

WILD SHEEP FOUNDATION

THINHORN SHEEP SUMMIT II SYNTHESIS & SUMMARY

[6/6/2017]

April 11-12, 2017

Hotel Captain Cook Anchorage, Alaska

EXECUTIVE SUMMARY

Approximately 110 people interested in Dall's and Stone's sheep (collectively referred to as thinhorn sheep, or THS) conservation and management participated in a two-day, multi-jurisdictional THS Summit II in Anchorage, Alaska. At THS Summit I in Richmond, British Columbia in April 2014, stakeholders identified the most significant management challenges, resources needed, top priorities for action/implementation, and enhanced communication needs, by jurisdiction. When all 4 jurisdictions were synthesized, 8 common priorities were identified during THS Summit I.

Wild Sheep Foundation (WSF) goals for THS Summit II were to:

- 1) assemble diverse stakeholders interested in and/or responsible for THS management in Alaska (AK), British Columbia (BC), Yukon Territory (YT), and the Northwest Territories (NWT); and
- 2) advance the level of communication, collaboration, and commitment of diverse stakeholders to benefit THS conservation.

WSF Objectives for THS Summit II were to:

- 1) Assess progress made since THS Summit I;
- 2) Report on THS population status and trends;
- 3) To the extent possible, synchronize priorities of jurisdictions, WAWFA, and WSF;
- 4) Determine how to best foster collaboration;
- 5) Identify resources, information, and assistance needed by each jurisdiction;
- 6) Summarize disease status and challenges, identify strategies to achieve/maintain disease-free THS, and refine jurisdictional separation strategies;
- 7) Refine THS priority goals in WSF North American Conservation Vision 2020 (N.A. CV2020);
- 8) Promote effective communication among THS stakeholders; and
- 9) Seek common solutions among jurisdictions for identified priorities.

POPULATION STATUS AND TRENDS

In AK, population numbers for THS today are very similar to what was reported in the 1960's, between 40,000 and 50,000. Specific sheep population numbers for regions have varied considerably over the years, due mainly to severe winter and spring weather. At present, BC reported 10,000 to 12,000 THS, of which 400-600 are Dall's sheep. BC also reported THS have tough survival conditions, and surveying them is difficult, due to frequent ice-fog conditions. The YT estimates about 20,000 THS, while NWT estimates about 28,000 Dall's sheep. Both territories continue to rely heavily on outfitter population estimates and hunter harvest, since cost of surveys is very high. Each territory reported their northernmost sheep populations fluctuate greatly, due to long cold winter weather.

JURISDICTIONAL REPORTS

Each jurisdiction reported on progress made on common priorities identified at THS Summit I; that information was assembled into a THS 3 Year Action Plan, by jurisdiction, and has been attached at the end of this synthesis/summary. Both AK and BC are actively working on their THS management plans,

and expect draft plans to be completed by August 2017 and March 2018, respectively. The YT is not currently working on a comprehensive THS management plan, and NWT feels one is not currently needed.

All jurisdictions reported significant progress toward maintaining or achieving effective spatial and/or temporal separation between domestic sheep, domestic goats, alpacas, and llamas (collectively referred to as DS) and THS. Action items completed for all jurisdictions combined include: draft regulations, formation of sheep disease workgroups, development of disease-sampling protocols for DS, implementation of disease surveillance for DS and THS, development of a no DS-pack use regulation for hunting, completion of disease risk assessments, outreach to DS growers, development of a DS/THS contact response plan, and consultation with Co-management Boards on regulations.

Next steps for effective separation for all jurisdictions combined includes: identification of DS growers, evaluation of high-risk contact areas, continued disease sampling, drafted or finalized regulations, education of DS growers and politicians, re-authorization of bylaws, and production of *Movi*-free DS. All jurisdictions indicated they have little influence with government officials and legislators; hence, the most important action NGO's (non-government organizations) can accomplish for THS is to continually push for creation and implementation of effective separation regulations, in each jurisdiction.

For the access management priority, ADF&G will be hiring non-permanent employees to identify and develop access projects, including access point/trailhead/parking area improvements. ADF&G is also working to enhance hunting access to currently-closed federal lands. BC has developed a few site-specific access management plans, and will implement and enforce restrictions. The YT is working to identify OHV/ATV access issues, and encouraging public participation in the process, prior to restrictions. The NWT has virtually no roads in THS habitat, but would like to develop guidelines addressing aerial traffic/access.

Communication and collaboration among NGO's, government officials, First Nations, outfitters, resident and non-resident hunters, and wildlife/livestock veterinarians was greatly fostered at THS Summit I and II by discussing shared challenges, collaboratively seeking solutions, and sharing of information/data. Pooling our efforts will create a significant force for improving THS conservation and management.

In AK, some revisions of Dall's sheep habitat mapping have occurred where new surveys have been completed. The Chugach Mountains are a priority for refined habitat mapping. For BC, Stone's sheep radio-collar data are being gathered near Dease Lake in the Tahltan Region, and will be used to refine existing habitat/distribution maps. The YT has a goal of deploying radio-collars on THS in regions with significant mining, gas and oil exploration activity; these data will be used to refine habitat/distribution maps. The NWT will refine their habitat/distribution maps, when new surveys are completed.

No THS jurisdiction is currently working on comprehensive predator control or habitat enhancement, although local predator management efforts occur, often to benefit caribou and moose, with side benefits realized for THS.

FIRST NATIONS AND FEDERAL AGENCY ROLES IN COLLABORATION

First Nations of Canada are taking a very active collaborative role in THS management. The Tahltan Central Government, Tahltan Guide Outfitters Association, WSF and other collaborators have initiated work on a Stone's sheep study near Dease Lake designed to estimate population status and population trend, refine habitat and seasonal movement maps, identify mortality and traffic risk along mine haul roads, and survey current health profiles. In YT, a 1995 Final Agreement created the Yukon Fish and Wildlife Management Board, whose primary role is to make recommendations, with public participation for fish and wildlife issues. Collaboration with all agencies and organizations, including First Nations is essential. The NWT has co-management advisory boards that focus on the importance of fish and wildlife resources for the benefits of aboriginal peoples; the main focus is to have aboriginal values promoted into Government decisions, in a collaborative manner.

In November 1980, the Alaska Native Interest Lands Conservation Act (ANILCA) was signed by President Carter, provided varying degrees of special protection of over 157,000,000 acres of land, and authorized federal agencies to have a species-management role. On federal lands in AK, this has led to THS surveys and monitoring, creation of rules to protect Dall's sheep and their habitats, ongoing research, rules on sheep harvest regulations, and providing for subsistence hunting allocations. The National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS) and Bureau of Land Management (BLM) presented results from extensive collaborative THS survey and monitoring efforts, as well as ongoing Dall's sheep research. All federal agencies indicated that deep snows and long/late winters strongly influence success or failure of THS populations. Consequently, THS populations have fluctuated widely over time, particularly in the northernmost ranges in AK. Also in AK, NPS has a regulation that prohibits the use of DS for grazing or packing. Substantial human activities were identified on the Chugach National Forest that are or may affect THS; these human activities need to be addressed in the Chugach NF Plan Revision.

RELEVANT RESEARCH ON MOVI IN WILD SHEEP

Dr. Peri Wolff presented Dr. Tom Besser's current research on the bacteria *Mycoplasma ovipneumoniae* (*Movi*) and its effects on wild sheep. *Movi* compromises ciliary function in the pharynx, which then allows other bacteria and viruses to descend into the lungs, causing respiratory pneumonia. *Movi*-induced pneumonia has caused large scale die-offs of bighorn sheep (BHS) throughout the West, and can lead to chronically-depressed lamb recruitment, for up to 20 years, or more. Likely sources of *Movi* are infected domestic sheep and goats, and wild sheep that have been previously exposed but have not died. Of 450 domestic flocks sampled, 88% of the animals tested positive for *Movi*. Transfer of *Movi* between DS and BHS has been proven in both pen studies and under natural, field conditions. Potential strategies for reducing risk of *Movi* exposure in BHS (and THS) were reviewed and discussed.

DISEASE STATUS, SURVEILLANCE, AND CHALLENGES

Dr. Kimberlee Beckman with ADF&G reviewed serology results from 531 Dall's sheep samples, collected from 1971 to 2016. Antibody responses were found for a variety of viruses and bacteria, but *Movi* was negative in all AK mountain ranges; PCR cultures from throat swabs also found no *Movi*. In summary, there is evidence for a limited presence of a small amount of endemic pathogens, but overall, AK THS herds are healthy. There is no recent evidence of transmission of domestic pathogens to THS.

In BC, Dr. Helen Schwantje with the Ministry of Forests, Lands, and Natural Resources Operations (MFLNRO) indicated we don't know a lot about THS pathogens. Dr. Schwantje believes *Movi* could be very important, but it has never been found in Stone's sheep. Thirteen sheep (10 ewes, 3 rams) from the Dease Lake area (captured/tested in February 2017) were all found to be negative for *Movi*; that information will be used to compare THS pathogens with BHS. Dr. Schwantje and colleagues are currently updating a 2003 Risk Assessment for Camelids. They are looking at opportunities for legislation that removes flocks in some high risk areas.

Dr. Jane Harms with Environment Yukon indicated very little domestic sheep/goat presence in the YT, with most occurring near Dawson City or Whitehorse. The YT has never had domestic sheep in THS habitat, and no THS die-offs have ever occurred. Since 2015, officials in YT have collected 87 samples from hunter-harvested THS; all tested negative for *Movi*. The Canadian Wildlife Health Cooperative (CWHC) completed a Risk Assessment from small domestic ruminants to THS in March 2016; potential mitigation measures and management recommendations were provided by CWHC to YT government officials.

Heather Sayine-Crawford with Gov't of NWT Environment & Natural Resources (GNWT E&NR) reported NWT does not currently have a disease surveillance program in place. In NWT, there has never been a documented THS die-off, and the limited samples they have tested have not shown *Movi* present.

STRATEGIES TO MAINTAIN DISEASE-FREE THS

Six presenters from the four THS jurisdictions recommended a variety of strategies to maintain or achieve disease-free THS:

- 1) Conduct health/disease sampling/surveillance for both DS and THS;
- 2) Form collaborative working groups with multiple stakeholders;
- 3) Educate and inform all stakeholders, via open communication;
- 4) Identify DS farms and evaluate risk in site-specific areas;
- 5) Establish buffer zones between DS and THS;
- 6) Produce Movi-free DS;
- 7) Contain/double-fence DS, to reduce opportunity for contact;
- 8) Purchase/elimination/replacement of *Movi*-positive DS;
- 9) Eliminate use of DS-pack animals in THS habitat;
- 10) Develop/Implement legislation or regulations to achieve effective spatial and temporal separation; and
- 11) Refine THS habitat/distribution maps

OPEN DISCUSSION

Question and answer/large-group discussion followed each of the above main sessions. These Q&A/discussion sessions allowed the group to seek clarification on information presented, foster collaboration, improve communication and dialogue, seek common solutions within and between jurisdictions, refine THS priority goals, identify resource and information needs, and to the extent feasible, synchronize THS conservation priorities among diverse stakeholders.

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INTRODUCTION

Kevin Hurley, WSF Senior Conservation Director and Thinhorn Sheep Program Lead, welcomed attendees, reviewed logistics and the schedule of events, and introduced Bruce Dale from ADF&G.

Bruce Dale, Director, Division of Wildlife Conservation, ADF&G

Bruce gave us all a warm welcome, and indicated how pleased he was to have this summit meeting in Alaska. He is very appreciative of the WSF and all their efforts toward conservation of wild sheep. There are a lot of issues involving THS in Alaska and Canada, and your collective vision for improving management focus is warranted. We hope THS Summit II will be as productive as the first.

Gray Thornton, WSF President & CEO

It's very nice to see such a large turnout; we have about 110 attendees. This Thinhorn Summit II is all about the sheep, this is not about us, or any jurisdiction. This summit is a result of Jack Atcheson, Jr.'s vision of putting funds and management emphasis on THS. A special thanks to Karen Gordon for all of her work with logistics with the meeting. Many thanks to Kevin Hurley for organizing and leading this stellar event. Many thanks to our sponsors (please see Sponsor Recognition, page 7) for their exceptional support, totaling almost \$54,000 USD. The cost of THS Summit II will be about \$40,000 USD; remaining funds will be applied directly to THS projects in the field, in one of the four THS jurisdictions.

Jack Atcheson, Jr., WSF Past Chairman and Conservation Committee Chair

This conference is a dream of mine, and I am thrilled to see so many THS enthusiast here. The focus in our early years was mostly about harvesting rams, and it became evident a few years later that we needed to increase our emphasis on wild sheep conservation. Just a few years ago, our WSF Conservation Committee and WSF staff met several times and developed WSF's North American Conservation Vision 2020 (*N.A. CV2020*), which addresses priority goals for THS and for BHS.

