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DRAFT ENVIRONMENTAL IMPACT STATEMENT

GROOM MOUNTAIN RANGE

LINCOLN COUNTY, NEVADA

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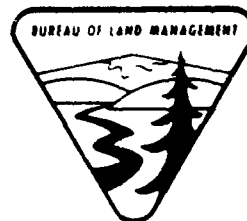
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OCTOBER 1985

ENVIRONMENTAL IMPACT ANALYSIS PROCESS



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SUMMARY

The Air Force proposes to request renewal of the withdrawal of the Groom Mountain Range from the public lands. The withdrawn lands will provide a public safety and security buffer zone for national defense programs carried out on the adjacent Nellis Air Force Range (NAFR). Prior to the existing withdrawal of 89,600 acres of the Groom Mountain Range in October 1984 by PL 98-485, the area was public land administered by Bureau of Land Management (BLM). The temporary withdrawal expires December 31, 1987. Air Force use of the area will not entail any air-to-ground targeting activities or construction other than a possible boundary delineation fence. Direct impacts to the land from Air Force activities should thus be no greater than those currently experienced from existing overflights. All impacts experienced would be related to restricted and prohibited access. There are no overriding impacts on the human environment which would render the proposed action unacceptable.

This draft Environmental Impact Statement (EIS) discusses possible mitigations for impacts including those on outdoor recreation, mineral exploration and development, and agriculture interests. Below is a summary of the potential mitigations in the areas specified by PL 98-485. Mitigations of impacts to roads, and socioeconomics are also addressed in the draft environmental impact statement. The complete discussion of potential mitigations is in section 4.3 of the document.

The proposed action may interfere with operation of the Bald Mountain Grazing Allotment. The Air Force recommends that no action be taken until a problem develops. However, the Air Force could mitigate, if necessary, by guaranteed access to potential purchasers of the Bald Mountain Allotment or by compensating if there is a loss of market value.

Access to the area for mineral exploration will be restricted by the proposed action. It has been suggested that the military should open other withdrawal areas to mineral exploration and development. This is not possible on the Nellis Range without seriously compromising national defense programs; therefore, this mitigation is not recommended. However, to mitigate potential impacts on owners of valid patented and unpatented mining claims, the Air Force will, at its option, either subordinate valid existing mineral claims or allow holders of valid claims controlled access to work the claims at levels of activity existing prior to the withdrawal. The combined affect of the two options will be to defer for the term of the withdrawal significant development of the claims or large-scale mineral extraction.

The potential impacts on outdoor recreation are primarily in the area of sport hunting. Some have suggested that additional portions of Nellis AF Range should be opened to controlled hunts of bighorn sheep to offset the restriction to hunting land in the Groom Mountain Range area. The Air Force has concluded that it can open an additional 26 square miles of the Stonewell Mountain area.

To mitigate the potential loss of chukar and quail hunting in the area of the proposed withdrawal, the Nevada Department of Wildlife and Bureau of Land Management helped identify locations for game bird guzzlers in the Tule Desert area to improve that chukar and quail habitat. The recommended mitigation is to install game bird guzzlers on a one-to-one basis for the springs included within the Groom Mountain Range.

Expansion of existing wildlife areas is another mitigation that has been proposed as an offset for potential loss of opportunities for hunting. The BLM has expressed willingness to work on this issue with the Nevada Department of Wildlife (NDOW) with reference to management of the BLM controlled lands adjacent to NDOW's Sunnyside area.

Other suggested mitigation related to wildlife are more specifically directed toward the bighorn sheep and the mule deer. Proposals to introduce a gene pool herd on the proposed renewed withdrawal area are not recommended because of the attending entrance requirements for wildlife managers. The range manipulation of approximately 86,000 acres to improve habitat is considered too expensive.

Some have proposed that the government buy land adjacent to Red Rock Recreation Land to expand that area. The proposed purchase cannot be justified on the basis of the estimated recreation lost through the renewed withdrawal of the Groom Mountain Range.

An area management plan has been suggested and could be prepared in conjunction with the BLM. The plan would address issues on management of the area to ensure against adverse impacts. Potential topics include management of livestock grazing, wildlife, maintenance of water resources, control of potential range fires, and protection of cultural resources.

Two separate suggestions were made for road improvements as mitigations. The first was a proposal to pave the Kane Springs Road. This road is not involved with the withdrawal and therefore not supported as a mitigation. The second proposal, was to pave the road from Rachel into the Nevada Test Site (NTS). Paving of the road is not a mitigation but an improvement. A schedule of open hours for the road has been distributed, which solved the previous problem of the road being closed at generally unknown times. Also, a telephone number has been provided so the public can check to determine if the road is open to traffic from the NTS to Rachel.

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CHAPTER 1
PURPOSE, NEED AND BACKGROUND

1.0 PURPOSE, NEED AND BACKGROUND

1.1 PURPOSE OF THE PROPOSED ACTION

The United States Air Force proposes to renew the withdrawal of 89,600 acres, more or less, of public land in the State of Nevada from settlement, sale, location, or entry under the public land laws of the United States, including the mining laws but not the mineral and geo-thermal leasing laws. The withdrawal is to provide a security and public safety buffer for the purposes of: (1) conducting weapons systems testing and training for electronic warfare, tactical maneuvering, and air support (not to include air-to-ground or targeting activities); (2) other defense related purposes consistent with, and involving no greater adverse impact on the withdrawn land and their resources than overflights pursuant to the military tactical training. The withdrawn area may be fenced to exclude entry by unauthorized personnel and animals which might affect the military missions being conducted. This renewed withdrawal is proposed in compliance with the Act of 1984, Public Law 98-485, and pursuant to the Act of 1958, Public Law 85-337, known as the Engle Act and Public Law 94-579, the Federal Land Policy and Management Act of 1976 (FLPMA), the National Environmental Policy Act of 1969 (NEPA) and Department of Air Force Regulations (AFR 19-2).

Appendix A provides the legal description of the land proposed for withdrawal. The proposed renewal of withdrawal will be for a period of 25 years with an option to renew for 25 additional years.

The Groom Mountain Range is geographically located west of Alamo, Nevada, in Lincoln County (Figure 1-1).

1.2 NEED FOR THE PROPOSED ACTION

The proposed renewed withdrawal would provide a buffer zone between public lands and the Nellis AF Range/Nevada Test Site complex where training, testing and weapons evaluation operations for the Air Force and other Federal agencies with defense related programs are conducted. This buffer is to prevent compromising safety and national security.

The Nellis AF Range (NAFR) is the most sophisticated range in the Air Force inventory. Although some of the capability for training is duplicated at other facilities they do not have the land space that is required for changing training scenarios, and thus they provide stereotypical training. The climate of southern Nevada is conducive to year-round training and testing operations and NAFR is large enough to prevent stereotyped training.

1.3 BACKGROUND

The Air Force's need for the Groom Mountain Range withdrawal stems from National Defense programs carried out by Department of Defense (DOD) and other Federal agencies at the adjacent NAFR complex. Establishment

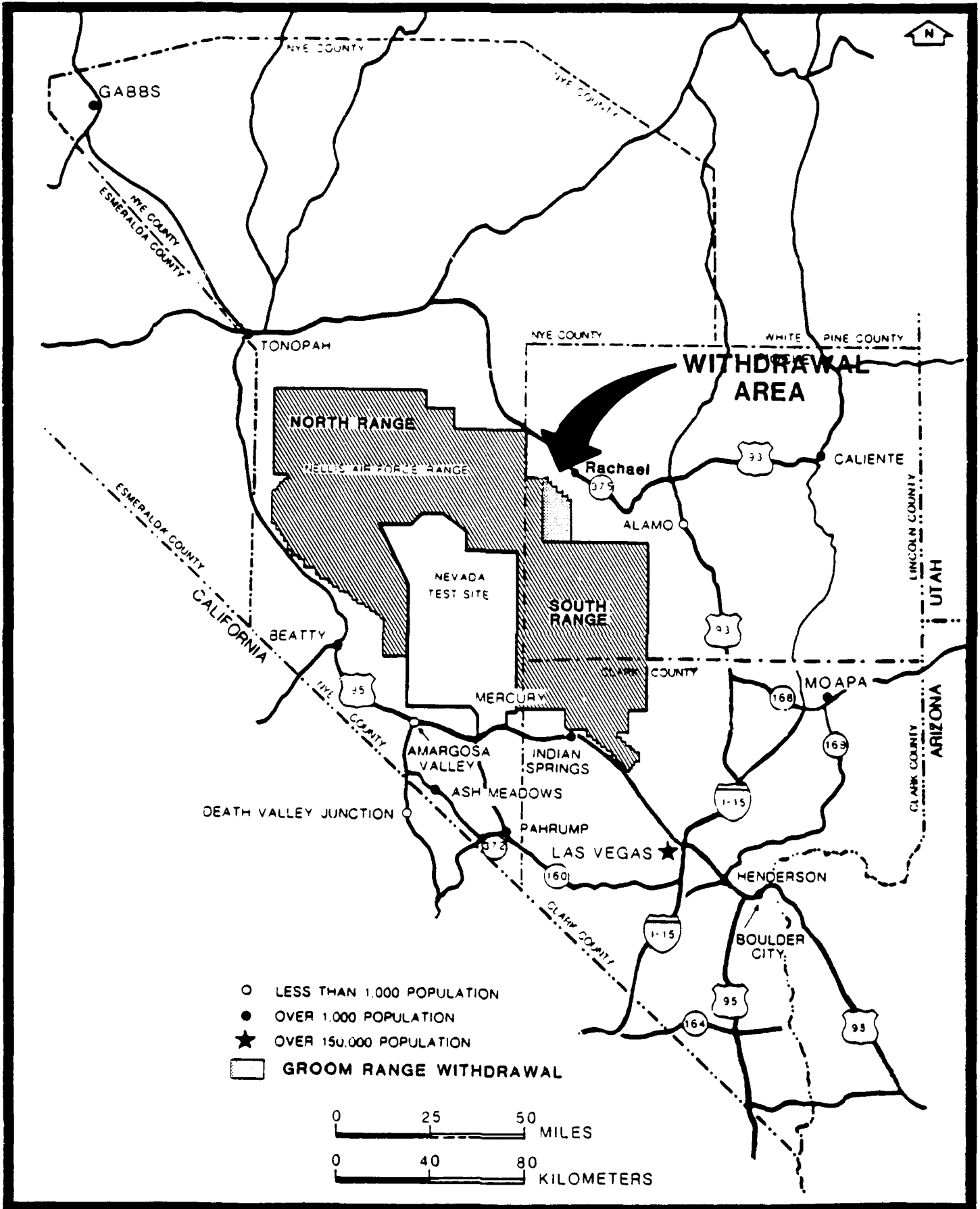


Figure 1.1 Generalized Location Map - Groom Mountain Range Withdrawal

of that complex and the longer history of the withdrawal area are relevant historical perspectives to the proposed action.

1.3.1 History

Nellis AF Range/Nevada Test Site Complex--

Western half of Desert National Wildlife Range, which was established in 1936 for the protection and preservation of desert bighorn sheep, is coincident with the southeastern portion of Nellis AF Range which was established in 1940. From the initial date of NAFR until 1959, co-use was granted to cattlemen and miners. Between 1959 and 1965 all grazing and virtually all mineral rights within the Range were purchased by the Air Force.

Through Public Land Orders and Memorandum of Understanding (MOU), portions of the NAFR were transferred to the Department of Energy (DOE) (formerly Atomic Energy Commission) for the development of the Nevada Test Site (NTS) located between the north and south portion of NAFR (Figure 1.1). The Air Force, in 1956, permitted 369,280 acres to DOE for utilization as a fully instrumented ballistic test range. This area is referred to as Tonopah Test Range (TTR).

The NAFR/NTS complex was established and is used to operationally test and evaluate new weapons systems, and permit aircrew combat training under conditions that simulate an actual enemy scenario. This training mission is assigned to the Air Force's Tactical Fighter Weapons Center (TFWC) located at Nellis Air Force Base in Nevada. TFWC is the command organization for Nellis AFB and functions directly under the Commander, Tactical Air Command. Subordinate units of the TFWC which are responsible for conducting TFWC range operations are the 554th Operations Support Wing (OSW), the 554 Range Group, the 57th Fighter Weapons Wing (FWW), and the 4440th Tactical Fighter Training Group (TFTG),

In recognition of national defense needs, and in accordance with the various Public Land Orders, the Engle Act, FLPMA, and NEPA, Environmental Impact Statements were prepared in 1977 and 1981 for continued withdrawal of Nevada Test Site and Nellis AF Range respectively. After the Final Environmental Impact Statement (EIS) for NAFR had been issued, the withdrawal application submitted to Congress was amended by the Air Force and Department of Interior (DOI) to include the Groom Mountain Range area, although the area had not been specifically addressed in the EIS.

In acting on the NAFR withdrawal application, Congress excluded the Groom Mountain Range. Withdrawal of the Groom Mountain Range addition was accomplished under separate Congressional Legislation (PL 98-485) in October 1984. The approved withdrawal is temporary, expiring Dec. 31, 1987, before which date the Air Force and Department of Interior are to prepare an EIS concerning continued or renewed withdrawal.

Groom Mountain Range Withdrawal Area--

Because of its isolated nature, the Groom Mountain Range has escaped most effects of civilization, and has not even been fully mapped at a detailed scale. Even the current name for the range is of recent origin, being coined by Humphrey (1945) during his geologic reconnaissance of the Groom Mining district. Earlier references to the range refer to it as the Naquinta Mountains, the Tequima Range, or most commonly as a portion of the Timpahute Range which is currently considered to end at Coyote Summit at the north end of the Groom Mountain Range (McLane, 1978; Carlson, 1974).

Reports and accounts of early attempts to explore the Central Nevada desert region recounted the hardships of scant water, limited game and sparse forage. These early explorations included Jedediah Smith's 1827 trek that took him across the area about 60 miles north of Groom Mountain Range. In 1849 a segment of the Death Valley Party travelled a route from the White River to Groom and Papoose Lakes (Bergin and Roske, 1978). In 1858 a group of Mormon settlers led by William Dame travelled the country east and north of the Groom Mountain Range in search of new lands to farm, finding only the Panaca area in Meadow Valley Wash suitable.

In 1864 the ore deposit at the Groom mine was discovered, and in March, 1865 the first mining locations were made in the Pahrnatag District, which is about 25 miles northeast of the Groom Mountain Range. The Pahrnatag discovery led the 1866 Nevada legislature to pass a bill creating Lincoln County.

The first systematic survey of south-central Nevada was by Lieutenant George M. Wheeler (Humphreys, 1871). During the 1869 itinerary, Wheeler camped at Summit Spring on the pass between the Groom Mountain Range and the Jumbled Hills. The party then proceeded across Tikaboo Valley to the Pahrnatag Mining District and out of the study area. The chief contribution of this reconnaissance was a map of the country along the route of travel at a scale of 1 inch to 12 miles (Hamel, 1869; Wheeler, 1869). Features located on this map in the Groom Mountain Range include Tikaboo Spring, the Groom District, Timpahute Mountain (the present Bald Mtn.), a road along the range, and an "Indian Rancheria" near Tickaboo Spring. The Groom Mountain Range itself is referred to as an extension of the Timpahute Range. In 1871 the Wheeler survey went directly through the Groom Mountain Range. On the Wheeler Survey maps Tikaboo Valley is called Tim-pah-ute Valley, Sand Spring Valley is called Penoyer Valley, and a Disappointment Spring is located at the north end of Groom Lake on the plotted route called "First Route Death Valley".

The Groom Mountain Range area has never been the subject of a cadastral survey with the exception of the extreme north boundary between townships 4 and 5 south. The region just north of the study area was partially surveyed in 1869, and the job completed in 1881. The reason for survey of this area was the existence of the Timpahute Mining District, which was much more active than the Groom District.

The only private land holdings within the Groom Mountain Range withdrawal area are the result of mining claims and patents. After discovery

in 1864 the Groom mine was acquired in 1885 by the Sheahan family who still own it to this day.

Cattle ranching in the vicinity of Groom Mountain Range (Sand Springs, Emigrant and Tikaboo Valleys) began in the 1890's and eventually resulted in establishment of two Taylor Grazing Act (PL 73-482) allotments on the Range, Naquinta Springs Allotment on the west side and Bald Mountain Allotment on the east side. The ranchers developed the springs in Groom Mountain Range for stock watering and constructed various livestock handling facilities. A ranch established at Cattle Spring was occupied from the early 1900's through the 1930's. Cattle Spring was also used as a base for mining operations during that period. With the 1959-'65 purchases of grazing rights on NAFR, BLM placed the Naquinta Springs Allotment in non-use status and the Air Force purchased most of the water rights to the west-side springs. The Bald Mountain Allotment permit is currently held by Mr. Steve Medlin of D/4 Enterprises in Tikaboo Valley.

Beginning in about 1978, in the interest of public safety and national defense, the Air Force began actively discouraging, and at times preventing, public or private entry to the Groom Mountain Range. This practice continued until October 1984 when Congress provided the authority for control of access through withdrawal under PL 98-485. The Air Force by letter guaranteed the Sheahan family and Mr. Medlin access to their respective properties and allotment (USAF, 1984a; 1984b).

1.3.2 Procedures for Withdrawal

Public Law 98-485--

Temporary withdrawal of the Groom Mountain Range area for use by the Air Force was authorized by PL 98-485 which was approved on October 17, 1984. This law withdrew the land from "...all forms of appropriation under the public land laws, including the mining laws but not the mineral and geothermal leasing laws" (PL 98-485, Sec. 1). The law requires that by no later than January 1, 1987 the Secretaries of Air Force and Interior shall issue an Environmental Impact Statement, consistent with NEPA, concerning the continued or renewed withdrawal of the area. Congress, in Sec. 2 of the law directed that the EIS "...shall include a description of and recommendations concerning measures to mitigate the impact of such continued or renewed withdrawal on opportunities for outdoor recreation, mineral exploration and development, and agriculture in Nevada" and further that "such measures shall include possible acquisition by the Secretary of Interior (through exchanges or otherwise) of lands in Nevada suitable for outdoor recreational uses and possible increased use of lands in Nevada withdrawn for military purposes."

In Sec. 3 (3), Congress states that the withdrawal under this Act is not intended to:

- "(A) reserve or otherwise withdraw any water for use in connection with the purposes specified in section 1;

- (B) affect in any manner the future appropriation, under State law, by the United States or others, of waters in, under, or upon the lands withdrawn by this Act; or
- (C) affect any water rights acquired by the Secretary of the Air Force or any other person or entity before the date of enactment of this Act."

Engle Act Considerations--

Passage of the Act of 1958 (PL 85-337) shifted the responsibility for defense-related withdrawals from the Executive Branch of Government back to Congress.

The Engle Act requires congressional legislation for DOD withdrawals in excess of 5,000 acres. Withdrawals of less than 5,000 acres will continue to be made by the Executive Branch by issuing Public Land Orders.

Federal Land Policy and Management Act of 1976 (FLPMA) Considerations--

Passage of FLPMA provided procedures for withdrawal of public land by the Secretary of Interior. The Act established new procedures for executing land withdrawals for public lands and established a segregative period of two years, allowing the Secretary of the Interior time to evaluate and process the application for withdrawal. For withdrawals over 5000 acres the major legislative difference between application of the FLPMA and the Engle Act is that under the Engle Act, Congress must enact legislation which withdraws the land for DOD use. Because the DOD is withdrawing public lands, both Acts are being complied with by the Secretaries of the Interior and Air Force before submittal to Congress.

National Environmental Policy Act Considerations--

The National Environmental Policy Act (NEPA) of 1969 (PL 91-190) insures that the environmental impacts of renewed withdrawal of the Groom Mountain Range land will be assessed. Additionally, NEPA requirements support FLPMA requirements in that Congress must be provided documentation of the environmental and economic impacts; a clear explanation of the proposed use of the land; evaluation of the natural resources; possible alternatives; and consultation with other Federal, State, and local agencies and the public concerning the withdrawal.

In addition to NEPA, the Air Force will also comply with all requirements contained in such legislation as Clean Air, Clean Water, Endangered Species and Historic Preservation Acts as they apply to continued use of the land.

1.3.3 Existing Operations and Site Conditions

Air Force use of Groom Mountain Range withdrawal has been for the purposes of maintaining a public safety and security buffer for the Nellis AF Range complex to the west. Air Force activities since the withdrawal itself have related to maintaining existing structures and roadways. No significant adverse impacts appear to have resulted from these above actions.

The withdrawal does underlie the existing Nellis AFB restricted airspace zone used for aircraft training exercises of TFWC. In order to fulfill the TFWC mission, many training exercises and test evaluations are conducted west of Groom Mountain Range at Nellis AF Range where many different types of ordnance, both live and inert, are dropped during air-to-ground bombing and gunnery practice missions.

Future Developments and Operations--

The stated purpose of this renewed withdrawal explicitly excludes air-to-ground or targeting activities. The Air Force does not contemplate any future activities with adverse impacts greater than those of the existing overflights conducted as part of the Nellis AF Range training programs. Any future actions will be analyzed under NEPA.

1.3.4 Inter-Relationships with Other Agencies

Bureau of Land Management--

Bureau of Land Management is the cognizant Department of Interior agency responsible for management of the land within the Groom Mountain Range withdrawal. This authority is pursuant to FLPMA and other Acts of Congress and will continue with renewed withdrawal. However, all use of the land, or leases or rights-of-way by Department of Interior are secondary to the military use. BLM may authorize uses, such as livestock grazing, only with the concurrence of the Secretary of the Air Force.

1.3.5 Land Use Plans, Policies and Controls for the Affected Area

Prior to the temporary withdrawal, the land comprising the Groom Mountain Range was public land under BLM administration. BLM had not forecast change of use for these lands.

Land use plans, policies, and controls have been implemented through the various cooperative agreements that have been signed with the DOI, State agencies, DOE, and other concerned agencies for lands adjacent to the Groom Mountain Range. Continuation of the withdrawal would not alter the management programs covered in these agreements.

Through 1983, Lincoln County population had grown steadily, but total population was still relatively low. The communities of Hiko, Ash

Springs and Alamo are about 30 miles to the east of the withdrawal and Rachel is about 5 miles to the north. It is doubtful that rural growth in these small communities would become a factor of concern in the continued withdrawal.

The Groom Mountain Range has not been specifically addressed in Lincoln County planning documents (Lincoln County, 1984) but the types of resources found there are discussed in general terms. The basic policy of Lincoln County is to work with Federal land managing agencies to derive the greatest possible benefits to Lincoln County residents through public land multiple-use practices. Such uses include mining, grazing, forestry, recreation and wildlife.

CHAPTER 2
ALTERNATIVE ACTIONS

2.0 ALTERNATIVE ACTIONS

Three alternative actions, including the proposed action, have been considered for the Groom Mountain Range Withdrawal. These actions are: "No Action"; "Renewed Withdrawal of a Reduced Area"; and "Renewal of the Existing Withdrawal".

2.1 NO ACTION

The "No Action" alternative is not acceptable to the Air Force since it is not responsive to the national defense and security needs that precipitated the existing withdrawal. No action would result in lapse of the existing withdrawal on Dec. 31, 1987 and return of the area to public lands status under BLM jurisdiction.

As BLM administered land, the area would be open to mining and other activities. The impacts forecast under the proposed action would not occur under this alternative. However, such a return to public land status would compromise public safety and the security of the national defense activities in the area.

2.2 WITHDRAWAL OF A REDUCED AREA

Withdrawal of an area smaller than 89,600 acres or one configured differently than the existing withdrawal was evaluated by BLM. Security and safety criteria for that evaluation were provided by the Air Force. On the basis of their study, BLM concluded that a smaller or differently shaped withdrawal area would not satisfy the Air Force safety and security criteria (BLM, 1985). These criteria are minimally, but adequately, satisfied by the existing boundaries.

All of the impacts associated with renewal of the existing withdrawal would be experienced in withdrawal of a smaller area. Level of those impacts would be less, but, in most instances, only minimally less.

2.3 PROPOSED ACTION (PREFERRED ALTERNATIVE)

Renewed withdrawal of the 89,600 acres would result in continued closure of the area to unauthorized entry. The Air Force has guaranteed access to the present owners of existing valid mining claims and the present permittee on the Bald Mountain grazing allotment.

Negative effects of this closure would include loss of a high potential recreation area for hunting, camping, hiking and off-road vehicle use; foregone mineral exploration and development in the Groom and Don Dale Mining Districts; possible decrease in market value of the D/4 Enterprises in Tikaboo Valley; inability to develop groundwater resources of the area; possible over-grazing of the Bald Mountain and Naquinta Springs grazing allotments due to restricted regulatory access by BLM;

loss of opportunity to conduct archaeological and ecological research in the area; and a further reduction in the overall accessible public land base in Nevada.

Lincoln County would experience a reduction of potential economic activities and the taxes derived therefrom during the period of the withdrawal. This potential loss could be mitigated in part by providing easier access to NTS from Rachel, thus encouraging NTS workers to live in the Alamo-Caliente- Pioche area. New residents, coupled with greater at-home time by current NTS workers, would strengthen the economy.

Owners of valid patented and unpatented mining claims would be impacted through deferral of potential revenues from development of their properties. These economic impacts could be mitigated through an Air Force lease of development rights or out-right purchase.

Deferral of mineral exploration and potential development of other mineral resources in the withdrawal area would impact the Nevada minerals industry in general. Mitigation of this impact might be achieved through opening other DOD withdrawals in Nevada to minerals exploration and development.

Potential adverse impact to the market value of D/4 Enterprises would stem from uncertainty as to whether the Air Force would allow access to the withdrawal portion of the Bald Mountain grazing allotment to a potential purchaser. This impact could be mitigated through Air Force financial compensation to the current owners, or an Air Force decision to guaranteed access of future permit holders.

Loss of hunting opportunity for both large and small game would be experienced by a currently small, but potentially much larger, number of hunters from Lincoln County and other areas in southern Nevada. These losses could be mitigated through development of a program with BLM and Nevada Department of Wildlife to improve game habitat in near-by areas of Lincoln County, and by opening of additional portions of Nellis AF Range for controlled hunts.

