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PERFORMANCE REPORT

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FEDERAL AID IN WILDLIFE RESTORATION ACT

TEXAS

Federal Aid Project No. W-109-R-6

BIG GAME INVESTIGATIONS

Job No. 49: Mule Deer Predation

Principal Investigator: Jerry L. Cooke

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Science and Resources Management
Big Bend National Park, Texas

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April 22, 1983

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ABSTRACT

Surveys were conducted on the Black Gap Wildlife Management Area and the western one-third of the Big Bend National Park to determine the effects of predator control on desert mule deer populations. Spotlight surveys indicated comparable desert mule deer populations on the two areas, with observed fawn to doe ratios of 1.00 on Black Gap and 0.80 in the Park. Scent stake indices were similar on both areas for grey fox (non-target) while the coyote index on Black Gap was approximately 20 per cent that of the Park. Lions are considered controlled in the effective area on Black Gap with four cats ranging on the periphery. Predation buffer species were found to be comparable on both areas and habitat conditions as determined by vegetative surveys showed no detectable statistical differences ($F=1.298$, d.f.=1,3, n.s.). Predator control resulted in the removal of 15 mountain lions, 30 coyotes and 4 grey foxes (non-target) on the Black Gap Wildlife Management Area during this segment. Cost benefits are presented.

PERFORMANCE REPORT

State: Texas Project Number: W-109-R-6
Project Title: Texas Big Game Investigations
Study Title: Big Game Harvest Regulations
Period Covered: March 1, 1982 through February 28, 1983
Objective Number: XLI Job Number: 49

I. Objective:

1. To measure the effects of 240 man-days of annual effort of mountain lion and coyote population reduction on the desert mule deer population on the Black Gap Wildlife Management Area of Texas.
2. To determine average 5-year and longer term cost per predator removed (species specific) in relation to value of unit gains (or losses) in the desert mule deer population on the Black Gap Wildlife Management Area.

II. Background:

No studies have been done on Texas mule deer herds to determine the significance of predation as a limiting factor; however, several studies in other states have indicated that losses from predation are as high as hunter harvest and that predation can suppress mule deer populations (Connally, 1981, in Mule and Black-tailed Deer of North America, edited by O. C. Wallmo). In Texas, several studies of predator relationships to white-tailed deer have been conducted. Knowlton (1964) found that the occurrence of deer in coyote scats and stomachs in South Texas increased during the fawning season. Carroll and Brown (1977) found that 50 percent of neonatal fawn mortality was caused by predation from coyotes in Lavaca and Gonzales Counties but concluded that predation losses were directly related to cover conditions and general physical condition of the deer herd. Cooke, et al (1971), working on the Wedler Wildlife Refuge in South Texas, found that predation, mostly by coyotes, was the major cause of mortality in newborn fawns. Beasom (1974) was able to increase deer productivity on a study area on the King Ranch through an intensive predator control program; however, predators from adjacent ranges rapidly infiltrated into the treated area; therefore, only short-term benefits could be expected from an intermittent or seasonal control program. Furthermore, Beasom felt that intensive predator control could not be justified on an economic basis unless hunter harvest was increased to utilize the surplus animals resulting from the control program.

III. Procedures:

1. Deer Population Trends

Deer were censused on the Black Gap Wildlife Management Area and on

the western one-third of Big Bend National Park by utilizing established spotlight cruise lines.

2. Coyote and Mountain Lion Population Trends

Coyote and mountain lion population trends were monitored on the Black Gap Wildlife Management Area and the western one-third of Big Bend National Park.

3. Javelina and Rabbit Population Trends

Javelina and rabbit population trends were monitored on the Black Gap Wildlife Management Area and western one-third of Big Bend National Park.

4. Habitat Conditions

Vegetation was monitored on both the Black Gap Wildlife Management Area and the western one-third of Big Bend National Park utilizing previously established vegetative transects. Rainfall records were maintained for both areas.

5. Predator Control

A total of 119 man-days of predator control effort was conducted on the Black Gap Wildlife Management Area under Texas Federal Aid Project W-48-D, Job 16. No predator control was conducted on Big Bend National Park.

6. Cost Benefit

Cost records were maintained by control method for each predator removed.

