use of trust lands outside of the SLO's hunting easement with the state's Game and Fish Commission. There are approximately 1,300 acres leased in the three parks. The prospects for the state legislature appropriating funding for the Park Division to acquire the leased trust lands are considered extremely low.

CULTURAL RESOURCES

At present more than 78,000 known archaeological sites have been identified on federal and state trust lands in New Mexico. By far, the majority of these sites are on federal lands, largely because federal lands have been the locus of most activities requiring the preparation of environmental impact statements or environmental assessments. Analogous projects on state

trust lands are far fewer with 2000 sites having been recorded. With such sparse first-hand knowledge about trust lands, their prehistory is primarily known from inference based on surveys of adjoining lands.

It is reasonable to assume there are no radical differences in archaeological sites on federal and state trust lands. Cultural resources data are not as easily quantified as those in other disciplines. Further, records from the many projects in the state have been consolidated only in the past 10 years. Earlier records have not yet been integrated into the Archaeological Records Management Systems (ARMS) being coordinated through the Historic Preservation Division. The data in Table 4 are based on the contents of the ARMS files as of November 1, 1989.

Table 4. Archaeological Records Management Systems (ARMS) survey coverage on federal and state lands in New Mexico

Administrative Region	Number of Projects	Mean Acres per Project	Site Density per Acre
Central NM	56	152	0.033
Jornada	631	129	0.121*
Mimbres	287	224	2.14*
Mt. Taylor/Socorro	614	234	0.068*
Northeast NM	318	107	0.029*
San Juan Basin	3,315	127	0.422*
Southeast NM	3,384	24	0.080*
Upper Rio Grande Valley	2,864	66	0.520*

* More projects exist, but data is not sufficient to include in calculations.

Cultural resources of the Mimbres ("Bootheel") and Northeast regions are largely unknown, however the Mimbres area is most notable for those sites that have been located. The total amount of work done in the Mimbres, however, is quite small. Although many projects have been conducted in the Southeast and Upper Rio Grande administrative regions, the acreage examined per project is so low it suggests that these regions, too, are largely unknown.

Current estimates of projects on federal and state trust lands have resulted in an inventory of less than 1 percent of the state. If accurate, the nature and distribution, or status of this non-

renewable resource, is largely unknown. A summary of the overall number of sites that have been excavated on federal and state trust lands in the past 20 years is provided in Table 5.

Table 5. Excavated archaeological sites on federal and state lands in New Mexico

Region	Excavated	Mostly Excavated	Total
Central NM	2	1	3
Jornada	35	11	46
Mimbres	47	8	55
Mt. Taylor/Socorro	76	8	84
Northeast NM	34	2	36
San Juan Basin	279	83	362
Southeast NM	18	6	24
Upper Rio Grande Valley	208	45	253
Total	699	164	863

Sources of impacts adversely affecting cultural resources and policies that may help to reduce these impacts while providing outside funding for preservation efforts on trust lands will be discussed in the next section.

V. ANALYSIS OF TRUST RESOURCES

OIL AND NATURAL GAS

Income Sources

Income from oil and gas on state trust lands is derived from three sources: lease bonuses, lease rentals, and royalty payments. The primary role the SLO can take to influence income from oil and gas on trust lands is to issue oil and gas leases. A guaranteed income from leases is derived in the short-term from bonuses and yearly rentals. Income is derived in the long-term by royalty payments if production is established. For purposes of managing state trust lands, leases can be divided into two general categories:

- leases on lands which would develop or extend known oil and gas pools; and
- leases in exploratory areas that are not within or adjacent to known oil and gas pools -- these lands may be in producing basins or they may be in frontier areas.

The philosophy for issuing and managing leases should be somewhat different for each type of lease. Leases which would develop or extend known oil and gas pools are more likely to establish production than exploratory-type leases. Therefore, development and extension-type leases can generally command larger bonuses and higher royalty rates than exploratory-type leases; expected revenue sources are primarily from royalties. In contrast, exploratory-type leases are less likely to establish production, especially on frontier areas; expected revenue sources are mainly from bonuses and rental fees, but most operators are not willing to pay the same bonuses that development leases command because of the lower probability of establishing production.

In recent years, the SLO has pursued a policy of encouraging development of wildcat acreage by offering leases at the best terms possible under the laws governing oil and gas leasing. The basic philosophy has been to issue such leases at the minimum royalty rate and with a low minimum bonus in exchange for a promise of drilling the acreage. It is hoped that such a policy will lead to discovery of new fields, and thereby result in royalty revenues, which would then exceed bonus and rental revenues manyfold.

In more developed areas, a higher royalty rate lease is usually issued. Although the SLO reduces the bonus price an oil and gas developer is willing to pay, the royalty revenues will be higher if production occurs.

Almost all exploratory-type leases may never be drilled. In frontier areas, most leases will not be drilled. Therefore, the leases provide income to the state without utilization of the land or extraction of resources from the land. Essentially, leasing of these lands provides "free income." If production from lands with exploratory-type leases is not established, those lands may be leased again in the future when they may possibly be drilled.

It is only through successful drilling on exploratory leases that new oil and gas reserves will be discovered and brought into production. These reserves are necessary to replace currently identified reserves that are being depleted by production. Without the discovery of new oil and gas reserves, production declines will accelerate and royalty payments obtained from state trust lands will decrease at a rate proportional to production declines.

Coal-Seam Gas

The potential for developing coal-bed methane on state trust lands in the San Juan Basin (estimated to be about 2 trillion cubic feet) needs to be addressed. It is possible when the federal tax credit expires at the end of 1990, the interest in coal-bed methane may also die. On the other hand, this industry may continue, and state trust lands may have the potential for developing coal-bed methane. An essential part of dealing with this potential is being aware of what coal-bed methane resources are available, and how to regulate this resource.

Also, a tremendous amount of water is produced from the coal-bed methane wells, and much of it approaches irrigation quality. Thus, in some of the areas with a large number of coal-bed methane wells, perhaps this water could be developed for irrigation or other beneficial uses.

Prices

The predominant issues concerning oil are resource base and commodity price. Oil prices as a whole are controlled by the Organization of Petroleum Exporting Countries (OPEC), since as a cartel it is the dominant market force. Today it does not influence the market as much as it did ten years ago, since production from the North Sea and Mexico has lessened its

market share. Nevertheless, the United States, and of course New Mexico, are market followers with little influence on oil prices as a whole.

An issue concerning oil price that the SLO may influence is whether or not it receives fair market price for oil from trust lands. There is little data to substantiate whether or not this is the case and a study is required. A crucial issue currently being litigated is whether or not the state is receiving its fair share of royalties from natural gas liquids. This issue could also produce millions of dollars if a ruling favorable to the SLO is handed down. However, an unfavorable ruling could cost hundreds of millions in past and future revenues.

Reclamation

Another important issue is land reclamation on state trust lands. A few lessees have been reluctant to carry out reclamation activities in the past, and some of these are resisting efforts to initiate such activities. Currently, the SLO does not have any type of reclamation bond in place for oil and gas leases. There is, however, a "Damage Bond" which is in the amount of \$10,000 for single leases, or \$20,000 for multiple leases. The damage bond is "...to secure the payment for such damage to the livestock, range, water, crops, or tangible improvements on such lands..." In other words, the bond may be used to compensate the surface owner for damages, but is not intended to be spent on actual reclamation.

Markets

The most important issue concerning natural gas today is the expansion of markets for New Mexico gas. The SLO is currently involved with other state agencies in several projects to deal with this issue. Favorable resolution of the marketing issue especially a pipeline to the eastern market could result in additional revenues in the hundreds of million dollars to the permanent fund.

New Reserves

Another important issue affecting both oil and gas is what the SLO terms "further development." There are many older oil and gas leases whose terms have been extended by production from shallow reservoirs. There may be deeper untested production horizons under the shallow reservoirs. However, lessees are, in many cases, unwilling to spend the capital to test the deeper horizons, and some even have the attitude that the leases should be managed solely for their benefit.

The SLO has begun a program of identifying and encouraging further development of tracts currently in production, and although progress has been slow, early results have been promising. There are some lessees that contend it is not appropriate for the SLO to pursue such a program.

Trespass

A problem facing the SLO is trespass by oil and gas operators. These sometimes occur when a lease is canceled for a default in the contract or has expired for lack of production in paying quantities. The operator will sometimes continue to produce the well, and in at least one case even stopped paying taxes and royalties, and reporting production to the Oil Conservation Division. With the present antiquated record-keeping systems, detection is accidental. However, when the currently integrated oil and gas accounting system (ONGARD) is completed, such detection should be easier.

Waterfowl Problems

The development of oil leases sometimes leads to unforeseen environmental problems. Produced water in sumps often has oil slicks on the surface along with hydrocarbons in solution or suspension. In arid and semi-arid regions, the presence of any surface water strongly attracts waterfowl along with some other species. Sumps become very small scale oil spills in a sense, and while a single sump will affect a small numbers of organisms, a large number of sumps in a large area can be significant. In parts of the state where oil and gas operations are numerous, this problem can be significant. The U.S Fish and Wildlife Service brought this problem to the attention of the state of New Mexico in 1988 and made it known to oil and gas producers the stiff penalties that could be imposed under the provisions of the federal Migratory Bird Treaty Act (16 U.S.C. §703-711 (1976 and Supp V 1981)). Problems associated with sumps are now circumvented during drilling operations by state regulations that require nets to be placed over a sump if any oil is present. Sumps are also required to be filled in after drilling operations cease.

