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SAN ANDRES NATIONAL WILDLIFE REFUGE

DOÑA ANA COUNTY, NEW MEXICO

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

UNITED STATES
DEPARTMENT OF THE INTERIOR

R2E

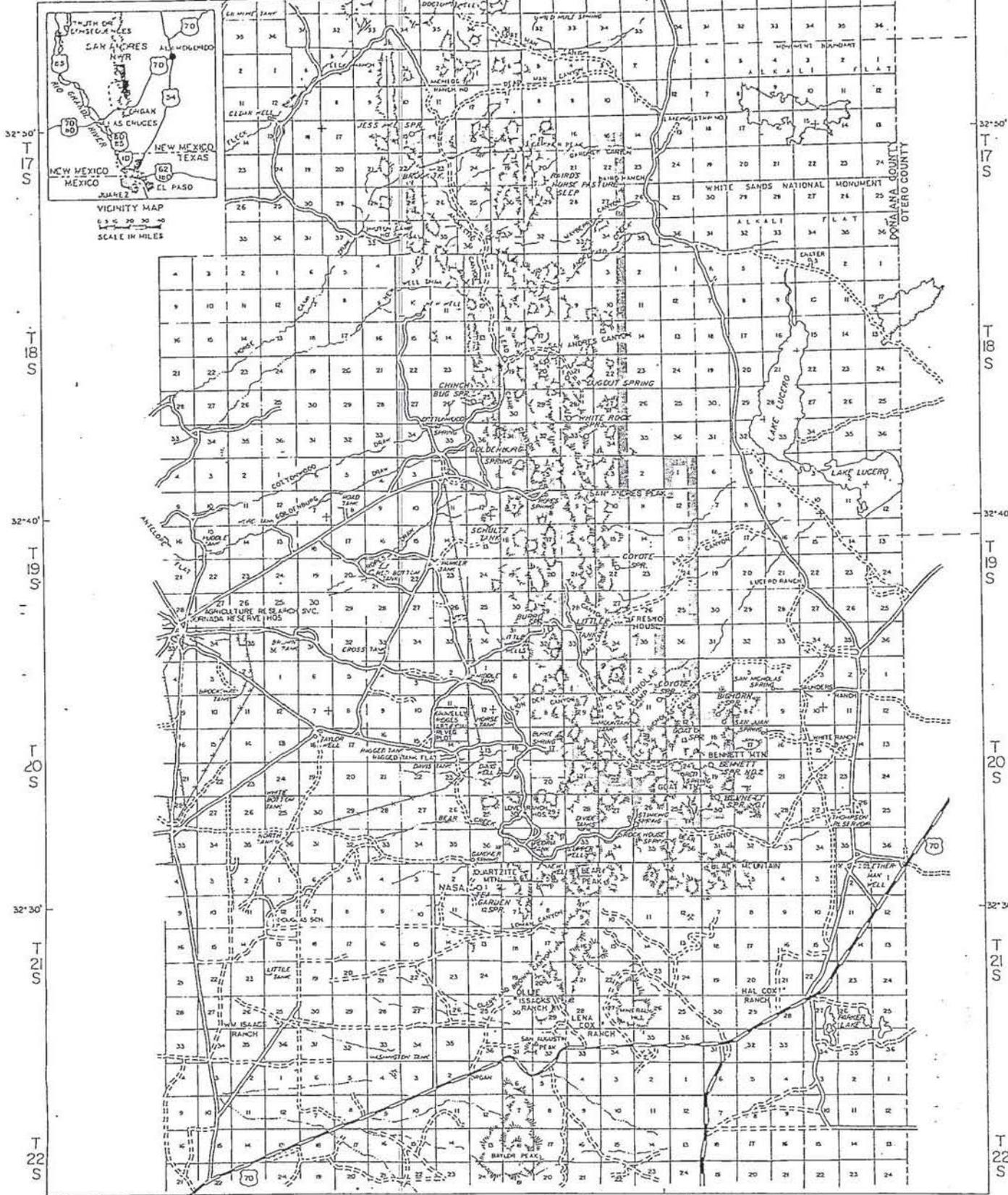
106°40'

