Test and remove adaptive management experiments

January 2017

Wild Sheep Working Group

Reno

Bighorn sheep pneumonia

- Mortality in all-age outbreaks is highly variable.
- Disease can persist for decades in the form of low recruitment due to pneumonia in lambs:also highly variable.
- The result is often small (<100 sheep), stable to declining, populations.
- Most animals (median 78%) in these populations test **negative** for respiratory disease pathogens, but positive for exposure.

Management implications of individual variation in disease transmission

Targeting select individuals for removal or treatment is especially useful when it is difficult or undesirable to manage the entire population.

Removing (managing) individual carriers is an alternative to population eradication.

How do bighorn sheep populations recover naturally from pneumonia outbreaks?

- Why do disease patterns differ in neighboring populations?
- What causes disease to fade out naturally?
- How can we manage for fade out?

Test and remove: goals

1. Stop pathogen transmission to lambs.
2. Prevent pneumonia outbreaks in lambs.
3. Recover populations.

Test and remove
Predictions if successful

- Lambs will test negative for infection and exposure (direct effect).
- Lambs will be healthy.
- Population will grow.

Ongoing experiments

- Captive experiment South Dakota State University.
  - Evaluate lamb health status in pens with and without ewes shedding *Mycoplasma ovipneumoniae (*M. ovi*)*
- Field experiment Hells Canyon.
  - Test adult females and remove those who test positive for M. ovi at least twice over two years.
- Field experiment Black Hills.

South Dakota State University
Captive Wildlife Facility

South Dakota State University

Shedder status	# Lambs Died	# Lambs Survived	Total Lambs
SDSU Commingled (4 pens)	12	0	12
SDSU Not commingled (4 pens)	0	6	6
Grand Total	**12**	**6**	**18**

- **Lambs commingled with shedders tested positive for M. ovi**
- **Lambs not commingled with shedders tested negative for M. ovi**

Captive study

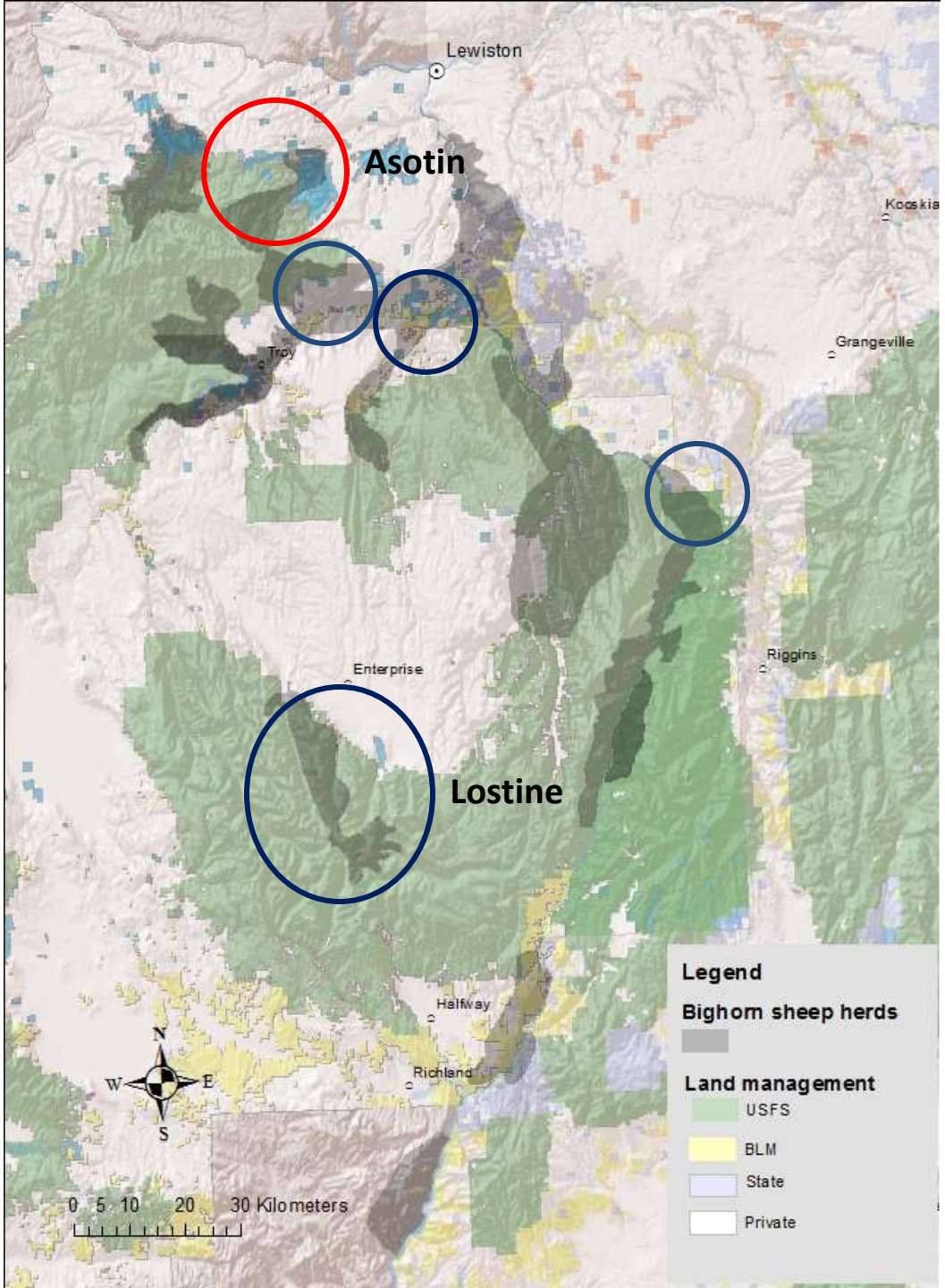
- Lambs will test negative for infection and exposure (direct effect). ✓
- Lambs will be healthy. ✓
- Population will grow.

