APPENDIX A

WILD SHEEP STATUS QUESTIONNAIRES
Prepared for 2ND North American Wild Sheep Conference

The Thinhorn Sheep: Dall's Sheep and Stone's Sheep

Alaska - Steven M. Arthur
British Columbia (Dall's) - Ian Hatter
British Columbia (Stone's) - Ian Hatter
Northwest Territories - Alasdair Veitch & John Nagy
Yukon Territory - Jean Carey

Rocky Mountain Bighorn Sheep

Alberta - Jon T. Jorgenson
Arizona - Raymond Lee
British Columbia - Ian Hatter
Colorado - John Ellenberger
Idaho - John Beecham
Montana - John J. McCarthy
Nebraska - Gary Schlichtemeier
Nevada - Larry T. Gilbertson
New Mexico - Bill Dunn
Oregon - Don Whittaker
South Dakota - Ted A. Benzon
Utah - Jim Karpowitz
Washington - George Tsukamoto
Wyoming - Kevin Hurley

California Bighorn Sheep

British Columbia - Ian Hatter
California - Steven G. Torres
Idaho - John Beecham
Nevada - Craig Mortimore
North Dakota - Mike Oehler
Oregon - Don Whittaker
Utah - Jim Karpowitz
Washington - George Tsukamoto

Desert Bighorn Sheep

Arizona - Raymond Lee
California - Steven G. Torres
Colorado - John Ellenberger
Nevada - Patrick Cummings & Craig Stevenson
New Mexico - Eric Rominger
Texas - Doug Humphreys
Utah - Jim Karpowitz

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **ALASKA**
Subspecies (1 questionnaire/subspecies): **Dall's** X Stone's ____ CABS ____ RMBS ____ Desert ____
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1. ESTIMATED POPULATION size: 1988 >65,000 1998 50,000-65,000

2. HARVEST
Permits were not limited, except in specific areas. These data are numbers of hunters reporting that they hunted sheep each year. Totals include hunters that did not report residency. Data for 1998 are preliminary.

Resident permits	1988 2,278	1998 2,427
Non-Resident permits	1988 580	1998 571
Total Permits	1988 3,169	1998 3,059
No. Killed	1988 1,377	1998 967

Record B&C Score and year killed: 189 6/8; 1961

What is the dominant harvest strategy in your state/province for hunting wild sheep?

For most areas: provide maximum opportunity to harvest full-curl rams.

3. PREDATION. What impact does predation have on your sheep populations?
Statewide, predators are not generally viewed as a significant problem, however, predation may be important to some subpopulations at some times.

Do you control predators to benefit sheep? If so, how?
No.

4. DISEASE. Have you had a disease die-off in the last 5 years? No X Yes ____

Last 25 years? No X Yes ____

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?
Record hunter reports of diseased sheep, and investigate these to the extent possible (analyze samples provided by the hunter, solicit reports from other hunters, biologists, etc. that may be active in the area).

5. **STATE-FEDERAL RELATIONSHIPS.** What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Conflicting mandates pertaining to allocation of subsistence resources among users.

B. Political debate may supercede biological considerations.

C. Decision-making process is still evolving, thus, changes may take managers by surprise.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Little effect on management activities or sheep populations. However, in some instances, sport hunting opportunities have been reduced.

6. **CAPTURE-TRANSPLANT TECHNIQUES.** What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation

25 years ago (1975) with estimated mortality rate (%)

A. Drop nets. No data on mortality.

Last 5 years, with estimated mortality rate (%)

A. Net guns. So far, negligible mortality.

B. Tranquilizer darts fired from helicopters. Not used often, very little mortality.

7. **SIGNIFICANT LIMITING FACTORS.** What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Adverse winter weather.

B. Hunting pressure in accessible areas may limit the number of mature rams (although generally this does not limit the success of the population).

C. Population-scale effects of predation are largely unknown, but may limit some subpopulations at some times.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **BRITISH COLUMBIA**
Subspecies (1 questionnaire/subspecies): **Dall's** __x__ Stone's ____ CABS RMBS ____Desert____
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1. ESTIMATED POPULATION size: 1988 __400-600__ 1998 __400-600__
Range is in the extreme NW corner of BC, i.e., the Haines Triangle west of Bennett Lake. Tatshenshini Provincial Park protects the majority of the Dall's sheep in BC.

2. HARVEST (AAH = Annual Allowable Harvest)

Resident permits	1988 30	1998 62
Non-Resident permits	1988	1998 ~20% of the AAH is allocated to Non-Res
Total Permits	1988	1998
No. Killed	1988 2	1998 8

Record B&C Score and year killed: _____

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)
A limited entry hunting (full-curl rams) season is offered in the Tatshenshini area of MU 6-28 and 6-29.

3. PREDATION. What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate. No studies have been done.

Do you control predators to benefit sheep? If so, how? No current control outside of liberal hunting and trapping seasons for predators, which in this area is likely not effective.

4. DISEASE. Have you had a disease die-off. None known.

Last 5 years? No __x__ Yes ____
Cause and herd name:

Last 25 years? No __x__ Yes _____
Cause and herd name:

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?
No action on this to date.

5. **STATE-FEDERAL RELATIONSHIPS.** What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

This is not directly applicable as British Columbia has jurisdiction over its land and natural resources and 94.5% of the Province is Provincial Crown Land.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

British Columbia is nearing the end of a ten year process to double the amount of provincial Protected Areas from 6% to 12% of the land base. Protection of wilderness areas and control of access is seen as a positive effect, providing that increased use by the recreating public is managed within the limits of acceptable change and does not negatively impact mountain sheep populations. The creation of the Tatshenshini-Alsek Park prevented significant access into sheep (Dall's) range.

6. **CAPTURE-TRANSPLANT TECHNIQUES.** What are the 3 primary techniques used to capture Dall's sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)? None done to date.

7. **SIGNIFICANT LIMITING FACTORS.** What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. The greatest potential source of mortality is predation and severe weather

B. Increased access and human activities (mining, forestry, etc.) can affect Dall's sheep. An effective environmental assessment and mitigation process related to natural resource development would help to reduce development impacts.

C. Unregulated First Nations harvest is a potential concern. There are no regulations for First Nations and they currently do not have to report harvests.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **BRITISH COLUMBIA**
Subspecies (1 questionnaire/subspecies): Dall's ____ **Stone's** __x__ CABS RMBS ____Desert____
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1. **ESTIMATED POPULATION** size: 1988 __11,000-12,000__ 1998__11,000-12,000__

2. **HARVEST** (AAH = Annual Allowable Harvest)

Resident permits	1988_____	1998__197____
Non-Resident permits	1988_____	1998 ~ 20% of the AAH is allocated to Non-Res
Total Permits	1988_____	1998_____
No. Killed	1988__359____	1998__407____

Record B&C Score and year killed: _____

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Primarily general open seasons for full-curl rams (over the bridge of the nose) are offered. There are some limited entry hunting (full-curl rams) seasons offered in Spatsizi, Mount Edziza, and Atlin areas of northwestern BC.

3. **PREDATION.** What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

Most of the work available on the impact of predation on Stone's sheep in BC comes from north-eastern British Columbia (Bergerud, AT and JP Elliott. 1997. Wolf predation in a multiple-ungulate system in northern British Columbia. Can. J. Zool. 76:1551-1569). Following a reduction in wolf numbers, there was approximately a 2-fold increase in lambs (9 mths of age)/100 ewes. This study also indicated that wolf numbers, not the severity of the winter (in either the first or second winter), explained the continued decline in recruitment of sheep from 9 to 21 months of age. Generally, populations in the Kechika area increased ($\lambda = 1.08$) when large recruitments were added after wolf reductions and decreased ($\lambda = 0.93$) when smaller additions followed no wolf reductions.

Do you control predators to benefit sheep? If so, how?

No current control outside of liberal hunting and trapping seasons for predators. Wolf removal experiments were undertaken during the mid-1980's in the Kechika and Muskwa areas of northeastern BC.

4. **DISEASE.** Have you had a disease die-off?

We obtained the head of a 6 year ram that died at Toad River this past spring, and several other rams from the Toad River area have been reported. They apparently were very emaciated, retained last winter's hair, and were wheezing and subsequently were not seen again (believed dead). Obviously there are many possibilities and without bodies and necropsy confirmation of cause of death, little can be concluded. This area has had, however, non-commercial llama use from Fort Nelson, leaving open a possible cause-effect connection. A controversy continues over the access of camelids, especially into northern wilderness areas of BC, most particularly where we have little information on existing health status of wild sheep.

We have initiated a project to evaluate the health status of a population of Stone sheep on winter range following reports of possible heavy tick infestations. Preliminary results confirm that some animals in this herd do carry significant numbers of *Dermacentor albipictus* and lost significant amounts of hair coat during the winter. Parasitological and serological testing is in progress and expansion of the project is planned.

Last 5 years? No __x__ Yes ____
Cause and herd name:

Last 25 years? No __x__ Yes _____
Cause and herd name:

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?
All radio-collared mortalities are necropsied by wildlife veterinarian when possible.

5. **STATE-FEDERAL RELATIONSHIPS.** What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

This is not directly applicable as British Columbia has jurisdiction over its land and natural resources and 94.5% of the Province is Provincial Crown Land.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

British Columbia is nearing the end of a ten year process to double the amount of provincial Protected Areas from 6% to 12% of the land base. Protection of wilderness areas and control of access is seen as a positive effect, providing that increased use by the recreating public is managed within the limits of acceptable change and does not negatively impact mountain sheep populations.

6. **CAPTURE-TRANSPLANT TECHNIQUES.** What are the 3 primary techniques used to capture Stone's sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%) no records available.

Last 5 years, with estimated mortality rate (%) During a sheep transplant in the Atlin area, there were 2 capture related mortalities among the 26 animals that were handled (i.e. 8% mortality).
One was believed to be an acute neck injury, the second was likely capture myopathy.

A. Net-Gun

B. Drive-Net

7. **SIGNIFICANT LIMITING FACTORS.** What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. The greatest potential source of mortality is predation and severe winter.

B. Access management including access associated with mining and oil/gas exploration.

C. Fire suppression and forest encroachment resulting in reduction of range quality.

D. Disease introduction from domestic animals is a potential concern.

WILD SHEEP STATUS QUESTIONNAIRE

2nd North American Wild Sheep Conference, Reno, Nevada,
6-9 April 1999

State, Province, or Territory: **NORTHWEST TERRITORIES, CANADA**

Subspecies: Dall's __X__ Stone's ____ CABS ____ RMBS ____ Desert____

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1. ESTIMATED POPULATION size:

Richardson Mountains: 1983 ___500___ 1991 ___1510____ (note years of surveys)

These estimates from aerial surveys.

Mackenzie Mountains: 1988 ___6500*___ 1998 14,000 - 26,000**

* Estimate from a model based on age structure of harvested rams (1984) combined with life tables developed for Kluane National Park, Yukon.

** Estimate from average density estimates from 10 aerial and ground surveys done across the Mackenzie Mountains (1966-98) applied over 140,000 km^2 of the total mountain range.

For the 1996-1998 hunting seasons we collected the horn plug cores from all rams harvested across the Mackenzie Mountains by non-resident hunters (appx. 200/year) and sent the samples to Dr. Curt Strobeck, University of Alberta for DNA analysis. One of the objectives of this research is to determine if there are recognizable 'herds' within the range of Dall's sheep in the Mackenzie Mountains, NWT.

2. HARVEST

A) *Richardson Mountains*

Resident permits	1988 0	1998 0
Non-Resident permits	1988 0	1998 0
Total Permits	1988 0	1998 0
No. Killed	1988 0	1998 0

Record B&C Score and year killed: ?

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Closed, other than for subsistence use. Subsistence harvest typically 10-20 sheep/year.

B) *Mackenzie Mountains*

Resident tags*	1988 71	1998 64 (note: data for 1996)
Non-Resident tags*	1988 ?	1998 246
Total tags	1988 ?	1998 310
No. Killed**	1988 194	1998 222

* There is no draw system for tags; each hunter is allowed to purchase 1 tag per year for a male sheep with horns at least ¾ curl.
** Does not include subsistence harvest, which is typically 10-30 sheep/year.

Record B&C Score and year killed: #1- 177 1/8 (1973); #2 - 176 4/8 (1973)

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Trophy ram and subsistence.

3. PREDATION. What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

Richardson Mountains – impact unknown, but not thought to be a problem.
Mackenzie Mountains – impact unknown, but not thought to be a problem.

Do you control predators to benefit sheep? If so, how?

Richardson Mountains - no
Mackenzie Mountains - no

4. DISEASE.

Richardson Mountains

Have you had a disease die-off in the last 5 years? No __X__ Yes _____

Last 25 years? No __X__ Yes _____

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Collect fecal samples and lung samples from harvested animals.

Mackenzie Mountains

Have you had a disease die-off in the last 5 years? No __X__ Yes _____

Last 25 years? No __X__ Yes _____

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Collect fecal samples during the course of ground-based population monitoring surveys at 4 separate study sites and lung samples from harvested animals. In 1997-1998 we began a detailed investigation of parasites and diseases of Dall's sheep in the Mackenzie Mountains with the University of Saskatchewan and will be expanded to include a project with Montana State University. These projects will be done at least from 1999 through 2001.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

Richardson Mountains – no challenges.
Mackenzie Mountains – no challenges.

