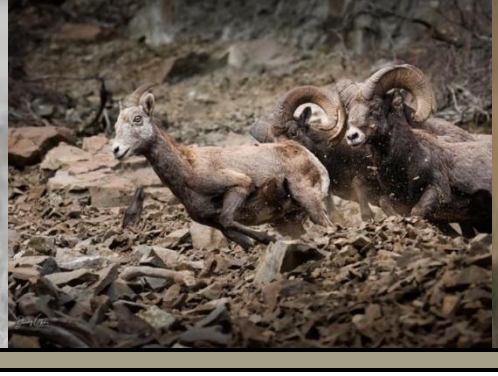
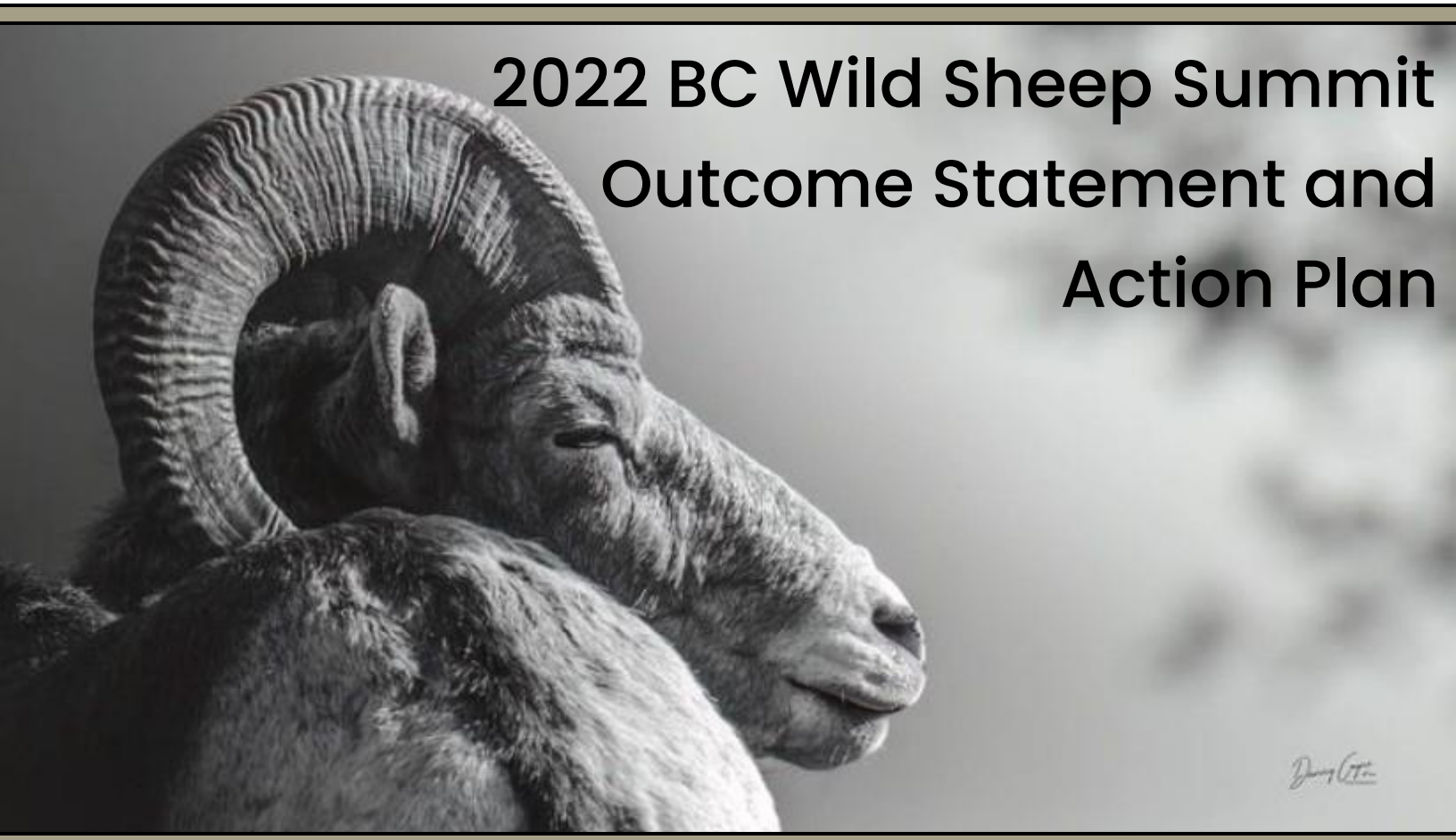



WILD SHEEP SOCIETY
OF BRITISH COLUMBIA

2022 BC Wild Sheep Summit Outcome Statement and Action Plan





BC Sheep Summit Outcome Statement and Action Plan Event Notes

Table of Contents

Introduction

The Wild Sheep Society of British Columbia (*WSSBC*) is a registered Non-Profit Society 1,300 members strong, dedicated to our mission: *to promote and enhance wild sheep and wild sheep habitat throughout British Columbia*. From 2018-2022, the WSSBC has provided $1,180,000 for projects including habitat enhancement, and disease research and mitigation in British Columbia. In November 2022, WSSBC invited first nations, conservation organizations, guide outfitters, the government, and those with an interest in wild sheep to the 2022 BC Sheep Summit. The Summit's goal was to seek agreement on methods to re-establish healthy wild sheep populations and maximize their abundance throughout British Columbia.

Restoring wild sheep to sustainable and stable populations is definitely a complicated challenge. We know that Predation, Disease, Habitat Loss, Hunting Pressure/Access, Human Encroachment, Vehicle Collisions, and perhaps most complicated of all, Climate Change all affect the viability of sheep. One of WSSBC principles is to work in collaboration to maximize input and efforts. By bringing together all interested parties we approached these challenges facing wild sheep and their conservation. We found a common understanding of the status of BC's wild sheep populations and determined trends regionally. We combined elements of scientific and traditional knowledge and identified how the limiting factors affect each herd. We accept that each region presents unique challenges but believe that the 2022 BC Sheep Summit has helped us to understand, mitigate, and address the threats. We have delivered long-term strategies to reach shared goals and collectively share a vision of stronger and more resilient wild sheep populations for British Columbia.

Disclaimer

The regional strategies included in this document are recommendations for future development with the regions with much of the content designed for discussion at regional round tables. Please take note that some of the actions are already being implemented as indicated in the summaries. The formatting in this document varies from region to region as regional representatives were not constrained on their outcomes.

Our vision is that this document will provide a starting point for any existing regional working group and serve as a reference document for future Together for Wildlife (T4W) Regional Wildlife Advisory Committees (RWAC). We encourage all interested titleholders, and stakeholders to engage with regional working groups, and with the Wild Sheep Society of BC (WSSBC).

Outcome Statement

- Strengthen the commitments and support policy and regulation reforms that address disease risks and achieve effective separation of domestic and wild sheep.
- Allocate dedicated funding to ensure a permanent full-time Provincial Wild Sheep and Mountain Goat Specialist.
- Split the existing Mountain Sheep Species Licence into two separate species licences. Specifically, this would require the creation of a Thinhorn Mountain Sheep Species Licence and a Bighorn Mountain Sheep Species Licence and would support and enhance data collection to inform management of hunter activities, preferences and harvest effort.
- Increase the Conservation Surcharge for Mountain Sheep Species Licence(s) with those proceeds being directed exclusively to wild sheep conservation initiatives.
- Initiate development of a Provincial Bighorn Sheep Management plan.
- View the Wild Sheep Society of BC Produced Film "Transmission".

Challenges and Action Items by Region

During the three-day Wild Sheep Summit, representatives from within each region met to discuss the most significant challenges affecting wild sheep in their area. They spent two full days identifying those regional issues, ranking them and eventually creating action plans to address them. At the end of each day, each regional committee had a representative report out to the plenary. Those findings were collected and are presented in that document for action.

Region 3

Current Population Estimate: 500-2,800
Fraser River Population Target: 3,000+ (includes Region 5)
Thompson River Population Target: 1,000
Spences Bridge Population Target: 500
Primary Regional Wild Sheep Issues: Health, Habitat, Predation

Fraser River Wild Sheep (population objective: 3000+)

1) Health – Mycoplasma ovipneumoniae (M. ovi) mitigation

- **a) Remove chronic shedders**
  - i) Test & Remove
    - (1) Led by Regional Biologists Chris Procter & BCSSP Jeremy Ayotte
      - (a) January/February 2023
  - ii) Continued Funding 2024-2028
    - (1) Procter, Chris Barker, Jeremy Ayotte
      - (a) Ongoing
  - iii) Community Support, including landowners
    - (1) Fraser River Working Group to distribute updates, WSSBC to support
      - (a) 6 months
  - iv) Collect standardized health samples
    - (1) Teams at capture
  - v) Continue herd treatment monitoring
    - (1) Regional Biologists
    - (2) WSSBC
- **b) Domestic Separation**
  - i) BC Sheep Separation Program
    - (1) Jeremy Ayotte & Helen Schwantje
      - (a) Ongoing
  - ii) Implement Policy for Domestic Exclusion Zones
    - (1) Provincial level
  - iii) Support/Funding Requirements
    - (1) Jeremy Ayotte & Helen Schwantje
      - (a) Ongoing
- **c) Education - Producers**
  - i) Transmission Film Screenings
    - (1) Jeremy Ayotte, WSSBC/Filter Studios
      - (a) Ongoing

(b) Film is going public early 2023

ii) Together For Wildlife to help push domestic separation policy & garner support from Nations

(1) Provincial Letter of support to be drafted by Kyle Stelter & Hunter Lampreau, to be signed off on by the region 3 summit working group

TIMELINES:

- 3 months
  - Public Engagement, about the risk of domestic and wild sheep mingling (target veterinarians as well)
    - BC Sheep Separation Program
    - WSSBC
- 6 months
  - Continued 4H Engagement
    - BC Sheep Separation Program
    - WSSBC
- 6 months
  - Work with First Nations, to help spread awareness and enabling Nations to participate
  - Fraser River Working Group
    - Jeremy Ayotte, Chris Procter
- Next FRWG meeting
  - Wool Pellet Project, helping engage producers and gaining their support
    - Jen Bowes
    - Expansion of project by Jeremy Ayotte & Helen Schwantje
    - Promote and support by WSSBC
- Ongoing

2) Habitat

a) Invasive Plants

i) Cheatgrass Assessment, mapping of affected areas

ii) Regional Biologists including Bill Jex

iii) Region 3 Agrologist

TIMELINES:

