



The Spread of Brucellosis in Elk and Livestock

Angela Brennan
University of Wyoming

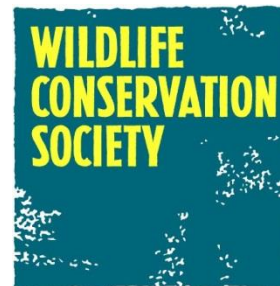
Outline

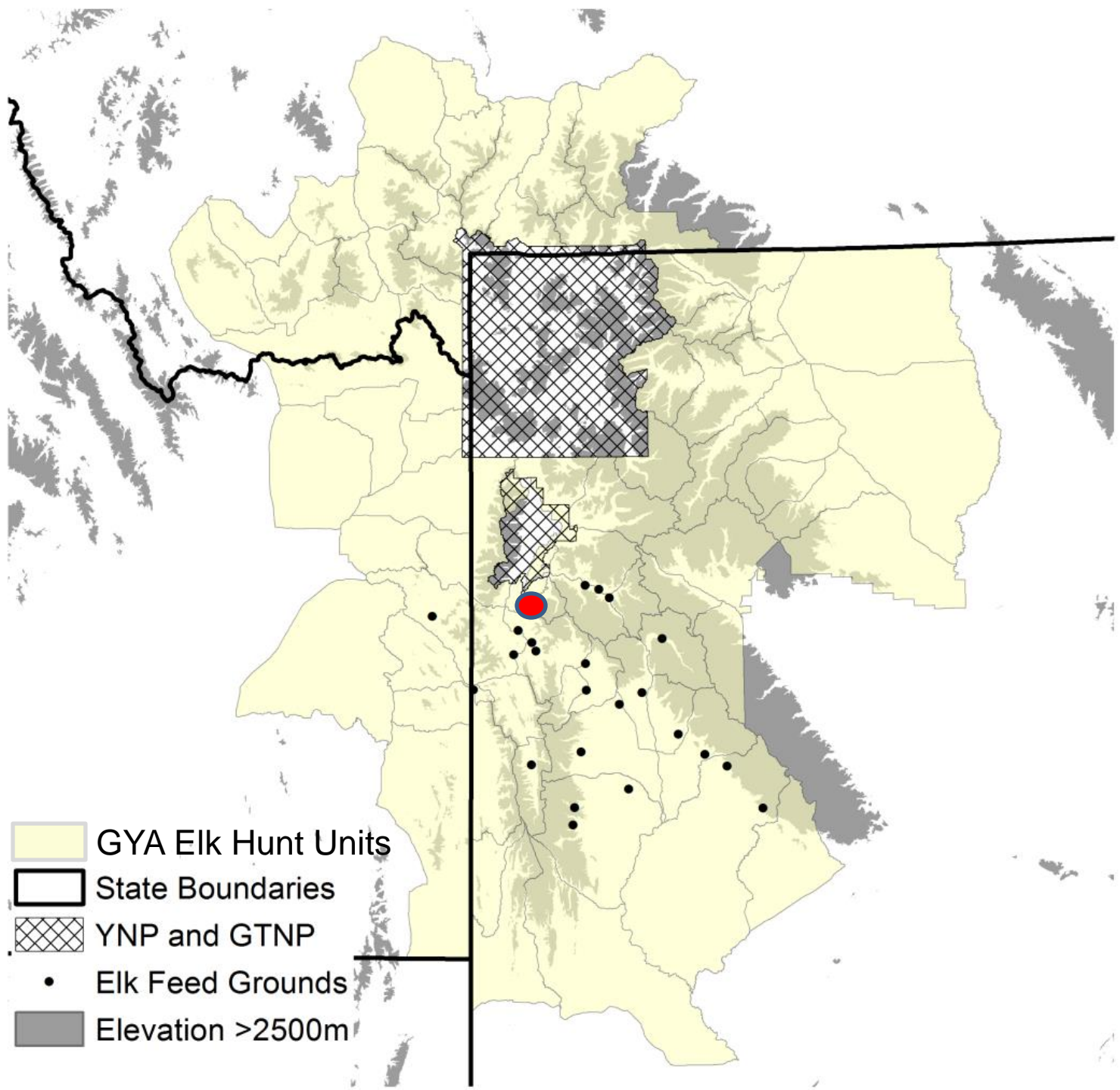
- Brucellosis in the GYA
- Elk aggregation
- Elk connectivity
- Livestock brucellosis and risk