NOTE: for the Richardson Mountains, NWT and the northern half of the Mackenzie Mountains, NWT - primary responsibility for wildlife management now falls under the mandate of wildlife co-management boards that were set up as a result of three settled land claim agreements between the Government of Canada, the Government of the Northwest Territories, and the Gwich'in, Inuvialuit, and Sahtu Dene and Metis. These co-management boards are public boards with members nominated by local land claim organizations and the governments of Canada and the Northwest Territories.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Richardson Mountains – no. Resident and non-resident hunting of Dall's sheep is not permitted. Range is essentially undeveloped wilderness, although there has been no official designation.

Mackenzie Mountains – were designated as a Game Preserve 1938 to 1953. Game Preserve status removed in 1953 and opened to sheep hunting by Resident Hunters. Non-resident hunting for Dall's sheep allowed since 1965, except within Nahanni National Park in the south Mackenzie Mountains (appx. 4770 km^2). Sheep management within NNP is the responsibility of Heritage and Parks Canada. Currently, the Mackenzie Mountains are primarily undeveloped wilderness, although there has been no official designation, except for NNP.

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

Richardson Mountains – no captures/transplants ever done.

Mackenzie Mountains

25 years ago (1975) with estimated mortality rate (%)

No captures/transplants in last 25 years. However, a log-net corral trap at two mineral lick sites in the central Mackenzie Mountains was used by Norm Simmons, Canadian Wildlife Service to catch 106 Dall's sheep for research from 1969 to 1973; mortality rate unknown (in our files there are records of at least one ewe and lamb that died as a result of handling).

Last 5 years (1995), with estimated mortality rate (%)

No captures/transplants in last 5 years.

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

Richardson Mountains – currently appear to be no limiting factors. Population growing.

Mackenie Mountains – unknown, but assumed to be some combination of climate, predation, harvest, and disease. Population trend unknown.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **YUKON**
Subspecies (1 questionnaire/subspecies): **Dall's** __x__ **Stone's** __x__ CABS ____ RMBS ____ Desert____
While the Yukon has both Dall and Stone sheep, we do not manage them differently, and harvest is not tracked separately.

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1. ESTIMATED POPULATION size:
1988 22,000
1998 22,000 (18,000 white Dall's sheep; 2,500 "Fannin" and 1,500 Stone)

2. HARVEST

Permits are required only in a small portion of the territory that is open to resident hunters only. The numbers presented here are for the number of seals sold ($10). In addition to purchasing a seal non-resident hunters must also retain the services of a licensed outfitter. Seals are only a very crude way of measuring hunter interest and can't be used to calculate hunter success because many seal holders do not hunt.

Resident permits	1988 625	1998 682
Non-Resident permits	1988 364	1998 334
Total Permits	1988 989	1998 1016
No. Killed	1988 321	1998 274

Record B&C Score and year killed: Dall's Sheep: 183 4/8; Stone's Sheep: 177 7/8
The horn growth measurements taken by Renewable Resources are not equivalent to a B&C score.

What is the dominant harvest strategy in your state/province for hunting wild sheep?

We believe that a conservative harvest focussed on older-aged (full curl) rams will have the least impact on sheep populations while at the same time providing recreational opportunities, both consumptive and non-consumptive. First Nations people are not required to obtain a hunting licence to hunt within their traditional territory and have the right to hunt sheep of either sex and any age at any time. Limited entry permits are required in a small area; for the most part harvest is open to general hunting by seal holders.

3. PREDATION. What impact does predation have on your sheep populations

Yukon sheep populations are, for the most part, naturally regulated. Predation is an important part of this natural system, but does not seem to drive annual variation in population size. Predation may, however, play a more important role during the decline phase of the snowshoe hare cycle when coyotes may switch prey.

Do you control predators to benefit sheep? If so, how?
Wolf control programs have been carried out in sheep range to benefit caribou and mosse; we have detected no response in the sheep populations.

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No __x__ Yes _____

Last 25 years? No __x__ Yes _____

What do you do to detect, manage and/or prevent disease
There is no systematic disease testing, but hunters and others occasionally submit tissue samples for examination.

5. **STATE-FEDERAL RELATIONSHIPS.** What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Neither the territorial nor federal agencies have large budgets with which to work.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations? n/a

6. **CAPTURE-TRANSPLANT TECHNIQUES.** What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)
There were no capture programs 25 years ago. We captured some animals in 1985 and 1990 A.

Last 5 years, with estimated mortality rate (%)
There have been no sheep captures in the last 5 years.

7. **SIGNIFICANT LIMITING FACTORS.** What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. stochastic events e.g. weather

B. predation

C. localized subsistence harvest of either sex, any age sheep

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **ALBERTA**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____ **RMBS** __X__ Desert____
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1. **ESTIMATED POPULATION** size: 1988 10,000 1998 10,000

Province wide our sheep population is similar to what it was in 1988. There have, however, been local changes in some populations.

2. **HARVEST**

Resident permits 1988 2412(male)*, 491 (non-trophy)** 1998 1793(male)*, 328(non-trophy)**
Non-Resident permits 1988 91 1998 86
Total Permits 1988 2994 1998 2207
No. Killed 1988 229(male), 132(non-trophy) 1998 167 (male), 122(non-trophy)

* unlimited entry for trophy males
** non-trophy are ewes and lambs

Record B&C Score and year killed: 208 1/8, 1911

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

To maximize recreational opportunity, rams are hunted on an unlimited entry basis in most areas (except two that are on a draw) with a minimum curl size defined as $4/5^{th}$ curl. In 3 areas, the minimum curl size is defined as full curl. Non-trophy sheep (ewes and lambs) are hunted in most areas on a permit system.

3. **PREDATION.** What impact does predation have on your sheep populations?

We have very little documented information on the role of predators in limiting sheep populations. In northern Alberta, predation (wolves, cougar) is thought to remove a portion of the available surplus of non-trophy animals that would otherwise be available for harvest but is not considered the predominant limiting factor. In the rest of the province, predators are thought to be of minor consequence except in very specific instances (Ram Mtn, Sheep River) where an individual predator (primarily an individual cougar) has become a specialist preying on sheep in which case they have shown an ability to limit a population.

Do you control predators to benefit sheep? If so, how?
We do not control predators for the benefit of sheep

4. **DISEASE**. Have you had a disease die-off in the last 5 years? No _X_ Yes _____

Last 25 years? No _____ Yes _X_
Cause and herd name: Sheep River, 1978, pneumonia
Cause and herd name: Waterton-Westcastle, 1981-82, pneumonia
Cause and herd name: Sheep River, 1985-86, pneumonia
What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

- nothing for detecting
- if sick sheep are reported, an immediate assessment is made and any sick animals with clinical signs of pneumonia will be culled from the herd and necropsied
- any sheep captured are visually examined for contagious ecthyma. Any sheep for transplant are treated with ivermectin and often nasal swabs will be taken for bacterial culture.
- Alberta has developed guidelines with the agricultural sector to exclude opportunities for domestic sheep/goat - bighorn sheep interactions.

5. **STATE-FEDERAL RELATIONSHIPS.** What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. In Alberta, management of sheep by federal authorities applies only within the National Park system. Cooperation is often needed to inventory populations that interchange across boundaries as well as enforcement along boundaries during hunting seasons. Currently, cooperation is very good.

B. National Parks currently have an excellent program of habitat enhancement through prescribed fire for sheep range that benefits both jurisdictions

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Designation of wilderness areas has not had a great effect on management activities other than the exclusion of hunting opportunities and an inability to manage the size of nursery herds. This has led to some sheep populations that are above carrying capacity and of relatively low quality in terms of productivity, survival, and growth.

6. **CAPTURE-TRANSPLANT TECHNIQUES.** What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

A. Drop nets (<1%)

B. Corral traps (<1%)

C. Chemical immobilization (3-5%)

Last 5 years, with estimated mortality rate (%)

A. Drop nets (<1%)

B. Corral traps, box traps (<1%)

C. Chemical immobilization (2%)

7. **SIGNIFICANT LIMITING FACTORS.** What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Lack of suitable winter range

B. Encroachment on some winter ranges of conifer and deciduous tree cover.

C. Longterm effective fire suppression policies have led to a reduction in high quality range. Although the situation has improved considerably, we are still severely limited through finite resources in implementing habitat enhancement projects.

D. Other potential limiting factors could include competition with livestock in certain areas, industrial and recreational activities, and disease related issues. Unfortunately, our understanding of these factors is poorly understood due to a lack of research.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **ARIZONA**
Subspecies (1 questionnaire/subspecies): **RMBS X**
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1. ESTIMATED POPULATION size: 1988 - 250 1998 - 600

2. HARVEST

Resident permits	1988 - 4	1998 - 9
Non-Resident permits	1988 - 0	1998 - 4*
Total Permits	1988 - 4	1998 - 9
No. Killed	1988 - 4	1998 - 9

Record B&C Score and year killed: 188 3/8 (1995)

*All permits are available to residents - no more than 10% of the total permits are available to non-residents, nor more than 50% in any one hunt.

What is the dominant harvest strategy in your state/province for hunting wild sheep?

Provide hunter recreation that stresses the quality of the hunting experience and harvest of older age class rams. The legal animal is any ram.

3. PREDATION. What impact does predation have on your sheep populations?

Predation is not usually a causitive factor in ungulate population levels, with the very small number of animals in a typical release, predation can adversely impact the success of a transplant.

Do you control predators to benefit sheep? If so, how?

The Arizona Game & Fish Department does not control predators to benefit bighorn sheep. In 1999, the Department will initiate a management action in a select area to remove mountain lions and determine the subsequent effect upon a bighorn sheep population.

4. DISEASE. Have you had a disease die-off in the last 5 years? No X

Last 25 years? No X

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Bighorn sheep populations are tested during capture projects to determine titers to common livestock diseases.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. US Forest Service burn policies and grazing polices.

B. USFWS endangered species recovery plans (e.g. wolf reintroductions).

C. US Forest Service grazing allotments.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Not applicable to this subspecies in Arizona.

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation?

25 years ago (1975) with estimated mortality rate (%)

A. None transplanted at that time.

Last 5 years, with estimated mortality rate (%)

A. Drop-net (<5%)

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Lack of habitat.

B. Lack of contiguous habitat.

C. Human disturbance.

D. Predation on a small population.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **BRITISH COLUMBIA**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____ **RMBS** _x_ Desert____
Contact Person: Ian Hatter
Full Address: PO Box 9374 Stn Prov Govt
Phone: 250-387-9792
Fax: 250-356-9145
e-mail: ihatter@fwhdept.env.gov.bc.ca

1. **ESTIMATED POPULATION** size: 1988 2500-3000 1998 2500-3000

2. **HARVEST** (AAH = Annual Allowable Harvest)

Resident permits	1988 888	1998 728
Non-Resident permits	1988 73	1998 64
Total Permits	1988 961	1998 792
No. Killed	1988 200	1998 99

Record B&C Score and year killed: _____

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Both general open (full-curl) and some limited entry hunting (full curl and ewe or lamb) seasons are offered.

3. **PREDATION.** What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

Predation is a possible limiting factor for some bighorn populations, but there is little information available for BC. Alberta has identified "sheep specialist" cougar's as being significant predators on sheep herds in an adjacent area to BC herds. Anecdotal information has identified coyotes as also being significant in some herds in the East Kootenays.

Do you control predators to benefit sheep? If so, how? No real control outside of liberal hunting and trapping seasons for predators.

4. **DISEASE.** Have you had a disease die-off.

Yes, although it does not fit a classic "die-off" scenario. Chronic pneumonia has resulted in likely less than a dozen deaths over a number of months in the fall of 1998 in one group of sheep. These were all very chronic bacterial pneumonias with mostly *Actinomyces pyogenes* bacteria isolated. Pathology suggested a primary pathogen such as a respiratory virus or Mycoplasma acting as an initiating factor. Other factors such as hot, dry and dusty conditions may have also played a role in this disease episode.

Last 5 years? No _____Yes ___x____
Cause and herd name: Some coughing sheep initially observed in Elk Valley (near the Line Creek mine) (southeastern BC) in July 1998 and a few mortalities reported, starting in August. Six necropsies were performed. Coughing is presumed to have been associated with a respiratory infection with moderate morbidity, but low mortality, followed by secondary bacterial infection. One animal from outside this population has been destroyed with similar pathology results. It was a mature ram after the rut and may have come from/been associated with this herd.

Last 25 years? No _____Yes ___x____
Cause and herd name: "Classic" die-offs in 1920s, 1941, 1964, and 1981 in the East Kootenay - initially reported to begin at Radium, Bull River and McGuire Creek herds respectively.

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)? Observations from staff and a contractor to monitor as well as to coordinate assistance from the interested public to report on status of the sheep herds in the area for the winter of 1998-9.

The majority of live captured animals are bled to archive samples. Any animals captured for relocations are sampled according to the WWHC protocol.