In 2016, the WAWFA Wild Sheep Working Group completed and published "Thinhorn Sheep: Conservation Challenges and Management Strategies for the 21st century". Both documents help focus WSF's conservation work on THS, in each of the four jurisdictions. I want to see the focus on helping sheep, not on how we will harvest them.

THINHORN SHEEP SUMMIT II OVERVIEW

Kevin Hurley, WSF Senior Conservation Director, Thinhorn Sheep Program Lead

At THS Summit I in Richmond, BC in April 2014, we collectively identified the most significant management challenges, resources needed, top priorities for action/implementation, and enhanced communication needs, by jurisdiction. When all 4 jurisdictions were synthesized, 8 common priorities were identified.

The top priority, developing and implementing comprehensive management plans, was identified as the highest, because these plans would/should address many of the 7 other priorities. Regulations and/or

legislation to prevent potential contact between DS and THS was our second priority, and led to WSF's "No Contact in the North" initiative. Developing access/travel management plans for motorized use in THS range was our third priority, and there is continual need to be updated, as on-the-ground situations change. The need for improved collaboration and communication among THS stakeholders extends to all THS jurisdictions. The need to refine THS habitat/distribution maps and identify seasonal migration corridors, lambing and winter ranges was also a priority. Predation and habitat enhancement were also identified as important priorities. The Synthesis/Summary from THS Summit I is available on the WSF website:

http://www.wildsheepfoundation.org/cache/DOC27 2014-05-9ThinhornSheepSummitSummarySynthesis.pdf?20160620040020

The WSF North American Conservation Vision 2020 (*N.A. CV2020*) identifies current population estimates and harvest trends, 6 priority goals, and management plan status for THS. As this was designed to be a dynamic, driving document, I encourage all of us to review/refine THS goals in the *N.A. CV2020*.

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- 8) Promote effective communication among THS stakeholders; and
- 9) Seek common solutions among jurisdictions for identified priorities.

On Day Two, we will summarize current disease status, identify challenges, and refine our separation strategies, as needed, to achieve effective spatial and temporal separation between domestic sheep and goats, and THS. Kevin went through summit meeting logistics, schedule, timetable for follow-up, etc.

Over a hundred years ago, Charles Sheldon wrote a book "The Wilderness of the Upper Yukon" (1911), in which Sheldon identified and mapped THS habitat. In 2015, the WAFWA Wild Sheep Working Group published their own THS distribution map; both maps are included in your handouts, and represent a contrast to, and refinement of, Sheldon's excellent work from more than a century ago.

JURISDICTIONAL REPORTS

ALASKA: Darren Bruning, Regional Supervisor ADF&G and WAWFA Wild Sheep Working Group rep AK is big, and THS populations, management and ranges are diverse. With the information we now have, most of the 10 THS ranges provide fairly stable populations of Dall's sheep. A few populations have increased, but many have decreased over the past 20 years. The western Brooks Range has had a significant decline; this population is subject to severe weather and climate, and has varied significantly over time. In 2013, winter continued well into May, and the snow pack was 3 times what it normally is. So, the western

Brooks Range experienced an all-age class mortality event. Since 2013, the western Brooks Range has showed very little recovery, and hunting has been closed since 2014.

All interior Dall's sheep populations affected by the 2013 extended winter seem to be recovering nicely. Current hunting strategies are providing stable hunter opportunity and harvest success. Looking at long-term population trends over the last 50 years for interior ranges, Dall's sheep numbers have increased and/or decreased several times. Comparing population numbers today, they are very close to what was estimated in the 1960's.

In 2016, there were 2,279 hunters that reported to have hunted Dall's sheep; about 400 hunters were non-residents of AK. Harvest was reported for 792 rams. Most of the harvest occurs in general, "over-the-counter" Dall's sheep hunting areas, as opposed to Limited Entry/draw areas.

Dr. Tom Lohuis has developed a carrying-capacity model for Dall's sheep in the Chugach Mountains; Tom has developed resource selection functions (RSFs), with nutritional condition and physiology being important variables.

In interior ranges, ADF&G is in the early stages of research studying ram ecology and their contribution to reproduction. For historical comparison, Darren circulated a copy of the 1949 Alaska Game Regulations that closed all Department of Interior Lands to harvest of any Dall's sheep.

Priority goals for AK: We continue to make progress on developing sound and reasonable measures to maintain separation between DS and THS. In recent years, and via the AK Dall's Sheep Working Group, harvest strategies were identified as a high level of concern, and an ongoing effort is underway to open now-unavailable federal lands for THS hunting. Climate change continues to be a very important factor and has reduced some Dall's sheep ranges; ADF&G will continue to monitor habitat use and refine habitat/distribution mapping, as necessary. ADF&G is continuing to improve public outreach and communication.

Tony Kavalok, Assistant Director, Division of Wildlife Conservation, ADF&G

Tony indicated how pleased he was that WSF decided to host THS Summit II here in Alaska; this means a lot to the State of Alaska. ADF&G has been slow in progress on our Dall's sheep management plans; management plans for moose have taken priority. Last week, ADF&G Regional Staff met and formalized procedures that will guide operational plans for THS ranges and populations. Operational plans will be dynamic 5-year reports, to be updated every 5 years thereafter. ADF&G anticipates a large public-involvement process for updating and refining each operational plan. Combining 12–14 individual operational plans will constitute Alaska's comprehensive Dall's sheep management plan. Harvest strategy revisions will take an ADF&G team effort to work them through the AK Board of Game (BOG). ADF&G draft operational plans will be submitted to headquarters by August 2017.

Habitat distribution mapping has had some updates, and will need more refinement as we conduct more intensive surveys. We have one GIS person working on digitizing our Dall's sheep maps. Intensive predator management for all species such as moose, caribou, and deer is conducted in specific problem areas in AK;

any benefit to sheep would be incidental, yet provide some relief. Recently, ADF&G focused on hunter access infrastructure for AK; this included developing and identifying access points/trailheads/parking areas for hunters, access to air landings in remote areas, and working to open hunting access/opportunity to currently-closed federal lands.

There are perhaps as many as 1,800-2,000 domestic sheep and goats in AK, with most of them in the Mat-Su, Valdez, and Cordova areas; this comprises about 150 growers, so almost all are small hobby farms and 4-H projects. ADF&G has had challenges with these growers, getting them to engage on this issue. Because of the size and remoteness of AK, it has been difficult to locate these growers and identify potential contact risks. Registering DS growers would be helpful.

Kevin Kehoe, Alaska WSF President

Over the last three years, efforts were made to restart the Alaska Chapter WSF. Many Alaskans feel THS management needs to be improved. We need to be pro-active and continue improving Dall's sheep conservation, with clearly-defined objectives of what we want to achieve. A team approach is required. Each team member needs ownership of each goal for their priority item, so it gets accomplished. In a collaborative manner, what should AK's Dall's sheep management plan look like? How does AK-WSF facilitate increased capacity, for better THS management? Combining all AK-WSF and state funds with Pittman-Robertson (P-R) 3:1 matching funds, we have the ability to generate nearly \$1,000,000 USD for THS conservation every year in Alaska; we have to have a good strategic plan, to move forward.

BRITISH COLUMBIA: Bill Jex, Skeena Regional Biologist, MFLNRO and WAFWA WSWG rep

In BC, THS are located in Regions 6 and 7, in the northern third of the province. Occupied THS habitat is in small isolated areas on the map, so landscape pressures are more prevalent than in larger, more continuous habitats. Dealing with disease, access, bio-politics in wildlife management, and politics in society is therefore, more complicated. Realities of these more-fragmented habitats are, we have extensive mineral exploration, recreation use, and forest harvest surrounding our THS habitats. Recently, we have had an increase in interest of THS management by the public, and a few wild sheep advocacy groups have formed. Jerome Ayotte continues to lead the BC Sheep Separation Program, which is most active in southern BC. What we learned with DS and BHS separation could and should be applied to THS management.

In BC, we have 10,000 to 12,000 THS, of which 400-600 are Dall's sheep. Last year we harvested about 330 Stone's sheep; while 2-5 Dall's sheep are harvested each year. THS have tough survival conditions and aerially-surveying them is difficult, due to frequent ice-fog conditions.

MFLNRO has been working on BC's comprehensive THS management plan; we finished a skeletal-draft last year. Progress has been slowed, due to higher priority for moose and elk plans, but we are now focused fully on finishing our THS management plan. Our draft plan will be completed by March 2018; it should be similar in format to our recently-completed mountain goat management plan for the province.

Currently, we do not have a disease contact issue with DS and THS. In BHS range, we have found that a softer approach is more successful than hard-line approaches. Habitat inventory and population surveys are important to us, even though funds are very low. The last good THS status report was completed in

2004. We have a good radio-telemetry project underway on Stone's Sheep in the Tahltan Region, which will help us refine our habitat maps and population estimates. Anecdotally, but consistently seen, ptarmigan numbers have an impact on predation on sheep; when ptarmigan numbers are down, predation on THS lambs increases from golden eagles and coyotes. Access/travel management plans have been completed for a few localized areas, but a province-wide plan is still needed.

Chris Barker, WSF Board Member and Past President, Wild Sheep Society of BC

We are very supportive of BC's MFLNRO personnel, and feel we need to assist them with their wild sheep conservation measures, as much as possible. A new independent funding model for wildlife management in BC is in process, and will make collaboration with NGO's and provincial officials much more frequent and impactful. Lately, I/we have been pushing for the province to hire a provincial wild sheep/mountain goat biologist that would work on inventories, harvest strategies, and population status; this person would help us move to a more pro-active approach, instead of us being reactive. It is important to look back historically at what THS sheep populations and habitat conditions were, and use that information to inform where we want to go. We need to look closely at our Stone's sheep health assessments, to determine which limiting factors are affecting them. By sharing more reports with the public, we could greatly improve communication.

YUKON: Troy Hegel, Ungulate Specialist, Environ. Yukon Fish & Wildlife Branch, WAFWA WSWG rep We believe the YT currently has about 20,000 THS. There have not been a lot of surveys for THS, particularly not in recent years. We continue to rely heavily on outfitter harvest information. THS distribution maps indicate continuous large habitats, but in reality, THS are mostly in "pockets" of good habitat. Two years ago, we completed a good survey in southwest YT and saw over 5,000 sheep. Due to the remoteness, it took over 200 hours of flying to complete this survey. In the North Richardson ranges, a survey in 2014 indicated the THS population was going down. We think the decline is weather-related, since the area is on the northern edge of THS habitat. Small pockets of THS along the Yukon River (150-200 head) have been surveyed for the last 10-12 years.

YT only has about 37,000 people, and about 28,000 of them live in/around Whitehorse. Consequently, we have harvest management issues concentrated in the areas surrounding Whitehorse. A working group has been formed, and we will revise our 1996 harvest management guidelines.

Access management is very polarizing with the public, and we do have ATV/OHV encroachment into THS habitat. We currently have no regulations for ATV's, but they are needed. Access/travel management regulations are currently being developed by YT Lands Branch; YT F&W Branch does not deal directly with land-use restrictions.

Troy shared a map that showed many current/planned industrial activities, such as mining, oil and gas exploration. Because there are so few roads, all of these activities require helicopter operations and some site-specific road construction. Effects on THS are occurring in some operations, and require evaluation of impacts and development of regulations.

YT F&W Branch has assisted with Zijian Sim's DNA genetics research recently completed for THS ranges. Troy has been refining YT THS management units to better reflect what is biologically more meaningful. Another goal is to fill our inventory gaps. The best approach will require detailed movement information through use of radio-collars on THS. Since this information is needed for environmental assessments for industry projects, YT F&W Branch will seek pre-disturbance mitigation/research funding from industry proponents. YT F&W Branch also needs to refine their sightability corrections for surveying THS.

NORTHWEST TERRITORIES: Heather Sayine-Crawford, Director of Wildlife Research & Management, Government of NWT, Environment & Natural Resources

E&NR recently surveyed the Palmer Lake area and saw about 500 THS. In the Captain Creek area, we only observed about 50 THS, which is down from an average of 200. A big issue is the cost of surveys. We rely heavily on outfitter data on ewe, ram, and lamb numbers, and will continue to do so. In 2015, we had a total harvest of 219 rams; all but 5 of the rams harvested were taken by non-residents. The average number of rams harvested is 198/year, and the average age of harvested rams is ~10.5 years old. Aboriginal harvest is very low (averages 2) and quite variable, since indigenous peoples focus on harvesting caribou and moose.

There was a management plan drafted for the Richardson Mountains in 2008; unfortunately, it was never approved as final. However, it still is used to set population goals and harvest quotas. Recently, there was a significant decline of THS in the North Richardson's ranges, and a hunting closure is still imposed.

Distribution and habitat mapping is pretty crude, but that is not going to change in the near future. We do not conduct any comprehensive predator control, but there were 20 wolves taken in 2015 by outfitters. There are very few motorized vehicle access roads in the NWT; we only have a few site-specific ATV use problems (e.g., along the Canol Road), and we deal with them locally.

