Brucellosis And Its Management on Elk Feedgrounds

Brucellosis (*Brucella abortus)*

- Bacterial disease normally associated with cattle that causes abortion.
- Wildlife hosts: Bison and elk
- Susceptible hosts: Broad range of wild and domestic animals
- Zoonotic disease

Brucellosis in Elk/Bison/Cattle

- Transmission: Contact with infected fetuses, fluids, milk
- Clinical signs: abortion, usually in the 3rd trimester, hygromas
- Can cause significant fetal losses in livestock ("abortion storms")
- Treatment is impractical
- Vaccination in cattle generally prevents disease (not effective in elk)

Brucellosis and Human Health

- Serious zoonotic disease
- Worldwide disease
  - 500K/year reported
- Undulant fever
- Malaise, fatigue, night sweats, depression, muscle and joint pain
- 6-8 week course of oral antibiotics usually clears symptoms (70% if treated early)
- Chronic infections with delayed treatment

Brucellosis & Human Health

Low risk during hunting season

- Bacteria not “active”
  - Can be found in bursa (joints) and lymph nodes
- Normally not found in meat
- Easily killed by cooking

Health risks after February 1st

- Bacteria becomes active in 3rd trimester of pregnancy
  - Fetus and associated fluids become infected

Why is Brucellosis a Problem for the Livestock Industry?

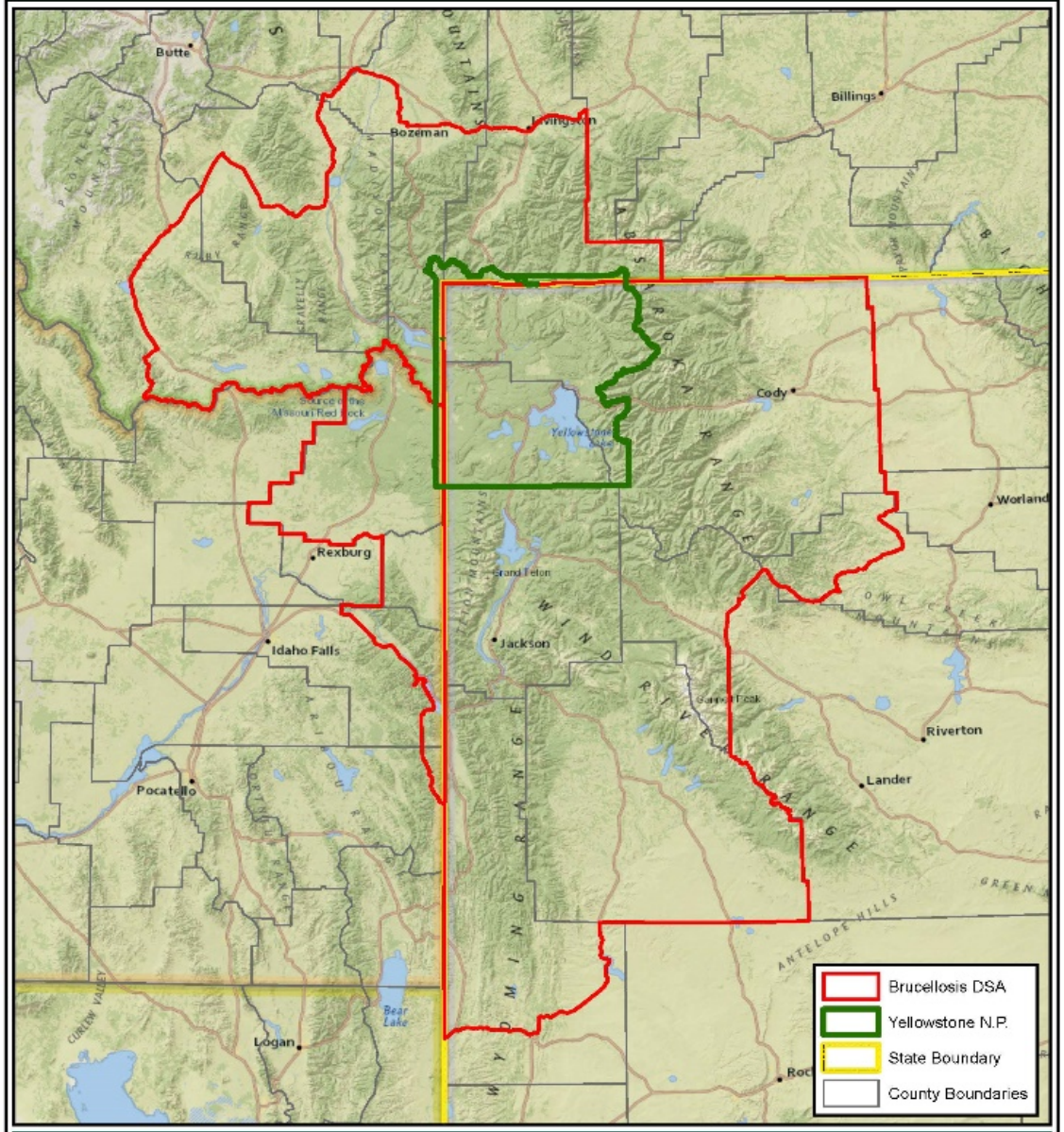
- Decreased production
  - Abortions as well as weak calves
- Transmission to other livestock (e.g. horses)
- Federal/State regulations for positive herds
  - Quarantine (can be very expensive)
  - Test and slaughter of positive animals
    - Loss of valuable animals/genetics
  - Increased testing/veterinary expenses
- Zoonotic

Brucellosis and the Livestock Industry

- A federal/state program began in 1934 - goal of eradication by 1998
  - Except for the GYA, the United States is free of cattle brucellosis
- 2010 establishment of the Designated Surveillance Area (DSA)
  - Within the GYA, ~2.6 cattle/domestic bison herds exposed each year
    - Transmission from elk

USDA United States Department of Agriculture

Brucellosis Designated Surveillance Area (DSA) July, 2020



USDA, APHIS, VS
Center for Epidemiology and Animal Health
2150 Centre Ave.
Fort Collins, CO 80526