Loss of other recreational activities in the area, hiking, camping, off-road vehicles, would not be significant. Available evidence and data indicate extremely limited historical use of this area for these purposes. However, as the eastern and southern Nevada population grows, the potential demand for these opportunities would also grow and would have to be met with the existing resource elsewhere.

Impacts due to foreclosed research opportunities are difficult to quantify since the significance of any research endeavor is not known until after the research is completed, and often not until long after. Loss of these research opportunities cannot be mitigated because they are specific to the withdrawal area. The withdrawal would protect archaeological resources from access, disturbance and vandalism by the general public and in that sense may be beneficial. However, the withdrawal would provide unregulated opportunity for disturbance of these same resources by personnel cleared for access to the area. The State

Historic Preservation Office (SHPO) will be consulted in regard to cultural resource management in the area.

Ecological changes would occur as a result of the closure, but these may be neither beneficial nor adverse. Without hunting pressure the sex ratio of the deer herd would probably change to include a higher percentage of males than is found in a hunted herd. The herd might also increase in size, thus increasing the browse pressure on vegetation. If livestock grazing is not controlled, severe combined over-grazing could occur resulting in accelerated soil erosion, loss of plant diversity and increased impact to cultural resources. It is unlikely any threatened or endangered plants would be impacted. Mitigation of any potential adverse impacts could be achieved through development and implementation of a management plan. This plan should address not only native species and livestock but fire control as well.

CHAPTER 3
AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

3.1 CLIMATE

3.1.1 Precipitation

The climate of the Groom Mountain Range withdrawal area is primarily influenced by two main sources of air movement as shown in Figure 3.1. In the winter months the primary source of moisture is to the west from the Pacific. As the moist air moves east from the Pacific, the Sierra Nevada Mountains deplete the moisture resulting in a rain shadow east of the mountains. In the summer, the primary source of moisture is from the south and southeast brought into southern Nevada by southerly winds. The net effect of these two phenomena is to provide some areas of southern Nevada with a relative precipitation excess and other areas with a relative precipitation deficit (Quiring 1965, French 1983). Figure 3.2 is an estimated annual precipitation map for the withdrawal area based upon these previous analyses using elevation and location with respect to excess and deficit zones. This shows precipitation ranging from approximately 20 inches per year at the highest elevations in the Groom Mountain Range to approximately 8 inches per year along the lower margins of the range. The winter precipitation often falls as snow at higher elevations with summer precipitation characterized by intense localized thunderstorms which can cause localized flooding.

3.1.2 Temperature

Daily and seasonal temperature varies greatly within the withdrawal area influenced by general air movement and topography. The coldest temperatures occur in January with the highest occurring in July and August. A ten-year summary (Table 3.1) from the class 1 weather station at Yucca Flat on NTS approximately 35 miles southwest of the area shows extremes from below 0°F occurring in January to in excess of 100°F in July. Similar temperature extremes and ranges can be expected in the withdrawal area.

3.1.3 Air Quality

The Groom Mountain Range is located within the Nevada Intrastate Air Quality Control Region (AQCR) which comprises the bulk of the state of Nevada with the exception of Clark County and northwestern Nevada. Several areas within the Nevada Intrastate AQCR have been classified as non-attainment although they are well-removed from the Groom Mountain Range. The Environmental Protection Agency (EPA, 1978) review of states' attainment status of National Ambient Air Quality Standards (AAQS), which is still applicable, indicates the following status for the Groom Mountain Range area: total suspended particulate matter (TSP) and sulfur dioxide (SO₂) are lower than national standards; and carbon monoxide (CO), nitrogen oxides (NO_x), and ozone (O₃) are lower than standards or cannot be classified.

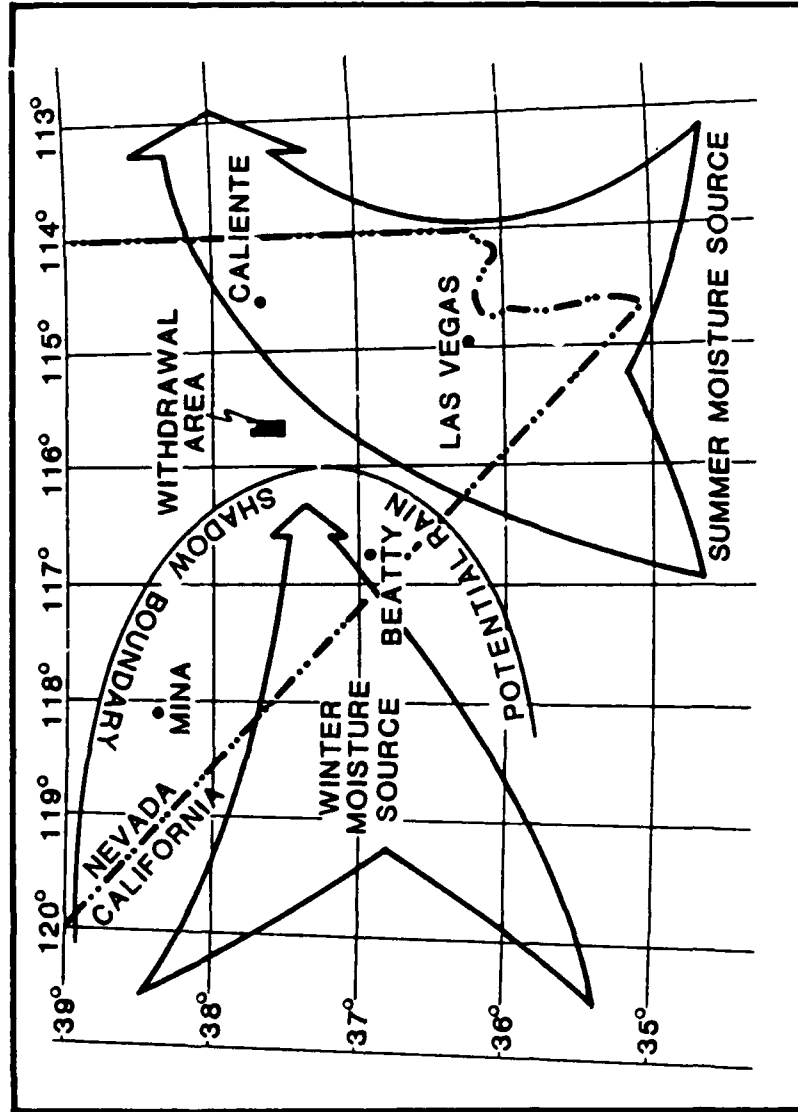


Figure 3.1 Summer and Winter Moisture for the Southern Nevada Area
(from French 1983)

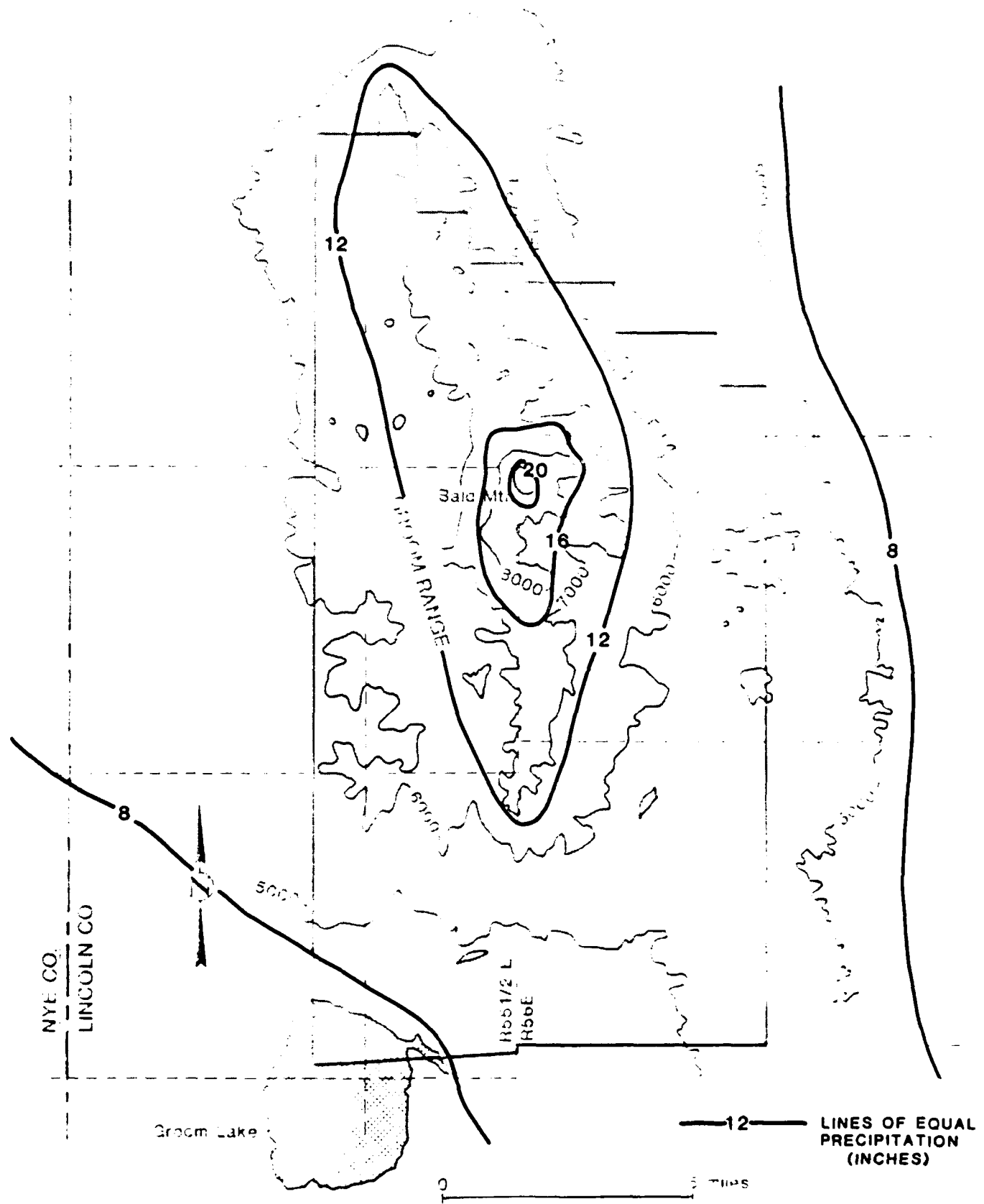


Figure 3.2 Average Annual Precipitation (after French, 1983)

TABLE 3-1. CLIMATOLOGICAL SUMMARY FOR YUCCA FLAT

Month	TEMPERATURE (°F)						DEGREE DAYS (Base 65°)		PRECIPITATION (INCHES)											
	AVERAGES						EXTREMES		SNOW											
	Daily Max.	Daily Min.	Monthly	Highest	Yr. Lowest	Yr. Highest	Heating	Cooling	Average	Greatest Monthly	Yr. Greatest Monthly	Least Monthly	Yr. Least Monthly	Greatest Daily	Yr. Greatest Daily	Average	Greatest Monthly	Yr. Greatest Monthly	Greatest Daily	Yr. Greatest Daily
Jan.	52.1	20.8	36.5	73	-2	1971	877	0	.53	4.02	1969	T	1971	1.25	1969	0.9	4.3	1962	4.3	1962
Feb.	56.7	25.8	41.3	77	5	1963	662	0	.84	3.55	1969	T	1967	1.16	1969	1.9	17.4	1969	6.2	1969
Mar.	60.9	27.7	44.3	87	9	1966	634	0	.29	.60	1969	.02	1966	.38	1969	2.0	7.5	1969	4.5	1969
Apr.	67.8	34.4	51.1	89	13	1962	411	1	.45	2.57	1965	T	1962	1.08	1965	0.7	3.0	1964	3.0	1964
May	78.9	43.5	61.2	97	25	1967	147	38	.24	1.62	1971	T	1970	.86	1971	0	T	1964	T	1964
June	87.6	49.9	68.8	107	29	1970	35	154	.21	1.13	1969	T	1971	.45	1969	0	0		0	
July	96.1	57.0	76.6	107	40	1967	0	366	.52	1.34	1966	0	1963	.77	1969	0	0		0	
Aug.	95.0	58.1	76.6	107	39	1970	1	368	.34	1.04	1965	0	1962	.35	1971	0	0		0	
Sept.	86.4	46.7	66.5	105	25	1971	51	103	.68	2.38	1969	0	1968	2.13	1969	0	0		0	
Oct.	76.1	36.9	56.5	94	12	1964	266	9	.13	.45	1969	0	1967	.42	1969	0	T	1971	T	1971
Nov.	61.8	27.6	44.7	82	13	1962	602	0	.71	3.02	1965	0	1962	1.10	1970	0.5	4.8	1964	2.3	1964
Dec.	50.7	19.9	35.3	70	-14	1964	914	0	.79	2.66	1965	T	1969	1.31	1965	2.3	9.9	1971	7.4	1971
Ann.	72.5	37.4	54.9	107	-14	Aug. 1970,	4600	1039	5.73	4.02	Jan. 1969	0	Sept. 1968	2.13	Sept. 1969	8.3	17.4	Feb. 1969	7.4	Dec. 1971

Source: Air Resources Laboratory, Las Vegas, NV. (Bowen and Egami, 1983).
 T - Trace, an amount too small to measure.

There are no air quality or meteorological monitoring sites within the land withdrawal area to compare ambient concentrations to the AAQS. However, several monitoring sites, from which representative air quality data may be obtained, are within 150 miles of the area. The Desert Research Institute (DRI, 1984; 1985) operates several sites near Moapa, Nevada, 80 miles southeast of the Groom Mountain Range, at which concentrations of SO₂, NO_x, O₃ and TSP are measured. Ambient monitoring for SO₂, NO_x, and TSP was done in 1982 and 1983 in White Pine County, 130 to 170 miles to the north, in preparation of the White Pine Power Project (BLM, 1984). TSP samples are collected by the Nevada Division of Environmental Protection (pers. comm. NDEP, 1985) at Baker, Nevada, which is 145 miles to the northeast.

Ambient Air Quality Standards for criteria pollutants are shown in Table 3.2. All pollutant concentrations measured at the sites near the Groom Mountain Range have been below the AAQS. For example, pollutant concentrations from Baker and Moapa for 1983 and 1984 are given in Table 3.3. Measurements in White Pine County also showed concentrations to be below the AAQS (BLM, 1984).

Some pollutants, such as SO₂ and NO_x, have concentrations above the instrument detection limits only because nearby sources directly impact the sites. These pollutants would probably have lower concentrations at the withdrawal area, since plumes disperse from point sources as they travel from their source.

Ambient concentrations of ozone and TSP can approach the AAQS. Causes of relatively high ozone in the remote locations such as the Southwest have been attributed to transport of polluted air from southern California urban areas (Macias, et al., 1980) and to intrusion of stratospheric O₃ from high altitudes to the ground (Johnson, et al., 1979). The Groom Mountain Range probably has O₃ concentrations at or below those found at Moapa. High concentrations of TSP in remote areas are generally due to strong winds which raise large amounts of soil particles into the air. The amount of suspension is directly dependent on the type of land surface and on the degree of disturbance of that surface. TSP concentrations at the Groom Mountain Range may be lower than at Moapa since there is less disturbed land and human activity. Groom Lake might contribute some suspended particulate matter.

The remaining criteria pollutants which are not measured at the closest available monitoring locations are directly attributable to anthropogenic causes. They are likely to have concentrations lower than the AAQS since there are few local sources.

3.2 PHYSIOGRAPHY

3.2.1 Topography

The withdrawal area is situated within the Basin and Range Physiographic Province which is characterized by north-south trending mountain ranges separated by broad alluvium filled valleys. The withdrawal runs north-south a distance of approximately 19 miles with elevations ranging

TABLE 3.2 AMBIENT AIR QUALITY STANDARDS
(MICROGRAMS PER CUBIC METER)

Pollutant and Averaging Time	National Ambient Air Quality Standards		Nevada Ambient Air Quality Standards
	Primary	Secondary	
<u>Sulfur Dioxide</u>			
3-Hour ¹	NA	1300	1300
24-Hour ¹	365	NA	365
Annual Arithmetic	80	NA	80
<u>Particulate Matter</u>			
24-Hour ¹	260	150	150
Annual Geometric	75	60	60
<u>Nitrogen Dioxide</u>			
Annual Arithmetic	100	100	100
<u>Ozone</u>			
1-Hour ¹	235	235	235
<u>Carbon Monoxide</u>			
1-Hour ¹	40,000	40,000	40,000
8-Hour ¹	10,000	10,000	10,000
<u>Nonmethane Hydrocarbons</u>			
3-Hour (6-9 am)	160	160	160
<u>Lead</u>			
Quarterly Arithmetic	1.5	1.5	1.5

¹ Short-term national standards (24 hours or less) not to be exceeded more than once per year, at any location. Short-term Nevada standards not to be exceeded.

NA - not available

TABLE 3.3 AMBIENT POLLUTANT CONCENTRATIONS FOR MOAPA AND BAKER, NEVADA
(MICROGRAM PER CUBIC METER)

Pollutant and Averaging Time	Moapa		Baker	
	1983	1984	1983	1984
<u>Sulfur Dioxide</u>				
3-Hour	86	107	NA	NA
Annual Arithmetic	0.4	1.9	NA	NA
<u>Particulate Matter</u>				
24-Hour	69	74	67	36
Annual Geometric	21.0	23.6	6.8	8.9
<u>Nitrogen Dioxide</u>				
Annual Arithmetic	9.4	9.0	NA	NA
<u>Ozone</u>				
1-Hour	184	178	NA	NA

from 4600 feet at Groom Lake bed to 9380 feet at the peak of Bald Mountain. The Groom Mountain Range itself is characterized by steep upland areas rising from an elevation of 6000 feet to over 9000 feet over a distance of less than 3 miles along both the east and west sides. Slopes below 6000 feet along the south and east sides are much less steep and not as dissected as the upland areas.

3.2.2 Geologic Setting








The Groom Mountain Range is an east-tilting fault block that exposes great thicknesses of Cambrian, Ordovician, and Devonian rocks partly buried by volcanic rocks. The oldest rocks, Prospect Mountain Quartzite, are more than 7,800 feet thick and make up most of the west half of the range. The total exposed Cambrian section may exceed 20,000 feet. Conglomerate of pre-Miocene age out crop from beneath the volcanic rocks on the northwest flank of the range and probably underlie the volcanic rocks along the southeastern side.

The major volcanic feature of the Groom Mountain Range is the Bald Mountain caldera, centered on Bald Mountain (Ekren, et al., 1977). Despite being a topographic high, the Bald Mountain caldera probably simply collapsed and never resurged (Ekren, et al., 1977). The caldera is filled with two or more rhyolite ash-flow tuff cooling units which are interfingered with numerous large landslide masses of various Paleozoic rocks. The tuff is mostly hydrothermally altered, and fresh phenocrysts are sparse.

A north-trending basin-range fault of large displacement cuts the Bald Mountain caldera on the west. Numerous bedded tuffs and tuffaceous sedimentary rocks are preserved on the downthrown block west of the fault. These rocks have been intruded by dikes and sills of intermediate rock, and are overlain by identical lavas. These occurrences may indicate that the caldera extends through the area of bedded tuff.

The structure of the Groom Mountain Range is comparatively simple except locally in the Groom mining district and near the north end of the Cambrian outcrop. The Groom mining district is in a complexly faulted graben where minor thrust plates of Prospect Mountain Quartzite have overridden Pioche Shale, and west-dipping normal faults which formed the graben have offset the thrust faults. The displacement on the normal faults is as much as several thousand feet and antedates the basin-and-range faults. The youngest faults are east-dipping normal faults of smaller displacement (Humphrey, 1945).

The structure of the Cambrian rocks above the Pioche Shale in the northern end of the range is not well understood. In the high hills, rocks tentatively identified as the Highland Peak Formation may be thrust over the Upper Cambrian rocks on the north and east and on the Pioche Shale on the south. Figure 3.3 is a generalized geologic map of the withdrawal area.

- EXPLANATION OF GEOLOGIC MAP
-  Tertiary basalt
 -  Tertiary volcanic rocks, undivided
 -  Tertiary latite, Bald Mountain
 -  Tertiary granitic stocks
 -  Ordovician through Pennsylvanian formations, undivided
 -  Cambrian shales and limestones, undifferentiated
 -  Cambrian Prospect Mountain Quartzite

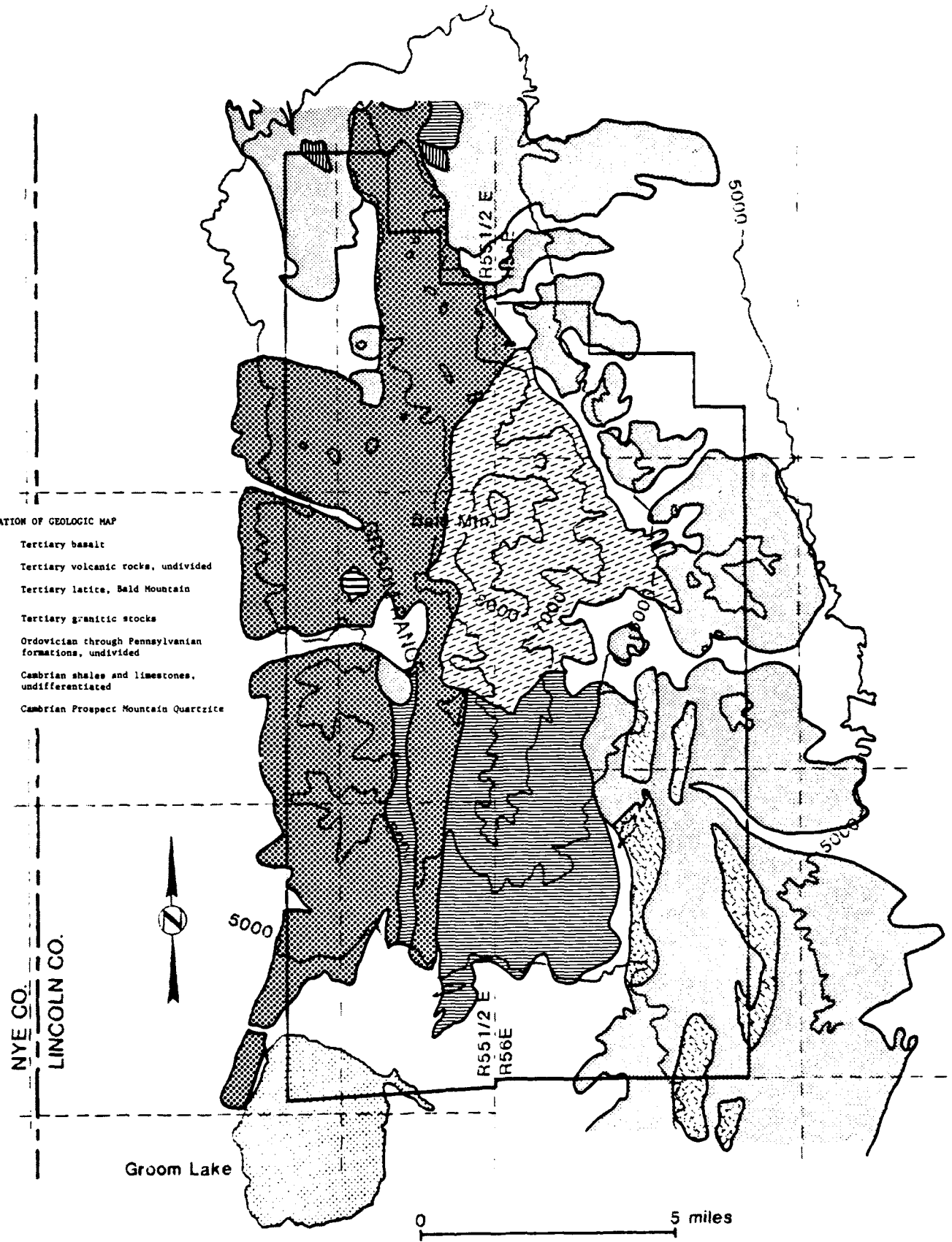


Figure 3.3 Generalized Geologic Map

3.3 SOILS

There has been no soil survey of the withdrawal area. An examination of Soil Conservation Service site writeups with similar vegetation suggests that the dominant soils are Orthents, Psammets, Orthids, Argids and Xerolls. These soils may have thermic temperature regimes but only at the lowest elevations. Most of the soils have mesic or frigid temperature regimes depending mostly on elevation. They have an aridic moisture regime and a mixed or montmorillonitic mineralogy. Many of the soils are deep and well drained with clay layers and are conducive to good plant growth which is only restricted by adverse temperature and moisture conditions.