5. **STATE-FEDERAL RELATIONSHIPS.** What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

This is not directly applicable as British Columbia has jurisdiction over its land and natural resources and 94.5% of the Province is Provincial Crown Land.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations? British Columbia is nearing the end of a ten year process to double the amount of provincial Protected Areas from 6% to 12% of the land base. Protection of wilderness areas and control of access is seen as a positive effect, providing that increased use by the recreating public is managed within the limits of acceptable change and does not negatively impact mountain sheep populations.

25 years ago (1975) with estimated mortality rate (%), Likely much higher then, but no solid records available.
A. Drive-net
B. Drop-net
Last 5 years, with estimated mortality rate (%) 0 to 4 %, depending on project, ave. probably 1-2 %
A. Net-gun
B. Drop-net
C. Drive-net

7. **SIGNIFICANT LIMITING FACTORS.** What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Habitat Alienation (residential developments, access and highway developments, industrial developments, agricultural developments and recreational developments and activities).

B. Fire suppression and conifer forest encroachment on grassland ranges.

C. Potential disease transmission from domestic sheep

D. Competition for forage on critical winter ranges with domestic livestock; mainly cattle on Provincial Crown lands and horses on Indian Reservations.

E. Unmanaged predator populations which fluctuate widely over the long term.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **COLORADO**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____ **RMBS** X Desert____
Contact Person: John Ellenberger, state big game manager
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1. ESTIMATED POPULATION size: 1988 ~6000 1998 7250

2. HARVEST

Resident permits	1988 305 ram, 45 ewe	1998 241 rams, 82 ewes
Non-Resident permits	1988 35 ram, 5 ewe	1998 28 rams, 8 ewes
Total Permits	1988 340 ram, 50 ewe	1998 269 rams, 90 ewes
No. Killed	1988 114 rams, 20 ewes	1998 114 rams, 36 ewes

Record B&C Score and year killed: 198 & 3/4 1998 (green score)

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)
Limited harvest of ½ curl or better rams in all units with limited ewe hunting in some units.

3. PREDATION. What impact does predation have on your sheep populations?
Predation (by mountain lion) occurs in many herds but is usually not a significant limiting factor.

Do you control predators to benefit sheep? If so, how?
Colorado uses a harvest quota system for sport harvest of mountain lions. APHIS or ADC is not used to harvest lions in addition to sport harvest.

4. DISEASE. Have you had a disease die-off in the last 5 years? No ____ Yes X
Cause and herd name: Big Thompson Herd, Pasteurella pneumonia most likely cause
Cause and herd name: Tarryall Herd, Pasteurella pneumonia most likely cause

Last 25 years? No ____ Yes X
Cause and herd name: Trickle Mountain, Pasteurella pneumonia most likely cause
Cause and herd name: Alamosa Canyon, Pasteurella pneumonia most likely cause
Cause and herd name: Almont/Taylor River, Pasteurella pneumonia
Cause and herd name: Upper Lake Fork/Pole Mt., Pasteurella pneumonia
Cause and herd name: Dillon Pinnacles, Pasteurella pneumonia/heavy winter
Cause and herd name: San Louis Peak/Lagurita, Pasteurella pneumonia
Cause and herd name: Rock Creek/Cebolla, Pasteurella pneumonia

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Our most frequent attempt at disease control is baiting and treating sheep with Fenbendazole in apple

COLORADO

pulp. We also treat all sheep captured for translocation with Ivermectin and a broad spectrum anti-biotic. Sheep that are found dead are necropsied (if carcasses are fresh) to determine cause of death and disease agent if possible. Blood samples and nasal/throat swabs are taken at trapping and translocation projects to determine disease status of sheep.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

In general, conflicts between state and federal agencies have been minimal. Preserving and maintaining sheep populations and their habitats is a high priority for all agencies in the state.

A. Habitat improvement projects such as prescribed burns and range fertilization on public lands can be cumbersome to plan and implement due to agencies' internal regulations and guidelines.

B. Outdoor recreation plans and projects (ski area expansion and helicopter skiing have caused problems in some areas but is not a state-wide problem.

C. We are beginning cooperative management of domestic sheep allotments in proximity to bighorn herds. This project is in the early stages and will probably face some opposition from land management agencies as well as livestock operators.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Wilderness area designation has caused some problems for trap and translocation projects. However, we have been able to work with individual forest supervisors and district rangers to acquire temporary exemptions for limited use of helicopters in wilderness areas to allow CDOW to conduct net-gunning operations or the use of helicopters to transport sheep to remote locations for release.

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)
A. Drop nets (<5%)

Last 5 years, with estimated mortality rate (%)
A. Drop nets (<5%)
B. Net-gunning (<5%)

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Human population growth and related development (housing, roads, etc.) that occurs as a result of

increasing human populations.

B. Increased human activity on sheep ranges (both wilderness areas and non-wilderness areas) as human population growth results in increased demands for outdoor recreation (both developed and undeveloped).

C. Disease management: We need to work with land management agencies, livestock organizations and the general public to make them aware of the need to keep bighorn sheep and domestic sheep segregated to decrease the potential for transmission of disease.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **IDAHO**
Subspecies (one questionnaire/subspecies): Dall's ____ Stone's ____ **CABS** __X__ **RMBS** __X__ Desert____
Fax:
Contact Person:
Full Address: Idaho Fish and Game, 600 S. Walnut/Box 25, Boise, Idaho 83707-0025
Phone:
e-mail:

1. **ESTIMATED POPULATION size:** 1988 ____?____ 1998____?____ (No data given)

2. **HARVEST**

Resident permits	1988 46(RM) - 22(CA)	1998 51(RM) - 38(CA)
Non-Resident permits	1988 22(RM) - 0(CA)	1998 13(RM) - 7(CA)
Total Permits	1988 168(RM) - 22(CA)	1998 64(RM) - 45(CA)
No. Killed	1988 62(RM) - 14(CA)	1998 36(RM) - 30(CA)

Record B&C Score and year killed: RM - 197-7/8 (1996) CA - 174-4/8 (1997)

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Trophy - 3/4 curl or 4 + years of age

3. **PREDATION.** What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

None known or suspected of being a problem

Do you control predators to benefit sheep? If so, how?

No

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No __X__ Yes _____
No all-age die-off, lamb die-off only.

Cause and herd name:

Last 25 years? No _____ Yes __X__

Cause and Herd Name: All pneumonia caused die-offs: Upper Hells Canyon 1983, 1991; Panther Creek, Morgan Creek, East Fork, Lost River Range, and west Middle Fork, Camas Creek.

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Monitor herd population characteristics and size

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Regulation of domestic sheep allotments

B. Grazing by domestic livestock

C. Helicopter use in Wilderness areas

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)
A. Darting - 10-15%
B. Drop-net - <1%
C. Net gun - <1%

Last 5 years, with estimated mortality rate (%)
A. Drop net - <1%
B. Net gun - <1%

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Management program

B. Disease/ Dieoffs

C. Availability of habitat

D. Availability of transplant stock

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **MONTANA**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____ **RMBS** X
Contact Person: John J. McCarthy
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Fax: (406)444-4952
e-mail: jomccarthy@state.mt.us

1. **ESTIMATED POPULATION size:** 1988 4600 1998 4900 (42 populations)

2. **HARVEST**

Resident permits	1988 447	1998 520
Non-Resident permits	1988 61	1998 77
Total Permits	1988 508	1998 597
No. Killed	1988 206 (125 M; 81 F)	1998 202 (157 M; 95 F)

Record B&C Score and year killed: 204-7/8

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Any ram, ewe hunting

3. **PREDATION.** What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.
There is some indication that wolves and lions have reduced some population in the Sun River Area.

Do you control predators to benefit sheep? If so, how?
NO

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No ____ Yes X
Cause and herd name: Pneumonia: Highlands; Anaconda: Taylor / Hilgard
Cause and herd name:

Last 25 years? No ____ Yes X
Cause and herd name: In addition to the above: Sun river, Beartooth, tendoys. Lost Cr. Ear Mtn. Black Leaf, Gardner, Taylor / Hilgards

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?
Detection has been done by field personnel. Once dectected nothing can really be done but to record the effects and results. We have utilized medicated salt block in the Highlands and inoculation with capture equipment in the Taylor Hilgard with no or limited success.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Fire Suppression

B. Over grazing

C. Road construction

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

NO

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

A. Corral Trap – 5%

B. Cannon net – 5%

C. Darting – 1-2%

Last 5 years, with estimated mortality rate (%)

A. Net gun – 1%

B. Drivenet – 1-2%

C. Darting – 1-2%

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Disease

B. Loss of habitat to forest encroachment

C. Habitat fragmentation

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **NEBRASKA**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____RMBS _X__Desert_____
Contact Person: Gary Schlichtemeier
Full Address: Nebraska Game & Parks Commission, PO Box 725, Alliance, NE 69301
Phone: (308)763-2940
Fax: (308)763-2943
e-mail: gschlich@ngpc.state.ne.us

1. **ESTIMATED POPULATION** size: 1988 __21_____1998____70_____

2. **HARVEST**

Resident permits	1988_____	1998___1_____
Non-Resident permits	1988_____	1998___1_____
Total Permits	1988_____	1998___2_____
No. Killed	1988_____	1998___2_____

Record B&C Score and year killed: _____1998 - 185⅞_____

What is the dominant harvest strategy in your state/province for hunting wild sheep?

Removal of surplus rams, legal bag one ram with one horn ¾ curl or greater. Provide recreational opportunity and funding for future sheep management projects.

3. **PREDATION**. What impact does predation have on your sheep populations?

No apparent impact observed. More data is needed.

Do you control predators to benefit sheep? No.

4. **DISEASE**. Have you had a disease die-off in the last 5 years? No __X____Yes _____

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Observations and in past years wormed annually using fenbendazole in a feed mixture.

5. **STATE-FEDERAL RELATIONSHIPS**. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

Nebraska is 97% private land. Cooperation with the Forest Service on sheep projects is good.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations? No.

6. **CAPTURE-TRANSPLANT TECHNIQUES**. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

No capture or transplants accomplished to date. A study was recently completed using satellite remote sensing to determine suitable habitat for transplanting sheep in Nebraska's pine ridge region.

7. **SIGNIFICANT LIMITING FACTORS**. What are the most significant factors that limit the success of your sheep populations?

We are in the process of developing a five year management plan that will address issues including transplants, habitat needs, behavior, disease, genetics, social interactions, predation, movement and other factors.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **NEVADA**
Subspecies (one questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____ **RMBS** __X__ Desert____
Fax: 775-738-2485
Contact Person: Larry T. Gilbertson
Full Address: Nevada Division of Wildlife, 1375 Mtn. City Hwy., Elko, NV 89801
Phone: 775-738-6036
e-mail:

1. **ESTIMATED POPULATION** size: 1988 ____150____ 1998____250_____

2. **HARVEST**

Resident permits	1988___2___	1998___5_____
Non-Resident permits	1988___0___	1998___0_____
Total Permits	1988___2___	1998___5_____
No. Killed	1988___1___	1998___5_____

Record B&C Score and year killed: ____182-6/8 Ruby Mtns._____

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Any ram with season including the months of September and October

3. **PREDATION.** What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

Lion predation has been documented on all released populations except for the Ruby Mtns., and may be one of the major factors (other than disease) limiting transplant success.

Do you control predators to benefit sheep? If so, how?

No

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No _____Yes ___X____
Cause and herd name: Pneumonia - Ruby Mtns.
Cause and herd name:

Last 25 years? No _____Yes ___X____
Cause and herd name: Unknown - possible disease and/or predation in the N. Snake Range, S. Snake Range, Pilot Peak, and Mt. Grafton releases.

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Detection - conduct intensive helicopter surveys. Investigate reports of disease. Collect and analyze blood samples during capture operations.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Domestic sheep management in allotements adjacent to bighorn areas

B. Red tape in Wilderness areas and WSA's related to capture and water development

C.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Wilderness has resulted in more red tape negatively impacting sheep management
Wilderness may have attracted more visitor use into sheep habitat

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

A. No Rocky Mtn. Bighorn were trapped in Nevada 25 years ago

Last 5 years, with estimated mortality rate (%)

A. Net gunning with a 8% mortality rate

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Domestic sheep in allotments adjacent to wild sheep populations

B. Low numbers of bighorn sheep available for transplants

C. Possibly lion predation in populations <50

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **NEW MEXICO**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____**RMBS** __X__Desert____
Contact Person: Bill Dunn
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e-mail: **wcdunn@state.nm.us**

1. **ESTIMATED POPULATION** size: 1988 ____575____1998__560_____

2. **HARVEST**

Resident permits	1988_____	1998_____
Non-Resident permits	1988_____	1998 _____
Total Permits *	1988__11___	1998__9_____
No. Killed	1988___8__	1998___9_____

Record B&C Score and year killed: __192 6/8, 1996_____

* Residents and non-residents are drawn from the same pool.

What is the dominant harvest strategy in your state/province for hunting wild sheep?