Data Source:
USDA, APHIS, VS

Date Created: August 6, 2020
Time Created: 3:37:44 PM MST

Coordinate System: NAD 1983 UTM Zone 12N

0 9 18 27 36 Miles

N

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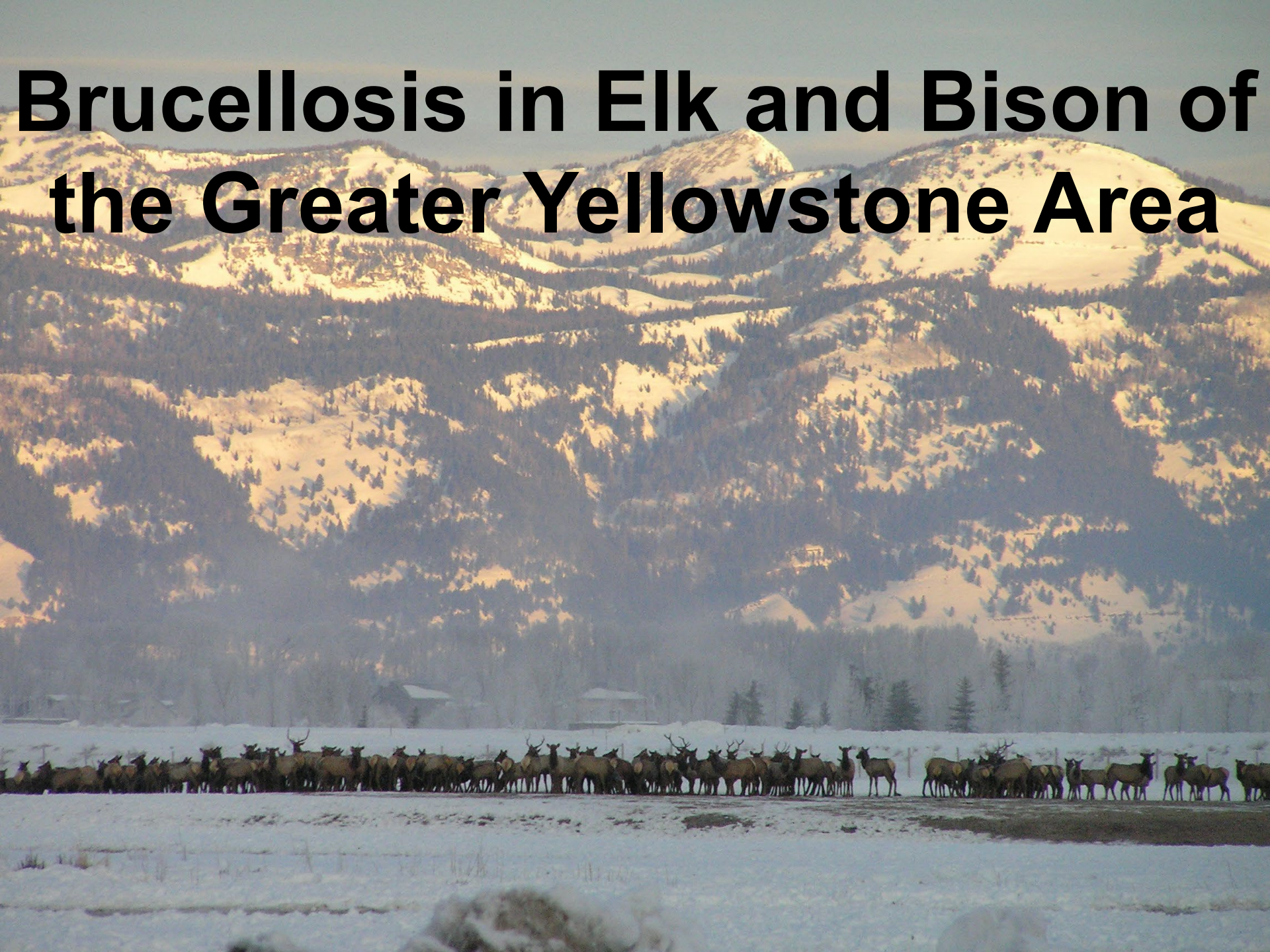
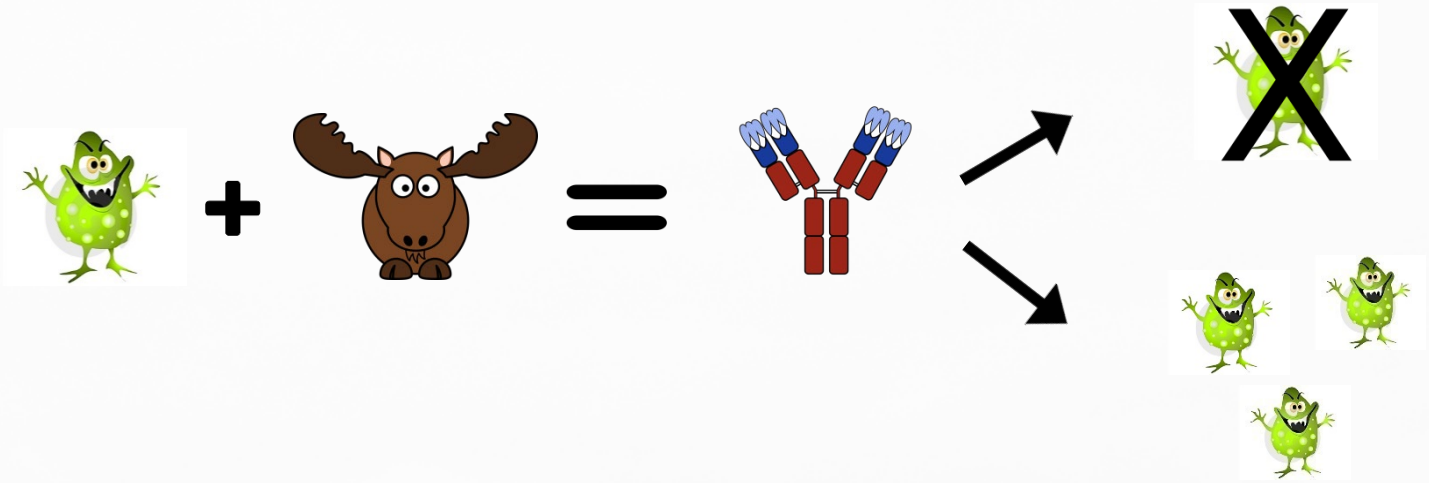
Managing Brucellosis in the DSA