R3E

R4E

106°30'

R5E



COMPILED BY THE DIVISION OF ENGINEERING
FROM U.S.G.S. COORDINATES AND OTHER
OFFICIAL RECORDS

ALBUQUERQUE, NEW MEXICO

JULY 1965

NEW MEXICO PRINCIPAL MERIDIAN

Scale 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580 600 620 640 660 680 700 720 740 760 780 800 820 840 860 880 900 920 940 960 980 1000 FEET

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60

TOWNSHIP
DIAGRAM



MEAN
DECLINATION
1960

2R N.MEX.341 4C

I. GENERAL

A. Introduction

The San Andres National Wildlife Refuge was established in 1941 for the protection of the Desert Bighorn Sheep and the plant life on which they feed. The refuge lies within the White Sands Missile Range and is closed to the public except during special hunting seasons.

The San Andres Refuge is located in Dona Ana County, New Mexico and covers 88 square miles of the southern San Andres Mountains. The San Andres Mountains extend from San Augustine Pass in Dona Ana County to Mockingbird Gap in Socorro County, a distance of 75 miles. The range is very rugged, changing elevation from 4,400 feet in the lowlands to 8,200 feet at the highest peak on the refuge.

Desert bighorn sheep have lived in this area since before the time of the Mescalero Apache Indians who used the animals for food and fashioned ornaments and tools from the horns. Remnants of old Indian campsites still remain and arrowheads and other artifacts can be found around these campsites, giving evidence of the former inhabitants.

B. Climatic and Habitat Conditions

Precipitation for the year was not measured due to the lack of personnel on the area for most of the year. However, range conditions indicate average to above average moisture sufficient to maintain springs and allow for normal vegetative growth.

C. Land Acquisition

1. Fee Title

None.

2. Easements

None.

3. Other

None.

D. Systems Status1. Objectives

The objectives established for this refuge have been reviewed and seem to be adequate and up to date.

2. Funding

Funding for FY 79 amounted to \$40,400 which included purchasing a new 4X4 pickup. Funding for FY 80 was at the custodial level (\$30,000) and was totally inadequate to manage the disease outbreak. The only way to make ends meet was to not fill the only permanent position until next year, hence there was no one permanently assigned to San Andres on board for seven months during 1979.

II. CONSTRUCTION AND MAINTENANCE

Nothing to report.

III. HABITAT MANAGEMENT

Nothing to report.

IV. WILDLIFEA. Endangered and/or Threatened Species

There are four plant species in this category known to occur on the refuge and six species suspected to occur but not yet located on San Andres National Wildlife Refuge. See Table 1.

B. Migratory Birds

Nothing to report.

C. Mammals and Non-Migratory Birds and Others1. Game MammalsBighorn Sheep

Desert bighorn sheep were hunted in the San Andres National Wildlife Refuge and surrounding areas by permit from 1968 to 1978. Prior to 1978, no reports

Table 1. Endangered and Threatened Species Either Occurring In or Expected to Occur in the Refuge ^{1/}.

<u>Family</u>	<u>Rank</u>	<u>Taxon</u>
Brassicaceae	EN	* <u>Lesquerella aurea</u> Wooton
Cactaceae	EN	* <u>Echinocereus lloydii</u> Brill. and Rose
Caryophyllaceae	EN	° <u>Silene plankii</u> Hitchc. and Magui
Fabaceae	EN	<u>Astragalus castetteri</u> Barneby
Papaveraceae	EN	* <u>Argemone pleiakantha</u> Greene ssp. <u>pinnatisecta</u>
Asteraceae	TH	° <u>Perityle cernua</u> (Greene) Shinnars
Asteraceae	TH	* <u>Perityle dissecta</u> (Torr.) Gray
Asteraceae	TH	<u>Perityle staurophylla</u> (Barneby) Shinnars
Cactaceae	TH	<u>Pediocactus papyracanthus</u> (Engelm) L. Bens
Rosaceae	TH	<u>Rosa Stellata</u> Wooton

* Taxon expected to occur within the refuge boundaries; has not yet been collected.