- Early 2023
  - Invasive Removal, this needs to happen before burning
    - Reach out to Invasive Species Council
    - WSSBC to help drive assessment
    - Build an action plan after assessment is completed
- 6 months
  - Natural Fire Cycle
    - Prescribed Burns, needs to mimic the natural fire cycle
    - Natural Fires, needs to be allowed to burn

        - Policy & Legislation, needs to change to make the prescribed burning process easier
    - Traditional Burning
        - Gain Knowledge from Nations
            - Fraser River Working Group
                - Discussion to start in the next 30 days

b. Forest Encroachment

i. Burns, ties in with natural and prescribed

ii. Thinning Project Potential

1. Identify critical areas by using sheep collar data
2. Get First Nations involvement via the Fraser River Working Group
3. Permit to destroy

TIMELINES:

- 6 months
    - Mechanical Removal of Sage
        - Permit to destroy, Bruce Ambler to open discussions

c. Overgrazing – Horses

a. Owners, who do the horses belong to? Open discussion with owners

i. Educational package from Wild Sheep Foundation. Fraser River Working Group to distribute the package and open discussions

TIMELINES:

- 6 months
    - Policy, look into policies surrounding sterilization and/or removal
    - Assessment, mapping of area used and population data

3. Predation

a. Cougars

a. Look into having cougars changed to furbearers. Get Nation involvement and approval. There is trapping potential.

i. Glen Cartwright/BC Trappers Association to bring up at the next Provincial Hunting and Trapping Advisory Team (PHTAT) meeting

b. Educate resident hunters on the importance of conducting their own predator management in sheep range.

i. WSSBC to target treatment areas, Chris Barker

b. Coyotes

i. Ungulate Enhancement Program

- BC Trappers Association & WSSBC
    - Renewed for 2022/2023 trapping season

ii. Promote hunting in lambing areas

- Guide Outfitters, Chris Barker
    - 1 month

- Bruce Ambler donated a cougar hunt in sheep range during group discussions **(**Ambler's Bighorn Country Guiding Ltd.)

c. Eagles

iii. Hunter Lampreau to take information back to his community to open discussions to study predation from eagles

1. 3 months

Spences Bridge Wild Sheep (population objective: 500)

Issues

1. Predation

A. Coyotes, Cougars, Wolves, Black Bears

i. Educate resident hunters on the importance of predator management

- WSSBC
  - 3 months (by their convention)

B. Eagles

i. Hunter Lampreau to take information back to his community to open discussions to study predation from eagles

- 3 months

2. Habitat

A. Highway Mortalities

i. Community Engagement

- Greg Rensmaag to reach out
  - 6 months

ii. Signage, in high sheep activity areas

- Greg Rensmaag
  - 6 months

B. Railway Mortalities

i. Look into slow down corridors

- Chris Procter
  - 3 months

ii. Potential Grants

- WSSBC to investigate and apply if available
  - 6 months to 1 year

3. Health

A. Disease Prevention

i. Education

- BC Sheep Separation Program, Jeremy Ayotte & Chris Procter
  - Ongoing

ii. Monitoring Population

- WSSBC counts

- Annual (every April)

Thompson River California Bighorn Sheep (population objective: 1,000)

Issues

1. Predation

A. Coyotes, Cougars, Wolves, Black Bears

i. Educate resident hunters on the importance of predator management

- ➢ WSSBC
  - 3 months (by their convention)

ii. Outreach to trappers regarding coyotes

- ➢ Shaun Freeman
  - 3 months

B. Eagles

i. Hunter Lampreau to take information back to his community to open discussions to study predation from eagles

- 3 months

2. Habitat

A. Highway Mortalities

i. Monitor

B. Railway Mortalities

i. Look into slow down corridors

- ➢ Chris Procter
  - 3 months

ii. Potential Grants

- ➢ WSSBC to investigate and apply if available
  - 6 months to 1 year

C. Forest Encroachment

D. Invasive Species

i. Reach out to Invasive Species Council

- ➢ Chris Procter & Chris Barker
  - Ongoing

E. Overgrazing – Winter Tenure

i. WSSBC Government Engagement Committee to discuss

- ➢ Greg Rensmaag
  - Next meeting

ii. Reach out to Cattlemen's Association President, Brian Thomas

- ➢ Chris Barker
  - 3 months

F. Recreational Users

i. Advise against recreating in lambing areas during lambing season

- ➢ Greg Rensmaag
  - Already begun

G. Grassland & Rangeland Enhancement Symposium

i. Host event in Kamloops & Lilloet

- ➢ Jeremy Ayotte
  - 6 months to 1 year

3. **Health**
   A. **Disease Prevention**
      i. Education
         - BC Sheep Separation Program, Jeremy Ayotte & Chris Procter
         - Transmission Film screenings
            - Ongoing

Provincial Items to be addressed:

1. Secure full funding for the Provincial Wild Sheep & Mtn Goat Specialist
2. Legislation and policy to enforce wild and domestic sheep separation
3. Longevity of the BC Sheep Separation Program and domestic producer outreach projects/testing
4. Legislated population objectives
5. Cougars to be considered furbearing
6. Enforcement of trapline use requirements as using current Wildlife Act legislation

Region 4

Current Population Estimate: Undetermined
Population Target: Undetermined
Primary Regional Wild Sheep Issues: Implementation of 2019 Kootenay BHS Mgt Plan (Poole & Ayotte 2019), BHS Herd Health, BHS Habitat Management (Protection; Acquisition; Enhancement), BHS Data/Survey/Inventory

1) Implementation of 2019 Kootenay BHS Mgt Plan (Poole & Ayotte 2019):

a) <6 months:
- i) Arrange stakeholder meeting with DRM, before Xmas 2022
  - (1) Assigned to Patrick Stent
- ii) Identify/Contact Additional NGO reps
  - (1) Assigned to Alan Duffy / Glenn Flynn
- iii) Re-Engage Poole & Ayotte, to "finish"
  - (1) BC F&W Branch, if/ when appropriate
- iv) If warranted, develop/submit "emergency" $ proposals

b) 6-18 Months
- i) Industry Reach-Out for Engagement
- ii) "Re-Fresh" BHS Herd by Herd Prioritization
  - (1) Assigned to Patrick Stent
- iii) Develop/Submit $ Proposals Requests

c) ≥ 18 Months
- i) Advocate for Provincial BHS Mgt Plan

2) BHS Herd Health:

a) <6 months:
- i) Work with Bill Jex to arrange in-person or virtual meeting with Jeremy Ayotte, Dr. Caeley Thacker, Dr. Helen Schwantje to provide current status of R4 BHS Herd Health data/ knowledge, to date

(1) Assigned to Colin Peters

ii) Help Identify Further R4 "Needs" for BHS Herd Health data

(1) Assigned to Patrick Stent

iii) Reach Out to Ktuaxana FN Bands

(1) Assigned to: Brian Gustafson, Glenn Flynn

iv) Arrange showing of "Transmission" film to Kootenay Livestock Association (Rask)

(1) Assigned to: Colin Peters (check w/ Jesse Bone/Filter Studios)

v) Existing Map showing location of DS/DG "farm flocks"/hobby herds (May not be possible for exact locations and names due to FOI)

(1) Assigned to: Jeremy Ayotte, Helen Schwantje, Jenn Bowes

vi) Once the above map is available, identify "overlap zones" between DS/DG & BHS (BCSSP has mapping for Region 4 risk between domestics and wild sheep)

(1) Assigned to: Patrick Stent

vii) Outreach to Kootenay Region 4-H Leaders/Program

(1) Assigned to: Riley Leuenberger, Jeremy Ayotte

viii) Reach out to MT FWP biologist Ethan Lula for X-border BHS Herd Health info/data

(1) Assigned to: Patrick Stent

ix) Reach out to AB F&W biologist Grant Chapman for X-border BHS Herd Health info/data

(1) Assigned to: Dave Beranek

b) 6-18 Months:

i) Legislative/Policy/ Zoning

(1) Assigned to: Bill Jex

3) BHS Habitat Management (Protection; Acquisition; Enhancement):

a) <6 months:

i) Identify/Prioritize BHS Habitat Needs, by Herd

(1) Assigned to: Patrick Stent, Irene Teske, F&W Branch

ii) Identify/Prioritize Vegetative Invasive Plants, on BHS Range (This Could create health issues for bighorns, like in the past- H.S)

(1) Assigned to: F&W Branch, LWRS

iii) Conversations with Trails, Mtn Bike, X-Country Skiing, Snowmachine User Groups

(1) Assigned to: Alan Duffy (reaching out to Lisa Cox)

iv) CMIAE "Call for Papers" circulated

(1) Assigned to: Brain Gustafson

v) Continuation/ Expansion of Winter Salting Effort on BHS Ranges

(1) Assigned to: Irene Teske, Volunteers

vi) Renewal/Extension of Access Guardian program?

(1) Alan Duffy & BHS

vii) Radium Hot Springs overpass/fencing

b) 6-18 Months:

i) Potential Acquisition of Seasonally - Important BHS Ranges??

(1) Assigned to: Kevin Hurley (check with Jasper Lament, NTBC), Riley Leuenberger (check with Nature Conservancy Canada)

ii) Possible BHS Habitat Enhancement on Private Land? Kootenay Conservation Program (KCP)

(1) Assigned to: Brian Gustafson

c) ≥ 18 Months

i) High-Level Discussions between F&W Branch & MOTI, on seed mixes for barrow ditches, cut/fill slopes; closure/ de-commissioning unnecessary roads into BHS habitat; expanded NRO authority to enforce travel/access mgt regulations

4) BHS Data/Survey/Inventory

a) ≤ 6 Months

i) BHS Population Objectives, by Herd. Inventory should be on a bighorn herd registry including historic work

(1) Assigned to: Patrick Stent, Irene Teske, F&W Branch

ii) BHS Population & Distribution flights

(1) Assigned to: Patrick Stent, Irene Teske, F&W Branch

iii) Telemetry/Radio Collar projects, to help refine BHS seasonal ranges, movements, etc.

(1) Assigned to: Patrick Stent, Irene Teske, F&W Branch

b) 6-18 Months

i) BHS Habitat Conditions Evaluation and Assessment

(1) Assigned to: LWRS, in coordination with F&W Branch

Region 5

Current Population Estimate: Undetermined
Population Target: 3,000+ (includes Region 3)
Primary Regional Wild Sheep Issues: Health, Habitat, Predation
Lower Elevation: Health, Predation, Habitat
High Elevation: Habitat, Health, Predation

Lower Elevation Herd - Problems

1) Health

a) MOVI

i) Wild/Domestic Sheep separation issue.

ii) Test and Remove program

iii) Messaging and Outreach

(1) using the film to bring people up to speed on the issue effectively

iv) BC Sheep Separation program

(1) Jeremy is a one man show, consider more support for him

v) Post Treatment Support

(1) Some herds that reach critically low numbers may require supplementation

b) "Triage Herds"

i) Is it better to focus efforts on herds that are strong and able to recover after low numbers? Should they be triaged?

