LAMBING AREA & SUMMER RANGE USE & SPRING MIGRATION PATTERNS OF ROCKY MOUNTAIN BIGHORN SHEEP ON BIG CREEK IN CENTRAL IDAHO

January 1, 1989 to August 30, 1990

Other Proposals

Principal Investigators: Jim Akenson, Research Associate &
Holly Akenson, Taylor Ranch Co-manager

UNIVERSITY OF IDAHO
COLLEGE OF FORESTRY, WILDLIFE & RANGE SCIENCES
MOSCOW, ID

Amount Requested: $8,060

Dean John C. Hendee, Director
Forest, Wildlife & Range
Experiment Station

Gerald R. Reynolds
Acting Vice President for
Finance and Controller
University of Idaho

STUDY OUTLINE
FOR FUNDING REQUESTS SUBMITTED TO THE
GRANTS-IN-AID COMMITTEE
National Rifle Association
1600 Rhode Island Avenue, N.W.
Washington D.C. 20036

TITLE OF PROPOSED STUDY:	Lambing area and summmer range use, and spring migration patterns of Rocky Mountain bighorn sheep on Big Creek in central Idaho.
PROPOSED DURATION OF STUDY:	1 Jan. 1989 to 30 August 1990
AMOUNT REQUESTED FOR STUDY:	From NRA $8,060 From Univ. of Idaho $400
INSTITUTION TO WHICH GRANT SHOULD BE MADE:	University of Idaho Moscow, ID 83843
PERSONS APPLYING:	Holly A. Akenson James J. Akenson Wilderness Research Center University of Idaho Moscow, ID 83843 (208/885-7911) SIGNATURES_____ _____ DATE_____
FISCAL OFFICER OF INSTITUTION:	Gerald R. Reynolds University of Idaho Moscow, ID 83843 SIGNATURE_____ DATE_____

LAMBING AREA AND SUMMER RANGE USE, AND SPRING MIGRATION PATTERNS OF ROCKY MOUNTAIN BIGHORN SHEEP ON BIG CREEK IN CENTRAL IDAHO

ABSTRACT:

Lambing areas and summer ranges are unknown for the native population of bighorn sheep on the Big Creek drainage in Central Idaho. Since winter 1986-1987 lamb to ewe ratios have been very low and sick lambs have been observed on the winter range. These symptoms are probably indicative of a problem occurring on one or several summer ranges. In order to assess the causes of these problems lambing and summer ranges must be located and potential mortality factors must be evaluated. Ten bighorn ewes will be radio instrumented to locate lambing areas and summer ranges and spring migration routes used by the Big Creek population. Herd productivity (lamb:ewe), causes of mortality, and lungworm parasite loads will be monitored through daily observations, necropsies, and analysis of fecal samples. Habitat characteristics will be measured in each lambing area and in their summer range to acquire a composite description of both types of seasonal ranges.

INTRODUCTION:

The purpose of this study is to locate bighorn sheep lambing areas and summer ranges, to evaluate herd productivity, to determine lamb mortality causes and assess lungworm parasite loads in each seasonal range, and to measure vegetation and abiotic habitat characteristics. Idaho Department of Fish and Game aerial surveys and personal observations on the ground documented a very low winter lamb:ewe ratio in 1986-1987. In 1985 there were 45 lambs per 100 ewes counted, then in 1986 the number was just 11 lambs per 100 ewes. If management action is to be taken in this, or similar situations there first needs to be a source of baseline information for this native sheep

population. The first priority of this study is to document where the lambing occurs and what the initial lamb production (lamb:ewe) is, and then assess habitat use during the lambing season. Secondary priorities are to determine the seasonal migration routes and quantify the lambing and summer ranges. By knowing this information it is then possible to evaluate the factors causing mortality at the lambing areas and along the migration routes. Such data are necessary in order to assure a healthy and huntable bighorn sheep population.

JUSTIFICATION:

In the rugged and remote River of No Return Wilderness Rocky Mountain bighorn sheep have passed on traditional seasonal ranges and migration routes to their offspring for thousands of years. Migratory habits of different bighorn sheep populations vary from minor seasonal drifts to long distance movements between multiple seasonal ranges (Blood 1963). Festa-Bianchet (1986) found that a particular range may be used by several different herds of sheep at diffent times or the same time. The complexity of range use and migration patterns is probably greater in native populations such as the one described in this proposal. Preliminary data (Bennett 1977, pers. obs.) indicates that ewes from the Big Creek population move to at least two and possibly five different lambing areas, one greater than 25 miles away. Only one lambing area, and no summer ranges nor migration

routes to these areas have been documented, while all of these factors are key components in understanding the ecology of this sheep population.

With information provided through this study more refined management of this population of bighorn sheep is possible, including prediction and control of disease spread, identification and rapid treatment of localized problems on a specific summer range, and an understanding of the spatial relationship between seasonal ranges and hunting units.

In the winter of 1986-1987 the lamb to ewe ratio was an extremely low 11:100 (pers. obs.) compared with 46:100 the previous winter; similar trends were observed in Idaho Department of Fish and Game helicopter counts. The cause of this low recruitment of lambs into the population is unknown. Sick lambs have been observed on the winter range for several years. A noticeable difference in sizes of lambs in winter and the wide variation in lamb:ewe ratios among different herds within the population suggest that problems may be occurring on some lambing and summer ranges, but not on others.

The Idaho Department of Fish and Game is trying to increase hunter opportunity on "trophy species". According to the IDF&G Trophy Species Management Plan 1981-1985 (1983), a primary goal is to increase Idaho's bighorn sheep population and increase the number of permits authorized. The allocation of permits is in direct proportion to the

available resource. Information on seasonal range use and migration patterns of a native population of bighorn sheep can be applied to reintroductions of bighorns into new areas and can improve the success of reintroductions. The end result is more sheep to enjoy through observation and hunting.

OBJECTIVES:

1. To document spring migration routes and movement patterns of ewes moving to lambing areas.
2. To locate lambing areas and describe these sites.
3. To determine summer distribution of ewes and describe these ranges.
4. To evaluate herd productivity (lamb:ewe) in summer.
5. To determine lamb mortality factors on the lambing and summer ranges.
6. To assess lungworm larvae parasite loads in ewes and lambs during summer.

STUDY SITE:

The indigenous population of bighorn sheep to be studied resides along lower Big Creek, in the heart of the Salmon River Mountains, home to the largest population of bighorn sheep in Idaho. This two year study will be based at the University of Idaho's Taylor Ranch Field Station, located in the midst of this sheep population's winter range and in the center of over 2.3 million acres of wilderness. Ten ewes will be radio collared during winter. The Idaho Department of Fish and Game has agreed to provide support

personnel and some equipment for instrumenting sheep with radio transmitters.

The Taylor Ranch Field Station is optimally located for conducting this project. The facility has a backcountry airstrip with weekly supply flights. Aerial tracking will be done in conjunction with these flights, eliminating one hour of charter flight time for each aerial tracking session. Since the entire study area is in wilderness, all ground travel is by foot or horseback, on trails and crosscountry. Horsepacking services can be provided by the Taylor Ranch. The principal investigators live at Taylor Ranch and have studied and photographed these sheep for 5 years. They are the resident managers of the Wilderness Research Center's Taylor Ranch Field Station and participate in research projects through the Center. Holly Akenson is completing a master's thesis conducted from Taylor Ranch on the behavioral interactions of bighorn sheep with deer and elk in winter. Jim Akenson is a research associate in the College of Forestry, Wildlife, and Range Sciences.

METHODS:

This bighorn sheep project contains three phases of study. The first phase involves determining spring migration routes and movement patterns of ewes wintering along Big Creek. In the second phase, lambing areas will be located and described. If these groups of sheep utilize a summer range seperate from the lambing areas, these summer ranges will be located and described in the third phase of

the study. Ten ewes will be captured and radio telemetry instrumented during January to March 1989. Radioed animals will be located daily from April 15 until migration occurs.

SPRING MIGRATION. April 15 to May 30. Herds of sheep which include a radio instrumented animal will be tracked on the ground and followed as they move from the winter range. Travel routes will be mapped daily on aerial photos and USGS quadrangle maps. Locations as well as habitat descriptions including slope, distance to escape terrain, elevation, aspect, percent and depth of snow, vegetation type, and canopy cover will be recorded every 2 hours during daylight. All radio instrumented sheep will be located once via aerial tracking during migration.

LAMBING AREAS. May 15 to June 30. Sheep will be located on lambing areas through aerial radio tracking and from ground tracking of migrating sheep during May 15 to May 31. Spike camps will be established near two of the lambing areas where intensive data collection will be done. All ewes in the herd will be located daily through ground tracking and spotting. Habitat use patterrns will be determined from relocations of radio collared ewes located daily at random times; location will be mapped, activity (feeding, bedded, travelling, standing, other) recorded, and habitat described at that site (slope, distance to escape terrain, elevation, aspect, topography, vegetation type). Radio locations will be used to determine home range using

the minimum area polygon method (Mohr 1947). Lamb:ewe ratios will be determined daily, and will be plotted with respect to time since lambing to determine critical periods when mortality occurs.