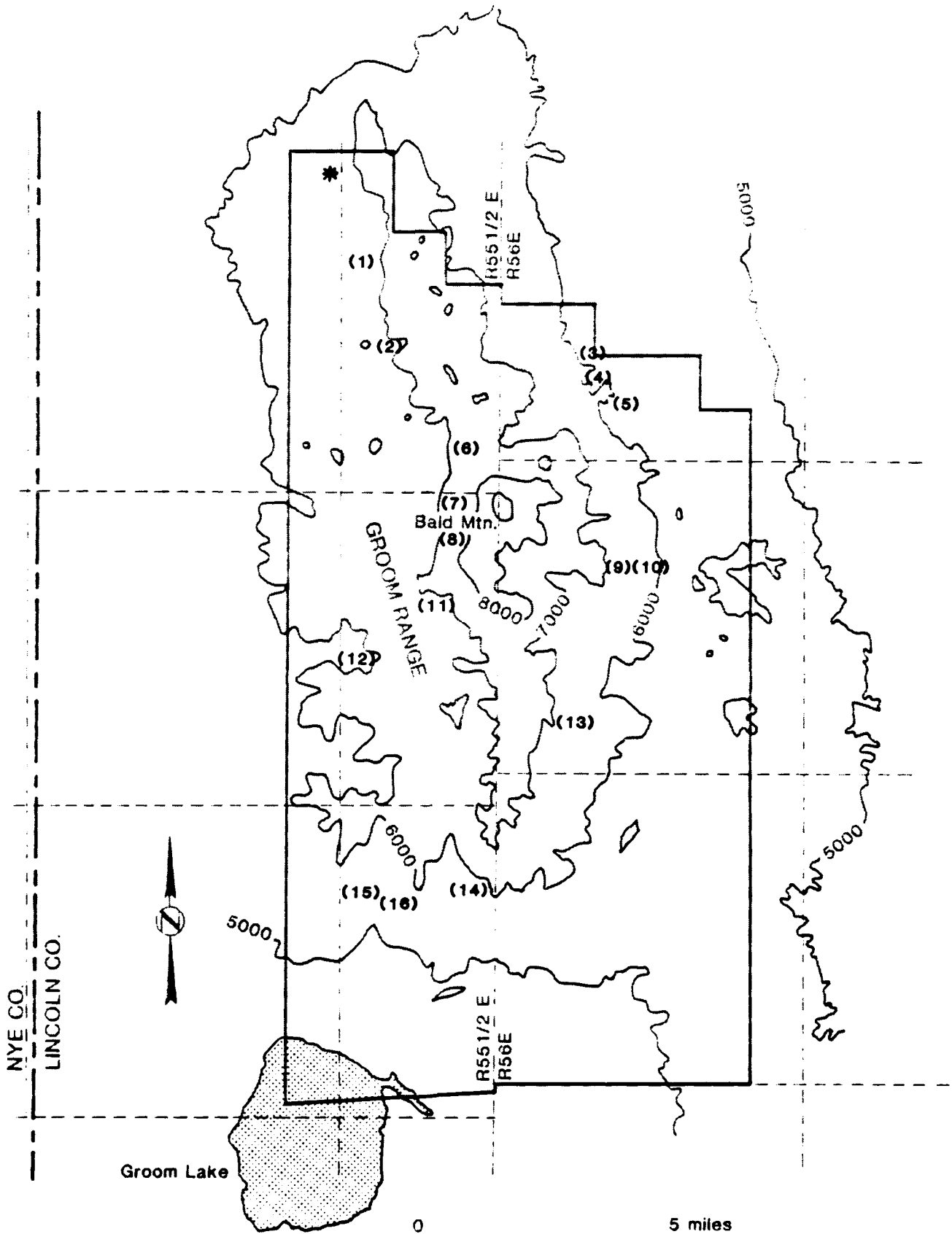
Soil erosion was estimated at 21 field sites using 15 erosion classes for each of 6 variables. These variables are bare ground, presence of a vesicular crust, litter, wind erosion, rills and the presence of gullies. Most ratings were stable with a few categories at some locations rated as slight or moderate relative to erosion. Generally the upland habitats were only slightly eroded. There was some gully erosion noted related to recent heavy storms probably within the past several years. Rill erosion was almost non-existent. There was also some evidence of litter movement and accumulation on some sites. Overall the entire withdrawal area is not heavily eroded and surface soils are stable.

3.4 WATER RESOURCES

3.4.1 Availability

The precipitation pattern in Figure 3.2 shows that for the withdrawal area elevation is the primary control, with the highest accumulations occurring at the higher elevations of the Groom Mountain Range. The high precipitation areas provide recharge to the groundwater system and serve as a source for the springs shown in Figure 3.4. Within the withdrawal area there exist no perennial streams. As evidenced by the drainage patterns, the only surface flow other than spring discharge results from either intense localized summer thunderstorms or from severe infrequent warm winter storms. This infrequent ephemeral discharge is not put to any direct use in, or adjacent to, the area. Most water either infiltrates into channel bottoms or flows to dry lake beds to be evaporated. Surface drainage from the west side of the Groom Mountain Range flows toward dry lake areas in Emigrant Valley and any surface flow from the east side flows toward the southeast to the center of Tikaboo Valley.

Groundwater quantities and direction of movement in and adjacent to the withdrawal area are not well defined. Estimates of quantities and directions of flow have been made for the valleys of which the withdrawal area is part (Rush, 1970) and general flow patterns defined as a part of NTS related work (Winograd, 1975). These studies together with work by Rice (1984) show the Groom Mountain Range is one of the more significant areas of recharge in the vicinity of NTS (Figure 3.5).



* OLD WATER TANK
 (1) NUMBERS CORRESPOND TO TABLE 3.4 (Page 3-12)

Figure 3.4 Springs In The Withdrawal Area

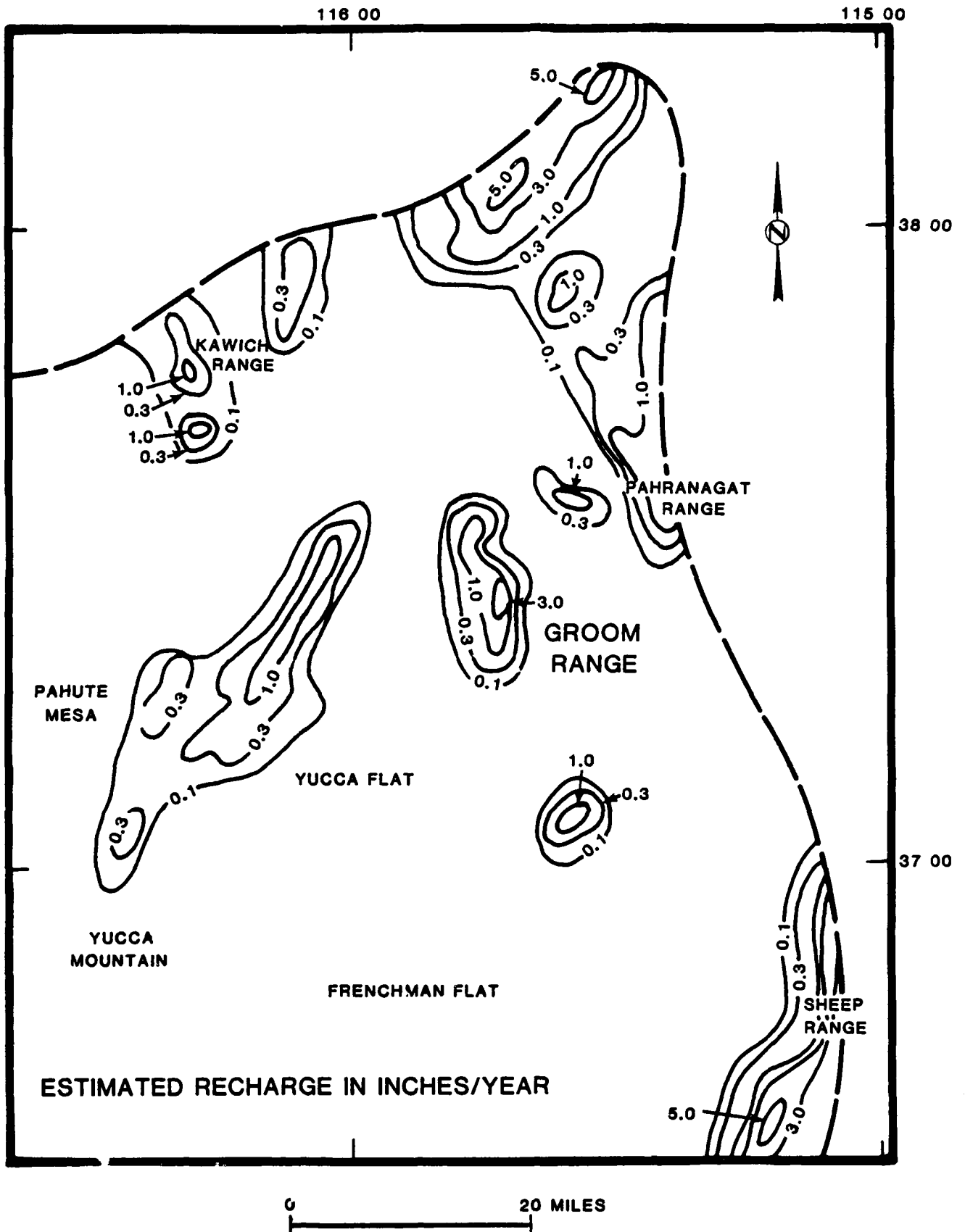


Figure 3.5 Recharge Distribution in Withdrawal and Surrounding Areas (after Rice, 1984)

Site specific water resource data are limited to a survey taken in the area during spring 1985 to assess the water resources and to characterize any potential impacts of continued withdrawal. A list of springs together with location and field data are presented in Table 3.4.

The quantities measured as spring discharge can only account for a small percentage of that estimated to be recharged, therefore the remaining estimated recharge contributes to the aquifer systems for Emigrant and Tikaboo Valleys. These valleys are estimated to receive 3,200 acre-feet and 2,600 acre-feet of recharge per year respectively (Rush, 1970), only a part of which comes from the Groom Mountain Range.

TABLE 3.4 SPRINGS IN WITHDRAWAL AREA

Spring	Township	Range	Section	Discharge ℓ/min	Temperature °C
1. Bullwhack	5S	55 1/2E	18	ND	ND
2. Rosebud	5S	55 1/2E	20	12	10.3
3. Savio	5S	56E	29	≈20	18.6
4. Lick	5S	56E	29	4	18.4
5. Rabbitbrush	5S	56E	28	46	14.4
6. Naquinta	5S	55 1/2E	33	60	16.5
7. Pine	6S	55 1/2E	5	3	20.2
8. Indian	6S	55 1/2E	8	6	14.4
9. Quail	6S	56E	9	≈8	15.0
10. Alum	6S	56E	10	ND	ND
11. Cliff	6S	55 1/2E	16	≈8	13.0
12. Cattle	6S	55 1/2E	18	8	16.5
13. Rock	6S	56E	29	ND	16.0
14. Cane	7S	55 1/2E	16	8.5	13.0
15. Disappointment	7S	55E	13	ND	ND
16. Miner	7S	55 1/2E	18	ND	ND

Note: One water source located at T5S,R55 1/2,S6 does not appear to be a natural spring. At this time it flows from a man-made excavation and at one time was piped approximately 200 yards to a large water tank. The flow from this source is less than 5ℓ/min.

ND - not determined

3.4.2 Water Quality

Analysis of water quality is available only for the springs which discharge within the withdrawal area. Table 3.5 presents water quality for those springs.

These data show that the limited spring discharge available in the area is of good quality and suitable for most beneficial uses.

TABLE 3.5 GROOM WITHDRAWAL WATER QUALITY¹

Spring	pH	EC	HCO ₃	CO ₃	CL	SO ₄	Na	K	Ca	Mg
Rosebud	7.25	845	398	ND	10.9	151.0	18.2	2.0	88.8	60.0
Savio	8.34	471	268	1.5	10.1	25.5	23.7	6.2	54.5	14.0
Lick	8.25	410	244	ND	9.4	26.0	27.6	4.5	48.1	10.5
Rabbit Brush	7.88	375	197	ND	9.0	27.2	25.4	3.5	42.1	8.9
Naquinta	8.20	308	180	ND	5.7	12.2	24.5	1.1	31.6	10.5
Pine	8.47	424	222	5.2	12.3	23.7	53.8	2.5	32.4	8.2
Indian	8.12	356	173	ND	9.4	31.4	38.6	0.9	29.9	7.1
Quail	7.80	668	166	ND	11.0	206.0	28.5	1.9	85.6	19.2
Cliff	7.72	508	271	ND	6.5	50.6	18.4	0.9	75.7	11.4
Cattle	7.98	526	261	ND	16.0	39.3	40.5	5.3	56.0	11.4
Rock	7.78	581	348	ND	5.8	35.0	13.1	1.7	86.5	18.7
Cane	7.61	807	360	ND	17.9	136.0	23.7	2.4	84.2	48.4
Miner	7.91	1710	485	ND	52.9	585.0	96.9	12.0	96.7	153.0

¹ Samples collected by 5/85 and analyzed by Water Analysis Laboratory, Water Resources Center, Desert Research Institute. All values reported in mg/l except for EC which is reported as μ mhos and pH reported in pH units.

ND - not determined
 pH - acidity
 EC - electrical conductivity
 HCO₃ - bicarbonate
 CO₃ - carbonate
 SO₄ - sulfate
 Na - sodium
 K - potassium
 Ca - calcium
 Mg - magnesium

3.4.3 Water Use

Present use of water sources within the withdrawal area is primarily limited to livestock and wildlife. Discharge from one spring, Rock Spring, is piped outside the withdrawal boundary for domestic and livestock use.

3.4.4 Water Ownership

Appropriation of water within the withdrawal area has in the past and will in the future follow procedures as defined in chapters 533 and 534 of Nevada Revised Statutes. These chapters contain procedures and regulations pertaining to adjudication of vested water rights; appropriation of public waters and underground water and wells respectively. The Air Force is not claiming any Federal reserved rights. Within the withdrawal area, water rights as shown in Table 3.6 exist for the springs identified. No rights exist in the area for either stream waters or for groundwater obtained through wells.

TABLE 3.6 GROOM WITHDRAWAL WATER RIGHTS

Proof Number	Spring Name	Owner	Date Filed	Deed* Number
01367	Cattle ¹	United States	10/28/55	46808
01369	Cliff ¹	"	"	"
01370	Disappointment ¹	"	"	"
01372	Indian ¹	"	"	"
01375	Cane ¹	"	"	"
01378	Naquinta ¹	"	"	"
01379	Miner ¹	"	"	"
01368	Rock	D/4 Enterprises	07/28/75	53620
01371	Savio	"	"	"
01373	Quail	"	"	"
01377	Rosebud	"	"	"
01533	Alum	"	"	"
01534	Lick	"	"	"
01536	Rabbitbrush	"	"	"
01376	Pine ¹	Estate of W.T. Stewart	1937	No Transfer of title found
	Bullwhack	none recorded [Application #48695 (no name spring) Filed 3/85 by D/4 Enterprises]		

* Deed filed in Lincoln County Court House, Pioche Nevada

¹ Application filed 3/85 by D/4 Enterprises; no action taken

3.5 VEGETATION

3.5.1 Plant Communities

The Groom Mountain Range is located near the floristic boundary between the Mojave Desert to the south and the Great Basin Desert to the north. Consequently, floristic elements of both deserts are represented, resulting in a relatively high degree of botanical diversity for such an arid region.

The predominant vegetation community types in the Groom Mountain Range withdrawal area are shown in Figure 3.6, and include shrub, woodland, and forest communities. Brief descriptions of major plant communities are given below.

1. Saltbush Community: This community is found at the lowest elevations of the withdrawal area, occurring from 4,500 feet along the margins of Groom Lake to about 5,100 feet on bajadas below the limestone slopes at the southern end of the Groom Mountain Range. Dominant shrub species on the Groom Lake shoreline include shadscale (Atriplex confertifolia), green ephedra (Ephedra viridis), seep weed (Suaeda torreyana var. ramosissima), and bud sagebrush (Artemisia spinescens). On the higher limestone bajadas, these same dominants occur along with

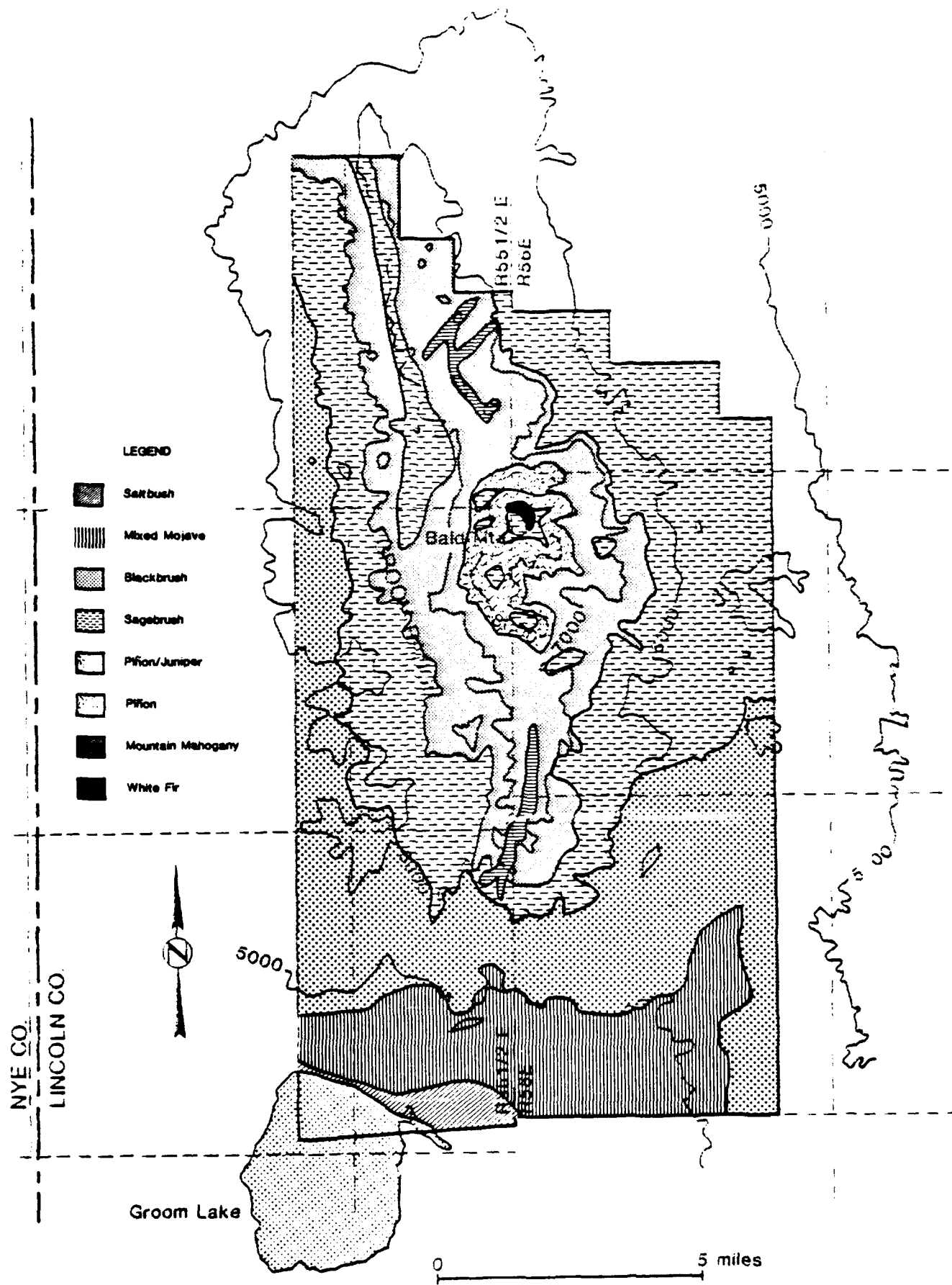


Figure 3.6 Dominant Vegetation Communities

creosote bush (Larrea tridentata). Common forbs and grasses include halogeton (Halogeton glomerata), Indian ricegrass (Oryzopsis hymenoides), russian thistle (Salsola sp.), and mesa dropseed (Sporobolus flexuosus).

2. Mixed Mojave Community: This broad community type, which may be further divided into several plant associations, consists of a mixture of shrubs characteristic of the Mojave Desert. This community generally occurs on tuff or alluvial deposits in the southeastern part of the withdrawal. It occurs at lower elevations between 4,500 feet and 5,300 feet. Joshua tree (Yucca brevifolia) is a conspicuous overstory species in this community, but exhibits only minor relative cover. Dominant shrubs in the community are smooth horsebrush (Tetradymia glabrata), spiny menodora (Menodora spinescens), hymenoclea (Hymenoclea salsola), box thorn (Lycium andersonii), green ephedra, green rabbitbrush (Chrysothamnus viscidiflorus), Nevada jointfir (Ephedra nevadensis), and 4-wing saltbush (Atriplex canescens). Common grasses are big galleta (Hilaria rigida), Indian ricegrass, and Erioneuron pulchellum. Conspicuous cacti are cactus (Echinocactus polycephalus) and prickly pear (Opuntia echinocarpa).
3. Blackbrush Community: The blackbrush (Coleogyne ramosissima) community type is found in habitats and at elevations which are intermediate between Mixed Mojave and Sagebrush community types. It forms extensive belts on both sides of the Groom Mountain Range at elevations between 5,000 feet and 6,500 feet. Blackbrush occupies open areas on well-drained, stony soils derived from a variety of rock types. At lower elevations in the southwestern section of the withdrawal, it dominates the upper bajadas above the Mixed Mojave community type. At higher elevations in the southern part of the withdrawal, it interfaces with Sagebrush communities, but often forms pure stands on drier south- or west-facing slopes. Subordinate shrubs in the Blackbrush Community include desert bitterbrush (Purshia glandulosa), big sagebrush (Artemisia tridentata), black sagebrush (Artemisia nova), Nevada jointfir, and green rabbitbrush. Grass cover tends to be quite low in this community, with dominants being squirreltail (Sitanion hystrix), Indian ricegrass, and galleta (Hilaria jamesii). The cacti Opuntia erinacea and Opuntia echinocarpa are common in this vegetation type.
4. Sagebrush Community: This vegetation type is dominated by a mosaic of black sagebrush and big sagebrush, which occur on a variety of parent materials at elevations from 5,200 feet on the southeastern side of the Groom Mountain Range up to 6,800 feet on the mid- elevation slopes of Bald Mountain. Generally these two sagebrush species are edaphically and microtopographically separated, but often occur as co-dominants. Big sagebrush occurs on deeper, sandy soils on mesas and in drainages and valley bottoms, whereas black sagebrush occupies shallower, rocky soils of ridges and hillsides. Subordinate trees and shrubs in this community type are single needle pinyon (Pinus

monophylla), Utah juniper (Juniperus osteosperma), desert bitterbrush, Nevada jointfir, green ephedra, and cliffrose (Cowania mexicana). Representative grasses of this community type include squirreltail, galleta, Indian ricegrass, and desert needlegrass (Stipa speciosa). The major cacti occurring in this community type are Opuntia erinacea and Opuntia echinocarpa.

A distinct plant association within this community type occurs on the volcanic summit and summit ridges of Bald Mountain above 9,000 feet elevation. Dominant species in this association are black sagebrush, mountain big sagebrush (Artemisia tridentata ssp. vaseyana), green rabbitbrush (Chrysothamnus viscidiflorus var. viscidiflorus), wormwood (Artemisia dracunculus), gray horsebrush (Tetradymia canescens), Paronychia jamesii, and whitesage (Ceratoides lanata). Grass cover is very high in this plant association, and is dominated by mutton grass (Poa fendleriana) and squirreltail.

5. Pinyon-Juniper Community: Single needle pinyon and Utah juniper become dominant constituents with sagebrush at about 6,200 feet, particularly along drainages and on north-facing slopes. They continue to form discontinuous stands up to about 7,800 feet, forming a vegetation belt at these elevations around most of the Groom Mountain Range, particularly on limestone slopes in the northern and southern parts of the range. Understory shrubs in this community are black sagebrush, big sagebrush, desert bitterbrush, cliffrose, green ephedra, and green rabbitbrush. Common grasses are needle-and-thread (Stipa comata) and squirreltail, with prickly pear being the most conspicuous cactus.
6. Pinyon Community: Single needle pinyon occupies discontinuous pure stands above 6,300 feet, forming a fairly continuous forest on the slopes of Bald Mountain at elevations between 7,600 feet and 8,600 feet. The Pinyon community type is found primarily on rocky volcanic substrates, and so occurs primarily in the central Groom Range. Understory shrubs in this community type are the same as in the Pinyon-Juniper community, although current (Ribes velutinum) and Gambell's oak (Quercus gambellii) are also found as localized co-dominants. The dominant grass is mutton grass, and the cactus prickly pear is found in scattered locations.
7. Mountain Mahogany Community: This community type is a distinct association of mountain mahogany (Cercocarpus ledifolius), single needle pinyon, and Utah juniper. It is restricted to the top of limestone ridges of the southern and northern Groom Mountain Range at elevations between 6,700 feet and 7,800 feet. Subordinate shrubs in this community type are cliffrose, back brush (Ceanothus greggii), Forsellesia nevadensis, black sagebrush, and green ephedra. The dominant grass in this community type is squirreltail, and the cactus Opuntia erinacea occurs occasionally.

8. **White Fir Community:** A small, distinct community of white fir (Abies concolor) occurs on north- and east-facing volcanic slopes of Bald Mountain at elevations between 8,600 feet and 9,100 feet. Also present within this forest type are scattered individuals of limber pine (Pinus flexilis) and single needle pinyon. White fir also extends below 8,600 feet on the ridges of Bald Mountain as a minor component of the pinyon forest community. The understory of the White Fir community is dominated by the mutton grass and to a lesser extent by the shrub mountain big sagebrush.

The eight community types delineated above and shown in Figure 3.6 are necessarily quite broad for mapping purposes. Most of the communities consist of well defined subgroups or associations. In addition, the major community types form a mosaic pattern throughout the withdrawal area, making it difficult to map vegetation types except on a broad scale. Thus, numerous vegetation types were observed in the area but were not specifically mapped. For example, riparian corridors of Gambell oak and Salix sp. occur in the major drainages of Bald Mountain. Small, disturbed wetland areas occur adjacent to the numerous springs scattered throughout the Groom Mountain Range. Although spikerush (Eleocharis sp.) and other aquatic plants occur at these sites, the spring areas tend to be dominated by native species indicative of disturbances, primarily green rabbitbrush stands. If these springs were protected from heavy disturbance (cattle overgrazing and water harvesting), they would probably revert back to a moderately pristine aquatic habitat through normal successional processes.

3.5.2 Threatened, Endangered or Sensitive Species

Several plant species judged to be of primary importance to this assessment have been checklisted. These species may require special attention by scientists and federal agencies because they are either threatened, endangered, sensitive, or of economic or recreational value. The reasons for their special consideration include: 1) population is restricted, perhaps to a few hundred individuals of an entire species in an area; 2) the geographical range of the species may be small, with the entire range potentially occurring in the Withdrawal Area; 3) although little is known of the current status of a species, information suggests that populations are declining; 4) a species is sensitive to human disturbance and may potentially be in danger if exposed to human pressures; 5) a species in an area is a relict population; 6) a species may have aesthetic or scientific value; 7) a species may have economic or recreational importance; and 8) any combination of the above.

A list of threatened, endangered, and sensitive plant species is given in Table 3.7. Only one species, Astragalus beatleyae, is listed in the Federal Register as proposed endangered (U.S. Fish and Wildlife, Service, 1983). It was extensively searched for and not found on the Groom Mountain Range Withdrawal Area.

Three important species on the list, Coryphantha vivipara var. rosea, Erigeron ovinus (watch), and Machaeranthera grindelioides var. depressa (watch) were found on the withdrawal area.