Outline

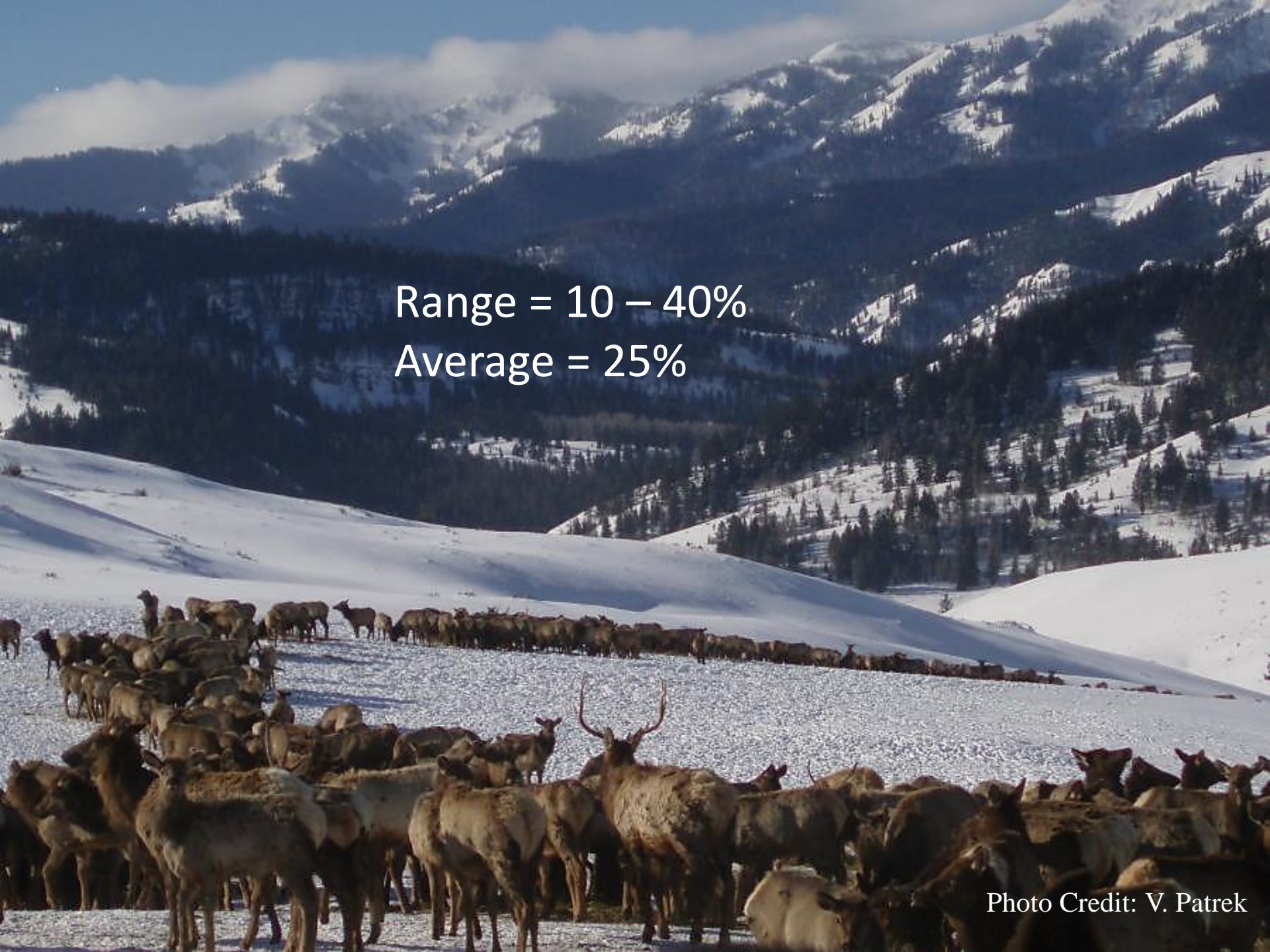


- Brucellosis in the GYA
- Elk aggregation
- Elk connectivity
- Livestock brucellosis and risk





