Wyoming Animal Damage Management Board

2006 Project Summaries

Supplement to the 2006 Annual Report

Compiled for the ADMB by Hank Uhden

Standing Projects:

1. Whiskey Mountain Big Horn Sheep Project. Funding: $18,000.00 (Carry Over Funds)

   Synopsis: Management of coyotes on Whiskey Mountain to enhance Big Horn Sheep lamb survival under a timed and targeted program. Whiskey Mountain Bighorn Sheep have suffered a 40 - 60 % die-off in 1991, and has suffered from extremely low lamb survival since that time. Coyote management will be used as one management component to improve lamb survival and herd viability. Submitted by The Wyoming Chapter of the Foundation for North American Wild Sheep.

2. Cattle Depredation Statistical Survey. Funding: $8,000.00

   Synopsis. The ADMB entered into an agreement with the U.S.D.A. National Agricultural Statistics Service to conduct an annual survey on depredation on cattle. This survey is conducted during the month of January coinciding with established survey of producers. The survey requests information on all depredation and other causes. This survey has only been conducted previously once every five years. Submitted by the WY ADMB.

3. Badger Creek - Hanging Woman Fawn Predation Project. Funding: $9,120.00

   Synopsis: Coyote management to enhance antelope and deer fawn survival. Project include areas of management and control (no predator management) areas to provide comparative results. Management will include timed and targeted predator management in the project area. Project is being conducted in cooperation with the Game & Fish, who will conduct antelope and deer population census and classification. Submitted by: Sheridan County Predatory Animal Board.

4. Black Bear/Mountain Lion/Livestock Depredation Prevention. Funding 25% cost share, $12,500.00 cap on expenditure.

   Synopsis: Funding cost share on a 25:75 match up to a maximum of $12,500 with the Wyoming Game & Fish Commission and Wildlife Services to alleviate black bear, grizzly bear, mountain lion depredation to livestock, bees and beehives in all counties of the state. Submitted by: Wyoming Game & Fish.

5. Coyote Specific Delivery Mechanism. Funding: 6,936.50

   Synopsis: This phase of an on-going coyote management project will investigate the development of a self-activated delivery mechanism for oral baits specifically to coyotes, thereby reducing/eliminating the threat of bait exposure to non-target species. Project is jointly funded by the Texas Sheep and Goat Predator Management Board. Specific testing will be on free-ranging coyotes to test the effectiveness of the target specific delivery system. Submitted by the University of Wyoming.

6. Project Title: DNA analysis for control of predatory wolves. Funding: $15,115.00

   Synopsis: Analysis of DNA isolated from predator saliva, blood, feces and/or hair can be used to identify the species, sex, and/or individual genotype of the predator. Results of this project should allow development of predator sample collection protocols and enhance management strategies. Submitted by: National Wildlife Research Center.

7. Project Title: Fremont County sage grouse/mule deer project. Funding: $10,000.00

   Synopsis: Project has three components: 1) Identification of predators affecting sage grouse nesting sites through the use of motion cameras; 2) measure and document differences in nesting success between areas of predator management and non-managed areas; 3) To enhance a struggling mule deer population to desired population levels. Submitted by: Fremont County Predatory Animal Board.

New Projects:

1. Project Title: Regional Symposia on the use and utilization of Livestock Guarding Dogs. Funding: $5,000.00

   Synopsis: More than 20 years has lapsed since any major effort has been made to promote and educate the use, applicability, benefits and limitations of livestock guarding dogs (LGDs) in the inter-mountain area. The proposal is to initiate, plan, promote and produce a major regional symposium on LGDs, focusing on both historical information, and bringing new information on uses of LGDs to the livestock industry. Submitted by the Wyoming Wool Growers Association.

2. Project Title: Quantification of losses dues to predation on Wyoming sheep operations. Funding: $42,800.00

   Synopsis: Three sheep operations will participate in the following: pregnancy testing of ewes, including number of fetuses will be determined ultrasonically. These sheep will be followed through docking and weaning of lambs, losses to various causes, including predation will be determined. Use of ultrasound technology should provide more definitive assessment of actual loss on Wyoming sheep operations. Colorado State University will participate in the ultrasound procedures. Additional laboratory services will be utilized for blood sample work and necropsy. Submitted by the Wyoming Wool Growers Association.

3. Project Title: Bear Conflict Trap Request. Funding: $4,000.00

   Synopsis: Funding for the purchase of culvert/box traps to be used to manage bear conflicts in the Jackson/Pinedale region and utilized elsewhere statewide when needed. Newer traps are more efficient and safer for operator use. Submitted by the Wyoming Game & Fish.

4. Project Title: North Fork Human/Bear Conflict Resolution. Funding: $15,000.00

   Synopsis: Project seeks to minimize human/bear conflicts, maximize human safety issues, minimize livestock losses, minimize property damage, minimize human interactions with bears and minimize human caused bear mortalities. This is to be done by making methods for proper storage of attractants and garbage available to the North Fork residents, making materials for storage or deterrent of attractants available, and implementing a continuing education and outreach program. Submitted by the Wyoming Game & Fish.

5. Project Title: Upper Green River Food and Waste Storage Project. Funding: $2,000.00

   Synopsis: Funding to provide food and trash storage containers, or modifying existing containers to prevent habituation of grizzly and black bears at rural business locations. Submitted by the Wyoming Game & Fish.

6. Project Title: Absaroka Elk Ecology Project. Funding: $59,528.50

   Radio-telemetry study to determine status of migratory and resident elk and examine elk seasonal movements and habitat use, including elk habitat selection response to wolf pack distribution and movement. Submitted by the Wyoming Game & Fish.

Wyoming Chapter
Foundation for North American Wild Sheep

Whiskey Mountain.

Wyoming Chapter

Foundation for
North American
Wild Sheep

Hi Hank,
Here is a short update on what Wildlife Services has done since mid summer of 2006 on Whiskey Mountain Big Horn Sheep Project.

- 72 hrs ground time (setting traps and ground crew for airplane)- $2304.00
- 14.4 hrs air time----------$1,800.00

Total-- $4,104.00

19 Coyotes were taken.

It appears to a lot of us that this program is working very well. On November, 9th I observed 41 Ewe's with 31 Lamb's with them on Tory Rim. On November,19th I was on Sheep Ridge and observed 58 Ewe's with 24 Lamb's and with them were a good number of one, two, and three year old Rams.

Cole Thompson, Dubois Game Warden observed at least a 50% Lamb crop in area 22 East of Dubois, and says he is seeing a great increase in numbers of Lambs on the north side of area 22where a lot of Coyote control has been done from the air.

The amazing part of this is we are seeing these results in one of the worst drought years in almost a century. Simply Amazing!

Thanks,

Fritz Meyer
Wyoming F.N.A.W.S. Board Member.
307-455-2464

Cattle Depredation Statistical Survey

(In progress – Survey not completed until January, 2007)

CATTLE LOSSES TO ALL CAUSES
2005

USDA NASS
Wyoming Field Office
National Agricultural Statistics Service

PO Box 1148
Cheyenne WY 82003
1-800-892-1660
www.nass.usda.gov/wy

Dear Data Users,

Wyoming cattle producers lost an estimated 42,000 head of cattle and calves to predators, weather, respiratory problems, calving problems, and other causes in 2005. These results are from the January 2005 Cattle Survey. Total losses were up by 1,000 head from 2004. Predators accounted for 10 percent of combined cattle and calf losses and 11 percent of calf losses. Respiratory problems, calving problems, and weather were the largest causes. The total value of all losses was estimated at $25.3 million.

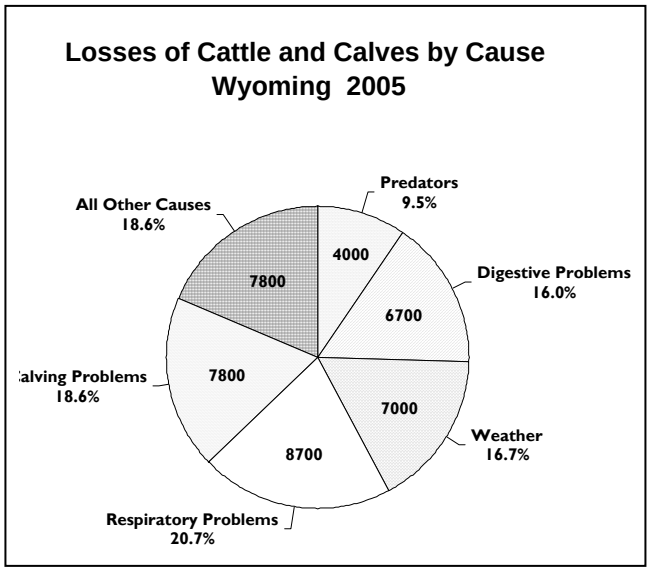
We thank all Wyoming ranchers and farmers for their help with this survey. This year's survey was funded by Wildlife Services, USDA. Last year's survey was funded by the Wyoming Animal Damage Management Board.

If you have any question about this report please call us toll-free at 1-800-892-1660.

Sincerely,

Dick Coulter

Dick Coulter
Director



Losses of Cattle and Calves by Cause: Wyoming, 2004 and 2005

Cause of Loss	2004			2005		
	Cattle	Calves	Cattle and Calves	Cattle	Calves	Cattle and Calves
	Head	Head	Head	Head	Head	Head
Grizzly Bears	1/	300	300	1/	200	200
Black Bears	1/	100	100	1/	100	100
Coyotes	100	2,100	2,200	100	2,100	2,200
Dogs	1/	100	100	—	100	100
Bobcats	—	—	—	—	1/	1/
Eagles	—	100	100	—	1/	1/
Mountain Lions	100	400	500	100	400	500
Wolves	100	500	600	200	500	700
Other Predators	100	—	100	100	100	200
Total Predators	400	3,600	4,000	500	3,500	4,000
Old Age	2,000	—	2,000	2/	—	2/
Digestive Problems	1,400	4,400	5,800	1,200	5,500	6,700
Respiratory Problems	1,600	6,400	8,000	2,700	6,000	8,700
Metabolic Problems	300	200	500	200	2/	200
Other Disease	600	1,100	1,700	600	800	1,400
Weather Related	1,700	5,400	7,100	1,000	6,000	7,000
Calving	1,100	7,500	8,600	800	7,000	7,800
Poisoning	1,100	400	1,500	800	700	1,500
Theft	200	—	200	100	500	600
Other Non-Predator 3/	600	1,000	1,600	3,100	1,000	4,100
Total Non-Predators	10,600	26,400	37,000	10,500	27,500	38,000
Total Loss All Causes	11,000	30,000	41,000	11,000	31,000	42,000

1/ Included in Other Predators
2/ Included in Other Non-Predator
3/ Includes "Old Age" in 2005

Value of Losses of Cattle and Calves: Wyoming 2004 and 2005 1/

Cause of Loss	Cattle		Calves		Cattle and Calves	
	2004	2005	2004	2005	2004	2005
	Dollars		Dollars		Dollars	
Grizzly Bears	2/	2/	117,000	84,000	117,000	84,000
Black Bears	2/	2/	39,000	42,000	39,000	42,000
Coyotes	96,500	111,300	819,000	882,000	915,500	993,300
Dogs	2/	—	39,000	42,000	39,000	42,000
Bobcats	—	—	—	2/	—	2/
Eagles	—	—	39,000	2/	39,000	2/
Mountain Lions	96,500	111,300	156,000	168,000	252,500	279,300
Wolves	96,500	222,600	195,000	210,000	291,500	432,600
Other Predators	96,500	111,300	—	42,000	96,500	153,300
Total Predators	386,000	556,500	1,404,000	1,470,000	1,790,000	2,026,500
Old Age	1,930,000	3/	—	—	1,930,000	3/
Digestive Problems	1,351,000	1,335,600	1,716,000	2,310,000	3,067,000	3,645,600
Respiratory Problems	1,544,000	3,005,100	2,496,000	2,520,000	4,040,000	5,525,100
Metabolic Problems	289,500	222,600	78,000	3/	367,500	222,600
Other Disease	579,000	667,800	429,000	336,000	1,008,000	1,003,800
Weather Related	1,650,500	1,113,000	2,106,000	2,520,000	3,746,500	3,633,000
Calving	1,061,500	890,400	2,925,000	2,940,000	3,986,500	3,830,400
Poisoning	1,061,500	890,400	156,000	294,000	1,217,500	1,184,400
Theft	193,000	111,300	—	210,000	193,000	321,300
Other Non-Predator 4/	579,000	3,450,300	390,000	420,000	969,000	3,870,300
Total Non-Predators	10,229,000	11,686,500	10,296,000	11,550,000	20,525,000	23,236,500
Total Loss All Causes	10,615,000	12,243,000	11,700,000	13,020,000	22,315,000	25,263,000

1/ Cattle value is based on a two year average value per head of beef cows. The average value used for 2004 was $965.00; the average value for 2005 was $1,113. Calf value per head is based on market year average price for calves times a 300 pound calf. The average calf value used for 2004 was $390; the average value for 2005 was $420.

2/ Included in Other Predators

3/ Included in Other Non-Predators

4/ Includes "Old Age"

Losses of Cattle and Calves: Total by Cause within each Agricultural Statistics District, Wyoming 2005

Cause of Loss	Agricultural Statistics District					
	North West	North East	West	South Central	South East	State
	Head					
Total Predators	900	500	900	1,100	600	4,000
Digestive Problems	2,000	900	1,200	900	1,700	6,700
Respiratory Problems	1,300	1,400	1,300	1,900	2,800	8,700
Other Disease	100	100	300	300	600	1,400
Weather Related	500	2,000	1,200	1,900	1,400	7,000
Calving	1,100	2,500	1,200	1,500	1,500	7,800
Poisoning	500	200	200	400	200	1,500
All Other Non-Predator 1/	900	1,100	900	1,000	1,000	4,900
Total Non-Predators	6,400	8,200	6,300	7,900	9,200	38,000
Total Loss All Causes	**7,300**	**8,700**	**7,200**	**9,000**	**9,800**	**42,000**

1/ Includes "Old Age"

UNITED STATES DEPARTMENT OF AGRICULTURE
Wyoming Agricultural Statistics Service
PO Box 1148
Cheyenne, WY 82003

OFFICIAL BUSINESS

Badger Creek – Hanging Woman
Fawn Predation Project

Badger Creek/Hanging Woman Creek Mule Deer Predator Control Project

The Powder River Mule Deer herd unit (consisting of deer areas 17,18,23,26) and the Clearmont Antelope herd unit (consisting of area 15) have traditionally been among the most prolific in the state. The populations have shown extreme difficulty rebounding from a difficult winter in '83/'84. Wildlife managers, ranchers, outfitters, local businesses, photographers and other outdoor enthusiasts have expressed concern. Speculation as to the reason for slow recruitment has of course been a source for conversation. Recent, very mild winters have failed to help the situation and speculation continues. Coyote predation is believed by many to be a major influence. A study could provide validity to that belief or suggest that other factors are more influential. If coyote numbers were reduced in a test area and doe/fawn ratios rose to historical levels while they remained the same in a control area, then predation could be ruled substantial. If there were no significant differences after the study period then other factors could be considered.

The herd units are too large to consider for study areas, so portions of hunt areas would be preferred. The northern parts of deer area 23 and antelope area 15 provide a unique opportunity to conduct a study. There are few landowners and the area has traditionally exhibited lower fawn survival than the hunt areas as a whole.

Currently, the only organized predator control within this area has been conducted by the Sheridan Country Predatory Animal Board. An employed trapper attempts to take coyotes throughout the county in an attempt to keep numbers at a minimum. His primary mission is to attempt to alleviate coyote predation to livestock in areas where chronic problems exist. Private trappers also catch some coyotes throughout the winter months, but coverage is sporadic at best. Their success at reducing predation and having any kind of positive affect on antelope and mule deer recruitment is open to debate. The Predator Board believes it would be beneficial, not only to livestock producers, but to sportsmen also to find what affect coyotes are having on wildlife populations and is therefore offering this proposal for funding consideration.

A study area consisting of 186,240 acres has been drawn. It was divided into a "control" area consisting of all of the Badger Creek drainage within Wyoming and a "test" area consisting of all of the Hanging Woman Creek drainage within Wyoming. Of the total, 167,510 are private. Mule deer and antelope doe/fawn ratios are currently low but similar in both areas. Coyotes will be intensely hunted in the test area and not hunted in the control area. Mule deer and antelope classifications will be intensely conducted in both areas and the ratios compared.

It is proposed that this study take 3 years to conduct. Each year 3 hours will be spent at the appropriate times to fly with helicopter and classify both mule deer and antelope (6 hours/year) within the areas. Qualified wildlife biologists will conduct and record the classifications. A request will be made to the Wyoming Game and

Fish Department to do the classifying, but if they are unable, then other professionals will be sought.

During each year of the study, four helicopter flights of four hours each (total 16 hours/year) will be conducted during the winter months to hunt coyotes within the test area. A licensed pilot and gunner will be utilized and permission to hunt on the private lands will be obtained. Numbers of coyotes shot will be recorded along with stomach contents and possible blood samples taken.

At the end of each year and at the end of the study period all data will be compiled, analyzed, and submitted to the appropriate agencies for perusal. All information will be also for the public.

It would be anticipated that if favorable flying weather existed during the study period so that significant numbers of coyotes could be removed from the test area, fawn survival would increase. It would also be anticipated that fawn survival would be lower in the control area.

Badger Creek – Hanging Woman Fawn Predation Project
2005 – 2006 Final Report on First Year Results

August 13, 2005

Antelope classification was completed. 2.9 hours spent in Bell Jet Ranger. Two observers and pilot.

November 11, 2005

Mule deer classification was completed. 3.2 hours spent in Bell Jet Ranger. Two observers and pilot.

December 1 – 3, 2005

Two people on ground called in and dispatched six coyotes.

January 29, 2006

Two people on ground called in and dispatched two coyotes.

February 15, 2006

Nineteen degrees below zero. We received some snow last night and communicating with Alan Plummer decided to fly. Tried to contact Craig Acres, but only received fax machine buzz. Using Hiller helicopter, Alan and Bob Eisele the pilot, left Sheridan and worked from the west boundary of the Test Area toward Hanging Woman Creek. Working some the rougher country they found ten coyotes and removed all ten of them. Reaching Hanging Woman Creek they ran out of snow and decided to fly back to Sheridan. Total of 5.8 hours were used.

February 25, 2006

Seventeen degrees above zero. Receiving about four inches of snow since yesterday, we immediately lined up the helicopter to fly the Test Area and try to get into more of the country that had not been flown before. Again, because of short notice, we were not able to call Craig Acres to help with the stomach contents. I met the helicopter at 10:30 AM next to the Passaic road at the head of School House prong and talked to Bob Eisele and gunner Alan Plummer. Unfortunately the little bit of sunshine already had taken the snow off the sagebrush so conditions were not too good and tracking was hard. They had removed five coyotes by this time. After refueling they worked back west and removed seven more coyotes. All but one was recovered for stomach analysis. Total flying time was 4.5 hours.

NOTE: I have also been in contact with Kelly Hufeby from Wildlife Services. The main reason for using the helicopter on the project was to keep the airplane free for the rest of the county plus all of the other flying work Kelly needs to do out of our county. Kelly and I had decided last night that he should try flying today if the weather conditions were right. I met Kelly and his gunner at 8:15 AM on the Passaic road were they had landed. This is the boundary between the Test Area on the project and the southeast corner and Sheridan County. After going over where the project is taking place and is not taking place, Kelly flew for two hours on five ranches off the project. Again, conditions weren't

as favorable as we had hoped. Even though snow conditions were poor, Kelly was able to remove nine coyotes before quitting and returning home. I had called all five of these landowners early this morning to let them know that Wildlife Services would be flying today.

SUMMARY OF COYOTES REMOVED:

December 1-3	6 coyotes removed	1 adult male	empty stomach
		1 adult male-mange and 3 legged did not check stomach	
		1 adult female	full of rabbits
		2 juvenile males	mice and rabbits
		1 juvenile female	mice in stomach
January 29	2 coyotes removed	1 adult male	mice and rabbits
		1 adult female	mice and rabbits
Feb15 & 25 -TOTAL	22 coyotes removed	14 females	3 juveniles
			11 adults
		8 males	1 juvenile
			7 adult

Of the 22 coyotes removed from Test Area 16 were recovered for stomach analysis. 9 had deer and or antelope in them, the other 7 had rabbits and or mice.

Cole & Elaine Benton

From: "Tim Thomas" <Tim.Thomas@wgf.state.wy.us>
To: <griz@vcn.com>; <grizout@vcn.com>
Sent: Monday, January 16, 2006 9:18 PM
Subject: Survey Results

Cole

Sorry about the delay getting back to you. I have been out of town.

On August 13, 2005, we flew for 2.9 hours in the Bell Jet Ranger helicopoter conducting a pronghorn herd composition or classification survey. The survey was flown along north-south transects at approximately 4 km (2.48 mi) apart. There were two observers and the pilot. We observed the following:

Badger Creek
2 yrl males
30 adult males > 1.5 yrs old
75 adult females > 0.5 yrs old
64 juveniles
171 total pronghorn

Hanging Woman Creek
12 yrl males
32 adult males
56 adult females
36 juveniles
136 total pronghorn

As we discussed at the November 11, 2005 Sheridan Predator Board Meeting, I suggest we do not continue the pronghorn portion of this study since the landowners in the Badger Creek drainage have significantly increased harvest of pronghorn.

On November 15, 2005, we flew the mule classification survey for this study. This flight was in conjunction with regularly schedule deer surveys in hunt area 23. We flew for 3.2 hours in a Bell Jet Ranger along north-south transects at ~4 km (2.48 mi) intervals. There were two observers and the pilot. We observed the following:

Badger Creek
13 yrl males
40 adult males
116 adult females
91 juveniles
261 total mule deer

Hanging Woman Creek
2 yrl males
11 adult males
57 adult females
44 juveniles
114 total mule deer

June 12, 2006

There is $184.03 left of the 2005-2006 budget. We would like to continue this Hanging Woman – Badger Creek project with funding from the ADMB. In 2005-2006, we lost the $250 per hour helicopter and had to use another helicopter at $455 per hour. This took a lot more out of our budget. Also, making contact with Craig Acres to help is not working out. This is not Craig's fault. Due to very limited snow when we did get it we flew immediately and could not get Craig there that quick. Also, the Game & Fish is asking us to drop the antelope part of the project and work only on the deer.

All of this is going to change our budget. Part of what we would like to do will cut back on helicopter expense by adding fixed wing use in the flatter country.