TABLE 3.7 PROPOSED ENDANGERED, THREATENED OR SENSITIVE PLANT SPECIES OCCURRING IN THE VICINITY OF THE GROOM MOUNTAIN RANGE WITHDRAWAL AREA

Species	Status Federal/NNNPS*
<u>Found on Withdrawal Area (Spring 1985)</u>	
<u>Astragalus gilmanii</u> **	
<u>Coryphantha vivipara</u> var. <u>rosea</u>	2/RFT
<u>Erigeron ovinus</u>	2/Watch
<u>Machaeranthera grindelioides</u> var. <u>depressa</u>	2/Watch
<u>Polygala subspinosa</u> var. <u>heterorhynca</u>	2/Watch
<u>May Have Been Found (Waiting Verification)</u>	
<u>Cryptantha compacta</u> ***	
<u>Expected to be Found</u>	
<u>Asclepias eastwoodiana</u>	2/Watch
<u>Astragalus beatleyae</u>	2/Endangered
<u>A. funereus</u>	2/Watch
<u>A. musimonum</u>	2/Watch
<u>Camissonia megalantha</u>	2/Watch
<u>Cymopterus ripleyi</u> var. <u>saniculoides</u>	2/Watch
<u>Frasera pahutensis</u>	2/RFT
<u>Galium hilendiae</u> ssp. <u>kingstonense</u>	2/RFT
<u>Lewisia maguirei</u>	2/Watch
<u>Penstemon arenarius</u>	2/Watch
<u>P. fruticiformis</u> ssp. <u>amargosae</u>	2/RFT
<u>P. pahutensis</u>	1/RFT
<u>P. pudicus</u>	2/RFT
<u>Phacelia beatleyae</u>	2/Watch
<u>Sclerocactus polyancistrus</u>	2/Watch
<u>Townsendia jonesii</u> var. <u>tumulosa</u>	1/RFT

Sources: Mozingo and Williams (1980); U.S. Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants (1976, 1980, 1983); Northern Nevada Native Plant Society, Sensitive Plant List for Nevada (1984).

- 1 - indicates taxa for which more information is needed
 2 - indicates taxa for which enough information is on hand to support listing as a threatened or endangered species.

RFT designates recommended for threatened status by the Northern Nevada Native Plant Society

* Northern Nevada Native Plant Society

** Not currently listed for Nevada since not previously known to occur in the state. The Northern Nevada Plant Society has been informed of this occurrence and the plant will be considered for listing.

*** Not currently listed for Nevada since not previously known to occur in the state. If verified it would most likely be listed.

The cactus Coryphantha vivipara var. rosea was found in the following location:

- 1) T7S, R56E, Sec. 23, 5400 feet, common
- 2) T7S, R55E, Sec. 20, 4900 feet, occasional
- 3) T7S, R55E, Sec. 17, 5200 feet, common
- 4) T7S, R56E, Sec. 10, 5300 feet, occasional
- 5) T6S, R56E, Sec. 35, 6200 feet, few
- 6) T6S, R55E, Sec. 29, 6200 feet, few
- 7) T6S, R56E, Sec. 21, 6000 feet, few
- 8) T6S, R56E, Sec. 30, 7500 feet, few
- 9) T6S, R55E, Sec. 13, 6300 feet, few
- 10) T6S, R55E, Sec. 6, 5200 feet, few
- 11) T6S, R56E, Sec. 10, 6200 feet, common

Favorable habitats are gravelly limestone, dolomite, tuff, or volcanic uplands at elevations of 5200 feet to 7500 feet. Scattered individuals occur in most sites. Plant associates are blackbrush, big sagebrush, black sagebrush, shadscale, mountain mohogany, Utah juniper, and single needle pinyon. The primary existing threat to this species is disturbance, specifically trampling by cattle.

Astragalus gilmanii was found at three locations throughout the Groom Mountain Range, all on volcanic tuff substrates. Specific locations include:

- 1) T6S, R54E, Sec. 12, 5700 feet, occasional
- 2) T6S, R55E, Sec. 18, 6200 feet, occasional
- 3) T7S, R56E, Sec. 2, 5300 feet, occasional

Astragalus gilmanii is scattered occasionally throughout tuff areas within the Mixed Mojave and Pinyon-Juniper community types. An existing threat to this species is trampling by cattle. This locoweed was known previously to occur only in the Panamint Mountains of Inyo County, California. It is listed as rare but not endangered by the California Native Plant Society. Because it was not known to occur in Nevada it is not currently listed for this state, but it will be considered for listing by the Northern Nevada Native Plant Society.

Erigeron ovinus was found occurring along the crest of the limestone ridge in the southern half of the Groom Mountain Range, specifically at the following locations:

- 1) T7S, R55E, Sec. 4, 7200 feet, common
- 2) T7S, R56E, Sec. 6, 7400 feet, common
- 3) T6S, R56E, Sec. 31, 7600 feet, common
- 4) T6S, R55E, Sec. 28, 7200 feet, few
- 5) T6S, R56E, Sec. 30, 7600 feet, occasional
- 6) T6S, R56E, Sec. 19, 7800 feet, few

Erigeron ovinus occurs in crevices, with shallow, coarse soil on limestone, typically at the base of north or west facing sides of rock outcrops. The elevational range of this species in the Groom Mountain Range is 7200 feet to 7800 feet. It occurs as scattered individuals and is

associated with mountain mahogany, snowberry and Forsellesia nevadensis. No existing threats to this species have been identified.

Machaeranthera grindelioides var. depressa was found at two locations on the limestone ridge in the southern half of the Groom Mountain Range. It was found with Erigeron ovinus at the first location, but it was not abundant. Locations are:

- 1) T7S, R55E, Sec. 4, 7200 feet, scattered
- 2) T7S, R56E, Sec. 6, 7400 feet, scattered

Machaeranthera grindelioides var. depressa occurs on shallow limestone soil in the Mountain Mahogany community type.

Polygala subspinosa var. heterorhyncha was found at three scattered locations within the Groom Mountain Range:

- 1) T6S, R55E, Sec. 18, 6200 feet, occasional
- 2) T7S, R56E, Sec. 14, 5300 feet, occasional
- 3) T7S, R56E, Sec. 32, 4700 feet, occasional

This plant occurs on tuff at the first two locations and on sandy alluvium at the third location. Polygala subspinosa var. heterorhyncha was found as widely scattered individuals among shrubs of the Mixed Mojave and Blackbrush community types. An existing threat to this species is trampling by cattle. The more common var. subspinosa is also known from the central Groom Mountain Range.

Two other species may have been found but their identities are pending verification. Cryptantha compacta, which occurs in Utah but was removed from Nevada lists because it is not known from this state, may also have been found. It was collected on the top of Bald Mountain in the Sagebrush community type. Townsendia jonesii var. tumulosa may have been found at several locations within the Sagebrush and Pinyon-Juniper community types. Trampling by cattle may be an existing threat to all three species.

3.6 ANIMALS

Table 3.8 lists the predominant vertebrate species expected to be found within the withdrawal area. These species are placed in the major vegetative communities as presented in Figure 3.6.

There are no listed or proposed threatened or endangered vertebrate species for the Groom Mountain Range (pers. comm. Sada, 1985). But, six species are listed as possible candidates to be present in the Groom Mountain Range: the ferruginous hawk (Buteo regalis), Swainson's hawk (Buteo swainsoni), mountain plover (Charadrius montanus), western snowy plover (Charadrius alexandrinus), long-billed curlew (Numerius americanus), and the desert tortoise (Gopherus agassizii). None of these species were sighted on the range during the period of study, May-June

TABLE 3.8 PREDOMINANT ANIMAL SPECIES EXPECTED ON THE
GROOM MOUNTAIN RANGE WITHDRAWAL AREA

<u>Predominant Species</u>	<u>Vegetative Communities</u>			Pinyon Juniper and/or Higher Elevation Communities
	Saltbush	Mixed Mojave and/or Black Brush	Sagebrush	
AMPHIBIANS				
Great basin spadefoot toad (<u>Scaphiopus intermountainus</u>)				X
Western toad (<u>Bufo boreas</u>)		X	X	X
REPTILES				
Lizards				
Zebra tailed lizard (<u>Callisaurus draconodes</u>)	X	X	X	
Desert collared lizard (<u>Crotophytus isularis</u>)	X	X	X	
Desert horned lizard (<u>Phrynosoma phatyrhinus</u>)	X	X	X	
Sagebrush lizard (<u>Sceloperous graciosus</u>)	X		X	X
Western fence lizard (<u>Sceloperous occidentalis</u>)	X	X	X	X
Side blotched lizard (<u>Uta stansburiana</u>)	X	X	X	X
Western whiptailed lizard (<u>Cnemidophorus tigris</u>)	X	X	X	X
Snakes				
Coachwhip - red racer (<u>Masticophis flagellum</u>)	X	X		
Striped whipsnake (<u>Masticophis taeniatus</u>)		X	X	X
Great basin gopher snake (<u>Pituophis melanoleucus</u>)	X	X	X	X
Western patch-nosed snake (<u>Salvadora hexalepis</u>)	X	X	X	
Sidewinder (<u>Crotalus cerastes</u>)	X	X		
Western rattlesnake (<u>Crotalus viridis</u>)	X	X	X	X
BIRDS				
Sage sparrow (<u>Amphispiza billi</u>)	X	X	X	
Black-throated sparrow (<u>Amphispiza bilineata</u>)	X	X	X	X
House finch (<u>Carpodacus mexicanus</u>)	X	X	X	X
Bush tit (<u>Psaltriparus minimus</u>)				X
Cliff swallow (<u>Petrochelidon pyrrhonota</u>)	X	X	X	X
Ash-throated fly catcher (<u>Myiarchus cinerascens</u>)	X	X		
Western meadowlark (<u>Sturnella neglecta</u>)	X		X	X
Horned lark (<u>Eremophila alpestris</u>)	X	X	X	X
Loggerhead shrike (<u>Lanius ludovicianus</u>)	X	X	X	
Western kingbird (<u>Tyrannus verticalaris</u>)	X	X	X	X

TABLE 3.8 (Continued)

<u>Predominant Species</u>	<u>Vegetative Communities</u>			Pinyon Juniper and/or Higher Elevation Communities
	Salt Bush	Mixed Mojave and/or Black Brush	Sagebrush	
Common flicker (<u>Colaptes auratus</u>)		X	X	X
Brown headed cowbird (<u>Molothrus ater</u>)			X	X
Rufous-sided towhee (<u>Pipilo erythrophthalmus</u>)			X	X
Pinyon jay (<u>Gymnorhinus cyanocephalus</u>)			X	X
Gambel's quail (<u>Lophortyx gambeli</u>)		X	X	
Chukar partridge (<u>Alectoris gracea</u>)		X	X	X
Mourning dove (<u>Zenaida macroura</u>)	X	X	X	X
Common raven (<u>Corvus corax</u>)	X	X	X	X
Sharp-shinned hawk (<u>Accipiter striatus</u>)	X	X	X	X
Cooper's hawk (<u>Accipiter cooperii</u>)	X	X	X	X
Red-tailed hawk (<u>Buteo jamaicensis</u>)	X	X	X	X
Golden eagle (<u>Aquila chrysaetos</u>)	X	X	X	X
Turkey vulture (<u>Cathartes aura</u>)	X	X	X	X
Great horned owl (<u>Bubo virginianus</u>)	X	X	X	X
MAMMALS				
Shrews				
Merriam's shrew (<u>Sorex merriami</u>)		X	X	X
Bats				
Little brown myotis (<u>Myotis lucifugus</u>)		X	X	X
Big brown bat (<u>Eptesicus fuscus</u>)	X	X	X	X
Townsend's big-eared bat (<u>Plecotus townsendii</u>)				X
Brazilian free-tailed bat (<u>Tadarida brasiliensis</u>)	X	X	X	X
Rabbits and Hares				
Desert cottontail (<u>Sylvilagus audubonii</u>)	X	X	X	
Black-tailed jackrabbit (<u>Lepus californicus</u>)	X	X	X	X
Rodents				
White-tailed antelope ground squirrel (<u>Ammospermophilus leucurus</u>)	X	X	X	
Townsend's ground squirrel (<u>Spermophilus townsendii</u>)			X	X
Botta's pocket gopher (<u>Thomomys bottae</u>)	X	X	X	X
Great basin pocket mouse (<u>Perognathus parvus</u>)			X	X
Dark kangaroo mouse (<u>Macrodidipodops megacephalus</u>)	X	X		

TABLE 3.8 (Continued)

<u>Predominant Species</u>	<u>Vegetative Communities</u>			Pinyon Juniper and/or Higher Elevation Communities
	Salt Bush	Mixed Mojave and/or Black Brush	Sagebrush	
Pale kangaroo mouse (<u>Macrodipodops pallidus</u>)	X	X		
Ord's kangaroo rat (<u>Dipodomys ordii</u>)	X		X	
Chisel-toothed kangaroo rat (<u>Dipodomys microps</u>)	X		X	X
Merriam's kangaroo rat (<u>Dipodomys merriamii</u>)	X	X	X	
Harvest mouse (<u>Reithrodontomys megalotus</u>)	X	X	X	
Deer mouse (<u>Peromyscus maniculatus</u>)	X	X	X	X
Pinyon mouse (<u>Peromyscus trueii</u>)				X
Desert wood rat (<u>Neotoma lepida</u>)			X	X
Sagebrush vole (<u>Lagurus curtatus</u>)			X	
CARNIVORS				
Coyote (<u>Canis latrans</u>)	X	X	X	X
Kit fox (<u>Vulpes macrotis</u>)	X	X	X	
Badger (<u>Taxidea taxus</u>)	X	X	X	X
Striped skunk (<u>Mephitis mephitis</u>)	X	X	X	X
Bob cat (<u>Lynx rufus</u>)	X	X	X	X
Mountain lion (<u>Felis concolor</u>)	X	X	X	X
Hoofed Mammals				
Mule deer (<u>Odocoileus hemionianus</u>)	X	X	X	X
Pronghorn antelope (<u>Antilocapra americana</u>)	X	X	X	

1985, for this environmental impact statement. No sign of the desert tortoise was seen in the dry wash habitat preferred by that species.

The abundance and distribution of these predominant vertebrate species varies greatly, primarily due to the extent and condition of each species' prime habitat. The field observation period, Spring 1985, appears to have been exceptionally good for most species. Reptile sightings were numerous. Bird numbers and diversity were high with breeding related activities the rule. Tracks and other signs of nocturnal animals were abundant. Jackrabbit and cottontail numbers were very high, possibly at the peak of a cycle. Coyote sign was very common and frequent sightings were reported. Badger and kit fox sightings were common. Two reports of mountain lion were made in late winter and mountain lion sign was seen by one study crew.

Chukar partridge numbers have been increasing in recent years and the Nevada Department of Wildlife considers the Groom Mountain Range to have the best chukar population in Lincoln County, a county with only a few other chukar populations (pers. comm. Beckstrand, 1985). Gambel quail have been reported on the west side of the range but their numbers do not appear to be high.

Mule deer are widespread throughout the range. Deer and/or fresh deer signs were observed from the highest to the lowest part of the withdrawal. Past estimates by NDOW were that about half of the range was deer habitat with a herd size of 145 to 175 animals. Recent observations indicate much of the range is deer habitat. Therefore, using NDOW density estimates, the herd size is about 300 animals. These new estimates of deer habitat and numbers have the concurrence of both the NDOW and BLM local wildlife biologists (pers. comm. Beckstrand, Meiss, Guerrero, 1985). Winter sightings by personnel within the area are reported which indicate the possibility of a migration route between the Groom Mountain Range and the Cactus Hills and the Belted Range. The Cactus Hills and the Belted Range are within the existing Nellis AF Range Complex and no migration of Groom Mountain Range deer appears to be outside of withdrawn areas. Domestic livestock graze the entire range and also use the primary deer forage species. Many of the areas near springs are severely grazed by livestock to the detriment of deer forage and deer.

There have been no recent sightings of wild horses in the area and since the withdrawal is fenced on the west side it is unlikely any will move in, especially if the entire withdrawal is fenced. Two burros were frequently seen a number of years ago, but only one burro has been seen in the last two years and he was not seen this last spring.

There are no bighorn sheep in the Groom Mountain Range, although in the 1930's one bighorn sheep skull was found near Indian Springs and one at Groom Lake (pers. comm. Sheahan, 1985).

Seven antelope were seen near the western border of the withdrawal area.

3.7 CULTURAL RESOURCES

Virtually no archaeological research has taken place in the Groom Mountain Range previous to the present study. Records at the Nevada State Museum, Carson City, the BLM Las Vegas District office, and at Environmental Research Consultants, Las Vegas indicate that the only antiquities survey within the project area boundaries was along the fence line that forms the south and west boundaries of the study area.

An archaeological reconnaissance of 6 percent of the withdrawal area was performed. A total of 251 archaeological sites were recorded including residential bases clustered around springs, temporary camps, rock shelters, quarries, lithic scatters, rock art, pinyon caches, pot drops, isolates, and historic sites including mines, roads and ranching related remains. Of these sites, 170 may be potentially eligible for nomination to the National Register of Historic Places. These sites range in age from contemporary to about 10,000 years old.

The National Historic Preservation Act of 1966, Sec. 101(a)(1), imposes certain requirements regarding significant resources. Consequently, it is important to determine what is conveyed by the term "significance." Federal Regulations (36 CFR 60.6 and 36 CFR 800.10) state that:

...the quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of State and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

- (a) That are associated with events that have made a significant contribution to the broad patterns of our history; or
- (b) That are associated with the lives of persons significant in our past; or
- (c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- (d) That have yielded, or may be likely to yield, information important in prehistory or history.

These criteria, used by Federal agencies in assessing eligibility of cultural resources for nomination to the National Register, provide a general mechanism for defining significance, but most of these criteria were written with historic buildings in mind and not prehistoric archaeological sites. The last criterion (d) is applicable for determining significance of prehistoric cultural resources in the Groom Mountain Range.

Given the number of sites that may be potentially eligible for the National Register nomination, it may be appropriate to consider the cultural resources on a regional basis. The State Historical Preservation Office will be consulted.

The prehistoric sites found in the Groom Mountain Range may be highly significant to a fuller understanding of Great Basin archaeology. The survey effort, however, did not provide opportunity to explore potential research domains in detail. Some of these important subject areas are as follows:

1. Anasazi and Fremont Periphery: Groom Mountain Range is on the edge of the distribution of artifacts from both of these culture areas.
2. Chronology: Excavations of buried sites which will yield artifacts in association of datable items, primarily through radio-carbon analysis, are needed to build reliable local chronologies. Rockshelters are of special importance for building chronologies because of the accumulation of debris over time and the protection afforded perishable items which are needed for carbon-14 dating. Several rockshelters which might yield datable remains were located in the Groom Mountain Range.
3. Buried Sites: Aside from construction of an adequate local chronology, sites with buried remains are useful for analysis of spatial patterning of aboriginal remains within sites. Small areas of local recent deposition are present throughout the Groom Mountain Range but spring sites and the sandy bajada above Groom Lake are highly significant.
4. Settlement Pattern Studies: Distribution of all archaeological remains is significant for such studies. Questions that can be approached from the available data include routes of travel, the local influence of topography on site patterns, and regional patterns.
5. Hunting: The many upland sites found relating to this activity include isolated projectile points and tools, hunting blinds, and loci within temporary camps and residential bases. Although the large canyons entering the Groom Mountain Range from surrounding valleys (Emigrant, Tikaboo, and Sand Springs) were not examined as part of this sample, there is a possibility that game drive fences are present in these areas.
6. Paleoecological Studies: The Groom Mountain Range provides many opportunities to expand our knowledge in this area due to the presence of many preserved packrat middens, notably the large one within Snowslide Cave, and the presence of trees, notably, limber pine which may be used for tree ring analysis of paleoclimates as well as dendrochronology.
7. Pinyon Exploitation: Pinyon caches of different ages and construction were observed during the survey. Dating of cache

sites is possible through comparison of associated artifacts, carbon dates from related temporary camps, and carbon dates from within caches which have also been used as roasting pits.

8. Rock Art: Three pictograph sites were found during the survey. All are associated with other cultural remains, which is significant for future studies designed to tie rock art sites more closely with the physical and cultural environment than has normally been done in the past.

Historic sites in the Groom Mountain Range relate primarily to mining, ranching, transportation, and logging. The main mining property is the Groom Mine. Other mines are the Black Metal Mine near the Groom Mine and a small area near Cattle Spring. All of the expected support facilities for small mines occur in the vicinity of these mines. In addition, the entire southwest portion and small areas on the north and east sides of the range have been prospected, leaving occasional isolated artifacts and a scatter of claim posts and cairns. All of the springs are sites of historic ranching activity since the late nineteenth century. Remains include tent platforms, hearths, trash scatters, corrals, spring improvements, and pipelines. A well used ranching facility was located near Cattle Spring. A local road system served mining and ranching activities. Two of the major links in this road system are nearly unused and have been preserved from recent damage by heavy traffic or improvement. Remains of a local logging industry to serve the needs of the Groom Mine are present north of the Groom Mine.

Historic aboriginal sites are present in the study area. These sites include pinyon caches and rock shelters with associated historic artifacts and many of the spring sites. These sites provide an unusual research opportunity for here is a situation where a hunting and gathering population is in operation within comparatively well known times. This enables creation of behavioral models from a well documented historic base line for application to other hunting and gathering societies in the remote past.

In general, historic and current land use within the withdrawal has had little affect on archaeological sites. In the vicinity of springs, heavy grazing and trampling by livestock has caused some disturbance. Past construction of roads and gravel pits and the recent construction of a powerline in the area may have disturbed unrecorded sites.

3.8 LAND USE

3.8.1 Agriculture and Livestock Grazing

The Groom Mountain Range withdrawal area is primarily desert range vegetation and pinyon-juniper woodland. Historic use of the rangeland has been limited to livestock grazing and wildlife production since it does not lend itself to any kind of intensive agriculture. There has been only limited forestry use and no plans are known for utilization of the woodlands even though there is some potential for woodland utilization.

Livestock grazing, which dates back to the late 1800's, is limited by the availability of water throughout the area. Presently only one rancher grazes livestock on the range as a permittee to the Bureau of Land Management which has controlled grazing allotments in the area since 1944. The two Bureau of Land Management Grazing Allotments which form a part of the withdrawal are the Naquinta Springs Allotment and the Bald Mountain Allotment. The Naquinta Springs allotment is entirely within the withdrawal while the Bald Mountain Allotment includes lands on the east slope of the Groom Range, in Tikaboo Valley and on the west slope of the Pahrangat Range. The Naquinta Springs allotment is currently used in conjunction with the Bald Mountain Allotment but only as additional forage for the permitted AUMs on the Bald Mountain Allotment. The single permittee grazes livestock on all areas of the withdrawal under a BLM permit but essentially without BLM review because of restricted access.

The Naquinta Springs Allotment contains 52,425 acres and the Bald Mountain Allotment contains 269,723 acres. There are 37,175 acres of the Bald Mountain allotment (13.8%) within the withdrawal area. BLM indicates that there are 6298 Animal Unit Months (AUMs) in the Bald Mountain Allotment of which 5,811 are active. The Bald Mountain Allotment permit allows 480 head of cattle and 5 horses. A strict percentage basis, i.e. 13.8%, would allow about 800 AUMs in the withdrawn portion of the allotment if cattle use were distributed evenly over the allotment. The withdrawal area provides considerably more than 800 AUMs in any given year due to natural resources available in the area.

The range vegetation resource was evaluated during spring 1985 to determine its condition, distribution, and importance as cover and forage for both wildlife and domestic livestock. The eight generalized vegetation types identified earlier (Figure 3.6) do not truly reflect the complexity of the range and woodland vegetation. Some 64 distinct plant communities were recognized in the field survey and given provisional names, each of which provide cover and forage for wildlife and domestic livestock.

Within this vegetation resource there are several important palatable forage plants. The forage shrubs include the following: budsage, four-wing saltbush, green ephedra, Nevada jointfir, black sagebrush, desert bitterbrush, Apache plume (Fallugia paradoxa), cliffrose, skunkbrush sumac (Rhus trilobata), Gambell's oak, and mountain mahogany. The grasses include: galleta, big galleta, desert needlegrass, Indian ricegrass, alkali sacaton (Sporobolus airoides), squirreltail, Sandbergs bluegrass (Poa sandbergii), bluebunch wheatgrass (Agropyron apicatum), Great Basin wildrye (Elymus cinereus), muttongrass and a high elevation needlegrass (Stipa lettermanii). These species, along with a variety of forbs, provide the majority of the livestock forage and they also provide the bulk of forage for mule deer.

Vegetation utilization has been heavy around watering points with considerable trampling and dunging. This is especially true on the east side of the range although this is also true for many of the springs on the west side, e.g., Rosebud Spring, Indian Spring, Cattle Spring, the Old Watertank and Naquinta Spring. Past utilization has been very heavy on the perennial grasses particularly in the sagebrush vegetation and

cliffrose, desert bitterbrush and Nevada jointfir. These latter species provide the bulk of the forage for livestock at all of the higher elevation plant communities and in the washes in the blackbrush plant community. An important low seral species at several spring locations is grey rabbitbrush (Chrysothamnus nauseosus) and cheatgrass (Bromus tectorum) is an additional low seral species found around developed stock ponds and water troughs and on many other disturbed areas on the withdrawal. Utilization on black sagebrush was generally not evident because it is so widespread. However, around most watering points where black sagebrush occurs the utilization is noticeable.

Livestock carrying capacities of the identified plant communities are relatively low in the Groom Mountain Range because of past heavy usage. Conservative field estimates of capacity for the major vegetation types in the withdrawal (Table 3.9) show that the area could support 4,500 AUMs of grazing. These AUMs are somewhat evenly spread over the range with blackbrush and sagebrush communities providing almost one half of the AUMs. It is likely that the true carrying capacity is higher than that shown in Table 3.9 since Soil Conservation Service ecological site writeup evaluations for similar range ecosystems suggest higher productivity than the field based estimates used here. Ecological site evaluations are an estimate of potential, not an inventory.