Trophy Ram

3. **PREDATION. What impact does predation have on your sheep populations?**
Predation seems to be more of a factor with low-elevation populations that share ranges with deer. We have had predation documented on the Manzano, San Francisco River and Turkey Creek herds. The data are sparse, but the impact of predation seems to be moderate.

Do you control predators to benefit sheep? If so, how? Yes. If we document a predator kill, we can issue a take permit to have the offending lion removed.

4. **DISEASE. Have you had a disease die-off in the last 5 years?** No _____Yes ___X_(Maybe)
Cause and herd name: San Francisco River. We suspect that disease may have played a significant role in the recent decline.

Last 25 years? No _____Yes ___X___
Cause and herd name: Latir Wilderness, 1981. Pneumonia from domestic sheep

What do you do to detect, manage and/or prevent disease?
At each capture, we do a complete external examination, take ear swabs, collect ticks, mites and fecal samples, and draw blood. These biological samples are analyzed by Dr. Walter Boyce at UC Davis. Eleven different titers are measured from the blood including BTV, CE, and PI3.

NEW MEXICO-RMBS

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Proper management of livestock allotments.
B. Wilderness regulations/restrictions
C. National Wildlife Refuge policy

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Negative in that capture for transplants requires a lot of extra steps and we are limited in the number of people we can have on the capture crew.
Positive in that wilderness herds aren't affected by heavy livestock grazing, roads, and as much human disturbance.

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

A. Dropnet: <15%

B. Chemical Immobilization: >30%

Last 5 years, with estimated mortality rate (%)

A. Dropnet: 0% n=28

B. Netgun: 0% n=28

C. Chemical Immobilization (on 1 occasion): 57% (4 OF 7)

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations?

A. Vegetation encroachment in low elevation habitats.

B. Roads and human disturbance

C. Predation from lions, coyotes, and feral dogs.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **NORTH DAKOTA**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____ **RMBS X** Desert____
Contact Person: Ted A. Benzon
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3305 West South St. , Rapid City, SD 57702
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e-mail: benzon@gfrc1.state.sd.us

1. **ESTIMATED POPULATION** size: 1988 300 1998 375

2. **HARVEST**

Resident permits	1988 2	1998 4
Non-Resident permits	1988	1998
Total Permits	1988 4	1998 4
No. Killed	1988 2	1998 4

Record B&C Score and year killed:

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Any ram.

3. **PREDATION.** What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

Unknown at present time.

Do you control predators to benefit sheep? If so, how?

No.

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No ____ Yes x
Cause and herd name: unknown, Badlands National Park
Cause and herd name:

Last 25 years? No x Yes ____
Cause and herd name:
Cause and herd name:

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Disease screening at capture.

5. **STATE-FEDERAL RELATIONSHIPS.** What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Habitat improvement

B. Maintaining present habitat

C.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

6. **CAPTURE-TRANSPLANT TECHNIQUES.** What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)
No captures done 25 years ago.

Last 5 years, with estimated mortality rate (%)

A. Drop net with 0% mortality

B. Net gun with approximately 5% mortality

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Habitat quality

B. Habitat quantity

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **OREGON - RMBS**

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1. **ESTIMATED POPULATION**:

	1988	285	1998	560

2. **HARVEST**

Resident permits	1988	3	1998	9
Non-Resident permits	1988	1	1998	2
Total Permits	1988	4	1998	11
No. Killed	1988	4	1998	11

Record B&C Score and year killed 200 6/8 in 1989

What is the dominant harvest strategy in your state/province for hunting wild sheep?
Conservative management for quality experience, using limited entry controlled hunts and any ram bag limit.

3. **PREDATION**. What impact does predation have on your sheep populations?
Mountain lion predation is suspected of causing some local population declines and may be depressing growth rates in other local populations.

Do you control predators to benefit sheep? If so, how?
No active predator control but hunters are encouraged to hunt mountain lions with liberal seasons and reduced tag fees.

4. **DISEASE.** Have you had a disease die-off in the last 5 years? YES
Pasteurella in Lower Hells Canyon, Upper Joseph Canyon, and Wenaha herds during winter 1995-1996. Herds in Washington and Idaho were also impacted.

Last 25 Years? YES
Pasteurella, Lostine herd in 1986–87.
Pasteurella, Upper Hells Canyon herd, 1984.

What do you do to detect, manage and/or prevent disease?
a. Disease screening when animals are captured for any reason.
b. All animals handled vaccinated with anthelmentics and broad spectrum antibiotic.
c. Medicated salt blocks.
d. Regular aerial population surveys with frequent ground observation to monitor health.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges?
   a. Ten years ago the approval process for bighorn sheep transplant was too detailed and expensive. The process has since been streamlined and is now much more effective.

Has the designation of wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Wilderness classifications have resulted in preserving some large blocks of bighorn habitat. However, some management practices (e.g. use of helicopters for capture) have become difficult to use in such areas.

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used?

25 Years ago with estimated mortality rate?

a. Corral trap, 0% mortality.
b. Darting from ground, 0% mortality.

Last 5 years?

a. Corral trap, 0% mortality
b. Helicopter netgun, 0% mortality.
c. Dropnet, 3% mortality.
d. Helicopter darting, 100% mortality.

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors limiting sheep popualtions?

a. Diseases associated with domestic livestock (*Pasteurella* and domestic sheep).
b. Fragmented land ownership patterns and the relationship with domestic livestock.
c. Predators, at least locally.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **SOUTH DAKOTA**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____ **RMBS** _X_ Desert____
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1. **ESTIMATED POPULATION** size: 1988 ___300___ 1998 ___375___

2. **HARVEST**

Resident permits	1988 ___2___	1998 ___4___
Non-Resident permits	1988 _____	1998 _____
Total Permits	1988 ___4___	1998 ___4___
No. Killed	1988 ___2___	1998 ___4___

Record B&C Score and year killed:

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Any ram.

3. **PREDATION.** What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

Unknown at present time.

Do you control predators to benefit sheep? If so, how?

No.

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No _____ Yes ___x___
Cause and herd name: unknown, Badlands National Park
Cause and herd name:

Last 25 years? No ___x___ Yes _____
Cause and herd name:
Cause and herd name:

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Disease screening at capture.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Habitat improvement

B. Maintaining present habitat

C.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)
No captures done 25 years ago.

Last 5 years, with estimated mortality rate (%)

A. Drop net with 0% mortality

B. Net gun with approximately 5% mortality

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Habitat quality

B. Habitat quantity

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **UTAH**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____ **RMBS** __X__ Desert____
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1. **ESTIMATED POPULATION** size: 1988 ___300___ 1998__800_____

2. **HARVEST**

Resident permits	1988__0___	1998___4____
Non-Resident permits	1988__0___	1998___1____
Total Permits	1988__0___	1998___5____
No. Killed	1988__0___	1998___5____

Record B&C Score and year killed: A ram scoring just over 184 was killed in 1992 .

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Provide a high quality hunting experience with a reasonable opportunity to harvest an older age class ram. Current regulations allow the harvest of any ram.

3. **PREDATION.** What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

Predation by mountain lions and coyotes has been observed in bighorn populations. The total impact of predation is unknown. However, predation appears to be a significant mortality factor in some areas. It is believed to be a principle cause of the failure of the Nebo and Deep Creek transplants.

Do you control predators to benefit sheep? If so, how?

Yes. Specific areas are targeted in predator management plans to remove coyotes and mountain lions through sport harvest and with removal by Wildlife Services and Division of Wildlife Resource personnel.

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No _____Yes __X_____
Cause and herd name: Lung worm related pneumonia - Sheep Creek herd near Flaming Gorge

Last 25 years? No Other than above ___Yes _____

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Regular census of bighorn populations by helicopter is the principle method used to detect disease. Changes in population trends and productivity are used as possible disease indicators. Bighorn populations are also periodically blood tested during capture projects to detect changes in disease exposure. Fecal analysis is conducted in areas of suspected lung worm.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Grazing by domestic sheep near some bighorn populations.

B. Habitat degradation due to vegetation changes and human disturbance.

C. Loss of habitat due to increased development.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Population management such as capture and survey work has continued in wilderness study areas. Habitat improvement especially water developments have been limited in some WSAs. Potential designation of millions of acres as wilderness areas may impact sheep populations if management practices are not allowed to continue.

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

Very few Rocky Mountain bighorns existed in Utah 25 years ago.

Last 5 years, with estimated mortality rate (%)

A net gun fired from a helicopter is the main method currently used to capture bighorns. Mortality rate is less than 5%. Darting with immobilizing drugs is occasionally used with minimal mortality.

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Disease
B. Predation
C. Human disturbance
D. Loss of habitat

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **WASHINGTON**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____**RMBS** __**X**__Desert____
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1. **ESTIMATED POPULATION** size: 1988 __235__ 1998__200__

2. **HARVEST**

Resident permits	1988__2__	1998__0__
Non-Resident permits	1988__0__	1998__0__
Total Permits	1988__2__	1998__0__
No. Killed	1988__1__	1998__0__

Record B&C Score and year killed: __198 pts.__ 1989

What is the dominant harvest strategy in your state/province for hunting wild sheep?

We have limited permits (none for rocky mountain bighorns currently) but any ram harvest strategy when permits are available.

3. **PREDATION**. What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

Predation impacts vary by herd. Most of our bighorn herds are limited to small populations that could be impacted by the loss of just a few individuals to predation. We do not have scientific studies documenting predation impacts but anecdotal reports. Biologist in the Hall Mountain area report cougar predation is likely limiting population size.

Do you control predators to benefit sheep? If so, how?

We do not control predators to benefit any ungulate population.

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No _____Yes __X__

Cause and herd name: Pasturella - Black Butte (1995-96)

Cause and herd name: Pasturella - Wenaha-Tucannon (1995-96)

Cause and herd name: Pasturella - Mt. View (1995-96)

Last 25 years? No __0__ Yes _____

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

We have an annual herd health testing program at Hall Mountain. Dr. Bill Foreyt and his veterinarian students have been monitoring herd health of this population every December for about 20 years. We also do disease screening when animals are captured for transplant or when sick or freshly killed animals are made available.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Domestic sheep grazing on public lands.

B. Noxious weed control

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations? NO

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

A. Drop Net mortality ?

Last 5 years, with estimated mortality rate (%)

A. Drop Net mortality less than 5%.

B. Net Gun mortality less than 5%.

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Adequate escape terrain

B. Domestic sheep

C. Severe winter weather

D. Predation

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **WYOMING**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____ **RMBS** **X** Desert____
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1. **ESTIMATED POPULATION size:** (post-season) 1988 **6,800** 1998 **6,700**
(includes Yellowstone National Park)____

2. **HARVEST**

Resident permits	1988 **273**	1998 **186**
Non-Resident permits	1988 **91***	1998 **66*** (Includes 5 governor's licenses)
Total Permits	1988 **364***	1998 **252*** (Includes 5 governor's licenses)
No. Killed	1988 **218***	1998 **183*** (Includes governor's license harvest)____

Record B&C Score and year killed: **200-0/8 in 1883**____

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)
--8 hunt areas with ≥3/4-curl ram regulation
--5 hunt areas (including 3 largest hunt areas in state) with any ram regulation; increasing use of this strategy
--1 hunt area with any sheep regulation
--6 hunt areas currently closed

3. **PREDATION.** What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.
--predation documented in almost every herd, but effect of predation not well established
--mountain lion predation (especially on lambs) suggested as one factor in keeping herds from building after transplant (e.g., Shell Canyon, Laramie Peak) or rebounding after dieoff (e.g., Whiskey Basin herd still depressed after winter 1990-91 pneumonia dieoff); most problematic where vegetative encroachment has affected high-visibility habitats, primarily due to fire suppression
--wolf expansion around Yellowstone National Park may directly affect large herds in Absaroka, Teton, Wind River, Gros Ventre Mountains, with most likely effect being reduced bighorn use of currently-utilized habitats furthest away from escape terrain

Do you control predators to benefit sheep? If so, how?
--generally no; prophylactic predator control work has been used in the past and is anticipated in advance of planned transplants (e.g., Sweetwater Rocks); contracted with APHIS/Wildlife Services

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No _____Yes ___X_____

Cause and herd name: winter 1990-91 pneumonia dieoff continues to affect Whiskey Basin herd

Last 25 years? No _____Yes ___X_____
Cause and herd name: winter 1990-91 pneumonia dieoff; ~1/3 (N=400) of Whiskey Basin herd died
Cause and herd name: winter 1981-82 *Chlamydia* (pinkeye) dieoff in northern Yellowstone NP
Cause and herd name: scabies, lungworm, other disease problems in various herds around state

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

--necropsy all recovered sheep mortalities at the Wyoming State Veterinary Laboratory
--blood drawn for serum bank/various analyses done at WGFD and Wyoming State Vet Labs
--ear swabs for scabies (*Psoroptes* spp.) mites
--tonsillar/pharyngeal swabs for *Pasteurella*
--occasionally, vaginal swabs taken for *Campylobacter* (none found)

5. **STATE-FEDERAL RELATIONSHIPS.** What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. differential ability to implement needed habitat improvement treatments (e.g., prescribed fire) on federal lands in various parts of the state; especially problematic in designated wilderness areas; situation is improving, though

