A Proposal for study

funded by:

THE WILDERNESS RESEARCH CENTER

AND

TAYLOR RANCH FIELD STATION

COLLEGE OF FORESTRY, WILDLIFE AND RANGE SCIENCES

A Survey of the Coyote's Diet in the Idaho Primitive Area

submitted by:

Christian J. Keller

March 27, 1981

University of Idaho

INTRODUCTION

Throughout history, the coyote (Canis latrans Say) has proven to be one of the most durable and successful members of the North American fauna, despite all of man's efforts to extirpate it. It has prevailed in the face of bounties, government trapping, and habitat destruction. In fact, the coyote has taken advantage of man-impacted areas and has enlarged its range to encompass them.

The original distribution of the coyote, according to Gier (1975), extended from the Mississippi, west to the Sierra Nevada Mountains, north into Alberta, and south to the extremes of Mexico. Since that time, it has expanded its range to include nearly all territories south to Costa Rico, and north to the Arctic Circle in Canada and Alaska. The longitudinal distribution of the coyote currently includes the breadth of the entire North American continent, from the Pacific to the Atlantic (Young 1951).

Young (1951) reports that the coyote was originally a plains animal, that has, in fairly recent times, incorporated woodland and mountain into its habitat. However, those areas which are most useful to man for agricultural purposes, the plains, remain the most useful to the coyote. Therein, lies the conflict that has been raging since the civilization of the West.

Most authors previous to the last two decades viewed the coyote as an interloper in man's world, bent on destroying his livelihood. With the eventual realization that Canis latrans was prospering despite control efforts, research has taken a different path: to a more

comprehensive knowledge of the animal. Rather than researching merely to substantiate claims of crop and livestock depredation, and studying ways to annihilate the population, scientists have begun projects that intend to contribute to a mutual understanding: a truce between man and the coyote.

My own motivation for proposing this research is based mainly on my interest in predators, and man's contribution to their survival. This study became progressively more intriguing to me as I found that most of the research that has been done on coyote food habits was based in areas where man was the dominant species. Only a few (A. Murie 1940, O. Murie 1945) have devoted study to coyotes residing in regions lightly impacted upon by man.

As a basis for more advanced, time-intensive research, I have chosen to study that part of coyote ecology most understood, the diet. In the relatively short time span afforded, and in light of my relative lack of experience, I feel that scat collection and analysis will most rapidly allow me to construct a survey of the coyote's food habits in the Idaho Primitive Area. Incidental to, and by means of the method of scat collection to be employed, a rough map of coyote dens will be compiled. This map could prove to be useful to future research based in the area.

This research project, if completed, will greatly benefit me. The practical experience I would gain, and the enthusiasm for my field that this project would be sure to intensify, will probably prove to be more important than the data I collect and the conclusions

I arrive at.

LITERATURE REVIEW

The coyote has been studied extensively for many years and its behavior and ecology is fairly well documented. Canis latrans is a small to medium-sized canine of amazing adaptability and fecundity. After being conceived in late winter, two to twelve pups are born naked and helpless in an earthen den, approximately two months later. The young are large enough to leave the den in May, and from that time until the fall, they are cared for and trained by both parents (Gier 1975, Audelt 1979).

As early as three weeks, the pups begin eating semi-digested meat regurgitated by the parents and after six weeks, pups frequently consume small mammals brought to the den (Young 1951). From this point on, the coyote's carnivorous life has begun. Studies indicate that the coyote is a generalistic feeder which takes advantage of prey, carrion, and vegetation to fulfill its dietary needs.

As previously stated, most of the research on coyote food habits has been restricted to areas where man's presence has been strongly felt. Examples of these would include studies by Ferrel et. al. (1953) over the entire state of California, Fichter et. al. (1955) in Nebraska, and projects in Missourri (Korschgen 1957) and Arkansas (Gipson 1974). The two latter studies strongly support the claim that the coyote is an opportunistic feeder. In Arkansas, a state that coyotes have only recently occupied, the coyote takes advantage of the poultry farms prevalent in the state. Chickens

and persimmons, both easily obtained in Arkansas but unavailable over most of the coyote's remaining range, are mainstays of the diet.(Gipson 1974)(See table).