Utilization determinations using the key forage plant method were accomplished during May and June, 1985 (see Appendix C). Even on these early dates grazing use was noticeable around watering points with use less noticeable on other upland sites removed from water. Most of the grasses were heavily grazed around water and in canyon bottoms. Utilization checks in canyon bottoms showed high use. Upland sites on slopes above the canyon bottoms were generally little used, at least when these utilization checks were made. Cattle grazing was noted everywhere on the Groom Mountain Range including the top of Bald Mountain.

TABLE 3.9 AN APPROXIMATION OF CARRYING CAPACITIES ON THE GROOM RANGE.

Plant Community	% Total	Acres	Estimated Acres/AUM	AUMs
Saltbush	2.6	2,330	5	466
Mixed Mojave	11.8	10,573	15	705
Blackbrush	26.1	23,386	20	1,169
Sagebrush	33.0	29,568	25	1,183
Pinyon-Juniper	21.9	19,622	25	785
Pinyon	3.0	2,688	25	108
Mahogany/Pinyon-Juniper	1.4	1,254	15	84
White Fir	0.1	90	-	0
Total AUMs:				4,500

Utilization of browse by deer was not very evident although deer are found distributed throughout the area. Most browse plants, such as desert bitterbrush and cliffrose, were noticeably and heavily browsed in areas where cattle use was evident. Cattle sign suggest that these heavy use rates on browse species was by domestic livestock. Deer, however, graze over the entire withdrawal area utilizing these rangeland plant communities for forage and cover.

3.8.2 Mineral Resources

History and Production--

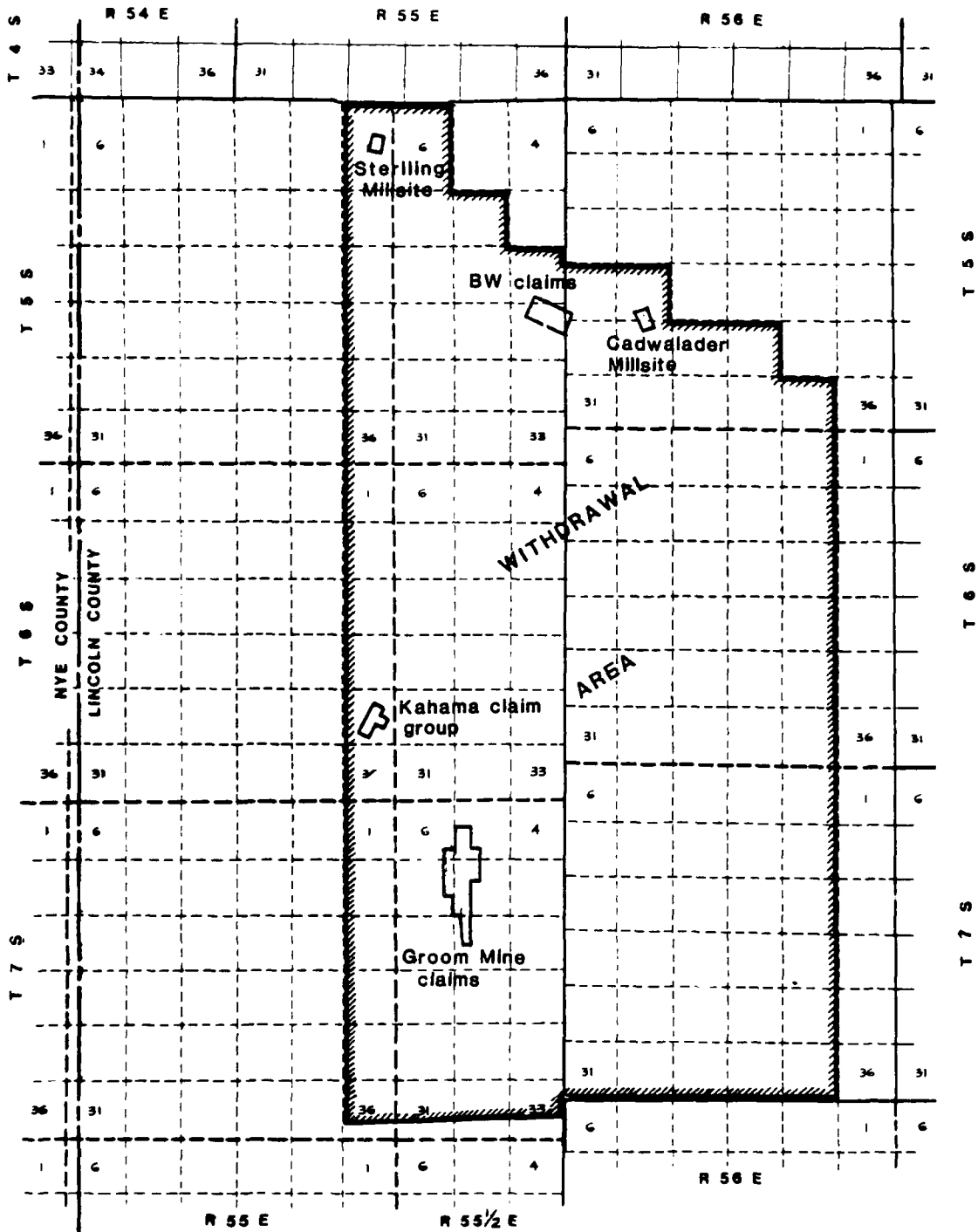
The first mineral discoveries recorded in the Groom Mountain Range were made in 1864 (Paher, 1970), and the Groom mining district was organized in 1869. Early accounts of the district place the mines on the western slopes of what is now known as Bald Mountain with the earliest activity having been in the northwestern portion of the range rather than at the site of the present Groom mine. An 1870 account states that silver chloride ores were being produced from mines on the west slope of Tempiaute Peak (Bald Mountain). The mines were worked for a 5-year period, ending in 1874, during which they yielded a small but unrecorded production. The Groom mine itself must have been discovered during this same period of time since patents were issued in 1872 on claims covering the deposit. In 1885 the Groom property was acquired by the Sheahan family, who still retain ownership. The Groom mine produced steadily from 1915 through 1918, sporadically from 1918 to 1942, and again steadily from 1942 to 1956. Total production for this time is \$935,900 in lead, silver, minor copper, zinc, and gold (Tschanz and Pampeyan, 1970).

In 1919, mercury was discovered at the Andies property on the north-eastern tip of the Groom Mountain Range and a new mining district, Don Dale, was organized in this area in 1945. This district produced small amounts of lead, silver, and mercury.

Mines, Prospects, Mineralized Areas--

Within the Groom Mountain Range Withdrawal area, which includes all of the Groom district and a part of the Don Dale district, mining and prospecting activity has been concentrated at four general locations along the west flank of the range and at one location on the northeastern edge of the area. Mining claims associated with this activity are shown in Figure 3.7 and are listed in Table 3.10.

The largest and most productive properties in the Groom district are associated with the Groom Mine and the adjacent Black Metal Mine. Mineralization can be traced by mine workings and outcrops on the surface for several miles along the eastern margin of the graben. Areas of quartz veining and brecciation crop-out through a cover of alluvium north of the main Groom Mine. These veins have been prospected by minor workings, apparently without success.



Patented and Unpatented
Figure 3.7 Mining Claims Location Map
 GROOM MOUNTAIN RANGE WITHDRAWAL AREA



TABLE 3.10 MINING CLAIMS, GROOM MOUNTAIN RANGE
WITHDRAWAL AREA

Groom Mining District

T6S, R55E:

Unpatented Claims
Kahama Gold
New Kahama
New Kahama Extra

T7S, R551/2E:

<u>Patented Claims</u>	<u>Patent No.</u>	<u>Minerals Survey No.</u>
White Lake and Conception Lode	1660	M.S. 37
White Lake No. 2 and Conception No. 2 Lode	1661	M.S. 38
South End and South End Fraction	1034979	M.S. 4658
Bride Lode	1034979	M.S. 4658
Southern Groom Lode	1055957	M.S. 4659

Unpatented Claims
Boondock Lode Claim

Unpatented Claims
Groom Mine Lode Group: (Maria, Willow,
East No. 1, East Side No. 2, June,
Junior, Senior, Ford, Martha, July,
Cliff, Mill, Pond, Mary, Avis)

Don Dale Mining District

T5S, R55E:

<u>Patented Claims</u>	<u>Patent No.</u>	<u>Mineral Survey No.</u>
Sterlling Millsite	9368	M.S. 57B

T5S, R551/2E:

Unpatented Claims
B.W. Claims

T5S, R56E:

<u>Patented Claims</u>	<u>Patent No.</u>	<u>Mineral Survey No.</u>
Cadwalader Millsite	3379	M.S. 41B

Most of the mine workings at the Groom Mine were sunk on visible mineralization in outcrop along the east side of the north-south structures associated with the graben. Very little drifting or drilling has been done to develop new ore according to the owner (pers. comm. Sheahan, 1985). An adit is currently being driven to an ore body beneath the open-pit adjacent to the main Groom Mine. In addition, maintenance work is continuing on the main adit to the Groom Mine to limit flooding and caving.

The Boondock Lode claim is located immediately to the west of the Groom properties. The worked vein is in a prominent quartzite outcrop that occupies the bottom of the major canyon, and is several feet south of the discovery monument on the Boondock Lode Claim.

A little more than three miles northwest of the Groom Mine is the location of the Hanus prospect or Kahama Claim Group. This property has a history of minor gold production in the 1920's and 1930's but no supporting records of this production have been found. The present Kahama Claim Group covers the two inclines, prospects, and open trenches in the southern drainage. The southern incline was reported to be 60 feet deep (Humphrey, 1945). Humphrey also reported a gold assay of 1.08 oz/ton from a small ore dump. Three adits and prospects in the drainage to the north appear along a parallel vein system that is several hundred feet to the west of the main Kahama vein. The gold content of the vein is similar to that of the main Kahama vein but the base metal content is much higher, the vein is thicker and is more brecciated.

A third area of mineralization located in the quartzite outcrop along the west side of the range is centered along a NE trending ridge with parallel quartz veins about one mile southwest of Cattle Spring. It is possible that this mineralization is a northern extension of the Kahama vein system. About 200 feet below and east of the ridge is an incline that is flooded to within 25 feet of the surface. The size of the dump suggests a possible 200-300 feet of underground workings. Five prospects and a shallow adit expose quartz veins with visible silver mineralization along the crest of the northeast ridge and into the canyon to the southwest.

Stream drainages in the vicinity of the Hanus property and the main drainage west of Cattle Spring, as well as the major stream courses west of Naquinta (or La Quinta) Spring were all worked for gold using dry washers. The best areas were apparently the narrow passages within the quartzite. No record of the production was found.

The Gold Butte claims (abandoned) staked in 1933 cover a fourth area of mineralization located about 1 1/2 miles west of Cattle Spring. These workings, which do not appear on existing maps, consist of several prospects on quartz veins up to several feet thick.

The site of the old Jumbo quartz and Placer claims (abandoned) staked in 1933 is about 1 1/2 miles northwest of Cattle Spring and about 1/2 mile west of Black Butte (the basalt plug west of the road by Cattle Spring). These workings consist of a 40-50 foot deep shaft sunk near a shale quartzite contact on the west side of the highest ridge. There is

no road to the prospect nor are the workings on any map. The workings are still open, having been sunk, in part, on a very hard, brecciated quartz vein. The matrix of the breccia is sulfide rich and contains minor gold-silver values.

Along the northwest margin of the withdrawal area, but still in the outcrop area of Prospect Mountain Quartzite, are a scattering of unidentified and unmapped shafts, adits and prospects that are probably related to the mineralization in the Don Dale district to the north. Most of these workings are old and are without accessible roads. They are not shown on any of the existing maps of the area.

Geochemistry--

As part of the mineral investigation of the Groom Mountain Range withdrawal area, geochemical surveys were conducted of both stream sediments collected from active drainage systems originating within the area and of rock samples collected from mines and prospects within and along the margins of the land withdrawal.

The sampling detected very high levels of mercury throughout the Groom Mountain Range in both panned concentrate and rock samples. Mercury has been produced from one cinnabar occurrence in volcanic rocks on the northeast side of the Groom Mountain Range (Andies mine, outside of the withdrawal) but has not been reported present within the Groom Mining District.

In addition to mercury, barium was also found to be present in anomalous amounts in panned concentrate samples collected from drainages along the southwest, northwest, northeast and east sides of the area. Distribution of high barium values in general follows that of mercury and the two elements may be associated with the volcanic activity of the Bald Mountain caldera.

High concentrations of lead, copper, barium, and mercury along with lesser amounts of zinc, silver, and antimony were detected in panned concentrate samples collected from drainages south of the Groom mine workings. This area is along the southern extension of the graben structures mineralized at the Groom mine.

On the east side of the district, sediment sampling detected anomalous metal concentrations in the drainage of Rock Spring. No mines or prospects exist in this area and the source of the metal anomaly is not known.

3.8.3 Recreation Resources

Past recreational activities in the withdrawal area have consisted of hunting, hiking, caving, sightseeing, camping and limited off-road vehicle use. Of these, hunting has been the greatest use due to the abundant wildlife habitat within the withdrawn area.

The Groom Mountain Range was a favorite hunting area for some Nevadans especially Lincoln County residents (pers. comm. Beckstrand and Meiss, 1985). This range has had a reputation for producing trophy buck mule deer. Estimates of the number of deer hunters using this area vary from ten to thirty per year with the estimated number of deer hunter days varying from 20 to 100 per year. Deer hunters are accompanied by family and friends which account for an unknown number of recreation use days. The range has been hunted for chukar, quail, rabbits and doves. Within Lincoln County, a county with limited chukar hunting, the Nevada Department of Wildlife (pers. comm. Beckstrand, 1985) considers the Groom Mountain Range to have the best chukar populations, and there were increasing numbers of hunters using the range. However, no estimates have been made for the numbers of small game hunters who used the area.

Although antelope are seen in the withdrawal area, their numbers are small and there has been no permitted antelope hunting in the area.

The other recreational activities have not been extensive as shown by the condition of the area and lack of evidence of these uses. The Sierra Club (pers. comm. VanEe, 1985) and Southern Nevada Off-Road Enthusiasts (pers. comm. Gaskill and Setnick, 1985) both indicated that in the past there has been little use of the area and that the attractiveness of the Groom Mountain Range is its remoteness and minimal use.

One specific recreation resource in the area is a limestone cave known as Snowslide Cave and there have been rumors of two other caves in the Groom Range. This cave has been mapped and photographed (pers. comm. McLain, 1985).

3.9 ACCESS FOR SCIENTIFIC AND RESEARCH PURPOSES

Background research performed for this EIS did not reveal any site specific scientific studies of the area. The material developed during the preparation of this EIS represents the existing site specific scientific data base for the area.

3.10 ECONOMICS

3.10.1 County Profile

Lincoln County, located in southeastern Nevada, is the third largest (10,635 square miles) in Nevada, and like Nye County to the west and White Pine County to the north, it is sparsely populated with less than one-half person per square mile. The population is primarily located in and near the tri-community region of Pioche, Panaca, and Caliente. Population in the county rose from 2,431 in 1960 to 4,460 in 1983 for an increase of approximately 83 percent (Figure 3.8). The most recent data, student numbers in Lincoln County schools, indicate a slight decrease in enrollment during the last two years, which may indicate a slight population decrease in the county (Lincoln County School District, 1985).

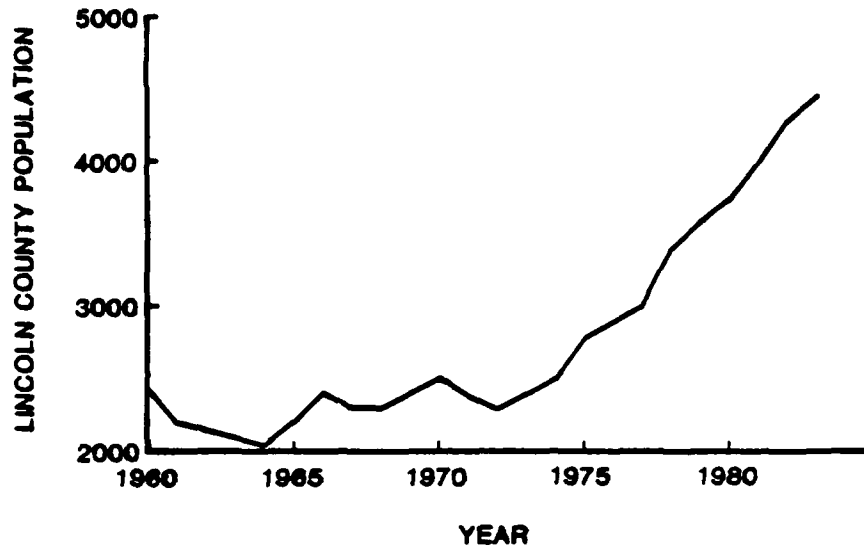


Figure 3.8 Lincoln County Population

As can be seen from Figure 3.8, Lincoln County realized rapid population growth from 1975 to 1983, primarily due to in-migration of new residents. Between 1975 to 1980, over 1,600 people moved to Lincoln County while less than 900 moved out. Therefore, for this five year span, Lincoln County population increased by 700 residents through in-migration. Fifty-one percent of persons moving to Lincoln County were from other Nevada counties. As can be seen from Figure 3.8, Lincoln County's population has continued to rise even after restricted access to Groom Mountain Range began in 1978. During this time period, population increased from 3,732 in 1980 to 4,460 in 1983, an increase of approximately 20 percent (U.S. Bureau of Census; Bureau of Economic Research, University of Nevada, Reno).

A comparative review of the 1980 Census indicates that the overall demographic composition of Lincoln County was similar to the state and the nation except that in 1980, only 5.8 percent of the county's population was minority. This was less than half the state average of 12.5 percent and the national average of 16.9 percent.

Lincoln County population distribution is evenly split between men and women, with each having a median age of 27.8 (Table 3.11). Age groups with the largest percentage of the population are the 5 to 17 old and the 25 to 44 year old groups. The smallest age group is the 18 to 24 year old age group, which implies that young adults are leaving Lincoln County to gain employment in other regions of the state or nation.

According to the 1980 Census, approximately one in three residents (30.4%) had completed at least one year of college. Median years of school completed by Lincoln county residents was equal to the national figure of 12.5 years (Table 3.12). Lincoln County provides primary and

TABLE 3.11 POPULATION DISTRIBUTION BY AGE AND SEX,
LINCOLN COUNTY, 1980.

Age	Male	Female	Total Persons	
(years)	(number)	(number)	(number)	(percent)
Under 5	221	176	397	10.6
5-17	439	510	949	25.4
18-24	188	176	364	9.8
25-44	453	443	896	24.0
45-64	333	315	648	17.4
65 and older	218	260	478	12.8
Total	1,852	1,880	3,732	100.0
Median Age	27.8	27.8	27.8	

Source: U.S. Bureau of Census, Census of Population-Nevada, 1980.

secondary education for students. The county presently spends approximately \$4,500 per student per year. There are no private schools in Lincoln County.

Lincoln County has seen a dramatic shift in the composition of its industrial base. In 1967, approximately five percent of the county's total employment was in the service industry, but by 1982 this figure had increased to 41.5 percent (Figure 3.9). Primary reason for this change was an increase in civilian employment in the Department of Defense activities. Other major employers in the county were state and local governments. The mining industry and wholesale and retail trade have

TABLE 3.12 YEARS OF SCHOOL COMPLETED, LINCOLN COUNTY, 1980.

Category	Male	Female	Total
Persons 25 Years and Older	999	1,023	2,022
Elementary: 0-8 Years	137	115	252
High School: 1-3 Years	186	196	382
4 Years	333	441	774
College: 1-3 Years	152	193	354
4 Years	113	51	164
5 Years or More	78	27	105
Percent High School Graduates (%)	67.7	69.6	68.6

Source: U.S. Bureau of Census, Census of Population-Nevada, 1980.

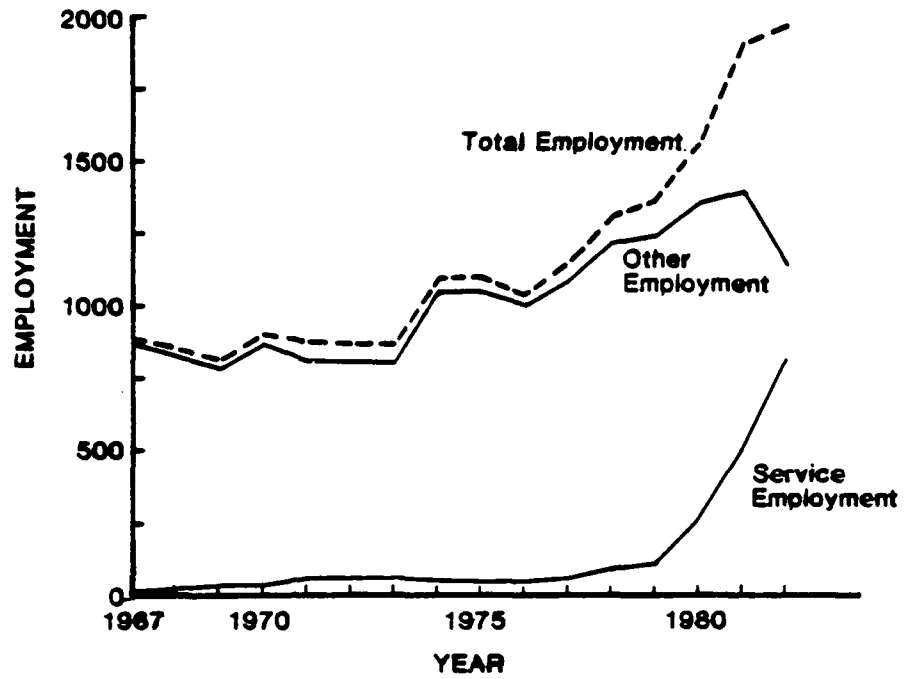


Figure 3.9 Lincoln County Employment

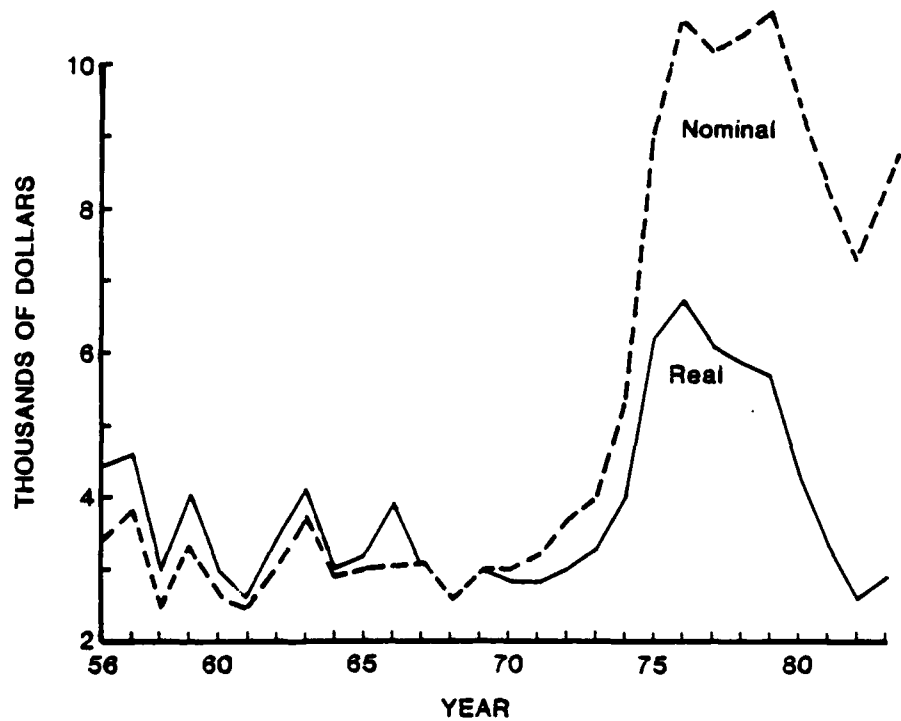


Figure 3.10 Lincoln County Real and Nominal Taxable Sales

witnessed decreases in employment. Gross taxable sales, which are primarily sales by retail establishments, have shown a decline in real dollar sales since 1976 with a slight increase in 1983 (Figure 3.10).

A large number of persons living in Lincoln County are employed at Nevada Test Site in Nye County. The 2,820 in Lincoln County's labor force far exceed the 1,680 wage and salary jobs based in the county in 1982. This can also be seen in the derived employment export base multiplier for Lincoln County.

Export based analysis, described in Appendix C, was used to derive the employment export base multipliers are shown in Table 3.13. Export base analysis dichotomizes economic activity into basic (export) and non-basic (support) industries. Export base industries are the driving force in the economy being responsible for injection of new funds into the local economy from export sales.

TABLE 3.13 EMPLOYMENT EXPORT BASE MULTIPLIERS FOR LINCOLN COUNTY.

Sector	Multiplier
Agriculture	1.05
Mining	1.41
Government	1.25
Defense Research Services	1.29

From Table 3.13, a one unit increase in employment in the Mining Sector creates 1.41 jobs in Lincoln County.

Using the same procedure, the income export base was estimated. This yields income multipliers shown in Table 3.14 as:

TABLE 3.14 INCOME EXPORT BASE MULTIPLIERS FOR LINCOLN COUNTY.

Sector	Multipliers
Agriculture	1.77
Mining	0.98
Government	3.10
Defense Research Services	0.59

From Table 3.14 a one dollar increase in incomes to the Agricultural Sector increases incomes in Lincoln County by \$1.77. In both cases the Defense Research Service Sector's multiplier was less than anticipated but this may be due to people working on the Nevada Test Site and living in Nye County during the week.

The largest tax revenue sources for Nevada counties are the sales and use tax and the ad valorem (property) tax. These tax revenues are divided among county government, municipalities, and school districts. In 1982/83 the county government received \$197,843 in ad valorem taxes and \$171,458 in federal "in lieu of" payments. Lincoln County, like many Nevada counties, has substantial amounts of land under the ownership of the federal government. The Federal government does not pay ad valorem (property) taxes but instead makes "in lieu of tax" payments to Nevada counties. Federal "in lieu of" payments are based on a county's population and the acreage of land under Federal ownership. For Lincoln County, population restricts the amount of "in lieu of" payments the county receives.