B. proposed transplants/augmentation/reintroductions have been hindered due to federal agency involvement and adverse public reaction to that involvement; transplants should be unilateral responsibility of state wildlife agency; federal agency(ies) should be in a support role but not decision-making role on transplant actions

C. bighorn sheep viewed as high-priority species by state wildlife agency, but not as high priority for federal agencies; federal budgets/staffing don't allow emphasis on bighorn sheep

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

--positive in terms of limiting development/activities (e.g., snowmachines, oil/gas exploration, housing/subdivisions)
--somewhat negative in terms of localized, heavy recreational activity (e.g., Grand Teton National Park, Wind River Mountains) attracted to designated wilderness areas
--negative in terms of implementing needed habitat treatments (e.g., prescribed fire, noxious weed control) in designated wilderness; situation improving, though; many spring/summer/fall habitats inside designated wilderness, with corresponding winter ranges often outside

6. **CAPTURE-TRANSPLANT TECHNIQUES.** What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

A. since 1975, drop-net exclusively used at Whiskey Basin winter range (source herd for in- and out-of-state transplants); ~1,900 sheep trapped since 1949; mortality averages <1%

Last 5 years, with estimated mortality rate (%)

A. drop-net used at Whiskey Basin, although trapping has only occurred once (i.e., 1995) in past 5 years due to depressed population status following 1990-91 dieoff; mortality <1%

B. net-gun has been technique of choice in past 10+ years everywhere else in state where sheep have been captured; mortality <5%

C. chemical immobilization still occasionally occurs, depending on circumstances and project needs; mortality ~5%

7. **SIGNIFICANT LIMITING FACTORS.** What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. conifer encroachment and decreasing visibility in many low-elevation and subalpine habitats, primarily due to historic fire suppression on national forest lands

B. in many transplanted herds, a combination of poor habitat conditions, varying inability to implement needed habitat treatments, known/suspected interaction with domestic sheep, and starting with too few sheep all contribute to poor transplant success

C. depressed population status at Whiskey Basin (which has been the source herd in Wyoming for in-state transplants/augmentations) has limited our ability to supplement struggling herds; another possible source herd (i.e., South Fork Shoshone River) has had scabies present in 1/4 to 1/3 of herd over the past 15+ years

D. unknown effect of predation (e.g., mountain lion) on lamb survival in native (e.g., Whiskey Basin), transplanted (e.g., Shell Canyon, Laramie Peak), and proposed (e.g., Sweetwater Rocks) herds; wolf expansion around YNP may affect habitat selection/use in large, native herds in NW Wyoming

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **BRITISH COLUMBIA**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ **CABS** _x_ RMBS ____ Desert____
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1. **ESTIMATED POPULATION** size: 1988 3200-3500 1998 4500-5000

2. **HARVEST** (AAH = Annual Allowable Harvest)

Resident permits	1988 84	1998 165
Non-Resident permits	1988	1998 ~ 20% of the AAH is allocated to Non-Res
Total Permits	1988	1998
No. Killed	1988 105	1998 49

Record B&C Score and year killed: _____

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)
Both general open (full-curl) and limited entry hunting (any ram, at least ¾ curl and ewe or lamb) seasons are offered.

3. **PREDATION**. What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

Hebert and Harrison (1998) studying CABS in the Junction herd concluded that coyote predation and range condition, nutrition, stress, parasites, disease or climate resulted in a significant loss of lambs as reflected in a decline in the seasonal lamb:ewe ratios from the late 1970s. Harrison and Hebert (1988) determined that cougar predation and not habitat condition or illegal hunting reduced the number and proportion of mature rams in the Junction herd. Evidence was obtained which supported the hypothesis that scavenging of cougar kills by coyotes increased the frequency of predation by cougar.

Do you control predators to benefit sheep? If so, how? No real control outside of liberal hunting and trapping seasons for predators.

4. **DISEASE.** Have you had a disease die-off.
There are no records of an all-age die-off of California bighorn sheep ever having occurred in BC. However, reductions of over all numbers and ewe:lamb ratios have occurred in the past in some populations, without reports of sick animals. Markedly increased summer lamb mortality/poor lamb survival has been noted over the past several years in specific sheep herds. Investigations have identified heavy lungworm loads in 6 - 8 week old lambs as well as bacterial pneumonia in some. Lamb losses appear to be less in the 1998 season.

Last 5 years? No _____Yes ___x____
Cause and herd name: pneumonia in lambs: Junction, Churn and West Fraser herds

Last 25 years? No _____Yes ___x____
Cause and herd name:

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?
All radio-collared mortalities are necropsied by wildlife veterinarian when possible. Over past two years helicopter census work has identified time of lamb losses and weak or sick lambs at that time were killed for necropsies. This work is still in preliminary stages.

All live captured sheep are bled to archive serum and genetic samples. Any animals captured for re-locations are sampled according to WWHC protocol.

5. **STATE-FEDERAL RELATIONSHIPS.** What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

This is not directly applicable as British Columbia has jurisdiction over its land and natural resources and 94.5% of the Province is Provincial Crown Land.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

British Columbia is nearing the end of a ten year process to double the amount of provincial Protected Areas from 6% to 12% of the land base. Protection of wilderness areas and control of access is seen as a positive effect, providing that increased use by the recreating public is managed within the limits of acceptable change and does not negatively impact mountain sheep populations.

6. **CAPTURE-TRANSPLANT TECHNIQUES.** What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%), Likely much higher then, but no solid records available.

A. Drive-net
B. Drop-net
Last 5 years, with estimated mortality rate (%) 0 to 4 %, depending on project, ave. probably 1 -2 %

A. Net-gun
B. Drop-net
C. Drive-net

7. **SIGNIFICANT LIMITING FACTORS.** What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Habitat Alienation (residential developments, access and highway developments, industrial developments, agricultural developments and recreational developments and activities).

B. Fire suppression and conifer forest encroachment on grassland ranges.

C. Potential disease transmission from domestic sheep

D. Competition for forage on critical winter ranges with domestic livestock; mainly cattle on Provincial Crown lands and horses on Indian Reservations.

E. Unmanaged predator populations which fluctuate widely over the long term.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **CALIFORNIA**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ **CABS __X*__** RMBS ____ **Desert_X__**

*Note that CABS in California (Sierra Nevada) have been found to unique (Genetically and morphometrically) from CABS in BC. While they are distinct and may merit their own subspecies designation, they are more closely aligned with the desert races of bighorn sheep. Therefore, their status will be included in this status report of desert bighorn sheep.

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1. **ESTIMATED POPULATION** size: 1988 __4700__ 1998 __3500__

2. **HARVEST**

Resident permits	1988 8	1998 9
Non-Resident permits	1988 0	1998 0
Fundraising permits	1988 1	1998 1
Total Permits	1988 9	1998 10
No. Killed	1988 7	1998 9

*Non-resident applicants are entered into the drawing with resident applicants. However, state law specifies that no more than 15% of the tags awarded may go to non-residents. Less than 5% of those that apply for drawing are non-residents.

Record B&C Score and year killed: 182 0/8 - this is the official CDFG score w/ deductions

What is the dominant harvest strategy in your state/province for hunting wild sheep?

Hunting Desert (Nelson) bighorn sheep began in 1987 with only two hunt zones (Marble Mountains and Old Dad Peak/Kelso Mountains) in San Bernardino County open for hunting. Currently, California has five zones open for hunting desert bighorn sheep. These are the Marble Mountains (Zone 1), Old Dad Peak/Kelso Mountains (Zone 2), the Clark/Kingston/Mesquite Mountain Ranges (Zone 3) of San Bernardino County, and the Orocopia Mountains (Zone 4) and San Gorgonio Wilderness (Zone 5) of Riverside County. One to two fund-raising tags, that are valid in any hunt zone (open zone tag), are auctioned each year to fund bighorn sheep conservation efforts.

The current stratgey is trophy ram hunting. A legal ram is defined as having at least one horn, the tip of which extends beyond in a straight line beginning at the front (anterior) edge of the horn base, and extending downward through the rear (posterior) edge of the visible portion of the eye and continuing

downward through the horn. These reference points are based on viewing the ram directly from a 90 degree angle from which the head is facing.

State law specifies that ram tags cannot exceed more than 15% of the number of adult rams estimated to be available in the population. Generally, we determine these tags as 15% of adult rams seen during helicopter surevys to ensure that we are in compliance with this law. This allocation usually results in tags being allocated for 3 to 8% of the adult rams estimated to be in the respective population.

Hunter success has been 88% overall (since 1988).

3. **PREDATION**. What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

Predation varies tremendously in desert sheep populations. Specifically, mountain lion predation appears to be very effective at limiting the recovery of small populations, including reintroductions. Mountain lion activity in California has increased dramatically since a moratorium on mountain lion hunting was established in 1972. Lion activity increased most dramatically in the late 1980's and peaked in 1995, and was defined by historically high reports of depredation (lions killing livestock or pets), human attacks, and predation (bighorn sheep and deer) problems. During this time, there are several circumstances where traditional theory of predator/prey relationships have come into question, with some scientists suggesting that mountain lion predation may be much more capable of influencing prey population trends than previously believed. Reestablishing bighorn sheep populations in areas where deer and mountain lions are present is problematic.

Populations that appear to have declined significantly under high levels of predation include:

Native:
1)San Gabriel sheep population (Nelson)
2)Peninsular Ranges sheep population (Peninsular)
3)Bighorn sheep in the Sierra Nevada - 2 herds (California)
4)Granite Mountains (Nelson)
5)San Gorgonio Mountains (Nelson)

Transplants that failed, most likely due to high mountain lion predation:
1)San Rafael Peak (Nelson)
2)Prarie Fork (Nelson)

Transplant that almost failed, but was recovered by selective mountain lion control (prior to 1990 mountain lion initiative):
1)Lee Vining Canyon

Do you control predators to benefit sheep? If so, how?

No. Since 1990 the California Department of Fish and Game does not have the authority to remove mountain lions to protect sensitive wildlife populations. This was the result of a ballot initiative (Proposition 117) that limited the Departments authority to manage mountain lions.

4. DISEASE. Have you had a disease die-off in the last 5 years? No ___X___ Yes _____

Last 25 years? No _____ Yes ___X_____
Cause and herd name: Pneumonia after contact with domestic sheep. Complete die-off of captive herd. Lava Beds National Monument. 1980
Cause and herd name: Pneumonia after contact with domestic sheep. Complete die-off of population. Warner Mountains. 1988
Cause and herd name: Pneumonia type disease. Dramatic population decline in the Peninsular Ranges desert sheep metapopulation. Late 1970's

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

The Deparetment screens for exposure to various pathogens by collecting a blood samples from all captured animals. These samples are submitted for a serological panel of tests. The blood samples and results are stored at the Departments Wildlife Investigations Laboratory in Rancho Cordova.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Interagency cooperation for the recovery of bighorn sheep in the Peninsular Ranges. Currently the Department is cooperating with the USFWS, BLM, US Forest Service, California State Parks, the University of California (Riverside and Davis), and Bighorn Institute in the completion of a metapopulation recovery plan. This bighorn sheep metapopulation is federally listed as endangered. Development pressures in the northern part of the Peninsular Ranges threaten bighorn sheep habitat.

B. Interagency cooperation for the recovery of bighorn sheep in the Sierra Nevada. Currently the Department is cooperating with the USFWS, National Park Service, US Forest Service, BLM, University of California White Mountain Research Station, and the Sierra Nevada Bighorn Sheep Foundation in the implementation of a recovery strategy. These bighorn sheep have been state up-listed to endangered, and are being federally listed as endangered under an emergency provision of USFWS. Mountain lion predation appears to have singularly limited population increases in the 5 remaining herds, and as few as 100 adult animals remain. Plans are being made to establish a captive herd in 2000.

C. In 1994 the California Desert Protection Act designated most of California's deserts as wilderness. This lead to conflict between the Department and the National Park Service and BLM in issues related to access for conservation and research projects, and jeopardized the Department's ability to monitor important bighorn sheep populations. Additionally, the maintenance, development, and restoration of

water sites was inhibited by access restrictions. Traditional volunteer organizations in California such as the Society for the Conservation of Bighorn Sheep and Desert Wildlife Unlimited were frustrated with lack of land agency support, and this ultimatley threatened volunteer assistance. Recently, the California Department of Fish and Game and BLM have developed and signed an MOU that attempts to address the issues of access, and guzzler maintenance and development. This agreement will hopefully lessen misunderstandings related to wildlife management projects on designated wilderness lands.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

See C. above. Likely to result in negative impacts on sheep populations.