HELLS CANYON STUDY AREA

16 interconnected bighorn sheep populations, 8900 sq miles

Treatment

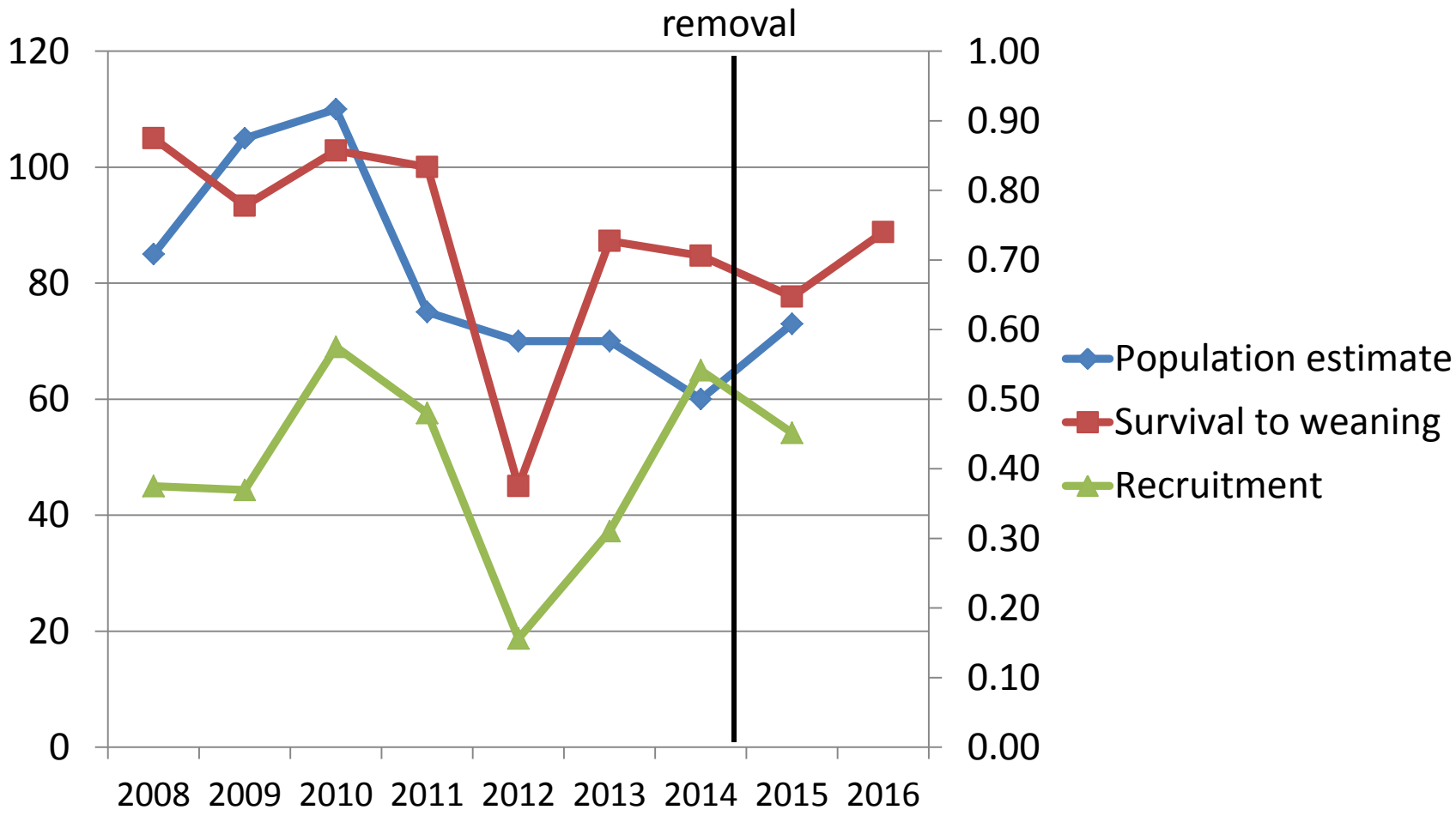
Control



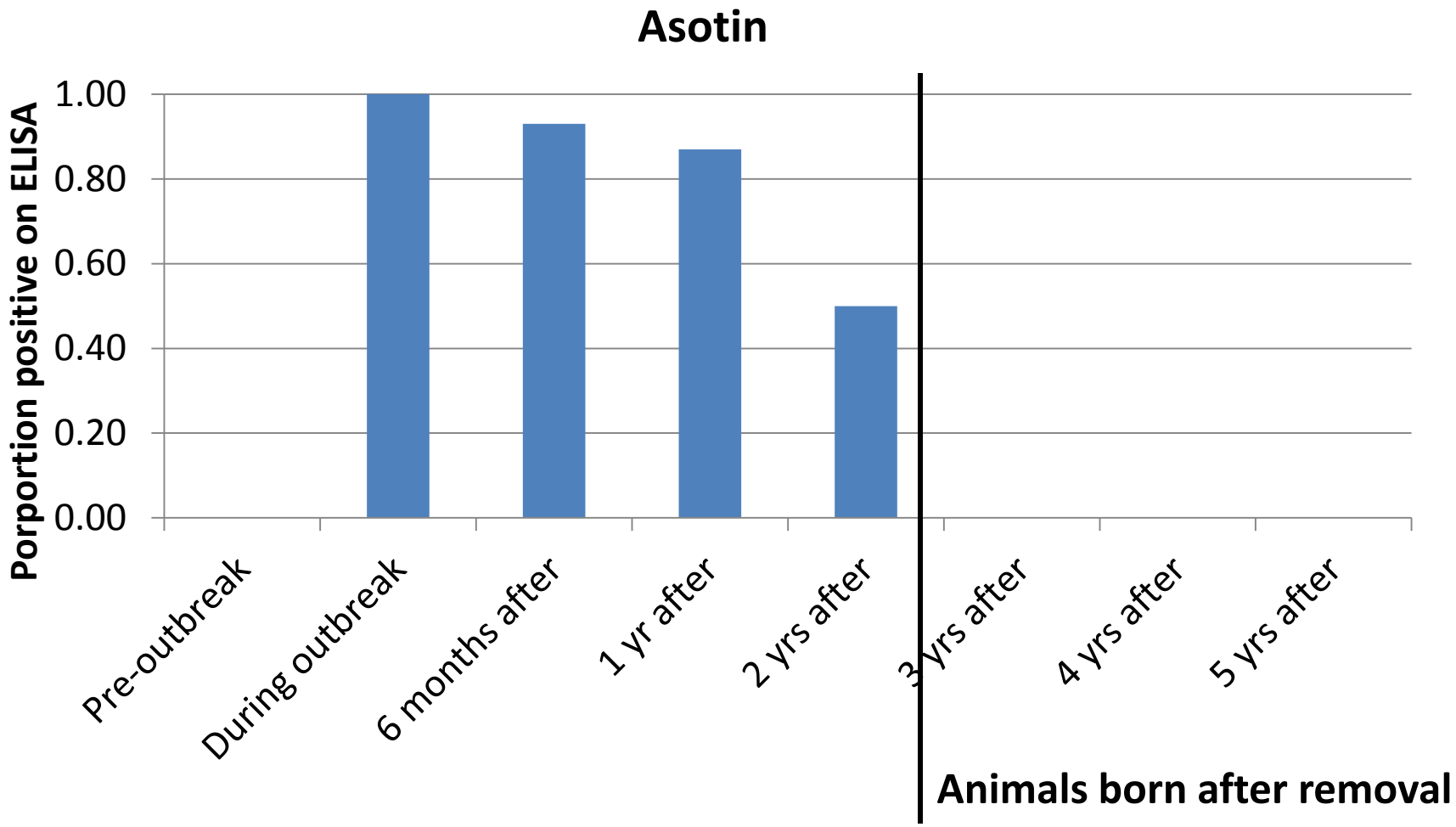
Asotin Creek removal

- Tested 90% of females in 2013 and 2014
  - Ground dart and helicopter netgun captures
- Removed three adult females (10%)
  - Two tested positive at least twice over 2 years, sent to SDSU captive study
  - One tested positive once and died during helicopter capture

Asotin Creek test and remove



Exposure to M. ovi



Field study

- Lambs will test negative for infection and exposure (direct effect). ✓
- Lambs will be healthy. ✓
- Population will grow.
  - Has not occurred yet due to other sources of mortality

Future Direction

- Continue captive project at SDSU and WSU.
- Continue field project in Hells Canyon.
- Additional experimental populations.
  - In and outside Hells Canyon
- Continue to work on a field-side test.
- Investigate dynamics of carriage.

Washington Department of FISH and WILDLIFE

South Dakota State University

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CIDD CENTER FOR INFECTIOUS DISEASE DYNAMICS

University of Idaho

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