COAL

Development of coal resources on trust lands in the San Juan Basin is greatly influenced by the issue of accessibility. The lack of rail transportation is one of the main issues, but this

has been affected in part by landownership. The significant holdings of the Navajo nation and Navajo allotments outside the reservation have restricted the construction of railroads in the basin. Exploration and development on these trust lands have thus been truncated.

The large holdings of the BLM in the San Juan Basin has had a significant influence on state coal lands whereby the present moratorium on federal coal leasing has had a negative effect on coal leasing of state trust lands. If the BLM decides to lease coal areas or act on the PRLA's (Preference Right Lease Applications) in the San Juan Basin, the state coal lands would have a much greater economic potential.

Resource Knowledge

Evaluation of existing coal resources is of major concern to many resource professionals. Without the determination of the quality and quantity of the remaining coal resources, informed leasing of state coal lands is difficult. Admittedly, there is little interest in exploration or new development of coal areas in New Mexico today, but this situation may change with the new environmental concerns that have created an interest in low-sulfur coals. The Salt Lake coal field is a case in point. Many people thought there to be little economic coal in the area. Interest was sparked by a recent resources evaluation by the New Mexico Bureau of Mines and Mineral Resources and the US Geological Survey (Anderson, 1987; Campbell, 1989; Greenberg, 1987; and Roybal, 1982). As the result of these geologic evaluations, the state leased a large area to the Salt River Project. From this example, it seems only prudent that the state should have a working knowledge of the remaining coal resources regardless of present economic situation.

Industry Fluctuations

Although coal mining was a growing energy industry in New Mexico during the 1970s, a decline in that growth rate has occurred during recent years, primarily for two reasons. The first is a decline in the demand for coal, since the leveling of oil and gas prices has made them competitive with coal. The second is the lack of adequate transportation in the San Juan Basin. Coal, being a bulk commodity, requires large-scale transportation systems such as railroads. Current coal producers in New Mexico have overcome this barrier by the creation of mine-mouth power plants. The energy contained in the coal is then transported in the form of electricity. However, many believe the San Juan Basin has reached its saturation point for this

type of operation, and further coal development will depend upon the future construction of new transportation facilities.

Environmental Considerations

Much of the commercial coal mining in New Mexico is open pit. Strip mining completely changes the area mined. Current state and federal reclamation regulations now require contouring and revegetation. Enforcement of these regulations allows recovery of surface mined lands to a state where the grazing potential, wildlife habitat potential, and recreational potential is equal to or better than the pre-mining condition. Surface mining need not result in permanent loss of the productivity potential of the land resource.

HUMATE

The humate resource will become important if the use of humate becomes valuable in radioactive-waste disposal. The ability to evaluate this resource along with the development of a standard method of analyzing the humic acid content is needed.

POTASH

One issue of some concern is the instability of revenues from potash, due to the wide swings in production from year to year. This is due to brisk competition from foreign potash producers and because mining does not continuously occur on state trust lands. Also, potash is a discretionary expenditure for most farmers and the agricultural demand also fluctuates.

In the potash mining area of New Mexico, spoil piles and salt drainage along with natural salt lakes can produce long-term ecological costs. Transport of salts by water and wind erosion from spoil piles and natural salt lakes affect surrounding soils and vegetation. This can reduce grazing potential as well as impact wildlife habitat. The presence of large spoil piles produces a source of salts that can also affect water quality. The natural land surface and related resources in this mining region are already of relatively poor quality and further degradation because of potash mining does not appear to be a significant issue. While it would be ecologically sound to place the salt tailings in the mined-out shafts, that does not appear to be economically justifiable in view of the marginal environmental benefits at this time. Further

evaluation of this issue, however, is in order in view of the uncertainty associated with long-term affects that may be unknown at this time.

SAND AND GRAVEL

Activities during the past 50 years in the sand and gravel industry have greatly increased in New Mexico, and sand and gravel remains a significant, widespread resource on state trust lands. This material is most often mined in open pits, greatly reducing the possibility for other co-uses. The major problems associated with sand and gravel production are the residual stacks of soil overburden that make the remaining pit areas unsightly and difficult to level for future land uses. Derelict equipment is a common sight at old sand and gravel operations.

Sand and gravel operations significantly affect the land surface and are generally conducted in terrace deposits above arroyos. Operations located within arroyos themselves can change the hydrologic characteristics of the channel. The vegetation of the arroyo margins is important wildlife habitat for both game and non-game species. Sand and gravel operations do not necessarily irreversibly destroy this habitat provided the industry recontours the surface and revegetates it with native species. Recontouring with waste-wash materials will not restore hydraulic transmission characteristics but will provide a measure of hydrological stability. Revegetation would return most, if not all of the original habitat features within 25 to 50 years.

The issue of mining in or near populated areas is likely to become more severe, with conflicts between local residents and lessees increasing as the major population centers grow. As present sources are depleted near populated areas, sand and gravel will become more valuable, and will likely become a more important mineral revenue source from state trust lands in the future. However, increases in revenues are predicated on the assumption that legislative action does not limit the extraction of sand and gravel as well as other industrial minerals in the future. The SLO presently has several leases adjacent to populated areas which have been developed by paving and concrete contractors because the supply of gravel is close to the point of consumption, and state trust lands are exempt from local zoning ordinances. This has resulted in residents living adjacent to state trust lands being upset about mining in their neighborhood, and has led to protests of such activities. Industrial minerals other than sand and gravel are likely to face similar problems if they are developed close to populated areas.

Much sand and gravel sold by the SLO is used for state highway construction. This has created a conflict with the State Highway and Transportation Department in that it is reluctant to pay the going market value. The department contends that a discounted price should be used, since the product is being consumed by another state agency, which is using tax dollars to pay for the product.

Trespasses upon trust lands for the removal of sand and gravel is a continuing problem which leads to the loss of untold amounts of royalty revenues. Trespasses follow two definite patterns. The first occurs when a trespasser enters upon the land and removes sand, gravel, or caliche without the benefit of a lease. These trespasses usually go undetected, unless a SLO land-use specialist accidentally observes the removal of materials while working on some other assignment. The second, and more common trespass involves split estate lands. The trespasser usually reaches an agreement with the surface owner, and is often ignorant of the fact that the minerals were retained when the surface was sold. These trespasses are often detected, because they are normally large projects which the land-use specialist will easily see or hear about, and because the Oil, Gas, and Minerals Division personnel regularly check the permits issued by the Bureau of Mine Inspection against the inventory of trust holdings.

CARBON DIOXIDE

Most of the carbon dioxide produced from state trust lands is produced, transported, and utilized by affiliated entities under non-arm's-length transactions. Therefore, the question of whether or not the SLO is receiving fair value for carbon dioxide is its main issue.

Another carbon dioxide issue revolves around the necessity of ensuring adequate supplies for future use in tertiary recovery projects in New Mexico. All New Mexico carbon dioxide is currently being transported for use in other states. The considerable amount of carbon dioxide in the coal-bed methane is not being used for lack of a market.

GEOHERMAL

Several state, federal, and Indian agencies regulate the exploration and development of geothermal resources in New Mexico. The New Mexico Geothermal Resources Act provides a regulatory framework for geothermal resource development on both state and private lands.

Under the act, the director of the Oil Conservation Division (OCD) is given statutory control over geothermal resources. This act, however, does not preempt the state engineer's control over ground or surface-water consumption. The SEO has prior right of approval for geothermal production or reservoir test wells drilled on state, private, and federal lands. In New Mexico, a geothermal resource is statutorily defined as:

"The natural heat of the earth, or the energy, in whatever form, below the surface of the earth present in, resulting from, created by, or which may be extracted from, this natural heat, and all minerals in solution or other products obtained from naturally heated fluids, brines, associated gases and steam, in whatever form, found below the surface of the earth, but excluding oil, hydrocarbon gas, and other hydrocarbon substances" (NMSA 1978, § 19-13-2A).

In addition the OCD has identified low-temperature thermal water as:

"...naturally heated water the temperature of which is less than boiling at the altitude of occurrence, which has value by virtue of the heat contained therein, and is found below the surface of the earth, or in warm springs on the surface (Rule G-0.1.A, Definitions, Geothermal Resources Rules and Regulations).

The OCD and the SLO both use the above definitions. The New Mexico Taxation and Revenue Department, however, has a different definition of geothermal resources:

"...geothermal fluid' means naturally occurring steam or hot water which is at a temperature of at least 95° F in the natural state of free-flowing springs or pumped from wells" (NMSA 1978, § 7-2-17.1 and 1-2A-8.5).

The major issue affecting geothermal development now and in the future is the unresolved question of correlative rights versus prior appropriation. Correlative rights versus prior appropriation represent the doctrines under which the OCD and the SEO operate, respectively. A developer must comply with both agencies' rules and regulations during a geothermal resources project on state or private land.