2) Predation

a) Helping the small herds after treatment

i) Need to build rationale

ii) Predators in the area: Cougars, Coyotes, Black Bears, Wolves (Cougars and Coyotes are the main concern) and eagles

iii) What are our options to manage predators?

(1) Hunters: *we can encourage hunters to cut tags*

(2) Trappers: *we can incentivize, through trappers association and local FN trappers*

(3) Government: *Long term pressure*

iv) Maternity Pens?

(1) Is this something feasible to the local populations?

(a) Seems to be some misunderstanding about maternity pens and their role in restoring populations. Not useful for a health issue since this would increase the rate of transmission of disease. We have no evidence that small populations cannot recover without aid. If triage suggests that small populations are that valuable then perhaps it could work post treatment.

3) Habitat

a) Human interactions

i) Mountain Biking

ii) Logging encroachment

b) Fire suppression

i) Prescribed Burns

ii) Forest growth encroachment

iii) FN Cultural Burning

c) Climate Change

i) Less rain = dry outs

d) Enhancement of wildlife corridor from Churn Creek to Camels Foot

e) Agricultural Impacts

f) Lambing habitat ID

i) Can we protect it?

ii) What are the mountain bikers impact

Lower Elevation Herd - Solutions

1) **Health**

a) MOVI: Identified as the main issue that we needed to focus on for "health"

i) Sheep Separation issue

ii) Low number heard support

2) **Predation**

a) Managing predators

i) Especially within the post treatment hearts

ii) Levers that we can pull = Hunters, Trappers, Government

3) **Habitat**
   - **a)** Human Influence (Mountain Biking, 4x4 clubs, Logging)
   - **b)** Fire
   - **c)** Climate Change
   - **d)** Ag. Impact
   - **e)** Lambing Habitat

High Elevation Herd - Problems

1) **Habitat**
   - **a.** Horses
     - i) Seem to be correlated to poor body condition of sheep
     - ii) Need to understand Range overlap with sheep range
     - iii) Cancer to the sheep population of Konni
     - iv) TNG managing horse observation
   - **b)** Quality of food available
     - i) Some areas where observes to have very poor quality of habitat "the grass was very low, almost like it had been grazed"
   - **c)** Mountain Bikers Impact
     - i) Tracks seem to be spotted regularly
     - ii) Deer Park Trail
   - **d)** Logging
     - i) Logging is encroaching onto the park boarders. This gives predators easy access to alpine terrain.
   - **e)** ATV Access
     - i) Recreational user access.

2) **Health**
   - **a.** Poor Body Condition observed.
     - i. Of ? sheep captured at ? time of year, most sheep had low "body condition" scores.
     - ii. TNG project collected herd health samples and if funding is available Wildlife Health will assess testing results.

3) **Predation**
   - **a.** Predators in the area
     - i. Wolves - *potential issue, not confirmed*
     - ii. Cougars - potential issue, there is evidence of them on the landscape
     - iii. Grizzly bears - potential issue, there is evidence of them on the landscape
     - iv. Wolverines - unsure of impact
     - v. Golden Eagles - unsure of impact

High Elevation Herd - Solutions

1) **Habitat**
    a. Horses are the #1 issue for forage quality for the higher herds. We know they impact habitat quality. There are too many horses.
2) **Health**
    a. We know some have poor body scores, but are awaiting the results of the health assessment from TNG project – funding limitations

3.) **Predation**
    a. Mostly unknown impact.

Action Items (focused solely on the lower elevation herds):

Health Action Items:

Short term

- Transmission film, send to Mitchell to show TNG Council - Jesse
- Find local trapper zones - Mike
- Communication with Gang ranch - Jesse to talk with Jeremy about it
- See which local FN Trappers are available - Mitchell
- Check in with Fraser River Working Group, talk about post treatment planning - Mitchell
- Outreach to the guide outfitter - Dan

Longer term

- Keep discussion going with the Fraser Working Group, for post treatment planning for future treatment herds on the whole Fraser project - Mitchell
- Transmission Film viewing for the Chilcotin Region - Jesse and Mitchell

Habitat Action Items:

Short term

- Critical Habitat Awareness - goal is to raise awareness of lambing habitat and limit impacts. Goal to have the signage in place before lambing May 2023
- Sign placements locations - Dan
- Outreach to local MTB clubs - Jesse
- Develop signage content - Dan / Mitchell / WSSBC
- Research permit needed for signage on crown land - Dan

Long term

- Habitat Enhancement
- Map potential “grassland” enhancement terrain - Dan
- Gather input from Fraser Working Group - Mitchell
- Gather input from Together for Wildlife - Dan

Region 6

Current Population Estimate: 3,500-4,500
Population Target: 5,500-6,000 (25 identifiable Herds)
Primary Regional Wild Sheep Issues: Predation, Access Management, Habitat

1) Predation

- **a)** Wolves
  - **i)** Note: Tahltan Nation has their own collaring program. Currently have 12 collars out on 12 different packs, with current population estimates of 13-24 per 1000km². (*Estimated carrying capacity of 3-5 per 1000km²? *See copy of poster*)
  - ii) Current potential in Stikine/Spatsizi is 100 per 1,000km²
- **b)** Wolverines
- **c)** Grizzlies
- **d)** Cats

Tools and Strategies

Trapline management:

- **a)** Increase minimum $ amount of fur required per year to maintain lines
  - i) Add concession contact list so dormant lines could be utilized
  - ii) Allowing access by assistant trappers
  - iii) Update legislation to allow for a change in ownership of trap lines (allowing Nation, or outfitter/business owned lines vs current private only ownership)
  - iv) Extend Wolverine trapping season

Hunting Seasons

- **a)** Extending Wolverine season to coincide with Sheep season opening. And extend later into spring.

2) Access Management to reduce overall pressure on wildlife:

- **a)** Currently no rules on landing frequency in remote lakes. Having an increase in noise pollution. Limiting access could reduce user impact on landscape. Has been noticeable impact on general herd structures as traffic has increased.

Tools/Strategies:

Aircraft access:

- **a)** Potential for requiring permits to limit# of
- **b)** landings per lake/area
- **c)** Reduce traffic during critical migration/ lambing periods.
- **d)** Map natal ranges for exploration. Implement timing windows and setback distances. (Currently used in Todagin area)

ORV Closures:

- **a)** Current need for adding elevation restrictions for atv/orv. Suggesting implementation of 1400m restriction in Skeena North as starting point.

b) Tahltan Nation previously submitted request to Govt, and were denied. Suggesting stake, and title holders submit letters of support to see this implemented.
c) Letters of support from all sectors would be very helpful – potentially a joint letter.
d) **Action:** WSSBC will circulate a draft letter to participants to finalize and potential for a joint letter can be confirmed by email.

Tag management:

a) Increase in tag cost for Sheep (Increase to exclusively be assigned to sheep, not general revenue)
b) Require mandatory training for legal harvesting program for sheep tag purchases.
c) Add specific tags for Bighorn & Thinhorns
d) Potential Increase of fines for illegal harvests
e) Agreement to incentivize harvest of rams older than 8 years old and older (75% target). Shift to a point system where each hunter gets x number of points which can be used to kill sheep. The younger the Ram the more points it takes. This type of system is already in place with Guide Outfitters.
f) **Action:** Letters in support of this shift should be prepared and sent to Together for Wildlife and the new system discussed and promoted at the Together for Wildlife roundtable.

Mineral Exploration:

a) Mineral exploration guidelines need to be improved with spatially explicit management direction so key areas can be avoided (e.g. mapping natal areas, cease of mineral exploration to increase lamb recruitment).
b) Action: Update mineral exploration guidelines.

Education:

a) New hunters need to be educated on sheep management issues as part of the CORE course.
b) **Action:** BCWF will work on introducing a new module on sheep conservation into the course materials.

3) Habitat:

a) Discussed Nutritional health importance, currently many sheep use highway areas as mineral licks
b) Requirement for more Prescribed burns
c) Govt seeking to work on Cultural Fire Stewardship with First Nations.

Tools/Strategies:

Nutritional Pilot Project -

a) Develop a new project in the Good Hope, Dome Mountain and Atlin East in partnership with the 3 Nations Working Group. Identifying and managing mineral licks, and studying forage. Will need to hire a group to do a study and develop plans. Fundraising sources GOABC, WSSBC, WSF & HCTF.

b) **Action:** Tahltan rep (Lance) will raise this with the other Nations at the G to G working group and convene a Project team to start planning for the Pilot within 90 days.
c) **Action:** Outfitters will raise funds to support the project.
d) **Action:** Todagin Burn Plan -
    i) Sheep herd data available from Red Chris mine. Tahltan Nation has been contacted regarding Cultural Burning. Baseline work has previously been completed for the Todagin area. Groups can work with Tahltan to support project moving forward. Need Micro burns to enhance habitat and foliage control. NO data on burns.
    ii) Action: Tahltan rep will initiate discussions.

Region 7a

Current Bighorn Population Estimate: MU7-19→ 18 (BC) / Alberta: MU445 → 120~
Population Bighorn Target: 120
Current Thinhorn Population Estimate: 500-900~
Population Thinhorn Target: 1,000
Primary Regional Wild Sheep Issues: Knowledge Gap, Habitat, Partnerships/Funding

Regional Problems:

TASK LEVEL:
PR = PROVINCIAL
R = REGIONAL
L= LOCAL
P= PERSONAL

1) **Knowledge Gaps:**
    a) "There are so many unknowns? Where do we start?"
    b) **PR/L/P** → Understanding Historical – Traditional information
        i) Location – Habitat / Movement / Corridors / Ranges
        ii) Could be community led
    c) **PR/R/L/P** → Utilizing Citizen Science
    d) **L/P** → Is there any historical die-off information?
        i) What were the Potential Factors?
            (1) What were the Range conditions?
            (2) What were these Disease events
    e) More Surveying to collect data & identify Inventory levels
        i) Funding
        ii) Structuring Inventory
    f) Who is going to do the task hierarchy
        i) Provincial, Regional, Local, Personal
    g) **PR/R** → Understanding the Current Status of the landscape
    h) **PR/R** → Knowing Inventory Cycles in 7A
    i) Creating Sheep Density Goals/ Objectives.
        i) Directly putting a number of animals in a zone and region. Then and only then should we spend money or ask government to do work. Any work, inventory and monitoring needs to be with the overarching goal/objective in mind. Anything short of that is just what we have been doing and will not put sheep on a mountain.