- Early detection in “high risk” herds
  - Movement restrictions
  - Increased testing (blood)
  - RB51 Vaccination
    - No silver bullet
    - Prevent abortion, but blood test positive following exposure
  - Quarantine exposed herds
- State maintains “Brucellosis Free” status

Brucellosis in Elk and Bison of the Greater Yellowstone Area



Background Terminology



- Serology (blood tests) measure serum antibody levels
  - Cannot determine if infected – only exposed
  - Seropositive/seroprevalence = antibodies present in blood
  - Live animal test
- Culture confirms presence of *B.abortus*
  - Culture of fetal tissues or lymph nodes
  - Low sensitivity
  - Post mortem (“dead animal” test)

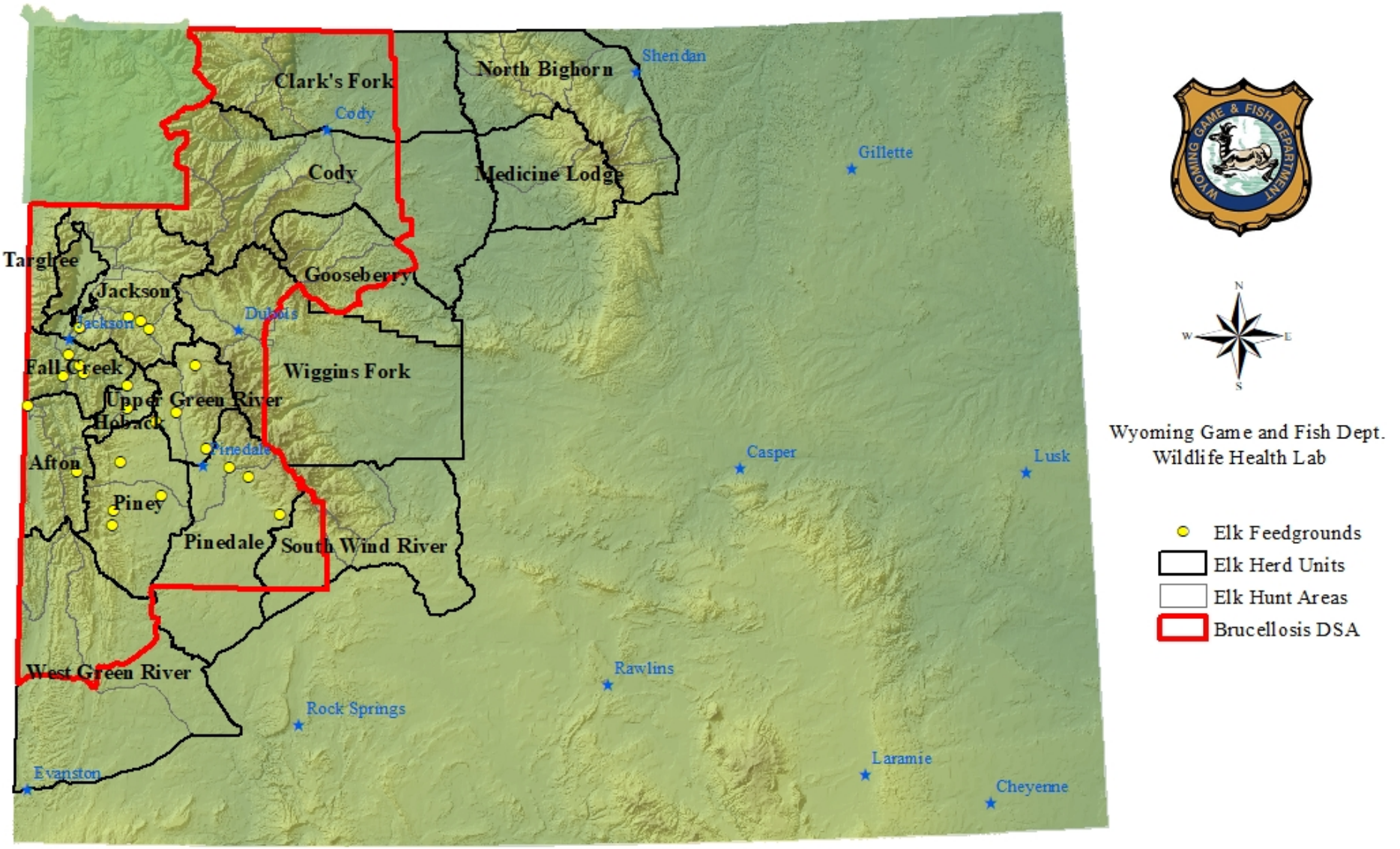
Brucellosis in Elk and Bison

- Introduced into GYA around civil war
  - First detected in bison in 1917, elk in 1930
- Loss of the first calf after infection
  - ~ 82% abortion rate in bison
  - ~ 61% abortion rate in elk which leads to ~24% reduction in reproduction of exposed animals (short and long-term effects).

Brucellosis and Feedgrounds

- Seroprevalence on feedground elk averages ~25%-30%
- Seroprevalence in bison ~65% (NER)