-  GYA Elk Hunt Units
-  State Boundaries
-  YNP and GTNP
-  Elk Feed Grounds
-  Elevation >2500m

A large herd of elk is gathered in a snowy mountain valley. The elk are in the foreground and middle ground, with some showing large antlers. The background features snow-covered mountains and dense evergreen forests under a clear blue sky with some light clouds.

Range = 10 – 40%
Average = 25%

Photo Credit: V. Patrek

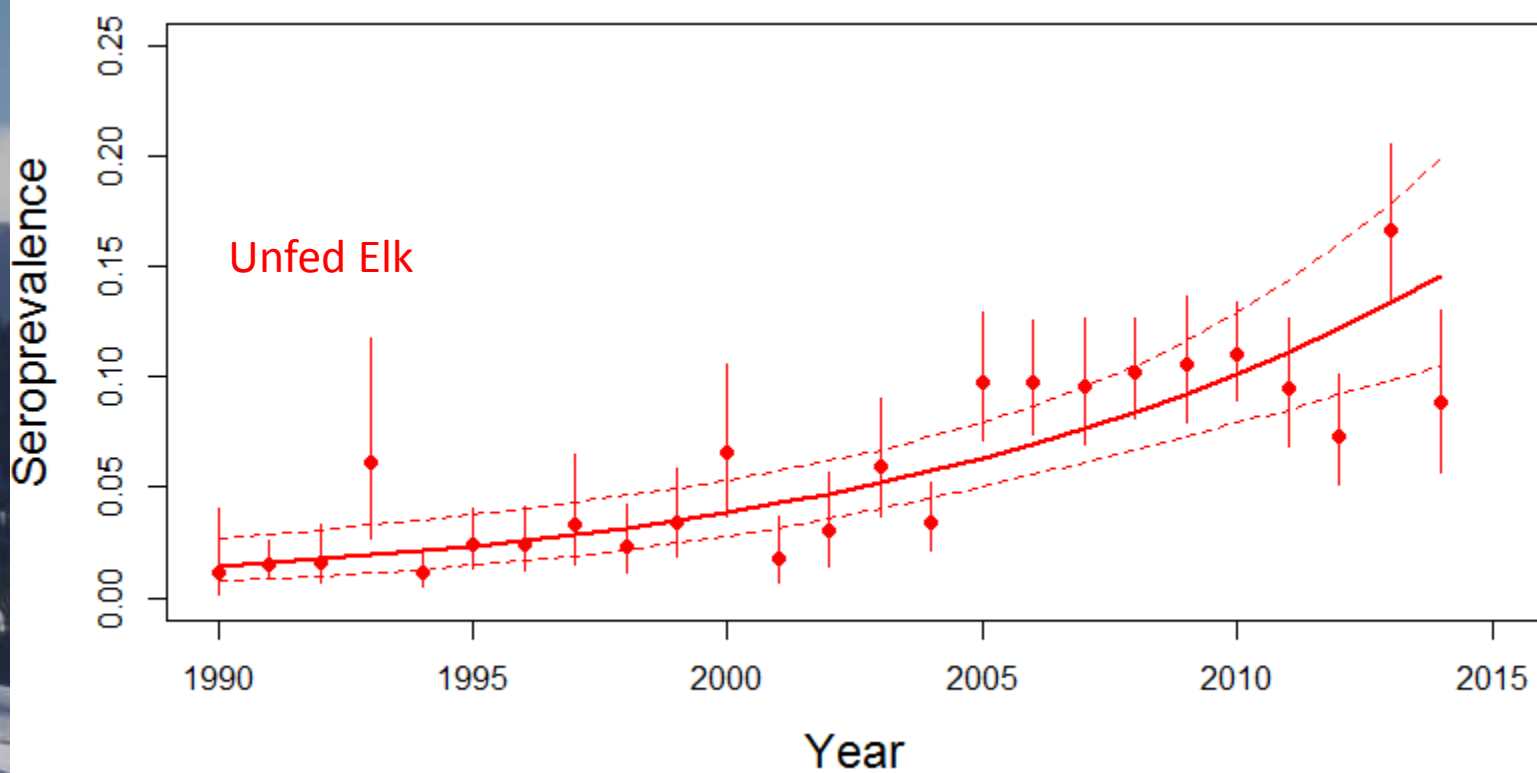
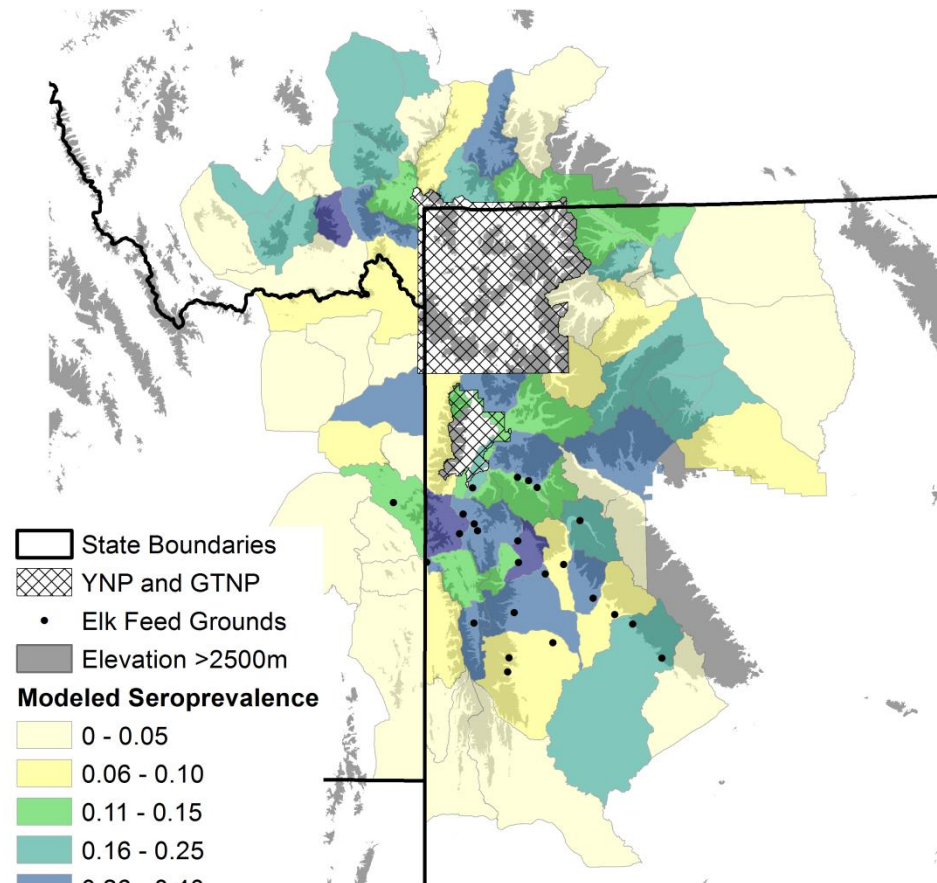
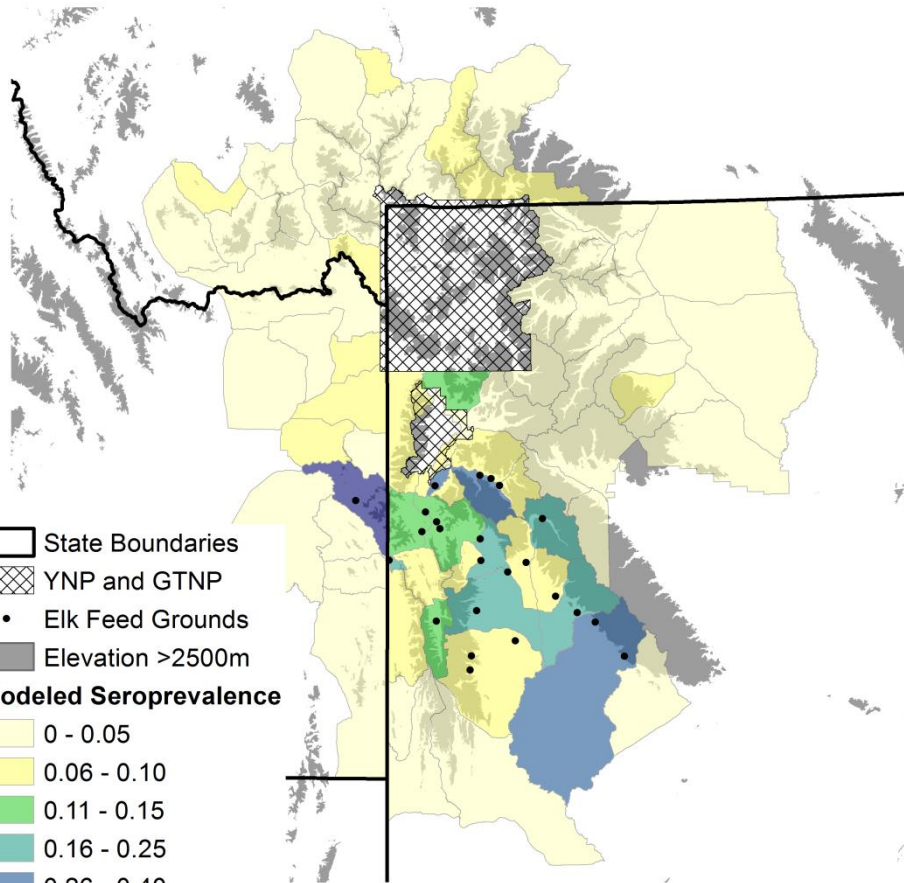