° Taxon has been collected in the Organ Mountains south of the refuge.

^{1/}Taken from Von Loh (1975), A Flora of the San Andres National Wildlife Refuge, Dona Ana County, New Mexico. Masters Thesis.

were made of scabies lesions nor were mites recovered from any of the sheep collected. In 1978, all 5 rams harvested by hunters were found to have live scabies mites of the genus *Psoroptes*, and active lesions of scabies in their ears and/or on their bodies. These mites were identified as *Psoroptes ovis* (Hering), the common scabies mite of domestic sheep, cattle, and horses (Meleney 1979). Historically, these mites have been associated with tremendous bighorn sheep population declines and extirpation from many ranges, (Bailey 1936, Jones 1950, Hornaday 1901, Honess et. al. 1942, Packard 1946, Seton 1929, Wright et. al. 1933).

To determine the extent and severity of scabies in the remaining population, the herd was closely monitored throughout the winter of 1978-1979. Although no mortality from scabies was confirmed, signs of severe and widespread infection were found. Several sheep were observed with a mucous drainage from the ears or with the ears severely folded over or cropped. Others exhibited a loss of hair laterally and dorsally. Signs of severe itching, excessive scratching, biting, head shaking and shrub horning were also noted. In addition, the number of sheep seen was considerably less than that seen on winter surveys before 1978. The conclusion was drawn that a severe and widespread scabies outbreak was occurring. (Lange, et. al. 1980).

An attempt to provide some ^{78?} type of herd treatment was initiated from November 1968 to January 1979. Dust bags containing 5% coumaphos ₂ were suspended over salt blocks at 38 treatment stations distributed throughout the sheep range. Unfortunately no utilization of the treatment stations has ever been observed and the attempt was unsuccessful.

Extensive ground surveys during January and February of 1979 revealed very few sheep occupying the normally heavily used areas, suggesting either large-scale emigration or mortality, or both. No evidence of unusually high mortality was found and long distance movements by the desert bighorn in this area are considered uncommon. Extensive aerial surveys of the entire San Andres Range during June and September, 1979 revealed no movement into previously unoccupied areas, therefore, it was postulated that mortality was occurring.

2/Co-Rale, 0(3-chloro-4-methyl-2-oxo-2H-benzopylream-7-yl-0-diethylphosphorothioate, Cutter Haver, Lockhart Labs, Division of Bayvet Corp., P.O. Box 4193, Hawthorn Rd., Kansas City, MO 64119)

Table 2. Numbers and composition of the San Andres desert bighorn population from 1941 to 1979. Sandoval 1979.

Year	Number	Ram/Ewe	Lamb/Ewe	Yr/Ewe	Year	Number	Ram/Ewe	Lamb/Ewe	Yr/Ewe
1941	27	50:100	75:100	00:100	1960	130	175:100	50:100	00:100
1942	51	52:100	52:100	22:100	1961	142	72:100	50:100	25:100
1943	62	57:100	63:100	43:100	1962	150	32:100	37:100	10:100
1944	71	82:100	73:100	54:100	1963	165	70:100	53:100	36:100
1945	78	63:100	33:100	47:100	1964	175	61:100	21:100	00:100
1946	85	71:100	33:100	23:100	1965	190	79:100	49:100	01:100
1947	100	51:100	34:100	10:100	1966	251	88:100	50:100	16:100
1948	112	67:100	46:100	35:100	1967	270	107:100	40:100	32:100
1949	130	41:100	91:100	29:100	1968	250	77:100	55:100	07:100
1950	140	100:100	43:100	26:100	1969*	200	90:100	62:100	26:100
1951	100	68:100	29:100	10:100	1970*	200	109:100	53:100	23:100
1952	112	68:100	31:100	26:100	1971*	200	40:100	88:100	33:100
1953	53	48:100	34:100	17:100	1972*	200	106:100	74:100	36:100
1954	62	65:100	39:100	35:100	1973	200	69:100	68:100	53:100
1955	70	58:100	42:100	42:100	1974	225	31:100	29:100	16:100
1956	86	60:100	50:100	00:100	1975*	200	82:100	46:100	26:100
1957	92	70:100	41:100	30:100	1976*	182	47:100	36:100	34:100
1958	100	50:100	59:100	32:100	1977***	182	50:100	35:100	35:100
1959	121	142:100	92:100	42:100	1978**	150	80:100	19:100	30:100
					1979	81	15:100	0:100	0:100