Tavis Molnar, Association of MacKenzie Mountain Outfitters (AMMO), Arctic Red River Outfitter

The MacKenzie Mountains are pretty unique, because there is so little pressure on THS. There are no roads or communities in THS country, so management is pretty simple. There is not a lot known about THS population estimates. Harvest estimates are probably less than one percent of the total population. The Association of MacKenzie Mountain Outfitters (AMMO) has a very good relationship with Environment & Natural Resources, and has been able to share information. THS are doing very well as a whole, with some small exceptions occurring, after weather-related events. Consequently, a lot of THS surveys are really unnecessary. Due to the remoteness, subsistence hunting is not significant for THS in NWT. Some helicopter or airplane use by non-outfitters is having an impact on THS. Developing guidelines on how to use helicopters in THS ranges (without impacting THS) would be beneficial in the MacKenzie Mountains.

O&A REGARDING JURISDICTIONAL REPORTS

- 1. Kevin Hurley: Who regulates ATV use on lands within NWT? Heather: On private lands, it would be the landowners, on public lands, it would be GNWT Department of Lands. All partners need to work together to make good decisions.
- 2. Mark Richards: What is the ram harvest in the YT? Troy: Varies from 200-330/year.

- 3. Bob Cassell: Are THS sheep surveys near the border of NWT and YT coordinated? Troy: Yes, we complete these surveys at the same time, and results are shared/compared between jurisdictions.
- 4. Jeff Burwell: Can you clarify the use of P-R funds to increase access for THS hunting in AK? Tony: We are using these funds to improve access points that are already being heavily used/impacted, and making safer places for folks to park their vehicles; we are not increasing motorized access into remote non-motorized areas.
- 5. Jim Herriges: Was Darren Bruning talking about the potential to increase access points, or, to increase/allow hunting on federal lands? Darren: Increase hunting access to currently-closed, unavailable federal lands.
- 6. Ted Spraker: Why are there only 5 sheep harvested by residents in NWT? Heather: it basically boils down to little access; the average person can't afford helicopter or airplane access.
- 7. Kevin Hurley: Outfitters in NWT survey THS in their concession areas; there is a need for outfitters to share their population estimates/trends with the government. Collectively, how can all of us do a better job of sharing the information that the government needs and that the outfitters have? Dan Reynolds: Outfitter security on where THS are located is huge, and that knowledge has to be protected; if the government cannot protect that information, they are not going to get it. Bill Jex: BC has a Freedom of Information-like request process; we protect the information released by sharing it on a large-scale basis only, no specific locations are disclosed.
- 8. Aaron Bloomquist: Why has ADF&G been so reluctant to accept THS information from outfitters? Tony: Our attitudes concerning using outfitter data is changing, and we feel it could be of benefit; it would be good to standardize the methodology and forms used.
- 9. Mike Cox: Can industries in YT provide \$ to get THS survey information? Troy: Yes they can; however, the scale at which YT F&W Branch does surveys is different for a population-wide survey vs. a site-specific industry operation. Surveying 1/10th of a THS population really does not benefit us.

WAFWA WILD SHEEP WORKING GROUP PERSPECTIVE

Clay Brewer, WSF Conservation Director, Bighorn Sheep Program Lead, Past Chair, WAFWA WSWG WAFWA stands for the Western Association of Fish and Wildlife Agencies and represents 23 western states, provinces, and territories; NWT is not a member jurisdiction in WAFWA, although they are most welcome to participate. The Wild Sheep Working Group (WSWG) was formed in 2007; Kevin Hurley was the first chair (2007-2011), I chaired the WSWG from 2011-2016. The WSWG purpose is/was to identify priority topics and management challenges for wild sheep, and foster collaborative solutions to those challenges. There is one representative from each member jurisdiction, and one for the Bureau of Land Management (BLM) and the U.S. Forest Service (USFS). Priority topics vary within each jurisdiction, so in 2014, we published a conservation and management document for BHS. Common-sense goals, objectives, and solutions were identified to BHS management challenges. The target audience was the public, hunters, western agency Directors, and their personnel. At THS Summit I, we committed to complete a similar publication for THS; the publication "Thinhorn Sheep: Conservation Challenges and Management Strategies for the 21st Century" was completed in 2016 by a number of talented THS experts. Again, issues varied greatly by jurisdiction. Meeting the goals and objectives in this WAFWA THS document will take a lot of work and collaboration.

Mike Cox (Nevada Department of Wildlife), WAFWA Wild Sheep Working Group Chair

WAWFA is a clearinghouse for sharing wild sheep information: what works and what doesn't. We want to improve collective learning and information/data-sharing on the best management practices for wild sheep. From a scientific standpoint, we will all be better off if we promote and utilize combined resources, from all jurisdictions. The WSWG has had a primary focus on BHS, but it is appropriate and time to increase our focus on THS management.

Q&A on WAWFA WILD SHEEP WORKING GROUP

- 1. Aaron Bloomquist: Is the USFWS and NPS engaged with the WAFWA WSWG? Clay: We are doing a lot more with those two agencies than we ever have before. Mike: Rick Kahn from NPS is now trying to inventory wild sheep populations, collect habitat information, evaluate allotment use, and analyze risk of contact, for NPS-managed lands.
- 2. Bob Dickson: How do bison impact THS in mountain habitats? Troy: Bison were reintroduced in the YT, and they use habitat high on the mountains. YT F&W Branch has investigated the effect of bison on THS and feels there is potential competition for forage (i.e., grasses). Displacement of THS by bison has also been observed. YT F&W Branch cannot say if there is any effect on THS population numbers.
- 3. Becky Schwanke: Can you expand on operational plans in AK, and how they would be of benefit? Tony: The operational plan process replaces our old Survey & Inventory (S&I) reports; they have more goals and objectives, are designed for a 5-year period, are designed to be dynamic, and will be reviewed/updated every 5 years. The public will be more engaged, too.
- 4. Helen Schwantje: The bison-wild sheep issue could have some disease implications; there is potential for transmission of viruses and bacteria to go either direction. We need to keep an eye on this situation.
- 5. Jack Atcheson Jr.: There is a common theme of not enough surveys. How can WSF, hunters and outfitters help? No response recorded.
- 6. Kevin Kehoe: Are the goals, objectives, and priorities for each jurisdiction synchronized in the N.A.CV2020 and WAFWA 2016 THS documents? Are the priorities the same today? Darren: Generally, the priorities are the same; there will be slight variations in the near future, and adjustments are important. Bill: Priorities are very similar, but we are facing challenges that continue to evolve, and will change more in the future. Troy: Priorities have changed slightly; conservation challenges do dictate priority changes. Heather: Priorities are basically the same. Jack: Yes, the two document's goals, objectives, and priorities closely mirror each other.
- 7. Mike Bridger: In BC, bison were introduced into Stone's sheep habitat, and have grown to about 1,000 animals; there is competition high on the mountains between elk, THS, and bison. There are also increased predators and increased utilization of forage/grass.
- 8. Kevin Hurley: How can WSF help your agency in funding THS projects? Gray: Special Governor's or Minister's tags and permits really are part of the North America Model for Wildlife Conservation. Non-resident license fees generate the majority of funds for wild sheep conservation and management. About 74% of all wild sheep management funds west-wide come from auction and raffle of special permits and tags. Since WSF sells the majority of those tags, our involvement is very important, as WSF raises and directs approximately 40% of all wild sheep revenue in the U.S. and Canada. If we do not have non-resident license fees, and if we don't auction or raffle special tags, we simply won't have the wild sheep conservation programs we have today, or need. Much of a jurisdiction's application fee is considered an administrative fee, and is not necessarily used for wild sheep management. Using 2014

information, WSF found that in Montana annual resident revenue for BHS conservation was only about \$20,000. Funds from the unlimited areas and miscellaneous other hunts generates about another \$100,000 in license revenue each year; \$120,000 is not much money for BHS management for a state as large as Montana. In 2014, the Montana statewide BHS auction tag sold for \$480,000, with 90% of those funds being returned to MT Fish, Wildlife, and Parks for their BHS program. So, special tags are critical. Besides raising wild sheep management funds, WSF can be a catalyst for generating funds which can then be multiplied into a 3:1 match, via P-R. For example, WSF and AK-WSF helped turn \$50,000 of Safari Club International Foundation funds into \$200,000, for ADF&G to write a comprehensive Dall's sheep management plan for AK. Kevin Hurley: on average, WSF retains a 7% commission from auction tag revenues, the remainder is returned to the state, provincial, tribal or First Nations wild sheep management agency. WSF's focus is to raise and direct \$\$ to be put back on-the-ground, to directly benefit wild sheep management.

Day 1 Afternoon

FIRST NATIONS ROLE IN COLLABORATIVE MANAGEMENT

BRITISH COLUMBIA: Rick McLean, Chief of Tahltan Band Council, Tahltan Nation

Most of my life, I have been an outfitter for hunting moose, caribou, and THS. The Tahltan Central Government and the Tahltan Guide Outfitters Association have teamed together to form a great working relationship. Our goal for Stone's sheep management is to have sustainable harvest through time, for our people, our communities, and our outfitters. The Tahltan Guide Outfitters Association includes many outfitters, and is a large voice for local game management issues, of all kind. We have also formed a collaborative roundtable with our local hunters, outfitters, government, local communities, and youth. We are always trying to get our youth involved with wildlife, so we can grow our own biologists.

Last year, we had a Northern Wildlife Symposium that focused on our Stone's sheep study in the Tahltan Region. In May 2017, we will have another symposium that will focus on the health of Stone's sheep in our area. The genetic study for THS indicates Stone's sheep in our area are pure breed, which has global significance. Our purpose of the study is to track movements, refine distribution and habitat use maps, estimate populations, identify mortality and risk, and investigate genetics. Funding for this Stone's sheep study is provided by WSF and the Tahltan Guide Outfitters Association. We have 2 high school students involved in the study, which creates a very positive situation with the local communities. Captured in February 2017, we now have 10 Stone's sheep ewes with active GPS radio-collars "on the air". All biological samples were taken by a diverse and well-trained crew, and were sent to various labs for processing. Monitoring Stone's sheep movements has been very successful, so far.

The Tahltan Nation is involved with many other wildlife activities. The potential disease issue between domestic sheep and goats and wild sheep has prompted the Tahltan Central Government to reach out and educate local homesteaders on the risk of contact, and mitigation strategies to prevent/reduce likelihood of contact. The key to this issue is to inform and educate. Our goal is to not allow any more domestic sheep or goats near THS range.

We had a wildlife sampling workshop put on by Dr. Schwantje which taught us how to take samples, how to collect tissue, hair, and blood; this baseline data is being sent to Dr. Schwantje for analysis. The Tahltan Wildlife Guardian Program is very successful and is focused on surveying hunters, monitoring recreation use, and monitoring/protecting wildlife. The Tahltan Nation has formed a working group with the Kaska Dene and Taku River Tlingit Nations, which covers ~70% of the Stone's sheep habitat in BC. We are now more efficient with our funding applications, training, youth education, and wildlife management. Our focus for wildlife is on the health of the animals, not necessarily harvest.

YUKON: Graham Van Tighem, Executive Director, Yukon Fish and Wildlife Management Board

We are a management board that came out of the YT 1995 Final Agreement; we don't represent First Nations, but we work closely with them. Wild sheep is only one of many species we work on. Our mandate is to represent the public interest on all wildlife issues and management. This requires mutual trust and respect, consensus-based approaches, bringing First Nations together, and evaluating scientific information. We make fish and wildlife management recommendations, and send them to a decision-making Minister of Environment. We are recognized as the primary instrument for fish and wildlife management on the YT landscape.

Our board works with the Director of YT F&W Branch and her staff to access and share technical information on fish and wildlife. We work closely with the Yukon Outfitters Association, First Nations, Yukon WSF, and the YT tourism industry. We work closely with the general public, and provide them an avenue for discussion and input/comment on fish and wildlife management issues. We are working on a grizzly bear conservation plan, representing a good example of collaboration. We do a lot of work with the trapping industry, and fund some activities that outfitters complete. All our recommendations are guided by the goal of long-term sustainability and proper utilization of fish and wildlife habitats and populations.

With respect to THS in the Yukon, we manage the Yukon Wildlife Act regulation change process. So, anytime there is a change in the Wildlife Act regulations, we manage that process in partnership with YT government and the public. This process is all about communicating with local communities, and listening to their issues with regulation changes. We feel this involvement has led to greater public appreciation for decisions on fish and wildlife. We were involved in the 2008 Dall's sheep draft management plan for the North Richardson Ranges, and helped with establishing outfitter quota guidelines. We are currently leading discussion of changing to a THS full-curl harvest limitation, and dealing with OHV/ATV off-road vehicle restrictions. We have recently formed a Dall's sheep working group to deal with all issues and challenges for THS in YT.