Proposal for 2006-2007 Total project cost $9480.00

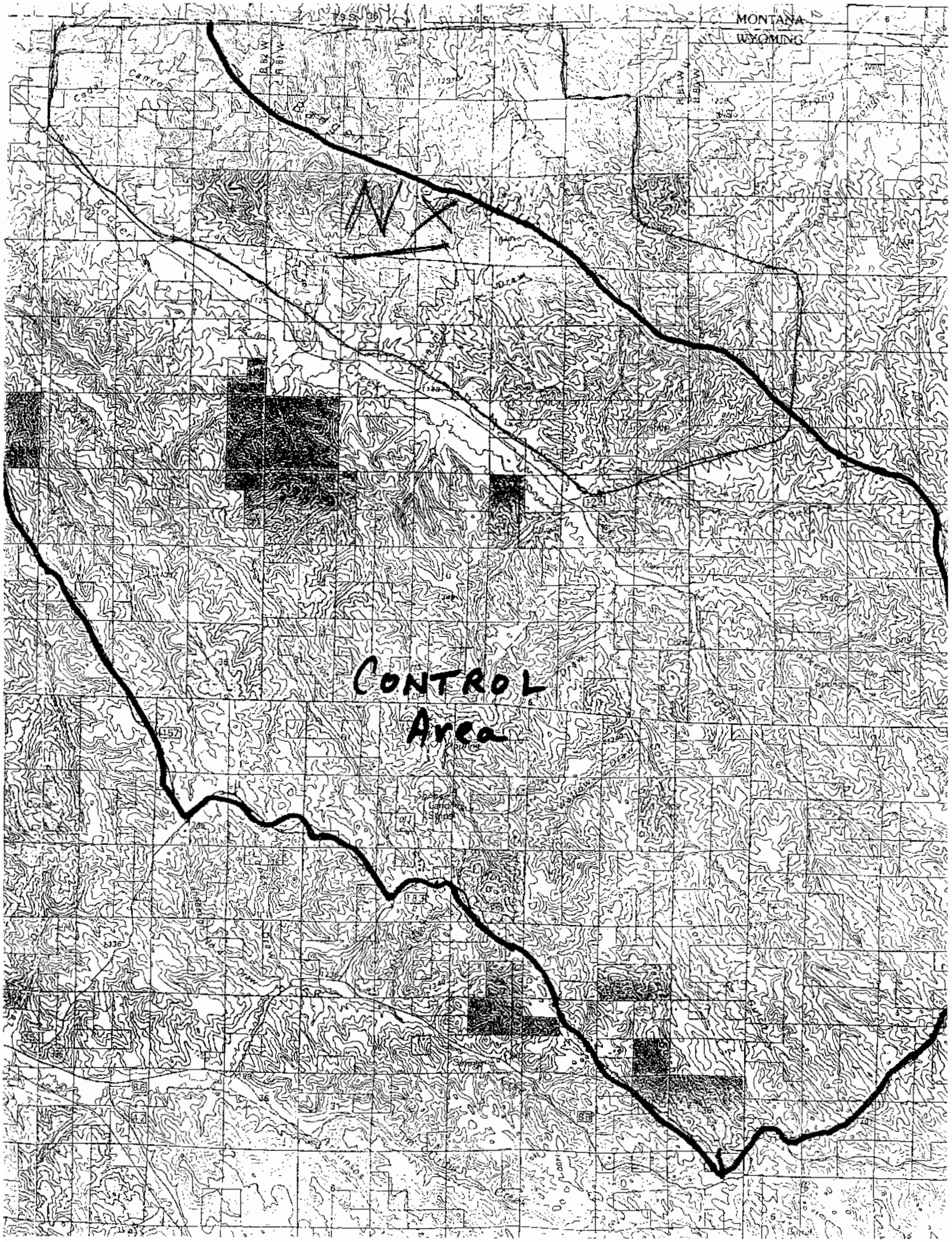
3 hour of classifying deer at $720 per hour with Jet Ranger	$2160 ADMB
Two – 6 hour flights hunting at $455 per hour with Hiller	$5460 ADMB
Three – 5 hour flights hunting at $100 per hour with fixed Wing from Wildlife Services	$1500 ADMB
	$9120 total ADMB
Gunner for Hiller, 16 hours at $15 per hour	$240 Sheridan Co PAB
Ammunition for Hiller gunner (1 case)	$120 Sheridan Co PAB
	$360 total Sheridan Co PAB

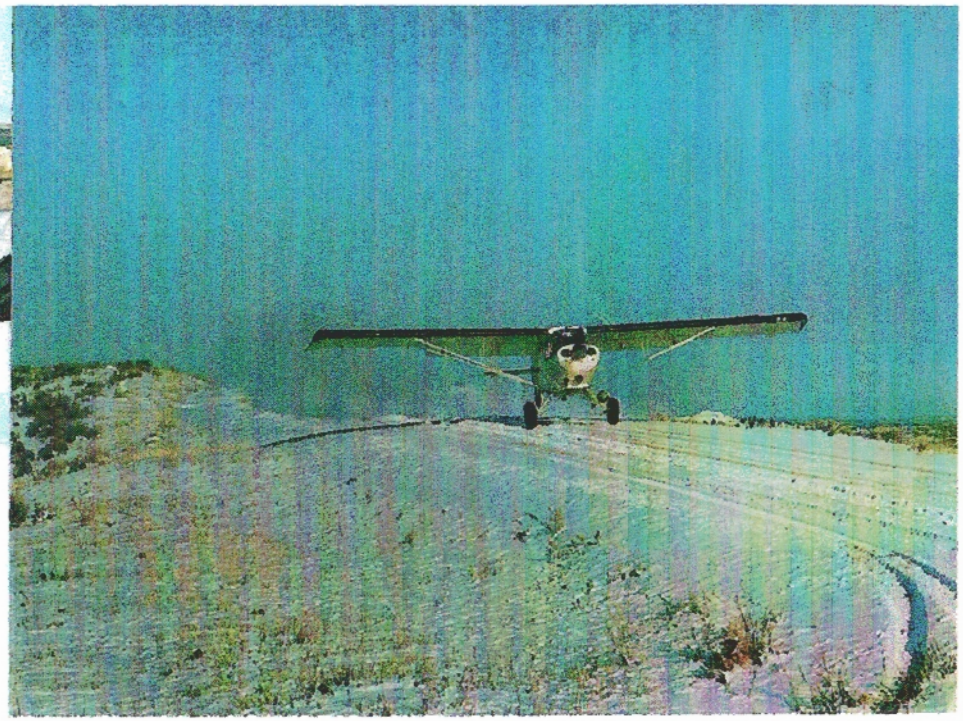
Proposal for 2007-2008 Total project cost $9767.00

3 hours of classifying deer at $750 per hour with Jet Ranger	$2250 ADMB
Two – 6 hour flights hunting at $455 per hour with Hiller	$5460 ADMB
Three – 5 hour flights hunting at $110 per hour with fixed Wing from Wildlife Services	$1650 ADMB
	$9360 total ADMB
Gunner for Hiller, 16 hours at $17 per hour	$272 Sheridan Co PAB
Ammunition for Hiller gunner (1case)	$135 Sheridan Co PAB
	$407 total Sheridan Co PAB

On your map, [redacted] indicates the eight coyotes removed December 1-3 and January 29. The blue indicates the ten coyotes removed February 15 and yellow indicates twelve coyotes removed February 25.


T 10 S
T 9 S
BIG HORN CO
SHERIDAN CO
POWDER RIVER CO
R 80 W
R 79 W
R 78 W
TEST AREA


MONTANA
WYOMING
N
CONTROL
Area




1203
H·C·L
H·C·L

November 25, 2006

On June 12, 2006 I submitted a proposal for year two of the Hanging Woman – Badger Creek Fawn Predation Project. Total project cost for the 2006-2007 time period would be $9480, which includes $9120 from ADMB and $360 from the Sheridan County PAB. This budget was approved.

On July 3, 2006 Sheridan County PAB trapper removed one adult male from 76 Creek and one male and one female on Trail Creek. All three of these three adult coyotes contained rabbits.

On September 30, 2006, two ground crew removed six mixed aged coyotes from different areas in the project test area. Again these were full of rabbits.

On November 13, 2006 Biologist Tim Thomas from the Wyoming Game & Fish Dept. flew and reclassified in the Jet Ranger the Test and Control areas. I called Tim for the classification data, amount of time flown, and cost of flying. As of today November 25, 2006 I have not received anything back. As soon as snow cover allows for good flying, we will continue year two of the Hanging Woman – Badger Creek Fawn Predation Project.

Thank you,

Cole D Benton

Mule Deer Classification Flight
13-Nov-06
Observers: Tim Thomas, Darrel Meineke - Wyoming Game & Fish Department

Area	Yrl Male	Ad Males	Tot Males	Fem	Juv	Total
Badger Creek	20	70	90	157	94	341
ratio:100 fem	12.7	44.6	57.3		59.9	
Hanging Woman	14	16	30	53	22	105
ratio:100 fem	26.4	30.2	56.6		41.5	
Area 23 Total	83	169	252	474	280	1006
ratio:100 fem	17.5	35.7	53.2		59.1	

Grizzly Bear/Black Bear/Mountain Lion/Livestock Depredation Prevention and Control

FY07 PROJECT UPDATE
JULY 1, 2006- DECEMBER 1, 2006

Project Title: Grizzly Bear/Black Bear/Mountain Lion/Livestock Depredation Prevention and Control

Brief Synopsis of project: This is a request for the ADMB to fund, through cost share on a 25:75 match basis, up to a maximum of $12,500.00 with the Wyoming Game and Fish Commission to contract with USDA Wildlife Services to alleviate grizzly bear, black bear and mountain lion depredation to livestock, bees and beehives in all counties of the State.

Project Update: During the first quarter of FY07 USDA Wildlife Services billed the WGFD for 31.5 hours of grizzly bear damage investigation and control for a total of $1008.00, 23 hours of mountain lion damage investigation and control for a total of $736.00, and 73 hours of black bear damage investigation and control for a total of $2,336.00. Total hours charged during the first quarter of FY07 was 127.5 for a total monetary obligation of $4,080.00. The total monetary obligations for the first quarter of FY07 under the terms of the grant agreement (25/75 match) were: ADMB $1,020.00, WGFD $3,060.00. USDA Wildlife Services charges are itemized in Table 1.

Table 1. Itemized charges by USDA Wildlife Services for work performed for the WGFD to investigate and manage trophy game damage.

FY07 WGFD CONTRACT EXPENDITURES

July 1, 2006- Sept. 30, 2006

07/01/06-09/30/06

Wyoming Game and Fish Tax ID #: 83-02008667

WY G&F Agree #: 06SC0403222
Acctg Code: 6737356316
Agree #: 0673565378
Bill #

Dates	Name	Species	Hrs	Salary Per Hour	Salary Cost
8/2-3/06	Casey Hunter, Warren Ranch, Cheyenne, WY	Blk Bear	14.0	$32.00	$448.00
7/1-9/30/06	Wade Jones, Medicine Bow Forest	Blk Bear	8.0	$32.00	$256.00
7/13-14/06	Matt Lumley, Grizzly Basin	Mtn Lion	11.0	$32.00	$352.00
7/1-9/30/06	Rod Merrell, Upper Green River	Grizzly	31.5	$32.00	$1,008.00
7/1-9/30/06	Steve Moyles, S. Fontenelle	Blk Bear	18.0	$32.00	$576.00
7/28-31/06	Kent Officer, Broadbent Livestock	Blk Bear	17.5	$32.00	$560.00
8/1-4/06	Kent Officer, Broadbent Livestock	Blk Bear	7.5	$32.00	$240.00
8/2-3/06	Mike Peterson, Tom Harlan, Johnson County	Mtn Lion	12.0	$32.00	$384.00
08/05/06	Mike Peterson, Pass Creek, Johnson County	Blk Bear	3.0	$32.00	$96.00
7/18-8/29/06	Tracy Villwok, O'Toole, Carbon County	Blk Bear	5.0	$32.00	$160.00
	Totals		**127.5**		**$4,080.00**

Submitted by: Scott Talbott

Affiliation: Wyoming Game and Fish Department
Mailing Address: 3030 Energy Lane, Suite 100
City: Casper, Wyoming Zip: 82604
Phone: 307-473-3404 Fax: 307-473-3433
E-mail: Scott.Talbott@wgf.state.wy.us

FIELD TESTING OF COYOTE-SPECIFIC DELIVERY

SYSTEM FOR REPRODUCTIVE INHIBITORS

FIELD TESTING OF COYOTE-SPECIFIC DELIVERY SYSTEM FOR REPRODUCTIVE INHIBITORS

Steven W. Horn, Principal Investigator
Department of Animal Science
University of Wyoming

ANNUAL REPORT

9/1/06 – 12/1/06

PROJECT SUMMARY

This research project is testing the species specificity of the Coyote Lure Operative Device (CLOD) on free ranging coyotes (*Canis latrans*) for the potential delivery of oral contraceptives/contragestives. Research conducted at the University of Wyoming over the past eight years has centered on the development of an effective single, oral dosage formulation of mifepristone (RU 486) to terminate pregnancy in coyotes. Further, studies on captive coyotes in a controlled environment have determined the effectiveness of the CLOD as a delivery mechanism for oral compounds. Federal Drug Administration (FDA) approval of mifepristone for use on coyotes will necessitate the establishment of a species-specific delivery mechanism. Remote cameras are being used to monitor eight CLOD stations from mid-December through the end of March over two breeding seasons (2006-07 and 2007-08) on a 1,300 acre study area in southeastern Wyoming. Efficacy of the CLOD will be determined by measuring physical, behavioral, spatial, and temporal events.

INTRODUCTION

Coyotes are the most significant predator of sheep, goats and cattle in the United States, taking more than $40 million of livestock every year. Controlling coyote populations in order to limit predation has been a goal of stock growers and local, state, and federal agencies (Wagner 1988). Increasingly, public opinion indicates that non-lethal, humane methods for controlling coyote predation are preferred.

Most coyote predation is attributed to breeding pairs of coyotes (Sacks et al. 1999; Bromley and Gese 2001a) referred to as alpha pairs. By eliminating the pups of these alpha pairs, predation on domestic livestock can be reduced by as much as 91.6 percent (Bromely and Gese 2001a; Till and Knowlton 1983) while simultaneously reducing coyote populations. An added advantage of leaving breeding pairs alive, but not

reproducing, is that they will defend territory against emigrating, transient coyotes or other breeding coyotes in search of new territory to colonize (Bromley and Gese 2001b).

The antiprogestin mifepristone (RU 486) developed by the French pharmaceutical company Roussel Uclaf in 1987 (Baulieu et al. 1990) has been used for reproductive control in a variety of species (Concanon et al. 1990) as an abortifacient with high levels of success (80%) following a single oral dose (Brogden et al. 1993). Concannon et al. (1990) and Sankai et al. (1991) demonstrated the effectiveness of RU 486 as an abortifacient in domestic dogs after 4.5 days of oral administration. However, multiple treatments of free-ranging coyotes are impractical. An effective single oral dosage of the antiprogestin compound was needed for use on coyotes.

With the support of the Wyoming Animal Damage Management Board and the Texas Sheep and Goat Predator Management Board, research at the University of Wyoming has established the biological importance of RU 486 as it applies to reproductive physiology in the coyote and its efficacy as an abortifacient in the speices (Horn et al 2006; Stith 2004). Extensive research on dispersion formulations of mifepristone to increase bioavailability and sustained release have allowed the development of a single dose treatment that is effective in inducing abortion in female coyotes. The field administration of a single dose of RU 486 to coyotes, which blocks the essential functions of progesterone, the primary hormone that supports pregnancy in mammals, has been achieved by increasing the bioavailability of mifepristone over a period of 72 hours. This allows the antiprogestin compound to compete with native progesterone in binding progesterone to its receptors during the late follicular phase of pregnancy and disrupting the inhibition of prostaglandin activity. The development of a valid high performance liquid chromatography (HPLC) method to measure mifepristone in coyote and rat serum was necessary to determine how the compound was metabolized in vitro. The end result of binding RU 486 to the progesterone receptor is a reversal in the calming influence of the myometrium and the resumption of uterine contractions while the cervix becomes relaxed and dilated (Stith 2004).

Buseck (2004) investigated a coyote-specific delivery system for field administration of RU 486. A modified version of the Coyote Lure Operative Device (CLOD), developed by Marsh et al. (1982), was used to successfully deliver an environmentally stable, pharmacokinetically acceptable mifepristone carrier-bait to coyotes. These University of Wyoming studies demonstrated considerable success with 63% of coyotes activating and ingesting the contents of the CLODs. Pregnant coyotes who activated CLODs on three successive days or partial activation over a six day period all aborted their litters (this research was conducted prior to the development of a single, successful oral dosage). Buseck's research conclusively demonstrates that oral reproductive inhibitors can be effectively administered via the CLOD. Other research has shown that the CLOD is as species-specific and as attractive to coyotes as the M-44 (Ebbert 1988). The CLOD also has potential for more revisits than the M-44, since there are no moving parts or loud noises and the coyote is rewarded with a highly palatable food item.

SPECIFIC/ MEASURABLE GOALS

The specific goals of this project are to determine: 1.) The selectivity (species specificity) of the modified CLOD in delivering the carrier-bait to free-ranging coyotes; 2.) Percentage of defined population activating the CLOD; 3.) Variables affecting CLOD visitation/activation; 4.) Identification of individual coyotes visiting/activating CLODs.

STUDY AREA

The proposed research will be conducted on approximately 1,300 acres of mixed ownership land, in the Laramie Range of southeastern Wyoming (Figure 1). The average elevation is approximately 7600 ft. The area is bounded by national forest and state park lands and is indicative of a montane ecosystem. The area is biologically diverse with Ponderosa Pine, Quaking Aspen, Narrow Leaf Cottonwoods, Big Sagebrush, Rabbitbrush, Mountain Mahogany, Current, Skunk Brush, numerous short-to-mid grass species including Blue Gramma, Buffalo Grass, Western Wheatgrass, Needle and Thread Grass and many forbs dominating the vegetative community. Black Bear, Mountain Lion, Bobcat, Mule Deer, Elk, Antelope, Moose, Raccoon, Badger, Pine Martin, Short- and Long-tailed Weasels, Porcupine, Coyote, Red Fox, Swift Fox, Mink, Beaver, Muskrat, Skunk, Hare, Rabbit, Marmot, Red Squirrel and numerous rodents including several species of ground squirrels comprise the representative mammals. Many species of Passerine birds occupy the study area. Also present are Rio Grande Turkey, Blue Grouse, some waterfowl and several species of raptors including Golden and Bald Eagles, Great Horned Owl, Red Tailed Hawk, Ferruginous Hawk, Falcons, and Turkey Vultures. Two, large wolf-like canids were seen in the study area in 2004. Positive identification remains unconfirmed. The study area is grazed lightly by cattle during the summer.

No public access and very limited hunting are allowed on the property. All research will be conducted on foot, by use of cross country skis or snowshoes.

METHODS

Biological Survey

A comprehensive census of both flora and fauna is currently being conducted. Coyote census techniques employing scent posts and siren/howl methods will be conducted before the second week of December. A coyote scat survey will assist in determining CLOD placements within the study area.

CLOD Placement

The study area has been defined, mapped and CLOD locations identified. CLODs will we separated by at least one linear mile. Placement of the CLOD will be at the center of high traffic areas (e.g., game trails, fence lines, geographic funnels). Each CLOD will be checked at least twice days per week throughout the duration of the study.

CLOD Design

Species-specificity has increased with modifications made to the original CLOD design by other researchers (Marsh et al. 1982; Ebbert 1988; Fagre and Ebbert 1988; Stolzenburg and Howard 1989; Hein and Andelt 1994; Andelt and Wooley 1996; Berensten 2004), such as altering the anchor stake, changing the size, shape, and color of the delivery device, and improving the method used to attach the delivery device to the stake. Buseck (2004) developed additional refinements for optimal activation by coyotes, including the use of dark, amber-colored, 30 ml. Nalgene bottles. Mason et al. (1999) reported that coyotes only investigated black-topped M-44s when placed against a snow background. Research at the University of Wyoming also found that high density Nalgene bottles provided more resistance for the coyote's bite and prevented rodents from gnawing through the bottle as reported by Ebbert (1988). Buseck (2004) also found that a wide-mouth nalgen bottle provided more space for easier extraction of the bait when the device was activated by a coyote.

Delivery Medium (Bait)

Liquid delivery mediums reported in previous CLOD research (Marsh et al. 1982; Ebbert 1988; Fagre and Ebbert 1988; Stolzenburg and Howard 1989; Hein and Andelt 1994; Andelt and Wooley 1996; Berenstein 2004) proved unacceptable in research conducted at the University of Wyoming (Buseck 2004). Mifepristone is hydrophobic and separated in the mediums reported in the literature (Stith 2004). Since mifepristone is lipophilic, a lipid-based bait was formulated that would provide a viscous delivery medium (Buseck 2004). Equal proportions of animal lard (Morrel Manteca Snow Cap Lard, Cincinnati, OH) and 100% flax seed oil (Now, Bloomingdale, IL) will be used as the delivery medium since it has been shown to be highly palatable in previous research at the University of Wyoming (Buseck 2004). The flax seed oil was used to facilitate bait delivery at low temperatures. Mifepristone **will not** be used in this study.

Lure/Attractant

A commercially available lure (FAS; USDA Pocatello Supply Depot, Pocatello, ID) that elicits biting, licking, and pulling by coyotes (Phillips et al. 1990; Mason and Blom 1998) will be used. Ebbert (1988) and Buseck (2004) found this lure effective in eliciting investigation by both free-ranging and captive coyotes. Other scents may be employed

depending upon the responses of the coyotes and/or other animals investigating the CLOD. Dale Wade (personal communication 2006) reported that castorium is an equally effective attractant for coyotes. The Fatty Acid Scent (FAS) will be diluted with either mineral oil or lubricating jelly to produce a 10% dilution and to allow for greater adherence to the CLOD. Approximately 0.5 cc of the FAS lure will be applied to the outside of the Nalgene delivery bottle.

Remote Wildlife Cameras

Eight remote wildlife cameras have been purchased and are currently being placed within the study area. Each camera will record visitation and activation of the CLODs. These digital cameras employ programmable infrared sensors that record black and white, color and video images using infrared flash. Sixteen high capacity digital memory cards will allow for limited human presence at the CLOD locations. A portable multi-card viewer has been purchased and will be used to download the memory cards in the field to assist in fine-tuning the camera and sensor adjustments. The cameras will be checked and downloaded at least twice days per week throughout the duration of the study. Depending upon the quality of the digital images, the identity and sex of individual coyotes who visit/activate the CLODs will be determined.

Weather Data Collection

Visitation/activation of CLODs may be influenced by climatological factors. Weather data will be collected from existing National Oceanographic and Atmospheric reporting sites nearby, as well as from a portable weather station within the study area.

Time Frame

Planning and study area census began September 1, 2006. CLOD visitation/activation data recording will begin December 15, 2006 and terminate on March 31, 2007 in Year I. Year II CLOD data will be gathered beginning on December 15, 2007 and terminate on March 31, 2008. Summer months will be spent repairing/replacing equipment, evaluating new CLOD placement sites, retrieving and analyzing remote wildlife camera recordings.

DISCUSSION

The agricultural industry, specifically the animal industry, will be the primary beneficiary of this proposed research. Loss of livestock to coyote predation has serious economic impacts to animal agriculture. Financial loss due to predation may have contributed to the reduction in numbers of sheep, goats, and livestock producing operations in the western United States. Coyotes have also been implicated in the loss of sensitive wildlife

species in some areas. Additionally, coyotes exert a disproportionate level of predation on susceptible wildlife species, such as deer and antelope, in areas where coyote populations have increased. Research at the University of Wyoming has established the effectiveness of the antiprogestin compound, mifepristone, as a humane, non-lethal, low-cost means of controlling coyote populations. An efficacious, single dose regimen for field application has been developed. Additional research at UW has demonstrated the effectiveness of the CLOD as a potentially species-specific delivery mechanism for RU 486. Field testing of the CLOD, the bait and the lure for species-specific delivery is the next step prior to application to the Federal Drug Administration for limited use in the field.

FUNDING

This research is jointly funded on an equal basis by the Wyoming Animal Damage Management Board and the Texas Sheep and Goat Predator Management Board

LITERATURE CITED

Andelt, W.F. and T.P. Woolley. 1996. Responses to urban mammals to odor attractants and a bait-dispensing device. Wildlife Society Bulletin. 24(1): 111-118.

Berensten, A.R. 2004. Behavioral responses of coyotes to the coyote lure operative device. M.S. Thesis, Utah State University, Logan, Utah.

Baulieu, E.E. 1990. Hormones, a complex communications network. Pages 3-171 in E.E. Baulieu and P.A. Kelley, editors. Hormones from molecules to disease. Hermann Publishers in Arts and Science. New York, NY, USA..

Brogden, R.N., K.L. Goa, and D. Faulds. 1993. Mifepristone: A review of its Pharmacodynamic and pharmacokinetic properties, and therapeutic potential. Drugs 45:384-409.

Bromley, C. and E.M. Gese. 2001a. Surgical sterilization as a method of reducing coyote predation on domestic sheep. J. Wildl. Manage. 65:510-519.

Bromley, C. and E.M. Gese 2001b Effects of sterilization on territory fidelity and maintenance, pair bonds, and survival rates of free-ranging coyotes. Canadian J. Zoo. 79:386-392.

Buseck, R. S. 2004. Development of a coyote (*Canis latrans*) specific delivery system for oral contraceptives. MS Thesis. University of Wyoming. Laramie, WY.

Concannon, P.W., A. Yeager, D. Frankin, and A. Lyampillai. 1990. Termination of pregnancy and induction of leuteolysis by the antiprogestin, mifepristone, in dogs. J. Repro. Fertility 88:99-104.

Ebbert, S.M. 1988. Field evaluation and improvement of a new system for delivering substances to coyotes. MS Thesis. Texas A&M University. College Station, TX.

Fagre, D.B. and S.M. Ebbert. 1988. Development and tesing of the coyote lure operative device. Proceedings of the Vertebrate Pest Conference. 13:235-240.