3.11 SOCIOLOGICAL FACTORS

The population (1983) of Lincoln County is made up of 4,460 individuals composed mainly of families as can be seen from the fact that more than 36 percent of the population is under 18 years of age and 13 percent is over 65 years old. Both of these percentages are greater than the Nevada statewide average for these categories. The divorce rate of 4.3/1000 is only 23 percent that of Clark County which is immediately to the south.

The area of Lincoln County is 10,649 square miles which gives the population density of less than one person for every two square miles. If the continental United States were populated at this same density, the nation would have a population of about 1.5 million people or approximately the population of Milwaukee, Wisconsin. This relative isolation of the people affects the lifestyles in Lincoln County.

Outdoor recreation plays an important part in the lives of the people of Lincoln County. In a report from the Lincoln County and Caliente Planning Commissions (Lincoln County, 1984) it was noted that the average citizen of Lincoln County spends five days hunting during the fall season, a figure five times higher than the average for the state of Nevada as a whole. Lincoln residents also spend twice as much time horseback riding and fishing as the average citizen of Nevada and on the average spend 50 percent more time engaged in all outdoor activities than the statewide participation rate.

While outdoor recreational uses of the land are very important to the people of Lincoln County, the county and citizens support the continued multiple uses of public lands in Lincoln County. They support policies that are intended to further agriculture and mining as economic and employment bases in the county and recognize that the development of Nevada's mineral resources is desirable not only for the county, but also for the state and the nation. The policies of the county of Lincoln stress the need to increase opportunities for local economic development in, not only agriculture and mining, but also other areas such as recreation and tourism, serving to diversify the economy of the area (Lincoln County, 1984).

The Federal government owns 98.4 percent of the land in Lincoln County with most under the control of the Bureau of Land Management and the United States Fish and Wildlife Service. With other exempt land in the county there is only 1.5 percent of the total acreage in the county on the tax roll. Because so much of the land of Lincoln County is under the control of the Federal government many people perceive that they have little influence over what happens to this land. They resent outsiders interfering with their destinies. This perception of little or no control over their own economy and land within Lincoln County was a major cause of what has come to be known as the Sagebrush Rebellion through which people in Lincoln County and other parts of Nevada have attempted to take legal control over public lands.

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 ASSUMPTIONS AND GUIDELINES

The proposed action would continue the Air Force authority to exclude unauthorized entry to the withdrawal area. Purpose of this exclusion, which might involve construction of a fence, is to provide a physically secure buffer zone for safety and national defense programs within the Nellis AF Range. These programs would not include any air-to-ground or targeting activities on the withdrawn area.

Given the stated purposes of the withdrawal it is assumed, for purposes of evaluating the effects of the proposed action, that:

1. for the duration of the withdrawal, all unauthorized access to the area would be prohibited. The Air Force has guaranteed access to the current owners of valid mining claims and the current permittee on the BLM Bald Mountain grazing allotment;
2. the Environmental Protection Agency would continue to have access to the withdrawal area to perform radiological monitoring related to NTS activities;
3. the BLM will be accorded adequate access to properly manage, with concurrence of the Air Force, the resources and livestock grazing on the withdrawal;
4. for a worst case analysis, a perimeter fence would be constructed to define the boundary of the withdrawal, and this fence would not exceed 42 inches in height and would be constructed in such a manner that blading would not be necessary; and
5. no additional construction related activities will be undertaken on the withdrawal other than normal maintenance and/or minor improvement of existing roads and facilities. However, if any future actions should occur they will be analyzed under NEPA.

Based on these assumptions the only on-site direct effects would be related to construction of a fence or those derived from currently authorized activities. All other effects will occur off-site and stem from loss of access to the withdrawal area resources.

To evaluate the consequences of the proposed action, an inventory and assessment were made of the Groom Mountain Range resources, the existing environment, and past, current and proposed uses of the area.

Based on the inventories and assessments, the probable range or most likely extent, of impact on each element was estimated. Significance of each impact, however, is entirely related to the frame of reference from which these judgments are made. For example, loss or gain of ten families or jobs in populous Clark County is insignificant in terms of the County and its tax base, but in Lincoln County that same change would

be both significant and measurable. Likewise, for all individuals directly effected, whether they are ranchers, miners or hunters, the impacts are significant though that direct impact may extend to a very limited number of individuals.

Thus, the assessment of consequences of the proposed action have been tempered by the scale against which they are measured. In most instances off-site consequences have been measured using Lincoln County as the yardstick. For on-site effects, or changes, consequences have been estimated on the basis of prior similar experiences and professional judgement.

4.2 IMPACT ANALYSIS

4.2.1 Climate and Air Quality

Renewed withdrawal would have no impact on the regional or micro-climates of the area since no land use changes would occur which might be capable of producing such impacts.

It is not anticipated that renewed withdrawal would have any significant impact on air quality. Minimal impact would result from fugitive dust generated by vehicular travel over existing unpaved roads. This generation of dust would not be concentrated in any one location and would be of an infrequent nature. Fugitive dust could also be generated if a perimeter fence is constructed. Dust generation would be limited to the actual construction time and would be a function of the amount of land disturbed and soil type encountered. Renewed withdrawal would not increase aircraft activity over the withdrawn area or in other portions of the existing Military Operations Area related to the Nellis AF Range. Therefore, it would have no additional impact due to aircraft emissions on air quality of nearby airsheds or secondary impacts on Las Vegas Air Quality Maintenance Area.

4.2.2 Physiography

Topography and Geologic Setting--

Renewed withdrawal would not impact topography in any significant way. The only construction contemplated, a perimeter fence, would not result in any significant topographic alteration.

4.2.3 Soils

The proposed action is not expected to significantly affect soil conditions within the withdrawal area. If a boundary fence were to be constructed along the currently unfenced portion of the perimeter, it should be constructed in such a manner that little or no vegetation removal would be necessary, therefore, minimizing erosion. The fence

would influence livestock use patterns with certain areas now little grazed, subject to more intense grazing. This and trailing along the fence by livestock could possibly accelerate erosion of soils in limited areas. However, the fence could also provide opportunity for improved livestock management within the withdrawal.

4.2.4 Water Resources

Renewed withdrawal would have no adverse impacts on water resources of the area. If a fence is constructed, it would not change natural drainage patterns or have any effect on either groundwater or surface water quantity or quality. Since no other construction is anticipated, the proposed action would not alter the natural hydrologic regime and would have no effect on existing floodplains of the ephemeral streams within the withdrawal area. Therefore, the proposed action is consistent with Executive Order 11988 titled "Floodplain Management".

Renewed withdrawal would have no measurable impact on physical availability of water in the area and would not effect existing water quality. There are no anticipated water rights transfers within the area due to the proposed action. Existing use of most of the recorded rights (Table 3.4) is expected to continue under the access agreement between the Air Force and the owner of record. The right to Pine Spring, proof number 01376, apparently remains with the estate of W.T. Stewart, since no subsequent transfer was found in records of the Nevada State Engineer's Office nor the Lincoln County Courthouse. Accommodation would have to be made to keep this right accessible to the owner.

The proposed action would prevent any private development of groundwater resources within the withdrawn area. This action will not interfere with appropriation, under Chapters 533 and 534 of the Nevada Revised Statutes, of surface or groundwater outside the withdrawal area.

The proposed action is in compliance with the "Water Quality Management Planning for the Non-Designated Planning Area of Nevada" since no activities are planned which would adversely effect the quality of the limited water resource available in the area. This document states "unless special concerns are expressed, related to very small volumes of surface or with groundwater, these areas can essentially be excluded from "208" planning at this time". The withdrawal area has not been designated as an area of special concern. Existing beneficial uses of the water resources, primarily wildlife and stock watering with minor domestic use, would continue with no foreseen change.

4.2.5 Vegetation

Renewed withdrawal of the Groom Mountain Range would have no deleterious impact on natural vegetation as a result of the withdrawal itself. However, potential localized overgrazing by livestock and wildlife could cause impacts on vegetation structure and diversity.

Each of the plant species listed as threatened or on the watch list (Table 3.7) occurred in relatively inaccessible areas in at least part of its range. However, overgrazing and fire could impact these species.

4.2.6 Animals

Renewed withdrawal would not change most of the conditions affecting animals found in the area.

If the livestock permittee increases numbers of livestock above the permitted number, resulting overgrazing would change the composition of plant species communities, resulting in changes in the composition of animal species within those communities. Near springs, cattle are currently overgrazing deer forage species to the detriment of deer.

An exception is the potential impact of non-hunting on the deer herd. Giles and Cooper (1985) have shown that the protected deer herd on NTS has a very different sex and age structure than normally hunted herds. The sex ratio on the NTS is about 160 adult males to 100 adult females, which is about five times more males than in hunted herds. Also, the NTS herd has a much higher percentage of animals over five years old than is found in hunted herds.

The Groom Mountain Range has historically received only light hunting pressure and the phenomenon seen at the NTS may already be developing. Compilation of all recent deer sightings by the impact assessment study teams and others shows a sex ratio of about 50 percent males and 50 percent females.

Because maintenance of springs by the livestock permittee is essential for his operation, water availability should not change at those springs. In accordance with PL 98-485, DOI will manage the withdrawn lands pursuant to FLPMA of 1976 and may utilize springs purchased by the Air Force prior to the enactment of PL 98-485 in such management.

Renewed withdrawal would preclude reintroduction of desert bighorn sheep to the Groom Mountain Range as either a gene pool or hunted herd. In 1974 the Nevada Department of Wildlife ranked Groom Mountain Range eleventh overall and sixth in Lincoln County as a possible bighorn reintroduction site. In 1981 the ranking was raised by NDOW to first in Lincoln County to try to implement the reintroduction before the existing withdrawal was formalized. In 1983 Groom Mountain Range was given a target date of Summer 1984 for reintroduction of 25 desert bighorn sheep but reintroduction did not take place. The next proposal was to reintroduce bighorn sheep as a gene pool herd rather than as a potentially hunted herd. Since any reintroduction would necessitate follow-up personnel and since the Groom Mountain Range withdrawal is to secure a buffer zone for the military operations, any activity requiring follow-up would be unacceptable to the Air Force.

4.2.7 Cultural Resources

Renewed withdrawal would be beneficial for cultural resources due to the protection afforded from vandalism and accidental damage by the public. Some concerns about the future of cultural resources on the property are summarized below.

1. General guidelines for administering the cultural resources and insuring against future damage should be developed in conjunction with the Nevada State Historic Preservation Office.
2. Overgrazing of the project area should be prevented to avoid livestock damage to archaeological sites.
3. If the Air Force should acquire the Groom Mine at any future date, it would be responsible for deciding whether to nominate this property to the National Register of Historic Places.

4.2.8 Land Use

Agriculture and Livestock Grazing--

In principle, grazing influences should not change because the Air Force has guaranteed continued access to the BLM permittee. However, reduction of hunting on the withdrawal area over the past few years is already beginning to influence the deer population structure and would have an impact on the browse ranges in the future. Removal of livestock grazing at some future date would have a profound influence on the browse plants. Many plant species would be reduced in numbers, primarily due to competition from grasses and forbs in the understory but also due to reduced vigor of the browse species brought on by a cessation of the annual stimulus of browsing.

Construction of a fence along the east and north boundaries of the withdrawal area would influence livestock use patterns. Certain areas now little grazed would be heavily grazed. Livestock movement along fences would cause new trails along the fences, possibly accelerating erosion.

Renewed withdrawal would continue to adversely affect the grazing permittee's time and cost to effectively manage his livestock on the withdrawal area. This occurs because of the need to coordinate livestock management activities with military activities which occasionally results in the permittee having to delay or re-schedule his plans. The undetermined additional cost and inconvenience to the permittee that result from this coordination are not believed to be significant.

Mining--

Renewed withdrawal would prevent new mineral exploration and eliminate the opportunity to expand property holdings to: 1) gain mill sites;

2) gain tailings disposal room; or 3) develop water sources. This set of conditions would, in effect, eliminate the possibility of any large-scale mining operations on the three smallest claim holdings within the Groom Mountain Range (BW claims, Kahama claims, Boondock claim). None of these claim blocks cover large enough area to support the surface plant that would be needed for anything but the smallest of underground mining operation. The BW claims, located on the east side of the range, could feed ore and/or tailings to sites in Tikaboo Valley outside of the withdrawal area. The other two small properties, located on the west side of the range, have no such opportunity unless ores were hauled long distances to sites beyond the limits of the restricted area.

The Groom mine claim block covers sufficient surface area to contain both mine surface plant and mill, but the Groom property owners could face restrictions on tailings disposal and water supply. The described ore zones at the Groom mine lie well within the existing claim block but potential new reserves which may be necessary to support future operations, could be found anywhere on the claims, near boundaries or extending beyond onto withdrawn lands.

None of the mineral properties within the withdrawal area can be considered to be thoroughly or even adequately explored. The properties are owned by families or individuals who may not have the financial reserves required to explore for minerals and develop mines. Future mineral activity in the Groom district is, therefore, dependent on the lease or sale of properties to major mining companies that have capital and technical resources needed for mineral exploration and development. It is highly unlikely that a major mining company would consider acquiring any of the properties within the Groom Mountain Range in view of renewed land withdrawal.

The potential effect on mining operations in the area can be considered as two separate effects: loss of income and loss of access to mineral reserves. The Air Force has proposed to: a) allow holders of valid claims controlled access to work their claims at approximately the existing level of activity; or b) subordinate valid claims; or c) outright purchase of valid claims. If existing levels of activity are continued with controlled access, there will be a potential loss of income through inability to expand or further develop the claims. If the claims are subordinated by the Air Force, the owners would continue to own the claims and receive monetary payment in exchange for the legal right to defer extraction of the minerals. Outright purchase would terminate ownership of the claims. If purchased at fair market value there would be no economic loss to the owners. Owners of claims that have not been recently active have had no income from their claims and, therefore, there is no loss in present value although there is a complete loss in the speculative value of these claims. Just compensation would depend on an evaluation of the existing and potential reserves of each property. At the present time, there are insufficient data available to do more than estimate the potential of any of the properties in the Groom Mountain Range.

Recreation--

Renewed withdrawal of the Groom Mountain Range would eliminate hunting entirely for the duration of the withdrawal. This action means loss of a reported trophy deer area and loss of hunting access to the best chukar population in Lincoln County. This immediate impact would affect ten to thirty deer hunters and their family and friends who accompany them, and the unknown number of small game hunters who use the area.

Recreation use of an area such as the Groom Mountain Range is difficult to quantify since many of the people who used the area did so for solitary recreation and thus have not broadcast their use of the area. The one type of recreation that can be quantified is legal deer hunting. The State of Nevada is divided into Management Areas for the purpose of controlling hunting, with deer tags issued for each of these areas and statistics regarding the success of hunters kept. The Groom Mountain Range is part of Area 24 and Unit 241.

It is estimated that the Groom Mountain Range has the potential to support 50 deer tags annually, 800-1000 hunter days annually for chukar, quail, doves, and rabbits, and 5 trap lines during a season (Pers. Comm. Crunden, 1985). Actual use in the area is estimated to have been 10-30 deer hunters who spent 20-100 hunter-days annually, and relatively few upland game hunters.

Renewed withdrawal would eliminate the area from use for hiking, sightseeing, recreational vehicles, caving and camping. Although evidence of past use shows this use to not have been extensive, future population growth in southern Nevada may bring pressures for increased use of relatively remote areas such as Groom Mountain Range.

In a study of the dispersed recreational activities occurring in Lincoln County conducted for the Statewide Comprehensive Outdoor Recreational Plan, regional participation rates were found for a variety of outdoor recreational activities (Lincoln County, 1984). Using the ratios derived from this study and the top estimate of 100 deer hunter days, estimates of other activities in the area were derived. This methodology presents a current estimate of 10 days annually of off-highway vehicle use, and 28 days each of primitive camping and hiking or back-packing.

4.2.9 Access for Scientific and Research Purposes

Renewed withdrawal of the Groom Mountain Range would adversely affect access for scientific or research purposes. The withdrawal area has a potential to provide unique data which may be important in addressing several significant scientific and research problems. These topics include:

1. Synecological and demographic studies of the pinyon-juniper, mountain mahogany and limber pine woodlands in the Great Basin.

Vegetation communities inhabiting the Groom Mountain Range include several excellent examples of pure, even-age stands of single needle pinyon. Stands of this nature are relatively rare and poorly sampled and offer scientists an opportunity to examine the synecological characteristics of pinyon. Similarly, mountain mahogany woodlands on the Groom Mountain Range also provide an opportunity to study characteristics of the distribution, growth, production and reproduction of that important big game forage species. Finally, a relic stand of limber pine now grows on the eastern slopes of Bald Mountain and could provide data regarding the history dynamics and ecological characteristics of this now much restricted woodland species.

2. Paleoenvironmental and biogeographical studies.

Today, the Groom Mountain Range lies in the transitional zone between the Great Basin and Mojave deserts. Fossil biological remains preserved in the abundant packrat middens on the Groom Mountain Range have the potential to codify past fluxuations in the distribution and abundance of plants and animals peculiar to both these desert environments. In addition, dendroclimatological studies of pinyon and limber pine could provide unique evidence of past fluctuations in climate of the Great Basin and Mojave deserts.

3. Studies of rangeland vegetation succession.

In order for rangeland managers to adequately maintain forage resources in a good productive situation, they must have knowledge of successional characteristics of the vegetation they manage. The Groom Mountain Range contains several excellent, high-seral, near-climax communities of pinyon woodland, blackbrush/desert needlegrass, dalea/Indian ricegrass, Nevada jointfir/Indian ricegrass and four-wing saltbush/Indian ricegrass that could usefully serve as barometers or comparative baselines of the success of vegetation management on adjacent and other rangelands throughout southern Nevada and adjacent states.

4. Analyses of age-class structure changes in mule deer and other game species.

Because hunting will be precluded on the Groom Mountain Range, it is likely that there will be a subsequent change in the age-class structure of the mule deer population. Research concerning this change in population structure has the rare potential to provide predictive models concerning hunting pressures and competition with domestic livestock on other mule deer ranges in Nevada. Studies of this magnitude are not possible in other areas since management practices seldom preclude all hunting over such a large area.

5. Study of the past distribution, interaction, and adaptive patterns of prehistoric populations in the southern Great Basin.

Surveys on the Groom Mountain Range have identified archaeological remains belonging to several different aboriginal cultural groups including both hunters and gatherers and horticulturalists. This diversity of remains offers an unusually productive opportunity to

examine questions regarding the past distribution and interaction of prehistoric populations as well as questions pertaining to how different cultural groups adapt to similar environments. Furthermore, because of its remote location, aboriginal adaptations persisted well into the 20th Century providing a continuum hardly found in other areas.

6. The history and development of the mining industry in southern Nevada.

The Groom Mining District, established in the early 1860's, is one of the earliest mining districts in southern Nevada and cultural remains pertaining to the development of this mining district are unusually well preserved in the withdrawal area. Because little has been recorded in the historic literature concerning this mining district, the remains in the withdrawal area offer the only avenue to study this important development in Nevada's history.

4.2.10 Economics

The renewed withdrawal has potential economic impacts on four areas. These are grazing, mining, recreation and taxes as addressed below.

Grazing--

Renewed withdrawal may adversely impact the market value of the Bald Mountain Allotment which is permitted to D/4 Enterprises in Tikaboo Valley. Right of access to the allotment is guaranteed by the Air Force to the current permittee but it is uncertain whether the same access would be guaranteed to a new owner if the cattle operation were to be sold. Public lands ranchers have a significant investment in the grazing allotments although the Taylor Grazing Act does not recognize the investment in these grazing rights. However, the value of the grazing allotment is included in the market value of the base property, money is loaned on this value, and the IRS taxes the estate value of the allotments.

The value of the grazing permit to the rancher is the difference between the grazing fee and the forage value of the land upon which the allotment is permitted. As an example, if it is assumed that the average forage value for the Groom Mountain Range area is about \$4 per Animal Unit Month (AUM). The difference between this \$4 amount and the \$1.35 grazing fee is the value of the AUM to the rancher. If this is capitalized at a 6 percent discount rate, the net present value of an AUM is \$44.17. Since there are 808 AUM's in the withdrawal area this is \$35,700 to the value of the cattle operation assuming a 6 percent discount rate and that the net return on an AUM will remain at \$2.65 for this area. Grazing fees, however, are being recalculated and may be increased to \$3, or even, \$4 dollars. If the fees are increased to \$3, net present value of 808 AUM's in the withdrawal area would be \$13,500 and if the fees go to \$4 there would be only speculative value to the allotment. True value of an AUM is also influenced by the cattle market prices.

Mining--

The total value to the economy of the loss of access to mineral reserves depends upon the price for raw materials and the discount rate applied to delaying consumption of those materials. The withdrawal does not result in a consumptive use of the reserves, therefore, they can be used at some future date when the social benefit of the metals may be very different.

The actual total value to the economy of the loss of access to mineral reserves depends upon the price for raw materials, production inputs, and the interest rate.

Recreation--

Loss of access for recreation on the withdrawal area will have some economic impact on Lincoln County. A 1970 study for the Agricultural and Resource Economics Department of the University of Nevada, Reno, (Pon, 1970) estimated the consumers' surplus values for deer hunting in various regions of the State of Nevada. His estimate of the surplus value per hunter day in the withdrawal area was approximately \$15 (1985 dollars). At an estimated 100 hunter days annually, a loss of \$1,500 in consumer surplus from deer hunting would result. Using a \$15 value for other types of recreational activity, an annual loss of \$1,000 is estimated from the elimination of off-highway vehicle use, camping, hiking and caving, and backpacking. Taken together these losses represent a total annual loss of \$2,500 which has a net present value of \$41,400 at the recent rates of use.

This loss represents the worst case scenario in which none of the potential users would go to another area in Lincoln County as a substitute for the Groom Mountain Range. If some users were to go to another nearby area the loss would lessen by an amount proportionate to the substitution of recreational areas.

This present value of loss is based upon recent recreational use of the withdrawal area. However, there will be increases in use of recreational areas in eastern and southern Nevada because of pressures from population increases. Based on population projections from the University of Nevada, Bureau of Business and Economic Research and assuming the same per capita use of the area by the people of Lincoln and Clark Counties, by the year 1990 there would be expected 38 deer hunters and 86 days of other recreational activity in the withdrawal area. By 1995, the area would support 43 deer hunters and 95 days of other recreational activity. The year 2000 would see 48 hunters and 104 days of other activities. These increases would continue on into the future at a rate depending on the rate of increase in population until the area achieves its saturation point.

Lincoln County retail sales revenue would also be adversely affected by this loss of recreational lands. Pon (1970) estimated that travel cost and on-site expenditures of a deer hunter in the withdrawal area to be approximately \$33.00 (in 1985 dollars). For every one of these

hunters who do not stay in Lincoln County to hunt, the retail sales figures in the area will decline by this amount.

Taxes--

The Groom Mountain Range renewed withdrawal changes management of those lands, not ownership, thus, population still restricts the amount of "in lieu of" payments the county receives. If the withdrawal should in some way increase Lincoln County's population, "in lieu of" payments may increase.

4.2.11 Sociological Factors

The renewed withdrawal is not expected to have any impact on the sociological makeup of Lincoln County or to change the basic perceptions of the citizens. But, it would strengthen those perceptions concerning control of public lands.

4.3 POTENTIAL MITIGATION MEASURES

Analysis of several mitigation measures were mandated by PL 98-485 which established the existing temporary withdrawal. Additional potential mitigation measures were suggested during scoping meetings held in the initial stages of the EIS process and others were developed during conduct of the EIS studies. Discussion of these potential measures is organized according to the environmental elements that might be impacted by renewed withdrawal. All suggested mitigation measures have been considered. The following paragraphs represent potential mitigations and others may be added as a result of public comment.

4.3.1 Agriculture and Livestock Grazing

Potential Mitigation No. 1: Compensate D/4 Enterprises for Possible Impact to Market Value of the Bald Mountain Allotment--

The Air Force could agree to guarantee access to potential purchasers of the Bald Mountain Allotment or develop an agreement with the owners of D/4 Enterprises specifying the terms under which compensation might be made if there is a loss in market value should the cattle operation be put up for sale. Alternatively the Air Force could consider out-right purchase of the allotment with subsequent lease-back to the current owners. It is recommended that no action be taken on this until a problem develops and can be evaluated under circumstances existing at that time.

4.3.2 Mining and Minerals

Potential Mitigation No. 2: Open Other Military Withdrawals to Minerals Exploration and Development--

The possibility of making other lands in Nevada, which have been withdrawn for military purposes, available for mineral exploration in lieu of the lands lost to exploration in the Groom Mountain Range has been investigated. This land trade could not be done on a value-for-value basis since exploration potential is speculative in any area. An area of equal size carved from one or more other DOD holdings within the state would be traded for the lands within the Groom Mountain Range. If done, this could mitigate general losses to the mining industry at large but would not provide compensation to the current property owners within the area. Other DOD lands within Nevada include Nellis AFB, Nellis AF Range, U.S. Army Ammunition Depot at Hawthorne, U.S. Navy Bombing Target Areas in Churchill County, and portions of the Wendover AFB. With the possible exceptions of Nellis AFB, Wendover AFB, and all but one of the Navy Bombing Target Areas, each of the listed DOD properties has a history of mineral exploration or production. Some of these areas, such as portions of the northern Nellis AF Range just east of the Goldfield district, the Tolicha Peak area, Stonewall Mountain area, and parts of the Cactus and Kawich ranges have high exploration potential and many mining groups would like to see these areas open for exploration. There are gold prospects in several areas along the margins of the Army Ammunition Depot in Mineral County and the Navy controls part of the Fairview silver district as part of one of its bombing areas east of Fallon. The southern portion of Nellis AF Range, the part that is occupied jointly by the Air Force and the Desert Game Range, may not fall into the category of DOD lands since the Department of Interior actually manages the land with joint usage by the Air Force. Within this area, however, there are rock types and structures which suggest that disseminated gold deposits similar to the Carlin Mine in Eureka County could occur.

In summary, there are many areas within existing DOD withdrawals in Nevada that could provide sufficient mineral exploration opportunities to compensate the general mining public for loss of Groom Mountain Range mineral potential. In reality, however, few, if any, of these areas could be considered for a potential trade. Many areas within the Nellis AF Range could not be considered due to security considerations. Other areas are active bombing ranges and public safety could not be assured and still maintain the military usage. Analysis of the locations of areas potentially attractive for minerals exploration and development, together with locations of on-going military training and testing programs, indicates that it would not be possible to open any portion of Nellis AF Range without seriously compromising national defense programs, therefore this mitigation is not recommended.