If the developer is drilling a geothermal well within a Declared Underground Water Basin or is planning to use any ground or surface water in the development of a geothermal resource, he must comply with both the OCD's and the state engineer's rules and regulations. The technical aspects of the two agencies' drilling requirements are comparable. However, the two

agencies operate under divergent philosophies concerning who has the right to how much of a given natural resource such as hot water in liquid or vapor form.

Correlative Rights

The OCD and the BLM operate under the philosophy of correlative rights. A correlative right means that, as an owner of a portion of a geothermal reservoir, the developer has the right to recover, as much as is practical, without undue waste, his ratable share of the total geothermal resources based on his share of the reservoir's land surface. The larger the holdings in the reservoir, based on surface ownership, the larger the share in the resources, and no one else should develop his holdings in such a way as to deprive anyone of his fair share.

Prior Appropriation

The state engineer operates under the doctrine of prior appropriation. Prior appropriation separates the ownership of the surface land from the right to use the water on or underground the land. This doctrine holds that the water belongs to the public and is subject to appropriation for beneficial use. By applying water to beneficial use, one acquires the right to use the water. Therefore, a private citizen cannot own water; he can only appropriate a certain amount of it if he is putting it to beneficial use.

The first person to apply the water to beneficial use has the first and prior right to the water. Therefore, the first person who drills for geothermal resources in a given reservoir and establishes his rights by putting the water or steam present in the resource to beneficial use has the prior right to develop the resources in the reservoir to the limit of his rights. The limit of one's rights is the amount of water or steam he began putting to beneficial use. For example, if the developer puts three acre-feet of water from the reservoir to beneficial use, that is the limit of his right and no one else has the right to any amount of water in that reservoir if it will interfere with that three acre-feet of water. Permits can be granted to subsequent users only if the state engineer finds that granting them will not impair prior users' rights.

Due to the limited geothermal resource development activities currently taking place, the regulatory conflict of correlative rights versus prior appropriation has not been tested or resolved. Future geothermal development in the state will surely be affected by this uncertainty.

RANGE RESOURCES

Grazing will continue as the primary use of SLO ranges. However, livestock grazing may not be the only grazing animal. Possible game ranching with its fencing and management needs may also have to be addressed in the future. Game ranching is controversial and is opposed by many citizens and governmental wildlife managers.

The public will demand accountability from the SLO and its grazing lessees for the condition and trend of state trust range lands. The SLO may have to comply with laws such as the National Environmental Policy Act (42 U.S.C. § 4321-4361 (1976)), Endangered Species Act (16 U.S.C. § 1531-1543 (1976 and Supp V 1981)), and Public Rangelands Improvement Act (U.S.C. PL95-514). In the absence of sufficient personnel and budget to perform range condition and trend studies, it is suggested that the permanent photographic file be continued. This photo file should record key areas on the lease. Simply retaking these photos every five years when the lease is renewed will help the SLO document changes and trends in the resource condition. If sufficient budget and personnel become available, other quantitative vegetation and soil sampling methodologies should be included in the allotment/lease file. If soil sampling is determined to be necessary, another option is to contract for services with the Soil Conservation Service. This private landowners' procedure is issued by the BLM and would not require an increase in SLO personnel.

Grazing

Grazing fees represent a sensitive issue that will have to be dealt with continually in order to keep receiving fair market value. Receiving less than fair market value is a breach of the trust. The largest percentage of state trust lands is used for grazing and these lands are largely embedded within private lands and BLM lands. The scattered nature of these lands does not allow for management that differs from the surrounding lands. On larger trust land units where the SLO can negotiate with the lessee, the SLO may need to consider the lack of agreement in the scientific community about livestock management practices on western rangelands. The perception of many environmental groups is that current range management practices have not halted or reversed the rangeland degradation that was documented during the past century. Environmental groups and some members of the scientific community are applying and will continue to apply pressure to reduce stocking rates and/or eliminate livestock grazing

completely. The SLO must evaluate as many of the alternative management strategies as possible in order to defend the lessees choices as the "best available" for sustaining livestock production, wildlife, quality and quantity of water yields, minimize erosion, and maintain general environmental quality.

Wildlife Competition

The competing use of available forage by livestock and wildlife is perceived by many as a conflict that is not prevalent throughout the entire state, but of utmost importance in some areas. The key point of this conflict is, are livestock numbers going to be reduced to accommodate wildlife use if the forage used by livestock is paid for by the livestock owner at fair market value while the forage used by wildlife is not paid for at all?

Rights of Way

The issuance of rights-of-way is a continual source of conflict with the surface lessees, especially in areas near urban development. The grazing lessee does not want his ranching activities or grazing management program interrupted. However, the urbanite's desire for access may not allow this to happen. If an easement is granted, which might pay several times more per acre than the grazing lessee, the grazing operation may be disrupted. If the easement is denied, revenue is lost as is the potential for development of the surrounding state trust lands. Other aspects than revenue must be considered. Grazing lessees provide benefits to the trust other than revenue.

WILDLIFE

Colonists who settled America brought the common law of England with them. Stripped of its many formalities, the core of English wildlife law at the beginning of the American Revolution was the absolute authority of the king and Parliament to appropriate wildlife. After the Revolution, title to wildlife passed from the English king to the newly formed states. The states in turn held the wildlife in trust for the people. Understandably, the early colonists of European and English descent, viewed wildlife as a common heritage, not subject to restrictive controls reminiscent of Old World class structure.

Wildlife has played an important role in the lives of immigrant Americans since colonization. Settlers used abundant wildlife for domestic and commercial food and fiber

products. However, as wildlife populations declined during the nineteenth century, American agriculture flourished and wildlife came to be valued more for recreational purposes than for food or economic gain. A growing, urbanized population with ample leisure time is providing new markets for outdoor recreation including consumptive and non-consumptive uses of wildlife. Increasingly, modern sportsmen are learning that "free" outdoor recreation is a myth and that quality outdoor recreation must be purchased. Assuming that favorable economic and political conditions exist, the demand for outdoor recreational opportunities can be expected to increase.

The increasing public demand for quality outdoor recreational privileges has heightened interest in private wildlife enterprises in the United States. Such wildlife enterprises include:

- Fee Hunting -- payment for the right to enter private property for the purpose of hunting. Includes such activities as day hunting, lease hunting, and package hunting.
- Game Farming -- a type of wildlife enterprise that confines game animals (usually exotic wildlife) to small enclosures for the purpose of providing husbandry that will lead to the production of meat and other by-products.
- Game Ranching -- an enterprise in which game animals are managed in large areas under semi-natural conditions for hunting and/or production of meat or other animal products.
- Game Parks -- a statutory classification (eg. Class A Park) of land obtained under permit, regulation and criteria of the New Mexico Department of Game and Fish which allows the natural increase of all game/fish confined in an enclosure (not to exceed 3,200 acres) to belong to the landowner holding the permit. These increased game animals held or confined in a park licensed under these statutes are the property of the licensee and he may capture, sell or dispose of the game in any manner and at any time of the year.
- Commercial Harvest -- the taking (by various methods) of wildlife for the purpose of selling meat, hides, or other parts. Animals are taken by various methods that are legal for the species in question.

Vocal opposition to these private wildlife enterprises has also heightened. Many ranchers facing unpredictable livestock markets, ever-increasing operational costs, and fluctuating land values are finding that one solution to the problem lies in raising livestock and wildlife as dual crops. Although not all lands and circumstances are suitable for wildlife enterprise pursuits,

wise management of the resources can often enhance the long-term financial return from both crops.

A major aspect of most wildlife management problems is the mixture of public and private land ownership and responsibilities. Indigenous wildlife is generally controlled by the states, but landowners can charge a fee for right of entry onto private land for purposes of hunting or other recreational pursuits. Wildlife do not recognize property boundaries, often leading to management problems. Managers of ecologically integrated acreage of intermingled ownership must understand that in such areas, comprehensive management is imperative if these lands are to be maintained as viable wildlife habitats. Clearly, landowners must be included in programs to enhance habitat and benefit wildlife. Appropriate changes would benefit wildlife, but whether or not income potential to the SLO would be increased is unknown. Different mandates of the various land ownerships makes coordinated resource management very difficult.

Wildlife resources on state trust lands have not been maximized as a method of generating income, although there is evidence throughout the state and in other states that show wildlife can provide economic benefits for landowners (Fowler and Knight, 1990). Other than payment made by the NM Game and Fish Commission, which allows hunters access to trust lands during the hunting season, no additional income has been derived for the beneficiaries from wildlife.

CROPLANDS

Potentially irrigable trust lands are located near metropolitan areas like Albuquerque, Las Cruces, and Roswell. These too have development potential.

Water Quality

The SLO should consider undertaking a more detailed irrigated and dry cropland inventory. In the future, ground-water contamination and water quality will be important issues facing landowners. Monitoring the application of fertilizers, pesticides and herbicides and best management practices (BMP) will be required by federal legislation. This raises important questions such as: who will be responsible for ensuring BMP adoption on state trust lands: the SLO or the lessee? Who will be responsible for aquifer contamination: the SLO or the lessee?

Considerable requirements and obligations have been past on to the lessee in the lease agreements in the past.

Other Considerations

An increased emphasis will be placed on soil erosion from cropland in the future. Currently, legislation regulates the quality of land resources that can participate in federal farm programs. Additional programs to retire marginal lands from production such as the conservation reserve program will likely be initiated.