TASK LEVEL:
PR = PROVINCIAL
R = REGIONAL
L= LOCAL
P= PERSONAL

2) Habitat:

a) **PR/R** → Indigenous Protected and Conserved Areas (IPCAs)
   i) What would be the Carrying capacity?
   ii) Understanding Core values / Management Strategies
b) **R/L/P** → Conducting Ground Truthing
   i) Identifying suitable habitat
   ii) Identifying key locations (ie. mineral licks)
   iii) Identifying Ungulate Summer & Winter Ranges
      (1) Then implementing access management to these locations
      (2) GAR (Government Action Regulation) → 1%
   iv) Identification of critical hotspots- Micro Refuge Areas
      (1) Community utilization to identify climate change concerns
c) **PR/R/L/P** → Management Tools to utilize?
   i) Prescribed Burns
      (1) Leveraging natural burns to prepare for future burns
      (2) Frequency of burns
   ii) Monitoring Plan
      (1) Collaring
      (2) Limited Invasive Plant Management
d) **PR/R/L** → Understanding Climate Change
   i) Elevation Effects (IE. Alaska- 1m/year)
e) Access & Predation related to Resource Extraction that affects Habitat
   i) No net loss with resource development
   ii) Constant disturbance patterns
      (1) IE. Roads creating Easy Access to the Alpine

3) Partnerships/Funding:

a) Outreach / Communication
b) Government Ability for multi-year funding
   i) "Show me the money!"
c) Find Potential Partners
   i) First Nations
   ii) Non-government organizations
   iii) Academia
   iv) Identifying Private Sector- Resource Developers
      (1) Approaching Resource Developers
   v) Local clubs
   vi) Government-to-government
   vii) Nation to nation partnerships
d) Funding
   i) Surcharges on private sector resource developers
      (1) Industry funding
   ii) Grant applications
   iii) Nation funding
      (1) Partnered projects

4) Predation:

a) Social License
   i) Southern BC Buy-in → major challenge
      (1) WhoCares / 1Campfire
b) Major lack of current data
   i) Need a control group
   ii) Understanding cause specific mortality investigations
   iii) Marry in Caribou data information
   iv) Citizen Science
c) Collaring predators
   i) And identifying wild sheep habitat overlap
d) Dealing with predators who target wild sheep specifically
   i) How to deal with Eagles, and protected species?
      (1) Utilize academia
   ii) "changing # of predators"
e) Competitive Prey reduction
   i) Moose research programs to help inform
   ii) Addressing Elk expansion
   iii) Identify a control group in other region
f) Reduction in silviculture practices
g) Incentivizing/Funding BC Trappers / Hunters / First Nations
h) Opening Sightlines around potential escape terrain
i) First Nation Reconciliation
   i) Influencing

Regional Solutions/ Timeline / Costing :

1) <u>Knowledge Gap →</u> $400,000 over 3 years

a) Consultant- Historical/Traditional Knowledge Collection
   i) 180 days/6 months
   ii) $20,000 to gather information
b) Outfitters/Trappers- Historical Knowledge
   i) 180 days/6 months
   ii) $0 to gather intelligence
c) Government- Current Population Survey & Lamb Survey's
   i) 1 year
   (1) 7-19 collaring
   (2) Survey cost: $35,000-$50,000/survey
d) Full Population Survey
   i) 3 Years
   (1) Survey cost: $100,000/ survey x3 = $300,000
e) Habitat Sustainability Survey
   i) 3 Years
f) Education / Outreach → Ongoing

2) <u>Habitat/ Habitat Enhancement →</u> $500,000 over 5 years

a) 2 years – Understanding Sheep Range Use – Ungulate Winter Range / Ungulate Summer Range- $15,000
b) 2-3 years – Monitoring Natural Burn Locations
c) 1 year- Project Development (Fall 2023) – Land, Wetland, Resource, Stewardship Partner - $10,000 Seed.
d) 2.5- 3 years - Access Management/Resource Development/Invasive Species
    i) Assessment + Monitoring / Education
    ii) Bighorn- Snowmobiling Access Conflict.

3) <u>Funding / Partnerships →</u> $1.1 Million total

a) 90-180 days- BC/AB- Bighorn- Contact Government to coordinate Director to Director Discussion on Management (Ray Pillipow)
b) Ongoing w/ renewed emphasis- WSSBC – Indigenous Relations Committee Establish/Continue Partnership / Engagement
c) 1 year – Identifying Resource Development Projects / Grant opportunities
d) 1 year – Reaching out to local clubs

4) <u>Predation →</u> $200,000 over 3 years

a) Ongoing- Education/Outreach – WhoCares + 1Campfire + Tsay Keh Dene "Science Week"
b) Present – 3 Years - Cause Specific Mortality Investigations leads to *Incentivization
c) Ongoing- Incentivizing Trappers / Guide Outfitters / First Nations / Hunters
d) 2-3 years - Predator Collaring + monitoring (2023 seed fund / 2024 project) - $150,000
e) 3-5 years - Government Implementation of Compulsory Reporting.
f) 1-5 years- First Nation Reconciliation for influencing Predation "ie. Grizzly Bear Policy Change"
g) Now- Consultant to reach out to Oliver Holt (UNBC Masters Student) re: Grizzly Diet Analysis

*** NOTE: Addressing the Muskwa-Kechika Access Management Area's boundary, and look at encompassing parts of 7A so to limit vehicular access to designated routes*

Region 7b

Current Population Estimate: Thinhorns are largely unknown.
Population Target: Our goal is to maintain or increase Thinhorns. Setting a number would be difficult without knowing the carrying capacity.
Primary Regional Wild Sheep Issues: Habitat, Predation/ Mortality, Health, Interspecific Competition

1) Habitat Issues:

a) What we want: Quality habitat for sheep to maintain populations
b) Permitting process and knowing how to effectively implement burns. What type of burn, and who leads the burn. Decisions are never made on some burns.

1) Habitat Action Items:

a) Go to the peace and ask for meeting

i) Is there a council? Who is on it?
ii) Advance this group. Formed with
(1) HRFN, FNFN, BRFN, WMFN, SFN, PRFN, WSSBC, NEBCWF, BCWF, DRFN, BCWS, NRP+G, MK, MoF, LWARS, BC Cattlemen's assoc., Treaty 8, Kaska, Chris Addison, BC Parks, BC Trappers
iii) Invite those people to the table and work it out. This is our 90 day action February Meeting – Josh to plan
(1) Discuss: Where we want to burn and Identify who should be leading the charge on these permits and how (wildlife burn, range burns cultural burns)
iv) Stay in communication and keep it moving forward to then present to decision maker
v) Stay in region. Don't go out of province.

b) Involve ombudsman to resolve complaints
c) Continue on with current burns

2) Predation / Mortality Issues:

a) Major Knowledge gap.
b) Collar studies. There is support for this if valid studies do come forward.
c) Lamb mortality is a cause for concern but hard to address.
d) Should we just move towards action and skip the studies? Do we need to know where we stand on mortality?
e) highway mortality
f) Current diversionary salting program with cameras to look at effectiveness
i) Appears very effective. Went from 35 sheep killed/year to 15-20 sheep killed/year
ii) Need to continue on with this

2) Predation / Mortality Solutions:

a) Incentive programs:
b) Get trappers back on the landscape
i) moving fuel, bait,
ii) Adding bounty -gov wont do it. It would have to come from somewhere else
c) Private trappers carry on
d) FN Guardian trapping program. Appetite is there but the funding isn't. subsidies for trapping a solution?
e) Gov wolf removal from caribou program helps. Can't do it for sheep (they aren't red listed)
f) Coyote release following wolf removal – mesopredator release?
g) Wolverine trapping seasons extended?
h) Test flushing roads free of salt
i) Where? Rock cut for starters, other areas along the highway
ii) Could be cheap and effective solution- Fultons can implement but who pays?
i) Guardrail does stop yearling sheep from jumping over. But its public safety concern to modify

j) Document the highway mortality- parks staff drive this route daily and can find this out. Collect samples for these mortality. Who to reach out?

3) Health Issues:

a) Not a concern yet
b) Starting from square one essentially. Where do we have domestics?
    i) Beryl Prairie, Pink Mountain, Toad River are areas of concern,
c) GAR isn't sign but would keep domestics off crown land within 30km of wild sheep range
    i) How can we put pressure on to keep this going: BCWF, WSSBC,
d) Need to get the word out about this issue: Education
e) Herd health
    i) Sampling kits for outfitters, FN, transporters, resident hunters. Coordinate with?
        (1) What is the most helpful to collect?
            (a) Photographs of internal organs, body fat measurements
            (b) Blood papers
            (c) Long bones if possible
        (2) If this happens, reporting and acknowledgement needs to occur to encourage people to continue with it
        (3) Should we start with a small kit, few things then work to larger kit if it takes?
        (4) History of this with Tahltan Guide Outfitters Association and Tahltan communities – see Caeley Thacker with Wildlife Health. A training video is available for some species (Naima did not produce a film - ask Skeena ESI for copy)
        (5) Nasal swabs should stay with CI inspections
            (a) Testing is expensive. Existing program on swabbing rotates around bighorns/thinhorns and region to region. This is where WSSBC can help. They can support sampling programs where they are lacking

3) Health Solutions:

a) Reach out to 4H groups in communities (if present) to provide education, similar to what's being down south. This will also help us find out where domestics are and identify where the priorities are.
b) Showing the Transmission film: FWCP can fund this
    i) Show it at banquet
    ii) Show it to cattlemen's assoc
    iii) FN showings- lands departments
c) Herd health
    i) Sampling kits for outfitters, FN, transporters, resident hunters. Coordinate with Caeley, NE guides

(1) What is the most helpful to collect?
    (a) Photographs of internal organs, body fat measurements
    (b) Blood papers
    (c) Long bones if possible
(2) WSSBC could support Movi swabbing at CI's where funds are required

4. **Interspecific Competition Issues:**
   b. With elk
      i. elk support high wolf densities
      ii. Predator prey interactions are tough with this
      iii. Burning for sheep can be difficult given how they benefit elk. Feeds into higher wolf densities
   c. With Bison
      i. They overlap in some areas with sheep on winter ranges. They have high consumption rates. They eat everything else out of house and home. Old enclosures on the landscape demonstrate this

4. **Interspecific Competition Solutions:**
   a. **What we need**: Winter range assessments – Sikanni
   b. Review BC Bison Management Plan, update it and follow it and use recent collar data from Liard bison to look at movement
   c. Following that: Targeted removal if there's a problem. FN support for removals
   d. Bison don't matter to FN. They need to be shown to care about this issue. How are bison affecting moose? Does this data exist? Who needs to show them this? NEED A PERSON TO REACH OUT.