NORTHWEST TERRITORIES: Heather Sayine-Crawford: Gov't NWT Envir. & Natural Resources

There are four land-settlement claims, each of which has advisory co-management boards, land-use boards, and renewable resources boards. Each co-management board highlights the importance of fish and wildlife resources for the benefits of aboriginal peoples. The main focus is to have aboriginal values represented and promoted into governmental decisions. All boards use traditional knowledge and information, as well as scientific data. Community involvement is critical. The boards do have decision making authority, but the Ministry Director retains final approval.

We have not done a lot of work with THS. In NWT, caribou are used as the primary food source, and get most of the attention and use from the public and local First Nation communities. Jeremy Ayotte from BC presented at a Dehcho wildlife workshop in October 2014 in Fort Simpson, and shared information about disease risk between DS and THS with local communities and individuals. Government NWT E&NR's primary duty is to collect and provide technical information about wildlife issues, and share that information/data with the co-management boards, when appropriate. We develop new regulations or legislation from these board decisions, when appropriate. These boards are our avenue for public involvement into government decisions.

Q&A ON FIRST NATIONS COLLABORATIVE MANAGEMENT

- 1. Mark Richards: Are your boards in the YT voting or consensus based? Graham: The chair tries to reach consensus on recommendations, and most of the time, consensus is reached. When someone disagrees, it is noted in the minutes, and they move forward.
- 2. Wayne Heimer: Is there a difference between co-management and collaboration? Graham: Co-management is wildlife managers from Government entities joining together to manage a resource. Collaboration is non-government entities getting together with governmental officials to manage a resource. Heather: Co-management boards make decisions; collaboration yields recommendations.
- 3. Becky Schwanke: How are population objectives and harvest levels established for areas in BC, YT, and NWT? Lars Jessup: In YT, we don't have management plans specifically for THS; THS harvest is based on management areas, and is shared by outfitters and First Nations. Troy: we have THS harvest guidelines; the only restrictions on ram harvest in the YT are surrounding Whitehorse. Bill: In BC, we have no harvest objective, but we focus on the % of the total population to be harvested; we have a THS guidance document that talks about what size a population has to be before we open a hunt. We have a 3% of the total population standardized off-take/harvest rate maximum, and our goal is to average over 8-year old rams. Our guidelines strive to have 70% of our harvested rams being at least full curl. We use population models to estimate population numbers, which are then used to develop harvest quotas.
- 4. Lew Bradley: You mentioned outfitter quota guidelines; can you elaborate on the need for that? Graham: My understanding is the outfitter quota guidelines were created in 1993, to make sure wildlife harvest was sustainable and distributed evenly among outfitters. Lars: most of the guidelines speak mainly to caribou and moose, and don't include THS.
- 5. Bob Cassell: What information do you have on color phase in the Yukon? Troy: We track resident and non-resident harvest, and color phase is noted on our harvest forms. Unfortunately, everyone has their own interpretation on what dark or light is. It is subjective, but does give us indications. Our goal for THS harvest is to maintain ram social structure, not the color phase of rams.
- 6. Kevin Hurley: WAWFA WSWG chairs (me, then Clay, now Mike) have maintained a spreadsheet that includes annual THS information on total population estimates, total licenses issued, and ram harvest. We kept this table current through 2013, but we are missing recent data. Every year, there are about 15,000 to 17,000 sheep hunters in North America, and 2,900-3,000 rams are harvested. WSF would like to see this table continued to be updated, for THS and for BHS.
 - a. <u>Action Item #1</u>: Kevin Hurley will take the lead in securing updated information on THS population estimates, license issuance, and ram harvest for the WAFWA WSWG "master spreadsheet".

7. Ted Spraker: If you reach a point where the councils, First Nations, and boards can't reach a majority, does the provincial or territorial government have final say in regulation changes? Heather: Nonagreement is noted and given to the decision-makers, with those disagreements noted. Graham: Our board does not agree on every issue; when public involvement and comment is brought into a recommendation, objections are amplified, and the recommendation usually does not go forward. Sometimes, there is not enough biological data or the politics are high, so a recommendation on a regulation may never go forward.

FEDERAL AGENCY ROLE IN COLLABORATIVE MANAGEMENT IN ALASKA

David Payer, National Park Service, Regional Wildlife Biologist

There are 15 National Parks (NP) in AK, containing about 50 million acres. Most NP are in mountain habitat occupied by THS. About one-third of the Dall's sheep in AK occur in NPS-managed lands. The harvest of Dall's sheep varies considerably on these parks and preserves. Generally, subsistence hunting is allowed in most NP and Preserves.

Over 100 years ago, Charles Sheldon and others led an effort to make Denali a national park. This was due to the railroad coming through the area and opening up market-hunting opportunities. Denali was in fact established as a national park in February 1917, with the primary reason being to protect Dall's sheep.

In 1980, the ANILCA Act was approved, and several additional NP were created. The Legislation defined rules for protecting THS and their habitats. Passage of ANILCA prompted a large effort to survey NP lands and monitor wildlife. Survey and monitoring efforts were sporadic after the mid 1980's. During the last decade, there has been a renewed effort to survey and monitor THS on NPS lands. Dall's sheep are designated as a barometer for a healthy ecosystem. When it comes to collaborative wildlife management, we have an excellent relationship with ADF&G. In AK, the NPS prohibits use or possession of domestic sheep or goats in all parks with Dall's sheep populations to prevent disease transmission. Possession of llamas and alpacas is also prohibited except as pack animals in accordance with written authorization from the park superintendent.

There are two collaborative research projects of interest: 1) Dr. Tom Lohuis with ADF&G has 30 rams radio-collared to determine the effect of different harvest regimes on mortality, dispersal, and energetics, and 2) a NASA-funded project is using existing data to look at THS distribution and population monitoring results, and how those have changed with large-scale climate change.

Kumi Rattenbury, Wildlife Biologist, National Park Service

I mostly look at Dall's sheep monitoring, primarily in the Brooks Range. For the last decade, we have collected data on trends in abundance and distribution, and changes in sex and age. Our primary sampling technique is distance-sampling (line-transect), where you record the perpendicular distance to the observed sheep. We use this technique, due to the large size of NPs. We note lambs, ewe-like sheep, young and old rams. The information is put into a model that estimates populations and trends, over time.

In a lot of areas, we are finding similar numbers to what Frank Singer found in the 1980's. We saw about 13,000 sheep in the central Brooks Range, Gates of the Arctic, and Noatak areas. In 2013, it was a really late spring with deep snows, and lamb numbers dropped to 18 lambs:100 ewe-like sheep. Lamb numbers were low in most NPs in AK during 2013. However, in 2014 lambs and THS populations increased in many areas, and are now considered stable. Kumi showed several slides of changes in THS numbers and distribution over the last 10 years. Deep snows and late winters really regulate success or failure of these THS, since they are on the northern edge of THS habitat. We will continue these distance-sampling surveys into the future.

McCrea Cobb, Wildlife Ecologist, U.S. Fish & Wildlife Service (USFWS)

Today, I will be focusing on Dall's sheep surveys in three areas: 1) Kenai Peninsula, 2) Yukon Flats, and Arctic NW. There are about 40,000 to 50,000 THS in AK, and about 27,000 in Canada. THS on the Kenai Peninsula Refuge increased in the 1950's and 1960's. They began to decline in 1970's, and declined 36-48%. In 1968, the THS population was estimated between 2,200 and 2,500. We currently have 800-1,200 THS. Reasons for the decline are thought to be attributed to a change in winter weather patterns to more rain, rain-on-snow, and wet snow events than prior to 1980.

Refuge personnel annually conduct THS surveys. Results are used to make recommendations on sport harvest. In 2017, the USFWS plans to collaborate with ADF&G, NPS, and USFS to test a new survey method that has been used on mountain goats. The new method could be expanded to THS, and would be used to estimate abundance.

At the Yukon Flats Refuge, a collaborative study (BLM, ADF&G, and USFWS) is being conducted for THS monitoring, prior to gas and oil exploration and a proposed land exchange. The researcher has radio-collared 68 THS, mainly in the White Mountains. They have been successful in identifying distribution, seasonal movement corridors, and sensitive areas such as mineral licks. The land exchange did not go through, but we learned a lot about the spatial ecology of THS.

In the Arctic NW Refuge, most of the area is open to hunting, except in small areas near First Nation communities, where it is open only for subsistence hunting. From limited surveys done on the Arctic NWR, the THS population peaked in the late 1980's and declined in 1990's. This is thought to be due to severe winters and/or late springs. Effects of predation are thought to be small, and nutrition is generally good. Distance-sampling surveys in the Aditat (??) area in 2016 observed 283 THS in 52 groups, with 54 lambs: and 39 rams:100 ewe-like sheep.

Jen McMillan, Ecologist, Bureau of Land Management (BLM), Alaska

BLM's mission is to sustain the health and diversity of public lands for the use and enjoyment by future generations. We are a multiple-use agency. We follow the ANILCA agreement in regards to providing for subsistence-hunting allocations. The BLM in AK has about 3.3 million acres of THS habitat spread over five focal regions. With respect to THS inventory and management, BLM focuses their attention on two regions, the Central Yukon and Eastern Interior, because this is where the most people and impacts are located.

The Eastern Interior has been surveyed every year since 1980. A distance-sampling survey in 2014 indicated about 1,200 THS in units 1A and 1B. THS population surveys have been conducted since 1990 in the Central Yukon, and indicate a stable population.

Our land-use plans dictate what and where activities can occur on BLM areas. The Eastern Interior plan is complete, and highlights specific values for wildlife and subsistence-hunting, including THS. There are identified priority habitats for THS mineral sources, movement corridors, access to grazing areas, and key lambing habitat. A land-use plan has just been initiated for Central Yukon.

In the Dalton Highway Corridor area, we verified about 25 mineral lick sources. Most licks were located along streams, which is where most mineral exploration is taking place. Remote cameras indicate most THS use on mineral licks is in summer.

Cheryl Carothers, Regional Wildlife Program Manager, U.S. Forest Service, Region 10

The mission of the USFS is also multiple-use, which aims to sustain our forests and grasslands for the benefit of the public. Each National Forest has a land/resource management plan that has specific strategic standards and guidelines. The Tongass NF has about 19 million acres, while the Chugach NF has 5.5 million acres. We have THS in the Kenai and Chugach Mountains on USFS-managed lands.

ANILCA required the USFS in AK to not only have a habitat and people role, but also a species management role. For habitat management, we want to maintain and enhance habitat, provide abundant forage, and maintain cover for predator avoidance. For people management, the Chugach NF is revising their land-use plan, and has draft special regulations in place for human activities such as ATV's, boats, airplanes, and helicopters. These restrictions are for the benefit of many wildlife species, including THS, and are designed to conserve species and habitats. On NF's in Alaska, there are no subsistence-hunting priorities; consequently, there are no hunting restrictions by the USFS. So, only state regulations apply.

We do acknowledge the potential for disease transmission between DS and THS. ADF&G currently has restrictions on domestic animal pack use during hunting; we plan to address this issue in the final Chugach land/resource management plan.

Q&A FOR FEDERAL AGENCY ROLE IN COLLABORATIVE MANAGEMENT

1. Rick McLean: What are the biologists and veterinarians thoughts on using mineral blocks to supplement THS? Wayne Heimer: I feel it would be important to focus on magnesium and calcium. Kevin Hurley: Biologists have discussed wild sheep trace mineral needs for many years; we always look at and use requirements for domestic sheep, but we really don't know what is necessary for wild sheep. Helen Schwantje: We used mineral salt blocks to draw BHS away from a highway, but the bighorns got a high amount of orf (contagious ecthyma); therefore, I feel that concentrating animals can lead to disease-transmission issues. Mineral data for high-elevation animals like THS have shown they are really good at selecting plants with high mineral content. There are several articles about trace minerals in wild sheep in the Northern Wild Sheep and Goat Council Proceedings. Mike Cox: We did a 4-year study on BHS use of mineral blocks in Nevada, and found no increases in population or lamb ratios. Bill Jex: In BC, I believe that concentrating wild sheep is dangerous, from a disease perspective. BC has outfitters that are putting out their own blocks, with the thought that it will produce better rams.