6. **CAPTURE-TRANSPLANT TECHNIQUES.** What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

A. Drive net and dart gun - 5 to 10% mortality

Last 5 years, with estimated mortality rate (%)

A. Net gun - less than 2% mortality

7. **SIGNIFICANT LIMITING FACTORS.** What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Climatic conditions influencing forage conditions and water availability

B. Mountain lion predation

C. Habitat loss and associated human activity (northern Peninsular Ranges)

D. Lack of wildfires in bighorn sheep habitat (particularly San Gabriel herd)

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **IDAHO**
Subspecies (one questionnaire/subspecies): Dall's ____ Stone's ____ **CABS** __X__ **RMBS** __X__ Desert____
Fax:
Contact Person:
Full Address: Idaho Fish and Game, 600 S. Walnut/Box 25, Boise, Idaho 83707-0025
Phone:
e-mail:

1. ESTIMATED POPULATION size: 1988 ____?____ 1998____?____ (No data given)

2. HARVEST

Resident permits	1988 46(RM) - 22(CA)	1998 51(RM) - 38(CA)
Non-Resident permits	1988 22(RM) - 0(CA)	1998 13(RM) - 7(CA)
Total Permits	1988 168(RM) - 22(CA)	1998 64(RM) - 45(CA)
No. Killed	1988 62(RM) - 14(CA)	1998 36(RM) - 30(CA)

Record B&C Score and year killed: RM - 197-7/8 (1996) CA - 174-4/8 (1997)

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Trophy - 3/4 curl or 4 + years of age

3. PREDATION. What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

None known or suspected of being a problem

Do you control predators to benefit sheep? If so, how?

No

4. DISEASE. Have you had a disease die-off in the last 5 years? No __X__ Yes ____
No all-age die-off, lamb die-off only.

Cause and herd name:

Last 25 years? No ____ Yes __X__

Cause and Herd Name: All pneumonia caused die-offs: Upper Hells Canyon 1983, 1991; Panther Creek, Morgan Creek, East Fork, Lost River Range, and west Middle Fork, Camas Creek.

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Monitor herd population characteristics and size

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Regulation of domestic sheep allotments

B. Grazing by domestic livestock

C. Helicopter use in Wilderness areas

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)
A. Darting - 10-15%
B. Drop-net - <1%
C. Net gun - <1%

Last 5 years, with estimated mortality rate (%)
A. Drop net - <1%
B. Net gun - <1%

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Management program

B. Disease/ Dieoffs

C. Availability of habitat

D. Availability of transplant stock

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **NEVADA**
Subspecies (one questionnaire/subspecies): Dall's ____ Stone's ____ **CABS** __X__ RMBS ____ Desert____
Fax: 775-423-8171
Contact Person: Craig Mortimore
Full Address: Nevada Divison of Wildlife, 380 West B Street, Fallon, NV 89406
Phone: 775-423-3171 x 225
e-mail: ndowr1@oasisol.com

1. **ESTIMATED POPULATION** size: 1988 __564__ 1998 __1248__

2. **HARVEST**

Resident permits	1988 __4__	1998 __37 + 1 Partners in Wildlife__
Non-Resident permits	1988 __0__	1998 __3__
Total Permits	1988 __4__	1998 __41__
No. Killed	1988 __3 (100%)__	1998 __33 (80.5%)__

Record B&C Score and year killed: __175-2/8 in 1997__

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Harvest: 8% of rams 1 year old+, based upon population models.
No age or size restrictions

3. **PREDATION**. What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

No impact, although one herd has changed distribution

Do you control predators to benefit sheep? If so, how? NO

4. **DISEASE**. Have you had a disease die-off in the last 5 years? No __X__ Yes _____
Cause and herd name:
Cause and herd name:

Last 25 years? No __X__ Yes _____

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Animals are briefly examined during annual composition surveys for obvious physical signs of disease. All captured animals are examined for physical evidence of disease and provided w/a panel of prophylactic drugs. Throat and nasal swabs used to be taken; however, our arrangement w/Dr. Hunter ended.

5. **STATE-FEDERAL RELATIONSHIPS.** What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

NDOW has good relationships with USFS, USFWS, and BLM

A. Commission policy prevents NDOW from releasing any bighorns onto Mtn. Ranges that have active domestic sheep permits

B. Domestic sheep trailing

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Not California BHS

6. **CAPTURE-TRANSPLANT TECHNIQUES.** What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

A. Drop net (< 5%)

B. Linear entanglement net (< 5%)

Last 5 years, with estimated mortality rate (%)

A. Net gun exclusively (5%)

7. **SIGNIFICANT LIMITING FACTORS.** What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Some type conversions due to wildfire

B. Public desire for limited harvest of mature rams (the "quality" experience) limits the harvest potential that individual herds have.

C. We have concerns about increasing densities becoming vulnerable to environmental factors. Our response has been to reduce densities through translocation; however, we are coming close to full re-establishment on a geographical scale.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **NORTH DAKOTA**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ **CABS X** RMBS ____ Desert____
Contact Person: Mike Oehler
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Phone: 701-227-7431
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1. ESTIMATED POPULATION size: 1988 200 1998 150

2. HARVEST

Resident permits	1988 7[A]	1998 7
Non-Resident permits	1988 0	1998 0
Total Permits	1988 8	1998 8
No. Killed	1988 8	1998 7

[A]An additional permit was auctioned at FNAWS (total of 8 both years).

Record B&C Score and year killed: 166 5/8 - 1987

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Maximizing hunter opportunity (current regulations allow harvest of any ram).

3. PREDATION. What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

The effects of predation on mountain sheep in ND has not specifically been evaluated. There have been incidental observations of sheep/coyote interactions by researchers doing other sheep research; however, predation was not the focal topic of their study. When discussing this matter with other biologists (i.e., Bill Jensen and Roger Johnson), there is a consensus among ourselves that predation is likely a problem for our sheep herds, and that it is an issue we would like to address in the future. In the past, we have had a pretty healthy coyote population in our sheep range (evidenced by the relatively high rate of sheep/coyote interactions), and it is likely that predation has affected recruitment in our herds. Recently, however, coyotes have declined in much of North Dakota as a result of mange, thus, the potential exists for sheep populations to experience higher rates of recruitment until coyote populations rebuild. I would like to reiterate that the effects of predation on sheep have not been evaluated in ND, nor has the current status of coyotes in habitats inhabited by sheep.

Do you control predators to benefit sheep? If so, how?

NDGF does not control coyotes for the benefit of bighorn sheep; however, Animal Damage Control does have an active predator control program that is aimed at reducing predation on livestock (based on complaints from ranchers). Because most of our sheep herds exist in areas that also are ranched, it is likely that sheep experience reduced predation as a result of the efforts of ADC. Again, population dynamics of coyotes in our sheep ranges are not known, and I have not seen data from ADC regarding coyote harvest from those areas inhabited by sheep.

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No _____Yes __X__
Cause and herd name:

We just recently (between January 1998 and January 1999) lost ca. 30 sheep from the South Bullion herd (South of Medora, ND). Skeletal remains are all that were discovered in the area, thus, cause of death is unknown at this time.
Cause and herd name:

Last 25 years? No _____Yes __X____
Cause and herd name: Lone Butte herd, cause unknown (all-age die-off).
Cause and herd name:

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

When mountain sheep are handled, every attempt is made to sample blood for serology. From 1980 to 1995, the Department treated bighorn sheep with fendbendazole (mixed with apple pulp) at various sites within sheep range; the efficacy of that treatment regimen is being evaluated. Additionally, sheep that have been trapped for transplant to other areas in the Badlands have been given intramuscular injections of Ivermectin (lungworm), vitamin E and selenium (capture-related stress), and longicil (infections). In addition to monitoring health of our herds during captures and other related activities, our herds also are monitored by a field technician during autumn months.

5. **STATE-FEDERAL RELATIONSHIPS.** What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. In the past, EISs have not been completed in a timely manner, thus, our ability to re-establish new herds in suitable habitats, in a timely manner, has been greatly hindered.

B. Much to our chagrin, there are federal agencies who continue to consider using domestic sheep and goats as a method for controlling noxious weeds in areas in and around our sheep herds.

C. Policies regulating use of federal lands (e.g., grazing, mineral extraction, etc.).

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Presently, we have no designated wilderness areas in our sheep range. If we did, however, I don't

think they would adversely affect our sheep herds. In fact, wilderness areas would likely limit activities such as grazing and mineral development (which would reduce disturbance, etc....), and consequently, would probably benefit our herds. To be designated as a wilderness area usually requires that a tract of land be quite large; unfortunately, as I pointed out earlier, much of our range is quite fragmented. Therefore, it is unlikely that wilderness areas within mountain sheep range will ever be a reality.

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)
A. Drop-net: handled ca. 150 sheep with about 5 % mortality.
B. Net-gun: 20-25 animals, with 4 animals dying from capture myopathy.
C. Drive-net: 4 animals handled, 100% mortality.

Last 5 years, with estimated mortality rate (%)
A. Drop-net: 28 sheep handled, no mortality.
B. Net-gun: not used.
C. Drive-net: not used.

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Recruitment of lambs into the adult population is probably the most important factor limiting our populations (go figure, huh). This is probably a result of several factors; however, the scarcity of good lambing habitat and escape terrain is likely the ultimate cause. The habitat is quite fragmented to begin with (i.e., there are no large contiguous blocks of land that have not been impacted by man - grazing oil development, etc.), and as such, the remaining sheep habitat consists of small "islands" that are not well connected. The range of sheep in ND is a mosaic of land ownership (private, USFS, ND school lands, and some BLM), so it can prove challenging to reduce further fragmentation of sheep habitats. I probably listed more than three limiting factors there, but I think most of the problems with any sheep population that is considered "unsuccessful" (or any population for that matter) is recruitment. I want to reiterate that point because most limiting factors ultimately can be reduced to that single HUGE factor; when recruitment is poor, sheep populations do poorly (be it trophy ram production, viewing pleasure, etc.).

B. Disease is a problem that we have to monitor more closely, as is evidenced by our recent loss of a herd of sheep.

C. As I stated in an earlier answer, I think predation could be important, and it too needs to be addressed with further study.

D. Pick one from my long and lengthy "first" answer.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **OREGON - CABS**
Contact Person: Don Whittaker
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Portland, OR 97207
(503) 872-5260 Voice (503) 872-5269 Fax
don.whittaker@state.or.us

1. ESTIMATED POPULATION:

1988 >1200 1998 2544

2. HARVEST

Resident permits	1988	37	1998	52
Non-Resident permits	1988	3	1998	3
Total Permits	1988	40	1998	42
No. Killed	1988	41	1998	55

Record B&C Score and year killed 184 7.8 in 1997

What is the dominant harvest strategy in your state/province for hunting wild sheep?
Conservative management for quality experience, using limited entry controlled hunts and any ram bag limit.

3. PREDATION. What impact does predation have on your sheep populations?
Mountain lion predation is suspected of causing some local population declines and may be depressing growth rates in other local populations.

Do you control predators to benefit sheep? If so, how?
No active predator control but hunters are encouraged to hunt mountain lions with liberal seasons and reduced tag fees.

4. DISEASE. Have you had a disease die-off in the last 5 years? NO

Last 25 Years? YES
Pasteurella, Aldrich herd, 1991
Suspected *Pasteurella*, Canyon Mountains herd, 1984.

What do you do to detect, manage and/or prevent disease?

a. Disease screening when animals are captured for any reason.
b. All animals handled vaccinated with anthelmentics and broad spectrum antibiotic.
c. Medicated salt blocks.
d. Regular aerial population surveys with frequent ground observation to monitor health.
e. Cooperative domestic livestock management, avoid domestic sheep.

5. **STATE–FEDERAL RELATIONSHIPS**. What are the 3 biggest challenges?
   a. Regulatory processes for re-introductions and water development.
   b. Domestic sheep allotment management.

Has the designation of wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Not a significant factor in Oregon's California bighorn ranges.

6. **CAPTURE–TRANSPLANT TECHNIQUES**. What are the 3 primary techniques used?

25 Years ago with estimated mortality rate?
   a. Corral trap, up to 10% mortality.
   b. Drive nets, no estimate of mortality.

Last 5 years?
   a. Helicopter netgun, 3% mortality.

7. **SIGNIFICANT LIMITING FACTORS**. What are the most significant factors limiting sheep popualtions?
   a. Habitat availability.
   b. Domestic and exotic sheep management.
   c. Fragmented land ownership patterns and the relationship with domestic livestock.
   d. Predators, at least locally.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **UTAH**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ **CABS** __X__ RMBS ____ Desert____
Contact Person: Jim Karpowitz
Full Address: 2549 South 660 West Price, Utah 84501
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Fax: (801) 538-4709
e-mail: jkarpowi@state.ut.us

1. ESTIMATED POPULATION size: 1988 ___0___ 1998 __45__

2. HARVEST

Resident permits	1988 __0__	1998 __0__
Non-Resident permits	1988 __0__	1998 __0__
Total Permits	1988 __0__	1998 __0__
No. Killed	1988 __0__	1998 __0__

Record B&C Score and year killed: _____

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

California bighorns are not currently hunted in Utah

3. PREDATION. What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

Predation is an unknown factor in Utah's only California bighorn population on Antelope Island.

Do you control predators to benefit sheep? If so, how?

No

4. DISEASE. Have you had a disease die-off in the last 5 years? No __X__ Yes _____

Last 25 years? No __X__ Yes _____

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Regular census of bighorn populations is the principle method used to detect disease. Changes in population trends and productivity are used as possible disease indicators. Bighorn populations are also periodically blood tested during capture projects to detect changes in disease exposure. Fecal analysis is conducted in areas of suspected lung worm.