Hein, E.W. and W.F. Andelt. 1994. Evaluation of coyote attractants and an oral delivery device for chemical agents. Wildlife Society Bulletin. 22: 651-655.

Horn, S.W., M. Hussain, W. He, and C. Stith. 2006. Extended release of mifespristone (RU 486) for field delivery to coyotes. In manuscript.

Marsh, R.E., W.E. Howard, S.M. McKenna, B. Butler, D.A. Barnum, and R.T. Teranishi. 1982. A new system for delivery of predacides or other active ingredients for coyote management. Proceedings of the Vertebrate Pest Conference. 10:229-233.

Mason, J.R. and S. Blom. 1998. Coyote lure ingredients: what determines success? Wildlife Control Technology. 26-30.

Mason, J.R., J. Belant, A.E. Barras, J.W. Guthrie. 1999. Effectiveness of color as an M-44 attractant for coyotes. Wildlife Society Bulletin. 27(1): 86-90.

Phillips, R.L., F.S. Blom, R.M. Engelman. 1990. Responses of captive coyotes to chemical attractants. Proceedings of the Vertebrate Pest Conference. 15: 285-289.

Sacks, B.N., M.M. Jaeger, J.C. Neale, and D.R. McCullough. 1999. Terrritoriality and breeding status of coyotes relative to sheep predation. J. Wildl. Manage. 62:593-605.

Sankai, T., T. Endo, K. Kanayama, U. Sakuma, M. Umezu, and J. Masaki. 1991. Antiprogesterone compound RU 486 administration to terminate pregnancy in dogs and cats. J. Vet. med. Sci. 53:1069-1070.

Stith, C.E. 2004. Nonlethal reproductive control of predatory coyotes. Ph D Dissertation. University of Wyoming. Laramie, WY.

Stolzenburg, H.W. and V.W. Howard, Jr. 1989. Activation of liquid bait devices by coyotes in southern New Mexico. Wildlife Society Bulletin. 17(3):306-312.

Till, J.A. and F.F. Knowlton. 1983. Efficacy of denning in alleviating coyote depredations upon domestic sheep. J. Wildl. Manage. 47:1018-1025.

Wagner, K.K. 1988. Predator control and the sheep industry, the role of science in policy formation. Regina Books. Claremount, California, USA.

Detecting Predator DNA from Carcass Swabs

Progress Report
Detecting Predator DNA from Carcass Swabs
November 17, 2006

Pen Tests:

Coyotes in pens at NWRC were given pieces of lamb to chew on in order to test and optimize our carcass swab protocol. The lamb pieces were directly swabbed in numerous spots that looked like they had been chewed on. We tested 13 swabs with several coyote microsatellite markers. All 13 yielded good genotype data that can be used for species and individual ID.

We plan further pen tests to investigate how long after a kill we can detect predator DNA from prey carcass swabs.

Hopland Tests:

We have received a number of sheep carcass swabs collected in the field at Hopland. Nineteen of those swabs have been tested with several coyote microsatellite markers. Twelve of 19 yielded genotype data.

Field Tests:

We have received one set of swabs (4 swabs from one sheep) from field operations in WY and there was no DNA detected on two. The other two provided DNA and one yielded predator DNA (tested with several coyote microsatellite primers).

We hope to get more swabs from WY in the Spring/Summer.

Other Related Capabilities:

We have tested markers that we use to identify individual coyotes on bear, sheep, and cow, and there is no cross-species amplification – this is highly desirable.

We have optimized our ability to do canid sex ID on carcass (sheep and coyote from Hopland) swabs, and coyote and wolf tissue.

We helped identify the ancestry of a canid hybrid for case work done in WY by Rod Merrell. We received the tissue sample and we tested markers that were supposed to differentiate coyotes, wolves and dogs. With these markers we determined that the sample from Rod Merrell was a coyote/dog mix and we confirmed that we can use this set of markers to differentiate wolves, dogs, and coyotes.

Also in WY we have worked with WS Operations to study relatedness among wolves suspected of livestock depredation.

Fremont County Sage Grouse / Mule Deer Project

Dear ADMB,

This is the annual status report for the Fremont county sage grouse/mule deer project. In July 2006 the project was funded for the second year. The project was funded originally in July 2005. The ADMB board has given us 10,000.00 per year to operate on with additional funding coming from USDA Wildlife Services and the Fremont county predator board. This has given us a full year and 3 months work in the area. The project area encompasses deer area 90, which is approximately 543,790 acres. The project area is split into two nearly equal segments. It is split by state highway 136 (Gas hills highway). The northern part of the project area is the *control* area where the only predator control activities are around calving and lambing operations. Most of this area is summer range; therefore very little predator work is required. The southern portion is the *treatment* area where intensive predator control is being performed. The project itself is three folds in its goals. First, to use infrared night vision trail cameras in both the control and treatment area to collect data on artificial sage grouse nests as to which mammals or birds might be molesting/scavenging them. Second, to measure and document differences in nesting success between areas of intense mammalian predator control and no predator control and third, to enhance a struggling mule deer population that has failed to regain desired population levels.

78 aerial hunting hours were flown in the treatment area. 916 manpower hours were worked. 340 predators (coyotes) were taken out of the treatment area. 31 predators were taken out of the control area for livestock depredation. A stomach content analysis was performed on 56 of these animals. Of these, 19 stomachs were empty of edible content. The following is a list and percentages of edible content found: Mule deer 9%, pronghorn antelope 6%, Sage grouse 5%, Livestock 6.5 %, rabbit (cottontail/jackrabbit) 34.5%, rodent 11%, wild horse 6%, other (indistinguishable) 22%.

Results from the sage grouse nest surveys for the year resulted in the following. Of the 40 nest sites in the field (4 weeks), 17 were raided and destroyed. The species that damaged the nests are the following: Common raven 3 damaged nests, magpie 11 damaged nests, red fox 2 damaged nests and one nest damaged by wild horses.

We will be compiling data from the Wyoming Game and Fish Department job completion reports in January 2007. This will give us the population data on both sage grouse and mule deer in both the treatment and control areas. In the treatment area in December 2006, aircraft counted 232 mule deer. The next count will be done in December 2006; therefore not much data is available at the present time, but will in the coming year.

We have been operating on the second year budget since Oct 1 2006. 16 aerial hours have been flown and approximately 26 manpower hours have been used to date.

Sincerely,
Fremont County P.A.B/Tracy Frye – USDA Wildlife Services

Wyoming Wool Growers Association

Quantification of Losses Due to Predation on Wyoming Sheep Operations

Regional Symposia On the Use and Utilization of Livestock Guarding Dog's (LGD's)

Report on Project Entitled "Quantification of Losses Due to Predation on Wyoming Sheep Operations "

Most of the actual research activities of this project will take place in 2007. As of this date, we have identified the three cooperators that we will be working with, and have ascertained their sheep breeding dates. From these dates, we have scheduled tentative times at which we will be ultrasounding the herds we have selected. We anticipate that we should have the pregnancy data by the 1st to the 15th of March, and from there we will then begin collecting predator loss data. Most of these operations will begin lambing near the 1st of May, and should be through lambing by the 1st of June. Typically, docking (which is where we will gather our first actual count of live lambs, occurs around the 15th of June, and then we will get our final lamb counts when lambs are weaned and shipped, usually between September 1 thru the 30th.

Report on Project Entitled "Regional Symposia On the Use and Utilization of Livestock Guarding Dog's (LGD's)"

It was our initial intention to host this event in late fall, early winter of 2006, but arranging for speakers and presenters for this time of year proved to be almost impossible due to the large number of livestock and agricultural meetings and conventions which occur throughout this time period. It's is now our intention to host this event in Wyoming sometime during the late spring or early summer of 2007 (times when we can attract the largest number of agricultural producers to the Symposia). We would like to hold it in southwestern Wyoming, but we are having difficulty in finding a site that we can hold it at that is not already fully booked (due mainly to the extreme energy development occurring in this area). If we can not find a southwestern city in which to hold it, then tentatively our plans are to host it in Riverton.

We have begun contacting speakers and have received tentative commitments from many. We also will be meeting with representatives of the sheep industry groups from Colorado, Idaho, Utah and Montana in late January to work out details for their involvement, support and endorsement of the Symposia.

In our initial discussions about the Symposia with a diverse number of people, we have received enthusiastic response and a great deal of encouragement for this event.

Bear Conflict Trap Request

FY07 PROJECT UPDATE
July 1, 2006-December 1, 2006

Project Title: Bear Conflict Trap Request.

Brief Synopsis of Project: This project and the monies associated with it will be utilized to purchase two new "culvert style" box traps to be utilized in the capture, relocation, or removal of conflict bears. With expansion of grizzly bear populations and increasing conflict with livestock the WGFD had an additional need for bear traps. The two traps that will be purchased will greatly help in addressing this rising conflict in a safe and productive manor.

Project Update: The funds ($4,000) provided by the ADMB were made available effective October 2006. C&C Welding in Cody, WY will be manufacturing the bear traps and the approximate price will be $2,000 each. It is unlikely that the traps will be finished in the 2006 calendar year due to the shops backlog, but is expected shortly after the new year. C&C has made traps for the Department previously and did an exemplary job meeting all of our design needs and requirements.

Submitted by: Zach Turnbull, Pinedale/Jackson Bear Conflict Specialist
Affiliation: Wyoming Game & Fish Dept.
Mailing Address: PO Box 850
City: Pinedale, Wyoming Zip: 82941
Phone: 307-367-4352 Fax: 307-367-4403
E-mail: zach.turnbull@wgf.state.wy.us

NORTH FORK HUMAN/BEAR CONFLICT RESOLUTION

FY07 PROJECT UPDATE
July 1, 2006-December 1, 2006

Project Title: NORTH FORK HUMAN/BEAR CONFLICT RESOLUTION

Brief Synopsis of Project: This project will minimize human/bear conflicts in the North and South Forks of the Shoshone River area through (1) minimizing and properly managing bear attractants; (2) employing bear resistant waste management systems; (3) managing bears/attractive bear habitat where potentials for conflicts and risks to human safety are high; and (4) employing a public outreach program for education about preventing conflicts with bears.

Project Update: The funds ($15,000) provided by the ADMB were made available effective October 2006. Procedure for ordering 100 automatically latching, bear resistant garbage carts was started October 27, 2006. ADMB funds are covering approximately $12,000 of this order. Because of the large order and cost, bid waivers and other forms are in the process of being approved by administrators before the actual order may be placed. Carts should be received before January 2007. Once the order is placed and carts are received, they will be sold to North Fork residents at a discounted price as a cost-share of the full price. Both area sanitation companies have agreed to service the carts. The chosen product is made by Bear Saver and is the only bear resistant cart with an automatically latching lid. This eliminates the human element of latching containers in order for them to be bear resistant. The funds residents will pay for containers will go back into the ADMB account and be used to purchase additional containers or be used to fund educational projects.

Submitted by: Dana Courtney, Bear Wise Community Coordinator
Affiliation: Wyoming Game & Fish Dept.
Mailing Address: 2820 State Highway 120
City: Cody, Wyoming Zip: 82414
Phone: 307-527-7125 Fax: 307-587-5430
E-mail: dana.courtney@wgf.state.wy.us

Upper Green Food and Waste Storage Project

FY07 PROJECT UPDATE
July 1, 2006-December 1, 2006

Project Title: Upper Green Food and Waste Storage Project.

Brief Synopsis of Project: This project and the monies associated with it will be utilized to purchase new waste storage containers or to modify current containers so as to be bear resistant in the Upper Green River near Cora, Wyoming. The Upper Green has seen an increase in bear numbers recently, and with such has also seen a rise in conflict with homes, businesses, and with the livestock industry. Two local businesses (Elk Ridge Lodge, and The Place) have had repeated bear conflict in the past due to improper waste storage facilities and it is the Departments intent to utilize the money awarded in this grant to specifically address those concerns. Proper waste storage at these businesses is imperative for both bear and human safety.

Project Update: The funds ($2,000) provided by the ADMB were made available effective October 2006. While the businesses mentioned above are fully dedicated to addressing waste storage issues they are both temporarily closed for the off-season. With this fact, and the time constraints associated with modifying large dumpsters, work on the project and costs associated with such will not occur until near the end of the calendar year and there after. All work will be completed by the spring of 2007 as to prevent any future conflict.

Submitted by: Zach Turnbull, Pinedale/Jackson Bear Conflict Specialist
Affiliation: Wyoming Game & Fish Dept.
Mailing Address: PO Box 850
City: Pinedale, Wyoming Zip: 82941
Phone: 307-367-4352 Fax: 307-367-4403
E-mail: zach.turnbull@wgf.state.wy.us

Absaroka Elk Ecology Project

FY07 PROJECT UPDATE
JULY 1, 2006- DECEMBER 1, 2006

Project Title: Absaroka Elk Ecology Project

Synopsis of project: The proposed study will document the proportion of resident and migratory segments of elk populations in the Absaroka Mountains west of Cody. Using GPS technology, we will determine the timing and location of routes for migratory elk, including elk migrating in and out of Yellowstone National Park (YNP). Elk use of private lands along the Absaroka Front will also be examined. Detailed studies will be conducted to relate elk movement and habitat use to landscape variables on summer and winter range, and we will ask if the risk of wolf predation by three resident packs alters elk movement and habitat use. This component will allow us to compare elk responses to wolves in the Absarokas to other regions of the Greater Yellowstone Ecosystem (GYE) and to evaluate whether changes in elk management are required now that wolves have recolonized the area. Results from this effort will be compared to findings from an earlier telemetry study conducted from 1979-1980, prior to the 1988 Yellowstone fires, grizzly bear expansion, wolf reintroduction, and increased human development of private lands along the Absaroka Front. Annual survival rates will be calculated for collared elk and productivity and recruitment data (calf:cow ratios, yearling bull:cow ratios) will be gathered from resident and migratory segments to better understand the current population health of these herds and to evaluate recently observed demographic changes. Information gleaned from this project would be used to better manage elk populations and elk habitat in this portion of the GYE. This includes, but is not limited to; setting appropriate hunting seasons, providing information for land-use planning (both federal and county), working with landowners to attain elk management goals on private lands, and increasing our understanding of how to mitigate the influence of wolf predation on elk herds.

Project Update: Fundraising and project planning has continued and is ongoing. Sixty GPS radio collars for elk and 6 GPS radio collars for wolves have been ordered and arrival is expected at any time. The University of Wyoming Cooperative Fish & Wildlife Research Unit and WEST, Inc. donated a total of 45 used elk GPS radio collars that were either upgraded or refurbished, resulting in significant savings over estimated elk collar costs. The cost for a total of 29 upgraded elk GPS collars was $57,217 and has been submitted for payment through ADMB. The cost for 16 refurbished and 15 new elk GPS radio collars was $24,080 and $37,095, respectively, and will be covered by other project funds. Elk and wolf capture operations are scheduled to begin in early January 2007.

Submitted by: Doug McWhirter

Affiliation: Wyoming Game and Fish Department
Mailing Address: 2820 State Highway 120
City: Cody, Wyoming Zip: 82414
Phone: 307-527-7125 Fax: 307-587-5430
E-mail: Doug.McWhirter@wgf.state.wy.us

Final Reports

Real West Natural Resource Consulting

Data Collection.

WYOMING ANIMAL DAMAGE MANAGEMENT BOARD

BIG GAME SURVEYS
at
THREE SITES IN WYOMING

Carbon County
Weston County
Rawhide Hills

Year Six
2005

July 2006

Prepared for
Wyoming Damage Management Board
Department of Agriculture
Cheyenne, WY

Prepared by:

Real West Natural Resource Consulting
1116 Albin Street
Laramie, Wyoming

Real West

NATURAL RESOURCE CONSULTING

1116 Albin Street
Laramie, WY 82072

(307) 742-3506
Fax: (307) 721-8130
e-mail: atravsky@wyoming.com

July 11, 2006

Wyoming Animal Damage Management Board
2219 Carey Avenue
Cheyenne, WY 82002-0100

Dear ADMB Members,

I am disappointed that I can't present the final report for the big game surveys to you in person. As has happened every year during your summer meeting, I am volunteering as Director of the Tour de Wyoming bicycle tour. This year the route takes me up to the Bighorn Mountains, so I am unable to attend your meeting.

I want to thank you all for your support of this project over the past six years. As most of you know, at the beginning I was a bit of a skeptic that the predator control measures could actually help the big game populations in each of the project areas. I was surprised when the trend data indicated improvements, and often significant ones, in several of the project areas. While the data this past year suggests that such improvements may not be sustained at the higher levels they eventually attained, big game numbers were still often substantially higher than those observed six years ago. There are other contributing factors, of course, but comparisons with control areas indicate that predator control was at least one of the factors influencing the higher big game numbers. Changes in the fawn to doe ratios are a bit more of a mixed bag, and less conclusive as to the effects of the predator control.

Thank you again for the opportunity to work with you on this project.

Sincerely,

Amber Travsky

Amber Travsky
Wildlife biologist/Owner

EXECUTIVE SUMMARY

Beginning in 2000, Real West Natural Resource Consulting (Real West) conducted pronghorn and mule deer surveys on three project areas in Wyoming. In each of the three study areas, at least one treatment area was defined where intensive predator control measures, targeting coyotes, was conducted annually over three years (2001 through 2003). Annual herd composition surveys were conducted on both the treatment areas and a corresponding and adjacent control area. No concentrated predator control measures were conducted on the control areas for the duration of the project. Following cessation of predator control measures, surveys continued for two additional years.

The purpose of the study was to determine if predator control measures would improve both big game population numbers and fawn survival rates. The purpose of continuing the surveys for two additional years was to determine if any improvements would be sustained even after predator control measures ceased.

Carbon County Project Area

The Carbon County project area is further subdivided into three treatment areas and one control area. Of the three treatment areas the Ferris Mountain area, also known as Hunt Area 63, provides the best analysis. Most of this area is within a single herd unit, as designated by the Wyoming Game and Fish Department (WGFD). Because of this, ingress and egress of pronghorn into surrounding areas is minimized.

On the Ferris Mountain area (Hunt Area 63) the number of pronghorn observed increased each of the three years of predator control, reaching a high in 2003 of 876 animals. This number increased further the first year following cessation of predator control to 1,152 animals, but then declined to 1,102 the next year.

Fawn: doe ratios were less consistent. Initially the ratio decreased over the predator control period, but increased the first year after predator control and then declined slightly the second year.

In Hunt Area 55 observation numbers also increased steadily each of the predator control years and then showed only a slight decline the first year after cessation of control measures. Counts for the fifth year will not be considered due to considerable land use changes in 2005 with the influx of oil and gas development in a significant portion of the project area. The fawn:doe ratios were also less consistent, showing initial declines during the predator control years, and then they increased after cessation of predator control.

Concentrated predator control via Wyoming Wildlife Services personnel was not conducted in Hunt Area 108, however predator control was provided by private contractors at the request of the area rancher. In this area, observation numbers increased steadily during the first four years,

and then declined the fifth year and remaining low in 2005. The fawn:doe ratios decreased each year, except for a slight increase in Year 6.

The number of pronghorn observed on the Carbon County control area showed slight increases the first four years of the survey, then a slight decline in Year 5 and a slight increase in Year 6. The fawn:doe ratios remained fairly consistent except in the fifth year when the ratio increased.

Weston County

The number of pronghorn observed on the Weston County treatment area steadily increased during the three years of predator control and it continued to increase one year after the control ceased, but then declined the second year following the cessation of predator control. At the same time, the number of pronghorn observed on the control area declined slightly every year except the fifth year.

The ratio of fawns per 100 does fluctuated each year of the predator control years and then increased considerably in the first year following cessation of predator control before dropping back down again. At the same time, the ratio for the control area also fluctuated all six years of the study, showing no discernable trend over the period.

Rawhide Hills

Observation numbers of mule deer in the Rawhide Hills was consistently low throughout the survey years. Numbers increased in the third year of the survey, but were only at a high of 300 animals observed. Due to the small sample size, surveys were discontinued the sixth year. In the five years before that, in addition to increases in the number of mule deer observed, the fawn to doe ratio also increased the first three years, dropped the fourth year, and then increased the fifth year.

Sample sizes for the control area were even smaller, ranging from 10 to 82 mule deer observed. Due to this extremely small sample size, comparisons of ratios and population numbers are unreliable.

Conclusions

This trend data indicates predator control may improve big game populations, at least in the short term. Long-term impacts are unknown since this study observed big game trends for only two years following the cessation of predator control.

TABLE OF CONTENTS

List of Tables

List of Figures

1.0 INTRODUCTION

The Animal Damage Management Board (ADMB) was created by the 1999 Wyoming State Legislature (W.S. 11-6-301-313) for the purposes of mitigating damage caused to livestock, wildlife and crops by predatory animals, predacious birds and depredating animals or for the protection of human health and safety. The departments of Agriculture and Game and Fish serve as co-chairs and give general direction to the board.

The mission of the ADMB is to coordinate and implement an integrated animal damage management program, based on best available science, for the benefit of human and natural resources throughout Wyoming.

In an effort to meet both the purpose and the mission of the ADMB, the board contracted Real West Natural Resource Consulting (Real West) in 2000 to prepare a study plan and collect baseline data for a big game monitoring project on three separate sites in Wyoming. Following the initial survey, predator control efforts were initiated and continued annually through 2003. Each year, Real West conducted the big game surveys to monitor possible impacts of predator control on big game fawn survival.

While predator control measures targeting primarily coyotes (*Canis latrans*) ceased in 2003, big game populations and fawn to doe ratios were monitored for two more years. The purpose of the subsequent surveys was to determine any changes in fawn survival or population numbers once the control measures ceased.

The purpose of this report is to document the field methodology and survey results for the 2005 field season and to provide an analysis on the possible affects of predator control efforts on big game reproduction in these areas for the entire survey period, beginning in 2000.

2.0 METHODOLOGY

The 2005 surveys for the Carbon County and Weston County sites mimicked, as close as possible, the previous surveys. The mule deer surveys for the Rawhide Hills site were not conducted in 2005; due to low observation numbers on previous years it was determined that the sample size was inadequate to determine population trends. At the urging of Real West, surveys of this area were not conducted in 2005.

The routes and the timing of the surveys were as similar as possible on each of the six years of the surveys. All surveys were conducted by the same wildlife biologist to minimize individual spotter changes and to ensure the similarity of routes traveled. Dates for the surveys each year are listed in Table 2-1.

The pronghorn classification surveys were conducted from a 4-wheel drive vehicle and on foot. Binoculars and a high-powered spotting scope aided in the observations. From 2000 through 2005, the Rawhide Hills mule deer survey was conducted from a helicopter and all observations were recorded in a field notebook and marked using a GPS receiver.

Table 2-1. Survey dates for each of the project areas for each of the five years of the study.

Year	Survey Dates		
	Carbon County[1]	Weston County	Rawhide Hills
2000	Sept 9 - 17	Sept 21 - 25	Nov. 18
2001	Sept 9 – 16	Aug 31 – Sept 3	Nov. 18
2002	Sept 1 – 13	Aug 27 - 31	Nov. 19
2003	Sept 4 - 13	Aug 27 - 31	Dec. 7
2004	Sept 5 – 14	Sept 1 – Sept 5	Dec. 6
2005	Aug 31 – Sept 4	Aug 22 - 25	Survey Discontinued

[1]Dates may not be continuous; the surveys occurred intermittently during the dates indicated.

Groups of pronghorn/mule deer were classified according to does, fawns and bucks. Following the initial baseline surveys in 2000, efforts were made in subsequent years to also identify yearling bucks. The assumption was that the number of yearling does would be similar to that of the yearling bucks. Yearling does are difficult to discern from older does, while yearling bucks are more readily identified from older animals. It is assumed that the number of yearling does is similar to the number of yearling bucks. Since yearling does do not produce young, a high number of yearling does could skew the fawn:doe ratio. The analysis for this report includes and adjusted fawn:doe ratio that excludes yearling does from the number of mature does, based on the number of yearling bucks observed.

2.1 Field Surveys

2.1.1 Carbon County Project

Surveys in 2005 were conducted on the portion of Hunt Area 63 north of Ferris Mountain, all of Hunt Area 55 and Hunt Area 108, and the control area (which is a portion of Hunt Area 61) from August 31 though Sept. 4. Data collection details concerning time spent and miles traveled are presented in Table 2-2.