Ferrel et. al. (1953) makes it even more apparent that a coyote eats mostly what is available to it. In this study, the diverse terrain of California was divided into five regions from which data was collected. Although the diet from region to region was fairly constant, predictable variations did occur. In the non-agricultural coastal forest region, rodents and deer were the most common food items. Livestock was third in importance. In the heavily farmed Inland-Sierra region (including the Sacramento and San Joaquin Valleys), rodents were still the most important food, but rabbit was very common. The Audubon cottontail, prevalent in this area, is an edge species that thrives on cultivated lands. Vegetables soared from last in importance in the Coastal and Northeast regions to a fairly large proportion in the Inland-Sierra study area with its farms and orchards (Ferrel et.al. 1953).

The studies most comparable to my proposed research are those by Adolph and Olaus Murie (1940, 1945). They are similiar in method and environment. Both of these projects took place in lightly populated, northern Rocky Mountain regions, roughly similiar to the Idaho Primitive Area. They found that in these remote regions, coyotes rely strongly on rodents, rabbits, and big game probably in the form of carrion. Livestock did not constitute a large part of the diet. Again, those food items most available were eaten.

Data from Past Coyote Food Habit Studies.

				Food Item (percent occurrence)									
Authority	Location	Sample	Source	Rodent	Lagomorph	Deer	Elk	Other Big Game	Wild Bird	Carrion	Livestock	Poultry	Vegetation
A. Murie 1940	Yellow-stone	5,086	scat	59.85	3.93	1.03	16.18	1.76	3.16	——*	.05	.03	2.04
O. Murie 1945	Br. Col.	311	scat	5.13	69.39	4.60	—	1.53	7.40	——*	6.64	—	1.78
	Montana	286	scat	40.78	31.18	.35	19.36	—	3.49	——*	——	—	.80
Ferrel et. al. 1953	Calif.	2,222	stom.	49.1	29.3	18.5	—	—	15.8	na	23.3	2.3	—**
Fichter et. al. 1955	Neb.	747	stom.	na	58.2	.4	—	—	29.9	na	26.1	14.2	3.6
		2,500	scat	na	23.0	7.6	—	—	32.6	na	30.5	1.1	16.0
Korschgen 1957	Mo.	770	stom.	36.3	55.3	2.9	—	—	6.2	8.6	13.8	15.8	7.9
		326	scat	33.3	80.4	—	—	—	9.5	na	2.8	5.2	23.5
Hawthorne 1972	NE Calif.	384	scat	74.2	5.7	35.2	—	—	3.7	——	15.2	—	45.3
Gipson 1974	Ark.	168	stom.	9.0	7.0	5.0	—	—	10.0	na	13.0	34.0	38.0

* A. Murie and O. Murie did not consider carrion as a separate food source, but categorized it under the appropriate prey.

