



# WDFW efforts to reduce pathogen transmission from domestic livestock

- Empirical evidence and land-management philosophy supports viewing the risk of pathogen transmission to bighorns as falling into 3 categories:
    - 1) Commercial herds grazed, in part, on public lands
    - 2) Small, typically non-commercial herds, held entirely on private lands
    - 3) Pack-goats
- 



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  - ▶ **\*\* Small, typically non-commercial herds, held entirely on private lands**



# Removing wandering bighorns

- ▶ WDFW considers bighorns near private herds a risk to the herds they've wandered from
- ▶ Routine policy is to lethally remove these bighorns. Recently:
  - ▶ In town of Asotin
  - ▶ In town of Clarkston
  - ▶ In town of Republic
  - ▶ Near Colockum
  - ▶ Near Ione
  - ▶ Across Columbia River in Douglas County near Trinidad



Example of a foray near federal sheep allotment

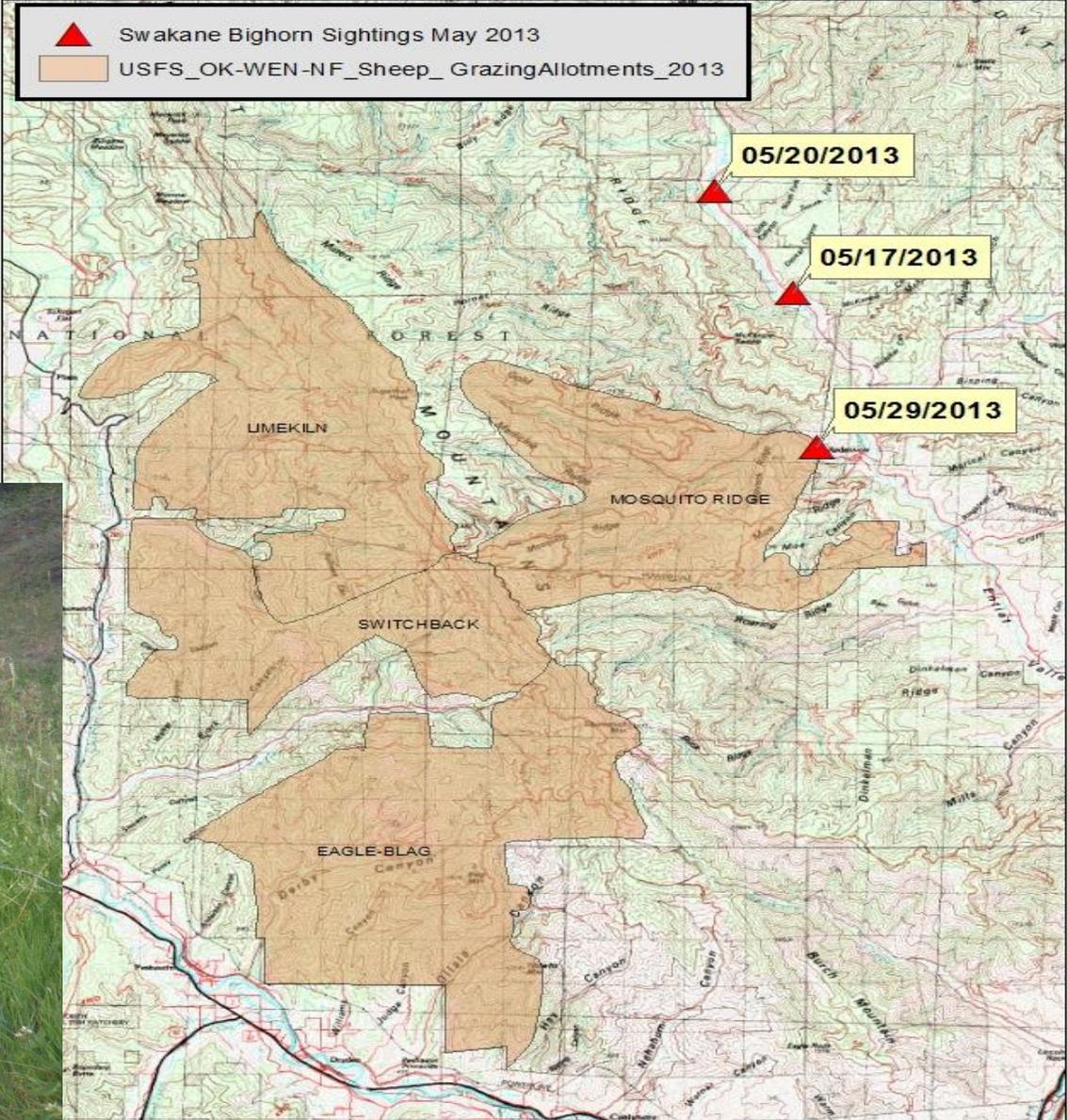


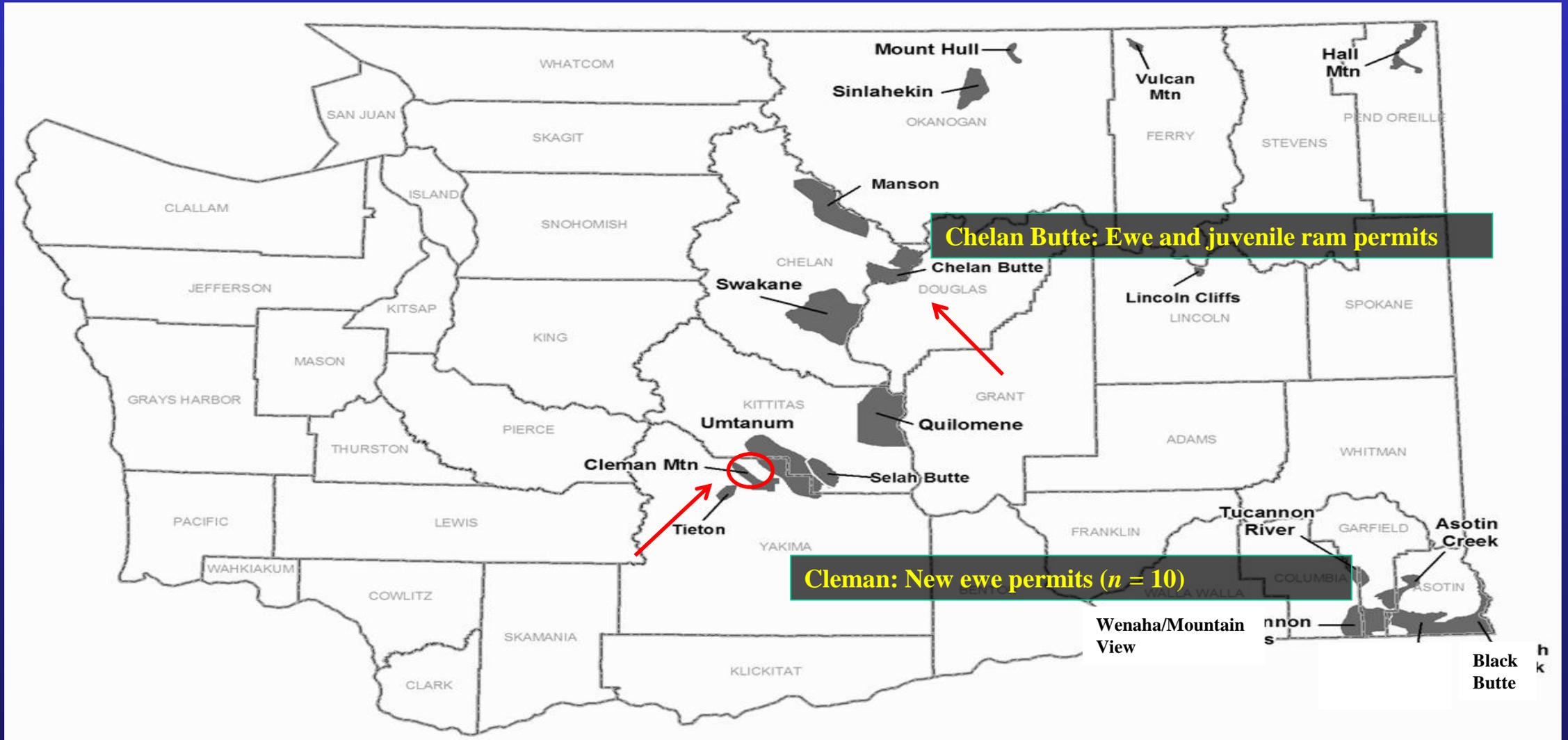
Photo and map: D. Volsen, J. Gallie

# 232-28-622 Bighorn Sheep

- Minor revisions in permits.
- All respond to Game Management Plan and recent survey information.
- Some herds need to be reduced in size to reduce risk of movements and thus exposure to pneumonia.



# Herd reductions through increased permits: 2016



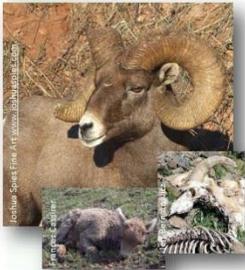


# WSU Study: Overview

- ▶ WSU study: Products
    - ▶ Survey of producers and of *M. ovipneumoniae* prevalence in small herds
    - ▶ Wildlife Society Bulletin publication
    - ▶ Outreach products:
      - ▶ PowerPoint
      - ▶ Educational brochures (in 2 languages)