IV.&V. Findings and Analysis:

1. Deer Population Trends:

Spotlight surveys were conducted on the Black Gap Wildlife Management Area and the western one-third of Big Bend National Park (contrast area of no predator control). These surveys indicate that mule deer populations are comparable though somewhat higher in the Park (Tables 1 & 2). No deer were observed on day-light mobile surveys on either area and population composition was determined by deer observed on the spotlight surveys. Estimated reproduction on both areas was considered excellent, with observed fawn to doe ratios of 1.00 on Black Gap and 0.80 in the Park.

Desert mule deer estimates indicate a total population increase on the Black Gap from 300 to 391 deer between the 1981 and 1982 fall surveys.

2. Coyote and Mountain Lion Population Trends:

During February 1983, scent stake surveys were conducted on the Black Gap and the Park. Stations were established at .3 mile intervals to index

coyote, fox (non-target) and lion visits. These data (Table 3) indicate the indices for coyote and lion visits were significantly higher in the Park, while the indices for fox were equivalent. No visits were detected on either area for bobcat (non-target).

Observations on the Black Gap indicate no resident lions in the area presently under control. Four lions are known to range on the periphery not yet included in the effective area.

3. Javelina and Rabbit Population Trends:

Density estimates for javelina, and rabbit populations based on spotlight surveys are presented in Table 4. Though combined rabbit estimates appear similar on both areas, inexperience with this index indicate interpretation should be held for subsequent estimates, where trends if any can be monitored. No javelina were observed on either area during the surveys.

Hunter observations of javelina and mule deer were recorded during the 1983 javelina hunt on the Black Gap. These observations were indexed to man-days per sighting for comparison. Javelina (.38 man-days per sighting) were sighted approximately 3.5 times as frequently as mule deer (1.35 man-days per sighting). No source of quantitative comparison has been found to index the javelina population in the Park beyond spotlight surveys.

4. Habitat Conditions:

Vegetative surveys, consisting of 20 feet by 1 foot belt transects, were conducted on Black Gap and the Park. The vegetative type summaries for cover and percent composition are presented in Table 5. No statistical difference was detected between the two areas. ($F=1.298$, d.f.=1,3, n.s.). Vegetative cover by species is found in Appendices 1-8.

5. Predator Control:

Predator control was conducted under Texas Federal Aid Project W-48-D, Job 16, on the Black Gap. No predator control has been applied to Big Bend National Park. On the Black Gap, predator sign was continuously sought for target species (mountain lions and coyotes) and trap-sites were located and maintained. Dogs were used to determine movement patterns of mountain lions on the Area. Although dog use greatly improved the efficiency of trapping, some lions were also caught in rough country with dogs where trapping was not feasible. During this project segment, 15 mountain lions, 30 coyotes and 4 grey foxes (non-target) were removed from the Area.

6. Cost Benefit:

Records were maintained indicating removal techniques of each animal. All coyotes were removed by steel leghold traps. Five mountain lions were taken by dogs where trapping was not feasible. Of the 10 mountain lions taken by steel leghold trap, eight were detected by dogs before trapping. Dogs were also required to locate four mountain lions after

trapping. Though steel leghold traps are an important part of this control effort, it would appear that the use of dogs can greatly increase their effectiveness.

During this project segment, use of dogs required approximately 45 per cent of the man-days of effort employed in the total control effort of 119 man-days.

VI. Recommendations:

None

VII. Prepared by: Jerry L. Cooke
Biologist II

Approved: _____
Wildlife Coordinator

Date: April 22, 1983

Robert L. West
Regional Director for Wildlife
Region I

Table 1. Desert mule deer population data from spotlight surveys on the Black Gap Wildlife Management Area, 1982.

Classification	No. Observed	Deer/1,000 acres*
Bucks	2	0.73
Does	4	1.46
Fawns	4	1.46
Undeter.	12	----
Totals	21	3.65

*Based on 5,746.8 acres sampled.

Table 2. Desert mule deer population data from spotlight surveys on the Big Bend National Park, 1982.

Classification	No. Observed	Deer/1,000 acres*
Bucks	3	1.32
Does	5	2.20
Fawns	4	1.76
Undeter.	4	----
Totals	16	5.28

*Based on 3,033.0 acres sampled.