In the second year of study sheep observations will be intensified during this period in order to locate dead lambs and sources of mortality. When dead lambs are found a preliminary cause of death will be determined; a detailed search of the area will be conducted to identify the predator if predation is suspected, carcasses will be necropsied in the field or sent to Washington State University Veterinary School Laboratory for examination, tissue samples from field necropsies will be preserved and sent to the WSU Lab for diagnostic tests. Fecal samples will be collected daily and combined as a weekly sample to be tested for concentrations of lungworm larvae using a Baermann apparatus (Knapp 1968). The vegetation of each lambing area will be measured using 40 randomly located 20 x 50 cm Daubenmire plots (Daubenmire 1959). This vegetation evaluation will be combined with the habitat information collected during observations of radio instrumented ewes to form a composite description of lambing area characteristics.

SUMMER RANGE. July 1 to August 15. Radio instrumented ewes will be aerial tracked in mid-summer to determine if the herds they are associated with move to a summer range separate from the lambing area. Summer ranges will then be

located on the ground. Radioed sheep will be located twice weekly and habitat data will be collected as described in the lambing area section. Lamb:ewe ratios and fecal samples from both ewes and lambs for lungworm analysis will be collected weekly. Vegetation plots will be measured as in the lambing area phase.

LITURATURE REVIEW:

The liturature has been reviewed and incorporated into the justification and methods sections in order to eliminate repetition. The following is the liturature cited for the entire proposal.

Bennett, J. 1977. Field notes from a bighorn sheep study, University of Idaho. Unpublished.

Blood, D. A. 1963. Some aspects of behavior of a bighorn herd. Can. Field Nat. 77:77-94.

Festa-Bianchet, M. 1986. Seasonal dispersion of overlapping mountain sheep groups. J. Wildl. Manage. 50:325-330.

Daubenmire, R. 1959. A canopy-coverage method of vegetational analysis. Northwest Sci. 33:43-61.

Idaho Department of Fish and Game. 1983. Species management plan 1981-1985: Trophy species -- moose, bighorn sheep, mountain goat, pronghorn antelope. Boise, Idaho. 113pp.

Knapp, S. E. 1968. A laboratory guide to parasitic diseases of domestic and game animals. Department of Veterinary Medicine, Oregon State University, Corvallis, Oregon. 97pp.

Mohr, C. O. 1947. Table of equivalent populations of North American small mammals. Am. Midl. Nat. 37:223-249.

PROPOSED PUBLICATION OUTLETS:

Journal of Wildlife Management (The Wildlife Society)
Idaho Wildlife Magazine (Idaho Department of Fish and Game)
Wild Sheep Magazine (Foundation for North American Wild Sheep)
Forest, Wildlife and Range Experiment Station Bulletin (College of Forestry, Wildlife, and Range Sciences, University of Idaho)

This yr: How many migr groups directions Locate lamb areas

(See computer disk NRAPROP.DOC)

NOTES FOR NRA Proposal 3/88

A: Have to do
B: Most impt. info
C: Very impt info
D: Good bkground info while collect B & C
E: Desireable but not necessary info
F: Not highly significant info or difficult to collect info
L: Important info; collect if have $, but not directly related to obj. as stated

Relates to objectives | Priority Ranked

Methods

SPRING MIGRATION

Relates to objectives	Priority Ranked	
1 2 3	A	Radio 10 ewes on winter range (in different bands)
1	C	Ground track migration routes May 1 - May 15
1	F	Aerial track to locate migrating sheep
1 1	CC	Map migration routes; age/sex composition of groups;
1 1	CE	dates of migration; daily travel distance; scan
1 1	E,E	activity (15 min) all day; compare migr. routes of different
1	E	bands moving in same direction; hourly (slope, dist escterr,
1	E	elev, asp, can cov., veg type, snow % & depth, behav.; migr route distance
[B]	F	& time to travel; focal alert behavior ∝ ~~lamb~~ veg types
[ ] [ ]	F	Paint mark animals for individual ID ① In migr & lambing ② locations & group comp on spring range.

LAMBING AREA

Relates to objectives	Priority Ranked	
2	B	Establ. camp near lamb area
2	B	Locate lambing area via aerial & ground tracking
4	C	Evaluate productivity - daily L:E ratio of group
2	B	Locate lamb cliffs
2	D	Determine boundary of lamb area (vs summer area if different)
5	C	Determine lamb mortality factors if possible (necropsy, pred.) daily obs
2	D	Quantify lambing area (cliffs specifically) habitat (slope, dist to esc, elev, asp., can cover, veg type, physiography, snow % & depth, Daub plots (? or circ. (Peek) plots), size of area
6e	Later	? Compare lamb areas to other avail area
6e	L	? Compare lamb areas to other likely lamb areas (rough steep terrain as located on aerial photos
6bc	D	Daily obs locations → home range Lamb/ewe activity patterns: Focal lamb 10 min/hr (Blood), scan every 15 min all day (Blood) 1/2 days - 4 hrs
2	F	Dates: of birth, move alone to cliffs, join other ewe/lambs, move to sum. rge.
	F	Recognize Identify individual ewes -
		fecal lungworm counts, focal lamb ID, age of lamb etc
	F	Relationship of dom (leader) ewe to her lambs age/dom in lambs
6a	C	Lungworm fecal counts - weekly (or as avail) in ewe (& lambs)
6d?	L	Food habits (& preference)

need hand held radio

26D 85 15E
30D9F1B 5E3L

Methods continued.

SUMMER RANGE

(3) F Dates: move onto, move from, intermittant trips
(3) D Whether shared w/more than one lamb area group.
(5) E Lamb mort. factors when avail
(4) C - productivity L:E ratios (daily)
(6a) C - presence of lungworm larvae in Baermann fecal count weekly
(6a) C Lungworm in ewes (Baermann) weekly samples
(3) C Locate summer range & size aerial tracking
(3) D Quantify habitat (slope dist. esc. terr., elev, aspect, can. cov., snow % & depth, dist water & salt, physiography, Daub or circ plots)
(6d) L Food habits (& preference)
(1) F Migr route to summer range by tracking (if possible)
(6e) L Compare summer range to other areas avail
(6e) L Compare summer range to sim. types of area
(6bc) E Lamb/ewe activity patterns: Focal lamb 10min/hr (Blood) scan every 15 min (Blood), dates weaned?

Lit Review

Lit has been reviewed & incorp into justif & meth sections

Justif

RNP Pass on trad ranges & migr

(Blood) Migr vary w pop drift vs long d

(Festa 86) Mixed use of ranges

(Bennett 77)

(IDFG 1983) Trophy Sp Mgt Plan

(Mohr 1947)

Pronghorn fawn (Knapp 68)

Smith (Daubenmire)

Objectives

① Determine spring migration routes and movement patterns of ewes

② Locate lambing areas (& describe sites)

③ Locate summer areas and summer distribution of ewes.
& describe sites

④ Evaluate herd productivity in summer

⑤ Determine lamb mortality causes (factors)

omit?

⑥ Examine potential population limiting factors on summer ranges (spring migr) lambing areas
including ⓐ lungworm larvae loads of e & l, ⓑ foraging efficiency
(% time spent feeding & Δ w/ time season), ⓒ threat of predation (alert behavior, pred sitings),
ⓓ food availability (clipping, fecal food hab?) ⓔ other areas not used

Justification

④⑤⑥ abc. Very low L:E in late 1986, unknown cause. 2 sizes of winter lambs — suspect differences in lamb/summer ranges.

④ ㉓ Sick lambs obs. on winter range — need to track source of illness
Prelim data high lungworm loads in feces — also obs in lungs of rams from hunterkill,

(①②③) Summer ranges & lamb migr. not yet known —

②③ □ ① need for more refined mgt: disease spread; hunt unit areas — establish relationship between seasonal ranges, local prob on one summer rge (where occurs & treat immediately)

③

Background Info: (② complexity of range use/migr patterns — esp native pop.)

②③ ③ applic to reintrod in other areas (know preferred habitat)
many reintros unsuccessful

(④ locate other potential lamb areas)
" " " summer ranges)

Exper proceed & meth. to alter meth
incl. timetables
progress used to eval exp results

6D5Fawn
3/29
bkyard

Lit review	Method	Time	Stat Eval	$
A Radio ewes	Radio collar 10	Jan-March 1989	—	10 radios 1 receiver
C Ground track migr air track if rec.	Ground track (obs sh daily & follow w/ backpk/horse) 1 aerial track	Obs Apr 15 - ~May 10 (1st week) Follow May 1 → ~~May 20~~	Descriptive rpt. IFG of ?	
C Map routes, dates dist.	Map USGS, air photo	" "	"	2 assistants 1 hr fly air photos?
			"	
		4hr/day		
B Loc lamb - aerial & ground area	Aerial track & aerial obs Ground track	May 15 - May 30		2hr fly
B Estab a camp near lamb	Estab camp	May 15 - June 30		2 asst.
B Loc ewes on cliffs grd trk	Daily locate, ewes: L:E, # birth 1-4hr gr trk & spotting, mort obs loc.? dates birth, ~~pred~~ deter cause, necropsy	" "	Graph L:E x time	
C Daily L:E ratios				
C Obs mort determ				
C Fecal collect weekly - Lungw.	Weekly fecal samples lungworm (Baermann) 1hr individ anim sample	" "	Lungworm x time ~~map~~ larvae/gm dry feces Baermann lab supplies	necropsy rpt ($50 each)
P Quant lamb hab.	Quant hab (see other page for details) + Daub plots 40 20x50cm %comp + freq 4 days	" "	(Compare lamb areas using ?)	
~~D Boundary of lambing~~	Quant anim loc. site 1hr			
D Home range	Daily loc. at random times ~36 obs min polygon (cite) / harm. mean (cite)	" "	Home range program (cite) compatr time	
C Loc Summ rge aerial or grd	Air track aerial obs Grd track	~July 1 - Aug 15		1-2 hr fly
C Fecal weekly lamb to	Weekly fecal lungw E & L	" "	Lungworm x time Presence in lambs	
C L:E ratios daily	Weekly L:E	" "	Graph E:E x time	
D Quant habitat	Quant habitat as above Quant animal loc site	Aug 15 - Aug 20	as above	
D Determ other sh join range	2x Weekly radio loc.	July 1 - Aug 15		