      - ▶ Protocols for routine testing for *M. ovipneumoniae*
      - ▶ Formal incorporation of surveillance/engagement in WDFW routine field operations
- 

# Educational brochures for owners of small herds

## Deadly interactions: sheep and goats near bighorn sheep



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WASHINGTON STATE UNIVERSITY School of the Environment

## Bighorn Sheep pneumonia: what you need to know

Bighorn sheep were historically widespread in the steep canyons of Western North America. In the past century, people have worked to save these majestic animals from the brink of extinction. Currently, the biggest threat to bighorn sheep is a deadly pneumonia caused by bacteria carried by domestic sheep and goats.

Recent research has identified *Mycoplasma ovipneumoniae* (Movi) as the infection that triggers bighorn sheep pneumonia outbreaks. Movi is commonly carried by healthy-looking domestic sheep and goats, but infection of bighorn sheep may kill up to 80% of the herd in the initial outbreak alone. Bighorn ewes that survive an Movi outbreak are immune but their lambs remain susceptible, so repeated lamb pneumonia outbreaks may recur for years, sometimes resulting in the loss of the entire bighorn herd.

Movi can also cause problems in domestic sheep and goats. Fatal pneumonia, though



uncommon, invariably involves Movi infection. More commonly, Movi infects weaned lambs and kids, causing a coughing syndrome and decreased rate of gain. No Movi vaccine is available for bighorn sheep or for domestic sheep or goats.

To prevent pneumonia, bighorn sheep must be kept separate from their domestic cousins. A wandering bighorn ram may