Table 3. Comparison of scent stake survey indices for the Black Gap Wildlife Management Area and Big Bend National Park, February, 1983.*

Species	Black Gap WMA	Big Bend NP
Coyote	31.3	273.5
Fox	177.1	170.9
Mountain Lion	0.0	8.5

*Based on standard USFWS scent stake survey procedures.

Table 4. Estimates of javelina, jackrabbit and cottontail rabbit densities from spotlight surveys on the Black Gap Wildlife Management Area and Big Bend National Park, 1982.*

Species	Black Gap WMA	Big Bend NP
Javelina	0.00	0.00
Jackrabbit	1.22	0.99
Cottontail rabbit	0.00	0.33

*Expressed as animals/1,000 acres.

Table 5. Ground cover and composition from 55 vegetative transects on the Black Gap Wildlife Management Area, 1982.

Cover Type	Sq. Ft.	Per Cent
Grasses	70.60	6.4
Forbs	29.69	2.7
Shrubs	119.68	10.9
Cacti	7.34	0.7
Bare Ground	872.66	79.3

Table 6. Ground cover and composition from 21 vegetative transects on Big Bend National Park, 1982.

Cover Type	Sq. Ft.	Per Cent
Grasses	38.44	9.2
Forbs	5.52	1.3
Shrubs	59.79	14.2
Cacti	2.65	0.6
Bare Ground	313.58	74.7

Appendix A

Black Gap Wildlife Management Area vegetative transect data, 1982.

<u>Scientific Name</u>	<u>Crown Cover/Sq. Ft.</u>
<u>GRASSES</u>	
Andropogon sp.	0.72
Aristida sp.	3.72
Bouteloua breviseta	33.37
Bouteloua hirsuta	0.00
Bouteloua sp.	0.04
Bouteloua trifida	1.97
Buchloe dactyloides	2.23
Heteropogon contortus	0.05
Hilaria mutica	12.18
Leptoloma cognatum	0.27
Panicum antidotale	1.00
Panicum hallii	0.72
Trichachne californica	8.45
Tridens muticus	4.28
Tridens pulchellum	0.66
Tridens sp.	0.80
Unknown grass	0.07
Total grasses	70.60
<u>FORBS</u>	
Ambrosia sp.	0.24
Argythamnia neomexicana	0.33
Bahia absinthifolia	0.29
Cassia sp.	0.00
Cheilanthes alabamensis	0.00
Coldenia canescens	1.08
Croton sp.	0.38
Dalea neomexicana	0.13
Dyssodia micropoides	0.00
Dyssodia sp.	0.88
Euphorbia antisyphilitica	21.22
Euphorbia cinerascens	0.14
Euphorbia sp.	0.00
Heliotropium confertifolium	0.66
Heliotropium greggii	0.40
Heliotropium sp.	0.29
Hoffmanseggia sp.	0.01
Lesquerella sp.	0.00
Linum rifidum berlandieri	0.04
Linum sp.	0.08
Machaeranthera pinnatifida	0.08

<u>Scientific Name</u>	<u>Crown Cover/Sq. Ft.</u>
<u>FORBS</u>	
Melampodium hispidum	0.68
Melapodium leucanthus	0.36
Menodora scabra	0.03
Nerisyrenia camporum	0.00
Polygala alba	0.10
Polygala macrodenia	0.06
Ruellia parryi	0.01
Selaginella lepidophylla	0.98
Sida filicanlis	0.01
Thelasperma sp.	0.01
Unknown forb	0.88
Xanthocephalum sp.	0.15
Total forbs	29.69
<u>SHRUBS</u>	
Acacia constricta	21.94
Acacia roemeriana	0.06
Agave lechuguilla	20.57
Callandra eriophylla	0.21
Calliandra conferta	0.12
Dalea formosa	1.74
Dasyilirion leiophyllum	4.58
Ephedra sp.	3.05
Fraxinus greggii	1.80
Hectia texensis	3.50
Jatropha dioica	1.06
Koeberlinia spinosa	0.14
Krameria glandulosa	0.00
Larrea tridentata	26.34
Leucophyllum frutescens	11.14
Leucophyllum minus	10.19
Parthenium incanum	0.86
Perlieria angustifolia	0.05
Prosopis sp.	1.18
Unknown shrub	0.36
Viguera stenoloba	7.34
Yucca elata	0.04
Yucca torreyi	1.44
Zexmenia brevifolia	0.14
Ziziphus obtusifolia	1.70
Total Shrubs	119.68