A Daily trav distance
B Scan activ 15 min all day
C Hourly habitat deer
D Compile total dist, time
E Lamb/Ewe activ patterns
W Lamb mort L/E Activ

Lambing Area & Summer Range Use, and Spring Migration Patterns of Rock Mt Bight Sheep on Big Cr. in central ID

Abstract Bkgr Obj Meth

~~Migr habitat~~ Bigh use ~~3-8 seasonal ranges (Geist 71)~~
lamb areas?

B Summer ranges unknown for this native popul of bigh Sh.

~~B~~ ~~Low~~ Since ~~1986~~ winter 1986-1987 Lamb to ewe ratios have been low and the ~~presence of~~ sick lambs present in winter range ~~have in recent years~~

~~The source of~~ These symptoms ~~hypothesis~~ probably reflect a phob on one or several sum ranges loc & potential lim factors eval.

In order to ~~assess~~ assess what the prob and cause is

Ob 10 ewes bighorn will be radio instrumented to locate lambing areas ~~and~~ summer ranges and spr migration routes used by the Big Ch populat herd, productivity, causes of mortality, ~~and~~ ~~monitoring of~~ lungworm ~~concentration in~~ the parasite loads will be ~~evaluated~~, monitored thru obs daily ~~collect~~ necropsy analysis of fecal pellets. Habitat characteristics will be measured in each lambing area and summer rge ~~for a composite of~~ to acquire a ~~generalized~~ composite description of ~~each type of range~~ both seasonal ranges

Progress Report I

BIGHORN SHEEP POPULATION ECOLOGY AND MIGRATION PATTERNS IN CENTRAL IDAHO

by Holly and Jim Akenson

We were delighted to hear the news last May of being selected as a FNAWS Grant-in-Aid project. Our goal is to locate bighorn lambing areas, determine seasonal distribution patterns of ewes, and evaluate herd productivity. We are also concerned with the recent low lamb counts in the fall. This summer was devoted to visual locations of sheep, since the ewes had already migrated to lambing areas before they could be fitted with radio collars.

With a crew of willing volunteers we went in search of new lambing areas, mostly following leads given to us by Idaho Department of Fish and Game personnel, local outfitters, and our own hunches of what would be suitable lambing habitat. These searches were not fruitful, except for maybe dispelling myths on where ewes were thought to lamb! Since ewes from this population have been known to travel over 25 roadless miles from their winter range tolambing areas, we knew that finding the ewes without the help of radio signals would be very difficult. Not all our efforts were in vain. In the one known lambing area high initial lamb production was observed. As fall progresses and ewes migrate to the rutting and winter range, we will continue documenting lamb numbers and lamb/ewe ratios.

During late summer we found a sick ewe with a healthy lamb. We observed the ewe regularly until her death. Fecal samples from the ewe indicated the presence of the Eimeria parasite. A necropsy was to be performed upon her death, but had to be cancelled, due to a black bear consuming most of the carcass and walking away with the necropsy information in its stomach!

The newest development related to this project is the dramatic change of habitat due to a 40,000 acre wildfire. Virtually all of the forested land on half of the study area has been scorched. This includes both summer and winter ranges. Long-term effects of this fire will be of benefit to this bighorn sheep population due to better forage, but short-term effects are still unknown. As a side-line to the study of migration patterns of these sheep, it will be interesting to document the seasonal use of burned areas by ewes and lambs.

Ewes will be radio instrumented during December and January when they are approachable on the winter range and not overstressed. Idaho Department of Fish and Game may conduct bighorn sheep blood and fluid sampling for diseases during these radio collaring activities. If the disease study materializes, it will greatly enhance the population ecology findings of this project.

Next spring radio collared bighorn ewes will be located by airplane and on the ground using a radio receiver to find lambing areas, summer ranges and migration routes. Through summer observations, we hope to uncover the cause of low lamb numbers during fall.

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157-K257

1/88
from 12/15/87

Abstract / expl the project
Justification (relevance, uniqueness, expectation for success)

BIGHORN SHEEP POPULATION ECOLOGY AND MIGRATION PATTERNS

The purpose of this study is to locate and document bighorn sheep lambing areas and evaluate productivity, and to determine ewe movement and seasonal distribution patterns. The second objective of this project is to determine ram movements and seasonal distribution and to compare ram locations relative to hunting units. Lamb mortality factors will also be determined. Information obtained from this project will build a foundation for continuous research on a native sheep population accessible from the Taylor Ranch Field Station. Data gathered by this project will have immediate management implications regarding sheep hunting permit allocations in units 26 and 27.

The indigenous population of bighorn sheep to be studied resides along lower Big Creek, in the heart of the Salmon River Mountains, home to the largest population of bighorn sheep in Idaho. This two year study will be based at the Taylor Ranch Field Station, located in the midst of this sheep population's range on lower Big Creek. ~~Six ewes and six rams~~ will be radio instrumented ~~this~~ during winter, then located weekly by airplane. The Idaho Department of Fish and Game has agreed to provide support personnel and some equipment for instrumenting sheep with radio transmitters. 10

The principal investigators live at Taylor Ranch and have studied and photographed these sheep for 5 years. Holly is completing a master's thesis on the behavioral interactions of bighorn sheep with deer and elk in winter. As resident managers of the facility, the applicants are provided with half-time salaries by the University of Idaho. The managers are responsible for generating the remainder of their income from research projects and special courses and programs. Past activities have included assisting with predator ecology and archaeolgy studies.

Jim is a research associate w/the CFWP

The Taylor Ranch Field Station is optimally located for conducting this project. The facility has a backcountry airstrip with regular mail flights. Aerial tracking will be done in conjunction with mail delivery, eliminating one hour of charter flight time for each trip, ~~for a savings of $4500.00.~~

The Salmon River sheep population has provided hunting opportunities from the days of the Sheepeater Indians to the present. Permit numbers are based on Idaho Department of Fish and Game aerial surveys. By determining herd vigor and migration patterns, game managers can more effectively monitor the overall herd health and analyze the causes of problems, such as a recent decline in fall lamb:ewe ratios. The application of this knowledge can result in better hunter opportunities through a more refined management of bighorn sheep and ram harvest per unit.

FOUNDATION FOR NORTH AMERICAN WILD SHEEP

720 Allen Avenue — Cody, Wyoming 82414 — (307) 527-6441

GRANT-IN-AID APPLICATION FORM

INTRODUCTION

The Foundation for North American Wild Sheep is composed of more than 5,500 hunter-conservationists dedicated to the conservation, propagation, and intensive management of the remaining wild sheep populations and their habitats in North America. Founded in 1978, FNAWS operates as a 501(c)(3) non-profit corporation and since the grant program began has funded nearly two million dollars to a wide spectrum of research, translocation, education, habitat improvement and acquisition projects deemed of highest priority to the conservation of wild sheep by the Board of Directors and Advisory Committees.

Grants typically range from $2000 to $20,000, occasionally higher, and are made once a year at the spring meeting of the Advisory Committee in April or May. Application forms are accepted at any time but must reach Foundation Headquarters by December 31st, to be eligible for consideration during the next year's funding period. Completed applications and supporting material should be sent to:

FNAWS Grant-in-aid Program
720 Allen Avenue
Cody, Wyoming 82414

Applicants will be notified of the acceptance or rejection of their proposals within three weeks of final Board approval at which time grantees will be sent a disbursement voucher to be completed and returned to schedule payments as needed.

GRANT REQUIREMENTS

All FNAWS grants-in-aid require the following items to be submitted:

1) This completed grant-in-aid application and twelve copies.

2) Thirteen complete copies of all supporting documents.

3) All papers must be 8½ x 11 inches.

4) A one-page cover letter explaining the project, its relevance, uniqueness, and expectations for success must accompany the grant-in-aid form. Twelve copies of this letter must be included.

5) All papers must have standard 3-hole punch along the left side. Do not cover papers in any kind of folder or spiral binding. All papers are numbered and placed in a 3-ring binder for each advisory committee member so any covering is a waste of time and expense. Seperate each of the thirteen groups with clips, bands or colored paper.

6) Please follow all requirements. Failure to do so will result in the proposal being returned to you.

FUNDING STIPULATIONS

Anyone receiving funds from the Foundation must comply with the following stipulations. Failure to do so will result in revocation of any funds not expended nor will they be considered eligible for any future projects.