join a group of domestic sheep or goats, or a stray sheep or goat may join a bighorn herd; in either case the risk of disease transmission is greatly increased!

A single contact between a bighorn sheep and a domestic sheep or goat can trigger a devastating pneumonia outbreak. One interaction is all it takes, but you can help!

## alojamiento

Las ovejas y cabras domésticas son peligrosas para los borregos cimarrón, la opción segura es eliminar a las domésticas y cabras de las áreas donde algunas personas están o por vender o realojar a males, o criar especies de alternativas de menor riesgo. Por ejemplo, animales que incluyen burros, y caballos en vez de vacas y los miembros de la familia que optan por mostrar o novillos en vez de cabras.

Para acciones de alto riesgo, un veterinario para vender o mostrar a sus animales puede ser útil. Por favor, comuníquese en contacto para más información.



## Liberándose de Movi

Es posible que su manada de animales domésticos, ovejas, borregos, y chivos, no estén infectados con la bacteria Movi. Si esto es el caso, el riesgo de transmisión de Movi a las ovejas y borregos cimarrón es minimizado. Sin embargo, puede beneficiarse si confirma que sus animales no están infectados con Movi. El estatus de infección es establecido con un examen de la nariz de sus animales usando un algodón. Contacte a un veterinario, a la WDFW, o al WADDL para más información. Si sus animales no tienen infección de Movi, no deje que sus animales tengan contacto con otros animales que pueden estar infectados con Movi. Rebaños libres de Movi también sirven como una fuente segura para cría para manadas nuevas.