*Combined aerial and ground counts

**Scabies epizootic

***Estimate



One of 38 unsuccessful field treatment stations consisting of an insecticide filled dust bag suspended over a salt block. MMH 9/79

A pre-hunting season aerial survey (September 22-23, 1979), resulted in a population estimate of 81 animals or approximately a 60% decline over a one year period; no reproduction was noted, and the 1979 hunt was cancelled due to a conspicuous lack of legal size rams.

On October 14, 1979 two bighorn sheep ewes were captured by New Mexico Department of Game and Fish, and removed from the refuge and a neighboring area for scabies transmission studies by the United States Department of Agriculture, New Mexico State University, and Colorado State University. Both sheep showed extensive Psoroptes infestations. Other sheep observed during the capture operation also exhibited symptoms of scabies. Subsequently it was determined by the New Mexico Department of Game and Fish, and the U. S. Fish and Wildlife Service that a concentrated effort to salvage as many sheep as possible should be undertaken. It was felt that without the salvage operation the only remaining viable desert bighorn sheep population within the state of New Mexico would be in jeopardy.

The salvage operation lasted from November 17-26, 1979. A total of 47 sheep were removed from the refuge and surrounding areas with 30 of them surviving the capture and treatment operation.

Methods and techniques used in the capture and treatment operation are outlined below.

1. Capture

Capture techniques used were a combination of the following:

- A. Using a 20' x20' entanglement net fired from a hand held gun out of a helicopter. After netting the sheep were sedated and transported to the treatment site.
- B. By darting the sheep with radio transmitter equipped hypodermic syringe projectiles loaded with M-99 and Rompum. A helicopter was used to pursue the sheep until they were darted. By utilizing the transmitter equipped darts, several sheep could be darted without having to follow each one until it went down. Darted sheep were easily located by homing in on the transmitter signal.

2. Transportation

After capture and sedation the sheep were loaded into canvas bags, suspended below a helicopter and transported to the treatment site.



Desert bighorn ewe arriving at the treatment site.

MMH 11/79

3. Treatment

The actual treatment procedure consisted of:

- A. Mechanically cleaning out the sheeps' ears and applying the chemical solution directly into the ears.
- B. Hand dipping each animal in a small vat of insecticide solution.
- C. After dipping, the sheep were placed on a drain back apron to allow any excess solution to return to the vat.
- D. The sheep were then placed into a large trailer to dry out before being released into the holding paddocks.

All treatment operations took place approximately one-half mile from the holding paddocks. The dipping vat was enclosed in a shallow basin surrounded by dikes and lined with plastic to prevent soil contamination should an accidental spill occur. In conjunction with the treatment site, a 100' x 100' area was cleared and leveled for operational activities. Both sites were inspected and approved by a New Mexico state archeologist.

The chemical used in the dipping vat was toxaphene, trade name Cooper TOX, (E.P.A. No. 59-28-AA, chlorinated camphene 61%, xylene 6.75%, kerosene 19.05%, inert 13.20%). Toxaphene is on the EPA restricted use list.

The maximum non-toxic dose of toxaphene through dermal absorption on sheep is 2% active ingredient. The minimum toxic dose is 4% active ingredient. The actual dipping solution contained .5% to .6% active ingredient (3 quarts of toxaphene and 100 gallons of water). A sample of the mixture was analyzed by the USDA lab to assure the correct mixture. All transportation, handling, storage, and disposal of the pesticide was performed by licensed USDA personnel according to EPA regulations. No chemical concentrate was stored on site. The pesticide applicators wore protective safety equipment and emergency fresh water was available on site.