1. [redacted]
2. The following will be submitted to the Foundation headquarters each year by February 1, following a grant award.
   a. An itemized list of actual, and, if applicable, estimated expenses which will account for the total current year's funds.
   b. Three copies of a progress report or completion report for the project.
   c. A series of six or more 35mm slides which depict highlights of the project. A brief narrative discussing each slide will be submitted.
3. Five or more copies of any reprints or published articles on the subject will be sent to Foundation headquarters.
4. All publications will cite the Foundation in some manner for support for the project.
5. Applicants must be members of the Foundation for North American Wild Sheep before funding can be made.

ITEMS FNAWS DOES NOT FUND

1. FNAWS does not, as a rule, fund capital equipment acquisition. All equipment purchased with FNAWS grant-in-aid money reverts to FNAWS or its designee at the completion of the funded project.

2. FNAWS does not, as a rule, fund salaries for government employees engaged in projects to benefit wild sheep as a consequence of their regular work. If a government project is funded that appears to require funds for regular salaries, FNAWS will request an itemized breakdown to include documentation of salaries and from what sources they are paid.

3. FNAWS does not fund projects that replicate past studies that have been demonstrably effective: i.e., FNAWS does not want to reinvent the wheel. Researchers, in particular, should review the literature to make certain their grant-in-aid request is relevant to uncovering new knowledge of wild sheep.

GRANT REVIEW PROCEDURE

FNAWS relies on an advisory committee comprised of select members of the board of directors and acknowledged experts in the field of wild sheep topics to make recommendations on each grant-in-aid application. FNAWS rarely acts as the sole funding source and prefers to review projects that have a list of cooperators that may include national government agencies, state game and fish departments, private industry sources, or other conservation organizations. Projects that have sources of matching funds are of particular interest to FNAWS.

Recommendations made by the grant-in-aid funding committee are presented to the full board of directors. Successful applicants are asked to structure their disbursements over the longest period of time possible, to maximize return on interest-bearing accounts established by FNAWS.

Unsuccessful applicants may resubmit their project for consideration for the next funding session but must fill out a new application form and provide updated supporting documents if necessary.

PROJECT NUMBER
Office Use Only

Project Title: Bighorn Sheep Population Ecology, and Migration Patterns

Date Submitted: December 1, 1987

Location: Valley (County) Idaho (State or Territory) Big Creek (Location)

Description of Project: Project objectives are to locate lambing areas, evaluate productivity, determine ram and ewe movement and distribution patterns and compare fall and winter ram locations relative to hunting units, and evaluate lamb mortality factors.

Objectives

Problem to be Solved: Idaho Department of Fish and Game aerial surveys have documented a decline in winter lamb:ewe ratios of 45 lambs per 100 ewes in 1985 to 11 lambs per 100 ewes in 1986 in the Big Creek drainage. Concurrently sheep permit numbers in Game Management Unit 27 were increased from 18 to 36 in 1987. The migration patterns of these bighorn sheep are not well documented, particularly the interchange of rams between Units 26 and 27 during hunting season and winter. Such data are needed to evaluate the increased hunting effort in Unit 27.

Methods Stats

Describe How You Propose Solving Problem: Six rams and six ewes will be captured and radio telemetry instrumented during winter 1988. Data regarding seasonal movements and distribution will be generated from weekly monitoring via aerial and ground tracking over a two-year period. Lambing areas will be identified from ewe locations in June. Lambing areas will be visited to document lamb productivity at each site. Ram locations will be mapped to evaluate their interchange between hunting units 26 and 27 during hunting season, the rut, and winter Fish and Game surveys.

☐ Check if additional supporting documents are attached

COST ESTIMATE First Year (1988)

Estimated Cost of Proposed Study $ 24,469 Amount Requested from FNAWS $ 18,570

	Cost to be funded by FNAWS grant	Cost to be funded by other cooperators
Subsistence	$ 200	$ 280
Travel Expenses 5 round-trip air, Cascade/Taylor Ranch $300, plus car mileage	$ 1,650	$ 700
Equipment 7 new radios; 5 rebuilt radios	$ 3,450	$
Supplies	$ 250	$
Services (secretarial, clerical, statistical, etc.)	$ 200	$
Publishing	$	$
Other (specify) wages & benefits	$ 6,600	$ 1,650
aerial radio tracking (30 trips)	$ 4,500	$
horsepacking	$ 1,000	$
U of I overhead (27.7% of 14,400)	$ 720 (5% of 14,400)	$ 3,269 (22.7% of 14,400)
TOTALS	$ 18,570	$ 5,899

Cost must be itemized for each additional year on a separate sheet if project will extend for more than one year.

Other organizations providing financial aid or support for the project:

	Amount Applied for	Date Approved
1) Idaho Department of Fish and Game Supplying sheep traps, 5 radios, personnel for capture	$ Equipment sharing No money transfer	
2)	$	
3)	$	

Other pertinent information including any special arrangements desired for administration of grant (i.e., make payable to: Name, Address, Institution, etc.)

COST ESTIMATE Second Year (1989)

Estimated Cost of Proposed Study $ 22,907 Amount Requested from FNAWS $ 16,690

	Cost to be funded by FNAWS grant	Cost to be funded by other cooperators
Subsistence	$ ~~200~~	$ 280
Travel Expenses 4 round-trip air flights Cascade/ Taylor Ranch	$ 1,250 870.00 (1,000)	$ ~~700~~ 1,950
Equipment	$ ~~100~~	$
Supplies	$ 250 250	$
Services (secretarial, clerical, statistical, etc.)	$ 200 ~~200~~	$
Publishing	$ 150 150	$
Other (specify) wages & benefits	$ 8,250 8,250	$ ~~1,650~~ 8,250
aerial radio tracking / veterinary school samples	$ 4,500 4,000	$
~~horsepacking~~	$ ~~1,000~~	$
U of I overhead (27.7% of 15,800)	$ 790 (5% of 15,800) 13520	$ 3,587 (22.7% of 15,800)
TOTALS	$ 16,690 13,720	$ 6,217

Cost must be itemized for each additional year on a separate sheet if project will extend for more than one year.

Other organizations providing financial aid or support for the project:

	Amount Applied for	Date Approved
1)	$	
2)	$	
3)	$	

Other pertinent information including any special arrangements desired for administration of grant (i.e., make payable to: Name, Address, Institution, etc.)

BIOGRAPHY OF APPLICANT

Social Security Number: 220-58-6270

Name Akenson (Last) Holly (First) A. (Middle Initial)

Home Address Taylor Ranch Research Station (Number, Street) Cascade (City)

Idaho (State) 83611 (Zip Code) (208)382-4336 via radio phone (Area Code & Telephone Number)

Office Address Same as above (Number, Street, City)

(State, Zip Code, Area Code & Telephone Number)

Age 30 Sex Female Citizenship USA

Institution (If applicable) University of Idaho

EDUCATION OF APPLICANT

University/College University of Idaho

Dates Attended: August, 1984, to present

Major Wildlife Minor _____ Degree M.S.

University/College Eastern Oregon State College

Dates Attended: January, 1981, to May, 1983

Major Secondary Education Minor _____ Degree B.S. 1983

University/College Eastern Oregon State College

Dates Attended: Sept., 1975, to June, 1979

Major Biology Minor _____ Degree B.S. 1979

At what institution will you be studying during the coming academic year? _____

Your major area of graduate study _____

Has your project been approved as your thesis topic by your graduate committee? _____

EMPLOYMENT HISTORY

Name and Address of Employer	Your Position	Dates of Employment
University of Idaho Moscow, ID 83843	Co Manager, Taylor Ranch Field Station	Sept., 1982 to present
	Great Gray	Jan.-June, 1982
USFS Range & Habitat Lab LaGrande, OR 97850	Wildlife Field Researcher Owls	Feb.-May, 1983
	Forestry & wildlife	Mar.-Aug., 79; June-No
USFS LaGrande District LaGrande, OR 97850	Biological Technician data collection	81; July-Sept., 82
USFS Globe District Globe, AZ	Wildlife Observer - Bald Eagles	Mar.-May, 1980

ENDORSEMENT

I hereby certify that the applicant is prepared to conduct the study as outlined and I consider this estimate to be adequate to cover the cost of the project.

Supervisor's Name Dr. Edwin Krumpe / Dr. Ernest Ables

Title Director, Wilderness Research Center / Department Head, Fish & Wildlife Resources

Department & University/College College of Forestry, Wildlife & Range Resources Univ. of Idaho

Government Branch

Signature Edwin E. Krumpe Ernest D. Ables Date 12/15/87

Gerald R. Reynolds, Acting Vice President for Finance & Controller

I hereby agree to abide by the stated requirements of a FNAWS grant. I also understand all FNAWS funding stipulations and will provide all necessary reports if I receive a FNAWS grant.

Applicant's Name Holly A. Akenson

Department & University/College Co-Manager, Taylor Ranch Field Station, College of FWR, Univ. of Idah

Government Branch

Signature Holly A. Akenson Date 12/15/87

MEDIA CONTACTS

Please list one or more media sources in your area that we may contact with details of your project.