Si su manada tiene infección de Movi, la mejor opción es realojar a sus animales en una ubicación lejos de manadas de borregos cimarrón. Usted puede trabajar para eliminar la infección. Animales que cargan la bacteria Movi suelen ser la minoría de la manada. Un examen para identificar que animales están infectados por Movi es el primer paso para reducir infecciones. Consecuentemente, animales domésticos infectados deben ser removidos de su manada. Esto disminuiría el riesgo que animales domésticos infectados poseen a los borregos cimarrón y a sus otros animales domésticos. Corderos y cabritos que son infectados con Movi, deben ser separados de animales infectados a los dos meses de edad para eliminar la infección.

## Cercas

Las ovejas, borregos, chivas, y chivos que están al campo libre, o que se escapan de sus cercas pueden ser un riesgo para las manadas de borregos cimarrón. Por lo tanto, cercas seguras son muy importantes. Además, se le aconseja que tenga un lugar seguro donde poner a sus animales domésticos en la noche o cuando vea una oveja o borrego cimarrón en la proximidad de sus animales domésticos.

Igualmente, instalar cercas doble alrededor de sus ovejas, borregos, chivas, y chivos puede prevenir que ellos vengyan en contacto con ovejas o borregos cimarrón. Hay ayuda financiera para áreas de alto riesgo. Usted puede ponerse en contacto para más información.



Locaciones de manadas de borregos cimarrón en el Estado de Washington. Si usted vive cerca de borregos cimarrón, llame al WDFW para ser incluido en nuestra lista de contactos y lo mantendremos al tanto.

## Reportar

El último paso que usted puede tomar para ayudarnos a proteger a las manadas de borregos cimarrón es llamar a un biólogo de animales salvajes en el WDFW en cualquier instancia que usted vea a una oveja o borrego cimarrón, especialmente si el animal está en una ubicación de riesgo de contactar a ovejas, borregos, chivas, o chivos domésticos. Usted también puede requerir que lo incluyamos en nuestra lista de contacto, para que nosotros nos comuniquemos cuando haya manadas de borregos cimarrón en su área. Actuar pronto en estas situaciones puede prevenir una erupción de neumonía fatal.

Todas estas acciones son voluntarias. Sin embargo, las manadas de borregos cimarrón son parte de la historia natural de nuestro estado. Los dueños de ovejas, borregos, chivas, o chivos domésticos desempeñan un papel clave para ayudar a proteger y preservar estos increíbles animales, las ovejas y borregos cimarrón.

## Contactos

Si usted ve borregos cimarrón cerca de sus animales:

Para más información y ayuda:

# WDFW engaging with owners



School of the Environment

## SAMPLING PRIVATE SHEEP AND GOAT HERDS FOR MOVI (*Mycoplasma ovipneumoniae*)

### Steps

When you identify a domestic sheep flock or goat herd near bighorn sheep habitat, contact the landowner. The most successful interactions are generally face-to-face, so take the time to meet in person on their property, if they are willing. If not, the first step of the following process can be conducted via phone.

### Develop a relationship

Learn why the owner raises animals. Ask if the owner knows about the concerns about Movi transmission between domestic sheep and goats and bighorn sheep. Listen and acknowledge what they know. Explain the most recent science and provide brochures, maps of bighorn herds, and a list of **voluntary** actions that they may take to reduce interactions.

#### Q: What is the owner's incentive?

**A:** Let them know if financial assistance or labor is available to help prevent interactions. Explain that you have sampled sheep and goats for other people living near bighorn sheep to help them make decisions and be informed about threats of interactions. Clarify that all sampling is voluntary and confidential, and there are no negative consequences to owners.