During the years of the surveys, oil and gas development expanded in Hunt Area 55. Up until 2005, new development concentrated primarily along the western border of the site. That changed drastically by the 2005 survey when development was particularly extensive all the way from Rawlins, north of Atlantic Rim, and extending to the Red Rim region before connecting with the previously developed areas along the western boundary. Construction, which was occurring at the time of the surveys in 2005, obliterated or blocked some of the travel routes used in the previous surveys. An attempt was made to adhere to the same routes and the survey in this area was conducted over the Labor Day holiday to minimize construction traffic and interference. In spite of these efforts, some route deviation was required and other areas could not be surveyed at all except from some distance away using a spotting scope, due to access limitations. In addition, the area was considerably transformed in appearance, making it difficult to identify previous routes. As a result of these changes, the mileage and survey time for Hunt Area 55 was slightly reduced from previous surveys and the data collected failed to follow the strict protocol parameters of previous years.

Table 2-2. Survey Details for the Carbon County Pronghorn Surveys for 2000 through 2005.

	Number of Days for the survey	Hours of Survey	Miles Traveled During Survey
Ferris Mountain (Hunt Area 63)			
2000	Not surveyed	Not surveyed	Not surveyed
2001	2	15	208
2002	2	15	197
2003	2	17.5	220
2004	2	16	204
2005	2	15	220
Hunt Area 55			
2000	2	20	196[1]
2001	2	17	173[1]
2002	2	17	180[1]
2003	2	17	198[1]
2004	2	17	202[1]
2005	2	18	176
Hunt Area 108			
2000	2	15	196[1]
2001	2	15	173[1]
2002	2	14	180[1]
2003	2	15	198[1]
2004	2	14	202[1]
2005	2	14	176
Control Area			
2000	2	18	164
2001	2	15	143
2002	2	16	150
2003	2	16	150
2004	2	14	163
2005	2	14	148

[1] Mileage is half of the combined mileage for HA 55 and 108. Due to proximity of the two areas, surveys were intermixed and separate mileages were not recorded.

Separate mileage counts were not kept for hunt areas 55 and 108 due to their proximity to each other. Along the shared boundary, surveys were conducted back and forth between the two areas. Mileages listed are half of the combined total for the two areas. Slight reductions in mileages

and hours was possible after the first year due to improved efficiencies, based on knowledge of the road system and the terrain.

In 2005 weather conditions were generally sunny and warm. Temperatures ranged from overnight lows in the mid 30s to mid 40s to daytime highs ranging from the mid 60s up to nearly 90 degrees. Winds were generally light in the mornings and turning breezy, with winds reaching 10 to 15 mph, during the day. Cloud cover ranged from 0% to 10% with some additional clouds and thunderstorm activity late in the day. There was no precipitation except for brief rain showers over the period and roads were dry during the entire survey period.

2.1.2 Weston County Project

Weston County surveys were conducted from Aug 22 through Aug 25, 2005 and they followed the same routes and timing as pervious surveys (Table 2-3). The weather was mild and pleasant. Temperatures ranged from overnight lows in the mid 50s to low 60s, and reached daytime highs in the low to mid 80s. Winds were calm in the early morning but typically increased to 10 to 15 mph by midday. There was no precipitation over the period and roads were dry during the entire survey period.

Table 2-3. Survey details for the Weston County Pronghorn Surveys for 2000 though 2005.

	Number of Days for the survey	Hours of Survey	Miles Traveled During Survey
Treatment Area			
2000	4	34	408
2001	4	29	374
2002	4	27	359
2003	4	28	370
2004	4	26	360
2005	4	27	363
Control Area			
2000	2	18	132
2001	2	15	165
2002	2	14	132
2003	2	14	157
2004	2	14	162
2005	2	14	150

3.0 RESULTS

3.1 Carbon County Project

3.1.1 Project Location

The treatment area (where coyote control occurred), as described in the ADMB project proposal application, includes pronghorn hunt areas 55 and 108. This area covers approximately 570 square miles immediately southwest of Rawlins (Figure 3-2). It is bound on the north by Interstate 80, on the west by Highway 789, on the south by Muddy Creek, and on the east by County Road 401. Concentrated predator control efforts took place in HA 55 between January and April 2001 through 2003. A similar concentration of effort did not occur in HA 108. Some predator control took place but it was primarily accomplished through a private contractor rather than through Wildlife Services personnel. Due to the difference in predator control intensity, the data is separated for the two areas.

The treatment area also includes a portion of HA 63, immediately north of Ferris Mountain (Figure 3-1). This area is bound on the north by Wyoming Highway 220, on the west by U.S. Highway 287, and on the east by Alcova and Pathfinder reservoirs. Data collection in this treatment area began in 2001. Concentrated predator control measures took place January through April 2001, 2002 and 2003.

The project control area (where no predator control occurred) is located approximately 15 miles north of Rawlins on the edge of the Great Divide Basin of the Red Desert (Figure 3-1). The area covers approximately 244 sq. mi. and is bound on the south by the Mineral X road (Carbon County Road 63), on the west by the Crooks Gap Road (County Road 23N), on the north by County Road 22, and on the east by Bull Springs Rim.

3.1.2 Survey Results

Pronghorn classification results for each of the six years of the project in each of the hunt areas are presented in Table 3-1. Figures 3-3, 3-4, and 3-5 illustrate classification and population number changes each of the six years. Individual analysis of each area is provided below.

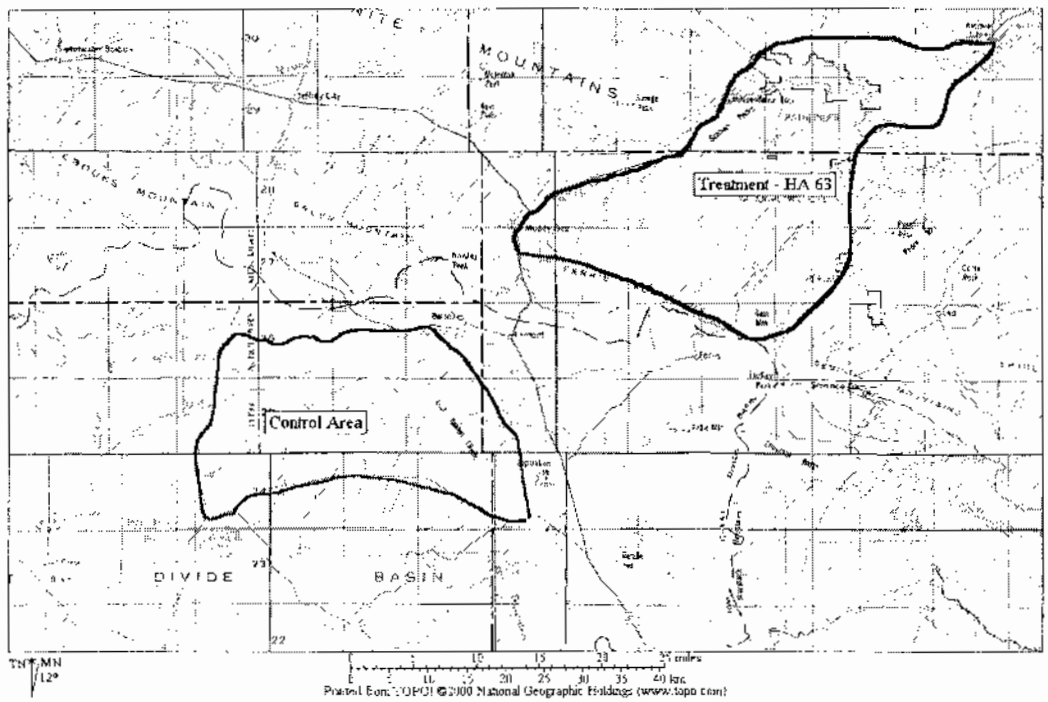


Figure 3-1. Carbon County Project Area showing the Control Area and the Treatment Area north of Ferris Mountain in Hunt Area 63.

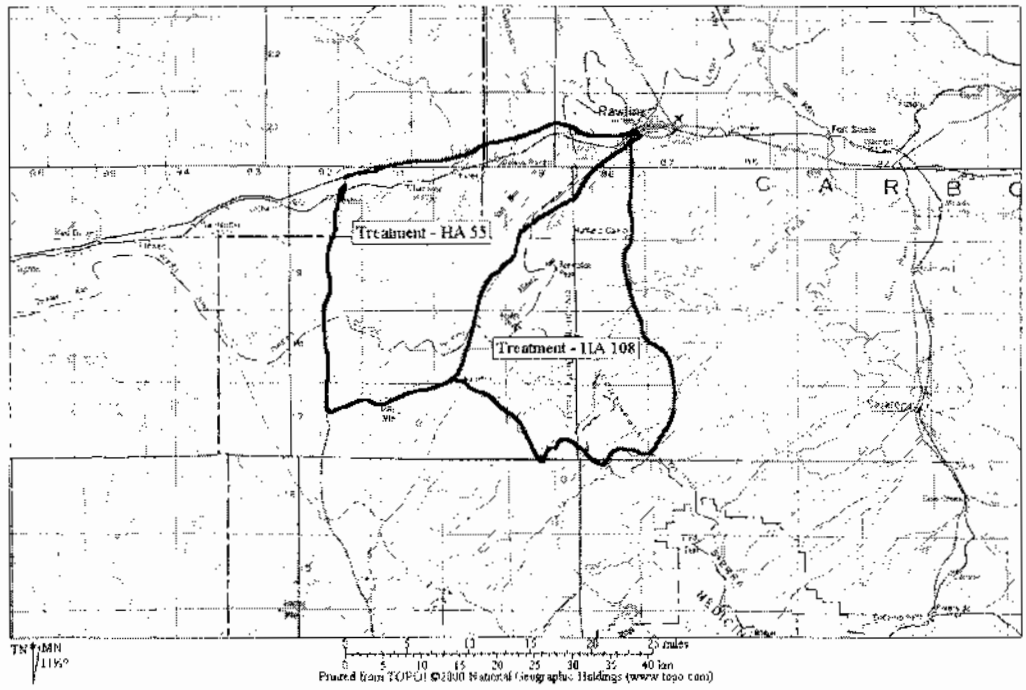


Figure 3-2. Carbon County Project Area showing the Treatment Areas south of Rawlins in Hunt Area 55 and Hunt Area 108.

Table 3-1. Results of Pronghorn Classification Surveys in for the Carbon County Project.

	No. Groups	Total No. Pronghorn	Does	Fawns	Mature Bucks	Yearling Bucks[1]	Fawn:doe ratio	Buck:doe ratio[2]	Adjusted fawn:doe ratio[3]
Treatment Areas									
HA 55									
2000	47	269	147	60	62	--	41:100	42:100	--
2001	63	331	173	90	60	8	52:100	39:100	58:100
2002	91	534	295	136	75	28	46:100	35:100	51:100
2003	88	675	389	175	88	23	45:100	29:100	39:100
2004	76	649	367	200	59	23	54:100	22:100	48:100
2005	50	304	157	97	39	11	62:100	32:100	55:100
HA 108									
2000	52	350	184	101	65	--	55:100	35:100	--
2001	52	454	231	169	42	12	73:100	12:100	68:100
2002	91	540	310	139	77	14	44:100	29:100	47:100
2003	70	719	404	223	67	25	55:100	23:100	49:100
2004	50	373	197	92	46	38	47:100	43:100	27:100
2005	52	424	213	110	65	36	52:100	47:100	35:100
HA 63									
2000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2001	37	136	53	42	31	10	79:100	77:100	60:100
2002	60	381	212	93	60	16	43:100	36:100	47:100
2003	83	876	480	223	79	94	46:100	36:100	27:100
2004	114	1152	552	391	120	89	70:100	38:100	58:100
2005	105	1102	464	308	154	176	66:100	71:100	28:100
Control Area									
2000	35	130	65	31	34	--	48:100	52:100	--
2001	45	274	147	75	25	14	51:100	36:100	56:100
2002	55	303	154	58	70	21	46:100	35:100	44:100
2003	61	353	182	94	62	15	52:100	48:100	56:100
2004	47	217	94	68	41	14	72:100	59:100	85:100
2005	61	261	125	66	53	17	53:100	56:100	61:100

[1]Data in 2000 did not separate yearling bucks from mature bucks.
[2]Number totals all bucks, including yearlings.
[3]Adjusted ratio excludes yearling does (based on the yearling buck count).

The adjusted fawn:doe ratio takes into account the number of yearling does that are too young to reproduce. This ratio assumes the number of yearling does is equal to the number of yearling bucks in the population. That number is subtracted from the total number of does and ratio recalculated.

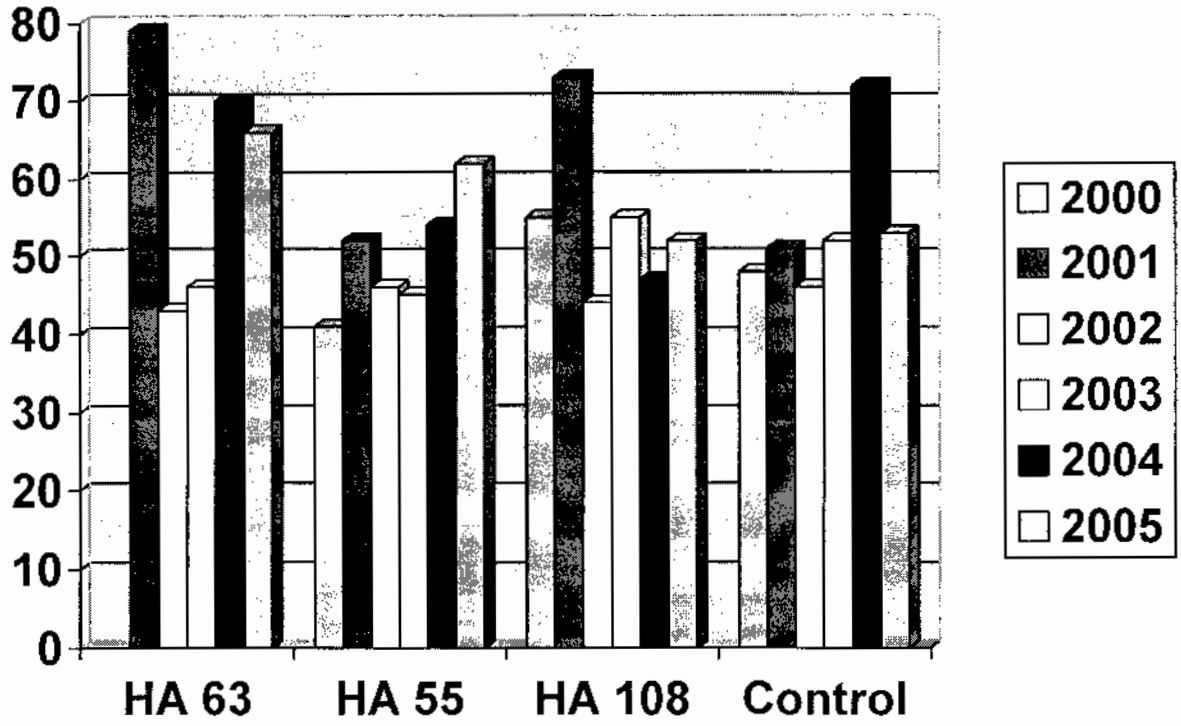


Figure 3-3. Ratios of Fawns per 100 Does on the Carbon County Project Area.

Hunt Area 63 – Ferris Mountain

The 2005 doe:fawn ratio in the Ferris Mountain site went down slightly from those found in 2004, going from 70 to 66. The adjusted ratio when down considerably, though, dropping from 58 in 2004 to 28 in 2005. Total number of pronghorn observed in 2005 was slightly lower than that counted in 2004, but the numbers were still considerably higher than those observed at the start of the project in 2001.

The low observation number in 2001 was at least partially attributable to unfamiliarity of the area and the reduced survey time in the vicinity of Pathfinder Reservoir. It is possible animals in that area were undercounted in 2001. However, that was not the case in subsequent years, at least in the vicinity of the reservoir. That area is especially rich in pronghorn and is also part of Pathfinder National Wildlife Refuge. From 2002 through 2005, this area was carefully surveyed due to the high number of pronghorn. The high densities made surveying tricky due to the difficulty in distinguishing individual groups; care was taken to prevent accidentally double-counting some animals.

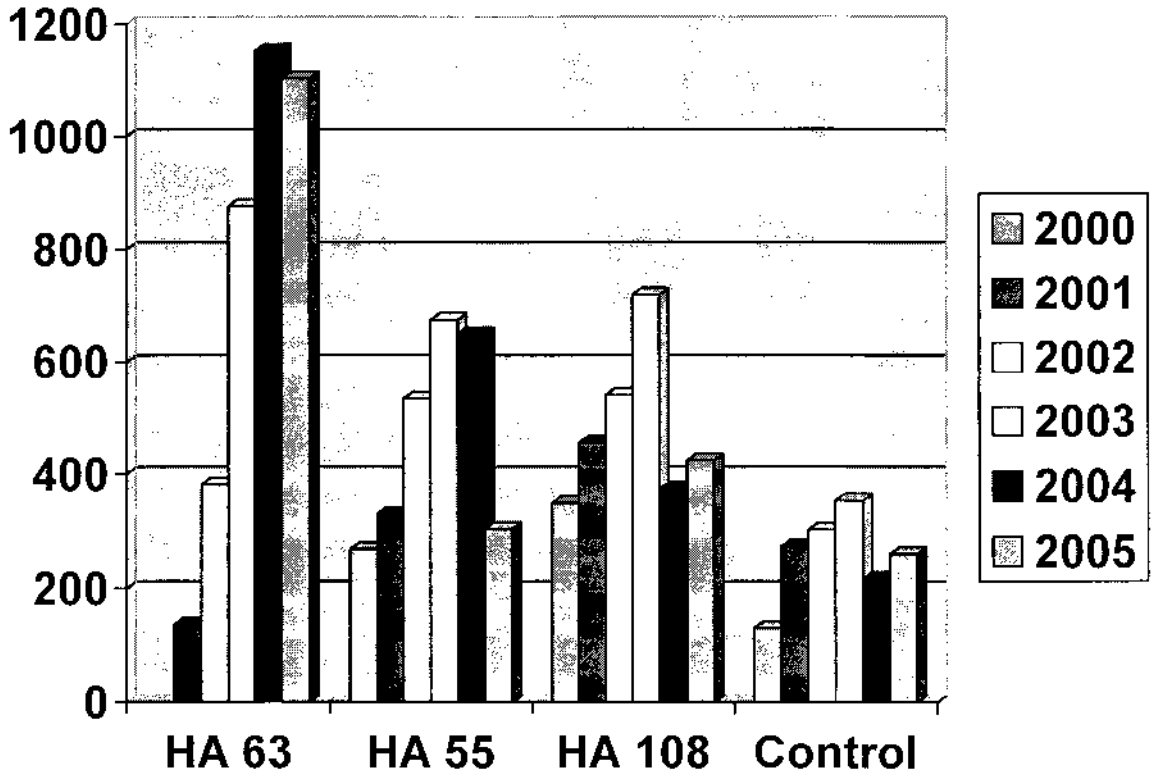


Figure 3-4. Total Pronghorn Observed on the Carbon County Project Area.

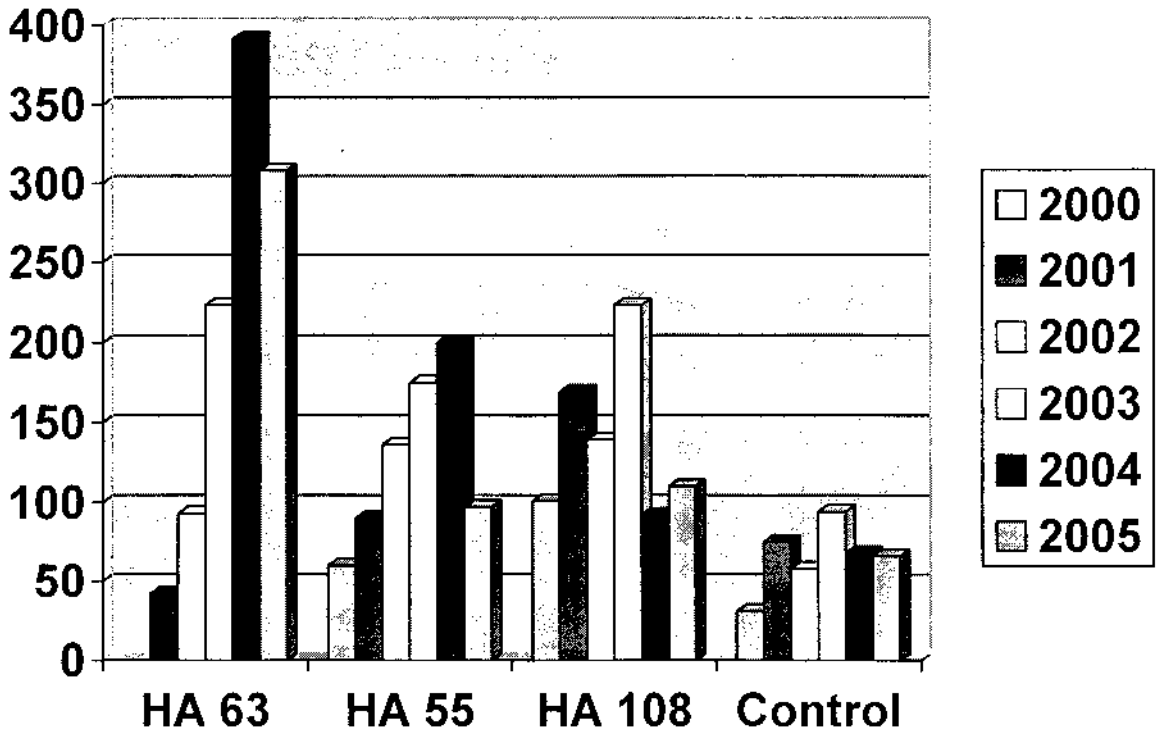
Hunt Area 55

The fawn:doe ratio increased in 2004 from all previous levels to 54 fawns per 100 does and it increased even further in 2005 to 62:100. The ratio for 2005 should be compared with caution, though, due to the difficulty in repeating the survey routes from previous years. Pronghorn numbers were down considerably in 2005, due to the disturbance in the area from oil and gas development.

Hunt Area 108

The fawn:doe ratio showed an increase in 2005 from 2004. At the same time, pronghorn numbers in 2005 increased from 2004, although they were still below those observed in 2002 and 2003.

Figure 3-5. Total Number of Fawns Observed on the Carbon County Project Area.



Control Area

The fawn:doe ratio decreased in 2005 to 53 fawns per 100 does, compared to 72 fawns per 100 does in 2004, but it was nearly the same as that observed in 2003. The ratio in 2004 was the highest reported for the five years of the surveys. At the same time, the overall number of pronghorn and groups observed was down in 2004 to 217 animals, compared to 353 observed in 2003. The number of pronghorn increased slightly in 2005 to 261.

3.2 Weston County Project

3.2.1 Project Location

The project treatment area covers approximately 330 square miles in northeast Wyoming, west of Newcastle (Figure 3-6). The triangular shaped area is bound on the southeast by Highway 450 beginning at Newcastle and the Mush Creek Road. The boundary continues along Mush Creek

Road to Highway 116, north on Highway 116 to the Raven County Road, north to the intersection with Highway 116, then north to Upton and east along Highway 16 to Newcastle.

The control area covers approximately 236 square miles immediately southwest of the treatment area. The area is bound on the north by the Thunder Basin National Grassland boundary, on the east by Wyoming Highway 116, Wyoming Highway 450 and County Road 7C (Bruce Road), on the south by the Cheyenne River Road (County Road 54), and on the west by County Road 7A, Wyoming Highway 450 and the Keeline Road (Forest Road 930).

3.2.2 Survey Results

The results of the 2005 surveys, compared with previous years are presented in Table 3-2. Comparisons of the six survey years and the fawn:doe ratios, number of pronghorn observed, and number of fawns observed are illustrated in Figures 3-7, 3-8, and 3-9, respectively.

The results indicate the total number of pronghorn observed on the treatment area increased steadily up to 2004 when it reached a high of 948 pronghorn, up from a low in 2001 of 426 animals observed. Total number of pronghorn decreased in 2005 to 706.

By comparison, the number observed in the control area was fairly steady the first three years, and then it decreased in 2003. That trend reversed in 2004, with 238 animals observed, compared to just 71 the prior year. The number returned to 2000 levels, though, in 2005 with 158 animals observed.