5. **STATE-FEDERAL RELATIONSHIPS.** What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

California bighorn sheep are currently found only on Antelope Island which is a state owned park. There is a good working relationship with the Utah Division of Parks and Recreation.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Wilderness is not an issue on Antelope Island. It may become an issue in future transplant sites.

6. **CAPTURE-TRANSPLANT TECHNIQUES.** What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

California bighorns did not exist in Utah 25 years ago.

Last 5 years, with estimated mortality rate (%)

A net gun fired from a helicopter is the main method currently used to capture California bighorns. Mortality rate is less than 5%.

7. **SIGNIFICANT LIMITING FACTORS.** What are the most significant factors that limit the success of your sheep populations? These may répeat answers to previous questions.

A. Quantity and quality of habitat
B. Human disturbance
C. Possible predation
D. Possible disease

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **WASHINGTON**
Subspecies: (1 questionnaire/subspecies): Dall's ____ Stone's ____ **CABS** __X__ RMBS ____ Desert____
Contact Person: George Tsukamoto
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Phone: (360) 902-2367
Fax: (360) 902-2162
e-mail: tsukagkt@dfw.wa.gov

1. **ESTIMATED POPULATION size:** 1988 460 1998 730

2. **HARVEST**

Resident permits	1988 9	1998 12 (includes raffle & auction)
Non-Resident permits	1988 0	1998 1
Total Permits	1988 9	1998 0
No. Killed	1988 8	1998 13

Record B&C Score and year killed: No records kept

What is the dominant harvest strategy in your state/province for hunting wild sheep?

We have limited permits for any ram harvest strategy.

3. **PREDATION**. What impact does predation have on your sheep populations?

Predation impacts vary by herd. Most of our bighorn herds are limited to small populations that could be impacted by the loss of just a few individuals to predation. We do not have scientific studies documenting predation impacts but anecdotal reports. In the Tucannon area we had very high coyote populations in lambing areas. Lamb survival plummeted to near zero. A coyote control program was initiated in the lambing areas and lamb survival went to 100% the following year. A few years later, lamb survival dropped again. Cougar have been seen in the lambing area and our local biologist believes cougar are impacting lamb survival.

Do you control predators to benefit sheep? If so, how?

We do not now control predators.

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No __X__ Yes

Last 25 years? No _____ Yes __X__
Cause and herd name: Scabies - Cottonwood creek 60% die-off

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

We do disease screening when animals are captured for transplant or when sick or freshly killed animals are made available. We also collect fecal pellets from bighorn herds suspected of parasite disease problems.

5. **STATE-FEDERAL RELATIONSHIPS.** What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Domestic sheep grazing on public lands.

B. Noxious weed control

C. Tribal hunting of bighorns

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations? NO

6. **CAPTURE-TRANSPLANT TECHNIQUES.** What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

A. Corral trap 10% mortality

B. Drop Net 10% mortality

Last 5 years, with estimated mortality rate (%)

A. Drop Net mortality less than 5%.

B. Net Gun mortality less than 5%.

7. **SIGNIFICANT LIMITING FACTORS.** What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Adequate escape terrain and winter range with quality forage.

B. Domestic sheep

C. Severe winter weather

D. Predation

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **ARIZONA**
Subspecies (1 questionnaire/subspecies): **Desert _X___**
Contact Person: Raymond Lee
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1. ESTIMATED POPULATION size: 1988 - 4500 1998 - 6500

2. HARVEST

Resident permits	1988 - 71	1998 - 99
Non-Resident permits	1988 - 7	1998 - 10
Total Permits	1988 - 78*	1998 -109*
No. Killed	1988 - 75	1998 - 98

Record B&C Score and year killed: 197 1/8 (1988)

*All permits are available to residents - no more than 10% of the total permits are available to non-residents.

What is the dominant harvest strategy in your state/province for hunting wild sheep?

Provide hunter recreation that stresses the quality of the hunting experience and harvest of older age class rams. The legal animal is any ram.

3. PREDATION. What impact does predation have on your sheep populations?

Predation has been blamed for the failure of three transplants (Black Mountain, Lion Mountain and the Superstitions). While predation is not usually a causitive factor in the decline of ungulate population levels in the Southwest, with the very small number of animals in a typical release, predation can adversely impact the success of a transplant.

Do you control predators to benefit sheep?

The Arizona Game & Fish Department does not control predators to benefit bighorn sheep. In 1999, the Department will initiate a management action in a select area to remove mountain lions and determine the subsequent effect upon a bighorn sheep population.

4. DISEASE. Have you had a disease die-off in the last 5 years? No X

Last 25 years? No X

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Bighorn sheep populations are tested during capture projects to determine titers to common livestock diseases.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Joint jurisdictional differences of opinion, particularly on military ranges and USFW National Wildlife Refuges.

B. Non-compatible domestic sheep grazing practices on BLM and USFS lands.

C. Designated wilderness areas affect management and utilization activities.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Designation of wilderness areas has required altering routine management activities.
Wilderness areas, over the long term, will probably have positive impacts on sheep populations.

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

A. Helicopter/ground drug darting (20%)

Last 5 years, with estimated mortality rate (%)

A. Drop-net (<1%)

B. Net-gun (<2%)

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Loss of habitat.

B. Fragmentation of habitat.

C. Human disturbance.

D. Adverse climatic conditions.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **CALIFORNIA**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ **CABS X*** RMBS ____ **Desert X**

*Note that CABS in California (Sierra Nevada) have been found to unique (Genetically and morphometrically) from CABS in BC. While they are distinct and may merit their own subspecies designation, they are more closely aligned with the desert races of bighorn sheep. Therefore, their status will be included in this status report of desert bighorn sheep.

Contact Person: Steven G. Torres
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Fax:(916)653-1019
e-mail:Internet:73430.207@compuserve.com

1. ESTIMATED POPULATION size: 1988 4700 1998 3500

2. HARVEST

Resident permits	1988 8	1998 9
Non-Resident permits	1988 0	1998 0
Fundraising permits	1988 1	1998 1
Total Permits	1988 9	1998 10
No. Killed	1988 7	1998 9

*Non-resident applicants are entered into the drawing with resident applicants. However, state law specifies that no more than 15% of the tags awarded may go to non-residents. Less than 5% of those that apply for drawing are non-residents.

Record B&C Score and year killed: 182 0/8 - this is the official CDFG score w/ deductions

What is the dominant harvest strategy in your state/province for hunting wild sheep?

Hunting Desert (Nelson) bighorn sheep began in 1987 with only two hunt zones (Marble Mountains and Old Dad Peak/Kelso Mountains) in San Bernardino County open for hunting. Currently, California has five zones open for hunting desert bighorn sheep. These are the Marble Mountains (Zone 1), Old Dad Peak/Kelso Mountains (Zone 2), the Clark/Kingston/Mesquite Mountain Ranges (Zone 3) of San Bernardino County, and the Orocopia Mountains (Zone 4) and San Gorgonio Wilderness (Zone 5) of Riverside County. One to two fund-raising tags, that are valid in any hunt zone (open zone tag), are auctioned each year to fund bighorn sheep conservation efforts.

The current stratgey is trophy ram hunting. A legal ram is defined as having at least one horn, the tip of which extends beyond in a straight line beginning at the front (anterior) edge of the horn base, and extending downward through the rear (posterior) edge of the visible portion of the eye and continuing

downward through the horn. These reference points are based on viewing the ram directly from a 90 degree angle from which the head is facing.

State law specifies that ram tags cannot exceed more than 15% of the number of adult rams estimated to be available in the population. Generally, we determine these tags as 15% of adult rams seen during helicopter surevys to ensure that we are in compliance with this law. This allocation usually results in tags being allocated for 3 to 8% of the adult rams estimated to be in the respective population.

Hunter success has been 88% overall (since 1988).

3. **PREDATION.** What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

Predation varies tremendously in desert sheep populations. Specifically, mountain lion predation appears to be very effective at limiting the recovery of small populations, including reintroductions. Mountain lion activity in California has increased dramatically since a moratorium on mountain lion hunting was established in 1972. Lion activity increased most dramatically in the late 1980's and peaked in 1995, and was defined by historically high reports of depredation (lions killing livestock or pets), human attacks, and predation (bighorn sheep and deer) problems. During this time, there are several circumstances where traditional theory of predator/prey relationships have come into question, with some scientists suggesting that mountain lion predation may be much more capable of influencing prey population trends than previously believed. Reestablishing bighorn sheep populations in areas where deer and mountain lions are present is problematic.

Populations that appear to have declined significantly under high levels of predation include:

Native:
1)San Gabriel sheep population (Nelson)
2)Peninsular Ranges sheep population (Peninsular)
3)Bighorn sheep in the Sierra Nevada - 2 herds (California)
4)Granite Mountains (Nelson)
5)San Gorgonio Mountains (Nelson)

Transplants that failed, most likely due to high mountain lion predation:
1)San Rafael Peak (Nelson)
2)Prarie Fork (Nelson)

Transplant that almost failed, but was recovered by selective mountain lion control (prior to 1990 mountain lion initiative):
1)Lee Vining Canyon

Do you control predators to benefit sheep? If so, how?

No. Since 1990 the California Department of Fish and Game does not have the authority to remove mountain lions to protect sensitive wildlife populations. This was the result of a ballot initiative (Proposition 117) that limited the Departments authority to manage mountain lions.

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No ___X___ Yes _____

Last 25 years? No _____ Yes ___X_____
Cause and herd name: Pneumonia after contact with domestic sheep. Complete die-off of captive herd. Lava Beds National Monument. 1980
Cause and herd name: Pneumonia after contact with domestic sheep. Complete die-off of population. Warner Mountains. 1988
Cause and herd name: Pneumonia type disease. Dramatic population decline in the Peninsular Ranges desert sheep metapopulation. Late 1970's

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

The Deparetment screens for exposure to various pathogens by collecting a blood samples from all captured animals. These samples are submitted for a serological panel of tests. The blood samples and results are stored at the Departments Wildlife Investigations Laboratory in Rancho Cordova.

5. **STATE-FEDERAL RELATIONSHIPS.** What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Interagency cooperation for the recovery of bighorn sheep in the Peninsular Ranges. Currently the Department is cooperating with the USFWS, BLM, US Forest Service, California State Parks, the University of California (Riverside and Davis), and Bighorn Institute in the completion of a metapopulation recovery plan. This bighorn sheep metapopulation is federally listed as endangered. Development pressures in the northern part of the Peninsular Ranges threaten bighorn sheep habitat.

B. Interagency cooperation for the recovery of bighorn sheep in the Sierra Nevada. Currently the Department is cooperating with the USFWS, National Park Service, US Forest Service, BLM, University of California White Mountain Research Station, and the Sierra Nevada Bighorn Sheep Foundation in the implementation of a recovery strategy. These bighorn sheep have been state up-listed to endangered, and are being federally listed as endangered under an emergency provision of USFWS. Mountain lion predation appears to have singularly limited population increases in the 5 remaining herds, and as few as 100 adult animals remain. Plans are being made to establish a captive herd in 2000.

C. In 1994 the California Desert Protection Act designated most of California's deserts as wilderness. This lead to conflict between the Department and the National Park Service and BLM in issues related to access for conservation and research projects, and jeopardized the Department's ability to monitor important bighorn sheep populations. Additionally, the maintenance, development, and restoration of

water sites was inhibited by access restrictions. Traditional volunteer organizations in California such as the Society for the Conservation of Bighorn Sheep and Desert Wildlife Unlimited were frustrated with lack of land agency support, and this ultimatley threatened volunteer assistance. Recently, the California Department of Fish and Game and BLM have developed and signed an MOU that attempts to address the issues of access, and guzzler maintenance and development. This agreement will hopefully lessen misunderstandings related to wildlife management projects on designated wilderness lands.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

See C. above. Likely to result in negative impacts on sheep populations.

6. **CAPTURE-TRANSPLANT TECHNIQUES.** What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

A. Drive net and dart gun - 5 to 10% mortality

Last 5 years, with estimated mortality rate (%)

A. Net gun - less than 2% mortality

7. **SIGNIFICANT LIMITING FACTORS.** What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Climatic conditions influencing forage conditions and water availability

B. Mountain lion predation

C. Habitat loss and associated human activity (northern Peninsular Ranges)

D. Lack of wildfires in bighorn sheep habitat (particularly San Gabriel herd)

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **COLORADO**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____RMBS ____**Desert X**___
Contact Person: John Ellenberger
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1. **ESTIMATED POPULATION size:** 1988 ~250 1998 460

2. **HARVEST**

Resident permits	1988 2	1998 6
Non-Resident permits	1988 0	1998 0
Total Permits	1988 2	1998 6
No. Killed	1988 2	1998 6

Record B&C Score and year killed: NA

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)
trophy ram with a half-curl or larger regulation

3. **PREDATION.** What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.
Mountain lions have been having an impact on some of our desert bighorn herds. One in particular, the Black Ridge herd seems to be suffering substantial mortality due to mountain lions.

Do you control predators to benefit sheep? If so, how?