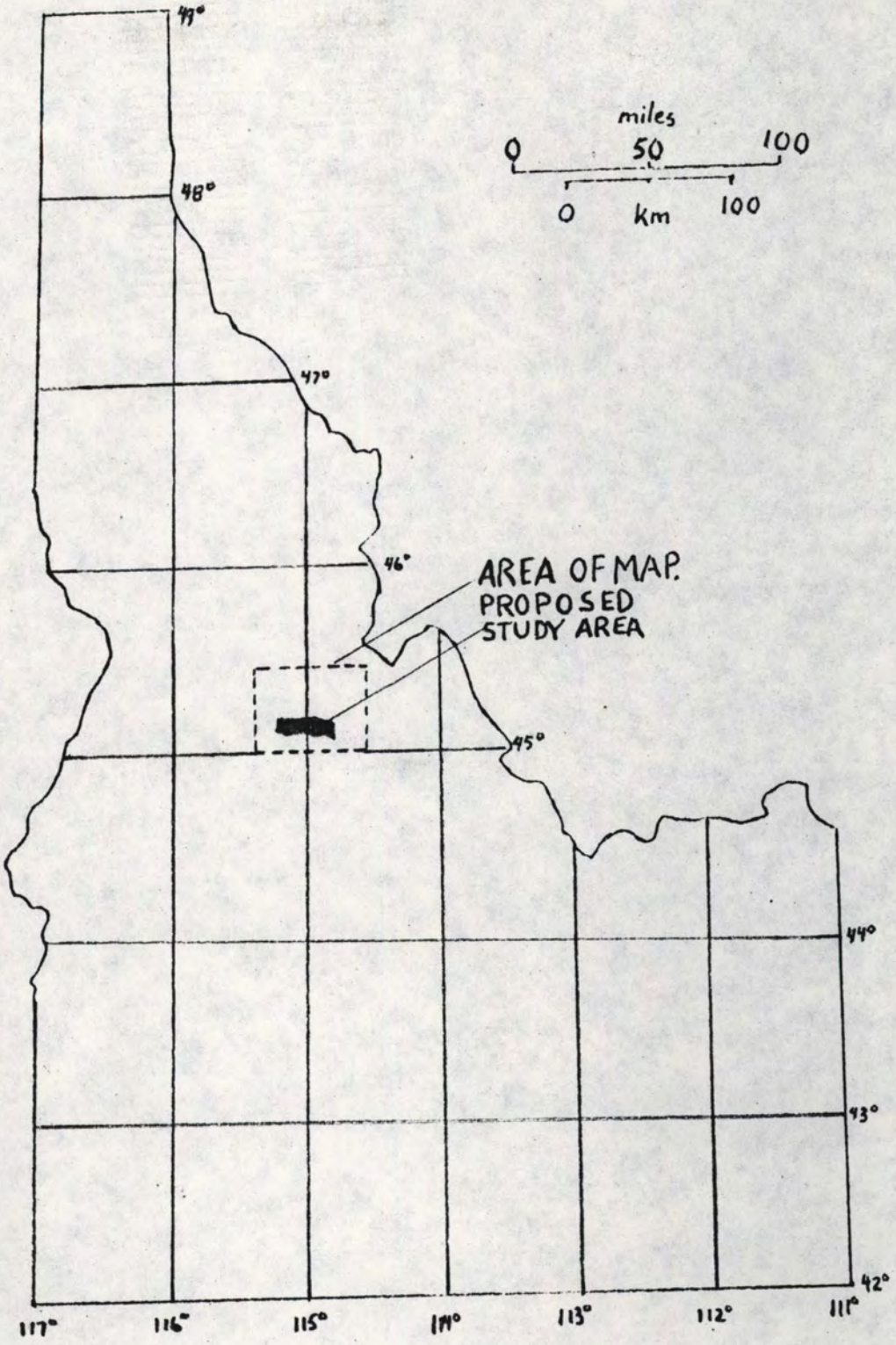
** Ferrel et.al. did not identify plant material.

STUDY AREA

The Idaho Primitive Area is a vast roadless area of approximately 5,200 km^2. Because of the inaccessibility and size of this area, this study would be limited to a strip of land along the Big Creek drainage from the Middle Fork of the Salmon upstream to the confluence of Monumental and Crooked Creek. Expeditions to other likely areas of coyote use such as Cold Meadows will be taken if possible. The region is located in central Idaho at approximately 45 15' N, and 115 0' West. (see maps)

The climate of this area ranges from cold and moist on the north slopes to dry and temperate in the lower Salmon Valley. The topography of the proposed study area is severe with elevations up to over 8,100 feet. Snowfall is the predominant form of precipitation and snowcover ranges from ten feet deep on the upper ridges to very little in the low valleys (Seidensticker 1973).

The vegetation is coniferous with four of Daubenmire's (1952) habitat types the most prevalent. Ponderosa pine (Pinus ponderosa), and Douglas Fir (Pseudotsuga menziesii) cover the lower slopes. Engelmann Spruce (Picea engelmannii) and Subalpine Fir (Abies lasiocarpa) habitat types grow on the higher, wetter inclines. Lodgepole pine (Pinus contorta) populates the Douglas Fir and Spruce/Fir zones after they have been damaged by fire. Mountain meadows that contribute greatly to the wildlife populations are interspersed throughout the coniferous forest(Seidensticker 1973). Alpine sedge zones prevail on the higher peaks.