7b GENERAL DISCUSSION- Both days:

1) General Discussion- Day 1:

- MKMA – not under wildlife act, stand-alone legislation
- Each area and drainage is unique and requires unique solutions to their specific challenges
- Ungulates are relatively easy to grow but there needs to be a balance between species
- People often managed too much and less habitat/animal/access management because people are easier to manage
- Apparent competition:
    - More to do with burn programs and elk/sheep overlap (no spatial separation). Not about alternate predator/prey dynamics
    - Competition with bison but only in specific areas. Bison seasons should be more open to limit range overlap with sheep in Sikanni area. Wood bison encroaching by Muncho, going south of Muncho Lake now (Moose Lake, Toad River). Emerging issue. They could go up into sheep country (Important for local region to remember there is a BC Bison Management Plan that sadly needs updating….these issues are with):
- Health

- Would we even be able to know if health was an issue? Thinhorns are remote, not always seen
- If disease was introduced, it could be a serious issue
- Training needed for guides/outfitters/FN to conduct health sampling.
- Isolation:
  - Peace arm sheep, Narraway bighorns
  - Peace arm sheep are connected to others, limited but still there
  - East of the highway near Sikanni there are isolated sheep bands
- Separation:
  - Dunlevy/Schooler from Saulteau vegetation control program
  - Wild sheep venture far away and commonly seen in ag fields
  - Stone's sheep ewe seen in bear flats sheep pen from 70's-historic interaction
  - No evidence of M. ovi in health sampling historically or now

- Harvest pressure
  - Worried over the panic resulting from over harvest (>2-3%). Winter survey vs fall harvest - sheep are not in the same areas. Harvest reports might not be true. No need to panic and make decisions out of urgency
  - What's density, access, population levels, ram numbers, hunter pressure?
  - Sheep CI reports are likely not accurate on harvest location
  - We need more information on how many sheep are available on the landscape rather than worry about where they came from
  - Ethics and education need to come into play: eg. shooting every legal ram
  - No one wants to go to LEH, not being pushed for. It's a tool and its there but no one wants to use it – David. Sheep are not limited by harvest.
  - LEH benefit any region? Sikanni/Halfway? Access is high, pressure is high, sheep aren't there. Competition with bison. Bison seasons should be more open to limit range overlap with sheep.
  - Mistakes are made (harvest young/illegal) and that's where education comes in.
- Access
  - High in the Sikanni area. Need LEH?
  - Sheep hunter numbers are getting higher. Concentrations in one year in an area might lead to higher concentrations in a different area the following area.
  - Float plane access can really concentrate hunters. Transport services need to report on activities.
  - No limits on plane transport services. There is on boating transport services.
  - Should we regulate the air transport services? Self regulation should happen but hasn't. People fly to the same lakes year after year. Transporters don't care to regulate the number of hunters they fly in to one spot. Paycheck is a paycheck.
  - Plane traffic has increased over the last few years.
  - Control/regulation/reporting for commercial backcountry access?
    - Legally hard to do. Aircraft are federal. They don't need to report unless landing in a park.

- Motor vehicle access could get out of control. Machines are getting better at going to tougher places.
- If trails are there, they will be used.
- Better signage needs to be used to inform users about closure areas, particularly in the MK
  - Sign should say "this is the closed area, and this is why its closed"
  - Signage should be clear with a map designated closure areas
- Fines should be more severe for violations. People will laugh at $150 fine as "the price of doing business". Hefty fines in the public eye will draw attention and ensure greater compliance.
- Access isn't an issue, but compliance and enforcement should be better

- Enforcement
  - The amount of CO's in the region is terrible. (there's 2 for the region). They can't respond to everything.
  - They could be more effective. Checks at steamboat vs getting stuck on the river trying to find camps. Helicopter to check hunter camps would be efficient but expensive.
- Habitat enhancement
  - How much does habitat enhancement help? If so, how much? How many sheep added?
  - Burns do help but benefits hard to measure. Lamb counts are one way. Cross reference with control areas. If enhancement occurs, you need to pay attention to other factors obscuring benefits (harsh winters negating benefits).
  - Parks not supporting burns
  - Cultural burning program. What does it look like? Will it happen in parks?
  - Permitting process for burning is brutal. Has gotten much worse in recent years. Need independent body for approvals, move decision away from director approval? Faith in regional director is low. Lack of trust
  - Some regions have better framework for industrial activity (MK as example)
  - Reburning old burns- maintain the habitat. Doesn't remove from timber harvest land base (THLB).
  - government support for burns is lacking? Independent groups leading the charge on burns and support from Gov is lacking. Gov support is meant to make projects better, push for use of improved knowledge, techniques, and refined areas for enhancement.
  - How many fire practitioners are there? We need more. Need to know what works. TO know how to burn, we need to burn.
  - 5-year timeline on projects-proposed vs delivered is usually different. New science and knowledge incorporated
  - Need to consider burn benefits to other species when considering burns
  - LMRP's should be followed. Knowledge has been lost in the region.
  - Can burns be implement proactively rather than reactively? Why does gov need a reason to burn? Burning can be done before herds decline and more serious actions are needed.
  - Gov recommendation of 2% of the land base to burn annual is arbitrary
  - Consider the dual purpose of burns: habitat enhancement and wildfire management.
  - Burn programs now will not look anything like the ones in the past

        - Increased rationale, more specific targeted areas,
    - Changing values and plans from year to year hinder burn approvals. Why does this need to happen. Reasons for rejection aren't always reasonable (increased sediment load in streams when glacial streams already have high sediment load)
    - FN perspective "Fire is ingrained in our culture. Its not culture lost, its culture stolen" – Fort Nelson Elder quote. If gov is going to lean on reconciliation and FN collaborations, they need to recognize fire is important to FN
    - FN capacity to handle these issues is limited
    - Build FN training, participation and involvement into future projects.
    - Fort Nelson FN community doesn't harvest sheep. They still care. Others should make sure they understand why its important and why they should care. Halfway River FN community is the same.
        - Challenge: FN communication, involvement and education on future work
        - FN use to burn, primarily for moose, but still was a tool they used and framed the landscape.
    - The MK is the "Serengeti of the north" and mostly because of fire regime in the area.
    - No plan from gov for burning. They leave it up to everyone else. MK plan should be used. "Implement the damn thing"
    - FN in Toad River used to burn in the spring. They loved sheep. Sheep were part of their lives. It was their tradition to help sheep in that area. Knowledge of this may not have been passed on.
    - Planning needs to involve all parties to ensure effectiveness and practicality. (FN, gov, NGO's). Knowledge holders and people experienced on the landscape can be a valued resource.
    - Habitat enhancement needs to be provided for stable/increasing herds to support them.
    - Previous burning was large and extensive but small inconsideration to the size of the region.
- Predation
    - Poisoning programs included too much bycatch
    - Sheep predators are numerous and the primary predator in each herd area can vary.
    - Eagles, lynx, wolverines, wolves, bears…etc
    - How do we find out about sheep predation? > collars. Look into cause specific mortality
- Inventory needs
    - Survey methods aren't great.
    - Mark resight approach with collars can help

1. **Habitat**
    a. Issue: biggest limiting factor for sheep in the area is quality habitat.
    b. How to address this? Support for habitat enhancement burns. We want quality forage in the right areas. Can we be proactive rather than reactive Do we need an issue in order to justify burns?. Problem is we are limited by the permitting process and knowing how to effectively implement fires.

2. **Predation/Mortality**
    a. Issue: sheep Predators are numerous and the primary predator in each herd area can vary. Need better knowledge to understand cause specific mortality to inform management.
    b. How do we find out about sheep predation? Collaring program. Look into cause specific mortality. Will also provide more informative surveys for mark resight approach
    c. Monitoring highway mortality

3. **Health**
    a. Disease spread could be catastrophic. No concern now, but we need to keep it that way. We need to focus on preventing introduction.
    b. How: looking into solutions like the separation program. Identify domestic farms nearby, some have been tested. Initiate health testing program for harvested sheep to reduce knowledge gaps regarding health data in areas where more effective sampling is limited. How can we do this? Training guides/outfitters/first nations to collect health samples appropriately. Could include sampling for highway mortalities. Use what's available.

4. **Interspecific competition**
    a. Focus here is bison and elk are hard on the landscape. Bison around sikanni and bison moving south of Mucho Lake. Overlap spatially with sheep on winter ranges and that overlap causes resource competition that sheep are likely to lose out on.

Action items:

1. Burning fire council
    a. Press the issue
2. Start collaring programs
    a. Monitor sheep health and mortality
    b. Improve surveys
3. Start disease prevention outreach?

2) General Discussion- Day 2:

- Agency doesn't act in good faith. Leadership problem, not staff
- Fire council has been asked for, for years and nothing has happened
- Reach out to other regions to find out what works to get fires going? Regional manager will respond "this region is unique and has its own challenges".
- Government needs to outline exactly what they want for burns for permits to be streamlined. Otherwise it's a lot of back and forth and new layers or "tick boxes" get added each time groups come to the table.
- Region is the problem getting burns going. Province is open to burning, region is not. Keeping pressure up on burning will keep region moving towards a fire council. Pressure is being kept up in Victoria to maintain support from the province.
- Decision makers are not following LRMP's
- Separation for moose, bison, elk and sheep
- MK

        - They have guidelines to use fire for wildlife but they aren't being used or followed
    - Administrative fairness
        - Policies can't change and overrule previous permissions
        - But who would care about this? Regional managers have a lot of power
    - Current burn plan includes 25 polygons to 2026. Consultation package for 6 being sent through. 4 burns approved already.
    - If burns are going to happen, the polygons can't be small. Staying within those boundaries is going to be very difficult and if burns go outside, decision makers will be reluctant to grant others. What about a buffer zone around target area? BCWS did like this. Region got rid of it though. Other solution is fire guards and those are scars on the landscape. Large polygons scare people
    - Why are people so scared of fires? They're scared of the unknown
    - Ombudsman or environmental appeal board can help?