In 2004, the number of fawns per 100 does was up considerably in the treatment area, reaching a five-year high of 127 fawns per 100 does. Even when the ratio is adjusted for yearling does, the rate is at a five-year high of 98 fawns per 100 does. By comparison, from 2003 to 2004 the ratio dropped 22 points in the control area. The decrease is even more significant when the ratio is adjusted for yearling does. These high levels didn't persist into 2005, however, when ratios returned to nearly the same as those observed in 2003.

Table 3-2. Results of Pronghorn Classification Surveys in for the Weston County Project.

	No. Groups	Total Number	Does	Fawns	Mature Bucks	Yearling Bucks[1]	Fawn:doe ratio	Buck:doe ratio[2]	Adjusted fawn:doe ratio[3]
Treatment Areas									
2000	77	544	256	193	95	--	75:100	37:100	--
2001	64	426	191	125	77	33	65:100	40:100	79:100
2002	101	711	356	239	86	30	67:100	33:100	73:100
2003	113	916	419	327	100	70	78:100	41:100	61:100
2004	101	948	325	414	115	94	127:100	64:100	98:100
2005	109	706	305	242	82	77	79:100	52:100	54:100
Control Area									
2000	27	153	66	56	31	--	85:100	47:100	--
2001	27	143	69	46	25	3	67:100	41:100	70:100
2002	49	128	59	30	29	10	51:100	66:100	61:100
2003	17	71	27	25	14	5	93:100	70:100	74:100
2004	36	238	103	73	26	36	71:100	60:100	36:100
2005	37	158	65	55	27	11	85:100	58:100	68:100

[1]Data in 2000 did not separate yearling bucks from mature bucks.
[2]Number totals all bucks, including yearlings.
[3]Adjusted ratio excludes yearling does (based on the yearling buck count).

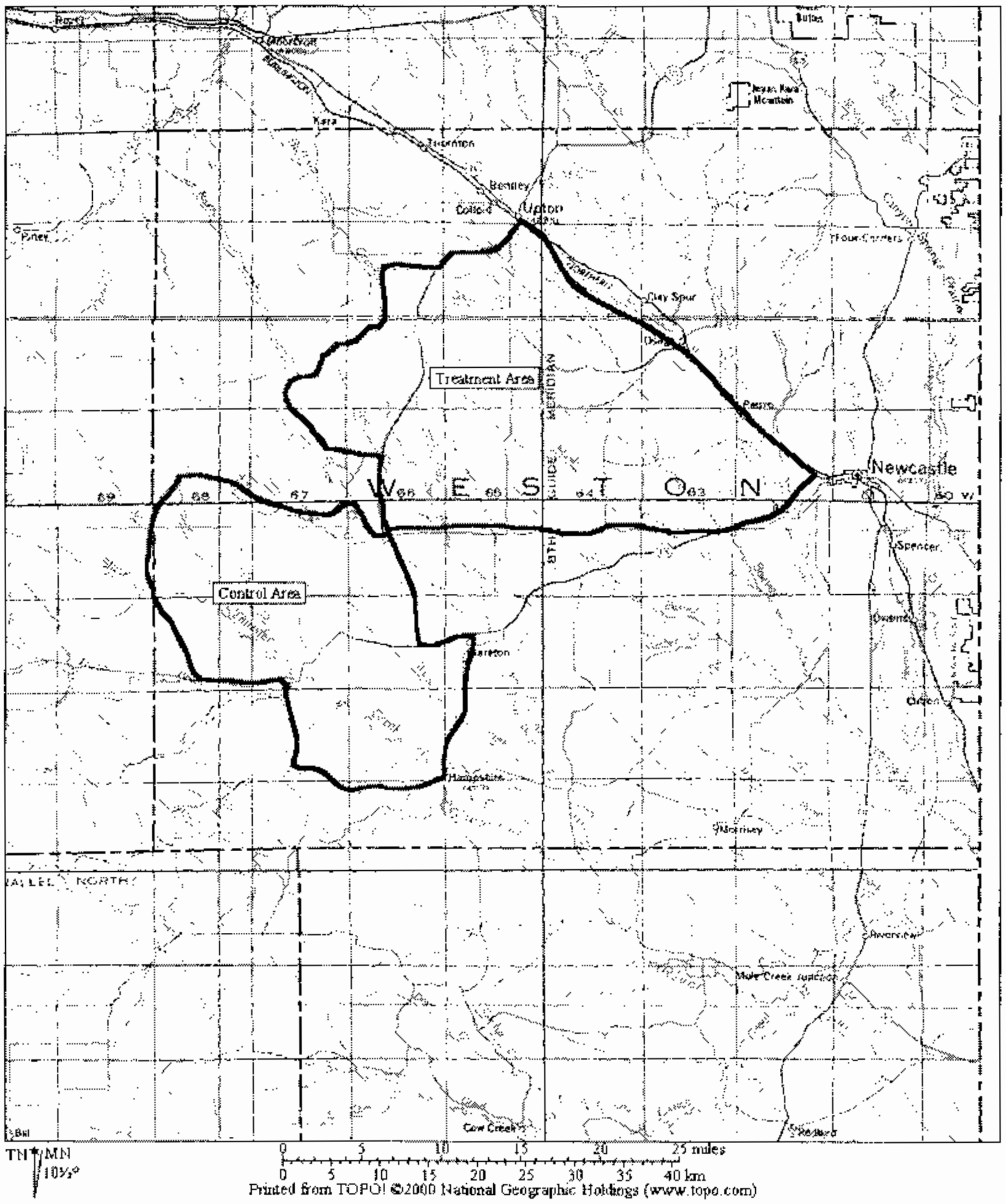


Figure 3-6. Weston County Project Area

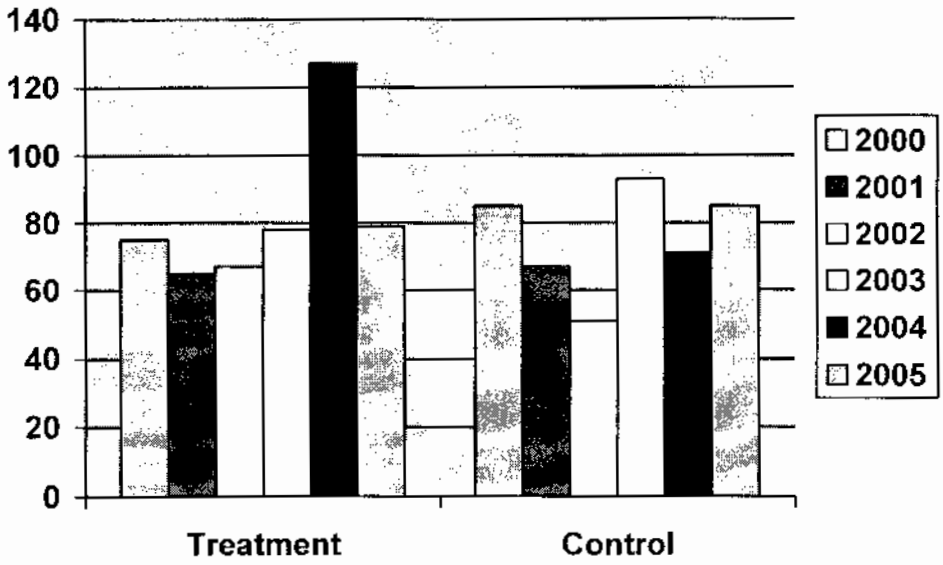


Figure 3-7. Ratios of Fawns per 100 Does on the Weston County Project Area.

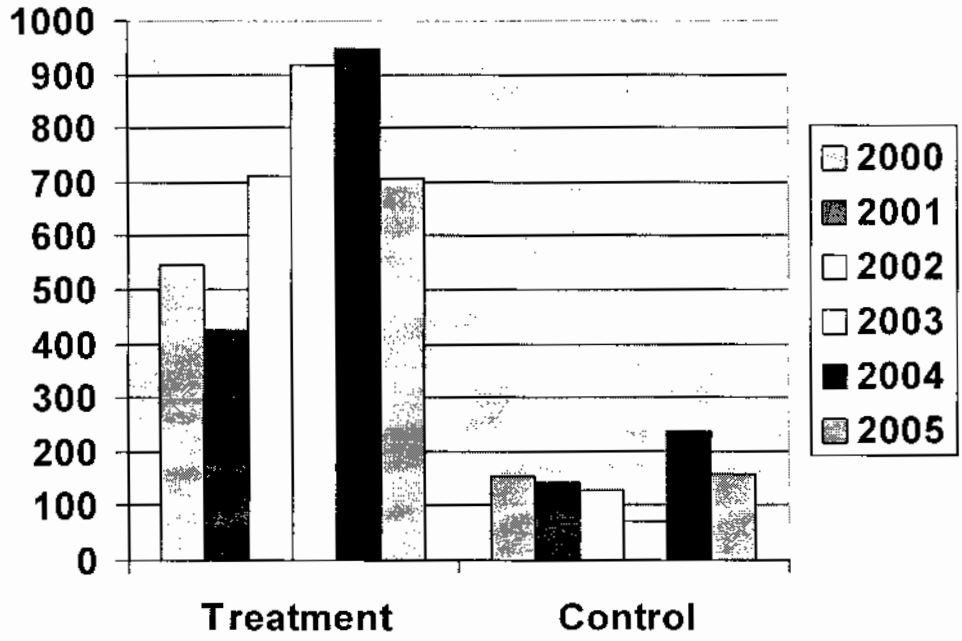


Figure 3-8. Total Pronghorn Observed on the Weston County Project Area.

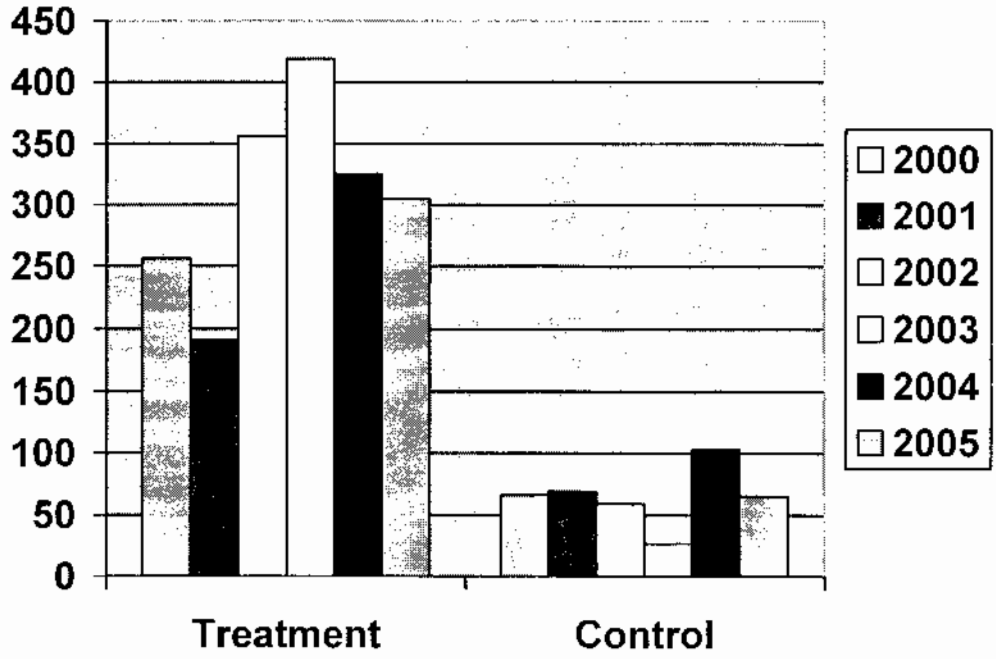


Figure 3-9. Total Number of Fawns Observed on the Weston County Project Area.

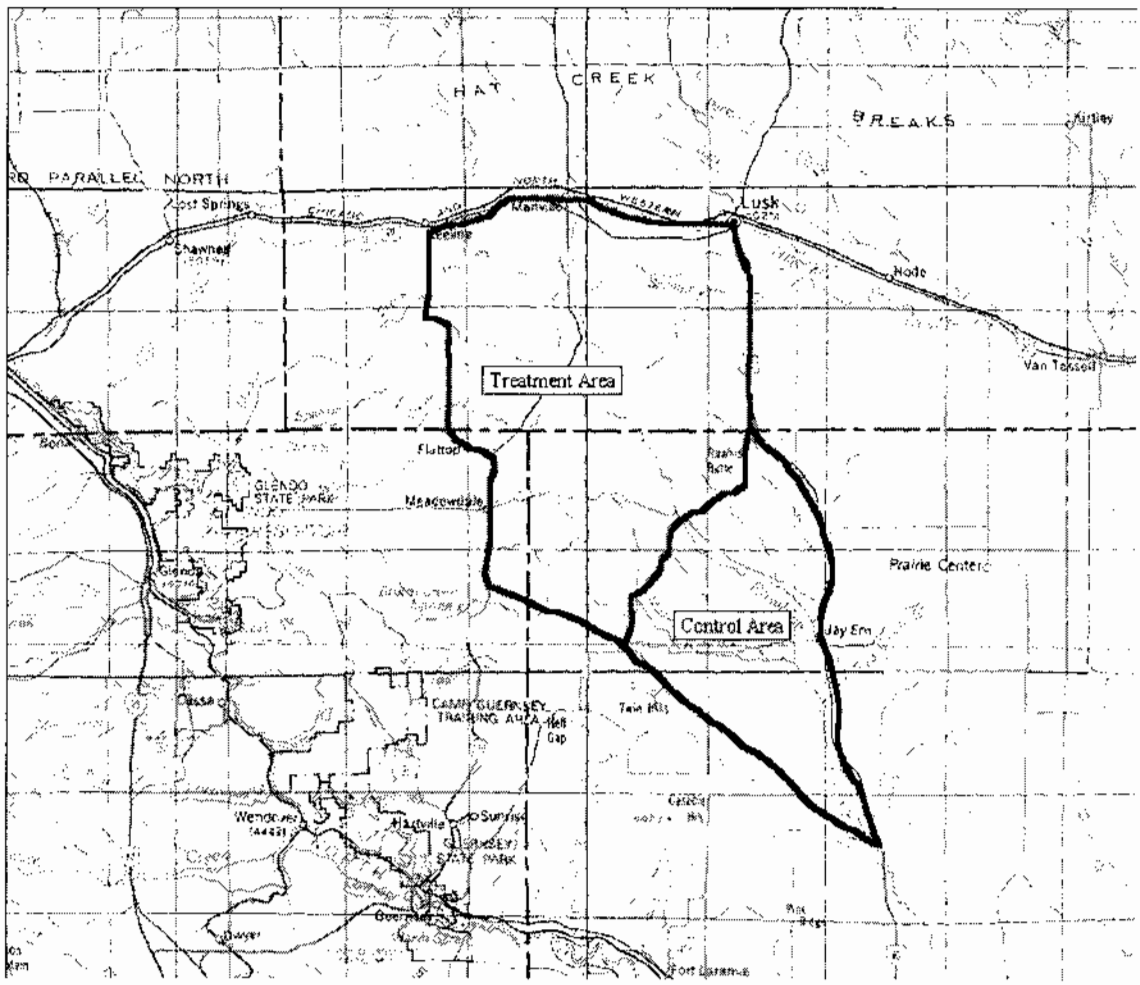
3.3 Rawhide Hills Project

3.3.1 Project Location

The project area is located in east-central Wyoming, southwest of Lusk and northeast of Guernsey (Figure 3-10). The treatment area covers approximately 390 square miles and is bound on the north by U.S. Highway 18-20, on the west by Highway 270 and Jireh Road, on the east by U.S. Highway 85, and on the south by a combination of county roads and transmission lines.

The control site is a triangular area covering approximately 160 square miles. It is bound on the east by U.S. Highway 85, on the south by a powerline, and on the northwest by a county road.

Figure 3-10. Rawhide Hills Project Area.



3.3.2

3.3.3

3.3.4 Survey Results

The mule deer classification survey was not conducted in 2005 but the summary of previous surveys and figures from previous years are presented here. A summary of the data for the five years is presented in Table 3-3 and data comparisons with previous years are illustrated in Figures 3-11 and 3-12.

Table 3-3. Results of the Mule Deer Classification Surveys for the Rawhide Hills Project from 2000 through 2004.

	No. Groups	Total Number	Does	Fawns	Mature Bucks	Yearling Bucks[1]	Fawn:doe ratio	Buck:doe ratio[2]	Adjusted fawn:doe ratio[3]
Treatment Areas									
2000	15	107	58	28	21	--	48:100	36:100	--
2001	17	58	28	15	12	4	53:100	23:100	39:100
2002	50	300	163	100	25	12	61:100	11:100	79:100
2003	4	31	19	10	1	1	52:100	11:100	47:100
2004	22	110	56	37	12	5	66:100	30:100	57:100
Control Area									
2000	5	37	21	11	5	--	52:100	24:100	--
2001	7	29	16	9	3	1	56:100	25:100	50:100
2002	7	54	31	17	2	4	54:100	12:100	42:100
2003	1	10	3	4	3	0	133:100	100:100	133:100
2004	7	82	40	19	15	8	48:100	57:100	28:100

[1]Data in 2000 did not separate yearling bucks from mature bucks.
[2]Number totals all bucks, including yearlings.
[3]Adjusted ratio excludes yearling does (based on the yearling buck count).

Figure 3-11. Ratio of Fawns per 100 Does on the Rawhide Hills Project Area

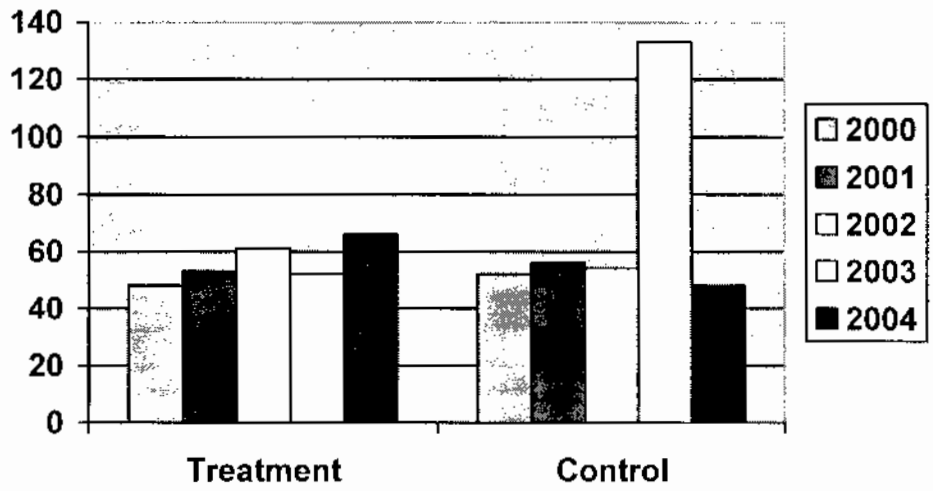
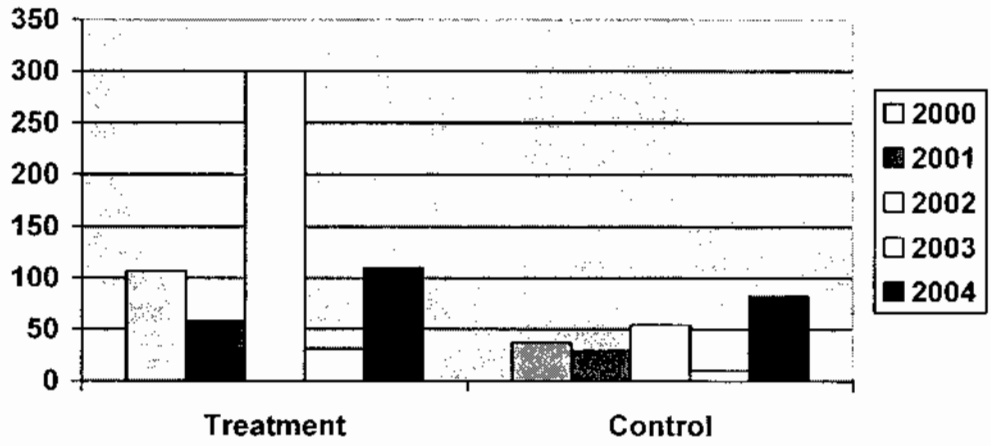


Figure 3-12. Number of Pronghorn Observed on the Rawhide Hills Project Area



From 2000 to 2002, the fawn:doe ratio steadily improved on the treatment area until declining in 2003, but rebounding in 2004 (Figure 3-11). In the control area, it remained fairly steady the first three years, then increased sharply in 2003, before decreasing in 2004. The ratio for 2003 should be viewed with caution, however, since it was the ratio found in the only group of deer observed on the control area.

Total numbers of mule deer observed (Figure 3-12) on the treatment varied considerably from year to year, although the sample size and number observed was consistently low, except in 2002. That year, the number of mule deer observed was at least three times the number seen in each of the other years.

4.0 DISCUSSION

Consideration of population trends and fawn:doe ratios in adjacent areas could indicate if the trends observed in the project areas were similar to those in adjacent hunt areas and overall herd units. Weather could also play a significant factor in fawn survival. The next section will look at additional factors that might have impacted fawn survival and overall big game numbers before providing an analysis of the data collected during the six years of this project.

4.1 Wyoming Game and Fish Herd Unit Data

This section will consider big game data collected by Wyoming Game and Fish Department (WGFD) biologists and compare it with data collected by Real West. Comparisons will also be made between the various Hunt Areas within the Herd Units that include the project areas.

4.1.1 Carbon County Project

A listing of the Hunt Areas and corresponding WGFD Herd Units is listed in Table 4-1. Hunt Area 55 is included in the Baggs Herd Unit, which also includes part of Hunt Area 53. Hunt Area 108 is in the Iron Springs Herd Unit, which also includes Hunt Area 56 and the rest of Hunt Area 53. The control area is in the northern portion of Hunt Area 61, which is part of the Red Desert Herd Unit along with hunt areas 60 and 64. Hunt Area 63 is the only area included in the North Ferris Herd Unit but the Real West survey area is only the area north of the Ferris Mountains.

Table 4-1. Hunt Areas and corresponding Herd Units for the Carbon County Project.[1]

Project Area Hunt Area	Herd Unit	Other Hunt Areas within same Herd Unit
Hunt Area 55	Baggs	Part of 53
Hunt Area 108	Iron Springs	Part of 53, 56
Hunt Area 63	North Ferris	No others
Hunt Area 61	Red Desert	60, 64

[1] The hunt areas are always a sub-area within the herd unit.

Comparisons of fawn:doe ratios and population changes between the Real West and WGFD data are presented in Table 4-2. In this data, the Real West observation numbers are the actual pronghorn observed each year. The WGFD population estimates are based on population sampling and statistical modeling.

Hunt Area 63

Hunt Area 63, the North Ferris Antelope Herd Unit, has an objective of 5,000 animals. In 2001 it was well below that, at 2,600 animals. After the three predator control years (2001, 2002, and 2003) it had increased only by 5%, but went up by 44% after four years and up by 58% by the fifth year (2005). The population estimate for 2005 was 4,550. The fawn:doe ratios for the entire herd unit have increased over the five year period from 52 to 70. The ratios for the sub-area surveyed by Real West decreased in 2002 and 2003 to 43 and 46, respectively, and then increased to 70 fawns per 100 does in 2004 and decreasing slightly to 66 in 2005.

Hunt Area 55

The population objective for the Baggs Herd Unit, which includes Hunt Area 55, is 9,000 animals. The unit was slightly above that at 9,300 in 2004 and then increased to an estimated population of 11,300 in 2005. The herd unit has shown an increase each of the past five years, except for 2001. Real West's data for the smaller hunt area shows a steady increase the first three years, with a slight decrease in observed numbers in 2004, but still well above the number of pronghorn seen in 2000. Those numbers went down by half, to only 304 pronghorn in 2005. However, this decline is heavily due to the high level of natural gas development in the area. Road building, well drilling, and utility and pipeline corridor construction was occurring at the time of the 2005 surveys. Many of the observation routes used in the previous years were obliterated by development or had been altered and/or expanded into well-constructed gravel roads. Truck and heavy equipment traffic in the area was considerable in 2005 and was a significant contrast to the near lack of any human disturbance and activity observed in prior years.

The fawn:doe ratio for the Baggs herd unit has increased from 30 to 55 over the five year period, and continued upward to 67 in 2005. The ratios increased each year, except in 2003. Real West has also found a steady increase, although not as great as that of the overall herd unit. Both the

Table 4-2. Fawn:Doe Ratios and Population Estimates for the Carbon County Pronghorn Project.