- 2. Kevin Hurley: In 2016, BLM came out with strong direction toward ensuring effective separation between DS and wild sheep. The USFS had some very effective separation policies in 2011, but backed off of them in recent years, due to politics. WSF would sure like to see the Chugach NF implement similar restrictions in their final land/resource management plan. Aaron Bloomquist: the Cooper Landing area on the Chugach NF is the most vulnerable area in Alaska for DS and THS disease transmission; distances of separation are only a few hundred vertical feet, not miles. Any help the USFS could do with the Alaska WSF Chapter's effort would be appreciated. Cheryl Carrothers: I agree.
 - a. <u>Action Item #2</u>: Cheryl Carrothers will pass on concern of high-risk disease transmission between DS and THS to USFS decision makers on the Chugach NF.
- 3. Helen Schwantje: In BC, we are working to update a 2003 Camelid Risk Assessment; hopefully, this update will give us some resolution to the camelid question. Kevin Hurley: In AK, per BOG regulations, you cannot use pack goats or llamas for hunting, but you can use them for non-hunting recreation. WSF would like to see these domestic animals banned from THS range on all federal lands in AK year-round.
- 4. Mark Richards: With the distance-sampling method you don't get ram numbers and age structure, which ADF&G needs to refine harvest strategies; do the federal biologists have any plans to modify your surveys to obtain ram full-curl information? Kumi: We are planning on using a mixed model to get better estimates on ram age structure. McCrea Cobb: The sightability model only performs well in small area surveys, so you need to tailor your efforts to the scale you want surveyed.
- 5. Jack Atcheson, Jr.: Have you done any mapping of crucial THS winter ranges? Jen: We do have some important winter areas, but they vary drastically from year to year, due to weather conditions. THS have such large habitats that crucial winter ranges are not well defined. Wayne Heimer: THS in the White Mountains have huge habitats in winter, and are required to adapt to winter weather changes by moving. Jen: Early snow-melt areas could be modeled to identify important winter ranges in the Brooks Range. Tom Lohuis: Our radio-collaring work in the Chugach and Wrangell Mountains will help us with fine-scale refinements necessary to identify persistent snow levels on important winter ranges.

Day 2 Morning

MOVI IN WILD SHEEP: MANAGEMENT-RELEVANT RESEARCH - <u>Presented by Dr. Peregrine</u> Wolff, State Veterinarian, NDOW, for Dr. Tom Besser, Rocky Crate Chair, WSU

Research at WSU on the respiratory bacteria *Mycoplasma ovipneumoniae (Movi)* has centered on: 1) What causes BHS pneumonia? 2) Where does it come from? 3) What can be done to prevent it?

In the Hells Canyon BHS meta-population, large die-offs occurred after *Movi* was introduced in a herd. Surviving BHS carry persistent infection after the die-off, adversely affecting lamb survival for up to 20 years. Lamb deaths occur 28-70 days after birth. Some of these BHS herds are managing themselves into extinction. After looking at the lungs of pneumonic lambs, we found lambs already had a smorgasbord of disease pathogens, documented from throat cultures. So, we looked at pre-clinical lambs (no sign of pneumonia) with ages between 10-20 days, and found no *Movi*. *Movi* gets on the cilia cells in the pharynx and causes them to be dysfunctional. This opens up the pharynx, and eventually opens up the lungs to a host of other bacteria staging in the back of the throat; these bacteria want to get into the lungs where they can feed on blood. Some of these bacteria lead to pneumonia and eventually death.

What causes BHS pneumonia? *Movi* is so important because it compromises the cilia and lets bacteria descend into the lungs. When we look at pneumonic lamb bacteria, it is identical to adults. From documented die-offs in the lower 48 states, every clinically-pneumonic BHS that we tested had *Movi* detected. In comparison, when we have tested BHS herds that have never had a die-off, *Movi* is not detected in PCR cultures. Serology tests, which show whether an animal has ever been exposed to *Movi*, have also not detected the presence of *Movi* in BHS herds that have never had a documented die-off.

BHS with observed pneumonia showed evidence of *Movi* in 42/42 cases. *Movi* is the first bacteria to infect the lungs. When we look at the genetic strain-type in these BHS die-offs, we find a single strain of *Movi* spread across the adults and lambs that end up dying. That same strain is persistent year after year in surviving adults. All age die-offs occur when a *Movi*-positive animal (domestic or wild) is exposed to a *Movi*-negative herd. In addition, when a *Movi*-positive animal with a different strain enters a herd without any immunity to that strain, a die-off can occur. Experimental exposure of *Movi* in pen trials reproduces the same pattern as found under natural conditions. If we don't think that *Movi* can affect THS, in late spring 1986, the Toronto Zoo had a major die-off of THS after contact with domestic sheep. *Movi* needs a live-animal source, which means the bacteria can't persist in the environment. *Movi* infects only sheep and goats (Caprinae), and is very rare in other species.

Where does *Movi* come from? Likely sources of *Movi* are infected domestic sheep and goats, and wild sheep that have been previously exposed but have not died. We have recently found that mountain goats can also become infected and be a carrier, similar to BHS. However, this is rare, and mountain goats are not usually attracted to BHS. *Movi* strains in Hells Canyon have moved throughout BHS herds, through time. It is important to note that Hells Canyon is primarily continuous habitat. Occasional re-infection by BHS may be occurring, and might explain why lamb recruitment is often cyclic.

Most DS farms carry *Movi* of multiple strains. Of 450 U.S. flocks sampled by USDA and WSU, 88% of the animals tested were positive for *Movi*; that percentage may not apply everywhere. In BHS die-offs, one strain seems to dominate. *Movi* does affect DS, primarily young animals, with coughing syndrome, which leads to lower weight gains. In a USDA domestic sheep study in 2011, animals without *Movi* reported much fewer pneumonia cases. In a study in Idaho and Washington State, researchers found 7% less weight gain in domestic lambs with *Movi*.

There have been numerous pen studies over the past 25 years that have mixed domestic sheep with BHS; greater than 95% of co-mingled BHS have died. When other studies mixed cattle, horses, and llamas with BHS, less than 10% of the BHS died. Tom repeated some of these same pen studies with *Movi*-negative DS, and found no die-offs in BHS.

So, what happens in the field? We have confirmed through DNA finger-printing that *Movi* can be transmitted under natural conditions between domestic sheep and BHS, and between domestic goats and BHS. We believe transmission can go either way. The problem is, we have never taken a naïve BHS population and intentionally exposed them to domestic sheep. In Nevada, we recently had a major BHS die-off; the strain of *Movi* was identified, and we determined it did not come from any nearby BHS herds.

The disease could not have come from a mountain goat, since we do not have mountain goats in that region in Nevada. Consequently the strain that killed the BHS had to come from a domestic sheep or domestic goat source. It is problematic to find the strain in a nearby domestic flock, since it is hard to get permission; they can have hundreds of animals to test, or have multiple strains to look for.

What can be done about BHS pneumonia?

- 1) Minimize exposure to domestic sheep and domestic goats, and Movi-infected BHS;
- 2) Vacate or close public land grazing allotments that have high risk of contact;
- 3) Educate private-land domestic sheep and goat producers about the need for effective separation;
- 4) Create effective spatial and temporal separation through fencing;
- 5) Collect stray domestics, as soon as possible;
- 6) Report BHS that are in or near domestic flocks;
- 7) Eliminate Movi in domestic sheep and goats;
- 8) Minimize contact with infected BHS (either test-and-cull, or eliminate the whole BHS herd)

Creating a BHS that is resistant to *Movi* has been explored; the problem is there are so many strains, that total immunity is unrealistic. Developing a vaccine that would increase specific host-resistance has been tried for 20 years in domestic sheep; none of these vaccines have proven effective in domestic or wild sheep. Tom Besser predicts that an effective vaccine will not be found in the next 20 years.

Q&A FOR MOVI PRESENTATION

- 1. Jane Harms: What types of DNA finger-printing techniques was Tom using to identify different strains? And, were the 5 different strains in Hells Canyon only found there? Peri: Tom is using a MLST technique using 16S and moved to a 4-loci gene. Tom has a graduate student working on a map of all *Movi* strains found in BHS die-offs. It is obvious there are clusters of strains by region. Tom is looking at genetic ancestries for the different strains. NDOW is monitoring 5 different strains in Nevada that have caused major BHS die-offs. The 5 strains in Hells Canyon are specific to that region. Some *Movi* strains are probably less virulent than others.
- 2. Kevin Hurley: Tom has said that in a flock of 1,000 DS, there could easily be 50 different *Movi* strains. Peri: That is only important if you are trying to make a specific case; we have shown in natural conditions, after DS and BHS make contact that a shared strain occurs in both.
- 3. David Payer: As I look at those potential mitigation factors, has there been any quantification of the effect of stress on wild sheep? Peri: I don't believe there have been any studies. A BHS herd in Lake Mead in the Grand Canyon has a huge amount of human activities immediately adjacent to them, and they have been healthy for years. It was not until they came in contact with *Movi* from DS that they ever got pneumonia and started dying. There are many more examples of BHS living with a lot of human activities, and never showing signs of reduced health. Kevin Hurley: Western fish and game agencies have had a greater than 98% survival rate on radio-collared BHS after net-gunning, capture, testing, and release. Peri believes that the crowding and transmission of pathogens increases the potential for pneumonia, more than any combination of stress factors.
- 4. Bill Oestrich: What research has been done on distances of virulent pathogens traveling in the air? Peri: Tom's study at WSU showed that transmission of pathogens from clinically sick BHS traveled 33

- feet (10m). Kevin Hurley: In South Dakota, graduate student Brandy Felts reported, under captive conditions, that virulent pathogens were transmitted ~375 feet (114m) from actively-sick BHS.
- 5. Jane Harms: What is your take on intermittent shedding? Peri: Some individuals seem to clear pathogens and never get that strain again. Some individuals become infected, and if isolated, can clear the pathogen, but they remain an intermittent shedder. There is also about 5-20% of a group that remains as chronic carriers, and always remains positive.
- 6. Ted Spraker: My understanding from your talk is cattle, horses, and llamas do not transmit *Movi*? Peri: Correct, *Movi* is specific to domestic sheep and goats. However, other disease agents are present and do represent a very small risk to BHS. We are not eliminating 100% of the risk, but almost all risk.

DISEASE STATUS, SURVEILLANCE, AND CHALLENGES

Dr. Kimberlee Beckmen, Wildlife Veterinarian, ADF&G

THS serology has been taken from live captures, post-mortem exams, and hunter harvest. Serology surveillance from 531 samples collected from 1971-2016 has shown the following antibody responses:

- 1) Q-fever (which causes abortions) was found in all populations except the Brooks Range;
- 2) Leptospirosis was found only in the Brooks Range (200 different strains) in THS;
- 3) We have found clinical sickness from leptospirosis in 1 moose and 1 caribou;
- 4) For sore-mouth, we have positive serology everywhere except the Brooks Range; we have clinical cases of sickness in Dall's sheep lambs;
- 5) Bovine Viral Diarrhea has been found in THS in the Kenai and Yukon Upland Ranges;
- 6) Brucella was negative for THS in all areas,
- 7) Para-influenza Virus and Respiratory Syncytial Virus were both found in THS in the Yukon/Tanana and Brooks Range, but not in the Kenai and Chugach Ranges. It should be noted that Para-influenza virus was transmitted from cattle to bison in the Delta area during the 1980's;
- 8) *Movi* was negative in all THS sheep ranges; we did have one animal test *Movi*-positive from the Central Brooks Range in 2009, but feel it was just a cross reaction with another *Mycoplasma* species. We have never had any mortality, from any *Mycoplasma* species, in any wildlife in AK.

For PCR cultures, Tom has found 50-60% of THS are positive for Pasteurella species. So, these pathogens are endemic in THS populations, but at a very low level. Rarely do any of these pathogens manifest as clinical sickness in THS. PCR cultures have never found *Movi* in AK THS.

From necropsies from dead THS sampled from 2014-2016, we found most died from bacterial pneumonia. Lungworms can be significant, with some mortality. Other parasites found were sarcocystis, Besnotra, Whipworms, and Colonial Pinworms. Some cases of bronchio-pneumonia, contagious foot rot, and contagious ecthyma were found. There has only been one disease-related, documented die-off of THS, and that was from contagious foot rot weakening the animal and causing bacterial pneumonia.

Selenium deficiencies were found in most AK THS (compared to DS requirements). In the Kenai and Mat-Su areas, severe deficiencies were noted, while the Brooks Range had high levels. Zinc and Copper vary widely by mountain range; Molybdenum, Manganese, and Iron don't vary much throughout AK.

Summary: There is evidence of a limited presence of a small amount of endemic pathogens, but overall, AK THS herds are healthy. There is no recent evidence of transmission of domestic sheep or goat pathogens to THS. Due to the remoteness of Alaska, getting useful samples or even detecting die-offs will always be a challenge. Regulations preventing contact between domestic animals and wildlife are important.

Dr. Helen Schwantje, Provincial Veterinarian, BC MFLNRO

I would like to point out we have had die-offs in BC, but never with THS. There have been a whole host of pathogens involved. In the South Okanagan BHS die-off, we did find *Movi*. Contact with domestic sheep usually causes impact. We have seen cyclic die-offs over the last 80 years, but in the last 10 years, we now have molecular techniques.

A lot of the die-offs in western United States BHS have occurred among bighorns transplanted from Canada. The Canadian BHS were fine until exposed to a whole host of pathogens in western states; these naïve BHS are particularly vulnerable.