Scabies infested ewe on the drain-back apron immediately after being dipped in the toxaphene solution. MMH 11/79



The trailer the sheep were kept in until dry before being released into the paddocks. GPM 11/79

All sheep were treated twice, the second occurring 10 to 14 days after the first. This assured complete eradication of the scabies mites and compliance with USDA regulations. Blood, hair, and fecal samples were taken from every sheep captured and all sheep mortalities which occurred during the removal and treatment operation had total necropsies performed.

There were 14 mortalities which occurred on site during capture and treatment activities as listed below:

- 2 ewes from fall during capture (net)
- 3 (1 ewe, 2 rams) from hyperventilation and respiratory distress caused by drug overdose.
- 3 (2 ewes, 1 ram) from hyperthermic shock
- 2 ewes from hypothermia
- 1 ewe from capture myopathy
- 2 ewes from capture injuries (dart wounds)
- 1 ewe from undetermined causes

Two mortalities occurred later at New Mexico State University where several sheep were taken for scabies transmission studies. One ewe broke her neck by running into the fence and 1 ewe died from toxaphene inhalation.

At White Sands Missile Range, one ewe with a badly dislocated hip was euthanized.

At the Red Rock holding pasture one ewe died of a severe infection from a dart wound, and another ewe died of unknown causes.

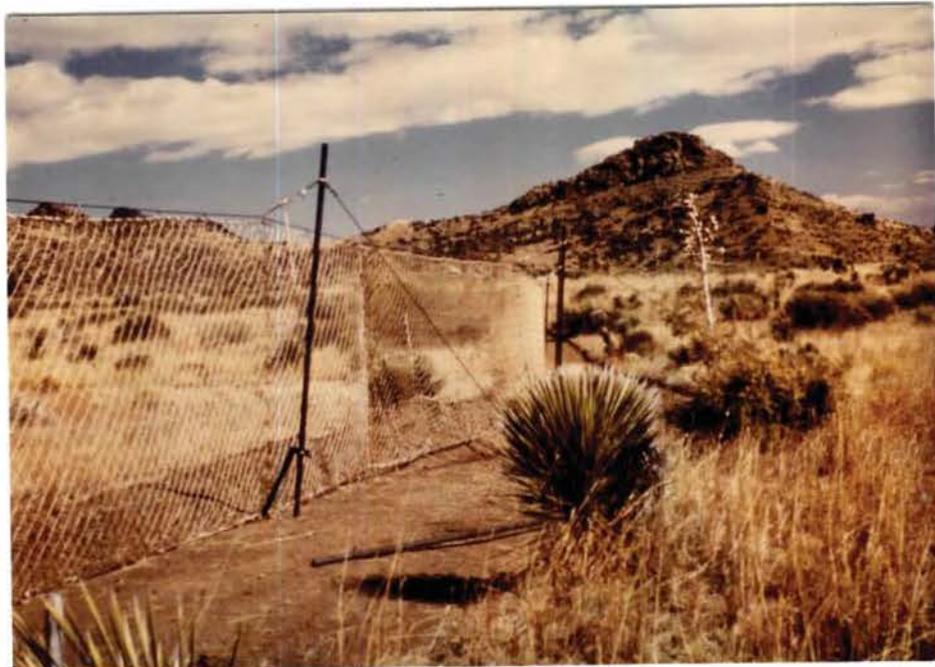
4. Holding Paddocks

Two approximately ten acre holding paddocks were erected in the old Lena Cox ranch area just south of the refuge.

The paddocks were made of an eight foot high nylon mesh stretched between two horizontal cables. A fire break was dozed around the paddocks. The area was inspected and approved by a state archeologist. The paddocks were built adjacent to an existing working windmill to supply water. This paddock had been used successfully by the New Mexico Department of Game and Fish in their bighorn sheep reintroduction project in the Big Hatchet Mountains of southern New Mexico.