State trust lands in areas overlying the Ogallala aquifer may warrant particular concern in a resources-use plan given the expected depletion of ground-water supplies in this area over the next twenty to twenty-five years. As these water supplies are diminished, the potential value of irrigated state trust lands in the area will correspondingly decline.

The leasing arrangement structures should be reviewed to determine if higher returns could be generated from state trust lands as well as considerations for other requirements.

Issues and Problems

Most state trust cropland issues and problems fall into two groups. The first group includes seemingly isolated situations between commercial entities and/or irrigators from ground water and livestock operations, in which commercial or irrigated uses of ground water can potentially draw down water tables to levels threatening water-use viability on grazing or irrigated lands. It also includes the problem of potential ground-water pollution by irrigated agricultural operations through use of fertilizers, pesticides, and herbicides.

The second group of conflicts are legal and/or jurisdictional in nature. Historically, the SLO was not able to address the importance of water resources for revenue enhancement from state trust lands, and the importance of taking steps to insure that water will be available for future irrigation. This is reflected in the very limited number of water rights vested in the commissioner, restricting the commissioner's options.

FORESTRY

There are less than 50,000 acres of forest on state trust land in two areas. Traditionally, these forest resources have not been managed as an integral element of the forest or woodland ecosystem. Land uses through lease agreement have dictated vegetation treatment on trust lands

exclusive of long-range planning considerations. Historically, forested land has been harvested to meet specific needs. For example, a market for a wood product is identified, or cleared land for forage or crop production is needed. The resulting impacts have often had adverse long-range effects on the quality and quantity of the residual resources. All resources associated with commercial forest and woodland ecosystems have considerable tangible and intangible values (such as the role of forests on global climate), yet frequently, the return on investment for these assets is hard to measure in terms of specific dollars over a short investment period. Because returns are long-term and periodic, the forest resources cannot effectively compete with other land uses in returning the highest benefit to the trustees.

Management of forest resources can enhance production and provide sustained returns to the trust. Additionally, many acres of trust land are suitable for afforestation and reforestation. Programs such as the New Mexico Forest Re-Leaf Act (NMSA 1978 § 68-2-29 thru § 68-2-33) on the state level, America the Beautiful on the federal level, and nonprofit private enterprises such as Tree New Mexico are focused on planting trees for environmental stabilization. Although conflict does not exist in the use of trust lands for this purpose, it may arise if planted lands need to be dedicated to tree production and withdrawn, even temporarily, from other leased uses.

Currently, forest resources on trust lands are not being managed as a renewable resource due to the restrictive covenants under the granting acts and the enabling legislation. These limitations exclude funding for the planning and applications necessary to bring these resources under management. Harvest administration can be funded by proceeds generated through sales, but pre-harvest planning and post-sale management applications cannot.

Although there are several tracts large enough for a comprehensive management scheme, New Mexico's state trust holdings are largely in checkerboard patterns with individual parcels generally too small for efficient management application. This becomes an issue if a management practice is recommended for a parcel that is not compatible with neighboring ownerships such as a recreation area in close proximity to a harvest operation. If the opportunity exists, consolidation should be emphasized to provide parcels of sufficient size to support efficient management.

Resource Potential

To date, the SLO has implemented Joint Powers Agreements with the State Forestry, the BLM, and with the US Forest Service to support the administration of forested and woodland trust lands. The SLO has identified a large forested trust tract in the Black Lake area of Colfax and Mora counties, which will be inventoried and evaluated with the intent of applying a forest management scheme to the lands.

Environmental Concerns

There is a growing conflict nationwide between the forest products industry and certain environmental groups. Forest products harvesting is viewed by these groups as an extractive industry with some basis in fact, especially concerning timber harvest on public lands. Unfortunately, the conflicting views have not generated dialogue that allows for compromise on harvesting a renewable resource without affecting the aesthetic, wildlife, and non-game species components of the forest ecosystems. Viable alternatives to clear-cutting exist that are ecologically and economically sound. However, where trust lands are embedded within national forests, management options are limited. Because forest lands are so important for the future, it is in New Mexico's best interest for the SLO to work with the Forest Service to develop procedures for harvest of forest products that protect forests.

WATER SUPPLY

Because the SLO manages a perpetual trust, it engages in what economists describe as "intergenerational resource allocation." This principle requires that in managing trust resources, consideration must be given to both present and future needs of the trust's beneficiaries. Thus, when assessing its water resources needs, the SLO must seek to assure that water resources will be available many years from now. If SLO seeks to anticipate future water needs for state trust lands and take the steps necessary to assure that water will be available when putting state trust lands to their highest valued uses, the following issues are relevant.

Water Rights Ownership

Because state trust lands are so dispersed, they are associated with nearly every type of water resource in the state. Under the doctrine of prior appropriation, beneficial use confers a property right. Water rights acquired under the early SLO policies permitted trust users to

appropriate water for use on these lands in their own names, holding these rights as their private property. Private individuals hold approximately 270 water easements pertaining to 115,266.49 acres under this policy. These easements apply to both water resource exploration and development activities. Unfortunately, no inventory has been compiled relating to water rights associated with trust lands under these existing easements.

In recent years the SLO has taken the position that private water rights vesting from use of trust lands is an inappropriate policy for resource management because it loses control over the use of a valuable property right. The SLO now requires that all new appropriations from state trust lands vest title to water rights in the commissioner's name. Currently, 9,213 acre-feet of water rights are vested with the SLO, which generated \$110,000 in income during FY 1989. Importantly, these revenues increased nearly 60 percent from the prior year.

For new water resources developments on trust lands, the SLO now executes "packaged" easements consisting of a water rights agreement, a water exploration easement, and a water development easement. Eight of these easement packages have been administered in recent years and are still active easements. The typical easement agreement contains provision for vesting water rights in the commissioner's name, provides short-term access to large tracts for exploration, and provides very small tracts (usually less than 2.5 acres per well) for the actual long-term development easement. Six out of eight easement packages are still in the exploratory phase and encompass 7,253 acres.

The potential magnitude of water right holdings on state trust lands is large. Though water in much of the state is fully appropriated, and rights are no longer available, many areas of the state have water available for appropriation, and there are state trust lands in these areas. At present there is no water market in areas where there is water available for appropriation since any new user could simply appropriate rather than purchase such rights. However, the value of water can be expected to increase as it becomes fully appropriated.

Where trust lands have an appropriative water right vested in the name of the commissioner, the SLO can presumably lease the water not being used to other water users. Leasing revenues vary widely throughout the state depending on the nature of the lessee's business, water scarcity, the period for which water is leased, and the quantity leased. A 1988 random sample survey of applicants for change in place and purpose of use of a water right in

New Mexico found 28 presently had water leases out of about 190 responses (Nunn 1990). Ten were in the Gila San Francisco region, eight in the Pecos River Valley, three each in the Middle and Upper Rio Grande basins, two in the Mimbres basin, one in Lea County, and one in Estancia. The Gila San Francisco leases were for municipal and industrial users; the rest were for a wide variety of uses: pipeline pressure testing, establishment of a duck pond, highway construction, commercial uses, mining and metallurgy, gas and oil drilling, and construction. In 1988 dollars, the average rate across all leases was \$222 per acre-foot of consumptive use or about \$416 per acre-foot of diversion, and the average transactions cost was about \$50 per acre-foot of consumptive use.

Stock Watering

Currently, one does not need a water right to construct a small stock dam (NMSA §72-5-32 and §72-9-3 (repl. 1985)), or to sink a well for livestock watering (NMSA §72-12-1 (repl. 1985)). However, the ability to secure small amounts of water for livestock without an appropriative right may be lost as regions become more tightly administered. The Arizona v. California (373 U.S. 546) decree required these uses acquire appropriative rights in the Gila San Francisco basin, though existing permits for dams or wells for stock-watering may still be exercised. In the Aamodt adjudication, an interim order has stopped the establishment of any livestock or outdoor domestic water uses under permit in the Pojoaque basin until the final decree (New Mexico v. Aamodt, 537 F. 2d 1102 (1976)). In any basin under adjudication, it is possible that the present stock-water privilege may be replaced with a requirement that water rights be acquired. The SLO may wish to anticipate this possibility and include in its resource assessment an identification of the stock-watering needs associated with the fullest development of trust lands for grazing. This will help assure that trust lands have stock-watering privileges in the event that adjudication decrees prohibit the future establishment of such privileges.

Water Rights Acquisition

The SLO's current policy that any water rights developed on state trust lands must be vested in the commissioner's name for the trust's benefit could be expanded. Some would agree that the SLO itself should appropriate water for future beneficial use on state trust lands. Under existing law, this may not be an option, since a notice of intent to appropriate must be followed

within four or five years by the actual appropriation and application of the water to beneficial use.

Such appropriations might be based on an inventory of state trust lands which identifies the highest use of the lands and an assessment of water necessary for development of these uses. New legislation empowering the SLO to appropriate water under these conditions would be required. It might be similar to current law which allows municipalities a 40-year water planning period (NMSA 1978 § 72-1-9). Water appropriated for future uses under such a provision could be leased to other users until required for state trust land development, as long as the lease did not threaten water availability for the land's development and the trust's value.