For Stone's Sheep, we don't know a lot about their pathogens. We have seen hair loss from winter ticks, parasitic or viral lumps, jaw tumors, arsenic poisoning from gold extraction, lumpy jaw, and some reports of what we believe is sore-mouth. We did transplants of THS to northern BC near Atlin, and I took samples. We did a radio-collaring study in the Fort Nelson area, and I have a lot of samples from that work. We now have a graduate student to analyze all those THS samples. We still have much to learn, especially with regards to the standardized testing we all currently aspire to accomplish.

I think *Movi* is important, but it has never been found in Stone's Sheep. When captured in February 2017, 13 Stone's sheep from the Tahltan/ Dease Lake area were all found to be negative for *Movi*. We have only had one positive *Movi* in the province via PCR, and that was with BHS in the Chase herd, after a die-off. We found only 5 positive *Movi* via serology, and that was also after a die-off.

Our new project in cooperation with the Tahltan Central Government, TGOA, and WSF will use funds to compare THS pathogens with BHS. We do have issues with remoteness and obtaining accurate samples. We are also updating our 2003 Camelid Risk Assessment toward wild sheep and mountain goats, and are now in a draft stage. We need to do a better job of communicating with the general public and key politicians. A team approach is needed to solve disease problems. We have about 50,000 domestic sheep and goats in the entire province, and MFLNRO doesn't regulate them.

With our friends in the Ministry of Agriculture, we put on 6 different biosecurity workshops on general health of small domestic flocks, and the importance of maintaining separation from wild sheep. We tested domestic sheep and goats (in 3 regions of BC, on 10 different farms/region) with PCR techniques and found 9/30 flocks tested positive for *Movi*. In comparison, this is much less than in other areas. We are going to continue our outreach to educate domestic sheep growers. We want to work more with Tom Besser in developing *Movi*-free domestic sheep herds. We are looking at opportunities for legislation that eliminate DS flocks in some high risk BHS and THS ranges and/or require *Movi*-free farm flocks.

Dr. Jane Harms: Environment Yukon Animal Health Unit

There is very little domestic sheep or goat presence in the YT (probably less than 1,000), and most are concentrated near Dawson City or Whitehorse. There is very little overlap with THS habitat. We have never had any evidence of a die-off. So, we are very much behind in sampling THS health, but we do have lots of questions concerning pneumonia.

Enough evidence exists that would suggest THS would act similar to BHS when exposed to virulent pathogens. There are some records that indicate lumpy jaw was found in 20-30% of the THS sampled, while sore-mouth was occasionally detected. Since 2015, we started collecting nasal samples from hunter-harvested sheep (using a deep nasal swab). Of 87 samples tested thus far, all were negative for *Movi*. From 9 necropsies on dead THS, we found no evidence of bacterial pneumonia.

We contracted with the Canadian Wildlife Health Cooperative to complete a YT THS disease risk assessment (March 2016) which provided some mitigation measures and management recommendations. This document:

- 1) quantified a lack of information;
- 2) concluded that the risk is real, and effective separation is important; and
- 3) concluded that the risk is low, but consequences to THS could be extensive.

We are implementing a communication effort to educate the DS growers in YT; we want to conduct some workshops to help with this educational effort. We do have a response plan for when and if contact occurs. The YT Government does have containment regulations on grazing of domestic animals, and could implement them if needed. The YT Government has a new proposed regulation under the Animal Health Act that would require clinically-sick animals to be tested. We do have a policy in YT Parks that no camelids are allowed. Our challenges are political legislation, acknowledgement of the risk of contact by those in the agriculture industry, limited data for THS and DS health, wild sheep crossing jurisdictional boundaries, and whether guard dogs are effective.

Heather Sayine-Crawford, GNWT Environment and Natural Resources

Currently, we don't have a program for disease surveillance. NWT is extremely remote, and the challenge is just getting there to obtain good samples. Communities are very small and very remote. From the limited samples we have obtained, no *Movi* has been found. There has never been any large-scale THS die-offs reported in NWT, from any pathogens. However, we have had a few sporadic cases of pneumonia in THS from Pasteurellaceae and lungworms. We have had some lumpy jaw reported, and one case of orf. I have plans to obtain samples from outfitter/guide-harvested rams.

Q&A ON DISEASE STATUS, SURVEILLANCE, AND CHALLENGES

1. Peri: We have sampled some hunter-harvested rams in Nevada. What we have found is, if any moist tissue is remaining, we have been able to obtain good *Movi* samples, even from frozen carcasses. The windpipe all the way down to where it branches into the lungs is good to take samples from. Also, the

- nose and head area below where the taxidermist cuts off the skull plate can yield good samples. The remaining head can just go into the freezer, with the intent of taking samples, at your convenience.
- 2. Kevin: Would you talk about sinus tumors? Peri: This emerging disease issue is very real in the lower 48 and Alberta where there is sinus-lining destruction, which leads to cancerous tumors. Dr. Karen Fox in Colorado has been leading the challenge of trying to find out what this is. They put some of this paranasal virus in DS and BHS lambs and found both species came down with these tumors. Colorado has since found it in healthy BHS, and it does not seem to be a problem, if *Movi* is not present. However, the area around the tumor harbors a huge amount of viruses and bacteria. In Nevada, we have found it in several BHS, so we are now looking at hunter-harvested skulls.
- 3. Heather: Are guard dogs effective in keeping BHS from DS? Kevin found/displayed a slide that showed a guard dog with DS and a BHS casually feeding in the background. Helen: Believes guard dogs can be a protective barrier, if trained correctly. There is a big difference in each dog's abilities. Tim Schommer: I had experience with a large number of DS operations over many years; these allotments were on large, open, rugged public lands, and had DS numbering over 1,000 animals. All of them had guard dogs. These large operations typically grazed over large areas during the day, and were spread out. Under these conditions, we had several examples of BHS getting into these flocks or DS wandering off and joining BS. From my experience, we did not see guard dogs as being effective at keeping BHS away from DS. In situations with smaller, more-confined flocks, guard dogs may provide some protection. No published studies have evaluated the effectiveness of guard dogs.
- 4. Aaron Bloomquist: Would hunter-harvested samples be good for baseline health monitoring? Peri: Any information that you get can be used to establish your baseline. Wild sheep can die from a whole lot of things. There are many tissues that are good to take. Make a list of what's practical to test for, and see if your hunters can help you obtain tissues/samples.
- 5. Tony Kavalok: What is the impact of *Movi* on muskox? Peri: There were 2 outbreaks of *Movi* in muskox in Norway. I believe muskox are at risk. Kimberlee: We just published our health assessment of muskox in the Journal of Wildlife Diseases, and we reported serological evidence of exposure to *Movi*.
- 6. Chris Barker: Can llamas and alpacas which are with domestic sheep and goats transmit *Movi* to wild sheep, and will that be addressed in the Camelid Risk Assessment revision? Helen: We do not know at this time, but it needs to be researched; I expect that it is possible.
- 7. Wayne Heimer: Don't forget about other pathogens playing a big role in wild sheep pneumonia besides *Movi*. Peri: The new molecular technology has cleared up what has been going on the past decades. When pathologists have gone back to old tissues from die-offs many years ago, *Movi* was always present. Interestingly, the same strain that led to the first die-of, was still virulent ten years later. *Movi* is not new.
- 8. Bob Cassell: Do we know why domestics that have *Movi* don't exhibit disease? Helen: DS have been selected over time to survive many diseases and have built up immunities.
- 9. Dan Montgomery: Do you think it would be a good idea to expose THS to DS, and see if it causes death? Peri: Personally, I don't think it is necessary, and it would be unethical; THS have already died at the Toronto Zoo.
- 10. Jim Herriges: AK THS ranges are very big and continuous. If they got infected with *Movi*, how far of an impact would it have, and for how long? Peri: In Nevada, where we have continuous habitat, we have seen BHS and their *Movi* pathogen move across many herds and many mountain ranges. Kevin Hurley: It can be like a wildfire; with continuous distribution of THS, where is the fuel break? Helen:

Since you have more predators in THS habitat, the spread of disease could be reduced. Jack Atcheson, Jr.: There is an area in Montana about 100 X 100 miles that is in mountainous sheep habitat with big valleys; in the course of about a 7-week period, disease went through 5 different core, native BHS populations, killing about 1,500 bighorns. If pneumonia ever gets into THS range, you will not believe what it will do. Mike Cox: In Nevada, we have had rams move a hundred miles or more; the whole state is connected, and if disease ever gets into a herd, it could spread across Nevada.

11. Gray Thornton: What is the lower 48 state's response protocol, for when DS and BHS make contact? Kevin: In Wyoming, if we had known, suspected, or likely contact between a BHS that got into domestics, we would capture the BHS if we could. If live-capture was not possible, that BHS would be killed. Virtually every state agency in the lower 48 has a contact response protocol in place.

STRATEGIES TO MAINTAIN DISEASE-FREE THINHORN SHEEP

Dr. Bob Gerlach, AK State Veterinarian

This is a very complex issue. Different individuals pick up pathogens at various rates. Each of our immunities to certain strains is also different. We have to be careful at how we interpret diagnostic tests. AK covers a huge area, and we don't have many domestic animals, so we don't want to take actions that have worked in the lower 48 that don't fit here. Based on a 2012 inventory, we have about 106 farms in AK with an estimated 1,368 DS, yielding an average of 13 domestic sheep or goats/farm. We have no free-range grazing, and domestic sheep and goats are required to be contained and fenced.

AK-WSF and ADF&G have collaborated with the Alaska Farm Bureau and my agency to form a Sheep Disease Working Group. Meetings have led to a census of farms which have sheep and goats. They grouped the farms into 6 geographic areas, and found there are \pm 1,368 domestic sheep and goats in AK, as of 2012. Everyone at our meetings wants healthy DS and healthy THS. I developed a protocol for sampling DS health; the sampling effort is voluntary, and results will be kept confidential. Samples of serology and nasal swabs will be taken by vets and sent to USDA ARS and the Washington Animal Disease Diagnostic Lab (WADDL) at WSU in Pullman, WA. We want to use the data to make science-based decisions. We need to evaluate whether we want to pursue disease-free status for AK.

Kevin Kehoe, President, AK-WSF

Our working group's goal is to prevent *Movi* disease for THS while minimizing the impact on DS growers. Maintaining the traditional lifestyle of growing domestic animals in AK is important. What is at stake for AK? We have about 25% of all wild sheep in North America. No documented cases of *Movi* have been found in Alaska, yet. Our THS range maps are probably not detailed enough to adequately evaluate risk. We don't have much reliable data on foray distances for THS and/or muskox. Because of all the past disease information on this issue in the lower 48, the AK working group was able to skip past the science argument. After Peri Wolff's presentation to our group a while back, we all agreed that we pursue this issue with disease prevention as our goal.

One of the challenges for the AK working group was that most DS producers were not registered and don't want to be required to have a permit. We identified and discussed potential solutions, such as buffer zones, double-fencing, and disease-free domestic herds, and combinations of all three. For our working group,

Bob brought in the current regulations on livestock grazing in AK, and made it clear he was ultimately responsible for their implementation and ensuring DS and THS separation. The working group discussed who would have to be responsible for maintaining and monitoring separation. The DS growers are very supportive of testing for disease, and want to do it once and do it right. The AK Chapter of WSF has offered to pay for the testing and any replacement of animals. Kevin Kehoe estimates about \$400,000 will be needed to test these animals, including any replacement costs. The idea of a certification for disease-free animals was well received. New importation restrictions would have to be implemented. Testing domestics would continue to be voluntary, unless and until a law was approved that would require it.

Jeremy Ayotte, BC Sheep Separation Program (SSP) Coordinator

The BC SSP Program was started about 15 years ago after a large BHS die-off occurred in the South Okanogan Region. My role is centered on education, engagement of all parties, assisting with mitigation measures, buyouts, and supporting research, policy, and regulations.

We have about 13,000 THS in northern BC and 6,500 BHS in southern BC. We roughly have about 50,000 DS in the province, with about one third in regions with wild sheep. Only about 5% of the DS overlap highrisk wild sheep areas. In the Thompson/Okanagan Region there are about 3,600 BHS and 12,800 DS. In the Kootenai Region there are about 2,200 BHS and 1,900 DS. Most of my work is focused on private lands within these two regions. Even though we are talking THS today, the following BHS separation issues can also apply in THS range.

Education is a huge key for separation program activities. We have made a lot of progress on refining our BHS habitat ranges and documenting foray excursions. Habitat data was used to determine minimum-distance buffer zones in high-risk areas. We are starting to get away from double-fencing, due to costs. When BHS come into contact with DS, the policy in BC is to destroy the BHS. A lot of my effort goes to coordinating reports and other data with Government (Ministry of Agriculture and Ministry of Forests, Lands, and Natural Resource Operations), DS growers, NGO's, and First Nations. A comprehensive Gap Analysis led by Andrew Walker highlighted the need for exclusion of DS in THS habitat, and continued political pressure to prevent contagious disease.