**Domestic sheep and goats commonly carry Movi (*Mycoplasma ovipneumoniae*) but do not show illness. This germ can cause severe, pneumonia in bighorn sheep if they have nasal contact with sheep or goats, killing up to 80% of the bighorn herd within a few months. Afterwards, some of the surviving bighorn ewes continue to carry Movi in their nose, which spreads to the lambs every summer and can cause lamb pneumonia deaths in the bighorn herd for years afterwards. There is no vaccine for this infection, and antibiotic treatment is ineffective.**

### In This Issue

- Develop a relationship

everyone when sampling, and thank the owner for helping protect bighorn sheep. Have the owner show you his or her pens, pastures, and areas where bighorn sheep have been sighted, if seen.

Have the owner fill out a [General WADDL Accession Form](#). On the form, designate "Specimen submitted" as "sheep or goat" and designate your WDFW veterinarian as "Veterinarian or Case Coordinator". In the "tests requested" section, tick the PCR box and write "Movi" in the "conditions suspected" box. You may also opt to have owners sign a liability release in case an animal is injured during sampling.



Photos by David Volsen

Before entering the barn, pen, or pasture, follow biosecurity measures to the level appropriate to your work and as requested by the owner. Boot covers and gloves are recommended. Explain that you are wearing these to protect the owner's goats or sheep. If travelling between herds on the same day, you should also change clothes between samplings. You can also contract some diseases such as sore mouth from sheep or goats. Women who are pregnant should not interact with sheep or goats due to concerns over Q-fever.

Sample as many animals as possible from the herd or flock that are older than three months old. The estimated sampling cost is



Photo by David Volsen

Mycoplasma Broth HDX,  
13x100mm R

\$40+shipping for 20 vials

Expires after 2 months

<http://www.hardydiagnostics.com/>

**Nasal swabs** can be ordered at Andwin Scientific

Product number B220144

CLTSWB SNGL PLY FOAM  
SWB100PK

\$120-130 plus shipping for 100  
swabs

<http://andwinski.com/>

\*Swabs with plastic shafts are  
much more flexible and safer  
than those with wooden shafts



Photo by Laura Heinse

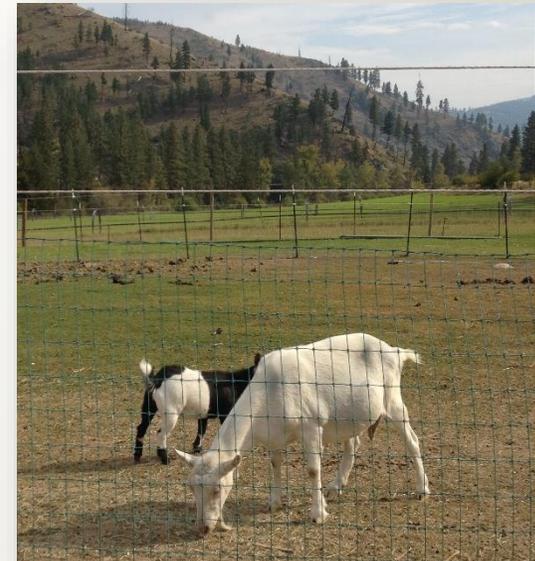
## Characteristics of small domestic sheep and goats flocks near bighorn sheep in Washington State: Implications for the risk of pathogen spillover

Journal:	<i>Wildlife Society Bulletin</i>
Manuscript ID	WSB-16-003.R2
Wiley - Manuscript type:	Original Article
Date Submitted by the Author:	n/a
Complete List of Authors:	Heinse, Laura; Washington State University, School of the Environment Hardesty, Laura; Washington State University, Natural Resource Sciences Harris, Richard; Washington Department of Fish and Wildlife, Game Division; University of Montana System, Ecosystem and Conservation Sciences
Keywords:	bighorn sheep, disease, domestic goats, domestic sheep, landowner attitudes, <i>Mycoplasma ovipneumoniae</i> , <i>Ovis canadensis</i> , pneumoni
Abstract:	<p>Bighorn sheep (<i>Ovis canadensis</i>) across North America have suffered population losses due to polymicrobial pneumonia typically initiated by spillover events of bacteria from domestic sheep and goats. Because vaccination or treatment of individual animals remains an elusive goal and because pneumonia often persists in bighorn herds for years or decades following infection, preventing contact between domestic and wild animals is widely accepted as the best prophylactic. For the past decade, most management efforts have focused on the risks associated with commercial sheep grazing on public lands; less attention has been paid to risks to bighorns from small flocks of domestic sheep and goats managed entirely on private land. We surveyed owners of 40 sheep or goat flocks located near bighorn sheep herds in central and southeastern Washington to better understand their knowledge level, management practices, and willingness to reduce risks. Over one-third of sheep or goat owners had no knowledge of the potential for pathogen spillover to bighorns, but all were interested in reducing risk of interacting with bighorns, particularly by options that did not restrict their autonomy. We also sampled nasal mucosae of 137 animals in 22 flocks for presence of <i>Mycoplasma ovipneumoniae</i>, the bacterium most closely associated with bighorn pneumonia. M</p>