Distribution of Brucellosis in WY



Management of Brucellosis on Feedgrounds

WGFD Brucellosis Management

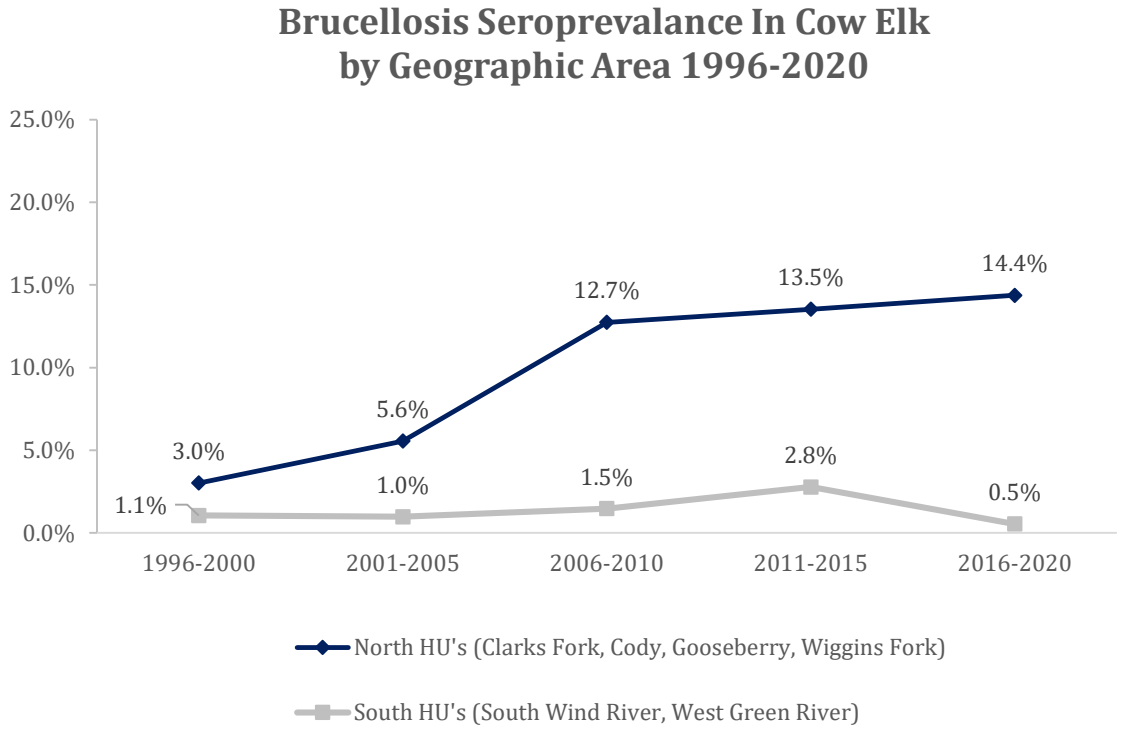
- Integrated approach
  - Surveillance
  - Elk/Cattle Separation
  - Habitat Enhancement
  - Feedground Management
  - Vaccination
  - Adaptive Management

Brucellosis Surveillance in Non-Feedground Elk

- Monitor brucellosis outside of feedgrounds
- Surveillance focused on hunter-killed cow elk
  - 8,000-10,000 blood collection kits mailed to hunters in target elk hunt areas (limited quota)
  - ~1,200–1,400 useable samples (32% successful hunters)
- Statewide coverage every 4-5 years
  - Yearly focus on DSA border
- 30 years of surveillance data (19,500+ samples)


EXEMPT
ANIMAL
SPECIMEN
NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES
BUSINESS REPLY LABEL
FIRST-CLASS MAIL PERMIT NO 4 LARAMIE WY
POSTAGE WILL BE PAID BY ADDRESSEE
WYOMING GAME & FISH DEPARTMENT
VETERINARY SERVICES
1174 SNOWY RANGE RD
LARAMIE WY 82070-9904
Wyoming Game and Fish Department
Wildlife Disease Labortory
1174 Snowy Range Road
Laramie, WY 82070
PRESORTED
STANDARD
US POSTAGE
PAID
WYOMING
GAME AND FISH
19
OR CURRENT RESIDENT
Joe Q Public
1 Hunter Way
Casper WY 82604-9162
OPEN CAREFULLY - MAILER NEEDED FOR RETURN
041-1 15-7663 D
USPS TRACKING #
9270 3901 6083 4300 2641 13
OPEN OTHER END
NUMBERS BELOW NEEDED FOR PROCESSING
UN3373
BIOLOGICAL SUBSTANCE
CATEGORY B
FALCON
The results of surveys such as this will improve game management through a better understanding of disease in wildlife populations. If you have any questions, please contact the Wildlife Disease Laboratory at 307-745-5865. We appreciate your help and support.
Please complete all information
Hunt Area_____ Harvest Date____/____/_____
Cow ____ Calf ____ Branch Antler ____ Spike ____
Ear Tag #'s (if present)_____
Kill Location (BE AS SPECIFIC AS POSSIBLE; lat/long, UTM, township/range/section, major drainage, or ranch name)
(5/11)

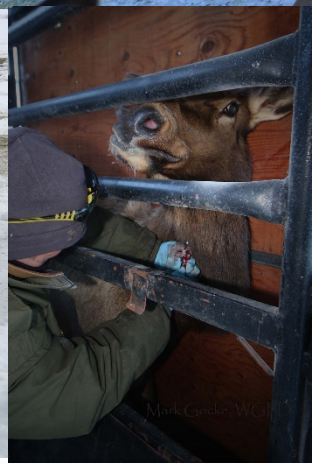
Brucellosis Surveillance in Non-feedground Elk



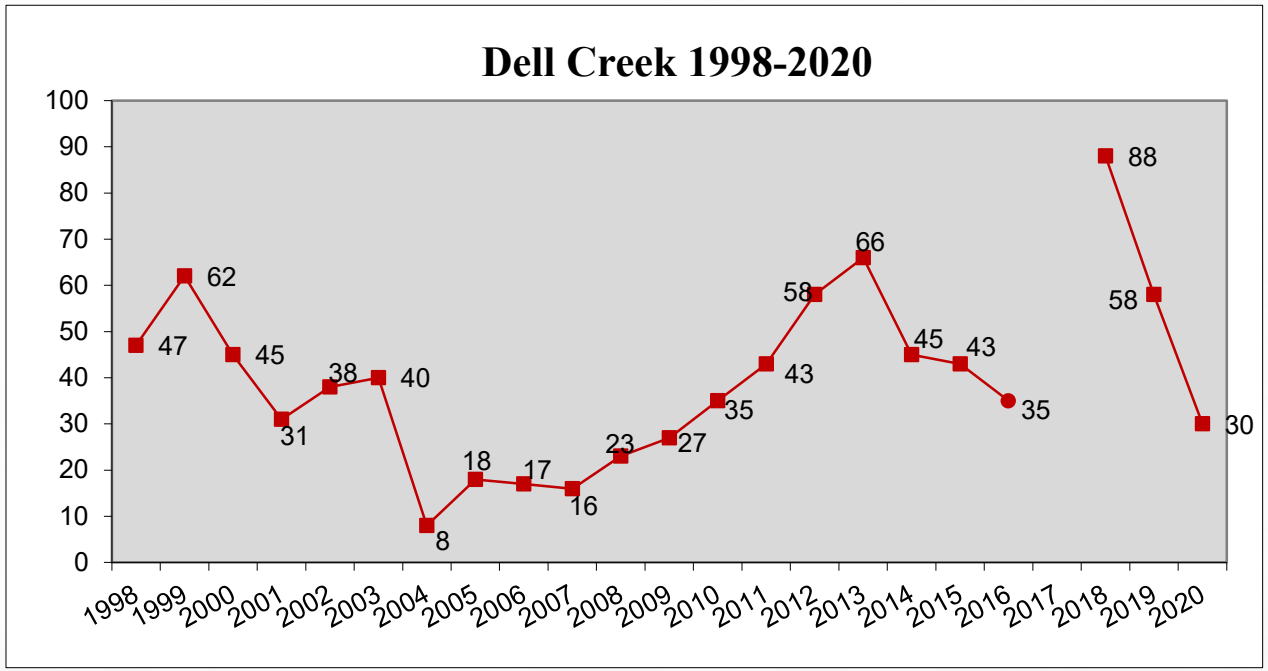
Brucellosis Surveillance in Feedground Elk