Name Idaho Statesman

Address PO Box 40 Boise ID 83707

Contact Person (208) 377-6445

Name Idaho Wildlife

Address Box 25 Boise 83707

Contact Person Bill Goodnight (208) 334-3748

Name Lewiston Tribune

Address PO Box 957 Lewiston ID 83501

Contact Person (208) 743-9411

BIOGRAPHY OF APPLICANT

Social Security Number: 543-82-5042

Name Akenson (Last) James (First) J. (Middle Initial)

Home Address Taylor Ranch Field Station (Number, Street) Cascade (City)

Idaho (State) 83611 (Zip Code) (Area Code & Telephone Number)

Office Address Same as above (Number, Street, City)

(State) (Zip Code) (Area Code & Telephone Number)

Age 30 Sex M Citizenship USA

Institution (If applicable) University of Idaho

EDUCATION OF APPLICANT

University/College Oregon State University, Corvallis, Oregon

Dates Attended: 9-25-79 to 6-15-85

Major Resource Geography Minor Geography Degree M.S. (completed)

University/College Eastern Oregon State College, La Grande, Oregon

Dates Attended: 9-25-75 to 6-12-79

Major Community Service-Environmental Studies Minor Geography Degree B.S. (completed)

University/College

Dates Attended:

Major Minor Degree

At what institution will you be studying during the coming academic year?

Your major area of graduate study

Has your project been approved as your thesis topic by your graduate committee?

EMPLOYMENT HISTORY

Name and Address of Employer	Your Position	Dates of Employment
University of Idaho Moscow, ID 83843	Research Associate/ Co-Manager, Taylor Ranch Field Sta.	9-15-82 to present
Bureau of Land Management Baker Area, Baker, OR 97814	Recreation Planner (Seasonal)	
USFS Range & Habitat Lab. ~~La Grande, OR 97850~~	Wildlife Researcher (Contractor)	1-1-82 to 9-1-82

ENDORSEMENT

I hereby certify that the applicant is prepared to conduct the study as outlined and I consider this estimate to be adequate to cover the cost of the project.

Supervisor's Name Dr. Edwin Krumpe / ~~Dr. Ernest Ables~~

Title Director, Wilderness Research Center / Department Head, Fish & Wildlife Resources

Department & University/College College of Forestry, Wildlife, & Range Sciences, University of Idaho

Government Branch

Signature Edwin E Krumpe Ernest D. Ables Date 12/15/87

Gerald R. Reynolds, Acting Vice President for Finance & Controller

I hereby agree to abide by the stated requirements of a FNAWS grant. I also understand all FNAWS funding stipulations and will provide all necessary reports if I receive a FNAWS grant.

Applicant's Name James J. Akenson

Department & University/College Co-Manager, Taylor Ranch Field Station, College of FWR, U of I

Government Branch

Signature James J. Akenson Date 12/15/87

MEDIA CONTACTS

Please list one or more media sources in your area that we may contact with details of your project.

Name University of Idaho News Bureau, CEB

Address Moscow, ID 83843

Contact Person Terry Mauer

Name Idaho Statesman

Address Boise, ID

Contact Person

Name Lewiston Tribune

Address Lewiston, ID 83501

Contact Person Bill Loftus

TITLE: Bighorn Sheep Population Ecology in the Big Creek Drainage

OBJECTIVES:

The primary objectives are to (1) define lambing areas, (2) evaluate productivity, and (3) determine ewe movements, distribution and habitat selection. Secondary objectives include (1) evaluating movement and distribution in relation to IDFG sheep hunt units, (2) comparing ram and ewe seasonal distribution and habitat selection, and (3) evaluating lamb mortality factors.

Null Hypotheses:

H_{01} Ewe bighorn sheep do not select specific lambing habitat.

H_{02} Bighorn sheep lambing habitat in the Big Creek drainage is not geographically discrete.

~~H_{03} Bighorn sheep habitat use patterns do not differ in respect to habitat availability.~~

H_{04} Bighorn rams and ewes do not select different habitats ~~and the selected habitat use patterns do not differ in respect to habitat availability.~~

BACKGROUND (Justification):

Aerial surveys have documented a significant decline in winter lamb:ewe ratios in the Big Creek drainage in 1986-87. Prior to the 1986-87 winter, ratios varied between 15 and 19 . The 1986-87 ratio was 17 lambs per 100 ewes. Results of the aerial survey data was corroborated by ground observations from the Taylor Ranch field station. These data documented winter lamb:ewe ratios of 45:100 and 11:100 respectively in 1985 and 1986.

The ground observations also revealed symptoms indicative of disease in the Big Creek sheep population. Yearling lambs in the spring of 1986 were observed exhibiting the following symptoms: coughing, diarrhea, ~~runny nose,~~ nasal discharge poor body condition, and small body size (in comparison to others without the above symptoms).

Lamb:ewe ratios on adjacent winter ranges did not reflect the low lamb ratios found in Big Creek during the 1986-87 winter.

In order to monitor lamb mortality, lambing areas will have to be identified. This will require capture and telemetry instrumentation of bighorn ewes on winter ranges. Data regarding seasonal movements, distribution, and habitat selection will also be generated from the instrumental ewes.

EXPECTED RESULTS:

This study will provide basic information regarding the location of lambing areas as well as fidelity, habitat and physiographic parameters of the lambing areas.

R5R8568JW

Lamb mortality factors will be determined and remedies will be evaluated. This information will be useful in evaluating bighorn sheep population trend and habitat selection in the Big Creek drainage.

SUPPORT NEEDS:

Aircraft rental, telemetry transmitters (10), a receiver (1), antenna (2), computer time, necropsy service (WSU), travel expenses, research stipend, horse hire, camp gear, spotting scope and binoculars, housing and field laboratory facility (Taylor Ranch, U of ID), capture equipment and man power (amount dependent upon capture technique used).

PRINCIPAL INVESTIGATORS:

Holly Akenson, University of Idaho, Taylor Ranch
Jim Akenson, University of Idaho, Taylor Ranch
Mike Schlegel, Idaho Dept. of Fish & Game

Send to Leon

TITLE: Bighorn Ram Movements, Distribution, and Habitat Selection in the Big Creek Drainage.

OBJECTIVES:

The primary objective is to determine dispersal of rams using the Big Creek drainage during the rut and winter. Secondary objectives include (1) monitor seasonal habitat selection, (2) evaluate fidelity for seasonal ranges, (3) monitor seasonal movements, and (4) monitor seasonal distribution.

Null Hypotheses:

H_{01}: There is no home range overlap among rams in IDFG Management Units 20A, 26, and 27.

H_{02}: There is no difference in mature ram ~~from~~ seasonal range use from year 1 to year 2.

H_{03}: There is no difference in movement and distribution between rams in age class I, class II, class III, and class IV.

BACKGROUND (Justification):

The Idaho Department of Fish and Game recently increased the number of bighorn sheep permits in Game Management Unit 27 two fold (18 to 36). To evaluate the impact of the increased hunting pressure on herd productivity and population dynamics, three aerial surveys will be conducted annually in Game Management Units 27 and 26. These counts will be conducted during three time frames; as close to the rut as possible (December), mid winter (February) and late winter/early spring (April). The validity of this data is based upon the assumption there is no interchange of rams between Units 26 and 27 during the hunting season and during the winter. The migration patterns of Middle Fork bighorn sheep populations is not well documented. This data is needed to properly evaluate the increased hunting effort in Unit 27.

EXPECTED RESULTS:

Provide movement and distribution data regarding bighorn rams in Game Management Units 26 and 27. This data is needed to properly evaluate increased hunting effort in Unit 27.

SUPPORT NEEDS:

Aircraft rental, transmitters (10), receiver (1), computer time, capture equipment (drop net, net gun, chemical immobilization), research stipend, field laboratory (Taylor Ranch), camp equipment, horse hire.

PRINCIPAL INVESTIGATORS:

Holly Akenson, University of Idaho, Taylor Ranch
Jim Akenson, University of Idaho, Taylor Ranch
Mike Schlegel, Idaho Dept. Fish and Game

R5R8569JW

ASSESSING ROCKY MOUNTAIN BIGHORN EWE - LAMB HERD COMPOSITION IN LAMBING AREAS AND SEASONAL RANGES ON BIG CREEK, IN CENTRAL IDAHO

This application is for the second year of funding on our bighorn ewe and lamb study. The money from our first year's grant-in-aid has allowed us to purchase the necessary instrumentation, get the ewes fitted with radio collars, and get started on aerial radio tracking. The trapping and collaring will be completed by January 1989. The Idaho Department of Fish & Game is cooperating through providing the capture equipment and experienced personnel. Additional collaboration with IDF&G has produced funding for a complimentary study which will analyze sheep diseases. This investigation will occur while we have the animals captured for instrumentation and will be conducted by a veterinarian. Our second year budget has been streamlined from earlier estimates. The primary purposes of the second years's funding are to continue the radio tracking for locating sheep, to pay for analysis of fecal pellets and tissue samples by Washington State University Veterinary School, and to allow for intensive long term field observations of ewes and lambs by providing matching salary money for the principal investigators who are paid half-time salaries by the University of Idaho. The project will utilize wildlife student interns who will volunteer time as field assistants.