Region 8

Current Population Estimate: 750
Population Target: 1200-1500
Primary Regional Wild Sheep Issues: Disease, Habitat, Predation

1) Disease:

a) M. ovi:

i) Found on the East side of Okanagan valley, affects the entirety of this population.

ii) Solvable disease issue but complicated due to transmission from Washington state bighorns. Pattern is slightly different than Fraser health issues as at this time only lamb survival is affected. Previous event in 1999-2000 was followed by similar pattern and resolved within several years with herd recovery.

iii) Collaboration between British Columbia, Washington State and all First Nations is essential to any removal program we undertake.

iv) The issue is well known, continue to work in the regional working group

v) More outreach is required by everyone

vi) ONA to contact Washington FN

vii) WSSBC to contact WSF Washington

viii) more outreach by everyone, everywhere to eventually perform a test and remove program similar to the ongoing Fraser project.

ix) Increased support for the Wild/Domestic Sheep Separation Program and testing/evaluation of Domestic sheep in the region.

x) Create a localized volunteer team to continue identifying local producers and provide outreach(through Jeremy Ayotte and Helen Schwantje),

(1) ONA may have capacity

(2) Peter has capacity

(3) Anyone welcome

xi) Continue to monitor and test wild sheep(ongoing through LW&RS, ONA, WSSBC)

xii) Continue to support Provincial regulation and policy from the Ministry of Ag to remove the threat of Movi for both wild and domestic sheep in British Columbia.

xiii) General Issues:

(1) Massive collaboration is required as well as large capacity and funding to conduct the large-scale test and remove programs needed to clear the disease issue.

b) Psoroptes:

i) West side of Okanagan valley from Washington State to Penticton, including all Ashnola and Similkameen sheep.

ii) Experimental treatment appeared successful but follow up research required. No effective cure for free-ranging wild sheep without more work.

iii) As with the Movi issue, multijurisdictional in scope. Massive communication and collaboration are required.

iv) More research is required to understand actionable items to remove the disease effectively.

(1) Mackenzie Clarke (ONA) has a research plan application in the works.

(2) Maintenance of pens on PIB will be a long-term need.

(3) Containment from Westside Rd sheep using game cams

(4) CO confiscated game cams?

2) Habitat

a) Fire Suppression, recent fires have moved in the right direction.

i) Increase communication with BC Wildfire for collaboration and identification of target areas for prescription fires.

b) Access Management, focus on existing motor vehicle closures in the sheep range

i) Inventory road density and identify target roads

ii) Promote deactivation in these areas

c) Recreational Areas, Skaha Bluffs Prov. Park

i) Increase education surrounding Wild Sheep and sensitive times of year (lambing)

ii) Create signage

iii) Outreach with Penticton city council, local climbing clubs, and BC Parks

iv) Support from LWRS (long-term)

d) Invasive Plants

i) Explore habitat protection through IPCA (ONA)

ii) Partnership with OASISS

iii) Outreach

e) Feral Horses

i) ONA outreach and education

ii) Removal/sterilization of stallions, other methods

3) Predation

- **a)** Cougar trapping, Provincial hold up with Control Species Policy
  - **i)** Engagement needed of regional wildlife council on policy change.
- **b)** Coyotes, observed to have a significant impact on Gilpin lamb recruitment
- **c)** Determine whether and where predation is an issue
  - **i)** Systematic collection of local knowledge
- **d)** Explore alternative methods of predator control
  - **i)** Research best management practices for coyote control in areas required.
  - **ii)** Engagement with local trappers, explore incentives
  - **iii)** Target problem predators with specialists

Region 8 Groups to reach out to / Who needs to be brought into the conversation:

- Fruit Growers Association
- Sheep Safe w/ Indigenous Nations
- Wine Growers Association
- Colville Confederated Tribes (separate from RWAC) - ONA
- Nature Trust of BC- ONA/WSSBC
- BC Timber Sales – ONA
- R.D.O.S
- Southern Interior Land Trust
- Ministry of Agriculture- Lori Vickers
- BC Wildfire – ONA
- O.C.C.P
- LWRS- Josie Simons?
- Lisa Scott- Oasis (Good Partner)
- BCTA (Action the Trappers)
- Washington State Fish & Wildlife- ONA
- BC Sheep Federation
- GOABC- ONA
- Okanagan Nation Alliance
- Wild Sheep Foundation - Washington Chapter (Pete G.)

Wild Sheep Issue Descriptions

This information was provided to the BC Wild Sheep Summit attendees prior to the summit to provide a baseline of information of significant challenges for wild sheep in British Columbia. This information was provided by technical experts within the province which included: regional biologists, wildlife experts, and wildlife veterinarians. The intent of this was to provide information that would help in decision making for each regional working group.

Predation (*Provincial Scale*)

Generally the list of predators of thinhorn and bighorn sheep are similar and include Golden eagles and to a lesser degree Bald eagles, wolverine, bears (both grizzly an- d black), coyotes and wolves, cougar, bobcat & lynx. The effect of predation on sheep populations will vary with geographic area, terrain, predator densities, winter severity, snow depth/density, and habitat quality, and there are often regional differences that affect which predator is having the most effect on sheep in different areas. For example, Golden eagles are effective predators of younger sheep and particularly so in summer months when newborn lambs are available, then again in winter seasons where sheep are

more concentrated and corresponding with the timing of eagle migrations, especially in the NW; coyotes are effective predators of young lambs and ewes at all times of the year in most areas where wolf numbers are low.

Predators generally affect populations through direct mortality, however, predators can also affect individuals and potentially populations and reproduction rate through increased levels of stress and they may also introduce parasites; both of which have the potential to result in impacts to fitness and reproduction. Predation of young sheep in B.C. by bobcat, lynx and coyotes does occur, however this has not been quantified and is likely affected by hare cycles (similar to what has been observed in some other jurisdictions). Cougar predation on sheep has not yet been identified as a significant issue in northern BC, however the range of these large cats is expanding geographically. Cougar predation in Bighorn sheep has been studied in many jurisdictions and the concept of individual cougars becoming sheep predation specialists has been shown to exist, but unless those specific cougars are targeted in any predator management action, positive outcomes for sheep may not actually result.

The actual effectiveness of wolf and cougar removal in benefitting some sheep populations will likely be highly variable and have many locally specific factors linked to unique landscape and predator assemblages and the length of time that control efforts are undertaken. Research suggests conflicting outcomes associated with control programs, and while there is a potential for increased adult and lamb survival, lamb recruitment and population growth, there is also a potential for increased competition with other ungulates (*i.e., elk, bison*) as those populations also respond to predator removals, and, a potential for mesocarnivore release (*i.e., coyotes and wolverine*) that can result in increased predation effect on lambs and ewes. Specific to wolves, where smaller packs remain, they may potentially shift prey selection towards smaller prey (i.e., from moose & elk, to sheep), but some researchers have suggested that the lowered wolf density may compensate for any negative effect for prey switching.

Potential Strategies- Predation

- Identification of species, and impact
  - Reduce high numbers
- Predator management
- Trapping - fund trappers
- Incentivize Outfitters and Hunters (*regulation or otherwise*)
- Reduced regulation around predator harvest
- Competitive prey reduction

Disease

British Columbia: Historical Summary of Wild Sheep Disease Events - Overview

Population effects from pneumonia causing catastrophic all-age die-offs in bighorn sheep have been documented across their range for decades. Evolving epidemiological and laboratory analysis methodologies have improved the understanding of the factors and pathogens involved in such events. Mycoplasma ovipneumoniae (*M. ovi*) is confirmed as the key bacterial species responsible for initiating pneumonia events that result in polymicrobial bacterial pneumonia mortality of bighorn sheep (*Manlove 2020*).

M. ovi was first recognized in dead bighorn sheep in British Columbia using a non-specific Polymerase Chain Reaction (*PCR*) test for *Mollicutes* spp. on lung tissue from a pneumonia-related mortality in the Okanagan in 1999 (*Schwantje pers comm*). The methodology was subsequently applied in other settings and advances in diagnostics and research in B.C. and the USA have allowed the identification of M. ovi as a significant pathogen of bighorn sheep and mountain goats. New introductions of M. ovi into wild sheep and mountain goat populations has caused devastating all-age die-offs (*commonly >50% of the herd*) and can result in pneumonia-related deaths of all young-of-the-year cohorts in the affected herd. Although this pattern can vary, in many cases negative effects from the initial herd die-off and poor

recruitment create long term effects for far more than the initial year of infection (*Besser et al. 2017, Cassirer et al. 2013, Wolff et al. 2019*).

Issue

Wild and domestic sheep are closely related and may share range, forage and water on rangeland and private lands. Contact can occur throughout the year and can be affected by weather and habitat condition. Bighorn sheep winter ranges are generally at lower elevation nearer farms, especially during their rut, the timing of which is similar to domestic sheep breeding season. Bighorn rams may then have increased interactions with domestic ewes. Because of their close ancestry, domestic and wild sheep (*and goats*) can share a number of infectious organisms, however, wild sheep are generally naïve to most pathogens that domestic sheep and goats carry (Dubay *et al.* 2003, Garde *et al*. 2005). However, infection by some organisms can result in significant disease and can be fatal to wild sheep. M. ovi is one of the best examples (*Black et al. 1988, Harris et al. 2011, Thacker 2020, Wood et al. 2010*).

Bighorn Sheep

The Bighorn sheep (*Ovis canadensis*) species is represented in B.C. by two subspecies: the California (*Ovis canadensis californiana*) and the Rocky Mountain bighorn (*Ovis canadensis canadensis*), with recent research confirming some genetic distinctiveness (Barbosa *et. al.* 2020). Bighorn sheep are on the provincial Blue List in B.C. as the species or subspecies is vulnerable to human activities or natural events (*Ministry of Environment, 2000, BC Conservation Data Centre*).

The California bighorn subspecies is present in the southwest interior of British Columbia, with herds present southward on the east side of the Coast and Cascade ranges into northern California. Rocky Mountain bighorns are native to the Canadian Rockies, and herds are present southward along the main chain of the Rockies to New Mexico, north to the Pine Pass in northeast B.C. and Alberta. B.C. bighorn sheep have been the source for numerous translocation efforts that supported the reestablishment of bighorn sheep populations in many of the western states (Barbosa *et. al*, 2020), with initial translocations in the early 1950's (*Wild Sheep Working Group, 2015*). In 2000, B.C. estimated the California bighorn population at approximately 3600 animals, while Rocky Mountain bighorns were estimated to be around 3,100 animals (*Ministry of Environment, 2000, Kuzyk et. al. 2012*). Bighorn sheep population health has been assessed over time and records confirm a series of pneumonia die-offs, observed as far back as the early 1900's in some populations with a varying degree of related information (*see below*).

Thinhorn Sheep

The population of thinhorn sheep in B.C. includes two subspecies: Stone's sheep (*O. dalli stonei*) and Dall's sheep (*O. dalli dalli*). Recent genetic research has shown that almost the entire global population of Stone's sheep are within B.C.'s borders (Sim et al. 2016, Sim et al. 2018). In 2021, the thinhorn sheep population in B.C. was estimated at approximately 12,300 Stone's sheep and 900 Dall's sheep (MOF 2022). Thinhorn sheep are only present in mountain ranges of northern B.C. and both subspecies are on the provincial Blue List (Ministry of Environment, 2000, BC Conservation Data Centre). Herd health assessments of thinhorns are limited due to their remoteness; however, previous and current projects have confirmed a lack of exposure to M. ovi and other common domestic pathogens (Schwantje pers comm, Wood *et al*. 2010, Thacker *et al.* 2020). Zoo-housed Dall's sheep developed fatal pneumonia in captivity following exposure to M. ovi, in a manner similar to bighorn sheep (*Black et al. 1988*).