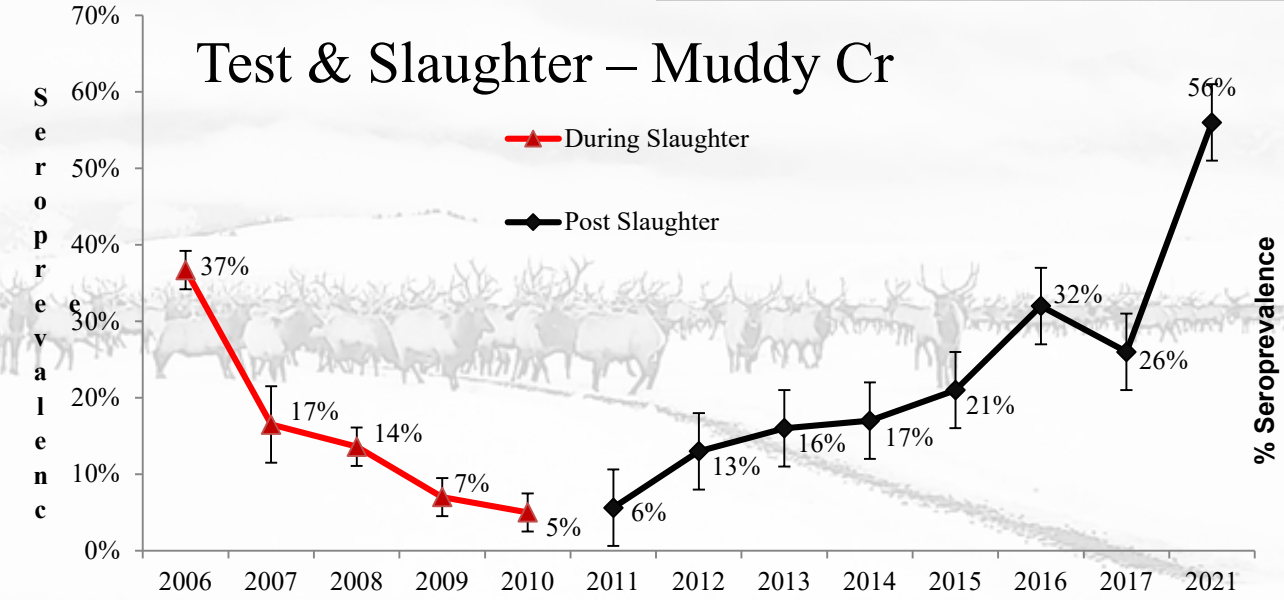
Feedground Surveillance

- Monitor brucellosis in feedground populations
- 3-5 Feedgrounds each year
- Seroprevalence over time