We have been attempting to control predators with sport hunting. We haven't attempted to use APHIS or ADC to do additional control work to benefit sheep populations.

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No X Yes ____
Cause and herd name:
Cause and herd name:

Last 25 years? No X Yes ____
Cause and herd name:
Cause and herd name:

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?
The only thing we are doing for desert sheep at this time is conducting necropsies on all fresh carcasses to determine cause of death and disease agent if disease was cause of death.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. We are working with BLM to try and control human recreation in desert bighorn ranges. Currently mountain biking is very popular in the area and increased demand for more bike trails and riding opportunities is a potential problem for desert bighorn sheep management.

B. Disease management in the form of establishing and maintaining segregation of domestic sheep from desert bighorn sheep.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Designation of some areas as wilderness curtails some of our management activities, but we have been able to get waivers for management activities (helicopter use for net-gunning or translocation of sheep).

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

A. Desert bighorn sheep were first released in Colorado in 1979.

Last 5 years, with estimated mortality rate (%)

A. Net-gunning (<5%)

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. CDOW has designated a portion of western Colorado as desert bighorn sheep habitat. Any sheep translocated in this area will be the desert sub-species. As a result, we are limited by the small number of sites that can hold sheep in the area designated as desert sheep range.

B. Human population growth. As the states human population grows there are impacts on sheep habitat due to road building, housing development and outdoor recreation.

C. Controlling human outdoor recreation activities in areas that are important habitats or seasonal ranges for desert bighorn sheep.

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **NEVADA**
Subspecies (one questionnaire/subspecies): Dall's ___ Stone's ___ CABS ___ RMBS ___**Desert X**
Contact Person: Patrick Cummings and/or Craig Stevenson
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riiidowa@govmail.state.nv.us
Patrckc@aol.com (Patrick Cummings)
BIGHORNH20@AOL.COM (Craig Stevenson)

1. ESTIMATED POPULATION size: 1988 5,700 1998 5,300

2. HARVEST

Resident permits	1988 123	1998 100
Non-Resident permits	1988 13	1998 10
Total Permits	1988 138*	1998 115**
No. Killed	1988 114	1998 95

* includes auction tags **includes PIW tags and auction tags

Record B&C Score and year killed: 187 2/8 1982

What is the dominant harvest strategy in your state/province for hunting wild sheep? (e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

The regulation which addresses harvest strategy stipulates any ram may be taken. The any-ram regulation has been the dominant harvest strategy in the last three seasons (1996-98). Previously, a trophy ram requirement corresponded to slightly more than half the hunt areas while an any-ram regulation applied to the remaining hunt areas.

3. PREDATION. What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

The extent to which predation has influenced sheep population dynamics is not well understood. Empirical data from which conclusions may be drawn relative to impacts of predation on sheep populations and transplants are lacking.

Do you control predators to benefit sheep? If so, how?
No.

4. DISEASE. Have you had a disease die-off in the last 5 years? No ___ Yes ___

Last 25 years? No _____ Yes__X____
Cause and herd name: Respiratory bacterial infection - Mormon Mountains, Lincoln County
Cause and herd name: Respiratory bacterial infection - Tobin Range, Pershing County
Cause and herd name: Respiratory bacterial infection - East Range, Pershing County

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

It is difficult to link a die-off to a disease event. Moreover, in instances marked by precipitous population declines, no conclusive evidence exists which would demonstrate disease transmissions between domestic and bighorn sheep occurred and bighorn sheep mortality resulted. Given that, in the absence of indisputable evidence, it has been suspected two additional bighorn populations experienced disease induced die-offs: Pancake Range (late 1990's), Nye County and Virgin Mountains (early 1990's), Clark County.

In the southern portion of the state, collection of biologic samples may occur during capture and translocation operations, and is considered incidental to the overall effort. Further north, in Churchill, Pershing and Lander counties, active domestic sheep allotments are more prevalent, and in instances where intermingling may have occurred between the species, bighorn have been captured for disease testing.

The policy regarding translocations stipulates priority will be afforded to those areas where no domestic sheep are present and adjacent to the proposed habitat area and introduction site. In the event domestic sheep are found to occupy adjacent habitats the degree of risk will be evaluated, and the appropriate land management agency(s) as well as concerned publics will be consulted to determine the overall long-term implications of a bighorn release with consideration of other multiple uses and potential recreational and scientific values.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Federal land management agencies tend to have many conflicting objectives and plans. The schizophrenic nature of multiple use agencies is often the root of unnecessary delays relative to obtaining required clearances and permits for wild sheep projects.

B. Wildlife programs and concerns within federal land management agencies ordinarily do not extend much beyond feral horses and burros, and species which are federally listed as threatened and endangered. Consequently, the welfare of wild sheep populations and management of wild sheep habitat often receives little consideration. Moreover, management actions within the scope of feral horses and burros, and threatened and endangered species usually have profound impacts on bighorn sheep habitat, distribution and movements.

C. The high turn-over rate of personnel from Washington to the field ensures many federal employees lack background knowledge on critical issues, and lack intimate knowledge of resources under their responsibility. In short, brief tenure breeds unfamiliarity on many levels, and ultimately serves to delay issuance of essential clearances and permits for desert bighorn sheep projects and activities.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

In Nevada, as a wilderness bill has yet to be enacted, the area designation of concern would be Wilderness Study Area (WSA). And indeed, the designation of WSAs has impacted management activities. The very qualities of remoteness, rugged terrain, and limited access, which qualified areas for wilderness consideration, constitute key habitat for desert bighorn sheep. Thus, the wilderness designation and attendant restrictions have been and continue to be an entanglement which the Division of Wildlife must maneuver through to achieve management objectives.

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

A. Drop-net: 1,037 trapped - 14 capture related mortalities (1.4%)
B. Net-gun: 815 trapped - 18 capture related mortalities (2.2%)
C. Drive-net: 32 trapped - 2 capture related mortalities (6.3%)

Last 5 years, with estimated mortality rate (%)

A. Drop-net: 6 trapped - 1 capture related mortality (1.7%)
B. Net-gun: 415 trapped - 9 capture related mortalities (2.2%)
C. Drive-net: 0 trapped

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Habitat fragmentation

B. Habitat loss and degradation as a consequence of increasing human population and public land disposals

C. Protracted drought conditions

D. Lack of knowledge (health status of herds and impacts of predation)

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **NEW MEXICO**
Subspecies (one questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____RMBS ____**Desert** X
Fax: 505-827-9956
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1. **ESTIMATED POPULATION size:** 1988 159 1998 230

2. **HARVEST**

Resident permits	1988 0	1998
Non-Resident permits	1988 0	1998
Total Permits	1988 0	1998 2*
No. Killed	1988 0	1998 1

*One permit is auctioned at FNAWS convention

Record B&C Score and year killed: 181-4/8 in 1995

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Trophy ram

3. **PREDATION.** What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

All herds are thought to be stable or declining with lion predation as a principal cause of adult mortality and hypothesized to be limiting recruitment also.

Do you control predators to benefit sheep? If so, how?

Special permits issued to harvest specific lions on a case-by-case basis.

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No X Yes ____
Cause and herd name:
Cause and herd name:

Last 25 years? No ____Yes X
Cause and herd name: Pneumonia Peloncillo Mountains
Cause and herd name: Blurtongue/Contagious Ecthyma Red Rock herd
Cause and herd name: Psoroptic scabies/Contagious Ecthyma San Andres

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

1) Disease screening at capture; 2) No mixing of bighorn from other states

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Federal wilderness capture and transplants

B. Cooperation on livestock allotment management plans

C. Implementing fire management to restore bighorn habitat

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Yes. Hampered capture and transplant programs negatively.

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

A. Drive net (3%)

B. Chemical immobilization by darting (10-20%)

C.

Last 5 years, with estimated mortality rate (%)

A. Net gun--n=111(<1%)

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Low juvenile recruitment due to ???

B. High adult mortality due primarily to lion predation

C. Reduction in habitat due to vegetation changes

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **UTAH**
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____RMBS ____**Desert x**
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e-mail: jkarpowi@state.ut.us

1. **ESTIMATED POPULATION** size: 1988 1500 1998 2600

2. **HARVEST**

Resident permits	1988 13	1998 28
Non-Resident permits	1988 2	1998 3
Total Permits	1988 15	1998 31
No. Killed	1988 12	1998 31

Record B&C Score and year killed: A ram scoring just over 168 was killed in 1997.

What is the dominant harvest strategy in your state/province for hunting wild sheep?
(e.g., closed, subsistence, any-ram, trophy ram, ewe hunting, maximum recreational opportunity)

Provide a high quality hunting experience with a reasonable opportunity to harvest an older age class ram. Current regulations allow the harvest of any ram.

3. **PREDATION.** What impact does predation have on your sheep populations? (e.g., has predation caused populations to decline or transplants to fail?). Specify herd name if appropriate.

Predation by mountain lions, coyotes and golden eagles has been observed in several bighorn populations. The total impact of predation is unknown. However, predation appears to be a significant mortality factor in some areas. It is believed to be a principle cause of the failure of the Westwater Canyon transplant.

Do you control predators to benefit sheep? If so, how?

Yes. Specific areas are targeted in predator management plans to remove coyotes and mountain lions through sport harvest and with removal by Wildlife Services and Division of Wildlife Resource personnel.

4. **DISEASE.** Have you had a disease die-off in the last 5 years? No X Yes ____

Last 25 years? No ____ Yes X

Cause and herd name: Suspected die off of North San Juan herd by Pasteurella pneumonia.

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Regular census of bighorn populations by helicopter is the principle method used to detect disease. Changes in population trends and productivity are used as possible disease indicators. Bighorn populations are also periodically blood tested during capture projects to detect changes in disease exposure.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Grazing by domestic sheep near some bighorn populations.

B. Habitat degradation due to human disturbance including unregulated outdoor recreation and off road vehicle use.

C. Loss of habitat due to increased development.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

Population management such as capture and survey work has continued in wilderness study areas. Habitat improvement especially water developments have been limited in some WSAs. Potential designation of millions of acres as wilderness areas may impact sheep populations if management practices are not allowed to continue.

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

25 years ago (1975) with estimated mortality rate (%)

Helicopter darting with immobilizing drugs was the only method 25 years ago. Mortality rate 20-40%

Last 5 years, with estimated mortality rate (%)

A net gun fired from a helicopter is the only method currently used to capture desert bighorns. Mortality rate is less than 5%.

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Disease
B. Predation
C. Human disturbance
D. Loss of habitat

WILD SHEEP STATUS QUESTIONNAIRE
2nd North American Wild Sheep Conference, Reno, Nevada, 6-9 April 1999

State or Province: **TEXAS** 98% Privately Owned
Subspecies (1 questionnaire/subspecies): Dall's ____ Stone's ____ CABS ____RMBS ____**Desert** __X__
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1. ESTIMATED POPULATION size: 1988 <90 1998 284 Observed

2. HARVEST

Resident permits	1988 1	1998 2
Non-Resident permits	1988 1	1998 1
Total Permits	1988 2	1998 3
No. Killed	1988 0	1998 1

Record B&C Score and year killed: 176 1/8 1997

What is the dominant harvest strategy in your state/province for hunting wild sheep?

Trophy Ram

3. PREDATION. What impact does predation have on your sheep populations?

Predation retards growth of transplanted populations i.e. Van Horn Mountains, 25 bighorns transplanted in late 1980's has remained stable at 10 for 5 years. Black Gap Wildlife Management Area 60 bighorns transplanted 1994-1997, 16 mortalities caused by mountain lions.

Do you control predators to benefit sheep? If so, how?

Predators are removed prior to transplant, during restoration, and specific depredating animals removed after bighorn population established.

4. DISEASE. Have you had a disease die-off in the last 5 years? No X Yes ____

Last 25 years? No X Yes ____

What do you do to detect, manage and/or prevent disease (e.g., disease screening at capture)?

Obtain disease exposure profile at capture, and screen for exposure during subsequent captures.

5. STATE-FEDERAL RELATIONSHIPS. What are the 3 biggest challenges in your state/province regarding state/federal relationships and management of wild sheep?

A. Federal Endangered Species Act has limited the State's ability to work with private land owners as they perceive that by keeping State employees off their property they are protecting their interest.

Has the designation of areas as wilderness impacted management activities or caused negative or positive impacts on sheep populations?

This is not applicable to Texas as there are no wilderness areas designated.

6. CAPTURE-TRANSPLANT TECHNIQUES. What are the 3 primary techniques used to capture bighorn sheep for research and/or translocation (e.g., drop-net, net-gun, drive-net)?

Use of the drop-net and net-gun are used exclusively for capturing bighorns in Texas.

25 years ago (1975) with estimated mortality rate (%)

A. Unknown

Last 5 years, with estimated mortality rate (%)

A. Fifteen bighorns have been captured using net-gun in Texas the past 5 years with no mortalities.

7. SIGNIFICANT LIMITING FACTORS. What are the most significant factors that limit the success of your sheep populations? These may repeat answers to previous questions.

A. Predation (mountain lion)

B. Fragmented habitat

C. Exotics, feral sheep and goats

D. Lack of bighorns to support transplanting within the State