We have done some small buyouts of DS operations in the past. Conversions from sheep to cattle grazing will continue to be emphasized, where appropriate. We have talked about a wild sheep-safe program where DS raised outside of high-risk BHS areas would be highlighted, and incentives could be given. We have developed a DS registry to develop where producers are located, and how many DS they have. In high-risk portions of the province, we are using a modified Risk of Contact tool the USFS and BLM created in the western states.

Working on a farm-by-farm basis has led to our share of frustrations. An overarching legislative approach would go a long way toward a more permanent solution, and could significantly reduce costs. Creating *Movi*-free DS flocks has tremendous potential for solving this issue in a manner that can be supported by industry. What has worked thus far in BC includes:

1) informal open communication;

- 2) site-specific risk reduction;
- 3) refining wild sheep distribution maps;
- 4) local ownership;
- 5) risk of contact tool/analysis;
- 6) wild sheep registry (GIS mapping of wild sheep distribution);
- 7) regulatory options for ex., Animal Health Act;
- 8) productive partnerships;
- 9) collaborative projects;
- 10) buyouts; and
- 11) conversion to cattle.

Chris Barker, WSF Board and WSSBC

After 12 years of educating government officials on the disease science, they are still not willing to approve any legislation to address this issue. I have spent a lot of time talking to DS growers, and feel it is paramount to find out why they have DS. One example was a private landowner who did not want to get rid of his DS. After asking him why, he said he was concerned with wildfires. So, we offered to mow the guy's pasture for 5 years, if he got rid of his domestic sheep; he accepted that offer. A second example was at Spence's Bridge, where a landowner had DS near BHS habitat. We spent 4 hours with him, and found out he loved to hunt, and did not want to be responsible for creating a BHS die-off. We offered him a cash incentive in the amount that would be necessary to build a double fence; he took that deal, and got rid of his sheep.

We are trying to re-authorize a bylaw that would require a DS grower (which has greater than 25 DS in high-risk areas) to have mitigation measures to reduce that risk. We would like to re-activate the exclusion of DS in First Nation areas that have high-risk THS habitat. We now have a restriction on use of DS for packing during hunting seasons. We are looking into a pilot project to produce *Movi* free lambs for 4-H. We still need legislation to implement these mitigations.

<u>Dan Reynolds: Yukon Outfitters Association/Dawson Renewable Resource Council, Graham Van Tighem, Yukon F&W Management Board</u>

After several meetings on this issue, our Renewable Resources Councils were able to get a resolution unanimously approved in May 2015; this was advanced to Ministry officials, recommending action. To date, Ministry officials have been slow to act. This resolution provided specific recommendations to achieve effective separation between DS and THS.

Our primary concerns as we move forward are: we need to address information/data deficiencies, education, and voluntary compliance. Strong, proactive management strategies are needed. No more disease research is needed, to evaluate whether separation is necessary. We recommend the following management strategies:

- 1) develop a regulation to require DS documentation and containment;
- 2) separation is the best strategy;
- 3) mandatory disease testing of domestic sheep and goats in YT;
- 4) clarify buffer zones around THS;

- 5) require mandatory separation measures for farms;
- 6) require registration of DS and map their locations;
- 7) a unified approach from all partners, throughout the YT; and
- 8) mandatory compliance and enforcement.

<u>Heather Sayine-Crawford: Government MWT Environment & Natural Resources, Tavis Molnar AMMO.</u> We see no reason why DS can't be banned from west of the MacKenzie River to the YT border, because there are no roads or people. All risk (although considered small) to THS comes from the Yukon side of the border. Muskox range does overlap with THS, on occasion. If muskox ever contracted *Movi*, a potential disease issue with THS could occur.

We are currently assisting our NWT Agriculture Department in developing an Agriculture Strategy that would help protect wildlife. We have proposed to:

- 1) register all DS and require testing;
- 2) prevent any interactions through effective separation measures; and
- 3) not allow any domestic sheep, goats, and llamas in any Dall's sheep habitat in NWT (MacKenzie Mountains and North Richardson Ranges).

The next step on this legislation is to consult with Co-management Boards. We currently don't see much resistance from the public, so we anticipate approval in 2018.

O&A ON STRATEGIES TO MAINTAIN DISEASE FREE THS

- 1. Jack Frost: In some large regions in AK we have no THS at all; should we consider transplanting THS into these areas? No comments provided.
- 2. Mark Richards: Feels the AK Chapter of WSF needs to slow down on its Proposal 90 to the AK BOG, and work more with the producers, before going forward. Kevin Kehoe: We appreciate the feed-back, and hope to continue working with DS growers. We feel nothing has been done on this issue in the last 20 years, and we just cannot wait. Bob Gerlach: The AK BOG does not have the statutory authority to act on Proposal 90 so, moving it forward will continue to frustrate some DS growers. We need to look at our statutory authority, and how we will move forward. Our AK Working Group feels that now is the time to move forward. If we can at least get certification and identify which farms pose the most risk, we can reduce the risk. Jack Atcheson, Jr: We have to look at the big picture; the enemy is not the domestic sheep, but the disease. We need to keep the focus on healthy DS and healthy THS.
- 3. Becky Schwanke: Specifically, who is offering to pay for the DS disease testing? Kevin Kehoe: The AK WSF Chapter is committed to pay for DS testing. If voluntary certification would become widespread, Proposal 90 could possibly go away. Bob Gerlach: The Farm Bureau is also looking at putting in money for DS testing and certification.
- 4. Becky Schwanke: How are animals that test positive for *Movi* going to be handled? Kevin Kehoe: We have not worked out the details yet, but that needs to be addressed. It is possible that farm animals could be processed for meat, but pets is another issue. Bob Gerlach: Mitigation measures will depend on how many animals test positive; currently we don't know.

- 5. Bill Jex: From our BC perspective, legislation is a very complex and time-consuming process; it is very hard to get passed. Our regulation to ban use of domestic animals for packing while hunting took about 14 intense months to get passed, and was very challenging.
- 6. Wayne Heimer: Between the outfitters, ADF&G employees, and an army of Alaska hunters, we have been able to keep the domestics out of THS range; that will continue until any regulations are developed.
- 7. Lew Bradley: Was there a potential problem with the mountain goat that made contact with DS near Palmer? Kevin Kehoe: We do not know for sure if contact was made, or not; it should have been handled differently (the mountain goat should have been shot instead of being moved to another area and released). This is the scenario that we have been talking about. Tony: We do not currently have a response protocol for disease sampling and removing THS after contact with DS; we are working on a protocol. Kevin Hurley: I know of 10-12 jurisdictions that have response protocols; these could be shared widely. You don't have to start from scratch.
 - a. <u>Action Item #3</u>: Mike Cox, Kevin Hurley, and Clay Brewer will gather existing jurisdictional response protocols; Kevin H. will forward to THS stakeholders email group.
- 8. Brian Bagley: Are there other species and disease issues out there to use as an example, so we don't have to start from scratch? Kevin Hurley: CWD for cervidae is a good example.
- 9. Ted Spraker: He is very appreciative of the information presented today. When he worked for ADF&G, they had several cases between DS and wildlife. They usually never took any chances, and always shot the wildlife. An example was a moose got into some domestically-raised elk and bison, and the moose was shot. They had a lice infestation in wolves on the Kenai in 1982; the recommendation was made to kill 14 infected wolves. The wolf preservationists would not allow the proposal to get approved; that lack of action led to the spread of lice in wolves in many areas of AK today. The BOG has limited authority on disease issues like this one for THS; the BOG takes this issue very seriously, and does not want to see a disease outbreak in AK. Darren Bruning: Each ADF&G Region is equipped differently in responding to domestic animals contacting wildlife; we can and do share experiences and successes with other regions.

Day 2 Afternoon

O&A ON ROLES, RESPONSIBILITY, AUTHORITY, ACCOUNTABILITY

- 1. Helen Schwantje: The BC Government doesn't put high emphasis on wild sheep; other species and issues such as moose and caribou often take higher priority. Kevin Hurley: There are several examples of BHS advocacy groups taking a stand and forcing change through political support. A recent example was the WSF pushing to make the BC THS management plan a priority. Due to changing priorities, NGO's will need to continue this push. How do we make sure any delays don't happen again? Chris: We have a new director of F&W in BC, and we need to keep urging the need for finalization of the BC THS management plan. Kevin: Using BC as an example, we have the Wild Sheep Society of BC, BC Wildlife Federation, Guide and Outfitters Association of BC, First Nations, and others who share common values and goals; pooling together all these NGO's should be quite a force in getting wild sheep priorities to the top. Joining forces on what you agree on is a strong coalition.
- 2. Wayne Heimer: What do you want from a management plan in AK, and what would be different and better? Kevin Kehoe: In August 2014, Kurt Alt of WSF put together a skeletal framework/checklist for what should be considered when working on a comprehensive management plan. AK-WSF will not dictate what is in the AK plan. Kevin Hurley: WSF is more concerned with plan implementation than

plan development. The plan should be for wild sheep, and it should identify what can be done to improve wild sheep management. WSF does not want to get involved in jurisdictional harvest allocation battles between residents and non-residents; WSF is most interested in increasing wild sheep populations, so individual jurisdictions will have more of a resource to base harvest allocation on. Wayne Heimer: Is it worth \$200,000 to complete a management plan? Kevin Hurley: THS in AK do have issues needing resolved, consequently WSF would like to see something better than the current status quo and 40-year old regional Dall's sheep plans. For NWT, they have very little change needed, so the focus should be on how we maintain what currently exists in NWT.

- 3. Mark Richards: In AK, all trends (for rams) are going down over the last 30 years; the main focus to help THS should be to change the harvest allocation. Kevin Hurley: Does the whole effective separation issue have merit in AK? Mark: The disease issue does have merit, but not the same as allocation. Kevin Kehoe: This allocation issue is an AK issue only, and should not be addressed in this forum.
- 4. Cheryl Carrothers: To address the DS/THS separation issue on the Chugach NF, I need good THS distribution maps. Are they available? Kevin Kehoe: Yes, but they do need to be refined.
- 5. Aaron Bloomquist: He would like to see collaboration between jurisdictions on management of THS along the borders. In addition, he would like to see better collaboration between government and hunters in AK, on all issues. Kevin Hurley: On the wild sheep disease issue, the jurisdictions are already collaborating very well together; there is also a lot of collaboration with Troy, Tony, Darren, and others on THS management. Helen: When one of us has a good idea for wild sheep, make sure we are sharing reports and or data with other jurisdictions; it would be really good for each of the State/Provincial/Territorial-level veterinarians to talk together about DS grower pushback, regulation details, and political support. Bringing Dr. Bob Gerlach into this group would be a good idea.
- 6. Lance Kronberger: We have lost a lot of great THS hunting to National Parks in AK; we need an effort to rewrite the subsistence rules for resident hunters, and now might be a good time to do it with a new administration.
- 7. Bill Oestrich: Who has worked on wild sheep goals, and what has the outcome been for wild sheep? Kevin Hurley: Looking at *N.A. CV2020* THS Goal #2 as an example: Each jurisdiction has made a lot of progress on developing regulations toward effective separation; we still have a long ways to go, but we are making progress, and sharing what's working is important.
- 8. Loren Karro: I would love to get a copy of the 2015 Renewable Resources Council Resolution that was approved in the YT in May 2015.
 - a. Action Item #4: Kevin H. will email the May 2015 YT RRC resolution letter. [Done 5/15/2017]
- 9. Cam Rader: What is the deliverable for each goal? The goals are pretty broad. What can I do to help these get completed? Kevin Hurley: In part, you are helping to achieve these goals by being here. WSF is trying to be a catalyst for getting these goals accomplished. If we do THS Summit III in 3 years, we want to be able to tick off the list of what got accomplished. Kevin Kehoe: You can help by getting on a committee and specifically working on the details of a particular goal.
- 10. Becky Schwanke: There are road blocks that continue to surface on completing some of these THS issues. Having a concentrated effort, through a collaborative effort, for whatever time frame, is needed. Use the people in this room to reach out and get their perspective before you go to your legislators. Kevin Hurley: I look at what has occurred in the YT with the separation issue and I see great collaboration of key agencies, outfitters, vets, First Nations, Yukon Fish and Wildlife Management Board, YK-WSF, YFGA, and resident hunters working toward reducing risk.