49°
48°
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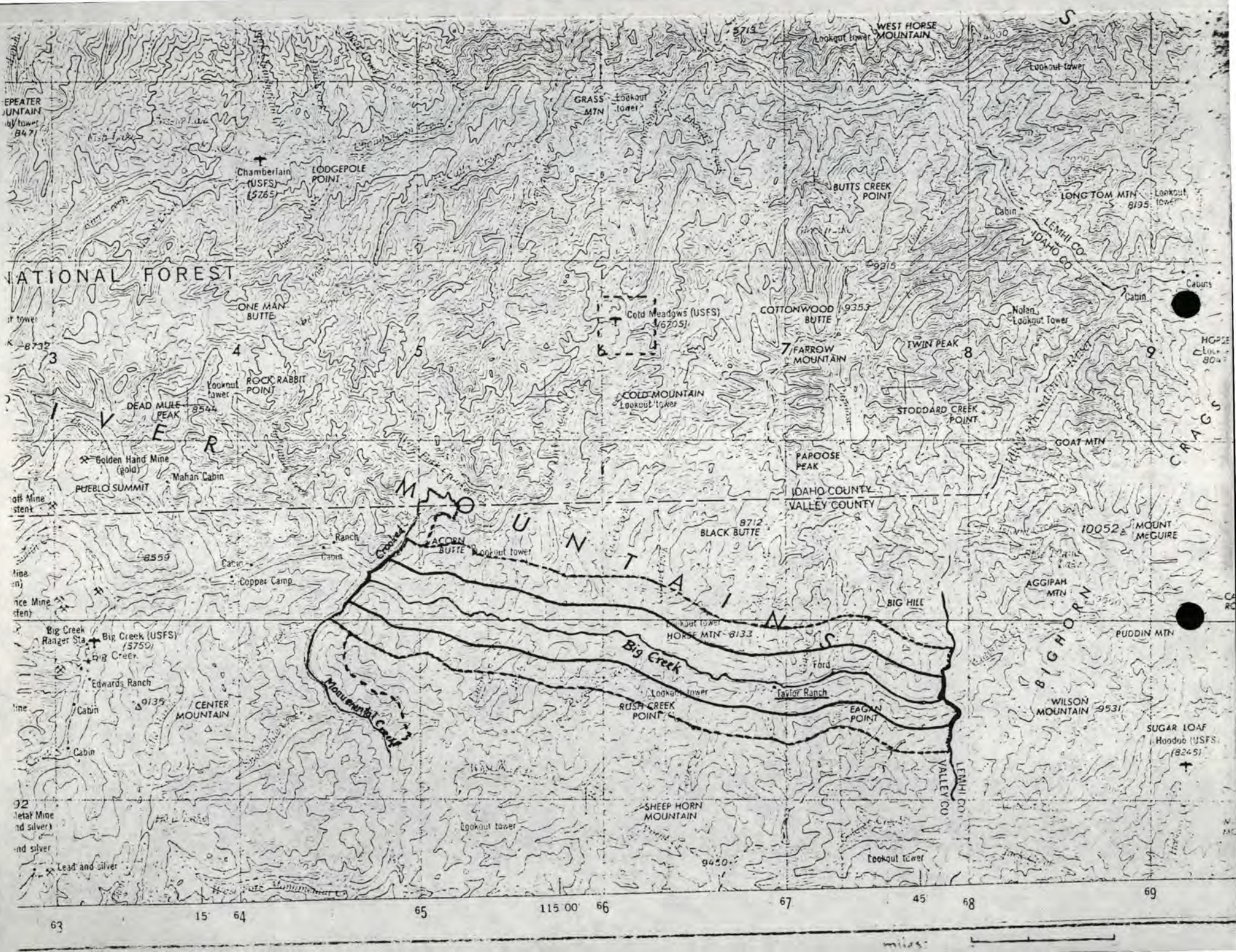
AREA OF MAP.
PROPOSED
STUDY AREA


WEST HORSE MOUNTAIN
Lookout tower
GRASS MTN
Lookout tower
Chamberlain (USFS) (5765)
LODGEPOLE POINT
BUTTS CREEK POINT
LONG TOM MTN 8195
Lookout tower
Cabin
LEMHI CO
IDAHO CO
ATIONAL FOREST
ONE MAN BUTTE
Cold Meadows (USFS) (6705)
COTTONWOOD BUTTE 9353
Nolan Lookout Tower
Cabins
Cabin
FARROW MOUNTAIN
TWIN PEAK
ROCK RABBIT POINT
Lookout tower
DEAD MULE PEAK 8544
COLD MOUNTAIN
Lookout tower
STODDARD CREEK POINT
GOAT MTN
I V E R
Golden Hand Mine (gold)
Mahan Cabin
PUEBLO SUMMIT
PAPOOSE PEAK
IDAHO COUNTY
VALLEY COUNTY
M O U N T A I N S
8712
BLACK BUTTE
10052
MOUNT McGUIRE
Ranch
Cabin
ACORN BUTTE
Lookout tower
8559
Copper Camp
AGGIPAH MTN
BIG HILL
Big Creek Ranger Sta.
Big Creek (USFS) (5759)
Big Creek
HORSE MTN 8133
Lookout tower
PUDDIN MTN
Ford
Edwards Ranch
Big Creek
Taylor Ranch
Cabin
9135
CENTER MOUNTAIN
Mountain Creek
RUSH CREEK POINT
Lookout tower
EAGAN POINT
WILSON MOUNTAIN 9531
SUGAR LOAF Hoodoo (USFS) (8245)
Cabin
SHEEP HORN MOUNTAIN
Lookout tower
9450
Lookout tower
Lead and silver
VALLEY CO
LEMHI CO
115 00
15
63
64
65
66
67
45
68
69
miles