In the rugged and remote River of No Return Wilderness Rocky Mountain bighorn sheep have passed on traditional seasonal ranges and migration routes to their offspring for thousands of years. The country they now occupy is the largest expanse of roadless terrain in the lower 48 states. The University of Idaho's Taylor Ranch Field Station is optimally located in the center of this expanse and is the base of operations for this study. Preliminary data indicates that ewes from the Big Creek population move to at least two and possibly five different lambing areas, one greater than 25 miles away. In the winters of 1986-87 and 1987-88 extremely low lamb to ewe ratios have been documented. The cause of low lamb survival or productivity is unknown. Sick lambs have been observed on the winter range for several years. A noticeable difference in sizes of lambs in winter and the wide variation of lamb to ewe ratios among different herds within the Salmon River Mountains suggests that problems may be occurring on some lambing areas and summer ranges but not on others.

With information provided by this study more refined management of this population of bighorn is possible including prediction and control of disease spread, and the identification and treatment of localized problems on a specific spring or summer range. The foundation has been laid for this study to answer those questions vital in enabling management to put more sheep on these Salmon River Mountains.

FOUNDATION FOR NORTH AMERICAN WILD SHEEP

720 Allen Avenue — Cody, Wyoming 82414 — (307) 527-6441

GRANT-IN-AID APPLICATION FORM

INTRODUCTION

The Foundation for North American Wild Sheep is composed of more than 5,500 hunter-conservationists dedicated to the conservation, propagation, and intensive management of the remaining wild sheep populations and their habitats in North America. Founded in 1978, FNAWS operates as a 501(c)(3) non-profit corporation and since the grant program began has funded nearly two million dollars to a wide spectrum of research, translocation, education, habitat improvement and acquisition projects deemed of highest priority to the conservation of wild sheep by the Board of Directors and Advisory Committees.

Grants typically range from $2000 to $20,000, occasionally higher, and are made once a year at the spring meeting of the Advisory Committee in April or May. Application forms are accepted at any time but must reach Foundation Headquarters by December 31st, to be eligible for consideration during the next year's funding period. Completed applications and supporting material should be sent to:

FNAWS Grant-in-aid Program
720 Allen Avenue
Cody, Wyoming 82414

Applicants will be notified of the acceptance or rejection of their proposals within three weeks of final Board approval at which time grantees will be sent a disbursement voucher to be completed and returned to schedule payments as needed.

GRANT REQUIREMENTS

All FNAWS grants-in-aid require the following items to be submitted:

1) This completed grant-in-aid application and twelve copies.

2) Thirteen complete copies of all supporting documents.

3) All papers must be 8½ x 11 inches.

4) A one-page cover letter explaining the project, its relevance, uniqueness, and expectations for success must accompany the grant-in-aid form. Twelve copies of this letter must be included.

5) All papers must have standard 3-hole punch along the left side. Do not cover papers in any kind of folder or spiral binding. All papers are numbered and placed in a 3-ring binder for each advisory committee member so any covering is a waste of time and expense. Seperate each of the thirteen groups with clips, bands or colored paper.

6) Please follow all requirements. Failure to do so will result in the proposal being returned to you.

FUNDING STIPULATIONS

Anyone receiving funds from the Foundation must comply with the following stipulations. Failure to do so will result in revocation of any funds not expended nor will they be considered eligible for any future projects.

1. No more than 5 percent of project funds can be utilized for administrative purposes.
2. The following will be submitted to the Foundation headquarters each year by February 1, following a grant award.
   a. An itemized list of actual, and, if applicable, estimated expenses which will account for the total current year's funds.
   b. Three copies of a progress report or completion report for the project.
   c. A series of six or more 35mm slides which depict highlights of the project. A brief narrative discussing each slide will be submitted.
3. Five or more copies of any reprints or published articles on the subject will be sent to Foundation headquarters.
4. All publications will cite the Foundation in some manner for support for the project.
5. Applicants must be members of the Foundation for North American Wild Sheep before funding can be made.

ITEMS FNAWS DOES NOT FUND

1. FNAWS does not, as a rule, fund capital equipment acquisition. All equipment purchased with FNAWS grant-in-aid money reverts to FNAWS or its designee at the completion of the funded project.

2. FNAWS does not, as a rule, fund salaries for government employees engaged in projects to benefit wild sheep as a consequence of their regular work. If a government project is funded that appears to require funds for regular salaries, FNAWS will request an itemized breakdown to include documentation of salaries and from what sources they are paid.

3. FNAWS does not fund projects that replicate past studies that have been demonstrably effective: i.e., FNAWS does not want to reinvent the wheel. Researchers, in particular, should review the literature to make certain their grant-in-aid request is relevant to uncovering new knowledge of wild sheep.

GRANT REVIEW PROCEDURE

FNAWS relies on an advisory committee comprised of select members of the board of directors and acknowledged experts in the field of wild sheep topics to make recommendations on each grant-in-aid application. FNAWS rarely acts as the sole funding source and prefers to review projects that have a list of cooperators that may include national government agencies, state game and fish departments, private industry sources, or other conservation organizations. Projects that have sources of matching funds are of particular interest to FNAWS.

Recommendations made by the grant-in-aid funding committee are presented to the full board of directors. Successful applicants are asked to structure their disbursements over the longest period of time possible, to maximize return on interest-bearing accounts established by FNAWS.

Unsuccessful applicants may resubmit their project for consideration for the next funding session but must fill out a new application form and provide updated supporting documents if necessary.

PROJECT NUMBER
Office Use Only

Project Title: **ASSESSING ROCKY MOUNTAIN BIGHORN EWE—LAMB HERD COMPOSITION IN LAMBING AREAS AND SEASONAL RANGES ON BIG CREEK, IN IDAHO**

Date Submitted: December 12,1988

Location: Valley (County) Idaho (State or Territory) Big Creek (Location)

Description of Project: Bighorn ewes have been radio-collared so they can be located on their spring, summer and fall seasonal ranges. Once located, ewe herds will be observed to determine lambing production at lambing areas and herd composition in seasonal ranges. Lambs will be observed for illness and fecal samples will be collected from all sheep for parasite analysis. Signs of predation, necropsies, and analyses of tissue samples will be used to determine causes of lamb mortality.

Problem to be Solved:

Bighorn lamb:ewe ratios have been significantly lower on the Big Creek winter range during the last 3 years compared with ratios in previous years and on adjacent winter ranges. Causes of this low proportion of lambs are unknown, but parasites and disease are suspected mortality factors for young lambs. In order to determine what is causing low lamb:ewe ratios by winter, ewes must be located and monitored from when they migrate to lambing areas in spring until they return to the winter range.

Describe How You Propose Solving Problem:

By January 1989 twelve bighorn ewes will have been radio-collared on the Big Creek winter range as the first phase of this two year study. To determine the causes of low lamb numbers on the Big Creek winter range the 4 objectives listed below will be accomplished by the methods following.

1. **Locate spring migration routes, lambing areas, and summer and fall ranges of Big Creek ewes.** Weekly aerial tracking will be used to locate radioed ewes. Daily on the ground monitoring will be done in May and June.

2. **Evaluate herd composition (lambs:100 ewes) throughout summer and fall and compare these ratios among different groups of sheep.** Herd productivity (number of lambs born:100 ewes) and subsequent lamb:ewe ratios will be determined weekly by ground observations of groups containing radioed ewes at each lambing area and seasonal range. Ratios will be compared among areas to pinpoint problem ranges or time periods.

3. **Determine lamb mortality factors.** Lambs will be found by locating radioed ewes and will be observed daily. Searches for missing lambs will be made when mortality is suspected. Dead lambs will be necropsied and tissue samples analyzed to determine cause of mortality.

4. **Assess parasite loads in ewes and lambs throughout summer and fall.** Fecal samples will be collected weekly and analyzed for parasite and microorganism identification. The Washington State University Vet School will do the tissue related examinations.

COST ESTIMATE

Estimated Cost of Proposed Study $ 27,231.60 Amount Requested from FNAWS $ 14,196

	Cost to be funded by FNAWS grant	Cost to be funded by other cooperators*
Subsistence	$	$
Travel Expenses 4 flights to Taylor Ranch (UI) FNAWS Convention presentation (FNAWS)	$ 870	$ 1000
Equipment	$	$
Supplies	$ 250	$
Services (secretarial, clerical, statistical, etc.)	$	$
Publishing	$ 150	$
Other (specify) wages for 2 people	$ 8250	$ 8250
aerial radio tracking	$ 3000	$
Vet School sample analysis	$ 1000	$
U of I overhead (33% of $13520)	$ 676 (5% of 13520)	$ 3785.60 (28% of 13520)
TOTALS	$ 14196	$ 13,035

*Costs funded by other cooperators is an estimate and is not considered to be a legal match.

Cost must be itemized for each additional year on a separate sheet if project will extend for more than one year.

Other organizations providing financial aid or support for the project:

	Amount Applied for	Date Approved
1)	$	
2)	$	
3)	$	

Other pertinent information including any special arrangements desired for administration of grant (i.e., make payable to: Name, Address, Institution, etc.)