Potential Mitigation No. 3: Compensate Owners of Valid Patented and Unpatented Mining Claims--

The Air Force will, at its option, either subordinate valid existing mineral claims or allow holders of valid claims controlled access to work

the claims at approximately the existing levels of activity. Subordination is a monetary payment to the claim holder in exchange for the legal right to defer extraction of the minerals. The amount of the payment would be based on the fair market value of the claim. At the present time, there are insufficient data available to do more than estimate the potential of any of the properties in the Groom Mountain Range. No mineral rights will be lost, since controlled access sufficient to preserve them will be provided. However, the combined effect of the two options will be to defer for the term of the withdrawal significant development of the claims or large scale mineral extraction. Compensation, as required, would be in the form of a subordination agreement, as described above, or outright purchase of the claims.

4.3.3 Hunting

Potential Mitigation No. 4: Open Additional Portions of Nellis AF Range to Controlled Hunts--

A study of game resources on Nellis AF Range, in relationship to training and testing programs and security requirements, was carried out by the Air Force. Bighorn sheep, antelope, chukar and quail were the species evaluated. The Air Force has concluded that an additional 26 mi² on Stonewall Mountain will be opened for bighorn sheep hunting in conjunction with the existing 10 mi² area during the same time frame. Additional tags might be possible with this expansion. For the other species evaluated, the Air Force has concluded that the numbers are either not sufficient to warrant controlled hunts and/or such hunts would compromise security and training and testing programs. This is a recommended measure.

Potential Mitigation No. 5: Improve Game Bird Habitat in Proximity to Groom Mountain Range--

Chukar and quail habitat could be improved in areas near-by to Groom Mountain Range by constructing "guzzlers" to provide water sources. The Nevada Department of Wildlife (NDOW) and BLM were consulted regarding these improvements and they have identified the opportunity to install 50 game bird guzzlers in the Tule Desert area to compensate, in part, for the loss of chukar and quail hunting on the Groom Mountain Range. NDOW (Pers. Comm. Cooper, 1985) has estimated construction cost to range from \$5,500 to \$6,000 per guzzler depending on site conditions, for a total construction cost of between \$275,000 and \$300,000. Approximately \$50,000 would also be needed for preliminary work on planning, site selection, and related aspects.

Recommendation: Construct guzzlers on a one-to-one basis to compensate for the springs included within the Groom Mountain Range. This would entail 16 guzzlers at an approximate cost of \$88,000.

**Potential Mitigation No. 6: Develop Water for Bighorn Sheep
or Other Big Game Species in other Lincoln County Ranges--**

To compensate for precluded reintroduction of bighorn sheep to the Groom Mountain Range it may be possible to increase herd sizes and suitable habitat by developing guzzler water sources on other mountain ranges in Lincoln County. These sources might also serve to improve conditions for mule deer and antelope.

NDOW and BLM were consulted regarding these enhancements and they identified the following projects:

<u>Area</u>	<u>Guzzlers</u>	<u>Species Benefited</u>
South Delamar Range	2	Bighorn and Deer
Hiko Range	3	Bighorn
So. Meadow Valley Range	2	Bighorn and Deer
No. Pahrnagat Range	3	Bighorn and Deer
E. Pahrnagat Range	2	Bighorn and Deer
Mormon Mountains	10	Bighorn and Deer
Dry Lake Valley	2	Antelope
Sand Springs Valley	<u>3</u>	Antelope
Total Guzzlers	27	

NDOW (Pers. Comm. Cooper, 1985) has estimated cost for constructing these big game guzzlers to range from \$10,000 to \$20,000 each depending on site conditions for a total construction cost of between \$270,000 and \$540,000. There would also be about \$50,000 worth of preliminary work for planning, site selection, and related aspects. This mitigation measure is not recommended for implementation.

**Potential Mitigation No. 7: Mule Deer Habitat
Improvement in Adjacent Lincoln County Ranges--**

To compensate for loss of mule deer hunting it may be possible to increase herd sizes and stability through range manipulation in near-by areas. This program could include "chaining" and controlled burns together with seeding of dense pinyon-juniper or sagebrush stands to allow growth of deer forage species. NDOW and BLM were consulted regarding this program and they have identified the following proposed projects:

<u>Area</u>	<u>Habitat Acreage</u>	<u>Species Benefited</u>
Delamar Range	40,000 acres	Deer and Bighorn
Clover Range	40,000 acres	Deer
Mormon Mountains	6,400 acres	Deer and Bighorn

Estimated cost for range manipulation is \$130 per acre for a total cost of \$11,200,000 (Pers. Comm. Guerrero, 1985). This mitigation is not recommended for implementation due to its high cost.

Potential Mitigation No. 8: Expand NDOW Wildlife Management Areas at Hiko and Sunnyside Through Purchase or Exchange--

In order to mitigate hunting losses associated with the withdrawal expansion of existing wildlife areas was considered. BLM administered public land adjacent to NDOW's wildlife management area at Hiko is all dry grazing land. Thus, according to BLM's Ely office, these lands would not be appropriately suited to augment NDOW's water-based management at Hiko. However, there are BLM administered lands adjacent to NDOW's Sunnyside area which are well-suited for water-based wildlife management. BLM has expressed willingness to work with NDOW on the Sunnyside lands.

Potential Mitigation No. 9: Establish Gene-Pool Herd of Bighorn Sheep on the Groom Mountain Range--

Any reintroduction of desert bighorn sheep would necessitate follow-up personnel. Purpose of the withdrawal is to establish a secure buffer zone and any follow-up personnel and activities would be unacceptable to the Air Force. This mitigation measure is not recommended for implementation.

Potential Mitigation No. 10: Establish Controlled Hunts for Deer and Birds on the Groom Mountain Range--

Purpose of the withdrawal is to establish a secure buffer zone for military activities. Any entry to the area will compromise this purpose and is therefore unacceptable to the Air Force. This mitigation measure is not recommended for implementation.

4.3.4 Non-Hunting Recreation

Pontential Mitigation No. 11: Purchase Adjacent Private Land to Expand Red Rock Recreation Lands in Clark County--

The proposal to buy land adjacent to the Red Rock Recreational Lands in Clark County has been suggested as a possible mitigation for adverse recreational effects of renewed withdrawal. Bureau of Land Management in Las Vegas (Pers. Comm. Maxwell, 1985) has estimated (not appraised) the present value of this land, now held by the Summa Corporation, to average about \$5,000 an acre. BLM has defined four priority areas for this proposed purchase as follows:

<u>Priority</u>	<u>Total Acres</u>
1	625
2	1,600
3	443
4	<u>2,300</u>
Totals	4,968

Primary benefit of this land would be to provide additional protection from urban encroachment to lands which are presently adjacent to and critical to maintaining the integrity of the viewshed of the Red Rock

recreation lands. Also, these lands encompass unique archaeological value that are threatened by encroachment.

Total initial cost to the Federal government for purchase of this land would range from approximately \$4,000,000 to \$25,000,000 depending on the amount of land purchased and the actual appraised values.

In addition to initial purchase price there will be a negative affect on the local tax base. Currently the land is privately held and subject to property tax. According to the Clark County Tax Assessor's Office, the land in that tax zone is subject to a rate of \$1.8823 per \$100 of assessed valuation. In Nevada assessed valuation is defined as 35 percent of the market value. At present tax rates and estimated market prices of land in each priority, loss to the Clark county property tax collections would be between \$26,764 and \$78,793 annually. At a discount rate of 6 percent, this amount would represent a net present value of between \$446,100 and \$1,313,200 to the property tax collections of Clark County. This quantification of the future losses is under the assumption that there will be no development on the land that would increase the tax rate levied in that area. If it is assumed that there will be development in this area, the potential loss of taxes to the county will be much higher. However, since the type of development is only speculative the actual amount of that loss is unestimable at this time. If this land is removed from the private sector and put under the control of the Bureau of Land Management, it will not increase "in lieu of" payments to Clark County since that county already receives the maximum allowed under the current regulations.

This mitigation cannot be justified on the basis of the estimated recreation use lost through withdrawal of the Groom Mountain Range and therefore is not recommended for implementation.

4.3.5 Economic Impacts - Lincoln County

Potential Mitigation No. 12: Improve Access Road from Rachel into NTS--

Paving the road from Rachel to NTS is a possible mitigation for loss of potential economic activities. There are approximately sixty-eight employees of Reynolds Electric Company (REFCo) who work at NTS and live in Caliente, Alamo, Panaca, or Pioche. Currently the employees have a commute of approximately 200 miles through Las Vegas in order to get to work or they drive the unpaved graded road from Rachel to NTS if it is open. Most of these employees stay at NTS during at least part of the week and return to their homes only on the weekend. Twenty-five percent of these employees were contacted concerning this possible mitigation measure, and all of the respondents said they would use the road daily if it were paved and open at times needed to fit their work schedules. However, the opportunity to use the road on a daily basis, whether paved or not, will continue to be constrained by safety and security considerations related to NAFR/NTS operations. A schedule of when the road is expected to be open has been prepared, however, day-to-day operations conditions frequently require closure on short notice. A 24-hour a day

information telephone number is maintained regarding the open/closed status of the road. Thus, even if the road were paved, there would continue to be uncertainty as to its availability for daily commuting to and from NTS. As a consequence the opportunity for use of the road, if paved, would remain at the current level.

To evaluate the worth of paving the road between Rachel and NTS to Lincoln County residents now working at NTS two approaches may be taken. The first is to evaluate the direct savings in terms of commute costs and time if the commute frequency were unchanged. From the telephone survey it was estimated that sixty of the sixty-eight employees working at NTS from Lincoln County made a weekly commute. The remaining eight currently travel the unpaved road on a more frequent basis. If those sixty were to use the Rachel road, they would save approximately 170 miles per round trip over going via Las Vegas per week per person and approximately three hours per round trip. Valued at \$0.25/mile the annual commute savings would be \$122,400 and 8,640 hours based on a 48 week year. A daily commute using the Rachel to NTS road would increase the mileage from approximately 400 miles/week to 1,150 miles/week. The added time spent commuting would be approximately 12 hours/week. In terms of total cost incurred at \$0.25/mile this would be \$540,000 and 34,560 hours per year.

Both of these figures are maximum values based upon each employee making the commute in their own vehicle. However, due to car pooling it is believed that these figures would be substantially less, possibly only 40 percent of those values. Therefore the annual savings based on weekly commuting would be approximately \$49,000 with a present value of \$816,000 using 6 percent interest rate. The increased incurred cost for daily commute, i.e., worth to Lincoln County residents, would be \$216,000/year with a present value of \$3,600,000.

The income multiplier for defense services employment in Lincoln County is 0.59 which means that for every dollar paid to defense service employees who reside in Lincoln County only \$0.59 is generated within the county. One of the reasons for this very low multiplier is that many employees actually spend a large percentage of their time outside the county because they are not able to return home at night. Of the employees contacted all of them said they would spend more money in Lincoln County if the road were paved and available for daily commute. The values ran from a low of \$30 more per week to a high of \$200 more per week with a mean of \$123 per week. This would translate into a direct annual sales gain of \$383,760 to Lincoln County businesses if workers returned home every night.

It should also be expected that there may be some in-migration of NTS workers from Clark County into Lincoln County if the road were paved and available for daily commute. Twenty-nine percent of the employees contacted volunteered that they knew of employees who currently live in Clark County who would move to Lincoln County if the commute were not so great. These facts indicate that were the road to be paved the very low income and employment multipliers for defense services in Lincoln County would be increased.

This mitigation would very likely result in an increase in the sales tax revenue collected in Lincoln County if REECO employees who now stay at the NTS were to return home during the week. Some of this increase would come from a resulting loss of sales tax revenue in Nye and Clark Counties but the magnitude of this change in areas of collection is impossible to estimate at this time. If this mitigation were to result in an increase of population in Lincoln County, as seems likely, it would also increase the "in lieu of tax" collections in the county since Lincoln County at present receives the maximum payment based on its population.

This mitigation might also cause some intra-county changes in comparative advantage since Rachel, Hiko, and Alamo would be a much closer commuting distance to the NTS than the Caliente-Panaca-Pioche area. However, this area in western-Lincoln County would also suffer the greatest losses from any negative impacts in recreation, agriculture, or mining expenditures in the county due to renewed withdrawal.

If the road were to be paved it would require two twelve foot lanes with two foot shoulders resulting in a twenty-eight foot road bed over the 39 mile length of the road. To do this job with an asphalt road mix the Nevada Department of Transportation estimates the cost would be approximately \$160,000 a mile or a total cost of \$6,240,000. If the job were to be done with gravel the total cost would be about \$2,340,000 and for \$11,700,000 the road could be paved to a secondary highway standards. Additional construction costs for culverts and other crossings of ephemeral channels would have to be added to the paving costs. These additional costs cannot be estimated at this time. These costs should be compared with the maximum derived benefit of the road. The mitigation measure is not recommended for implementation.

**Potential Mitigation No. 13: Complete the Paving
of Kane Springs Road--**

The Kane Springs Roads is not an acceptable mitigation at this time. This road would shorten the trip from Caliente to Las Vegas but would bypass the towns of Alamo and Hiko which have always been on the major road connecting points of eastern Nevada with Las Vegas. This possible loss of revenue from travelers has caused internal political pressures in Lincoln County and a great divergence of opinions between the people of Alamo and Caliente which must be solved by the citizens of Lincoln County without outside interference. This road is not involved with the withdrawal. This mitigation measure is not recommended for implementation.

**Potential Mitigation No. 14: Locate Wild Horse
and Burro Corrals in Lincoln County--**

Approximately 1500 wild horses and burros were recently removed from the Wild Horse and Burro Range located on the Nellis AF Range and transported to BLM's permanent handling facility in Washoe County.

Additional excess animals need to be removed from Nellis AF Range over the next two years.

While Air Force and BLM believe that it is desirable to mitigate the potential economic adverse impacts to Lincoln County, existing permanent facilities in other parts of the state and the temporary nature of the excess horse problem make this mitigation measure unworkable. Therefore this potential mitigation is not recommended.

4.3.6 Resource Management

Potential Mitigation No. 15: Develop Groom Mountain Range Management Plan for Wildlife, Range and Cultural Resources--

Many aspects of the withdrawal area will require a continuing level of management to insure against adverse impacts. These include livestock grazing, wildlife, maintenance of water sources, control of potential range fires, and protection of cultural resources. The Air Force will mitigate these impacts through an agreement with BLM to cooperatively plan for and manage the resources of the area.

4.3.7 Nevada Public Lands

Potential Mitigation No. 16: Transfer of BLM Land in Clark County for a Veterans Cemetery--

The people of Nevada have seen a continuing loss of public lands to military withdrawals during recent years. This proposed mitigation is viewed as partial compensation for this latest loss.

A Southern Nevada Veterans' Cemetery is not an acceptable mitigation for this action. It has been estimated by the Bureau of Land Management office in Las Vegas that the proposed 80 acre site would cost approximately \$8,000 an acre for a total cost of \$640,000. According to the Clark County Public Works Department the area that has been proposed is subject to severe flooding and should be used for flood protection. The local Veterans' Administration representative has expressed no interest in this possible mitigation and it is not related to the withdrawal. This mitigation measure is not recommended for implementation.

4.3.8 Needed Studies and Research

Potential Mitigation No. 17: Impact Evaluation of Perimeter Fence Construction--

If a perimeter fence is constructed, a survey of archaeological resources on the alignment would be conducted. Stock gates would be placed to minimize trailing impacts. Based on studies conducted for this EIS, the fence is not expected to adversely affect wildlife, vegetation, soils or water resources.

Potential Mitigation No. 16: Controlled Access for Scientific Studies and Research--

The Groom Mountain Range offers opportunity to conduct archaeological and ecologic research that may be unique. It has been suggested that controlled access be given for such studies. However, this access would compromise the secure buffer zone purpose for which the renewed withdrawal is sought. This mitigation measure is not recommended for implementation.

4.4 UNAVOIDABLE ADVERSE IMPACTS

4.4.1 Impacts Which Cannot Be Mitigated

Based on analysis of the proposal for renewed withdrawal, the land involved and the likely consequences, the only impact which cannot be mitigated is the loss of 89,600 acres of public land available for broad-scale multiple use by the public. Groom Mountain Range has characteristics and attributes that are specific to that area, and thus the loss cannot be fully mitigated even by opening other areas, improving recreational opportunities elsewhere or providing economic compensation. To the extent that private rights within the withdrawal area can be compensated for financially, loss of full exercise of those rights could be mitigated. However, heritage and tradition are generally not financially compensable.

4.4.2 Local Short-Term Versus Long-Term Productivity

Direct environmental consequences to the Groom Mountain Range area would be negligible if the withdrawal is renewed. Neither the short-term (5-7 years) nor long-term (35 years) productivity of the area to support wildlife or livestock grazing will be affected if proper management practices are employed.

Mineral productivity of the area could be totally lost in the near-term and possibly in the long-term. However, there are no known economic deposits of strategic materials in the area and thus nationally this lack of productivity is not a serious matter. In either case renewed withdrawal would not consumptively use the area's mineral resources, and they would, therefore, remain available for production at some future time.

Both near- and long-term productivity of the withdrawal would be eliminated as a recreation resource. This loss could, however, be mitigated through provision or enhancement of other comparable recreational resources. To individuals with property or grazing rights in the area the impact of renewed withdrawal could be significant. Renewed withdrawal of the Groom Mountain Range itself would not significantly impact any aspect of Lincoln County's or Nevada's lifestyle or economy. However, when viewed in the context of other past and pending military withdrawals, the cumulative impact of any additional military withdrawal is significant to most Nevadans.

4.4.3 Possible Conflicts With Land Use Plans

Only one area of conflict has been identified between the proposed renewed withdrawal and the plans of any other Local, State or Federal agency. Nevada Department of Wildlife had proposed, and was planning, to re-introduce bighorn sheep to the Bald Mountain area, first as a hunted herd, then later as a gene-pool herd. These plans cannot be implemented if the withdrawal is renewed. This conflict could be successfully reconciled through the proposed mitigation measures of: 1) opening additional area for bighorn sheep hunting on Stonewall Mountain within Nellis AF Range; and/or 2) enhancing other Lincoln County bighorn sheep habitat through construction of guzzler water sources.

4.4.4 Resource Requirements

Renewed withdrawal would not result in any increased energy or other resource consumption. If properly managed, the withdrawal would result in conservation of wildlife and vegetation resources within the area.

There are no irreversible or irretrievable commitment of resources should the proposed action be implemented.

Several of the potential mitigation measures would result in significant wildlife resource conservation. Installation of guzzlers and range improvements would increase the numbers, viability and stability of the target species (deer, bighorn sheep, antelope, quail, and chukars) and also contribute to well-being of non-game species.

The Rachel-NTS road improvement, while consuming asphalt and aggregate, could result in conservation of fuels, time and money spent by Lincoln County residents who commute to NTS for work, or could increase consumption of these commodities depending upon commute frequency.

CHAPTER 5
LIST OF PREPARERS

LIST OF PREPARERS

Dr. John Bowen was responsible for examining air quality and related aspects of the withdrawal area. He holds a Ph.D. in Physics and has 20 years experience in evaluation of air quality and meteorological monitoring.

Dr. Gilbert F. Cochran was responsible for overall co-ordination and management of the preparation of this EIS. He holds a Ph.D. in Hydrology and has 18 years experience in various areas of research, and administration related to all aspects of water resources and other environmental concerns.

Mr. John W. Fordham was responsible for all water resource areas and related issues for the project. Mr. Fordham holds B.S. and M.S. degrees in Civil Engineering (Water Resources) and has 20 years experience conducting hydrologic investigations and water resources research in both the public and private sectors.

Dr. Thomas R. Harris was responsible for evaluating the economic and social conditions of the area as well as economic aspects of various mitigation measures. He holds a Ph.D. in Agricultural Economics and his work has emphasized developing evaluation methods and natural resource models for Nevada counties.

Dr. R. Narayanan was involved with the economic evaluations of the several aspects covered in the EIS. He holds a Ph.D. in economics and has 10 years experience related to resource economics.

Dr. Lonnie C. Pippin was responsible for the overall cultural survey and evaluation. He holds a Ph.D. in Anthropology with 8 years experience in Nevada-California as well as 12 years experience in the American Southwest.

Dr. Michael J. Pontrelli was responsible for evaluating the existing animal populations and the potential adverse and beneficial impacts to these species. He holds a Ph.D. in zoology and has over 20 years experience in both academics and as a consultant.

Mr. Jack G. Quade served as a senior geologist for mineral assessment of the area evaluated in the EIS. Mr. Quade holds a M.S. in Geology and has 20 years experience in geologic exploration and evaluation of mineral resources.

Mr. Ronald R. Reno served as supervisory archaeologist for all cultural fieldwork and as historic consultant for the project. He has a M.A. degree in History and is an archaeologist/historian with 18 years experience in Nevada.

Dr. Stanley D. Smith was responsible for vegetation analysis and identification of rare and/or endangered species in the withdrawal area. He holds a Ph.D. in biology and plant physiology and has 8 years experience working with Great Basin and desert vegetation.

Mr. Joseph V. Tingley served as an economic geologist to evaluate the mineral resources of the withdrawal area. Mr. Tingley is a registered Mining Engineer in Nevada and a Registered Geologist in California and has 25 years as an exploration geologist.

Dr. Paul T. Tueller was responsible for evaluating the range ecology and grazing impacts for the area. He holds a Ph.D. in range ecology and has over 21 years of field experience with natural resource sampling problems.

CHAPTER 6
CONSULTATION AND COORDINATION

6.0 CONSULTATION AND COORDINATION

6.1 SCOPING PROCESS

Public scoping meetings were held in Lincoln County (Caliente and Alamo) and Clark County (No. Las Vegas) on May 9, 10 and 13. Attendances at these meetings were respectively 20, 50 and 50 people. Also, a preliminary briefing on the proposed withdrawal renewal was held on April 27 in Carson City for the Nevada Federal Land Multiple Use Advisory Board.

At each of the Scoping Meetings a formal Air Force presentation was made by Col. Monte Crook and Lt. Col. John Kuminecz. The presentation provided an overview of the EIS process, the EIS preparation schedule and a list of items categorized as "Issues", "Possible Issues" and "Non-Issues" related to the proposed action. At the conclusion of the formal presentation the floor was opened for public comment. The presentation and comments were recorded by a court reporter and written comments were solicited. A transcript of each of the meetings was prepared and is on file. After the formal presentation and comments, Air Force and DRI personnel remained for informal discussions with attendees.

Since these meetings were held for the purpose of gathering information, debate was not entered into with the public on any matter pertaining to the withdrawal. If any new concerns, beyond those already identified by DRI, were raised by the public, the concerns were addressed in the EIS as Issues. Furthermore, any of the factors identified as "Possible Issues" or "Non-Issues" in the presentation addressed by the public as a concern, those items also became "Issues" for EIS consideration. Transcripts of the Scoping Meetings and the written comments were analyzed to identify issues that had not previously been raised. Written comments have been received from 20 different individuals and/or organizations.

The comments both written and in the public meetings can be categorized into three areas, (1) withdrawal need and size; (2) withdrawal impacts and (3) mitigation. Each of these areas are summarized below.

6.1.1 Need/Size

Several persons questioned the need for the withdrawal, given that historically the area west of the Groom Mountain Range has been used for sensitive military purposes and simultaneous public access for hunting and recreation has been allowed on the range. They also questioned the need for withdrawal of the entire 89,600 acres, suggesting that a smaller area should be examined.

6.1.2 Impacts

A list of potential impacts resulting from the withdrawal was developed by the contractor and the Air Force prior to the scoping

meetings and was used as a basis for the scoping meeting presentations. As a result of the meetings and written comments five "issues" were specifically emphasized. These are:

1. Transferability of the Bald Mountain grazing allotment.
2. Ability to actively mine valid mining claims.
3. Access to valid mineral claims.
4. Ability to appropriate water on the withdrawal.
5. Potential economic loss to Lincoln County.

Several Additional items presented at the meetings as possible issues or non-issues were addressed by the public and were considered in the DEIS. These were:

1. Big horn sheep reintroduction.
2. Access for scientific and research.
3. Airspace restrictions and traffic.
4. Air Quality

6.1.3 Mitigation

Most public comment from the scoping meetings dealt with the question of mitigation for the withdrawal. Numerous suggestions were made, some of which have little or no relation to the withdrawal. Because of this, particular attention was given to evaluate mitigations which are commensurate with the withdrawal and would benefit the affected public.

6.2 AGENCIES AND INTEREST GROUPS CONTACTED ON THE DEVELOPMENT OF THE DRAFT EIS.

Federal

U.S. Department of Agriculture
Forest Service, Humboldt National Forest
Soil Conservation Service

U.S. Department of the Interior
Bureau of Mines
Fish and Wildlife Service
Geological Survey

U.S. Department of Energy

U.S. Department of Defense
Air Force

U.S. Environmental Protection Agency Region IX

State of Nevada Agencies

Governor Richard Bryan

Department of Conservation and Natural Resources

Division of Environmental Protection

Division of Forestry

Division of Historic Preservation and Archeology

Nevada State Conservation Commission

Water Resources Division

Division of State Parks

Department of Employment Security

Department of Highways

Department of Minerals

Department of Taxation

Department of Wildlife

Nevada Bureau of Mines and Geology

Nevada State Historical Society

Nevada State Multiple Land Use Advisory Committee

Nevada State Clearinghouse

Nevada State Indian Commission

County

Clark County Commission

Clark County Assessors Office

Lincoln County Commission

Lincoln County Game Management

Lincoln County Power District #1

Lincoln County Road Department

Lincoln County Sheriff

Lincoln County Recorders Office

Municipalities

Caliente City Council

Caliente Police Department

University of Nevada

University of Nevada, Reno
Department of Agriculture Economics
Bureau of Business and Economic Research
Special Collections Library
Government Publications Department
Co-operative Extension Service

University of Nevada, Las Vegas
Museum of Natural History
Library

Interest Groups

Nevada Mining Association
Central Nevada Development Authority
Nevada Wildlife Federation
Sierra Club Toiyabe Chapter
Southern Nevada Off-Road Enthusiasts
National Public Land Task Force
Nevada Outdoor Recreation Association, Inc.
The Nature Conservancy
Red Rock Audabon Society
Nevada Cattleman's Association
Defenders of Wildlife
Western Shoshone National Council
South Nevada Environmental Forum
People's Animal Welfare Society
Nevada Public Land Users Association
Wild Horse and Burro Committee for National Academy of Science
Northern Nevada Native Plant Society
National Speleological Society, Great Basin Grotto

Wild Horse Organized Assistance

Natural Resource Defense Council

Congressional Delegation

Senator Chic Hecht

Senator Paul Laxalt

Representative Harry Reid

Representative Barbara Vucanovich

CHAPTER 7

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APPENDIX A

LEGAL DESCRIPTION OF WITHDRAWN LAND, LINCOLN COUNTY NEVADA

APPENDIX A

LEGAL DESCRIPTION OF WITHDRAWN LAND LINCOLN COUNTY NEVADA

The Groom Mountain Range withdrawal area is comprised of lands in Lincoln County as described below and shown on the accompanying Figure A-1.