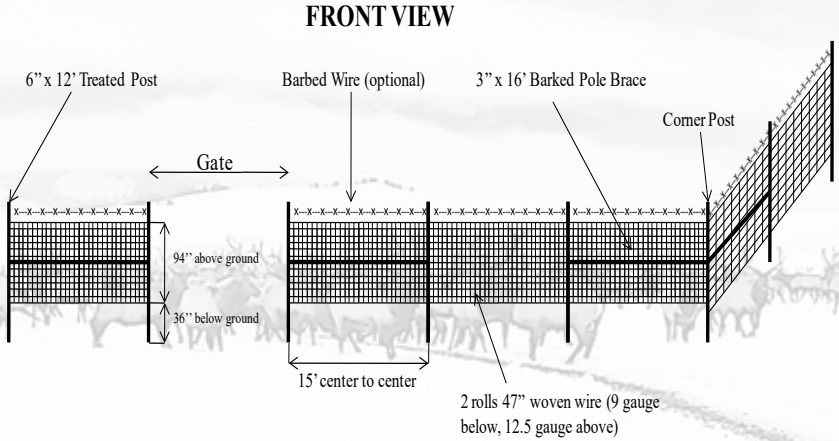
Feedground Seroprevalence



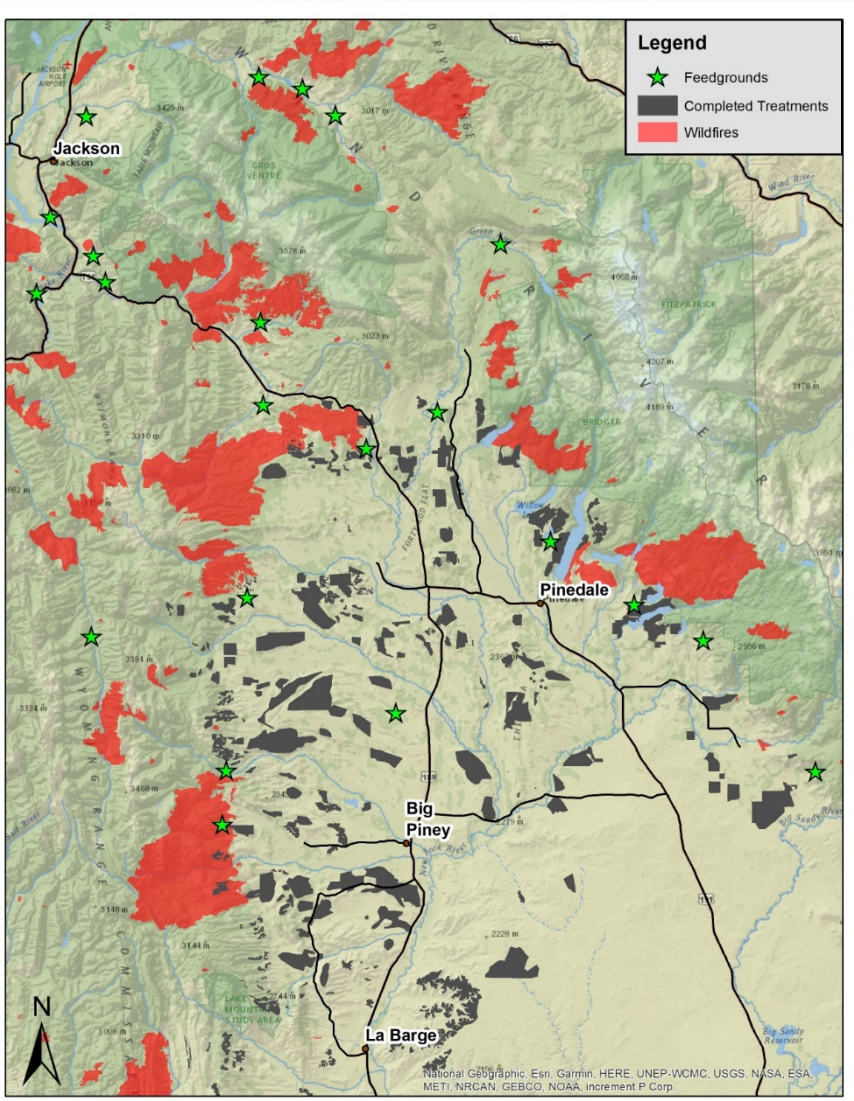


Separation of Elk and Cattle

- Winter feeding
- Elk hazing
- Stack yard fencing



Habitat Enhancement



Feedground Management

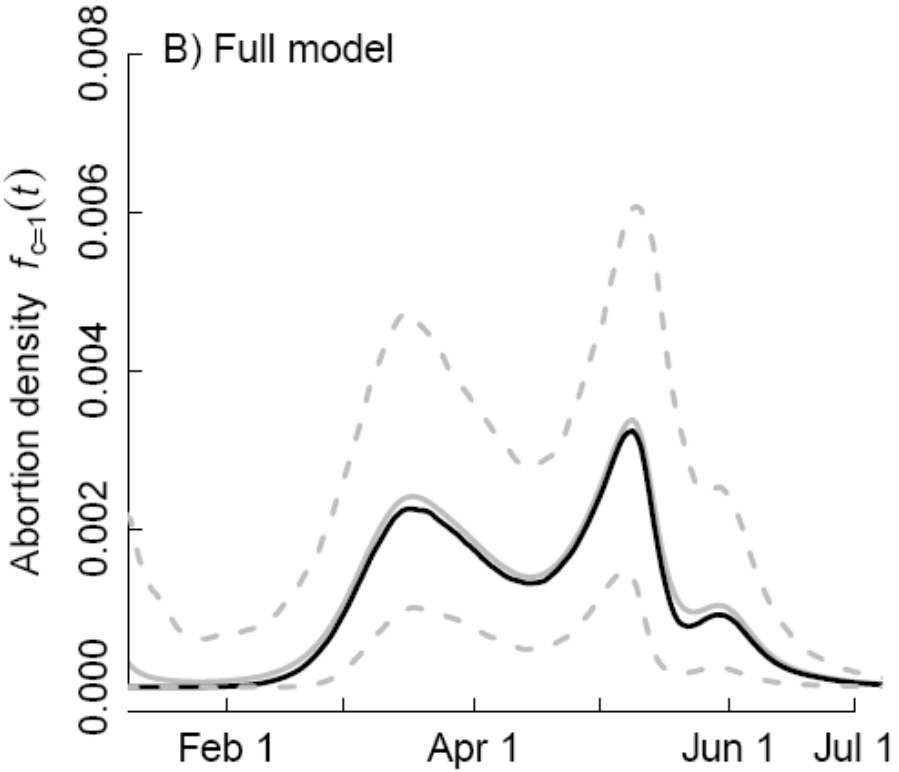
Carcass Removal

Feeding on clean snow

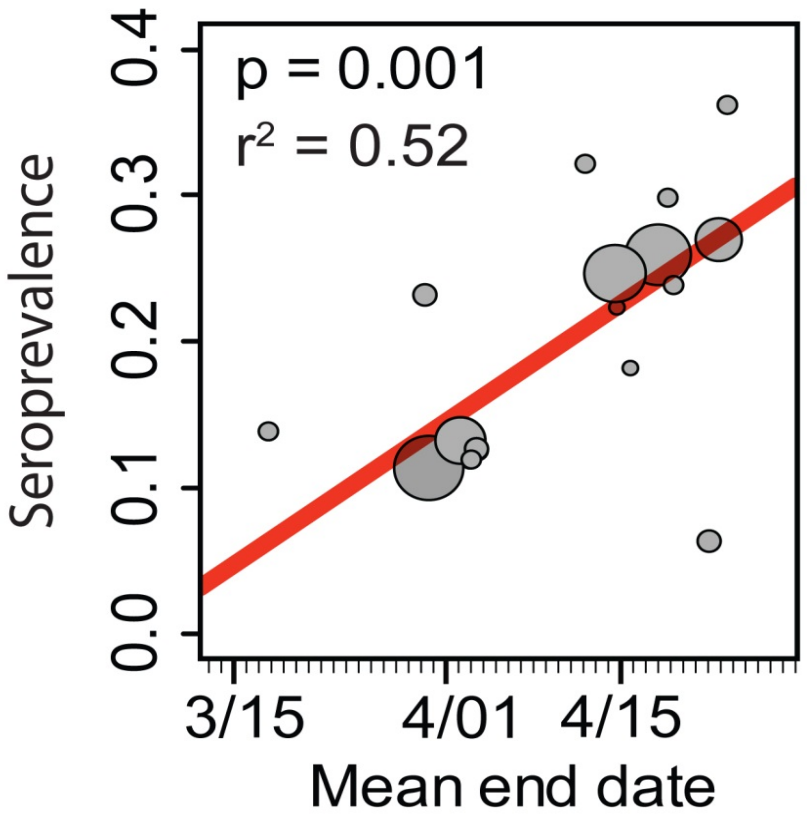
Strain 19 Vaccination

- Began in 1985; discontinued in 2015
- Vaccinated ~2,500 calves annually
- Total vaccinated 1985-2015
    - 91,145 juveniles (99% avg. vacc/yr)
    - 19,336 adults (67% avg. vacc/yr)