Operations, treatment and holding paddock site.
MMH 11/79



Close-up view of holding paddock. MMH 11/79

5. Care and Feeding

New Mexico Department of Game and Fish and Bosque del Apache National Wildlife Refuge provided observers to constantly monitor the captured sheep. The sheep were fed alfalfa while in captivity.



Treated bighorns after being released into the holding paddocks. MMH 11/79

All 47 sheep captured were infected with scabies and many were in extremely poor physical condition due to scabies and the resulting secondary infections. Severe infections of scabies in the ears of nearly all the sheep had rendered most of them partially-to-completely deaf. Twenty-eight of these sheep are currently being held at the New Mexico Department of Game and Fish bighorn propagation facility at Red Rock, New Mexico, for propagation and future relocation back into the San Andres Mountains and other areas. The other two sheep were taken to New Mexico State University for scabies transmission studies.

Mule Deer

The refuge mule deer population continued to decline during 1979 and as a result, no mule deer hunt was held for the first time in three decades. Overhunting, mountain lion predation and poor fawn survival were the suspected causes for the population decline.



One of the 47 sheep captured, this one had the most severe infestation of scabies. This ewe died 1½ days after capture. MMH 11/79



The same ewe as above, note how large plaques of scab could be peeled off. MMH 11/79



Another view of the same ewe, after most of the scab has been removed. MMH 11/79

2. Other Mammals

The mountain lion, bobcat and coyote are the primary mammalian predators on the refuge. Bobcat and coyote populations remained static while the mountain lion population increased substantially. Fresh mountain lion sign could be seen at virtually every spring on the refuge. The increase in mountain lions was attributed to the good supply of diseased, partially deaf bighorn sheep which were easy prey for a healthy lion.

During the bighorn sheep capture operation, an adult barbary sheep ram (auodad) weighing 326 pounds was darted and captured on Bennett Mountain in the southern portion of the refuge. Also, prior to the capture operation, 5 barbary sheep were seen by Andy Sandoval, the State bighorn sheep biologist, in the northern portion of the refuge. Fortunately Andy was able to eliminate 3 of the 5 the next day. Barbary sheep appear to be expanding their ranges in New Mexico and efforts are being made to prevent their colonization of bighorn sheep habitat throughout the state.



Ten year old, 326 pound barbary sheep ram captured during the bighorn removal operation. No scabies mites were found on this animal.

MMH 11/79

3. Resident Birds

Nothing to report.

4. Other Animal Life

Nothing to report.

V. INTERPRETATION AND RECREATION

Nothing to report.

IV. OTHER ITEMS

A. Field Investigations

Nothing to report.

B. Cooperative Programs

The bighorn sheep capture and removal operation was a cooperative program involving the U. S. Fish and Wildlife Service, New Mexico Department of Game and Fish, White Sands Missile Range, U. S. Department of Agriculture,

New Mexico State University, Colorado State University, and Alpine Helicopters, owned and operated by Tim Wallace from New Zealand.



Lots of help was on hand. Cooperating agencies represented in this picture include Fish and Wildlife Service, New Mexico Game and Fish, U. S. Army - White Sands Missile Range, U. S. Department of Agriculture, Colorado State University, and University of New Mexico.

C. Items of Interest

Tim Wallace, owner of Alpine Helicopters of New Zealand, and his gunner, Colin Yeates, also of Alpine Helicopters, graciously donated their time and equipment to the bighorn sheep rescue operation.

Also of interest, the bighorn sheep rescue operation was highlighted nation-wide on the ABC evening news, as well as on several local TV and radio programs throughout New Mexico and Texas.

This report was written by Mike Hawkes, refuge biologist for the Bosque del Apache, Sevilleta, and San Andres NWR's complex and typed by refuge clerk, Romero.

D. Safety

Nothing to report.



Part of the support services supplied by White Sands Missile Range. MMH 11/79



New Zealanders, Tim Wallace (center, and Colin Yeates (left). GP, 11/79