Chronology of wild sheep die-off events in BC:

B.C. has and continues to experience disease outbreaks in Bighorn sheep in the form of epizootic pneumonia. Regional observations and investigations include:

- 1920s - East Kootenay - pneumonia symptoms with significant mortalities in multiple herds.

- 1924-1950 - Cariboo, Similkameen and Okanagan regions – Sugden (*1961*) detailed a series of wild sheep population declines dating back to the late 1800's with mention of some associated events such as exposure to domestic sheep, potentially leading to those declines; Sugden referenced a 1903 report from B.C. that listed

human disturbance and forage competition as a reason for some wild sheep declines, but lungworm, predation, over-hunting and habitat loss were also noted.

- 1964-66 - East Kootenay – unknown domestic sheep contact, pneumonia with mortalities in multiple herds with an estimated loss of 57% of the population or approximately 930 bighorn sheep (*Schwantje 1988*).

- 1970's - a UBC captive herd, all died due to pneumonia.

- 1980's - Columbia/East Kootenay Trench - domestic contact confirmed, pneumonia with mortalities in multiple herds were reported in Davidson (*1994*) with a reported loss of approximately 550 bighorn sheep, or 26% of the overall population. Subsequent research included examination of survivor lungs with lesions with histological changes suggestive of M. ovi infection (*Schwantje pers comm, Schwantje 1988*).

- 1994 – Fraser River herds (*meta-population spanning regions 3 & 5*) - Region 3 investigated the east side of Fraser – poor lamb production, several lambs showing poor condition or coughing killed for post-mortem. Several bacterial pathogens and high levels of lungworm noted, consistent with the prevalent theory of "summer lungworm pneumonia" in bighorn lambs. Likely to have also involved M. ovi from photographic evidence. No samples archived (*Schwantje pers comm*). Population estimated at ~2900 sheep in 1990 for the complete Fraser meta-population, and this declined to ~1200 sheep by the early 2000's (*Kuzyk et al. 2012*).

- 1999-2000 - South Okanagan - domestic contact confirmed, pneumonia with mortalities in adjacent herds, the bighorn population declined from approximately 450 to 150, during outbreak animals were shot if showing signs of disease (*coughing, poor condition*), trace minerals added to mineral licks, disease investigation noted lung tissues that had both histological changes consistent with M. ovi infection and were Mollicutes (*Mycoplasma family*) positive on PCR(*Schwantje pers comm, laboratory reports*), this is apparently the first recognition of Mollicutes positive bighorns by PCR.

- 2011 – Fraser River - Pavilion and Big Bar bands (*East side of Fraser River, north of Lillooet*) – sick bighorn lambs reported, collections and laboratory culture from investigations confirmed lambs died of M. ovi (*Struthers et al. 2012*). Both bands of sheep have continued to decline since 2011 with only intermittent years having some degree of lamb recruitment.

- 2013-2014 - Chasm herd (*north of Clinton*) – domestic sheep contact confirmed, population declined from over 100 to less than 30 over winter 2013/14, no carcasses found or observed. No lambs in herd survived to over 6 months of age since in most years. M. ovi confirmed with PCR and serology in sampled ewes in Spring 2014. Sheep continued to decline from 2014 until time of test and remove treatment 2020 and lamb survival has improved significantly. However, poor adult female survival, largely due to cougar predation, now appears to be hampering herd recovery despite good recruitment rates in recent years, due to the small number of adult ewes remaining in the herd.

- 2018 – Fraser River herd – first comprehensive herd health assessment of any bighorn population in B.C. Presence of M. ovi detected by PCR and serology in all areas on the east and west side of the Fraser River in Regions 3 and 5. A population management trial was initiated in 2019 to test and remove M. ovi positive bighorn ewes to recover Chasm and Fraser River sheep populations (*Ayotte 2022*) (*see above*). While significant population research was carried out historically in some Fraser herds, little formal disease monitoring or mortality investigations occurred due to remoteness. As an example of subsequent herd management, inventory and local observations identified that bighorn sheep declined in the Churn Creek area from approximately 600 in the mid to late 1990s to less than 100 by 2022. In the only two resident bands of bighorn sheep in the area (*Gang Ranch and McEwan Creek*), there were only 7 and 11 adult females remaining by 2022. Sampling of these bands in 2022, as part of the test and remove treatments, resulted in 3 of the 7 ewes

at Gang Ranch and 7 of the 11 ewes at McEwan Creek testing positive by field PCR and were subsequently removed. All removed sheep were necropsied and most had significant residual lung lesions consistent with bacterial pneumonia; further laboratory work is pending. These two bands are the only remaining resident sheep on the Fraser north of Grinder Creek and south of the Chilcotin River. Both bands are now considered to be on the brink of extirpation, and will be particularly vulnerable to predation and environmental effects.

- 2019-2022 – Vaseux Lake and south Okanagan herds – no known domestic contact, lamb morbidity and mortality with later adult pneumonia, strain-typing identified M. ovi match to bighorn sheep cases in Okanogan County, WA (*McLean 2021*). M. ovi strain was linked to an exposure event in Mt. Hull, WA bighorn herd, later identified as a domestic contact event. These herds have also been affected by a recent Bluetongue virus epizootic and some are infested with *Psoroptes ovis* mites. There is now a cross-border collaborative effort to manage the ongoing health issues in this shared bighorn sheep population.

All B.C. die-off events were followed by at least several years of poor to no lamb recruitment and initial population declines. The 1999 Okanagan event is the only one recorded in B.C. to show a relatively quick population recovery (*i.e., ~5-10 years*), but that recovery may have been assisted by Wildlife Branch and Conservation Officer staff, who for several years immediately following the die-off, undertook active removal of any ewes that were observed displaying signs of pneumonia (*i.e., coughing*).

Potential Strategies- Disease

- Continue standardized wild sheep herd health testing and update the provincial herd registry
- Support BC Wild/Domestic Sheep Separation Program
- Continue communication strategies to inform public and agricultural sectors
- Ministry of Agriculture - Regulation and Policy changes
  - Designation of high/medium/low risk zones with specific requirements (*regulation or policy changes*)
- Movi mitigation
  - Test and Remove projects
  - Separation
    - Effective Fencing
    - Guardian Dogs
    - Collaboration with domestic sheep producers, ensure high health flocks
- Treatment research – *Psoroptes ovis*

Habitat

Wild sheep occupy some of the most expansive, rugged, and picturesque landscapes on the continent, but they can also be found at times, continuing to use habitats enveloped by expanded human settlement. The challenges of surviving in these habitats include extreme weather events such as winter rain-on-snow and prolonged cold spring rain events, wide ranges in seasonal and daily temperatures, heavy snowfalls and avalanche hazards, and severe windstorms. The intensity of these conditions varies both with geographic location and the effects of marine weather systems. All of these are further influenced by global climatic events, such as the Pacific Decadal Oscillation. As a result, sheep have adapted to exploit very specific habitats that include windblown, southern-aspect grassy slopes as winter range; steep rock slopes to evade predators and provide natal habitats and safety to newborn lambs; unobstructed seasonal migration and movement corridors; and mineral licks often located at lower elevations.

To date, habitat protection and enhancement efforts in B.C. have been focused on optimizing the quality and quantity of important seasonal range (a) and, where possible, implementing industrial activity mitigations and timing windows to improve protection of habitats like natal range and mineral lick micro-sites (b):

a. Habitat enhancement for wild sheep has historically focused on prescribed burning in areas of forest encroachment or sub-alpine habitats, with the intention of enhancing nutritional quality and availability of forage, opening site-lines to reduce predation and removing deciduous shrubs, aspen and conifer in-growth. There is some concern that the benefits of prescribed fires, to forage digestibility, biomass and quality, be short-lived (*i.e., ≤2-3yrs*) and that population and distribution responses in other species may increase apparent competition effects (i.e., increased elk distribution and abundance consequently increases wolf abundance, that then increases wolf predation effect on wild sheep.

b. Important sheep range and habitat features have been protected using land use designations under the *Forest and Range Protection Act* (*FRPA*); higher level plans such as Land & Resource Management Plans (*LRMPs*); the *Park Act* as a *park*, *conservancy* or *recreation area*; and through Wildlife Management Area designations under the *Wildlife Act* (*e.g., Muskwa Kechika Management Area, Todagin Wildlife Management Area*). In addition, Federal statutes such as the *Species At Risk Act* (*SARA*) include specific directives for managing habitats for SARA-listed species. Each of the designations establishes limits and offer guidance on the types of habitat interventions that may be used to benefit wild sheep that may be consistent with the purpose of that land designation, and this can both streamline and complicate the implementation of some types of proposals. In southern B.C., private land ownership complicates effective implementation of management strategies across large areas, or where specific issues such as development within migration corridors or domestic livestock disease is an issue.

As climate change affects natal, summer and winter period temperatures, the cycle of melting and freezing and rain-on-snow events, and delays in spring green-up dates and frequency of wildfire, the effects from snow on sheep movements, foraging and energetics costs, forage nutrition, habitat resilience and predation may all see dramatic swings in severity and response, as nature tries to achieve an equilibrium. Weather pattern changes will continue to have a profound effect on sheep survival, adult fecundity and lamb survival and recruitment. Identifying key climate variables and their effect on sheep survival and demographics will help manage and respond to population impacts, prioritize population units for monitoring investments and adapt conservation strategies at both local and meta-population scales.

Potential Strategies- Habitat

- Regulation changes to reduce habitat impact by industry
- Road rehabilitation
- Prescribed fire
- Habitat intervention through alpine forage community fertilization
- Reduction of invasive weeds such as cheat grass (*spraying program*)
- Development of parks that restrict industrial development
- Industry support (*surcharge for impacts to habitat/wildlife*)
- Expanded scope of Environmental Impact Assessments that consider gross affected area and just the project footprint
- Round tables that include industry, First Nations and NGO's

Hunting Pressure /Hunter Harvest

There are generally two approaches to managing harvest:

- Reactive regulation setting (*i.e., regulation change in response to a significant biological or human-caused event);* and
- Proactive regulations *(i.e., where changes are implemented as a conservation effort to avoid a more dramatic change potentially being required later*).