# Who has sheep and goats?

- ▶ 95% of owners consider their sheep and goats pets
- ▶ Most common uses included using or selling animals for:
  - ▶ vegetation control
  - ▶ breeding stock
  - ▶ Meat
  - ▶ 4-H and FFA shows
- ▶ 1/3 had no knowledge of bighorn pneumonia or that their animals could cause an outbreak

“I'm sure that [goats] have a bunch of creepy crawlies that the bighorn have never been exposed too.”



# What are the risks?

- ▶ At least 800 sheep and goats live near bighorn sheep in the inland Northwest
- ▶ 1/3 of owners had seen bighorns near their goat or sheep herds
- ▶ Many owners allowed sheep or goats to free-range when home
- ▶ 3/4 of owners had animals escape their fence
- ▶ Half of these left their owner's property entirely and returned
- ▶ Some never returned



“Earlier this year, it was daily [that my sheep escaped]. It's open range.”

# How common is *M. ovi*?

- ▶ *M. ovi* was detected in 41% of sampled small sheep and goat herds
- ▶ 10% of animals in these herds tested positive for *M. ovi*
- ▶ In every herd in which *M. ovi* was detected, animals interacted with other sheep or goats:
  - ▶ at shows
  - ▶ auctions
  - ▶ when new animals were brought home
  - ▶ when owners leased them out for breeding
- ▶ *M. ovi* positive herds were generally not purebred
  - ▶ Boer goats most common breed

**Table 3.** Percentage of owners of sheep and goats near bighorn sheep herds who said they would take the listed actions to prevent interactions between their animals and big

Potential action	Yes	No	Unsure	n
If free-range, install fencing	100	0	0	4
Install internal livestock pen	100	0	0	9
Contact WDFW if a bighorn sheep is seen	96	0	4	40
Allow WDFW to haze bighorn away	96	0	4	38
Allow WDFW to dart or shoot bighorn	96	4	0	38
Haze bighorn themselves	95	5	0	36
Help with education and outreach	88	12	0	43
Contact WDFW if sheep/goats escape property	88	12	0	40
Test for presence of <i>M. ovipneumoniae</i>	85	15	0	39
Purchase <i>M. ovipneumoniae</i> -free animals	83	4	13	32
Double-fence the property	83	7	10	24
Tell people who buy animals about threats to bighorns	75	25	0	32
Work with veterinarians to attempt to clear <i>M. ovipneumoniae</i> from flock	44	50	6	38
Acquire guard dogs, llamas, or donkeys	40	40	20	13
Voluntarily sell or rehome sheep or goats	39	53	8	39
Not sell sheep or goats to people in or near bighorn habitat	35	65	0	32
Accept a buy-out of livestock	35	50	15	38
Change livestock species	18	63	19	36
Establish a covenant to exclude domestic sheep and goats from property	13	79	8	38
Use alternative pasture locations	12	80	8	39
Use alternative forms of weed control	4	84	0	40

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## Subsidizing creation of *M. ovi* - free flocks – cooperation with WDOC



### Sheep Program at WA State Penitentiary Program Coordinator

Partnering consultants or students are often ideal coordinators for these prison conservation programs. The tasks outlined below are examples of duties that may be performed as part of the sheep program position. This document is a draft and will be finalized by the potential consultant/coordinator and program partners before a paid contract is completed.