		2005	2004	2003	2002	2001	2000
HA55 Real West	Fawn:doe ratio	62	54	45	46	52	41
	Observation numbers	304	649	675	534	331	269
Baggs HU	Fawn:doe ratio	67	55	43	53	33	30
	Population Estimate	11,300	9,300	8,700	7,600	6,800	7,600
HA 108 Real West	Fawn:doe ratio	52	47	55	44	73	55
	Observation numbers	424	373	719	540	454	350
Iron Springs	Fawn:doe ratio	65	65	55	48	37	53
	Population Estimate	10,400	10,000	9,500	10,100	9,450	10,450
HA 63 Real West	Fawn:doe ratio	66	70	46	43	79	--
	Observation numbers	1,102	1,152	876	381	136	--
North Ferris HU	Fawn:doe ratio	70	71	68	71	73	52
	Population Estimate	4,550	3,925	2,850	2,900	2,600	2,725
HA 61 Real West	Fawn:doe ratio	53	72	52	46	51	48
	Observation numbers	261	217	353	303	274	130
Red Desert HU	Fawn:doe ratio	63	72	54	53	41	55
	Population Estimate	11,900	14,650	13,400	14,000	13,350	17,150

herd unit and the Real West data show a similar ratio in 2004 of 55 and 54 fawns per 100 does, respectively, and similar increases in 2005 to 67 and 62.

Hunt Area 108

The population objective for the Iron Springs Herd Unit is 12,000. The 2004 WGFD population estimate was below this at 10,000, but it increased to 10,400 in 2005. This estimate has remained fairly steady over the past six years, with population estimates ranging from a low of 9,450 in 2001 and a high of 10,450 in 2000.

Real West observation numbers in 2005, at 424 animals, are higher than those reported by Real West in 2000 with 350 animals. During the intervening years, numbers have ranged from a low of 454 in 2001 to a high of 719 in 2003.

Fawn:doe ratios for the herd unit have fluctuated annually, with a high of 65 in 2004 and 2005, and a low of 37 in Iron Springs. Ratios observed by Real West have similarly fluctuated but with the highest level in 2001 at 73 and the lowest in 2002 at 44.

Hunt Area 61

The population objective for the Red Desert Herd Unit, which includes the control area, is 15,000. The 2004 population estimate was near this, at 14,650 but it decreased in 2005 to 11,900. The estimate was at a high of 17,150 animals in 2000 followed by a decline to 13,350 in 2001 and then a low in 2005 of 11,900. Real West observation numbers show a gradual increase all years, with a decline in 2004.

The fawn:doe ratio for the entire herd unit has ranged from a low of 41 in 2001 to a high of 72 in 2004. The Real West data had a low level of 46 in 2002 and also had a peak in 2004 of 72.

4.1.2 Weston County Project

The treatment area is contained within pronghorn Hunt Area 7, although the hunt area is larger than the treatment area. The northeast corner of the hunt area is outside the treatment area while the southwest corner is included in the control area. Hunt Area 7 is included in the Cheyenne River Antelope Herd Unit, which also includes hunt areas 4, 5, 6, 8, 9, 27, and 29. The remainder of the control area is contained in Hunt Area 6, which is also part of the Cheyenne River Herd Unit. Approximately two-thirds of the hunt area is outside the control area.

The WGFD population objective for the entire Herd Unit is 38,000 pronghorn. The 2004 population estimate was right at this level with 38,059 pronghorn and it increased in 2005 to 39,705 animals.

Population trend counts and fawn:doe ratios for the Herd Unit, as compared to the Real West data, are shown in Table 4-3. The population trend of the entire herd unit has increased steadily over the six-year period. Likewise, the Real West observation numbers in the treatment area have increased steadily until 2005, when observation numbers declined. Observation numbers in the control area have fluctuated, however, with a low of only 71 animals observed in 2003 and a high of 238 in 2004. The 158 pronghorn observed in 2005 was nearly the same as that observed in 2000, the first year of the surveys.

Table 4-3. Wyoming Game and Fish Department Fawn:Doe Ratios and Population Estimates for the Weston County Pronghorn Project.

		2005	2004	2003	2002	2001	2000
Real West Treatment Area (HA 7)	Fawn:doe ratio	79	127	78	67	65	75
	Observation numbers	706	948	916	711	426	544
WGFD HA 7	Fawn:doe ratio	83	86	97	77	71	81
	Observation numbers	810	809				
Real West Control Area (Partial HA 6)	Fawn:doe ratio	85	71	93	51	67	85
	Observation numbers	158	238	71	128	143	153
WGFD HA 6	Fawn:doe ratio	81	73	79	60	70	62
	Observation numbers	444	526				
Cheyenne River Herd Unit (WGFD)	Fawn:doe ratio	85	85	84	74	67	74
	Population Model Est.	39,705	28,406	27,121	25,920	25,143	23,571

Real West fawn:doe ratios for the treatment area fluctuated from 2000 through 2003, but showed a significant increase in 2004. The ratio returned to 2003 levels in 2005, however. The treatment area also demonstrated fluctuations but no similar increase was observed in 2004. The WGFD data for the entire herd unit show more of a gradual increase in ratios over the six-year period, except for a slight drop in 2001 and a steady ratio from 2003 to 2005.

4.1.3 Rawhide Hills Project

The treatment area is included in mule deer Hunt Areas 15 and 16. Both are part of the Goshen Rim Herd Unit, which also includes hunt areas 55 and 57. The control area is contained in Hunt Area 16.

The population objective for the Goshen Rim Herd Unit is 25,000 mule deer. The 2004 population estimate was 6% below this at 23,399 animals, but it dropped to 19,225 in 2005, or 24% below objective (Figure 4-4). Over the six years, the estimated number of mule deer was highest in 2000 and 2004, with lower levels for the three intervening years and 2005.

Table 4-4. Fawn:Doe Ratios (fawns per 100 does) and observation numbers for the Rawhide Hills Mule Deer Project Area from 2000 through 2005.

		Hunt Area 15[2]	Hunt Area 16[3]	Entire Herd Unit[4]	Treatment[5] (HA 15, 16)	Control[5] (HA 16)
2000	Fawns per 100 does	50	63	68	48	52
	Pop Est/No. counted			23,420	107	37
2001	Fawns per 100 does	35	22	49	53	56
	Pop Est/No. counted			19,056	58	29
2002	Fawns per 100 does	57	54	55	61	54
	Pop Est/No. counted			19,956	300	54
2003	Fawns per 100 does	81	66	71	52	133
	Pop Est/No. counted			20,957	31	10
2004	Fawns per 100 does	38	58	56	66	48
	Pop Est/No. counted			23,399	110	82
2005	Fawns per 100 does	99	74	76	--	--
	Pop Est			19,225	--	--

[1] Data from Wyoming Game and Fish Department Annual Reports and personal communication with WGFD biologists Bob Lanka, Bart Kroger, and Martin Hicks (WGFD 2004, 2003, 2001, 2000, 1999, 1998, 1997, 1996, 1995).

[2] Approximately one-third of Hunt Area 15 is in the treatment area.

Real West has consistently observed low numbers of mule deer in this area. The highest number observed on the treatment area was in 2002 with 300 mule deer being seen during the helicopter survey. That number dropped considerably in 2003 to only 31 animals, the lowest over the five-year study period. The number of deer observed rebounded somewhat in 2004 with 110 animals being observed. Observation numbers in the control area are consistently even lower. The highest number of observations was the 82 observed in 2004; the lowest count was only 10 animals in 2003.

WGFD fawn:doe ratios for Hunt Area 15 fluctuated over the six year period, with a high of 99 in 2005 and a low of 35 in 2001. These high and low years were similar in Hunt Area 16, with a

high of 74 in 2005 and a low of 22 in 2001. This trend was also found in the entire Herd Unit with a ratio of 76 (fawns per 100 does) in 2005, after a low of 49 in 2001.

Real West fawn:doe ratios have shown a different pattern. The lowest ratio was the first year of the study, at 48:100 in 2000. The highest level was observed in 2004 at 66:100. Similarly, the control area had a low in 2000 but the highest ratio was in 2003. This ratio of 133:100 is unreliable due to the low sample size; only 10 mule deer were observed on the control area that year. Due to persistently low sample sizes, surveys were discontinued in 2005.

4.2 Weather Conditions

For the summer of 2005, precipitation was above normal over the eastern third, north central, and northwestern corner of Wyoming, while being below normal in the central and western regions of the state (Water Resource Data System 2006). Range and pasture lands were rated good or excellent in 49 percent of the state, well ahead of last year's 13 percent and the average of 9 percent. Conditions remained the best since 1999.

Based on this general demarcation, the Carbon County area would have had the below normal precipitation, while the Weston County and Rawhide Hills area would have been above normal amounts. Measurements of sites in these areas (Figure 4-5) verify that precipitation was below normal in the Carbon County region, near normal in the Weston County area, and below normal in the Rawhide Hills area.

4.3 Analysis

4.3.1 Methodology Strengths and Weaknesses

The purpose of this study was to track fawn production in three project areas where predator control measures were being conducted. In each area, an adjacent control area was also monitored to provide a comparison area. The control area had no predator control, aside from incidental take.

As has been stated in previous annual reports for this study, identifying actual cause and effect interactions that explain changes in fawn survival, as expressed in changes in the fawn:doe ratio,

Table 4-5. Annual precipitation and snowfall for the three project areas.

	Carbon County (Muddy Gap)	Weston Area (Upton)	Rawhide Hills (Lusk)
Annual Precipitation (inches)			
30-yr Average	9.94	14.49	15.60
2001	6.72	15.33	11.68
2002	4.63	13.67	11.85
2003	4.48	13.96	11.16
2004	10.89	8.62	7.02
2005	Not available	15.03	5.55
Annual Snowfall (inches)			
30 year average	50.81	43.56	52.79
2001	35.80	37.00	63.50
2002	17.00	31.00	42.40
2003	Not available	41.00	41.00
2004	25.30	42.00	27.20
2005	Not available	31.00	9.00 (incomplete)

are difficult to verify with certainty. Real West identified the following shortfalls in the methodology of this project prior to initiation of field surveys in 2000:

1. The project areas, while generally covering large areas, did not include entire herd units. In all cases, the project areas are subsets of a herd unit, making it more likely that animals move in and out of the area. Herd unit boundaries have been delineated to describe, for the most part, geographical limits of populations within which animals move freely. Changes in population size and composition could be a result of ingress and egress of animals, rather than a result of increased or decreased production.
2. Coyote populations were not monitored either on the treatment areas or the control areas. It is unknown what impact the predator control measures actually had on the coyote population, the percent of the population that was removed, or the level of coyote reproduction in the area.
3. The causes of fawn mortality are unknown and may not be a result of coyote predation. Poor vegetation, harsh winter, and other environmental conditions could also result in fawn mortality.

A concern that had been mentioned in several of the subsequent annual reports is the small sample sizes in some of the survey areas. There are particularly low numbers in the Rawhide Hills project area, as well as the Weston County control area.

Efforts were made through survey methodology to minimize these shortcomings in the protocol. Most notably, the surveys were conducted by the same person using the same routes, and within the same time period each year. While observer bias can always play a factor in how many animals are seen, since the same observer conducted all surveys in all years, this bias is minimized.

It is possible that improved numbers from the first year to the second could be attributed, to some degree, to improved knowledge of the areas and expectancy of where to concentrate the survey time. For example, in the Carbon County surveys for Hunt Area 63, the area around Pathfinder Reservoir is especially rich with pronghorn. More time was spent in this area after the first year, and likely helped to increase observation numbers in subsequent years. Likewise, on the control area for Carbon County, the pronghorn were particularly concentrated in areas proximal to water sources. While all areas were covered every year, more survey effort was directed in the vicinity of water holes in years 2 though 5 simply because it was known that that was where the animals concentrated.

Each project area also had a control area. These areas were sometimes limited in size due to the inability to eliminate predator control measures over a five-year period in a larger area. In spite of the smaller size of the controls, they provide some comparison since weather conditions are consistent between the control and treatment areas.

4.3.2 Project Area Summaries and Herd Unit Comparisons

It's possible the predator control measures resulted in a sort of refuge where the pronghorn experienced greater security due to the lower number of predators. If this is the case, the population increase could result from ingress of animals from the adjacent area. Consideration of the population estimates of the entire Herd Unit may indicate if this is occurring. Comparisons with Herd Units and Real West results are compared and discussed in the following sections.

Table 4-6. Percentage changes in pronghorn observations and population estimates after four, five and six years in the Carbon County project areas and each respective herd unit.[1]

Time Frame	HA 55	Baggs HU	HA 108	Iron Springs HU	HA 63	N. Ferris HU	HA 61	Red Desert HU
4 yrs (2003)	151%	14%	105%	-9%	544%	5%	172%	-22%
5 yrs (2004)	141%	22%	7%	-4%	747%	44%	67%	-15%
6 yrs (2005)	13%	49%	21%	-.05%	710%	67%	101%	-31%

[1]Data for Hunt Areas is observation numbers by Real West and data for Herd Units is for population estimates from the WGFD. For each combination, the Hunt Area is contained within the much larger Herd unit.

4.3.2.1 Carbon County

The three treatment areas in the Carbon County Project Area are considered separately due to the differences among the sites. Percentage changes in pronghorn observations and herd unit population estimates are shown in Table 4-6.

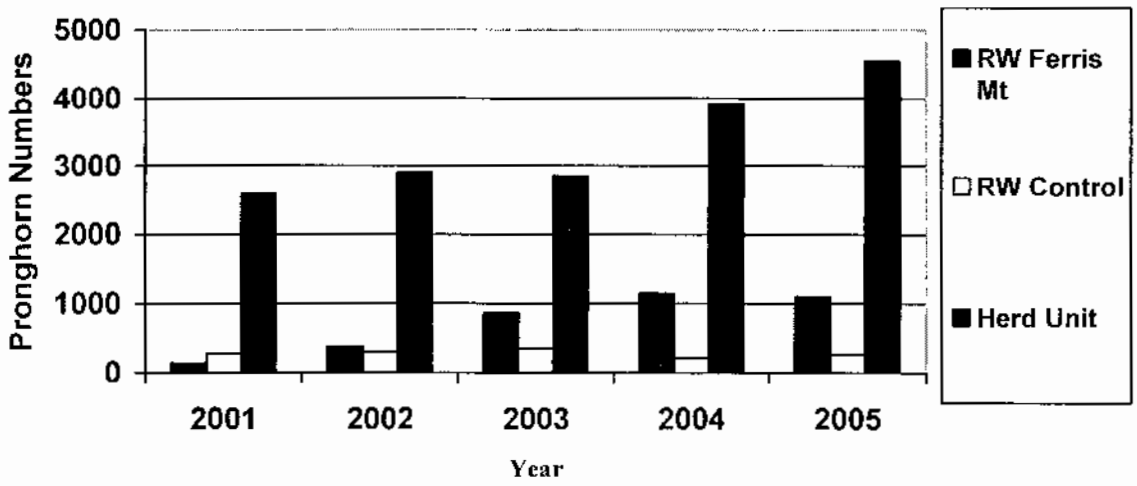
4.3.2.1.1 Ferris Mountain Project Area – Hunt Area 63

Hunt Area 63 nearly corresponds with the boundaries of the North Ferris Mountain Herd Unit. The Herd Unit also extends north of Ferris Mountain but the bulk of the Herd Unit includes the Hunt Area 63 survey area. For that reason, of all the survey areas, this one is least likely to have significant ingress and egress of animals.

Fawn:doe ratios in HA 63 decreased initially from 2001 to 2002, then increased in subsequent years, although there was a slight decline in 2005 compared to 2004 ratios. More notable than the changes in the ratios was the number of pronghorn observed on the site. It increased steadily over the first four years of the surveys, and then decreased slightly in 2005 (Figure 4-1).

Through the years of the surveys, observed pronghorn concentrations near Pathfinder Reservoir, in the eastern third of the project area, have increased steadily. Obtaining accurate classifications of pronghorn in this area is difficult due to the high density of pronghorn and the necessary distance required to prevent the animals from fleeing. This difficulty was a factor throughout the

Figure 4-1. Comparisons of Observations and Herd Unit Population Estimates for the Ferris Mountain Project Area (Hunt Area 63).



survey years, though, and likely had a similar bias each year. Weather factors likely have enhanced the attraction of the Pathfinder Reservoir area to all wildlife. Drought conditions persisted through most of the survey years, although precipitation levels increased in 2005. The lack of water availability likely resulted in animal concentrations near the available water sources, especially the reservoir and streams flowing into the reservoir.

Both fawn:doe ratios and pronghorn numbers increased steadily during the period of concentrated predator control. While there are likely other factors involved, it is possible that reduced predation played some role in improving population numbers. The predator control measures ceased after 2003. In 2004 and 2005, fawn:doe ratios and the number of pronghorn observed declined slightly, but were still well above those observed in 2001 and 2002.

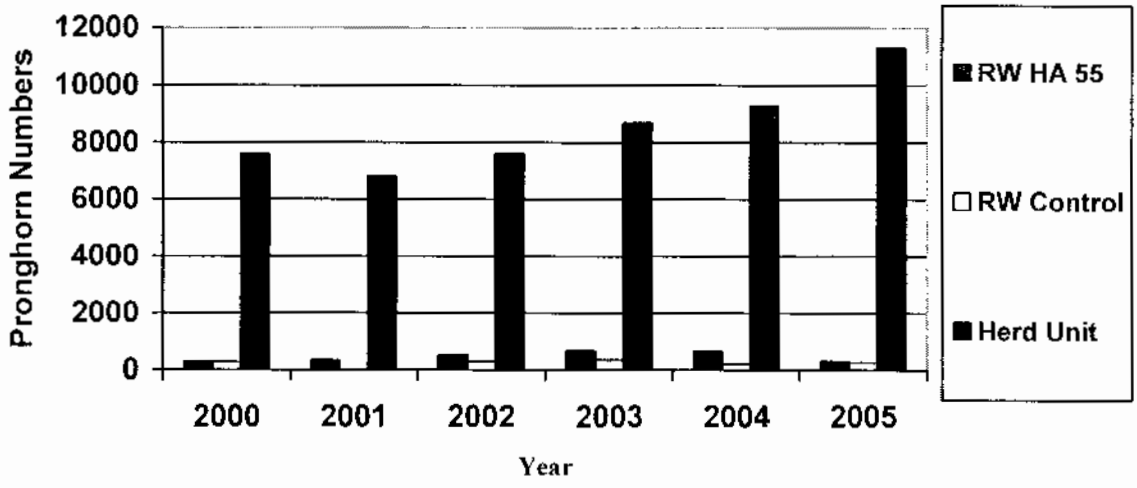
The conclusion for this project area is that predator control measures appear to have been at least one factor in improving pronghorn numbers in the area. While such measures may increase the population for the short term, the improvements persisted at least two years following cessation of the predator control.

4.3.2.1.2 Hunt Area 55

In the years with concentrated predator control measures on Hunt Area 55, both the fawn:doe ratios and overall pronghorn observation numbers either were maintained or increased slightly. These increased levels were also observed in 2004, the first year following cessation of predator control. Data from 2005 should be considered with caution. High levels of human activity and heavy equipment construction operations in the area drastically changed the character of the area in 2005. While natural gas development was spreading into the area throughout the six years of the survey, these changes were most pronounced in 2005.

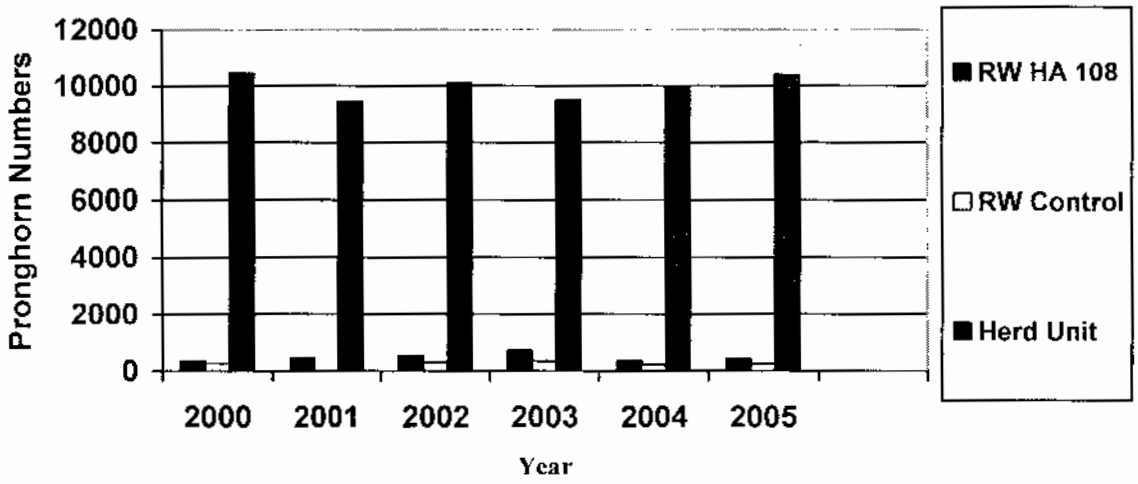
WGFD biologists observed similar pronghorn population increases in the much larger Baggs Herd Unit (Figure 4-2). Increases in the herd unit were more pronounced than those reported by Real West in Hunt Area 55, and numbers continued to increase in the herd unit in 2005.

Figure 4-2. Comparisons of Pronghorn Observations and Population Estimates for Hunt Area 55 of the Carbon County Project Area.



This comparison generally provides evidence that some migration in and out of the hunt area is occurring but, because the herd unit population also increased, such movements would not explain all of the increase in numbers on the treatment area.

Figure 4-3. Comparisons of Pronghorn Observations and Population Estimates for Hunt Area 108, Carbon County Project Area.



4.3.2.1.3 Hunt Area 108

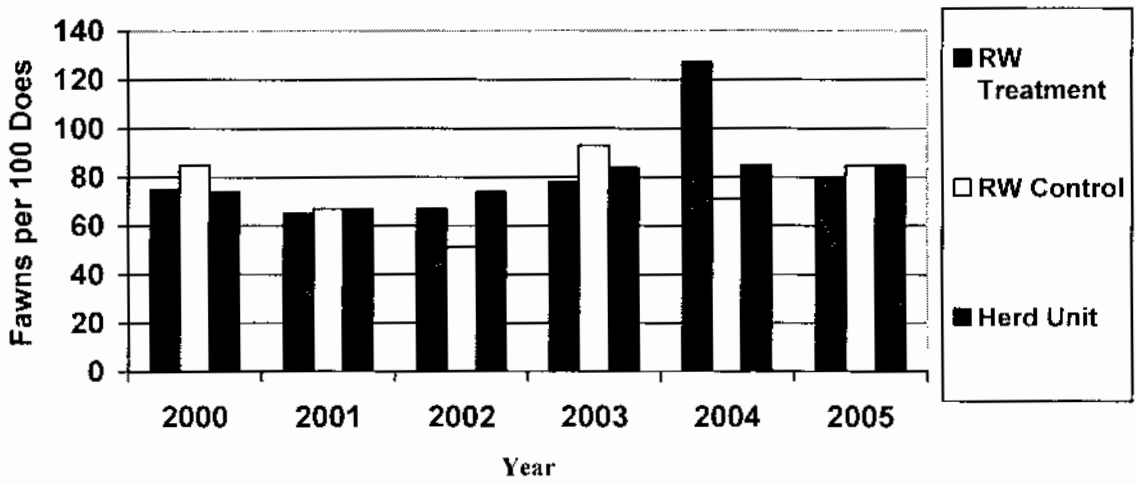
Concentrated predator control measures were not undertaken in Hunt Area 108. Some predator control took place but it was primarily accomplished through a private contractor rather than through Wildlife Services personnel with the State of Wyoming.

Real West pronghorn numbers for Hunt Area 108 increased initially in 2001, 2002, and 2003 before decreasing in 2004 and 2005. Meanwhile the entire Iron Spring Herd Unit population estimate fluctuated through the six-year period (Figure 4-3). Since intense predator control measures were not used in this hunt area, the initial increase in pronghorn numbers was likely due to other factors besides reduction in predation on fawns. Because predator control was not eliminated or structured, this area is not a control area. The control area, by contrast, had no predator control aside from recreational shooting by the general public.