Across the north from Alaska through to BC. we saw severe winters and springs impact survival of thinhorns between 2010-2014, and again between 2019-2022. This resulted in fewer sheep and fewer harvestable rams, and we can expect that while we might see a bit of a recovery in abundance in the next few years, between 2028-2030, we'll see even fewer.

While in the south we saw widespread wildfires, which are generally considered an enhancement tool, we also saw large expansions of invasive plants like cheatgrass, and of course impacts and die-offs related to blue-tongue, M.ovi and Psoroptes., so the possibility for bighorns is that things may continue to be worse before they get better.
To ensure resilient and viable populations we need to consider what a maximum allowable harvest by species would be; research suggests that a 3% harvest rate is sustainable. Trends in resident hunter sheep license sales over the past decade continue to increase steadily, however there is relatively little information available on hunter motivations, effort, party size, or where hunters who do not harvest sheep, spend their time hunting.

Generally over the past decade the provincial harvest of thinhorn sheep has averaged ~330 rams per year; bighorns have generally averaged ~85 rams and ~7 ewes per year. While provincially we are generally <3% harvest rate for both species, at local scales the actual harvest rate can be 2 or 3 times the provincial harvest rate, so considering the scale of analyses and harvest-pressure focused regulation change is important.

One of the main harvest related issues revolves around how to ensure resiliency in our sheep populations where harvest is very selective (*horn curl and/or age minimums*). When this is considered there is some question about the best approach(*es*) to take: implement studies and develop science-based directives based on those outcomes, or use existing trends and anticipated outcomes to incorporate changes in outcomes in a more gradual way? The preference of actions may relate to and individuals' perceptions about the current and future status of populations and their resiliency; the availability of habitats and their function; and their personal hunter motivations and goals.

WSSBC Note: *Clearly this is an emotive issue for consumptive users (sheep hunters). Please note that WSSBC is not advocating for any one of these particular options. However, we do have to consider the impacts that hunter harvest and hunting pressure have on wild sheep and be proactive in management so as not to create a conservation concern on the resource.*

Potential Strategies- Hunting pressure /Hunter Harvest

- Regulation changes – strict adherence to the species harvest management procedures and opportunity based on minimum populations, and compositions
- Limit the number of rams harvested in a lifetime
  - 1 ram every 5 years/ 7 years
  - Maximum of 2 or 3 rams in a lifetime
    - Increasing hunter interest requires a balance between harvest success and what the resource can handle
  - Demerit point system where each hunter can only acquire a maximum of 3 points in lifetime – after that no more sheep hunting (*e.g., harvest ram <8 years old = 1 point, harvest and illegal ram = 2 points*)
  - Shared license – 2 hunters on license that allows only 1 ram harvested
- Age-contingent tag issue
- Species specific tags – thinhorn and bighorn but can only purchase 1 per year
- Draw-based hunting:
  - Limited Entry Hunting for all sheep areas
  - status quo on regulations but once you harvest a ram you have to go LEH for the next 5-7 years
  - same as #2 except you are on LEH for life after your first harvest.

Roads and railways (*Road Mortalities*)

Generally, compiling reliable data on wildlife and wild sheep collisions along roads and rail lines difficult to achieve, however it seems safe to suggest that there are more instances in southern BC than northern BC; with this as an assumption, it may be that bighorn sheep are more negatively impacted by these networks than thinhorn sheep (*to date*).

When populations were robust and vehicle volumes and speeds were lower, it may have been arguable that highway mortality was compensatory in nature. Today however, populations of Bighorn sheep in BC have declined significantly in many areas of the province, predominantly due to habitat change and wildlife health challenges [*i.e., created by chronic M.ovi and/or Psoroptes infections, and in the past summers of 2020 and 2021, Giant Liver Fluke and Blue Tongue die-offs (respectively)*]. An argument can now perhaps be made that these somewhat 'uncontrollable' environmental and health challenges change the way we look a highway related loss, especially in the south of BC, and consider them as a source of additive mortality. Recently some NGO led initiatives have resulted in changes to highway traffic management and infrastructure (*e.g., Radium Hill*), and in drought years diversionary watering appears to have been successful at reducing bighorn sheep crossings and attendance along highways where they are attempting to access water. Other efforts to use diversionary salting as a way to attract wildlife away from the highway have yet to be rigorously studied to determine if collision risk and/or individual behaviours of wild sheep have been changed in a meaningful way.

Rail mortality also appears to have decreased in recent years, but this could be due to a density dependence effect from generally lower populations of bighorns in the area. Historically Bighorn involved in rail collisions have been reported in both Kamloops, and Kootenay regions.

Potential Strategies- Roads and Railways

- Wildlife warning signage w/ speed restrictions – innovative and attention getting
- Rumble strips
- Educational Awareness Signage
- Wildlife Overpasses (*Wildlife Corridors*) or fencing in high-risk areas
- Roadway Lighting
- Changes to Highway maintenance techniques
    - Salt is the attractant, so could request thorough washing of highway collision locations a couple times in the spring using a hose truck and crew (*not the cosmetic spray truck as they are not effective enough*) that really washes the grooves and rumble strip areas where salt collects – at the very least this moves animals off the highway to the shoulder rather than them collecting in the middle of the highway to lick the centerline grooves…
- Off road salting/watering stations – acknowledge the pros and cons
- Roadside / In-vehicle wildlife detection systems

Climate Change

Ultimately there will be climate change effects, some potentially good and some potentially very bad. If those changes contract the availability of suitable and functional ranges, or reduce the resiliency or quality of those ranges, any dramatic negative effect could result in population declines.

Forecasted changes to the availability and distributions of wild sheep ecosystems (and for example any resulting reduction in suitable and functional wind-swept winter ranges) will likely have negative impacts in the long run to wild sheep. There may however also be short-term positive effects through improved forage productivity, natural wildfire, impacts to parasite and disease occurrence, etc. in those same ecosystems.

Thinhorn sheep have evolved to maintain relatively stable populations, across relatively stable ranges and habitats, within generally stable seasonal environments that are not subject to short fire-return cycles. Bighorns use traditional ranges, migration routes and traditional areas, at times amongst human developments, as seasonal habitats even though but also possibly because, some of those habitats are prone to shortened fire-return intervals. This likely means that climate change has the potential to both positively and negatively impact thinhorn and bighorn sheep in very different ways.

Although habitat has not been considered limiting in most areas in terms of carrying capacity, range and forage quality can vary widely across those ranges and this can affect population productivity at local sub-population/herd levels. We can anticipate that changing environments in response to climate change and subsequent changes in animal and herbaceous species assemblages will affect wild sheep in some ways. As well, any activities by humans expanding use into areas with poorer recruitment can have disproportionately significant impacts at that local scale and because these are often intermittent and localized in nature, they are relatively undetectable to wildlife managers.

Potential Strategies- Climate Change

- Habitat Research – impact of temperature on forage quality
- Determining accurate population ranges and ideal wintering ranges
- Understanding changing weather patterns in BC, green-up timing and natal period weather patterns
- Vegetation Management – invasive plants, forest ingrowth/encroachment, etc.
- Encourage Forestry biodiversity practises
- Limit development in areas that are functioning as sheep habitat
- Animal Relocation, reintroduction of former range and population augmentation (*to improve genetic health*)

Access Management (*Consumptive / Non-Consumptive*)

The resiliency of wildlife populations is at risk, as is the land that they inhabit. Changes in the levels of intrusion of humans via access into wild sheep range is changing rapidly in BC. Changes are generally the result of three drivers:

- Urban/rural expansions and associated highway and secondary roads
- Industrial exploration, site development and haul route management
- Recreational uses

This is expected as trends toward more urbanization occurs; as improvements are made in mechanized technologies; but there are also culturally generated drivers as well that include a broader societal shift toward healthier, active lifestyles, a need for escaping civilization that has a new mindset associated with prioritizing the use of 'disposable household income' to access 'nature', is also having effect. Main outcomes of high levels of access are:

- Habitat Alienation - Selection and Sensitivity to disturbance is something that we understand, but there has been little effective mitigation to address it. In addition, public recreation is something we haven't yet been able to address. There are also predators who use the advantage provided by trails to access sheep habitats;
- Habitat Availability – Sheep habitats are shaped by geography, weather and vegetation; all of which are relatively stable aspects of the environment, although climate change may change this.
- Health – Primarily in two ways:
    - First by reducing availability to accessing important seasonal range areas or reduced fitness as a result of these movements.
    - Second, by potentially creating exposure risk to other ungulates, parasites, predators and even more disturbances.

Potential Strategies- Access Management

- Restrict more access (*seasonal* (*eg. Harrison Lake Grizzly Bear Breeding*))
  - Permanent Access Restriction
  - Limit commercial fly-in numbers on lakes in sheep range to avoid high pressure and habitat alienation (*similar to an angling guide that has rod days, commercial flyers would have flight days*)
  - Limit motorized access of none-primary and secondary roads across the entire north (*similar to Muskwa-Kechika management plan*)
- Educational awareness for all users
- Habitat alteration
- Vegetation Management
- Reduction of Human footprint in backcountry
- Maintenance of undeveloped, 'refuge' habitats

Resource Development (*Agriculture, Commercial Recreation, Forestry, Mining, Resource Extraction*)

Industry is issued a series of mitigation measures that require compliance associated with their tenure. Those can be changed if they are found to be ineffective.

Protecting environmental values comes with a cost, but often those costs can be offset be alternative profits and in today's business envelope, innovation can be employed to achieve better outcomes than legislated minimums.

Potential Strategies Resource Development

- More thorough consultation with First Nations & NGO's
- Environmental assessment certification processes that have a wider scope of considerations such as road and utility corridor assessment and impact mitigation and management and not just limiting the assessment of values and impacts to the footprint area of the development
- Expanded baseline environmental values pre-assessments, with mitigation effectiveness monitoring through and post project lifespans
- Reclamation of land to better than before project
- Major Investment in habitat from miner
- Exclusion zones for development/agriculture in sensitive areas
- Reduction of development footprint
- Sustainable resource extraction

BC Wild Sheep Summit Sponsorship Acknowledgement

Thank you to our generous sponsors of the Wild Sheep Society of British Columbia's, 2022 BC Wild Sheep Summit.

Silver Sponsors
Jim & Kanina Fulton

Bronze Sponsors
Darryn Epp
Heather Bryan
David Beranek

BC Wild Sheep Summit Contact Information

If you have any concerns, issues, or questions, please connect with one of the following WSSBC representatives:

Kyle Stelter, Chief Executive Officer |#: 1-250-619-8514 |@: kstelter@wildsheepsociety.com
Michael Surbey, Executive Assistant |#: 1-604-690-9555 |@: exec@wildsheepsociety.com