Litigation Impacting Water Resources of the Trust

There are several threats to water availability in New Mexico which could affect the future development potential for trust lands. Two of these include the exportation of water and claims of federal reserved water rights.

Exportation of water results in the physical removal of water from New Mexico; federal reserved water rights claims raise the possibility of the removal of water resources from the state's sovereign jurisdiction. In both situations, the availability of water to be used with state trust lands may be reduced or eliminated.

Exportation

Prior to 1982, New Mexico had an embargo law which did not permit New Mexico water to be transferred beyond the state border. In that year, however, the United States Supreme Court ruled that water was a commodity in interstate commerce and, therefore, under the Commerce Clause of the United States Constitution, states were not allowed to prohibit the transfer of water across state lines, (Sporhase v. Nebraska, 458 U.S.C § 941, 1982). The New Mexico embargo law thus became unconstitutional and unenforceable. The result was that water resources once believed to be preserved for use in New Mexico became subject to out-of-state transfer (El Paso v. Reynolds, Civil No. 80-730-HB, D.N.M. 1983).

The Supreme Court established, however, that a state may, in times of critical shortage, prefer and limit water use to its own citizens, thus preventing out-of-state export. Exercise of the preference and limitation is possible if a state can show that exportation would be contrary to the conservation of water within the state or detrimental to the public welfare of the state's

citizens. Unfortunately, the meanings of "conservation" and "public welfare" in a water shortage context are not yet defined. Only after extensive litigation and judicial review might some standard or guideline emerge that could provide some certainty. The incomplete definition of these critical terms causes significant distortions in a current planning context, where certainty is desirable if not necessary.

There is one notable exception to the Supreme Court's ruling that would allow New Mexico to limit exportation of water. This exception deals with the "market participant" doctrine. It applies when a state acts as a "market participant" rather than as a "market regulator" as in the case of a state appropriating water to itself for defined future needs. There have been only three Supreme Court cases finding this exception valid, so the precise contours of the doctrine have not yet been established. A classic case, however, approvingly applied the exception to a state action limiting sales of concrete from a state-owned concrete plant, that competed in the interstate market, to in-state customers during times of concrete shortage. Essentially, the Court ruled that in this capacity, the state like any other business, could decide with whom it would prefer to do business (Reeves v. Stake (447 U.S. 429)).

With state trust lands, the SLO might be considered to be in the land and resource management business and as such does not regulate development but, rather, competes with other land owners for the development dollar. When water resources are limited, and do not constitute enough supply for both in-state and out-of-state needs, as in the case of cement, some have argued that New Mexico could restrict the transfer of water in preference for the development of its own state trust lands.

Federal Reserved Water Rights

The second threat to water planning for state trust lands is the assertion of federal reserved water rights. Very simply, those rights have been recognized by the courts as existing when Congress reserves federal public land for a specific federal purpose. Without express language, it is implied that Congress also intended to reserve for those lands a sufficient quantity of unappropriated water, with a priority date of the date of reservation, to achieve the primary purpose of that reservation.

This presents a problem for water resource assessments because priority dates and quantities claimed for such federal reserved rights may upset all established expectations. For

example, an Indian federal reserved right water claim made today may include an assertion of "time immemorial" as the priority date and seek quantification based on all practicable irrigable acres over which the tribe or Pueblo at one time asserted aboriginal title. If and when such claims are successful, changes in existing water right titles and water market scarcity conditions upset not only planned activities, but the water resource availability itself may be constrained due to the acquired control of the federal interest.

Federal reserved water rights are grounded in the recognition by Congress that land grants in the arid west were meaningless without the water necessary to achieve the grant purposes. There is an obvious parallel between this recognition and the understanding of Congress about the arid nature of New Mexico's trust lands. Indeed, certain lands ultimately transferred as trust lands to the state of New Mexico may be entitled to support a federal reserved rights claim.

The importance of water to successful management of state trust lands requires further research into the relationship the New Mexico Enabling Act creates between the federal government and the state. At the very least, however, where federal reserved water rights claims may be in conflict with the proper administration of state trust lands, there is a conflict of implications from congressional intent. That should necessitate, at the very least, some balancing of the state trust lands' interests with those of the federal right claimants.

WATER QUALITY

Although water quality on state trust lands is not thought of as a "resource" in terms of its being able to produce revenue, it can be an important factor in the revenues generated from the trust lands. Water pollution on state trust lands as well as surface-and ground-water pollution adjacent to the land could lower the land's value, decrease its lease income, and cost SLO money for cleanup. If the SLO was named the "responsible party" in a pollution cleanup action, it could cost millions of dollars. For instance, the Lee Acres landfill site near Bloomfield was leased by the BLM to the county as a landfill some years ago (McQuillan). The BLM is currently conducting a series of studies (RI/FS/EIS) under the direction of EPA. These studies should determine if pollutants from the landfill were leaking into the Animas River. EPA considers BLM the "responsible party" and therefore BLM could be required pay the cleanup

costs should pollution be found from this source. Thus, it is vitally important that the SLO be concerned with water quality related to the trust lands.

In the last 20 years, major federal water quality legislation has been enacted. This includes the Water Pollution Control Act of 1972 (as amended in 1986 and 1989, 86 U.S.C. § 1251 et. seq.), the Clean Water Act of 1977 (as amended in 1981 and 1986, 33 U.S.C. § 466 et. seq.), the Resource Conservation and Recovery Act of 1978 (as amended in 1980, 94 U.S.C. § 2334), and the Hazardous and Solid Waste Amendments to RCRA in 1984 (98 U.S.C. § 3221). In 1967 the state of New Mexico first adopted the Water Quality Act (NMSA 1978 § 74-6-1 to 14) which created the Water Quality Control Commission (WQCC) and gave it authority in areas of water quality. The WQCC adopted stream standards to protect surface waters and ground water standards for the protection of ground water. These protection programs are administered by the New Mexico Environmental Improvement Division (EID) and the New Mexico Oil Conservation Division.

Federal legislation divided pollution into two broad categories, point source and non-point source. The federal Clean Water Act (Sec 502(19)) defines water pollution as "the man-made or man-induced alteration of the chemical, physical, biological and radiological integrity of water." Point source pollution is defined as that pollution which could be attributed to a single source or discharge. Non-point source pollution is that which is not attributed to a point source. The Federal Environmental Protection Agency (EPA) developed the National Pollutant Discharge Elimination System (NPDES) to regulate point discharges to surface water (33 U.S.C. § 1313 et. seq.) and the WQCC developed a ground water discharge permit system to protect ground water.

Leases issued by the SLO for uses which could result in point source pollution of water (such as mineral leases, oil and gas leases, and salt-water disposal easements), all have a stipulation written into the lease agreement such that the lessee must comply with applicable federal and state laws. This appears sufficient to protect the surface and ground water on these lands from point source pollution. Depending on what uses were involved, it might be necessary to write appropriate stipulations into water, business and special use easements.

Every other year, the EID prepares a report for approval by the WQCC and submission to the U.S. Congress on the quality and pollution control of the state's waters. The latest report

is "Water Quality and Water Pollution Control in New Mexico 1990." According to this report, 98 percent of New Mexico's surface water quality impairment is due to non-point source pollution, mainly in the form of sediment and accompanying siltation. The WQCC has adopted a voluntary non-point source pollution management program as a way of controlling the problem. This plan sets forth processes to identify best management practices and programs to control nonpoint source pollution. Under this plan the SLO is requested to meet the following milestones:

- Adopt policy on use of best management practices in road building and maintenance by January 1, 1990.
- Adopt reclamation standards for oil and gas development by July 1, 1991.
- Develop and transmit information materials on available Soil Conservation Division/Agricultural Stabilization and Conservation Service incentive programs to all grazing and agricultural leases by July 1, 1990.
- The SLO will report to the Environmental Improvement Division on progress and problems related to non-point source management by July 1 each year.

COMMERCIAL DEVELOPMENT

Currently, the SLO's Commercial Resources Division is working closely with the Legal Division in the analysis and revision of SLO sale and leasing activities, the administration of lands which are urban or transitional, and the resolutions of environmental issues associated with trust management. Current internal concerns include the following issues:

- sand and gravel extraction vs. commercial development
- rights-of-way easements vs. commercial development
- funding sources development planning and marketing
- environmental hazards

External concerns are:

- public demand for open space, recreation wilderness areas
- water resource allocation and development for commercial properties

- infrastructure development mechanisms for commercial properties
- marketability of commercial properties, especially given constitutional, statutory, and political constraints
- competitive edge for SLO's commercial properties
- demand by government entities for site landfill locations especially in the area of regionalization
- incompatible use of land adjoining state trust lands
- retention of mineral rights by the SLO when trust lands are sold

Landfills

Because of internal pressures from local governments, state trust lands have been used for domestic solid-waste landfills, especially for small communities. In the past, these landfills were rarely considered to be significant, and as a result, little or no planning took place. Volume reduction, burial methods, sub-surface monitoring, proper determination of the waste's acceptability, top cover, site closure, and waste management are all issues that have been unattended. Ground-water pollution, and the potential for future problems, are the inheritance left by these landfills. Many of these lands are now seriously impacted and have little to offer as sites for future use.