- 11. Dr. Jane Harms: We will have to get the agricultural interests at the table, or nothing will go forward. Kevin Hurley: Using that example in the YT, who is responsible to make that happen? Jane: That falls on the Environment and Agriculture Branch Ministries; we are starting to open up that process. Kevin: What WSF is looking for is continuing "forward progress" on these issues.
- 12. Chris Barker: We need to reach out to people to get involved and form collaboration. In the Wild Sheep Society of BC, we have formed working committees to tackle details of these priorities; we are also developing a WSF Chapter & Affiliate liaison committee with other jurisdictions to share ideas and successes.
- 13. Gray Thornton: I recommend we shift gears, and do a 3-year report card on priorities identified at THS Summit I. Kevin Hurley: Using YT as an example: 1) Is there a comprehensive THS plan underway? No 2) Are regulations in place to prevent contact between DS and THS? It's moving forward. 3) Build trust, partnerships, and awareness? Good progress continues to be made. 4) Improve communication and collaboration? I would say so. 5) Habitat Distribution Mapping? Some progress has been made. 6) Predation management? Nothing comprehensive is being done. 7) Protection and Enhancement of Habitat? Not much has been needed. We can create a "report card" for each jurisdiction, to measure tangible progress.
- 14. Jack Atcheson, Jr: Looking at the THS distribution map, we are talking about an inter-connected community of wild sheep; I would suggest that we develop a unified committee that would break down the jurisdictional boundaries for each one of these issues. So, if you are on a disease issue, you would work together on getting support, reports, position statements, draft legislation etc. instead of doing your own thing by jurisdiction. Another example is needed for the federal land managers: Can you pool all your survey efforts with ADF&G, outfitters, and hunters, and develop a more-useful product, for less money? Kevin Hurley: For NWT, Heather is a "committee of one" that has to deal with several of these issues; she would benefit from forming unified committees. WSF hopes that you will look at your wild sheep work priorities differently when you get back to work next week.
- 15. Graham: We need to highlight common themes of work, by jurisdiction. The intent of bringing all these people here together is not just to take a record of the session, but to highlight all the commonalities expressed by jurisdiction. Kevin Hurley: At THS Summit I, we had breakout groups that identified priorities by jurisdiction. We then got back together and synthesized common themes, for all jurisdictions. So, your suggestion has been done. WSF would also like to know if there are any THS priorities we missed.
- 16. Gray Thornton: I would like to know what our action items are. We have a list of priorities, and each of us needs to know what our next steps are, and become accountable for this work. Kevin: What can WSF do to help the agencies address these THS priorities?
- 17. Helen Schwantje:
 - a. Action item #5: Helen Schwantje and Peri Wolff are willing to develop a standardized sampling protocol for hunter-harvest kits.
 - b. Action item #6: Helen Schwantje will be having a graduate student that could be made available to sample THS for live-animal disease sampling; contact Helen if you have opportunities.
- 18. Becky Schwanke: The government agencies need to reach out to THS advocates and use them to help collect THS population information. Kevin Hurley: Yes, we should solicit and utilize volunteers, whenever possible. Chris Barker: Wild Sheep Society of BC plays a key role in coordinating wild sheep surveys with sportsmen's associations, guides and outfitters, regional F & G biologists, and hunters.

- 19. Kumi Rattenbury: I am thinking of gathering some basic health assessments for THS in the Brooks Range; would you recommend outfitters and/or general hunters to collect samples, and what tissues could they collect? Rick McLean: Our first health assessment was focused on testing for heavy metal poisoning; Helen developed a sampling kit, and gave us training on how to take viable samples. Our volunteer Tahltan Guardians took most of the samples from hunter-harvested sheep; the mining industry paid for the analytical lab costs. Learning how other jurisdictions are doing their THS work is very valuable to us. I would like to see some action on predator control for caribou, THS, and moose, and would like to know what is being done elsewhere: Ted Spraker:
 - a. <u>Action Item #7</u>: Ted Spraker will send Rick McLean and Kevin H. some links on predator management in Alaska that you may find beneficial; Kevin H. will forward to group.
- 20. Rachel Ahtila: There is a big opportunity for outfitters to help collect tissue from hunter-harvested THS; is there a way we can get those sampling kits Rick mentioned? Helen: I have made up a lot of kits over the years, and have not gotten much response. I made and sent out 150 kits to the Tahltan Guide Outfitters, and got back over 70. It all depends on the willingness of the outfitters. You need to keep it simple, focus on the sheep, and share the results. Helen said she is willing to work with you to get sample kits.
- 21. Bryce Bekar: We need training on how to take good samples from the kits.
- 22. Dan Montgomery: The public needs to be involved early on in development of the management plan in AK; he has been frustrated with THS harvest strategies in some units, and it really needs addressed, up front. What constitutes a good harvest strategy? Bill Jex: When I think about a management plan, I do not think about harvest strategies. A management plan addresses topics like population distribution and abundance, conservation status, and the science behind different harvest strategies. In BC, once we establish a minimum population estimate based on field data, then, we apply our maximum 3% harvest rate of the total population. We have a harvest management procedure that talks about applying different harvest strategies in different wild sheep ranges. Dan: He feels that having a segment of the ram population in the older-aged rams is very important, and many areas in AK have very few old rams. Kevin Hurley: NWT has an average age of 10+ for harvested rams, which is excellent. In Wyoming, we targeted an average age for harvested rams between 6 and 8 years old. Ten years ago, in the NWSGC Biennial Proceedings from Utah (2008), we published an analysis/summary of off-take rates for BHS for 17 jurisdictions, and found that off-take rates ranged from 1.5 to 3.5% of the total population; 2-3% off-take rate appears to be sustainable.
- 23. Chris Barker: From the *N.A. CV2020* THS Goals, we have not really accomplished any items that could be taken off the list. Are there any new THS priorities that need to be added? Gray Thornton: I still want to 1) validate if the THS Summit I priority goal list is still correct, and 2) write down some accountability, by jurisdiction. Kevin Hurley: So looking at THS Summit I's 8 priority action items for all jurisdictions: 1) In AK & BC they are working on their comprehensive THS management plans; the YT is not currently working on one, and NWT feels they don't need one. 2) All jurisdictions have separation strategies they are working on.
- 24. Tony Kavalok: Feels that WSF and AK-WSF support in pushing for legislation/regulations drafted and passed would be paramount. Gray Thornton: AK Chapter WSF and AK Chapter SCI need to pool their efforts, and push for separation legislation.
- 25. Kevin Hurley: So what are the next steps? Dr. Jane Harms: Each jurisdiction should have a representative that reports back to this group on our next steps in the coming year. Sharing them with

this whole group would make them more accountable. Kevin Hurley: The synthesis from THS Summit I had breakout sessions by jurisdiction that summarized those next steps. I would like to challenge each of you to go home, get some of this work accomplished, and report back to me @ WSF HQ.

- a. Action Item #8: Tim Schommer and Kevin Hurley will synthesize the information presented over the last 2 days into a 3-year action plan, by jurisdiction. For each priority, it will include work status, next steps, funds needed from where, and the lead person(s) responsible for each task or accomplishment. This 3-year action plan will be included as an Appendix to the THS Summit II synthesis/summary. [Done 4/26/2017; draft disseminated 4/27/2017; included as an Appendix to THS Summit II synthesis/summary 5/15/2017]
- 26. Todd Brinkman: There will be 5 years for the public to comment on ADF&G's THS operational plans; let's get these documents in a draft form, and then have public review/input. These operational plans are dynamic, and will be revised in the future. For AK as a whole, we estimate we have an off-take rate of 2%; the challenge for us is the accuracy of the metrics of THS numbers. There is no predator control focused just for THS, but they do get some benefit from predator control for other species.
- 27. Ted Spraker: I sent out a lot of kits for determining age by collecting teeth when I worked for ADF&G, and got little or no kits back. So, I started sending people back results from the tests, and started having a lot of success.
- 28. Todd Rinaldi: THS operational plans for AK are forcing ADF&G staff to think of where we have been with THS management, and where we need to go. These documents are based on scientific principles, and are very technical in nature. Habitat/distribution mapping is a big effort, and is really needed for all jurisdictions; I would suggest WSF develop a habitat mapping initiative and provide funding.
 - a. Action Item #9: WSF staff will evaluate the need for an initiative for revising habitat/distribution mapping for all jurisdictions.

Tony: In developing ADF&G THS operational plans, we are struggling with our goals and objectives; this is where public participation can really be of benefit. These plans will take a long time to finalize, and the public will need to have some patience.

- 29. Mark Richards: Preventing contact between DS and THS will take legislation. RHAK feels we will need to hire our own lobbyist to work with our legislators in Juneau; we would be happy to work with WSF and others. For management plans, we want a diversity of harvest management strategies across AK. The BOG has final authority for those ram harvest strategies. The management plan should involve the public up front, in order to define plan direction. Tony: You can talk to me any time, and public participation will be a huge effort. We can make changes through drafts and BOG anywhere in the process. The draft THS operational plans are scheduled to be at ADF&G headquarters by August 2017.
- 30. Kevin Hurley: WSF has been trying to raise funds for jurisdictions to do their wild sheep work; let's use BC for an example. At convention, we have auctioned the Minister's special permit for at least 12 years; those funds go into a Habitat Conservation Trust Foundation special sheep account. There is a special committee assigned with the task of directing where that money is spent. WSF wants to inform its members on where the money raised was spent on, and periodically report that information in *Wild Sheep* magazine. WSF plans to query the agencies that we sold auction tags for, and report the results. Does anyone have suggestions on where WSF can help fund or support their priority THS work?
- 31. Todd Rinaldi: How do jurisdictions other than AK feel about the need for a habitat mapping effort that I previously brought up? Kevin Kehoe: AK-WSF has suggested we start refining habitat maps for the Chugach Mountains first, and then work our way to other areas. Tony: Our THS staff discussed this

issue last October, and collectively said the current THS maps are sufficient, for now. Kevin Kehoe: AK-WSF feels it is a priority, has the funds to do the work, and would like Tony to continue to push the issue. Tony indicated he has only a little influence on work priorities within his agency and suggested AK-WSF could really help in this effort by lobbying ADF&G staff. Troy: WSF can really help the YT with pushing our elected officials on separation legislation. Most governmental agencies are more responsive to external queries than from internal agency staff. We need to define exactly what we mean with habitat mapping. We have opportunities to partner with other parties, and we would like to do that. Kevin Hurley: From what I have heard here, I agree.

- a. Action Item #10: After checking with every presenter, Kevin Hurley will post a .pdf version of each Power Point given here on the WSF website. [Done; notification sent 5/4/2017]
- b. <u>Action Item #11:</u> Kevin Hurley will obtain and distribute a copy of the NPS regulation banning domestic sheep and goats as pack animals. [Done; sent 5/15/2017 as attachment]
- 32. Jack Atcheson, Jr.: If we were able to develop a partnership agreement with our Canadian jurisdictions on habitat mapping projects (and other projects), can we use P-R funds in AK to serve as the lead or template for THS ranges, in all four jurisdictions? Kevin Hurley: Is there a way for BC, YT, and NWT to each give \$1 to WSF, and WSF then gives those \$3 to ADF&G for habitat mapping, for all or THS range? Could ADF&G potentially use P-R matching funds, to turn that \$3 into \$12? Tony: I don't know how it would work across international boundaries. We could probably develop a template or model for AK THS habitat mapping that could then be used in other THS jurisdictions; I don't believe we could use P-R matching funds to map THS habitat in Canada. Kevin Kehoe: For the camelid risk assessment update that Helen talked about, could it possibly be funded through Kimberlee in AK? For the mapping work, WAWFA has the Critical Habitat Assessment Tool (CHAT) that may be useful, but it would be hard to pay for CHAT mapping with P-R funds. Jen McMillan: What is the level of mapping needed? What is the end goal? Costs will depend on the definition of habitat mapping? Todd Rinaldi: Yes, I agree. The mapping effort needs to at least define historical, current, and potential THS habitat; there is an elevation component, and a heavy, wet-snow-load component. An effort for all of AK would be huge.
- 33. Kevin Hurley: WSF's goal for the THS Summit II Synthesis/Summary is to email a draft to you all by May 15, 2017, asking for your review, corrections, and comments. Please provide me any email changes/edits you might have on the list of THS Summit II attendees. Thank you all for your participation, and your work on behalf of Thinhorn Sheep! Thank you to all our sponsors! Travel home safely!!

SUMMARY OF ACTION ITEMS (as of 5/15/2017)

<u>Action Item #1</u>: Kevin Hurley will take the lead in securing updated information on THS population estimates, license issuance, and ram harvest for the WAFWA WSWG "master spreadsheet".

<u>Action Item #2</u>: Cheryl Carrothers will pass on concern of high-risk disease transmission between DS and THS to USFS decision makers on the Chugach NF.

<u>Action Item #3: Mike Cox, Kevin Hurley, and Clay Brewer will gather existing jurisdictional response protocols; Kevin H. will forward to THS stakeholders email group.</u>

Action Item #4: Kevin H. will email a copy of the May 2015 YT RRC resolution letter. [Done 5/15/2017]

<u>Action item #5</u>: Helen Schwantje and Peri Wolff are willing to develop a standard sampling protocol for hunter-harvest kits.

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