Adaptive Management



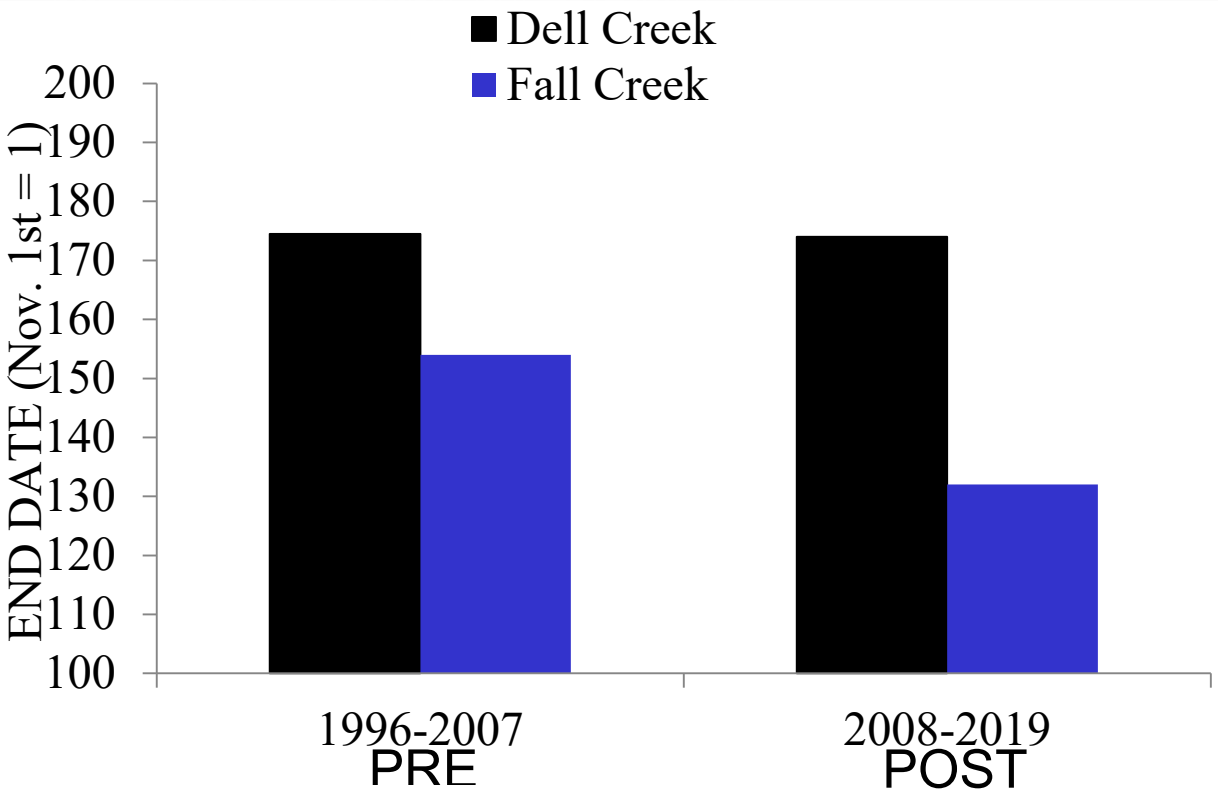
March-May is Peak Transmission Period



Longer feeding season = more disease

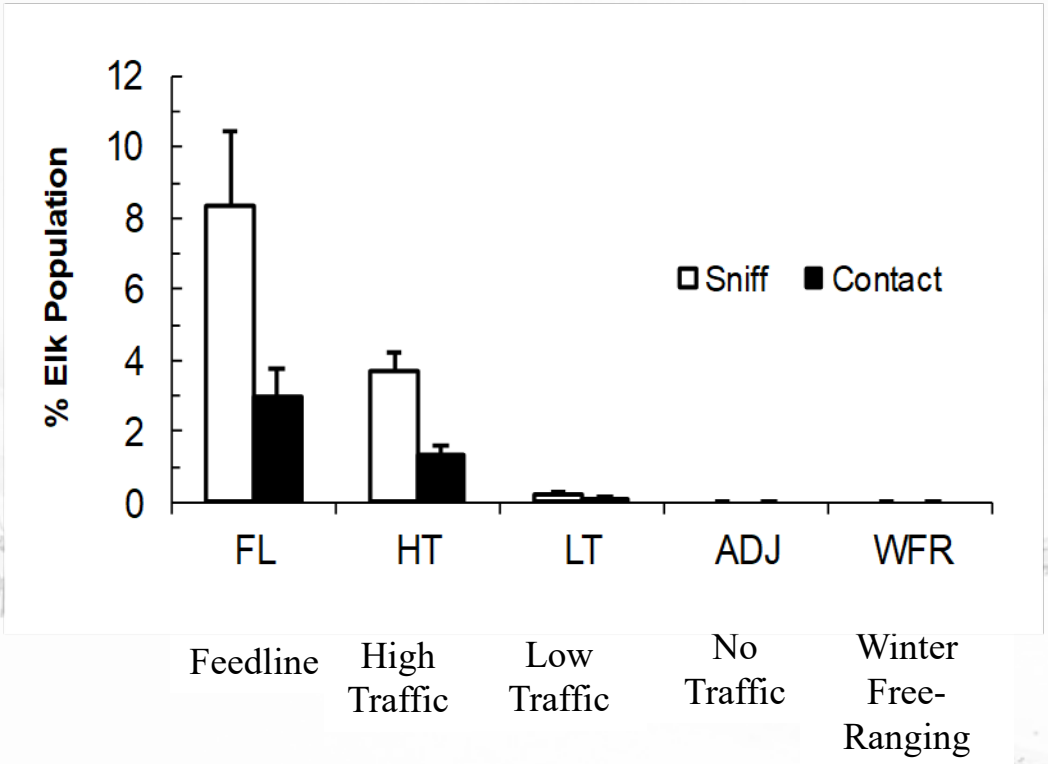
Adaptive Management

Truncation of feeding season in spring reduces the duration of high concentration



Adaptive Management

Disease transmission at the feedline



Maichak, et. al. 2009. Effects of management, behavior, and scavenging on risk of brucellosis transmission in elk of Western Wyoming. *J Wild Disease.*