4.3.2.2 Weston County

Comparisons of fawn:doe ratios for the two survey areas and the entire Herd Unit show some variation in the treatment area, with a significant increase in 2004 but dropping back down in 2005 (Figure 4-4). This increase in 2004 was not observed on either the control area or the herd unit as a whole.

Figure 4-4. Comparisons of Fawn:Doe ratios on the Weston County Project Area.



The number of pronghorn observed on the treatment area has shown a steady increase since 2001, but decreasing in 2005. The control area had four years of decline from 2000 to 2003, but increased in 2004 and then declined again in 2005. The population of the entire Herd Unit declined the first two years of the survey period, remained steady for two years, declined in 2004, and then increased substantially in 2005, the sixth year of the study (Table 4-7).

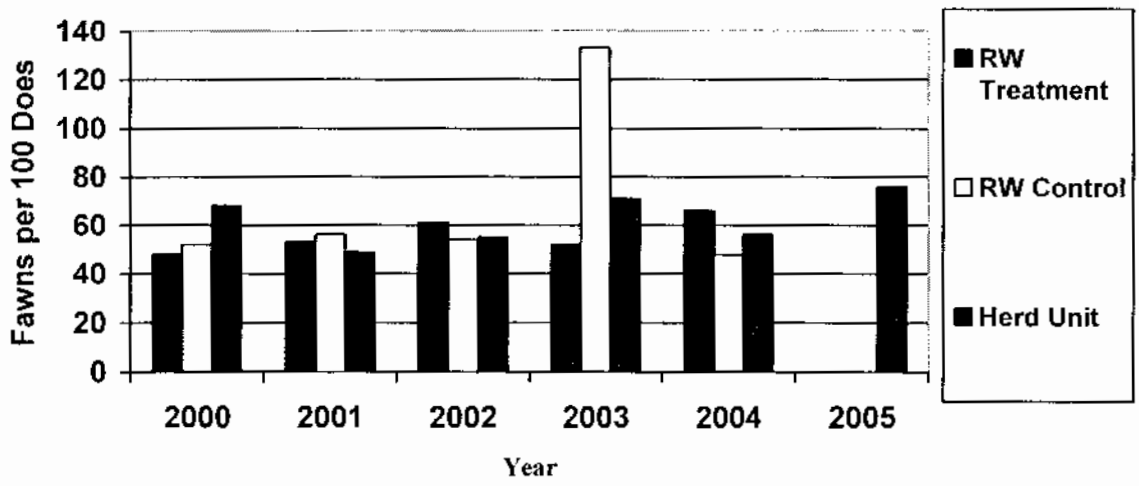
Percentage changes in observation numbers and herd unit population estimates show the treatment area increased considerably more than the herd unit itself during the coyote control

Table 4-7. Percentage changes in pronghorn observations and population estimates after four and five years in the project areas and herd unit for the Weston County Project.[1]

Time Frame	Treatment	Control	Herd Unit
After 4 yrs	68%	-53%	15%
After 5 yrs	74%	56%	21%
After 6 yrs	30%	3%	68%

[1]Data for treatment and control areas is observation numbers by Real West and data for Herd Units is for population estimates from the WGFD.

Figure 4-5. Comparisons of Fawn:Doe ratios on the Rawhide Hills Project Area.



measure years, which were the first four years of the project. The first year (Year 5) after concentrated predator control was discontinued, pronghorn numbers on the treatment area continued to improve. This improvement from pre-treatment counts decreased considerably by the Year 6 of the study. By comparison, the control area showed only slight increases from the start of the study. The entire Herd Unit improved 68% by the sixth year.

4.3.2.3 Rawhide Hills

Due to low samples sizes, comparisons of data in the Rawhide Hills area should be considered with caution. Real West surveys were not conducted in 2005 due to the low sample sizes; therefore this analysis will compare data from the first five years of the survey, while also including the WGFD data for 2005.

The fawn:doe ratios on the treatment area varied only slightly over the five year period, with the highest ratio in 2004 (Figure 4-5). The control area showed similar slight variations over the period, with a large increase in 2003 but this number is skewed because only a single group of mule deer was observed on the control area. Herd Unit ratios have also fluctuated over the period, with a low in 2001 and a high in 2005.

Population estimates for the herd unit and Real West observation numbers (Table 4-8) show a decline in the treatment area after fours years of predator control, but an increase over the five-year period. At the same time, the Herd Unit also showed a slight decline over four years but

Table 4-8. Percentage changes in pronghorn observations and population estimates after four and five years in the project areas and herd unit for the Rawhide Hills Project.[1]

Time Frame	Treatment	Control	Herd Unit
After 4 yrs	-71%	-73%	-11%
After 5 yrs	+3%	+122%	0%
After 6 years	Not surveyed	Not surveyed	-18%

[1]Data for treatment and control areas is observation numbers by Real West and data for Herd Units is for population estimates from the WGFD.

returned to nearly the same population at the end of the five-year period, and then dropped again in 2005.

4.4 Conclusions

The weather over the six years of the survey period was a mixed bag for wildlife. Severe drought conditions persisted for the first five years. In the sixth year (2005), precipitation levels improved. Winters were relatively mild throughout the entire six-year period. The expected result of this combination is that fawn production would be lowered due to poorer nutrition of the does as a result of reduced forage availability. However, those fawns that survive into the winter were more likely to make it to yearling age because of the mild winters.

Percentage of the population comprised of yearling bucks provides information on survival of fawns to the next year. While female yearlings are not distinguished in the field, bucks are more readily identified.

The percentage of yearling bucks in the Carbon County project areas show Ferris Mountain had the highest percentage of yearling bucks over the six year period at 16 percent of the population (Table 4-9). This indicates considerably greater yearling survival from the previous year when compared to the control area with only 6.5 percent of the population being yearling males.

Table 4-9. Percentages of the surveyed populations comprised of yearling bucks in each of the three project areas.

	2001	2002	2003	2004	2005
Carbon County					
Treatment: Hunt Area 55	2.4	5.2	3.5	3.5	3.6
Treatment: Hunt Area 108	2.6	2.6	3.5	10.2	8.4
Treatment: Ferris Mountain	7.3	4.2	10.7	7.7	16.0
Control Area	5.0	6.9	4.2	6.5	6.5
Weston County					
Treatment Area	7.7	4.8	6.2	9.9	10.9
Control Area	2.0	7.8	7.0	15.1	7.0
Rawhide Hills					
Treatment Area	6.9	4.0	3.2	4.5	--
Control Area	3.4	7.4	0	9.8	--

In all Carbon County areas, including the control area, the percentage of yearling bucks in the population increased over the first five years of the project; for the sixth year, only Ferris Mountain showed an increase.

For Weston County, the percentage of yearling bucks increased every year, except in 2002, on the treatment area, reaching a high of 10.9 percent in 2005. The percentage increased in the control, as well, except in 2005 when percentages dropped back down.

In the Rawhide hills, the percentage of bucks declined in the treatment area, while increasing in the control area.

Changes in fawn:doe ratios, comparing each year with the 2000 baseline year (Table 4-10) show improvements after four years in all but Hunt Area 108 and Ferris Mountain areas of the Carbon County Project area. By the fifth year, changes from the start of the study showed only slight declines in the Ferris Mountain Area and Hunt Area 108 for the Carbon County areas, and in the control areas of both the Weston County and Rawhide Hills project areas. By the sixth year (2005) and compared to the first year of the study, fawn:doe ratios remained higher in Hunt Area 44, the Carbon County control area, and the Weston County treatment area. Ratios were either unchanged or lower in all other areas when comparing the first and sixth years of the study.

Table 4-10. Summary of Fawn:Doe Ratio Changes for 2001 though 2005, as compared to the baseline year in 2000 on the Three Project Areas.

	Baseline Level	Predator Control			No Predator Control	
	2000	2001	2002	2003	2004	2005
Carbon County						
HA 55	41	+11	+5	+4	+13	+21
Ferris Mountain Treatment[1]	79	--	-36	-33	-9	-13
Hunt Area 108	55	+18	-11	Same	-8	-3
Control Area	48	+3	-2	+4	+24	+5
Weston County						
Treatment Area	75	-10	-8	+3	+52	+4
Control Area	85	-18	-34	+8	-14	Same
Rawhide Hills[2]						
Treatment Area	48	+5	+13	+4	+16	--
Control Area	52	+4	+2	+81[2]	-4	--

[1] Base year is 2001.
[2] Small sample size.

Percentage observation number changes after four, five and six years (Table 4-11) in the Carbon County sites show increases in all areas after four years with the most significant change in the Ferris Mountain area. Once predator control measures ceased (Year 5), percentage changes compared to the first year were still highest in the Ferris Mountain area, but observation numbers had increased across the board, including in the control area. After the end of the second year of no predator control, observation numbers were still higher in Ferris Mountain and the control area, but they had declined in Hunt Area 108 and 55.

After four years, improvements were also observed in the Weston County treatment area, but the observation numbers had decreased in the control area. After predator control ceased in Year 5, observation numbers had increased in both the treatment and control areas, but after two years of no predator control, the observation numbers declined in the treatment area, as compared to the first year of the study.

Table 4-11. Summary of Percentage Changes in the Number of Pronghorn or Mule Deer Observed Over Six Years on the Three Project Areas.

	Yr 1 to 4	Yr 1 and 5	Yr 1 to 6	Yr 4 to 6
Carbon County Pronghorn				
HA 55	151%	141%	13%	-55%
Ferris Mountain (HA 63)	544%	747%	710%	26%
Hunt Area 108	105%	7%	21%	-41%
Control Area	171%	67%	101%	26%
Weston County Pronghorn				
Treatment Area	68%	74%	30%	-23%
Control Area	-53%	56%	3%	12%
Rawhide Hills Mule Deer[1]				
Treatment Area	-71	3	--	--
Control Area	-73	122	--	--

[1] Extremely small sample size.

Increases in the number of mule deer observed in the Rawhide Hills areas was found after five years, but not after four years. As mentioned previously, drawing any conclusions on that project area should be done cautiously due to the low observation numbers.

In assessing impacts of predators to big game populations it must be determined what factor(s) are limiting the population. Often winter range quality and quantity are limiting the population, regardless of quality of vegetation during spring, summer, and fall. If the big game population is near the carrying capacity of the area, it is likely that predation is not resulting in a reduced population. If predators didn't reduce numbers, other habitat limitations would.

However, if the big game population is well below the area's carrying capacity, predation on fawns could be additive. In other words, if a predator didn't kill the fawn, it would likely live to reproductive age. The result is that predation can have a significant impact on the big game population.

Ballard et al (2001) provides a literature review of deer and predator relationships. The authors of the review concluded that predator control was useful in improving deer populations in some cases, while in other cases it was not.

They found the following similarities among those cases where predator control appeared to help the deer:

- Predator control was implemented when the deer populations were below habitat carrying capacity;
- Predation was identified as a limiting factor;
- Control efforts reduced predator populations enough to yield results (e.g., at least 70% of the coyote population was removed);
- Control efforts were timed to be most effective (just prior to predator or prey reproduction); and,
- Control took place at a focused scale (generally a study area <259 mi^2).

Conversely, there were similarities where predator control was not effective or could not be measured at improving mule deer populations. These included:

- When mule deer populations were at or near habitat carrying capacity;
- When predation was not a key limiting factor;
- Where control failed to reduce predator populations sufficiently to be effective; and,
- Where control efforts were on large-scale areas.

They found one failure in much of the research has been a lack of an adequate experimental design. Often small sample sizes limited usefulness of studies because of their low statistical power to actually detect significant differences.

The authors of the paper concluded that "seasonal or long-term changes in fawn:doe ratios can provide an indication of when most losses are occurring, but cannot be used to determine causes for changes. Simple changes in fawn:doe ratios cannot be used to determine whether predation is a limiting factor. Only through intensive studies can predation be identified as a significant mortality factor."

The implications from this research on this project are that any increases in fawn survival on all project areas when compared to control areas should be viewed with caution. The sample sizes

are small, as are the study areas. No doubt migration in and out of each area by big game and predators occurs.

However, the results of these surveys over the six-year period indicate that it is likely predator control, in association with mild winters, helped improve big game populations through improved fawn survival. When a big game population is depressed and seemingly unable to rebound several years after a harsh winter, predation could be a factor in keeping the population down. Temporary control measures to increase fawn production could help in population recovery. Once big game numbers near the habitat carrying capacity, predation is less likely to have as noticeable an impact on the population.

Summaries of observation numbers, fawn and doe ratios, and adjusted fawn and doe ratios are illustrated in Figures 4-6, 4-7, and 4-8. The result of this study suggests intensive predator control may result in increased, observed, preseason fawn:doe ratios and result in increases in pronghorn numbers. The areas with predator control showed population increases that were, in most areas, greater than those observed within the entire herd unit.

Figure 4-6. Total Pronghorn or Mule Deer Observed in Three Study Areas Over Six Years.

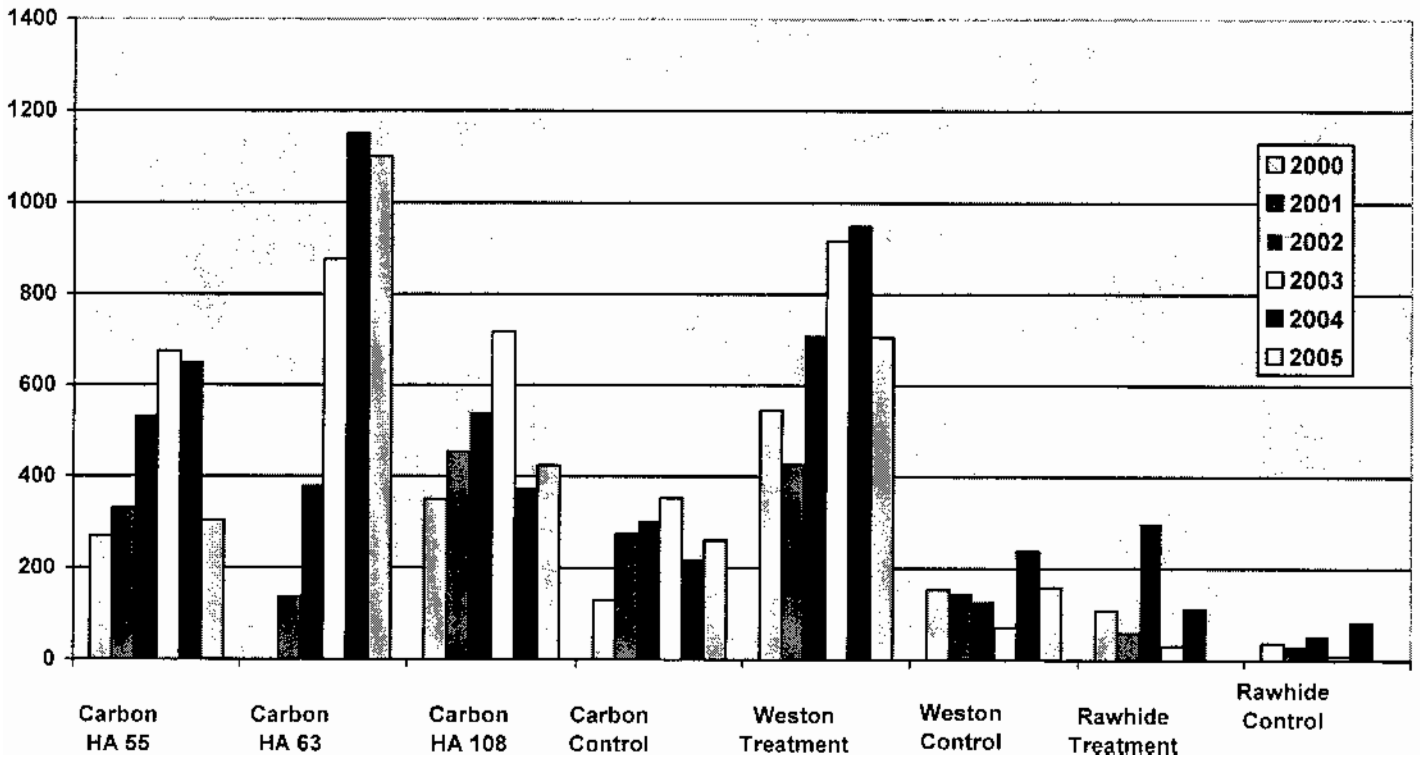


Figure 4-7. Pronghorn or Mule Deer Fawn Ratios[1] per 100 Does Observed in the Three Study Areas.

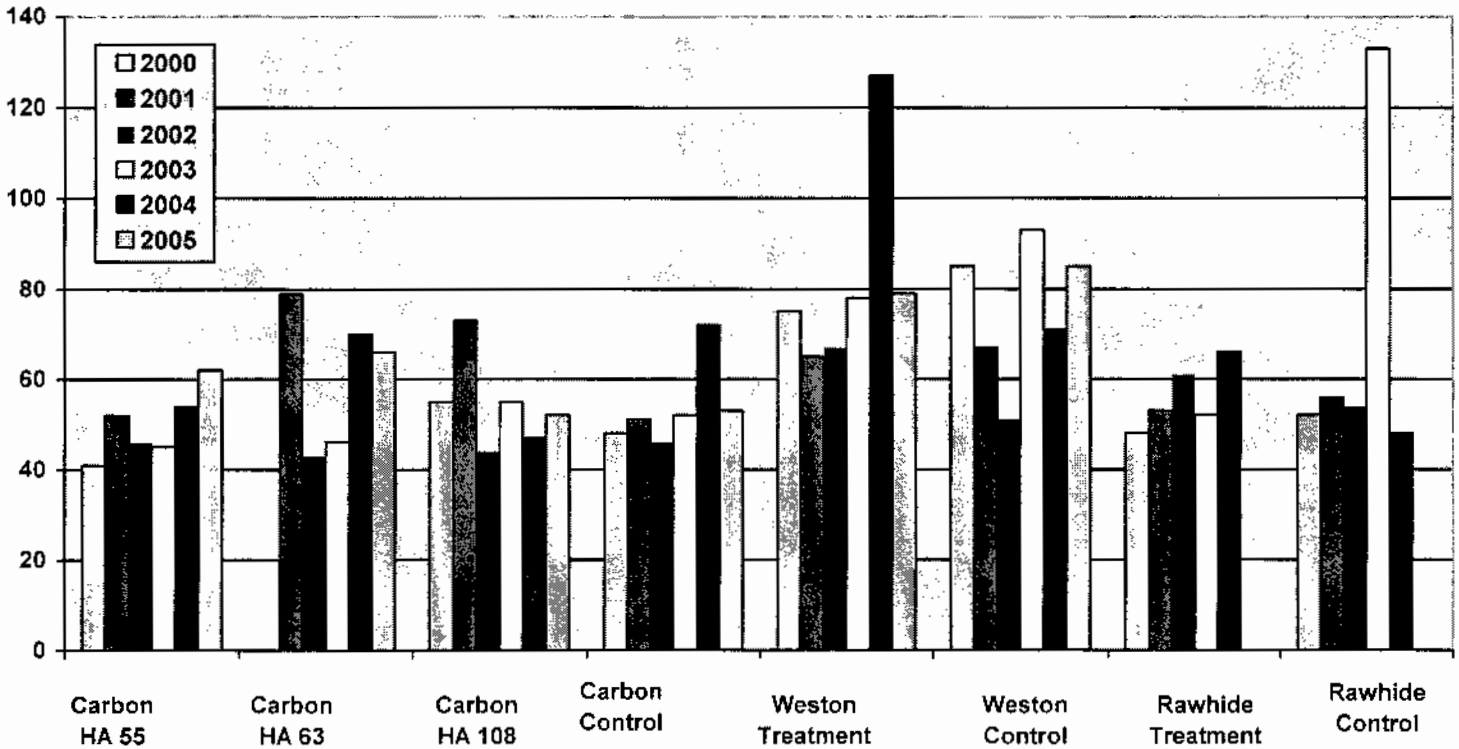
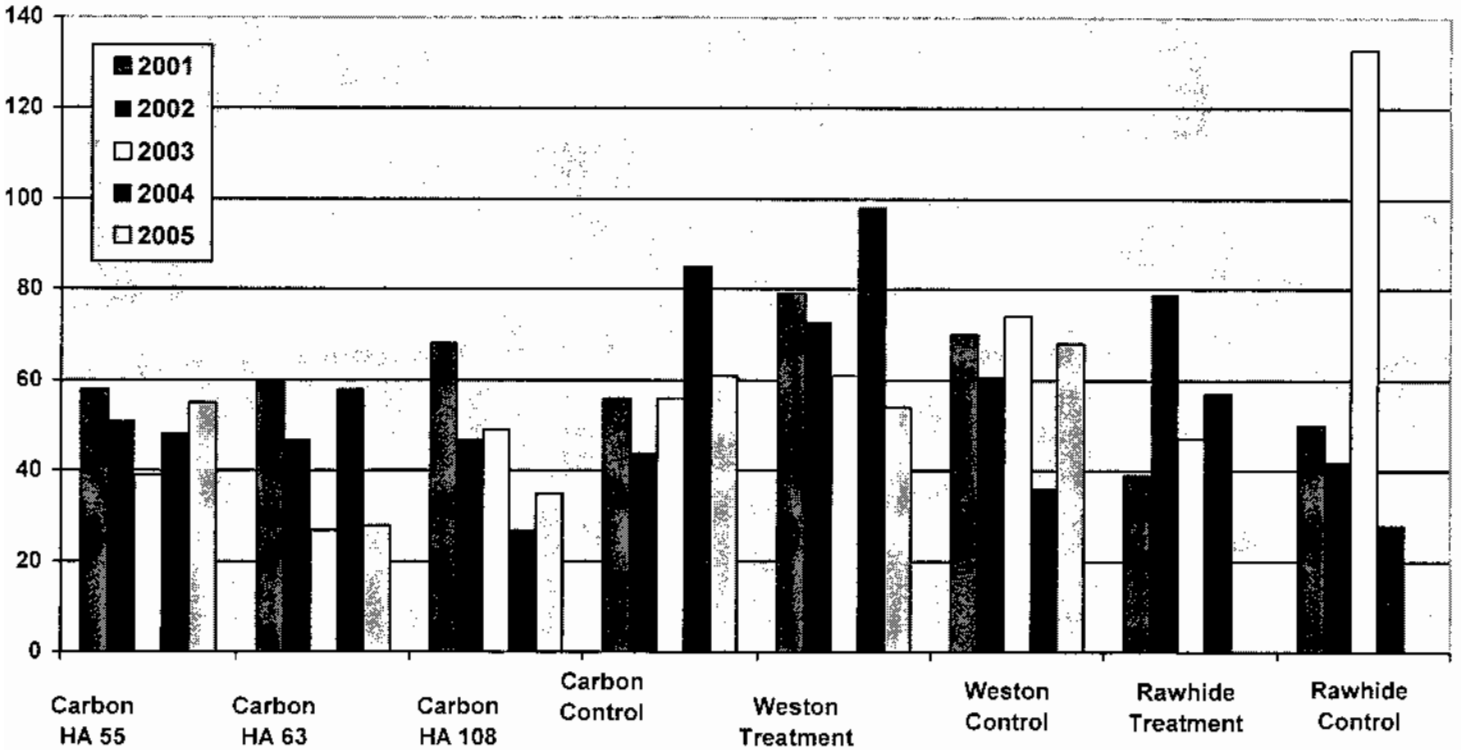


Figure 4-8. Adjusted Pronghorn or Mule Deer Fawn Ratios[1] per 100 Does Observed in the Three Study Areas.



[1] Adjusted ratio is the number of fawns per 100 does, subtracting the number of yearling bucks from the number of does.