BIOGRAPHY OF APPLICANT

Social Security Number: 220-58-6270

Name Akenson (Last) Holly (First) A. (Middle Initial)

Home Address Taylor Ranch Research Stn., HC 85 (Number, Street) Cascade, (City)
Idaho (State) 83611 (Zip Code) (208)382-4336 radio phone (Area Code & Telephone Number)

Office Address same as above (Number, Street, City)
(State, Zip Code, Area Code & Telephone Number)

Age 31 Sex female Citizenship USA

Institution (If applicable) University of Idaho

EDUCATION OF APPLICANT

University/College University of Idaho

Dates Attended: August 1984 to present

Major Wildlife Resources Minor _____ Degree M.S. to be completed

University/College Eastern Oregon State College

Dates Attended: January 1981 to May 1983

Major Secondary Education Minor _____ Degree B.S. 1983

University/College Eastern Oregon State College

Dates Attended: September 1975 to June 1979

Major Biology Minor _____ Degree B.S. 1979

At what institution will you be studying during the coming academic year? _____

Your major area of graduate study Big Game Population Ecology

Has your project been approved as your thesis topic by your graduate committee? _____

EMPLOYMENT HISTORY

Name and Address of Employer	Your Position	Dates of Employment
University of Idaho Moscow, ID 83843	Research Associate, Co-Manager Taylor Ranch Research Station	Sept. 1982 to present
USFS Range & Wildlife Lab LaGrande, OR 97850	Wildlife Field Researcher Great Gray Owls	Jan.-June 1982 Feb.-May 1983
USFS LaGrande District La Grande, OR 97850	Biological Technician Forestry & Wildlife	Mar.-Aug. 79; June- Nov. 81; July-Sept 82
USFS Globe District Globe, Az	Wildlife Observer Bald Eagles	Mar.-May 80

BIOGRAPHY OF APPLICANT

Social Security Number: 543-82-5042

Name Akenson (Last) James (First) J. (Middle Initial)

Home Address Taylor Ranch Field Station, HC-85 (Number, Street) Cascade (City)

Idaho (State) 83611 (Zip Code) (Area Code & Telephone Number)

Office Address Same as above (Number, Street, City)

(State, Zip Code, Area Code & Telephone Number)

Age 31 Sex M Citizenship USA

Institution (If applicable) University of Idaho

EDUCATION OF APPLICANT

University/College Oregon State University, Corvallis, Oregon

Dates Attended: 9-25-79 to 6-15-85

Major Resource Geography Minor Geography Degree M.S. 1985

University/College Eastern Oregon State College, La Grande, Oregon

Dates Attended: 9-25-75 to 6-12-79

Major Community Service-Environmental Studies Minor Geography Degree B.S. 1979

University/College

Dates Attended:

Major Minor Degree

At what institution will you be studying during the coming academic year?

Your major area of graduate study

Has your project been approved as your thesis topic by your graduate committee?

EMPLOYMENT HISTORY

Name and Address of Employer	Your Position	Dates of Employment
University of Idaho Moscow, ID 83843	Research Associate/ Co-Manager, Taylor Ranch Field Sta.	9-15-82 to present
Bureau of Land Management Baker Area, Baker, OR 97814	Recreation Planner (Seasonal)	4-15-82 to 9-15-82
USFS Range & Habitat Lab. ~~La Grande, OR 97850~~	Wildlife Researcher (Contractor)	1-1-82 to 4-1-82

ENDORSEMENT

I hereby certify that the applicant is prepared to conduct the study as outlined and I consider this estimate to be adequate to cover the cost of the project.

Supervisor's Name Dr. E. O. Garton

Title Acting Director, Wilderness Research Center

Department & University/College College of Forestry, Wildlife & Range Univ. of Idaho

Government Branch

Signature E O Garton Date 12/6/88

I hereby agree to abide by the stated requirements of a FNAWS grant. I also understand all FNAWS funding stipulations and will provide all necessary reports if I receive a FNAWS grant.

Applicant's Name Holly A. Akenson

James J. Akenson

Department & University/College College of Forestry, Wildlife & Range Univ. of Idaho

Government Branch

Signature Holly A. Akenson ; James J. Akenson Date 12/6/88

MEDIA CONTACTS

Please list one or more media sources in your area that we may contact with details of your project.

Name Idaho Statesman

Address P.o. Box 40 Boise, ID 83707

Contact Person (208)377-6445

Name Idaho Wildlife (Idaho Dept. Fish and Game magazine)

Address Box 25 Boise, ID 83707

Contact Person Bill Goodnight (208)334-3748

Name Lewiston Tribune

Address P.O. Box 957 Lewiston, ID 83501

Contact Person Bill Loftus (208)743-9411

April 7, 1989

FNAWS Grant-in-aid Program
720 Allen Ave.
Cody, WY 82414

Dear FNAWS:

Enclosed are three copies of the second progress report on our 1988 Grant-in-aid for Assessing Bighorn Ewe-Lamb Herd composition in Lambing Areas and Seasonal Ranges. Several slides of the capturing efforts are included. We will be working into the summer from the 1988 funding, since we were not able to radio instrument ewes until this winter. Enclosed is an itemized estimate of expenditures anticipated from the 1988 grant. The second summer (1990) of field work can be funded through our 1989 Grant-in-aid application.

Thank you for funding this important project. For the third year, Idaho Fish and Game helicopter counts and our own weekly surveys on the winter range have revealed extremely low lamb numbers. We hope that as a result of our investigations the cause of the low lamb recruitment can be identified and the Idaho Fish and Game can resolve this situation as soon as possible to alleviate a decline in this population.

Sincerely,

Jim Akenson Holly Akenson

enclosures

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ASSESSING BIGHORN EWE-LAMB HERD COMPOSITION IN LAMBING AREAS AND SEASONAL RANGES

FNAWS Grant-in-aid Progress Report
submitted by Holly and Jim Akenson
April 6, 1989

In March we fitted 9 ewes with radio transmitters. By the end of April we will have completed the radio collaring phase of this study, having 12 ewes instrumented. The next objective will be to document migration routes and lambing areas. Ultimately, we hope to determine the cause of the low survival rate for lambs in this area.

We have coordinated our efforts with Idaho Fish and Game Biologist Mike Schlegel and veterinarian Dr. Mike Dunbar. Mike Schlegel operated the dart gun on all the captures. Idaho Fish and Game provided air transportation to the Taylor Ranch which is located on the bighorn sheep winter range in the center of the 2.3 million acre Frank Church River of No Return Wilderness. Dr. Dunbar is also the recipient of a FNAWS research grant. He sampled the ewes for a variety of diseases while they were tranquilized for radio collaring. The University of Idaho provided housing and logistical support from its Taylor Ranch Field Station.

Ewes were captured for radio collaring using a 32 guage Palmer dart gun with a drug filled dart. The drug used was carfentnil, which proved to be very effective at putting the sheep down rapidly. The ewes had to be stalked within 30 yards before shooting. Some darting situations had to be passed up due to the sheep being in bluffs where they were in danger of falling if darted there. We were selective in picking the ewes for collaring, choosing from different herds with hopes of finding several undocumented lambing areas. While under the influence of the drug the sheep could not run, but it could struggle and thrash around so it was blindfolded and restrained by several people while blood and tissue samples were taken and the collar was attached. A reversing drug or antidote was administered to the ewe after work was completed. The ewe was capable of standing and moving off to feed within minutes. We attempted to use a drop net baited with apple pulp to capture additional sheep for disease sampling and radio instrumenting. It was not possible to coordinate sheep activity under the net with mobilizing the capture crew. After lowering the net 5 times due to heavy snows, the drop net was permanently disassembled.

The next phase of this study will be to track the ewes as they migrate from winter range to lambing areas. Living in the center of 2.3 million acres of wilderness, these sheep will be difficult to follow through trailless and snow covered mountains. During the month of May we will radio track weekly from a small plane. Aerial and ground radio tracking will be more frequent while the ewes are migrating. Once the ewes have settled into their lambing ranges we will hike and snowshoe into these areas to intensively observe the sheep to determine the initial productivity, survival, and physical condition of the lambs. We expect to discover several new lambing areas and hope to find out why the number of lambs returning to winter range is low compared to the number of ewes.

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ITEMIZED EXPENDITURES
1988 FNAWS Grant-in-aid

ASSESSING ROCKY MOUNTAIN BIGHORN EWE-LAMB HERD COMPOSITION
IN LAMBING AREAS AND SEASONAL RANGES ON BIG CREEK, IN IDAHO

HOLLY and JIM AKENSON
April 6, 1989

Item	Actual Expenses	Future Expenses	Total	Final
Air travel	425	80	505	481
Equipment	4,058		4,058	4079
Supplies	26	30	56	52
Wages		3,287	3,287	2964
Aerial radio tracking	125	1,600	1,725	2055
Overhead	369		369	369
Totals	**$5,003**	**$4,997**	**$10,000**	

ITEMIZED EXPENDITURES

1988 FWAWB Grant-in-aid

ASSESSING ROCKY MOUNTAIN BIGHORN EWE-LAMB HERD COMPOSITION
IN LAMBING AREAS AND SEASONAL RANGES ON BIG CREEK, IN IDAHO

HOLLY and JIM ARENDON
April 8, 1989

Item	Actual Expenses	Future Expenses	Total
Air travel	425	80	505
Equipment	4,058		4,058
Supplies	26	30	56
Wages		3,287	3,287
Aerial radio tracking	125	1,600	1,725
Overhead	389		389
Totals	$5,003	$4,997	$10,000

SLIDE LABELS

1988 Grant-in-aid Project

ASSESSING ROCKY MOUNTAIN BIGHORN EWE-LAMB HERD COMPOSITION
IN LAMBING AREAS AND SEASONAL RANGES ON BIG CREEK, IN IDAHO

Holly and Jim Akenson

3. A huge drop net was set up over an apple pulp bait throughout the winter months. The net was never dropped on sheep due to the difficulty in coordinating sheep use with field crew availability.