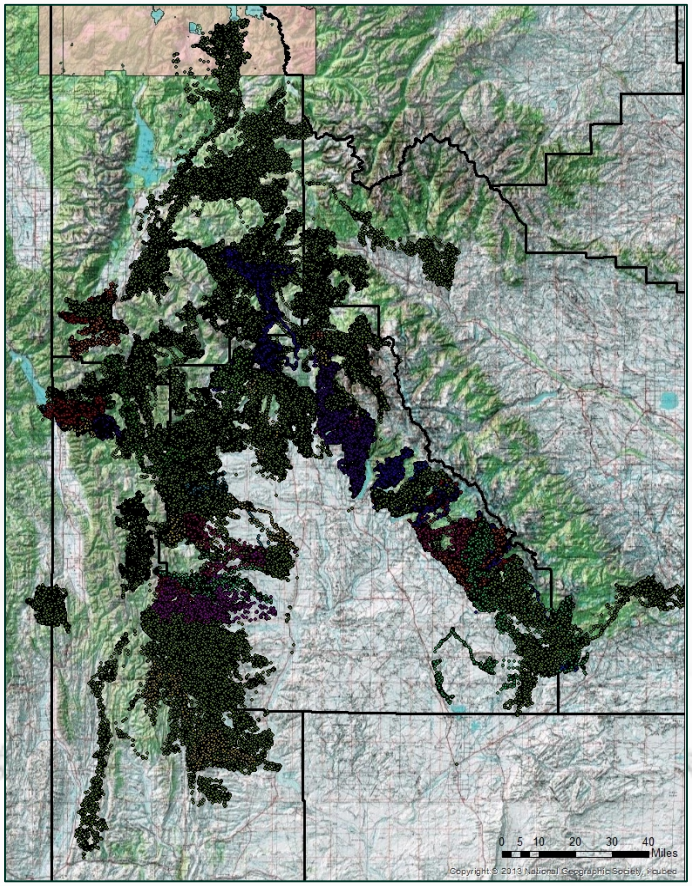
Adaptive Management

Traditional Feedline

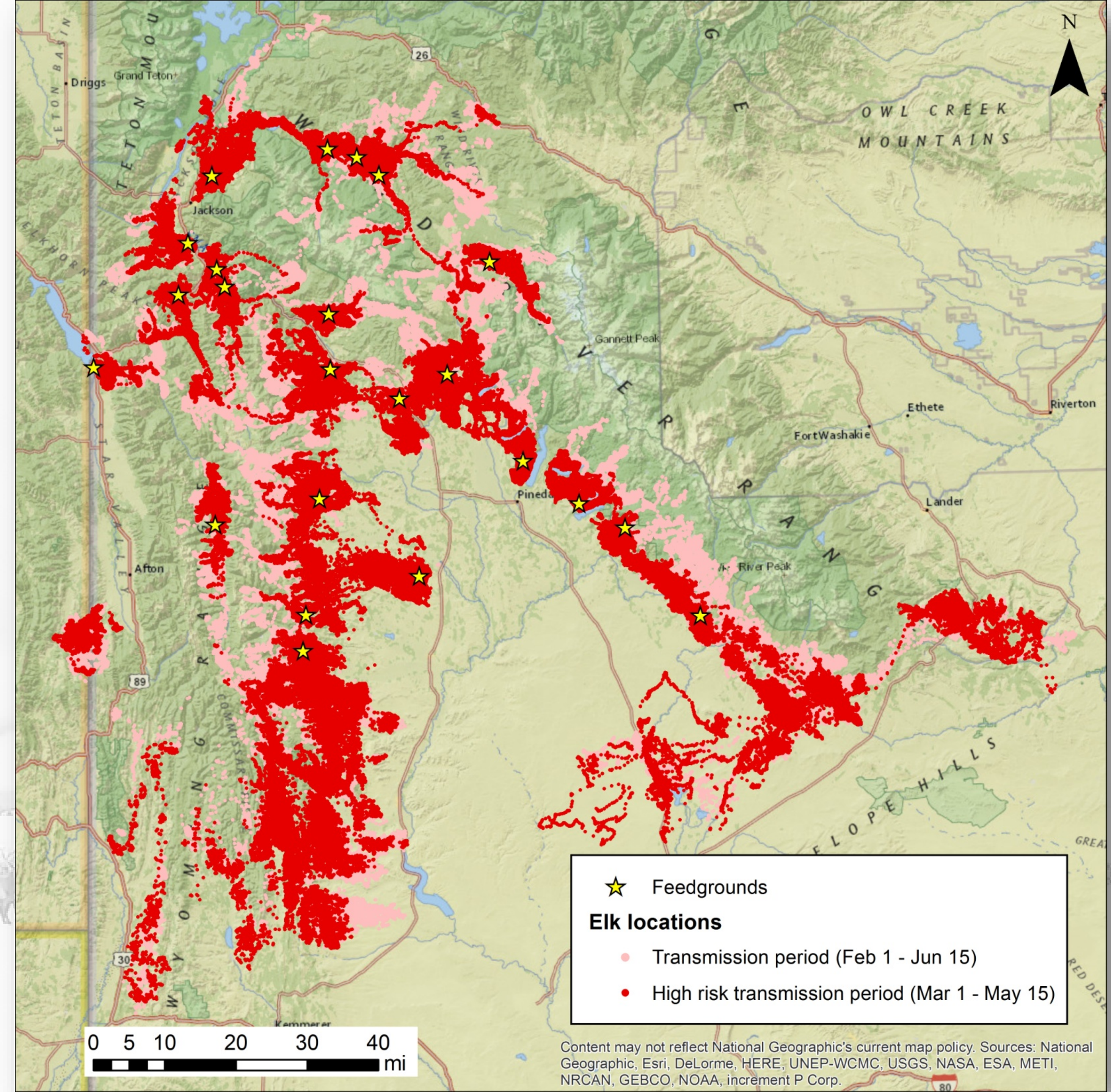
Low-Density

75% Reduction in elk-fetus contacts

Elk/Cattle Brucellosis Transmission Risk Assessment



9 years of data from over 700 GPS collars from feedgrounds


N
Driggs
Grand Teton
Jackson
OWL CREEK MOUNTAINS
Gannett Peak
Ethete
Riverton
Fort Washakie
Pinedale
Lander
Afton
River Peak
Kemmerer
Feedgrounds
Elk locations
Transmission period (Feb 1 - Jun 15)
High risk transmission period (Mar 1 - May 15)
0 5 10 20 30 40 mi
Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Questions?