Waste management

Past and current commercial leases of state trust lands take advantage of both surface and subsurface resources. In the past, many activities that took place on, or below these lands were not carefully regulated to avoid adverse impacts on other lessees, and on future users. Adverse impacts have taken many forms: surface salt deposits, soil erosion, ground-water pollution, residual sludge pits, abandoned gravel pits, derelict equipment left at sites, and other similar environmental problems. When problems arose in the past, leases were often terminated, the land returned to state control, leaving the problems associated with remediation to the SLO.

Problems concerning waste mismanagement on state trust lands can be minimized by taking the following actions.

- Develop criteria for the review of all new and renewed leases which require an environmental assessment because of potential adverse impacts that may be associated with the activities under the lease;
- Develop criteria for the management of existing land leases where activities may result in the generation of wastes or significant adverse environmental impacts;
- Develop a protocol for an environmental audit of lease sites that meet the criteria developed, and provide a mechanism for funding and conducting audits of varying intensities depending on the significance of the issues involved;
- Develop a system to insure regulatory agency inspection and oversight of plans and specifications for activities on state trust lands that meet the criteria developed;
- Develop procedures that include some form of insured financial responsibility for post-lease site-closure and monitoring for those lease activities identified in the criteria; and
- Develop contract documents to incorporate these concepts.

RECREATION AND TOURISM

Many state legislators have difficulty understanding why a state agency must pay to use state trust lands or must request an appropriation to purchase state trust lands for use as a state park. If public funds are to be invested in developing a recreational use area on state trust lands, the investment should be protected by excluding inappropriate or conflicting uses. A single parcel of trust land could conceivably be leased for nearly a dozen separate uses simultaneously. In theory, if use for a single purpose results in diminished value of another use, the SLO should insist on compensation for that diminished value. Thus the need exists to distinguish between the value of casual recreational use of trust lands, which may not require exclusive use and the designation of trust lands as state parks, national parks, and federal wilderness areas where exclusive or restricted use is an important issue.

Future issues and conflicts associated with the recreational use of state trust lands are similar in many respects to the issues and conflicts which arise regarding other multiple-use public lands. The primary difference relates to legal constraints that prohibit the SLO from permitting any use for less than market value. Traditionally, park areas which are managed specifically for recreation with associated support facilities are fee areas. Multiple-use public

lands managed by the Forest Service or BLM are generally open for recreational use without a user fee. The public and many government officials incorrectly assume that the same free recreational use policy is applicable to trust lands.

In order to legally accommodate the growing number of requests for recreational use of trust lands, the SLO created a recreational permit system for trust lands. The daily \$3.00 fee would allow the SLO to meet legal obligations and still made lands available.

Additional recreational issues which could be divisive include the management of trust lands within wilderness and park areas, the pending constitutional amendment to facilitate efforts consolidating trust lands through exchange, wildlife grazing, and endangered species protection.

CULTURAL RESOURCES

Cultural resources in the case of outstanding discoveries can generate income to the trust when people pay to view or otherwise experience the "find." Finds of this magnitude, however, are not very common and there is presently no income to the trust from this source. Cultural resources are viewed by many developers as something that often gets in the way of progress. Balancing the societal desire to protect the evidence of our past against the mandate to generate income from trust lands is a significant challenge.

Most current issues and conflicts regarding preservation of cultural resources on trust lands involve three issues: illegal pothunting for profit; land exchanges with federal and local agencies; and leasing for grazing, mining, and other activities. These factors have caused and continue to cause the loss or destruction of cultural resources on state trust lands. To the extent these resources are non-renewable, these activities are fostering the irretrievable loss of information that is valuable not only to archaeologists, but to broader sectors of the public.

The latter two factors might be grouped under a more general category of impacts to cultural resources arising from development. What is important to note is that New Mexico's development has accelerated markedly over the past few years. For want of a more sophisticated index, the number of development projects per year is used as a glossary for the rate at which cultural resources are being affected by development.

Between 1970-1990, a total of 11,469 projects were completed on federal and state trust lands in New Mexico (Table 4). The number of projects in ARMS in 1989 alone was

approximately 3,850 for the year, or 34 percent of the total for the past 20 years. Projections for 1990 indicate that the total number of projects will be three times greater than in 1989. It is unlikely that cultural resources can sustain this rate of depletion for a protracted period of time.

Pothunting for profit, land exchanges with federal and private agencies, and development of trust lands are likely to remain important for the foreseeable future. Governmental policies encouraging development in New Mexico will continue and, judging from estimates cited earlier, the rate of impact on cultural resources will increase. However, the preservation of cultural resources and development of state trust lands are not mutually exclusive goals, although some innovative approaches toward reconciling these two desires may be required.

Illegal Pothunting

Illegal pothunting, notably in the Mimbres region, has caused the destruction of many sites, included multi-room pueblos. Their destruction effectively removes our ability to reconstruct this region's prehistory. The recent effort to enact a state law protecting burial sites on public and private lands may help to reduce the destruction rate of these sites. At present it is too early to gauge this legislation's impact. Note the emphasis here on reducing the rate of destruction; it is not likely that such legislation alone will completely halt illegal pothunting so long as there is a market for southwestern antiquities. Recent actions at the federal level for the protection of Native American burial sites and human remains are important considerations for the SLO (Native American Grave Protection and Repatriation (HR 5237 1990)).

Land Exchanges

The exchange of state trust lands with federal and local agencies is another factor that can affect cultural resources. In general, such exchanges fall under the Section 106 of the Natural Historical Preservation Act provisions and such lands are surveyed to locate archaeological sites prior to the exchange. If surface modifications are to occur, it is also a requirement that adverse impacts to any sites found within the boundaries of the exchange be mitigated. In most cases, this requires excavation of cultural resources.

With the notable exception of lands acquired as part of the Cox Ranch Land Exchange, contiguous blocks of state trust lands tend to occur as small, non-contiguous parcels that are

difficult to manage. In Doña Ana County, for example, there is a checkerboard of discontinuous 640-acre parcels of state trust lands interspersed with BLM holdings.

Sales of state trust lands to private individuals have not fallen under the provisions of Section 106 compliance. Such sales under the provisions of New Mexico House Joint Memorial #6 are not subject to cultural resource surveys prior to conveyance to private individuals. There is an attendant risk of loss of cultural resources that is difficult to gauge at this time. While such sales are infrequent (there were approximately 16 sales last year), impacts to cultural resources on such properties remain largely unknown.

Land Development

The impact on cultural resources of leasing state trust lands to private individuals or corporations varies depending on the activities these individuals/organizations undertake. Grazing is one of the most common activities on leased state trust lands and has, perhaps, the least impact on cultural resources. Subsurface pothunting by lessees does not appear to be a common practice.

A more irretrievable loss of cultural resources occurs when major construction takes place on state trust lands. Again, state law requires that firms mitigate adverse impacts to cultural resources by avoiding archaeological sites or by excavating them prior to construction. Major conflicts can arise between SLO officials and private agencies over the costs of such mitigation programs.

VI. IMPORTANT MANAGEMENT CONSIDERATIONS

THE RURAL DIMENSION

Trust lands for the most part are rural lands and what is done on these lands can have a direct and significant impact on rural people. Social impacts upon this vital sector of our society rank among the most important management considerations with which the SLO must deal.

Rural communities generally do not have a primary industrial or commercial base. Their economies typically depend on some variation of natural resource extraction or on agriculture. As a result, most rural businesses are either associated with resource extraction, with agriculture production, or serving the needs of people employed in those fields. Rural community residents tend to view themselves as being linked and interdependent. What affects the mine, the oil patch or the ranching community affects all. The interrelationships of good weather, good commodity prices, and stable employment is well understood by small businessmen. Mine or mill layoffs, plant closures, or reduced agricultural incomes mean lower sales volumes for appliance and automobile dealerships, and other stores along rural main streets. Consequently, rural people generally favor management decisions which increase, or at least maintain, extractive and agricultural production levels.

Given the close tie and dependence on the natural resources surrounding the community, rural residents have long been actively concerned about trust land management. As a result, past social issues have often centered on the demands and needs of local residents—lessees or other rural residents. They may have depended on trust lands for firewood, sand and gravel, and hunted on them for generations. Businesses may be dependent on access to these lands by sportsmen and others. Such intimate association and dependence, over a long period of time usually leads to a sense of quasi-proprietary right even where ownership by others is explicitly acknowledged. Policies or management decisions severing this special quasi "right" can be very unsettling to rural people. The rural social fabric is easily torn asunder by the loss of access to grazing land, hunting areas or woodlands, especially in New Mexico. While the rights may

have a tenuous legal basis, local demands are nonetheless difficult to ignore as witnessed in the recent dispute over sheep grazing on state wildlife properties in Rio Arriba County.

A problem that has bedeviled resource development from very early times is the "boom or bust" phenomenon. Examples of this phenomenon are well known in American history. The social impacts of bust periods are generally apparent, while the negative impacts of boom periods are much less apparent. The prospect of the new prosperity often encourages a rate of in-migration far in excess of what can be employed. Unemployment may actually increase, housing may be scarce and more costly, vital services become inadequate, and crime rates may increase. All of this increases the level of stress on at least several segments of the population and not infrequently causes some resistance to development. Accordingly, the challenge to resource managers is to smooth out the swings in production cycles, thereby, mitigating the social disruptions which accompany them. At the same time, it must be recognized that market forces often overwhelm resource managers' efforts to dampen boom and bust swings. However, whenever possible it remains a desirable goal.