4. A tranquilizer dart appears in the rump of a sheep. Each ewe was stalked to inside of 30 yards before being shot with a drug filled dart from a Palmer 32 ga. dart gun. IDF&G biologist Mike Schlegel did the dart gun shooting.

5. We coordinated capture efforts with Dr. Mike Dunbar, a veterinarian who received a GIA grant to assess diseases among bighorn sheep in Idaho. He took blood samples to determine if the sheep had been exposed to various diseases.

6. Shortly after the drug antidote had been administered the sheep would jump to their feet and begin feeding. To date 9 ewes have been instrumented with radio collars.

Note: Slides 1. and 2. were submitted with this projects first progress report.

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Dear FNAWS Board of Directors:

We would like your help in additional project funding of $7350 to find the cause of lamb mortality in the Big Creek bighorn population. As you have seen from our latest progress report, we have documented a high incidence of lamb mortality for this Big Creek bighorn population. It is of vital importance that we intensify our research of this problem in coordination with efforts of the Idaho Department of Fish and Game.

The **primary objective: Find the cause of lamb mortality.** The most important information about this population of bighorns is what is happening to newborn lambs. This past summer we discovered a major lambing area in Big Cottonwood Creek and found that most of the lambs are dying before mid July when they are less than 2 months old. Last summer most observations were made by aerial searches in this area. We did make two trips to this remote area, and found two dead lambs, one which was fresh enough to necropsy and test for diseases.

The veterinarian examining specimens from this project determined the lamb died from *Pasteurella haemolytica* T10. Serum antibodies for *Pasteurella haemolytica*, *Leptospira pomona*, and Anaplasmosis were found in a significant proportion of the 10 radio instrumented ewes which were tested. Additionally, a tentative identification was made this fall of *Mycoplasma spp.* from a bighorn ram lung collected on Big Creek - the first time this disease has been observed in Idaho bighorns. Three of the radio collared ewes died last spring, probably of disease. Any or all of these diseases which have been found in this population may be significant in causing mortality in these sheep. A large number of samples is necessary in order to more fully understand which of these diseases are most detrimental to this population. Knowing the source of mortality, Idaho Fish and Game can assess the methods of treatment and prevention and act to protect this population from declining and to keep adjacent populations healthy.

We are working closely with IDF&G on this project. They are continuing to pay for veterinarian and laboratory expenses, as well as assisting with radio collaring and flying expenses for IDF&G personnel. Last year the 2 of us, as principal investigators donated 410 hours of our personal time, plus 520 hours of student volunteer time for this project, because of the immediate nature of problems affecting this bighorn population.

With the current level of funding only bimonthly aerial tracking can be done with a limited field season of 5 1/2 weeks. To adequately determine **causes** of lamb mortality we want to have 2 teams of observers backpack to the lambing areas and camp near the sheep from mid-May through July so the bighorn ewes and lambs can be **constantly monitored daily.** Fresh dead specimens can be immediately located and preserved for necropsy. **We will need to know if additional funding is available by mid-winter, so we can prepare for the field season.** The additional cost of constant monitoring and collection of a sizable sample of newly dead lambs to determine the cause of lamb mortality: $7350.

Sincerely,

Holly Akenson Jim Akenson

Holly Akenson, Jim Akenson

PROJECT NUMBER
Office Use Only

Project Title: ASSESSING ROCKY MOUNTAIN BIGHORN EWE:LAMB HERD COMPOSITION IN LAMBING AREAS AND SEASONAL RANGES ON BIG CREEK, IN IDAHO

Date Submitted: October 24, 1989

Location: Valley (County) Idaho (State or Territory) Big Creek (Location)

Description of Project: Lambs will continue to be monitored in lambing areas through the tracking of radio collared ewes, with an emphasis on determining causes of lamb mortality. We have documented when and where mortality occurs. Now we would like to intensify monitoring of lambs during this critical time from May to July with the intention of determining causes of death, and specifically which diseases are causing mortality.

Problem to be Solved: The purpose of this project is to determine why lamb: ewe ratios have continued to be significantly lower than previous years and adjacent ranges for the past 4 years. Last summer lambing areas were located, lamb production was normal, but most lambs died within 2 months. Several dead lambs were found and necropsied; results indicated mortality was caused by disease. Now the primary priority of this study is to determine which diseases are causing this heavy lamb mortality.

Describe How You Propose Solving Problem: To determine causes of lamb mortality the lambs must be intensively monitored daily in order to look for symptoms of illness and to find dead lambs and collect tissue samples for disease analysis. We propose to hire 2 competent wildlife students and take on a volunteer assistant. We will work in 2 teams, backpacking into the 2 major lambing areas and camping near the sheep from mid-May through July, so the bighorn ewes and lambs will be under constant observation. When a dead lamb is found, the lamb or fresh organ samples will be collected and immediately taken to the Idaho Fish and Game State Veterinarian for necropsy, disease culturing, and testing for disease antibodies. Aerial tracking will be used to locate and count sheep not observed on the ground. It will be critical for us to collect as many dead lamb specimens as possible in order to determine which of the diseases in this herd are responsible for the mortality.

FNAWS has committed $4000 for this phase of the study. This funding has been allocated to 5½ weeks of wages for field observations and 7 radio tracking flights. This limited field season will not allow us to collect many specimens. In order to intensively monitor the sheep as described above, we will need an additional $7350 to hire 2 students for 10 weeks, provide half-time wages for principal investigators for 4 weeks, and allow for 8 additional tracking flights.

☒ Check if additional supporting documents are attached

DATE	HERD SIZE	E+YE	L	YR	I	II	III	IV	F	UNK	L/100E per obs	L/100E per day
10-26-86	6	5	1								20	20
10-26-86	6	5	1								20	
10-26-86	8		1						7			
10-26-86	20		2						18			
10-26-86	24		3						21			
10-28-86	11	6	2	1	2						33	33
11-02-86	12	1			1	4	4	1		1	0	0
11-03-86	8									8		0
11-03-86	9								9			
11-03-86	7	5			1	1					0	
11-03-86	4	1				1	1			1	0	
11-05-86	3	3									0	0
11-08-86	36	29	6			1					21	21
11-08-86	9					3	6					
11-13-86	10	9					1				0	0
11-17-86	12	6	1			1	4				17	7
11-17=86	12	9				3					0	
11-19-86	1						1					6
11-19-86	1				1							
11-19-86	8	6	1			1					17	
11-19-86	6	4			2						0	
11-19-86	8	7						1			0	
11-19-86	7	1				2	3	1			0	
11-25-86	13	7	1		1	1	3				14	5
11-25-86	1						1					
11-25-86	1						1					
11-25-86	10	8			1	1					0	
11-25-86	7	5		1		1					0	
AVERAGE:											8	9

DATE	HERD SIZE	E+YE	L	YR	I	II	III	IV	F	UNK	L/100E per obs	L/100E per day

10-26-86	6	5	1								20	20
10-26-86	6	5	1								20	
10-26-86	8		1						7			
10-26-86	20		2						18			
10-26-86	24		3						21			
10-28-86	11	6	2	1	2						33	33
11-02-86	12	1			1	4	4	1		1	0	0
11-03-86	8									8		0
11-03-86	9								9			
11-03-86	7	5			1	1					0	
11-03-86	4	1				1	1			1	0	
11-05-86	3	3									0	0
11-08-86	36	29	6			1					21	21
11-08-86	9					3	6					
11-13-86	10	9					1				0	0
11-17-86	12	6	1			1	4				17	7
11-17-86	12	9				3					0	
11-19-86	1						1					6
11-19-86	1				1							
11-19-86	8	6	1			1					17	
11-19-86	6	4			2						0	
11-19-86	8	7						1			0	
11-19-86	7	1				2	3	1			0	
11-25-86	13	7	1		1	1	3				14	5
11-25-86	1						1					
11-25-86	1						1					
11-25-86	10	8			1	1					0	
11-25-86	7	5		1		1					0	
AVERAGE:											8	9

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10-26-86	12	10	2									20
10-28-86	11	6	2	1	2							33
11-02-86	12	1			1	4	4	1		1		0
11-03-86	11	6			1	2	1			1		0
11-05-86	3	3										0
11-08-86	45	29	6			4	6					21
11-13-86	10	9					1					0
11-17-86	24	15	1			4	4					7
11-19-86	31	18	1		3	3	4	2				6
11-25-86	33	20	1	1	2	3	5					5
11-26-86	19	10	2		2	2	2	1				20
11-27-86	31	19	1	1	2	3	5					5
11-30-86	43	27	2	2	4	2	5	1				7
12-01-86	50	32	3		4	5	4	2				9
12-02-86	87	59	9	1	5	3	8	2				15
12-09-86	74	49	9	2	4	3	4	2		1		18
12-10-86	94	58	9		7	5	10	4		1		16