- T.5 S., R. 55 E.,
SECS. 1, 12, 13, 24, 25, 36.
- T.6 S., R. 55 E.,
SECS. 1, 12, 13, 24, 25, 36.
- T.7 S., R. 55 E.,
SECS. 1, 12, 13, 24, 25;
SEC. 36, EXCLUSIVE OF LAND IN PLO 1662.
- T.5 S., R. 55 1/2 E.,
SEC. 6, EXCLUSIVE OF MINERAL PATENT 9368;
SECS. 7, 8, 16 THRU 21, 28 THRU 33.
- T.6 S., R. 55 1/2 E.
T.7 S., R. 55 1/2 E.,
SECS. 4, 6, 7, 9, 16, 18 THRU 21, 28 THRU 30;
SECS. 5, 8, EXCLUSIVE OF MINERAL PATENTS 1660, 1661, 1034979;
SECS. 17, EXCLUSIVE OF MINERAL PATENT 1055957;
SECS. 31 THRU 33, EXCLUSIVE OF LAND PLO IN 1662.
- T.5 S., R. 56 E.,
SECS. 19, 27 THRU 35;
SEC. 20, EXCLUSIVE OF MINERAL PATENT 3379.
- T.6 S., R. 56 E.,
SECS. 2 THRU 11, 14 THRU 23, 26 THRU 35.
- T.7 S., R. 56 E.,
SECS. 2 THRU 11, 14 THRU 23, 26 THRU 35.

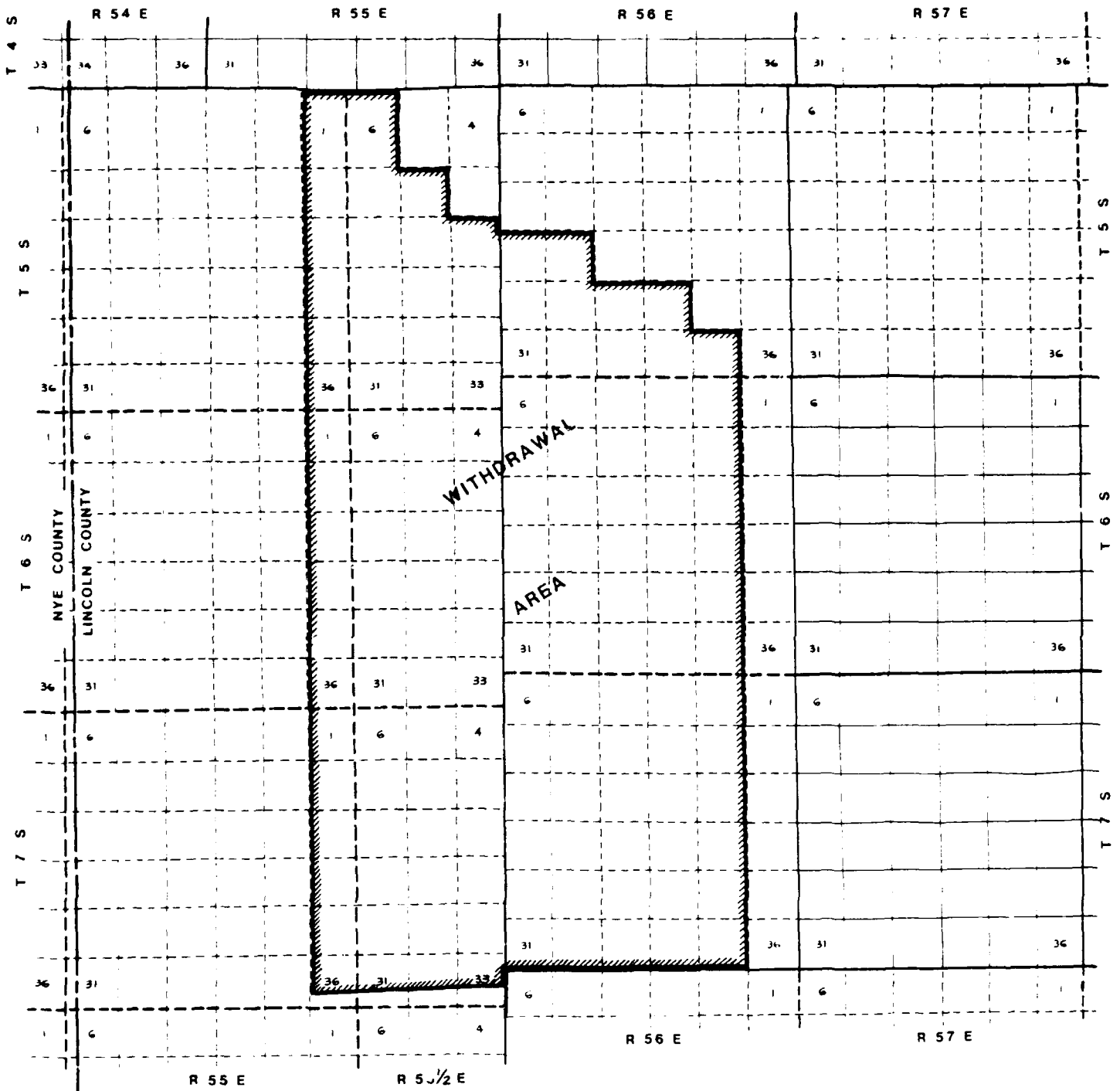


Figure A-1.
GROOM MOUNTAIN RANGE WITHDRAWAL AREA



APPENDIX B

UTILIZATION LEVELS FOR KEY SPECIES AT 21 LOCATIONS
ON THE GROOM RANGE WITHDRAWAL

APPENDIX B

UTILIZATION LEVELS FOR KEY SPECIES AT 21 LOCATIONS
ON THE GROOM MOUNTAIN RANGE WITHDRAWAL

No.	Plant Community	Key Species % Utilization
1	<u>Yucca Brevifolia/</u> <u>Coleogyne ramosissima</u>	Orhy = 0 Brru = 0
2	<u>Artemisia tridentata/</u> <u>Coleogyne ramosissima</u>	Orhy = 5.0 Stco = 1.0
3	<u>Artemisia tridentata/</u> <u>Cowania mexicana</u>	Come = 25.6 Epne = 37.6
4	<u>Pinus monophylla/</u> <u>Juniperus osteosperma/</u>	Kocr = 24.0 Arno = 11.5
5	<u>Artemisia tridentata/</u> <u>Cowania mexicana</u>	SiHy = 12.5 Come = 54.5
6	<u>Artemisia tridentata/</u> <u>Cowania mexicana</u>	Stco = 6.0 Come = 57.0
7	<u>Pinus monophylla/</u> <u>Juniperus osteosperma/</u> <u>Cowania mexicana</u>	Come = 48.0 Posa = 28.5
8	<u>Pinus Monophylla/</u> <u>Artemisia nova</u>	Arno = 6.5 Epne = 52.5 Agsp = 7.5
9	<u>Coleogyne ramosissima/</u> <u>Stipa speciosa</u>	Stsp = 20.8 Epne = 10.8
10	<u>Atriplex confertifolia/</u> <u>Hilaria jamesii</u>	Hija = 39.6 Cela = 61.2 Orhy = 52.5
11	<u>Pinus monophylla/</u> <u>Artemisia nova/</u> <u>Cowania mexicana</u>	Come = 42.0 Arno = 18.4
12	<u>Pinus monophylla/</u> <u>Juniperus osteosperma/</u> <u>Artemisia nova</u>	Arno = 2.4 SiHy = 1.6
13	<u>Pinus monophylla/</u> <u>Juniperus osteosperma</u>	Come = 9.5 Arno = 2.5
14	<u>Artemisia nova/</u> <u>Oryzopsis hymenoides</u>	Orhy = 2.0 Posa = 0

No.	Plant Community	Key Species % Utilization
15	<u>Pinus monophylla/</u> <u>Artemisia tridentata/</u> <u>Artemisia nova</u>	Come = 0 Arno = 2.8 Posa = 41.0
16	<u>Pinus monophylla/</u> <u>Juniperus osteosperma/</u> <u>Cowania mexicana/</u> <u>Artemisia nova</u>	Come = 3.0 Arno = 2.5
17	<u>Artemisia nova/</u> <u>Stipa speciosa</u>	Stsp = 19.5 Arfe = 1.5
18	<u>Artemisia nova/</u> <u>Poa sandbergii</u>	Posa = 3.2 Arno = 0.4
19	<u>Dalea polyadenia/</u> <u>Oryzopsis hymenoides</u>	Orhy = 16.8 Atca = 52.9
20	<u>Yucca brevifolia/</u> <u>Oryzopsis hymenoides</u>	Orhy = 4.0
21	<u>Pinus monophylla/</u> <u>Juniperus osteosperma/</u> <u>Artemisia nova/</u> <u>Coleogyne ramosissima</u>	Come = 3.0 Arno = 0.5

KEY:

Agsp	<u>Agropyron spicatum</u>
Arfe	<u>Aristida fendleriana</u>
Arno	<u>Artemisia nova</u>
Atca	<u>Atriplex canescens</u>
Brru	<u>Bromus rubens</u>
Cela	<u>Ceratoides lanata</u>
Come	<u>Cowania mexicana</u>
Epne	<u>Ephedra nevadensis</u>
Hija	<u>Hilaria jamesii</u>
Kocr	<u>Kolaria cristata</u>
Orhy	<u>Oryzopsis hymenoides</u>
Posa	<u>Poa sandbergii</u>
Sihy	<u>Sitanion hystrix</u>
Stco	<u>Stipa comata</u>
Stsp	<u>Stipa speciosa</u>

APPENDIX C
METHODOLOGIES

APPENDIX C - METHODOLOGIES

WATER RESOURCES METHODOLOGY

A field investigation of the study area was undertaken during the time period May 13-19, 1985. The purpose of the field activity was to make an assessment of the water resources of the proposed withdrawn lands in order to characterize any potential impacts the continued withdrawal might have.

Preliminary surveys of available literature covering the study area revealed essentially no site specific data and that in most previous work, the study area had only been considered in a regional context. With the lack of specific data the field study was undertaken to fill the data gap. The characteristics observed and data collected with respect to water resources included the following:

- 1) an inventory of available water sources in the withdrawal area;
- 2) general description of these sources;
- 3) estimates or measurements of discharge;
- 4) field chemistry and water samples to characterize water quality;
- 5) use of the resource; and
- 6) general watershed condition.

During the field activity site visits were made to every identified water source (spring) in the study with the exception of one, Bullwhack Spring. These spring locations are shown in Figure 25. Water quality samples were collected for all springs visited plus several just outside the withdrawal boundary to the northeast. Water ownership status was determined through examination of records in the Nevada State Engineer's Office and records of property transfers in the Lincoln County Court house in Pioche, Nevada.

MINERALS GEOCHEMICAL SURVEY

Sampling Procedure

Stream sediment samples were collected from 135 separate sites around the range, two samples were collected at each site. One sample was seived on site to minus 16-mesh, the second was seived to minus 16-mesh, concentrated at the sample site by use of a mechanical dry washer to half-volume then later concentrated by hand-panning. Each sample was then analyzed by spectrographic analysis for thirty-one elements. The unconcentrated stream-sediment sample generally gives information on rock geochemistry while the panned concentrated sample gives information on mineralization.

All samples collected as part of this project were transported to Alamo, Nevada for preparation and analysis. Analysis was done by the Branch of Exploration Geochemistry, U.S. Geological Survey through a cooperative agreement between that agency and the Nevada Bureau of Mines

and Geology. Maps showing location of sample sites and geochemical maps showing concentrations of individual elements have been prepared and are included in the minerals report appended to the EIS. Sample results as well as statistical analyses comparing these results are also included in the appended minerals report.

SOILS AND GRAZING

The key forage utilization procedure was used to obtain estimates of early season forage utilization on selected key species. This procedure is outlined on pages 20-25 in the Nevada Rangeland Monitoring Handbook.

Erosion was estimated using an Erosion Condition Class Guide. This is described in the appendix of Tueller and Booth (1975).

Estimates of carrying capacity, vegetation reconnaissance procedures and other procedures used in the field were those of the individuals responsible for this EIS.

CULTURAL RESOURCES RECONNAISSANCE METHODOLOGY

Literature Search

Archaeological data files at the Nevada State Museum, Carson City, the BLM Las Vegas District office, and at Environmental Research Consultants, Las Vegas were searched for all sites and projects in the four U.S.G.S. fifteen minute series quadrangles surrounding the project area.

Archives consulted for historic data include the Nevada Historical Society at Reno and Las Vegas, the Special Collections Library, University of Nevada, Reno, the personal library of Alvin R. McLane, Reno, and the B.L.M. State Office. In addition, Pat Sheehan was consulted concerning the history of the Groom Mine.

The Sample

A six percent sample of the Groom Mountain Range project area was intensively surveyed for cultural resources. This sample consisted of 85 500x500 meter quadrats. The sample quadrats were selected by overlaying a 500 meter interval UTM grid over the project area and randomly selecting intersections as quadrat locations. Any potential unit that fell within 1 kilometer of a previously selected unit was eliminated to insure adequate dispersion of the sample.

Survey Techniques

All field work was done out of a base camp located on site. Access to most sample quadrats was by vehicle, but several of the more remote units were accessed by helicopter. Virtually all of the driving was done on existing roads.

The center point of each sample quadrat, selected by the computer, served primarily as a guarantee of the general dispersion of the sample. Due to the rugged nature of the terrain and a desire to make units as re-locatable as possible, the field crews were allowed to shift the orientation and position of the quadrat around the center point. The following constraints were observed while making field decisions concerning shifting quadrats.

- 1) The original center point must remain with the quadrat.
- 2) Unit location and orientation should be shifted as little as possible while trying to find a fit between quadrat and topography.
- 3) Quadrats must not be shifted with the purpose of decreasing the distance that needs to be travelled.
- 4) Quadrats must not be shifted for the purpose of covering areas that appear to be more likely to contain cultural remains.

Quadrat centers were plotted on 1:62,500 scale topography maps and on 1:24,000 scale orthophotoquads where available. A set of 1:24,000 scale air photos was used for all field plotting.

In the rugged terrain, comprising most of the project area, topography alone served to mark edges of quadrats, but in areas lacking significant relief, quadrat boundaries were established by compass and lines of flagging tape.

The basic interval between transects was 30 meters, which translates to 16 transects per quadrat in relatively level terrain. Transects were oriented parallel to one of the quadrat axes when possible. This scheme was heavily modified in rugged terrain. Transects were often contoured to match topography and distance between transects often became much wider.

A limited intuitive sample was also performed, consisting of visits to most springs in and near the project area, and meandering transects through areas that seemed likely spots for archaeological remains. Access to sample units also served to increase the size of the sample. Due to the local historic importance of the Groom Mine, this property was also surveyed and the remains recorded.

Recording and Collection Procedures

A quadrat form and vegetation sheet summarizing environmental and cultural data was completed for each sample unit. In addition, a photograph of most units was taken. A site encoding form was completed for each site found within the quadrats. Recording of sites encountered outside the sample units was optional dependent on time constraints. Each site, with the exception of isolates, was marked with an aluminum tag bearing the site number.

Temporally diagnostic artifacts were collected. Normally, historic artifacts were not collected. A sample of obsidian artifacts was collected for trace element analysis. The field location of each

collected artifact was marked with a large nail and an identifying tag. All artifacts are curated at Desert Research Institute, Reno.

Laboratory Analysis

Site encoding forms were entered into computers for output of final site forms, Intermountain Antiquities Computer System (IMACS) site encoding forms, and data processing. Sample quadrat forms were also entered into computers to assist data manipulation. Completed sites and IMACS forms were sent to the Nevada State Museum for integration into the statewide archaeological database. Projectile points and potsherds were analyzed for comparison with other artifacts outside of the project area for purposes of cross-dating and identifying the presence of different archaeological cultures. A sample of obsidian artifacts was subjected to trace element analysis for the purpose of discerning prehistoric toolstone sources and regional movement of artifacts.

VEGETATION METHODOLOGY

The Botany/Vegetation team surveyed the entire withdrawal area in order to inventory for endangered, rare and threatened plants and also to describe the community composition of the vegetation. Sixty-six (66) vegetation stands were selected and surveyed within the withdrawal area. Criteria for selection of the stands were: (1) systematic coverage at the withdrawal area; or (2) uniqueness of habitat or substrate type.

Each stand was thoroughly surveyed for species composition of the area. In addition, two parallel transects were walked in which a plotless (point-quarter) survey of the vegetation was conducted. This yielded a count of 100 perennial plants at each site, so that a relative density for each perennial species could be obtained. Analysis of relative densities allowed a categorization of each stand into specific community type. Elevation, substrate type, aspect, and other significant features were also noted for each stand. In addition, a binocular survey of all surrounding slopes was also conducted for each stand.

In addition to the 66 stands surveyed by the vegetation team, approximately 25 stands were also surveyed by the range expert and 86 random sites were surveyed by the archaeological crews for dominant trees, shrubs, and forbs. Each site (from all three surveys) was placed in an appropriate community type category, color coded by community type, and plotted on an aerial photo (overlain by mylar covering) of the withdrawal area. Community boundary lines were then drawn using the plotted stands, information obtained from binocular surveys, and information from photography taken on the ground and from the air during field visits.

All plant species identifications were verified by Ferris (1968), Munz (1968) or Cronquist et al. (1977, 1984).

ANIMALS AND HUNTING RECREATION METHODOLOGY

Extent of Deer Habitat

Determined by on site observation and discussion with NDOW and BLM biologists.

Deer Density and Total Number

Determined from existing NDOW estimates and discussion with NDOW and BLM biologists.

Other Vertebrates

All other animal habitat areas and population determinations were based on discussion with area wildlife biologists and on personal field observation by EIS preparers.

ECONOMIC ANALYSIS METHODOLOGY

Dummy Variables in Regression Analysis

Frequently economists wish to include qualitative variables (e.g., sex, race, occurrence of land withdrawal) in a regression analysis together with continuance quantitative variables. The objectives are to estimate the relationship between the continuous independent variables and the dependent variable and to determine whether the qualitative variables influence the relationship significantly (Leistritz, n.d.).

The technique of using dummy variables has been widely adopted, and the result is the straight forward inclusion of qualitative variables in the regression models. The technique uses the value of 1 (one) for the presence of the qualitative attribute (occurrence of the Groom Mountain land withdrawal) that is assumed to have an impact on the dependent variable and 0 (zero) for the absence of the given attribute. Dummy variables can be used to capture changes (shifts) in the intercept, changes in slope, and changes in both slope and intercept.

Tests of hypothesis concerning the parameters of the covariance model are identical to those in regression analysis using conventional variables. The student t-test is used to test significance of the dummy variable. If the absolute value of the calculate student t is greater than the tabulated value with the desired level of significance, then the calculated dummy variable is significant and the qualitative variable did play a role in the value of the dependent variable. For this analysis, dummy variables were applied to the export base model and the hunting success regression. The dummy variable was given a value of one for the time that the Groom Mountain Range was withdrawn, that is from 1980. For both regressions the dummy variable was tested for significance to determine if the Groom Mountain withdrawal did effect regional economic activity and hunting success.

Export Base Methodology

Export base analysis dichotomizes economic activity into basic (export) and non-basic (support) industries. Export base industries are the driving force in the economy being responsible for injection of new funds into the local economy from export sales. Export base theory asserts that a stable relationship exists between export and service employment or income in an economy. Thus, changes in the level of export employment or income will lead to a predictable change in service and therefore total employment or income. Expansion or contraction in export employment or income is directly linked to the service sector. Export employment or income, therefore, has a multiple impact on the total economy. Based on this relationship, regional employment or income multipliers can be estimated.

In general, the importance of exports is an inverse function of the economy's size. Export-base analysis is, therefore, most appropriately applied to small regional economies that exhibit market dependence in specialized export activities (Andrews, 1985). This approach then is very applicable to Lincoln County Nevada.

Regional multipliers using export-based models can be estimated from several approaches. In the initial development of this analysis, regional employment (income) multipliers were calculated by taking a simple ratio of total employment (income) to basic or export employment (income) as follows:

$$(1) \quad M = \frac{T}{X}$$

where T represents total employment (income), X represents export employment (income), and M is the employment (income) multiplier. Improvement in the reliability of the model is obtained if a time series and method for dichotomizing the economy into export and service industries are available. The model can be expressed as:

$$(2) \quad E_T = E_X + E_S$$

$$(3) \quad E_S = bE_X$$

$$(4) \quad E_T = E_X + bE_X$$

$$(5) \quad E_T = E_X(1+b)$$

where E_T is the total employment, E_X is export employment, E_S is service employment, and $(1+b)$ represents the employment multiplier. Differential export multipliers can be derived by disaggregation of total export employment (income) sector into its industrial components (Braschler, 1972). Thus, the model can be generalized to consider differential multiplier impacts as well as nonproportional linear relationships:

$$(6) E_T = b_0 + (1+b_1)E_{X1} + (1+b_2)E_{X2} + \dots + (1+b_n)E_{Xn}$$

where b_0 is a constant term, E_{Xi} represents export employment by industry and $(1+b_i)$ are differential employment multipliers. This formulation allows detail in estimating the impact of changes in export employment (income) by sector on total employment (income).

However, in estimating employment (income) multiplier modifications based on statistical properties were made which follow the research done by Weiss and Gooding (1968). Instead of estimating total employment (income) as a function of export employment (income), service employment (income) is substituted as the dependent variable, with export employment (income) remaining as the independent variable. This formulation is provided as follows:

$$(7) E_T = b_0 + b_1E_1 + b_2E_2 + \dots + b_nE_n$$

$$(8) E_X + E_S = b_0 + b_1E_1 + b_2E_2 + \dots + b_nE_n$$

$$(9) E_S = b_0 + (b_1 - 1)E_1 + (b_2 - 1)E_2 + \dots + (b_n - 1)E_n$$

$$(10) E_S = b_0 + (b_1 - 1)E_1 + (b_2 - 1)E_2 + \dots + (b_n - 1)E_n + e$$

This substitution was made to prevent the estimation of a dependent variable that is a high proportion of the independent variable. Equation 10 is used to estimate differential employment multipliers; E_i represents export employment (income), $b_i - 1$ represents the impact of export employment (income) on the service employment, and e is a disturbance. In order to obtain employment (income) multipliers, 1 (one) must be added to $b_i - 1$ in the above model.

Cost-Benefit Analysis

In road improvement or construction projects, cost-benefit analysis is an attempt to apply the criterion of economic efficiency to the project proposal. The conceptual framework of cost-benefit is straightforward. The costs and benefits of building or improving the road are estimated. If the benefits of the project are greater than the costs of that project, the project has a positive value. If the costs exceed the benefits, the project usually is dropped. In actuality, the analysis is much more complex and controversial than first seems apparent.

In estimating the costs, the actual expenditures for paving the road are used but the benefits may be harder to measure. In this analysis, the difference between the total mileage on the new road and the next best alternative to that road was used to compute the savings in travel costs which were valued at an average of twenty-five cents per mile. The

value of time that is saved by the users of the new road is a function of the wage rate of those users. These two values of the annual benefits are then added together and amortized at the appropriate discount rate to compute the present value of the road. The difference between the total cost and the present value is the value of the project.

Consumer Surplus

The travel cost method (Menz, 1983) is the most widely used method for determining the value of an outdoor recreational use. The underlying theory of this method is based upon the idea of consumers surplus which Marshall has defined as "the excess price which a consumer would be willing to pay rather than to go without the thing, over that which he actually does pay".

The travel costs plus the on-site expenditures for an outdoor activity represent the marginal costs for that experience. The consumer surplus represents the difference between these costs and the total amount that the hunter or other recreational user would have been willing to pay for the experience.

Figure C-1 shows an example of this. A demand function DD is assumed with quantity Q demanded at price P , the shaded area PDS represents the area of consumer surplus. The area $PSQO$ is what Samuelson calls the market value and the area $ODSQ$ is the "total welfare" associated with the good. Thus, the consumers' surplus may be viewed as the difference between the total value of an item and its corresponding market value.

In the absence of a market price, market value can be measured by consumers willingness to pay.

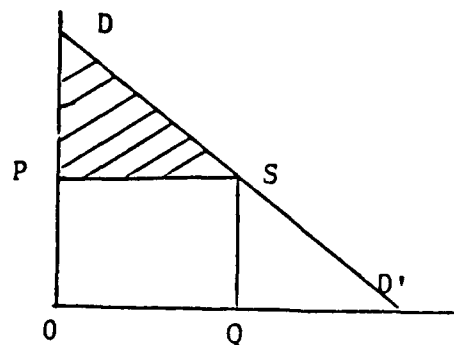


FIGURE C-1. Consumer Surplus

Present Value

A rational individual does not consider 1 dollar payable next year to be the equivalent of 1 dollar payable today. The present value of the dollar paid one year from today is equal to:

$$(1 + i)^{-1} = 1/(1 + i)$$

where: i = the applicable interest rate
 $1+i$ = the discount rate

in general the present value of any income flow, "y", "t" years into the future is equal to:

$$y = y_0 + y_1 (1 + i)^{-1} + y_2 (1 + i)^{-2} + \dots + y_t (1 + i)^{-t}.$$

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APPENDIX D

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