Rural sociology enters the land management equation not as another category of resources to be managed, but rather as an undesignated category of clientele with well-articulated interests and enough political clout to effectively demand some attention. No land owner, public or private, ever has complete dominion over his holdings. He must be ever mindful of his neighbors' interests. The land commissioner's mandate is explicit and clear—to protect the trust assets and to maximize revenues for the various designated beneficiaries. However, these trust lands do not exist in a vacuum; they are part of the resource base that citizens depend on for subsistence. Moreover, since much state trust land is checkerboarded or dispersed among other holdings, they cannot be treated independently. They must be managed in concert with those holdings. Therefore, the land commissioner must exercise his mandate within that reality.

Land managers have long realized that receiving local input is crucial to good decision-making. As residents in the community, field staff were in a position to know and understand the values that were important to local residents and how these values affected the trust land management. In recent times, communicating with the public has become increasingly complex and difficult. Where once a land manager faced a small and relatively homogeneous community,

whose interest could be satisfied with one or two programs, today there are numerous and often divergent demands. Dealing with those "people" pressures is an ever greater challenge.

Social issues reflect important human concerns--basic values, emotional security, a sense of continuity and stability and overall well-being. They go well beyond the satisfaction of immediate material needs. Consequently, since social issues are so important, they can generate substantial controversy. Moreover, there is infrequently one "best" solution nor can they be ground through a mathematical equation to provide a solution. Precisely because the process of finding acceptable resolutions to social issues is so different from finding technical solutions, specialists such as social scientists, are needed.

LAND OWNERSHIP PATTERNS

Because the SLO owns noncontiguous parcels of land, the agency has developed relationships and interdependencies with private landowners, government agencies, and other organizations. The SLO frequently is the minority land owner and thus finds itself in conflict with other land owners. The checkerboard land ownership pattern impacts the SLO's management practices and revenue generation. Most land managers believe that consolidation of ownership primarily through land exchanges will help minimize adverse or negative impacts from adjacent land owners.

Federal designation adjacent to or surrounding trust lands such as wilderness study areas, areas of critical environmental concern, national parks or monuments, and others can constrain SLO management options and reduce income. There may be potential for federal government actions to restrict SLO use by law, regulation or policy regarding these special designation areas. SLO access to and from trust resources as well as the opportunity to use the resources are may be restricted. The SLO should carefully evaluate the possible issue of illegal taking.

Building productive relationships with interest groups is very important, but difficult. Again, the role and purpose of state trust lands are often misunderstood or ignored by those who have some objection to the limitations placed on the trust. Interest groups range from lessees to sportsmen groups to civic organizations and environmental groups, all with different goals and perceptions of state trust lands. Any constructive relationship that might be developed could be

used to inform these groups about the constitutional purposes of the trust and that they do not necessarily exclude their interests.

Some SLO holdings are often adjacent to BLM land and conflicts can arise because of differences in administrative philosophies. Unlike the SLO, the BLM's administrative directives are not to generate maximum revenue, and their fees and rentals charged reflect this. Their approach is one of resource conservation and protection as is generally the case with the U.S. Park Service, Forest Service, and Fish and Wildlife Service.

The SLO interface with adjacent private land owners can create another set of problems. Road easements across trust lands to access private property is a good illustration. The current surface lessee may oppose the easement due to the exposure and the increased possibility of trespass being created. A grazing lessee, for example, would be concerned about unwanted traffic interfering with livestock movement and general disruption to ranch operations. An attempt to resolve this conflict would include communication with the grazing lessee to determine the specific nature of his concerns. The right-of-way applicant must also be consulted to find ways to minimize impacts on the ranching operation. Because each situation is usually different, the SLO must deal with each on a case by case basis. Since the SLO's mandate is to generate revenue, but not at the long-term expense of the resource, the ultimate decision must be to determine if the road will benefit the land.

Similar resource management questions arise when a new application to lease land for grazing is received. Is the land suited to a better use? Will such use of the land impair it physically beyond repair for a future use? Should the land stay unleased to await its highest and best use to come along? These are critical questions that will face all SLO commissioners.

OTHER CONFLICT CONSIDERATIONS

Several conflicts concerning state trust lands have emerged. Currently, a growing conflict exists between all mineral resources and residents in the areas where the resources are located. This conflict could best be termed the "not in my back yard syndrome." This conflict is most prevalent in those areas which heretofore have had little or no mineral development, (or in which mineral development was early in this century and then abandoned) and where there have been a large influx of new residents from other densely populated areas of the country.

Santa Fe County is an example. Mineral development is protested least in the southeast part of the state, simply because the vast majority of the population in that area derives its living from mineral extraction.

Another conflict deals with the multiple leasing program of the SLO whereby a single tract of land could conceivably be leased for nearly a dozen separate uses simultaneously. Under strict interpretation of the federal statutes, state constitution, and laws of the state, the commissioner must receive fair market value consideration for the specified beneficiary for each separate use made of the land. There can be no free-use leases or permits, if such use is of value; free use would diminish the return to the beneficiary. Such diminishment is prohibited by the state's enabling act and constitution, and the state must be compensated for any diminishment.

Water and the ownership of the right to use the water is a conflict that is with us today, but will be more prevalent in the future due to water basins not recharging fast enough to meet the level of demand. The conflict lies in the fact that some people in the state do not think the SLO should acquire water rights, but that rights should be developed in the name of the private developer. The control and ownership of water will be a new source of income to the trust in the future. Therefore, acquiring water rights in the name of the commissioner of public lands will continue to be an issue.

Another major rights-of-way conflict is the issuance of an easement in known mineral country. The easement must be issued so as not to prevent the mining of minerals or not be issued at all. Also, easements must not be issued if land values will drop as a result; or, if issued, must be routed to minimize the devaluation.

VII. FUTURE VISIONS

OIL AND GAS

Present conflicts will certainly continue into the foreseeable future since no resolutions currently exist. Oil pricing conflicts will take years to identify, let alone resolve. Land reclamation will continue to be an issue as long as there is oil and gas production from state trust lands.

Although natural gas is second to oil in current revenues, future issues and conflicts may become even more important than those facing oil for several reasons. First, natural gas has only recently become a valuable commodity when compared to oil, so many of the issues concerning natural gas are relatively new. However, natural gas may become much more important than oil in the future, due to its natural characteristics of being environmentally clean, easy to transport, and relatively safe. Second, natural gas is plentiful when compared with other energy resources, and each year the proven reserves continue to increase. Third, recent events at the federal level concerning natural gas use tend to indicate that demand may grow much faster than demand for competitive fuels.

As a result of these factors, the current issues of pricing and the receipt of the fair share of natural gas liquids will become even more salient as the importance of natural gas grows. There may also be some other crucial issues which now are not foreseeable.

Suggestions have been made to suspend sales of state oil and gas leases during periods of low oil and gas prices primarily because relatively low bonuses and royalty payments are received when oil and gas prices are down. However, a moratorium on state oil and gas leasing could well decrease revenues both in the short-term and the long-term by severely hampering exploration and development leasing. It is inevitable that total production from all **existing wells** on state trust lands will decline. Unless known oil and gas accumulations are further developed and unless new reserves are found, total production from state trust lands will decline. Although some decline may be inevitable, it will be accelerated if no wells are drilled because leases are not issued. Operators will drill elsewhere. In addition, future prices of oil and gas are difficult, if not impossible, to forecast; reserves discovered or developed at today's oil prices may become

more valuable in the future if prices increase. Furthermore, newly discovered reserves may take decades to be fully delineated and developed; a moratorium on leasing could stop the discovery and development process. Discovery and development of new reserves are vital to maintaining a healthy income from state trust lands.

RESOURCE RENEWABILITY

Most of the revenue-generating resources discussed in this document are non-renewable resources, so eventually they will no longer produce new revenues for the trust. In order to maximize long-term revenues, the SLO must begin to shift its revenue-producing efforts to those areas which are renewable, revenues which generally come from surface uses of land.

Timing is the most important unknown concerning the future depletion of the trust's mineral assets. As recently as ten years ago, forecasters predicted that New Mexico's oil and gas resources would be depleted by the year 2000. Now, it is clear that there will be significant oil and gas production well into the middle of the next century.

In order to begin to shift the SLO's earning power to renewable resources, planning must begin now. There may be a need for legislation to direct future commissioners to continue such planning efforts, so that the SLO is well prepared when there are no new revenue streams from the mineral estate.

Administrators who deal with land use and the related conflicts must make decisions based on as much local knowledge as possible. This knowledge can be derived from mineral and land resource inventory data bases. An inventory of the land resources is the first step toward making sound land-use decisions. Without a resource inventory, the administrator is essentially making blind decisions which might eventually result in adverse long-term impacts to the trust and the land's ability to generate revenue. It would be helpful to coordinate automated inventory data with the BLM, which already has a data base for many of these areas.

In promulgating and imposing the terms and conditions under which lands were granted to the state, Congress apparently did not foresee or concern itself with the eventuality that the lands selected might prove valuable for purposes other than for commerce or industry. New income sources should be continually studied and aggressively implemented. To not pursue a

program of allowing the trust lands to develop to their full revenue producing potential would constitute a diminishment of the trust and a breach of trust law.