<u>Scientific Name</u>	<u>Crown Cover/Sq. Ft.</u>
<u>CACTI</u>	
Ariocarpus fissuratus	0.01
Echinocactus horizonthalonius	0.03
Echinocereus enneacanthus	0.04
Echinocereus rigidissimus	0.00
Echinocereus stramineus	0.38
Opuntia engelmanni	0.59
Opuntia grahamii	0.01
Opuntia leptocaulis	0.41
Opuntia macroncentra	0.98
Opuntia phaeacantha	0.73
Opuntia sp.	4.12
Unknown cacti	0.00
Total Cacti	7.34
Bare ground	872.66

Appendix B

Big Bend National Park vegetative transect date, 1982.

<u>Scientific Name</u>	<u>Crown Cover/Sq. Ft.</u>
<u>GRASSES</u>	
Aristida sp.	1.10
Bouteloua barbata	4.16
Bouteloua breviseta	7.76
Bouteloua curtipendula	0.02
Bouteloua eriopoda	13.25
Bouteloua sp.	0.61
Bouteloua trifida	1.11
Heteropogon contortus	3.09
Leptoloma cognatum	1.26
Panicum hallii	0.60
Setaria macrostachya	0.01
Sporobolus cryptandrus	0.06
Trichachne claifornica	2.38
Tridens muticus	0.96
Tridens pulchellum	1.98
Tridens sp.	0.02
Total Grasses	38.44
<u>FORBS</u>	
Arabidosid thaliana	0.01
Argythamnia neomexicana	0.10
Astragalus sp.	0.07
Bahia absinthifolia	0.29
Baileya multiradiata	0.01
Coldenia canescens	0.34
Coldenia hispidissima	0.09
Croton neomexicana	0.01
Croton pottsii	0.04
Croton sp.	0.28
Dalea greggi	0.09
Dalea neomexicana	0.51
Descurainia sp.	0.04
Dyssodia aurea	0.10
Dyssodia pentachaeta	0.12
Dyssodia sp.	0.18
Euphorbia cinerascens	0.22
Euphorbia sp.	0.25
Lesquerella fendleri	0.06
Malva sp.	0.06
Nerisyrenia camporum	0.09
Phyllanthus polygonoides	0.02

<u>Scientific Name</u>	<u>Crown Cover/Sq. Ft.</u>
<u>FORBS</u>	
Polygala macrodenia	0.13
Polygala sp.	0.03
Psilostrophe tagetina	0.30
Quincula lobata	0.45
Ruellia parryi	0.64
Sida filicanlis	0.00
Unknown forb	0.75
Verbena neomexicana	0.02
Verbena pumila	0.01
Xanthocephalum sp.	0.06
Total Forbs	5.52
<u>SHRUBS</u>	
Acacia constricta	1.66
Agave lechuguilla	12.18
Callandra eriophylla	0.44
Coldenia greggii	0.63
Dalea formosa	0.61
Evolvulus sp.	0.03
Flourensia cernua	0.08
Fouquieria solendens	0.05
Hibiscus denudatus	1.57
Jatropha dioica	0.44
Krameria glandulosa	1.46
Krameria sp.	1.27
Larrea tridentata	13.38
Parthenium incanum	3.18
Perlieria angustifolia	0.75
Prosopis sp.	2.07
Unknown shrub	8.10
Viguera stenoloba	4.01
Yucca sp.	0.23
Zexmeniz brevifolia	7.54
Total shrubs	59.79
<u>CACTI</u>	
Echinocereus dasyacanthus	0.08
Echinocereus rigidissimus	0.12
Echinocereus stramineus	2.33
Opuntia leptocaulis	0.07
Opuntia sp.	0.03
Total Cacti	2.65
Bare Ground	313.58