5.0 PERSONS CONTACTED

The following individuals were contacted for information contained in this report:

Individual	Company/Agency	Reason for Contact
Dr. Archie Reeve	Adjunct Professor University of Wyoming	Survey technique analysis
Dr. Fred Lindsey	Associate Professor University of Wyoming, Wyoming Cooperative Research Unit	Survey technique analysis
Rod Merrel	Wyoming Wildlife Services	Predator control information
Lee Denney	Rancher, Rawhide project area	Predator control information
Alan Todd	Rancher, Weston County Predatory Animal Board	Predator control information
Greg Hiatt	Wyoming Game and Fish Dept., Rawlins District	Pronghorn classifications
Greg Anderson	Wyoming Game and Fish Dept., Newcastle area	Pronghorn classifications
Bob Lanka	Wyoming Game and Fish Dept., Laramie District	Mule deer classifications
Bill Rudd	Wyoming Game and Fish Dept., Rock Springs Dist.	Helicopter observation success rates
Daryl Lutz	Wyoming Game and Fish Dept., Casper Dist.	Predator control effects; helicopter coordination
Mark Nelson	Wyoming Game and Fish Dept., Cheyenne area	Helicopter survey results
Bart Kroger	Wyoming Game and Fish Dept., Douglas area	Helicopter coordination
Mark Zornes	Wyoming Game and Fish Dept., Wheatland area	Helicopter coordination
Martin Hicks	Wyoming Game and Fish Dept., Wheatland area	Helicopter coordination; Mule deer classifications
Joe Sandrini	Wyoming Game and Fish Dept., Newcastle area	Pronghorn classifications

6.0 LITERATURE CITED

Animal Damage Management Board. June, 2000. Request for Proposals No. 0360-G. Opening date and time: 2 p.m., June 30, 2000. 10 pages.

____. 1999a. Project Proposal Application for the Weston County Wildlife Enhancement Project. Application submitted on 12-01-99. 29 pages.

____. 1999b. Project Proposal Application for the Rawhide Recovery Project. Application submitted on 12-01-99. 16 pages.

____. 1999c. Project Proposal Application for the Carbon County Herd Objective Control Project. Application submitted on 12-01-99. 23 pages.

Ballard, W.B., D. Lutz, T.W. Keegan, L.H. Carpenter, and J.C. DeVos, Jr. 2001. Deer-predator relationships: a review of recent North American studies with emphasis on mule and black-tailed deer. Wildlife Society Bulletin 2001, 29(1):99-115.

Guenzel, R.J. 1997. Estimating pronghorn abundance using aerial line transect sampling. Wyoming Game and Fish Dept. Publ. 173 pp.

Lindsey, Dr. Fred. Associate Professor, Wyoming Cooperative Research Unit. 2000. Personal communication with A. Travsky of Real West Natural Resource Consulting.

Natural Resources Conservation Service. 2003. Wyoming Basin Outlook Reports. Snow Survey Data, Casper, Wyoming. Web site: http://www-wwrc.uwyo.edu/wrds/nrcs/nrcs.html

Real West Natural Resource Consulting. 2001. Big Game Surveys at Three Sites in Wyoming. Unpublished report presented to the Animal Damage Management Board.

Real West Natural Resource Consulting. 2000. Big Game Surveys at Three Sites in Wyoming. Unpublished report presented to the Animal Damage Management Board.

Reeve, Dr. Archie. Adjunct Professor, Wyoming Cooperative Research Unit. 2000. Personal communication with A. Travsky of Real West Natural Resource Consulting.

Water Data Resources Systems. 2003. Precipitation data summary for three sites in Wyoming (data request) for 2002. University of Wyoming, Laramie, WY.

Water Data Resources Systems. 2002. Precipitation data summary for three sites in Wyoming (data request) for 2001. University of Wyoming, Laramie, WY.

Water Resources Data System. 2003. Wyoming Monthly Climatology. Data compiled and available at the Web site: http://www.wrds.uwyo.edu/wrds/wsc/monthsum/monthsum.html

Western Regional Climate Center. 2005. Wyoming Climate Summaries. Data compiled and available at the Web site: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?wyupto

Western Regional Climate Center. 2002. Wyoming Climate Summaries. Data proved by Desert Research Institute, Reno, Nevada. Web site: http://www.wrcc.dri.edu/index.html

Wyoming Game and Fish Department. 2000 – 2004. Annual Big Game Herd Unit Reports: for the Casper, Green River, Lander and Laramie Regions.

Johnson County
Rabies Mitigation

Johnson County Predatory Animal Board
211 Upper French Creek Road
Buffalo, WY 82834
November 27, 2006

Wyoming ADMB
2219 Carey Avenue
Cheyenne, WY 82002

Dear Hank,

I am happy to report the continued success of our Rabies Mitigation Project. City and Town officials continue to report reductions in troublesome animal calls within the towns of Buffalo and Kaycee. Population management of potentially rabid animals has been obtained by creating a buffer zone of control around these towns. These zones include greenbelts, wetland areas, a cemetery, a golf course, parks and campgrounds as well as riparian areas of Clear Creek and Powder River. We have also taken many targeted animals far away from the towns.

With our project in place from the previous year, our early springtime control was better than last year, when we struggled to get started on time. With most of the equipment and supplies on hand, we were able to expand this year with the contracting of a second part-time control officer to work in the Kaycee area. We were fortunate to have four good employees, all striving to make the project a success. They reported to the board each month of the daily activities and catches. We also had great cooperation with other local and state agencies. The county landfills disposed of the animals at no charge and the Wyoming State Veterinary Lab did the testing at no cost.

We still had some trap tampering and theft, but not nearly as much as last year. Maybe that's to be expected as you do this kind of work in and around populated areas. We were also asked to leave a property because of the daily early morning activity.

We are very excited about the projects first two years and satisfied that it met the goals we had set. Other towns and counties have asked a lot of questions about our control. Last year we had several positive tested animals, however, this year's tests showed none.

Enclosed are reports of monthly activity and financial expenses.

Thank you for your continued support of the project.

Dave Hall, Secretary

Johnson County Predatory Animal Board

City Of BUFFALO WYOMING

JEREMY GRIMM CITY PLANNER

BRUCE HEPP MAYOR
CITY COUNCIL:
GARY ANDERSON
R. L. HANCOCK
KATE HOLT
MICHAEL R. JOHNSON

December 1, 2006

Animal Damage Management Board
2219 Carey Avenue
Cheyenne, Wyoming 82002-0100

To Whom It May Concern:

I write this letter to encourage the continued funding and support of programs such as Wyoming Department of Health: Rabies Education, a program that was so incredibly successful here in Johnson County last year. The support of this board in addressing rabies awareness has been an essential part of the success that we have seen in Buffalo. In 2004 we had 924 total skunk contacts, 2005 just 6 and in 2006 I am pleased to say that we have not had any skunk encounters. Peter Camino has done an exceptional job addressing the concerns of rabid skunks in our community and again, this success is much in part of the support given to him through your board.

Sincerely,

Bruce Hepp

Bruce Hepp
Mayor

46 NORTH MAIN • ZIP CODE 82834 • TELEPHONE 307-684-5566 • FAX 307-684-5726
e-mail: buffalox@vcn.com • TTY 1-800-877-9965

Johnson County Predatory Animal Board
2006 Rabies Mitigation Project
Projections / Accual Expenses - January to November

	2006 Projected Expense	January	February	March	April	May	June	July
Contract La	10000				750.00	2050.00	1875.00	1925.00
% of Count	12500	1461.00	1461.00	1461.00	1461.00	1461.00	1461.00	1461.00
Traps, Lure	500							
Testing and	250							
Training	500							
Admininsta	1000	125.00	125.00	125.00	125.00	125.00	125.00	125.00
Misc. Expe	1000							
	25750	1586.00	1586.00	1586.00	2336.00	3636.00	3461.00	3511.00

August	September	October	November	Total Expense
2050.00	1200.00	1150.00	400.00	11000.00
1461.00	1461.00	1461.00	1461.00	10227.00
				0.00
	96.12			96.12
				0.00
125.00	125.00	125.00	125.00	875.00
		570.00		570.00
3636.00	2882.12	3306.00	1986.00	22768.12

Johnson County Predatory Animal Board
2005 Rabies Mitigation Project
Tabulation of targeted animals taken by month and employee

Totals by Month

	Skunks	Raccoon	Fox	Fox Pups
April	23	6	1	8
May	12	34	1	0
June	11	19	3	14
July	7	9	1	1
August	7	9	1	0
September	14	7	3	0
October	10	2	5	0
Total	84	86	15	23

Totals by Employee

	S
Floyd Cummings	
Cenny Burnell	
Randy Tissino	
Total	

Raccoon	Fox	Fox Pups
12	13	14
25	1	8
49	1	1
86	15	23

Johnson County Predatory Animal Board
2005 Rabies Mitigation Project
Projections / Accual Expenses - April to October

	Projected Expense	April	May	June	July	August
Contract Labor	7500.00	950.00	1300.00	1250.00	1300.00	1350.00
% of County Trappers' Salary	10000.00	1378.85	1341.00	1341.00	1341.00	1341.00
Traps, Lure, and Supplies	1500.00	2900.18				
Testing and Disposal	1250.00	59.30			18.37	
Training	500.00	114.90				
Admininstation and Record Keeping	750.00	125.00	125.00	125.00	125.00	125.00
Misc. Expense	1000.00	1215.00				
Total	22500.00	6743.23	2766.00	2716.00	2784.37	2816.00

October	Total Expense
400.00	7850.00
1341.00	9424.85
	2900.18
35.53	113.20
	114.90
125.00	875.00
	1215.00
1901.53	22493.13

Wyoming Department of Health
Rabies Educational Project

Wyoming Department of Health
Final Report on Rabies Educational Project

The Wyoming Department of Health (WDH) Rabies Educational Project began January 2005. It consisted of three parts. Part one was to have health care providers (HCP) and veterinarians in the state complete a questionnaire to obtain their base level of knowledge about rabies in the state. The results of this questionnaire were used to create an educational campaign for HCP and veterinarians in Wyoming. Then, a post questionnaire was administered to determine if their educational level improved following the campaign.

Part two was the HCP, veterinarian and public educational campaign.
The educational campaign for the HCP and veterinarians consisted of several mailings including post cards, letters and a rabies notebook with specific information for both HCP and veterinarians. The rabies notebooks were very well received and we have had numerous requests for additional notebooks.

A similar campaign was created for the public. Three main messages were delivered in the form of posters, book marks, radio ads, a power point presentation for school age children, a new Wyoming Department of Health web site and an educational packet that was distributed to teachers around the state. The messages were:

1. Keep your pets up to date on rabies vaccination.
2. Stay away from stray animals and wildlife including bats and skunks.
3. If you do come into contact with these animals seek advice from a health care provider to discuss your need for rabies post exposure prophylaxis.

Part three of the project was to obtain and analyze the results of the pre and post questionnaires. Results indicated there may have been an improvement in rabies awareness and knowledge among HCP and veterinarians.

For example, both HCP and veterinarians were asked, “Would it be appropriate for individuals to receive rabies post exposure prophylaxis if a bat is found in an infant’s crib and the bat is tested and found to be positive for rabies”, results were as follows:

In 2005 91.4% of the veterinarians questioned answered yes, 57.1% of the HCP said yes. In 2006 98.6% of the veterinarians answered yes and 78.8% of the HCP did. This demonstrates a 7% improvement for veterinarians and an almost 32% improvement for HCP.

Another positive result of the educational campaign was learning most veterinarians and veterinary technicians were not current on checking their rabies titers. WDH recommends veterinarians and veterinary technicians have their titers checked every two years since skunk rabies is endemic in the state. WDH attended the Wyoming Veterinary Medical Association Meeting in June of 2006 to provide this service to veterinarians and technicians. In total we had 50 veterinarians and technicians participate in having their

titers checked some of which had not been checked in over 25 years. Additionally, the Wyoming Veterinary Medical Association applauded our efforts in helping veterinarians stay protected against rabies.

The educational materials created from these funds will continue to be distributed to veterinarians, HCP, school educators and the public around the state. We hope to update the rabies booklets in the future and redistribute them to HCP and veterinarians. We also hope to expand our educational campaign to include animal control officers in the state. We feel this educational program has been extremely successful and we greatly appreciate the funding from the Animal Damage Management Board.

Jamie Snow
State Public Health Veterinarian
Wyoming Department of Health
6101 Yellowstone Road
Cheyenne, WY 82002
307-777-5825

Increasing the Speed of Action and Potency of the Theobromine and Caffeine Based Predacide

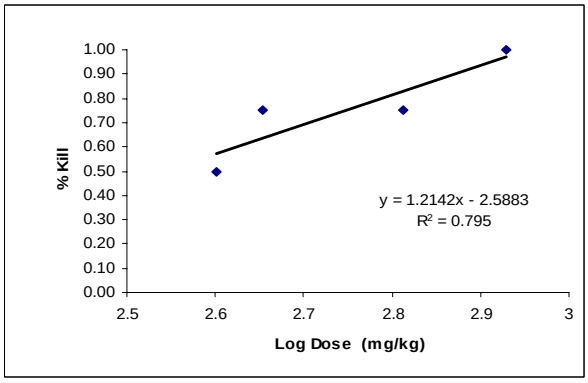
Final Report submitted to WYADMB

Project Title: Increasing the Speed of Action and Potency of the Theobromine and Caffeine Based Predacide

Project Durations: 7/2005 - 6/2006

Submitted by: John Johnston, USDA/APHIS/WS/NWRC

In 2003/2004, the WY Animal Damage Management Board (WYADMB) funded a USDA/APHIS/Wildlife Services/National Wildlife Research Center proposal to develop a natural (plant derived) predacide based on the selective toxicity of theobromine and caffeine to canids. It is hoped that the increased level of safety and a natural designation will minimize public opposition to these toxicants. Natural extracts of caffeine and cocoa were combined to replicate the methylxanthine ratios in tea (high in caffeine) and cocoa (high in theobromine). Administration of the theobromine-rich cocoa formulation to coyotes resulted in death with no apparent undesirable symptoms. The caffeine-rich tea formulation was more toxic (resulted in death at a lower concentration) but was accompanied by undesirable symptoms (i.e. seizures). Based on these preliminary results, coyotes were administered the cocoa formulation at doses ranging from 400 to 850 mg/kg. A dose vs. response curve constructed from these data indicated that a dose of 536 mg/kg would be toxic to 99 percent of exposed coyotes.

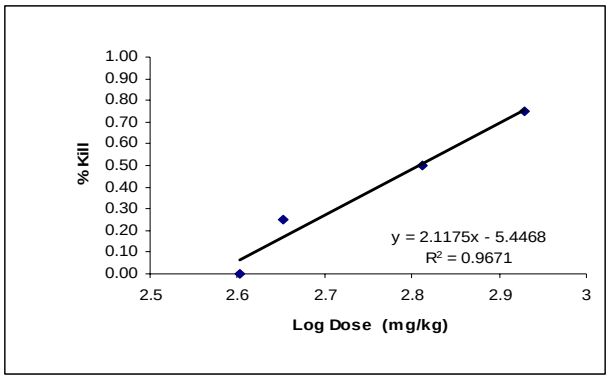


Toxicity Curve for cocoa based natural predacide. Each data point represents 4 coyotes.
LD_{50} = 392 mg/kg
LD_{95}=489 mg/kg
LD_{99}=536 mg/kg

Based on these findings, WYADMB funded our 2004/2005 proposal to: 1) determine if theobromine alone could be used as an effective predator toxicant (since registering a single active ingredient product would be less expensive than registering a two active ingredient product) and 2) identify the most promising mixture of methylxanthines for development as a predacide candidate for US EPA registration. In completing these objectives, we conducted a series of toxicity tests with coyotes.

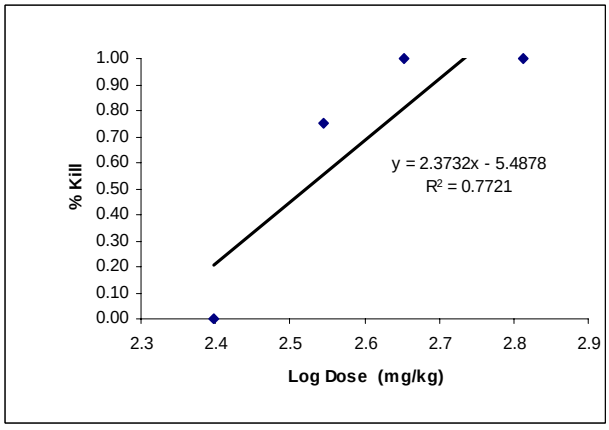
For the first objective, we identified that the theobromine dose required to kill 99% of exposed coyotes is

618 mg/kg (about 15% greater than the dose required for the cocoa formulation).



Toxicity Curve for theobromine.
Each data point represents 4 coyotes.
LD_{50} = 516 mg/kg
LD_{95}=586 mg/kg
LD_{99}=618 mg/kg.

For the second objective, we identified a theobromine:caffeine mixture with increased potency (by maximizing the proportion of caffeine), while retaining the "humaneness" (lack of undesirable symptoms) associated with theobromine toxicity. These experiments indicated that a 5:1 ratio of theobromine:caffeine produced a humane and potent toxicant for coyotes. To determine the quantity of this mixture that would need to be delivered in a predacide product, additional toxicity tests were conducted. These tests indicated that the dose of the 5:1 theobromine:caffeine mixture required to kill 99% of exposed coyotes is 385 mg/kg.



Toxicity Curve for 5:1 theobromine:caffeine.
Each data point represents 4 coyotes.
LD_{50} = 335 mg/kg
LD_{95}=369 mg/kg
LD_{99}=385 mg/kg.

Since the required dose of theobromine was significantly higher than the required dose of the 5:1 theobromine:caffeine mixture, I decided to concentrate on the theobromine:caffeine mixture for the next phase of this study. The 5:1 theobromine:caffeine mixture was mixed with dog food and corn syrup and placed in a Coyote Lure Operative Device (CLOD). Each CLOD contained approximately 12 grams of the theobromine:caffeine mixture. One CLOD was offered to each of six coyotes. Three of the six coyotes bit the CLOD with consumption ranging from 50 to nearly 100% of the CLOD contents. All three of these coyotes died with minimal pre-mortality symptoms. Death occurred between two and seven hours post consumption.

Given the absence of symptoms, this experiment was repeated with a 4:1 theobromine:caffeine. Two of the six coyotes bit the CLOD. One coyote consumed nearly 100% of the CLOD contents and died approximately three hours post consumption. The other coyote consumed approximately 10% of the contents and died 8 hours post consumption. Pre-mortality symptoms included staggering and labored breathing.

Based on these findings, it appears that the 5:1 theobromine:caffeine mixture is a very promising candidate for development into a canid predacide. However, the mass of the required dose would likely limit its use to devices which can deliver a significant quantity of active ingredient(s) such as the Coyote Lure Operative Device. WY ADMB funded an additional year of research aimed at developing a formulation to increase the potency and speed of action of the 5:1 theobromine:caffeine mixture. This funding permitted us to address 3 research objectives:

Objective 1: Determine potential U.S. EPA registration requirements, costs and time-line.

Neither caffeine nor theobromine are currently registered with the U.S. Environmental Protection Agency (EPA) as pesticide active ingredients. The first phase of registering these compounds as a predacide is to determine the registration data requirements and associated costs for each material. Concurrently, a literature search was performed to determine what data are available in the open literature which would satisfy EPA data requirements. Working with a former EPA employee, we determined an approach for registering a new predacide and a timeline for the registration process.

Proposed Registration Costs:

- Total cost for all potentially required studies = $4,831,000
- Projected savings
    - Waivers = $2,587,000
    - Literature = $1,279,000
- Projected registration costs = $965,000

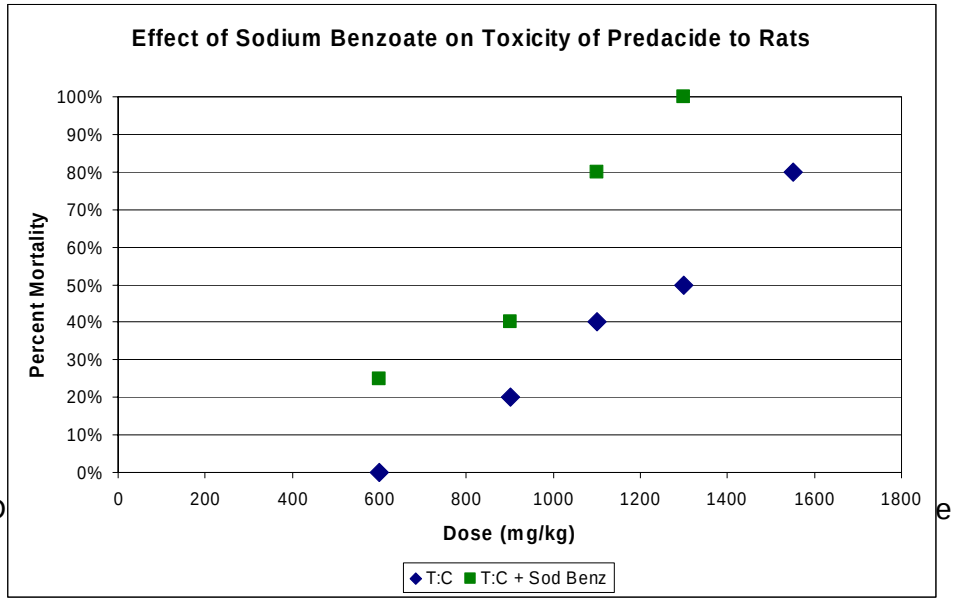
Proposed Registration Timeline

Conduct Outdoor Pen Efficacy Study	$50,000	2007
Submit Preliminary Data to EPA	$10,000	2008
Data to support EUP Application	$150,000	2008/2009
EUP Study	$250,000	2010
Final Registration Data Requirements	$415,000	2011/2012

Objective 2: Determine the effect of adding sodium benzoate and calcium citrate on the toxicity of theobromine and caffeine to rats

our groups of 5 rats each were dosed for each toxicity test. Rats were orally gavaged with aqueous solutions of the test mixtures. In test one, the toxicity of theobromine:caffeine (5:1) to rats was determined. In the second series of tests, the toxicity of theobromine:caffeine (5:1) plus various amounts of sodium benzoate was determined. This results of this test indicated that the optimal ratio of theobromine to the theobromine:caffeine (5:1) was 1:1. In test series three, the toxicity of theobromine:caffeine (5:1) plus various amounts of calcium citrate was determined. In these tests, no increase in toxicity was noted for calcium citrate.

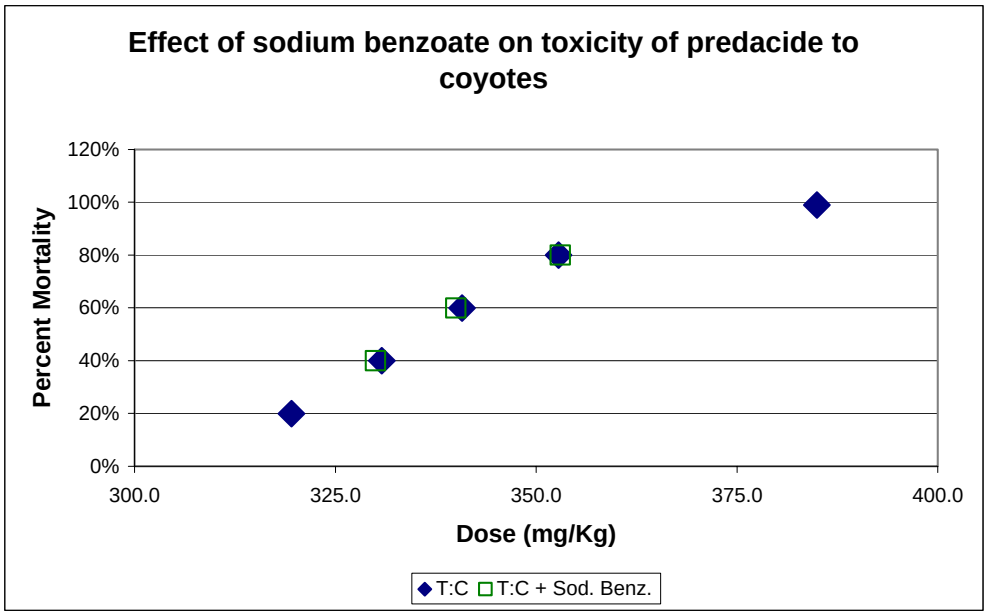
As summarized in the graph below, the sodium benzoate approximately doubled the toxicity of the prototype theobromine:caffeine (5:1) predacide.



Objective 3: D e toxicity

of theobromine and caffeine to coyotes

The optimal mixture of sodium benzoate (1:1, as indicated by the results of rat studies) was combined with various concentrations of the 5:1 theobromine:caffeine predacide to determine the LD99 (the quantity of these compounds that would be required to be delivered in a coyote control device). As indicated by the graph below, sodium benzoate did not increase the toxicity of the prototype predacide mixture to coyotes:



Expenses

Accounting Code	Description	Amount
2000	Salaries	$8,236
2100	Travel	$2,431
2200	Shipping	$ 47
2600	Supplies	$1,410
	Total	$12,124