METHODS

Meinzer et. al. (1975) came to the conclusion that scats were more suitable for dietary analysis than stomachs. Large-scale coyote mortality may affect the results of a dietary study and scat collection allows a much larger sample size.

Olaus Murie (1954) gives a good description of coyote scat and tracks; any questionable scats will not be used. Accumulations of coyote scat most often occur along trails and near scent posts. If need be, scent posts will be utilized to ensure a large enough sample size.

Denning sites, as obvious locations of high coyote use, will be given special attention since they are ready sources of scat. Extreme care will be exercised to prevent disturbing the den and the consequent den site movement (Audelt 1979, Gier 1975). A map of all coyote den locations that have been discovered will be constructed to aid completion of this particular study, and future research projects.

Observations and records of coyote feeding activity will be taken, especially when coyotes are observed feeding on vegetation that is difficult to identify in the scats. Observations should be easily accomplished with the aid of binoculars. A blind should not be necessary (Fichter 1950).

After scats are collected, they will be placed in individual cotton bags. These bags will be labeled with date, location, and apparent age of the scat. Each scat will be assigned a number for filing purposes. After transporting the sample to the base camp, it will be dried in

some manner to prevent spoilage. Korschgen (1980) recommends that the scat not be washed because washing disturbs the sequential segmentation that food items often exhibit in the sample.

The actual analysis of the scat will be accomplished through hand separation and identification. A dissecting microscope will be used to aid in the identification of small bones, seeds, and hairs. The presence of each food item in the scat will be recorded on cards with the other pertinent information. Efforts to record food items by volume will be avoided, because of the differing detectability and digestability of various foods (Weaver et. al. 1979, Johnson and Hansen 1978, 1979).

Keys to the identification of animal and plant species present in the scat will be relied on heavily. Blair et. al. (1957) contains descriptions of mammal teeth and skull structure, along with identifications of all the vertebrates. An article by Stains (1959) provides a species key for the identification of the calcaneum in small mammals. Hair identification will be accomplished with the aid of a key and text by Moore et. al. (1974). Several keys for vegetation and seeds are available (Hitchcock et. al. 1973, Martin et. al. 1961). The University of Idaho's mammal collection will be utilized when the keys are not adequate.

The age of the scat will not be a factor in this study because of the difficulties in determining scat age. Because of this fact, seasonal differences in diet will not be noted. However, the location of the scat may prove to be significant if a descrepancy continually sur-

faces between scat samples from widely seperated areas.

EQUIPMENT

500 cotton sample bags with drawstrings or twist ties

500 durable paper labels with strings

reflecting oven or drying rack (to aid in dessication of scats)

binocular dissecting microscope with case

various enamel containers, petri dishes, and dissecting tools

use of a reference collection of small mammal and bird skeletons and hides

SCHEDULE

June 1 arrive at Taylor Ranch

June 1-7 familiarization period

June 8- Scat collection, analysis and behavioral observations
August 14 Leave Taylor Ranch

Approximately
November 20
Submission of Final Paper.

ADDENDUM

Recent correspondence with Chuck Elliot, an alumnus of the University of Idaho's school of wildlife, has resulted in a circumstance particularly important to this proposed study. As a possible portion of Elliot's research on the Columbian Ground Squirrel, he collected 150 coyote scats from various parts of the Idaho Primitive Area during his last summer there. After receiving my letter requesting information on the rodent populations in the area, Mr. Elliot felt that these scats will be more important to my study than to his. So, he is sending me 150 washed and bagged scat samples so that I can analyze them. Hopefully, the data derived from these samples can be incorporated into my study and some comparisons can be made in support of my conclusions.