There will undoubtedly be increasing pressure on the SLO to produce higher revenues in the future, while at the same time limiting mineral resource development near communities. One strategy might be to invest some SLO revenues into trust land improvements. The action which would increase revenues the most would be to invest in oil and gas development as a working interest owner, instead of only retaining a royalty interest. By taking such action, the SLO could substantially increase revenues, provided the working interest is properly managed.

However, any type of investment brings increased risk with the increased revenues. It is quite easy to envision what the newspapers would report if the SLO drilled a ten million dollar dry hole or the criticism that would be leveled on the commissioner by the legislature, beneficiaries and the general public. It is perhaps best to leave oil exploration and development to the industry professionals.

CARBON DIOXIDE

Carbon dioxide future issues include its use in New Mexico and Texas fields to aid in tertiary recovery of oil. There is a considerable amount of CO₂ in the coal-bed methane and this also can be utilized if gathering facilities were available.

ENVIRONMENTAL INTERESTS

The ecological issues addressed in the preceding sections are issues that potentially can generate intense emotion and response by any one of a number of environmental organizations and conservation groups. The trend toward coalition of such groups utilizing the legal system to obtain their goals will likely continue to increase. While the SLO does not have to respond to political pressures from such groups, litigation could cost many man hours and loss of revenues should the legal actions of these groups be successful. The SLO should carefully assess the short-term benefit of actions which will generate revenue but that may also generate a committed public opposition on the basis of environmental concerns. It may be possible to negotiate an acceptable compromise by educating the members of the environmental coalition,

but this must be done at an early stage in the planning of a potentially controversial lease or other land transaction.

RESOURCE INVENTORIES

The SLO must deal with the issue of how to best develop an adequate inventory of resource assets on trust lands. It has been argued that the petroleum potential of state trust land not currently under production should be evaluated. These lands may be in producing basins or in frontier wildcat areas and they may or may not contain undiscovered accumulations of oil and gas. An evaluation of the oil and gas potential of these lands would allow for better formulation of objective short-term and long-term leasing policies, including how much land should be put up for lease in any given year and which tracts of land should be put up for lease. This evaluation would also allow for the objective determination of minimum acceptable lease bids and would produce better land valuations for state trust lands that are put up for sale or exchange with the federal government or private entities.

The vast number of oil and gas leases and the amount of money derived from these leases suggests that most of the effort should be made toward oil and gas leases on state trust lands. Although the SLO operates on financial restraints that limit its spending of funds, perhaps future legislative funding could be appropriated to fund evaluations of state trust lands in the oil patch. A pilot program may prove the value of this approach. The NM Bureau of Mines and Mineral Resources could be of much cooperative help with this inventory. The inventory assessment of mineral resources on state trust lands could also be done in cooperation with the BLM, particularly in areas where state sections are surrounded by BLM land. Opportunities exist for data sharing with other state and federal agencies. For example the BLM has compiled a great deal of resource data on public lands which adjoin many state trust lands, and in some cases, such as vegetative and soils data, on state lands directly. Agreements which lead to the computerization of data for easy retrieval and analysis would be beneficial to the SLO.

In addition, the SLO could require lessees to submit some level of information on their leases to the SLO, particularly if they turn the lease back. The object would be to collate and develop information available to potential lessees when these new lessees consider trust land.

SOCIAL ISSUES

Future social issues will increasingly focus on urban concerns. The urban sector will continue to grow much more rapidly than the rural sector of the population. Moreover, as the urban population expands, an ever increasing number will be effectively cut off from nature in their residences and occupations, and consequently will look to public lands to fulfill their recreational needs. The outline of future issues is already clear: There will be a continuing clamor for wilderness preservation. People submerged in artificial living and working environments try to compensate by getting away to "pristine" natural environments. Demand for conservation of all flora and fauna will be a parallel set of issues. Such demand by urbanites is apt to be more often idealistic than realistic and, therefore, perhaps in some respects more extreme and unforgiving than previous demands by those closer to the land.

The same genre of expectations of the local population are likely to continue into the future. However, they will find themselves sometimes in league with, sometimes in competition with, and sometimes overwhelmed by the interest of an ever-growing urban population.

Because citizens' interests in state trust lands were less expressed in the past, land managers made decisions with greater emphasis on technical criteria. Now with the awakening interest in public land and resources among a much wider segment of the population, managers must take into account a much broader data set during any decision process. It seems likely that the public issues demanding SLO attention will only increase, primarily because there is likely to be a growing number of land-based conflicts.

Every land management agency should have in-house capability to assess social impact. There is a continuous need to identify and monitor existing and emerging issues. Sociologists could join an interdisciplinary team to defuse potentially explosive issues and/or to respond to emerging issues before they become disruptive.

Various documents prepared by SLO personnel indicate substantial sensitivity to social issues. There is no doubt that the office has developed a very effective expertise in responding to past social issues, however, specialized expertise could still be useful. Social impact assessment has evolved into a specialty during the past decade. Expertise in this area could sharpen the definition of issues, enhance the communication with various interest groups and the public at large through educational efforts, and improve the decision process.

Indeed, the State Land Trust Advisory Board, appointed by the commissioner was established to provide this kind of input. While such a board can make recommendations, it takes resident staff working day in and day out to implement them. A small unit, with perhaps three specialists, should be enough to initiate a credible social impact assessment effort. These specialists would do much of their work in interdisciplinary teams to provide the social perspective so essential to sound decisions in the future.

ECOLOGY

Much of the revenue currently derived from state trust lands is from the depletion of non-renewable resources. The SLO's challenge is to develop ecologically sound management practices which continue to derive economic benefit from non-renewable resources, while not destroying the long-term value of the land. This is especially critical for the well-being of New Mexico's future generations.

There are two factors that will have a major effect on the issues and conflicts of land management by the SLO in the next half century: increasing urbanization of New Mexico's population, and climate change.

Urbanization

The "not in my back yard syndrome" is not going to decrease in the foreseeable future. It will almost certainly become more prevalent as a larger percentage of the population moves into suburban areas, and as the population continues to make its living from activities other than mineral extraction.

The SLO should look at new uses for land resources that could generate new income in the future. The resources leased today must be geared toward protecting and minimizing the current impacts so that the new uses can be eventually integrated into revenue producing positions.

As urbanization increases, the demand for outdoor recreational opportunities will increase in an almost exponential fashion. At the same time, the intensity of conflicts arising over the operations of extractive industries that might increase air pollution, generate dust, be aesthetically unpleasing, or reduce wildlife habitat, etc. will increase. Conflicts with the ranching and forest products industries will also intensify. While urbanization can result in

increased conflicts over land use, it can, at the same time, provide opportunities for the SLO to develop revenues from lands that now produce only small revenues. The need for outdoor recreation near urban areas can lead to pay-for-use development of SLO-managed lands. However, lands near urban areas that have recreation potential could cause conflicts among user groups. These include, all terrain vehicle and four-wheel drive vehicle users vs. hiker-nature enthusiasts vs. hunters-target shooters vs. picnic-camper users vs. cattle growers and timber harvesters, and others. Such conflicts can produce a management nightmare and financial drain rather than financial gain.

As the population becomes more urbanized, environmental awareness and activism will increase. The ecological issues addressed above will undoubtedly be more hotly debated and more problematic for the land manager. Indeed, political pressures from these groups may result in increased costs to SLO operations. The SLO must be prepared to address issues of long-term sustainability and maintenance of the natural resource base. If the SLO begins now to prepare to address these challenges, the future political and economic costs may be minimized.

Climate Change and Variability

Human activities on this planet may have increasing effects on the global climate. Our ability to predict the direction of that change for a given land area such as a geographic region of New Mexico is poor, at best. We can be fairly confident, however, that the climate will change as it has many times in the past. With a changing climate affecting renewable resources, the management of these resources must be changed accordingly. Planning in the absence of accurate climate change forecasts is extremely difficult. With a more variable climate, or a wetter or drier climate, the conflicts arising from land uses are likely to be exacerbated.

Wildlife Enterprises

Future management options may also result in conflicts as well as opportunities to increase state trust lands earnings. For example, consolidated state trust lands of a semi-arid grazing land (shrubland-grassland) might be developed as a game park, generating revenues from hunting, sale of animal products, and tourism. Such a park might be highly profitable but would almost certainly generate opposition from some wildlife management agencies, "game purists", "ecological purists," and possibly from the livestock industry. The livestock industry

however, may not be opposed to game ranching since game animals can be managed very well in conjunction with livestock, especially if there is an incentive. Such options should be explored, however, because they may be ecologically more sustainable than domestic livestock grazing alone, and may generate higher revenues per unit area of land.

The SLO must be flexible in managing the state trust lands and sustaining revenues. Ecological issues will undoubtedly increase in importance and demand the SLO's attention in the future. Beneficiary organizations such as the universities, have expertise in ecology, range management, forestry, fisheries, etc., that can be tapped for assistance in dealing with problems as they arise. This expertise should be used to develop plans for sound development of state trust lands and to assist with public education regarding the role of the SLO, land commissioner and the benefits that accrue from the efforts of that office.

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