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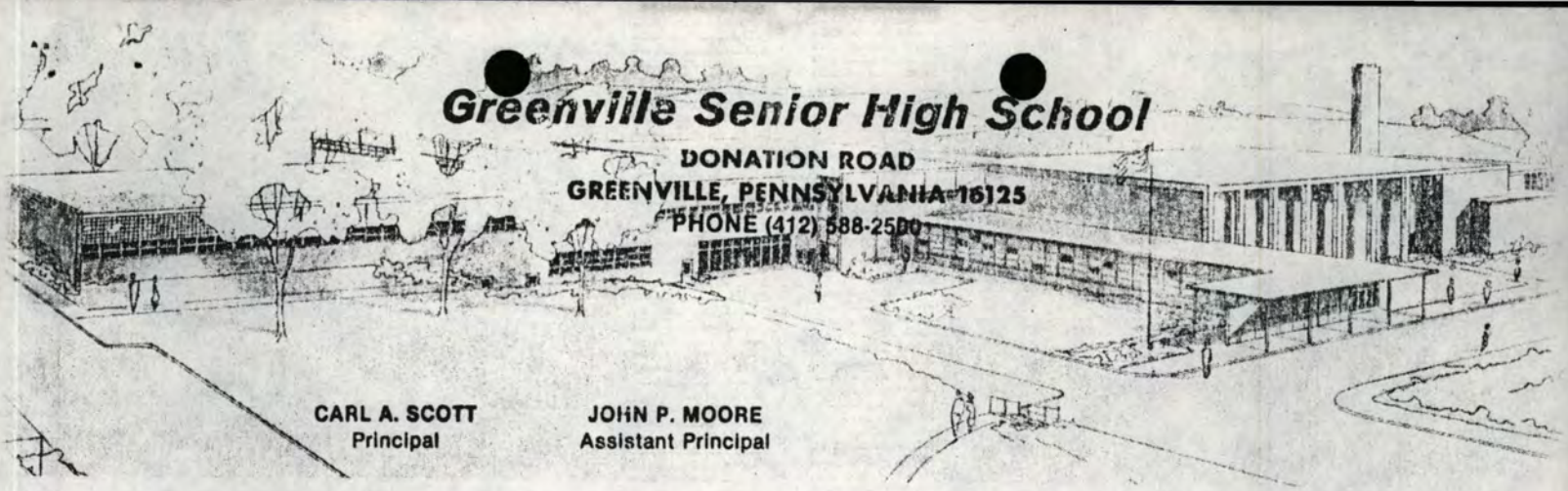

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CARL A. SCOTT
Principal

JOHN P. MOORE
Assistant Principal

March 12, 1981

Dear Sirs,

Chris Keller has asked me for a letter of recommendation for your Taylor Ranch Honorarium Program.

I have known Chris since he was thirteen. My first impression of this self-assured young man was formed the evening of his eighth grade band concert when, durind his drum solo, he lost one of his sticks and undauntedly kept playing until such time as he could retrieve it. I watched him continue to mature through his high school years.

In my Advanced Biology class, a laboratory and research oriented course, Chris showed considerable insight interpreting data and forming hypotheses. He is a gifted student who showed an aptness for science - always interested and often ahead of the discussion.

Chris was an enthusiastic participant in Bios Club field trips, showing considerable interest in all wildlife identification and easily mastering same.

Chris is an even-tempered, energetic, self-starter whose belief in himself and his ability will make him an excellent candidate for your summer program. Therefore, it is my privilege to highly recomend Chris Keller.

Sincerely,

James A. DeFrance

Department of Biology
Greenville Area High School
Greenville, Pa.

To Wilderness Honorarium Committee

From Winifred B. Kessler

Subject Letter recommending Chris Keller

University of Idaho
Inter-Office Memorandum

Date 13 March 1981

Chris Keller has asked me to submit a letter of recommendation in behalf of his application to the Taylor Ranch Honorarium program. Chris is an exchange from Notre Dame University, and so most of our faculty are not acquainted with him. He is enrolled in two of my classes, so I am more familiar with his capabilities.

Chris is one of the outstanding students we've had in our wildlife program, as a glance at his scholastic records will show. His energies are not restricted to bookwork, however. My Wildlife Techniques class requires a substantial amount of field work, and Chris' enthusiasm in these tasks is contagious. He has conceived and prepared his coyote proposal entirely on his own, as opposed to the typical undergrads who need considerable guidance to successfully develop their research ideas. Chris is more advanced in this regard than alot of graduate students I have known.

I am confident that, if selected, Chris will produce a quality research paper with a minimum of supervision. His pleasant personality will fit in nicely with the other people living and working at the Taylor Ranch, where Chris proposes to base his study.

Wini Kessler