Photo Credit: V. Patrek

Modeled Seroprevalence

1990

2014

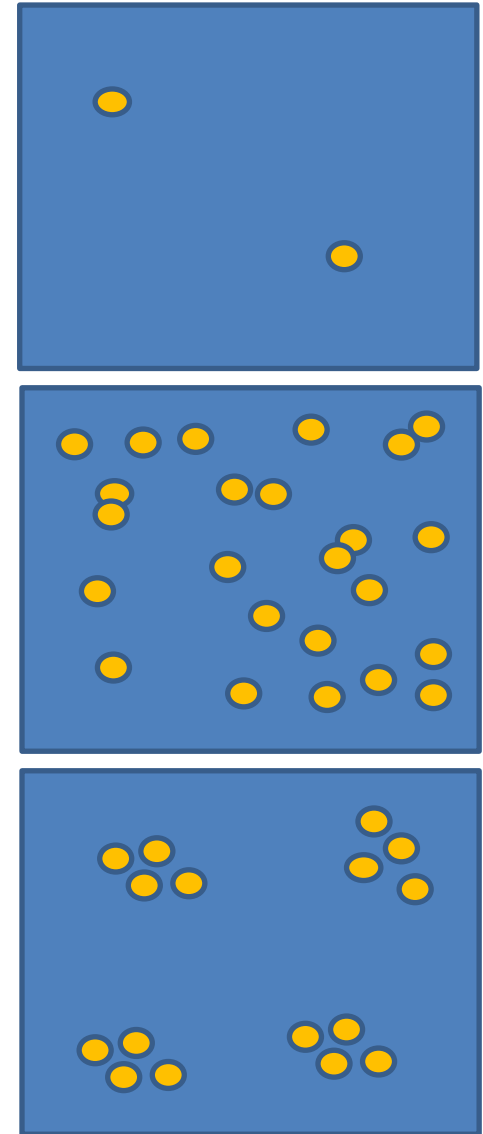


Explanations for Increases

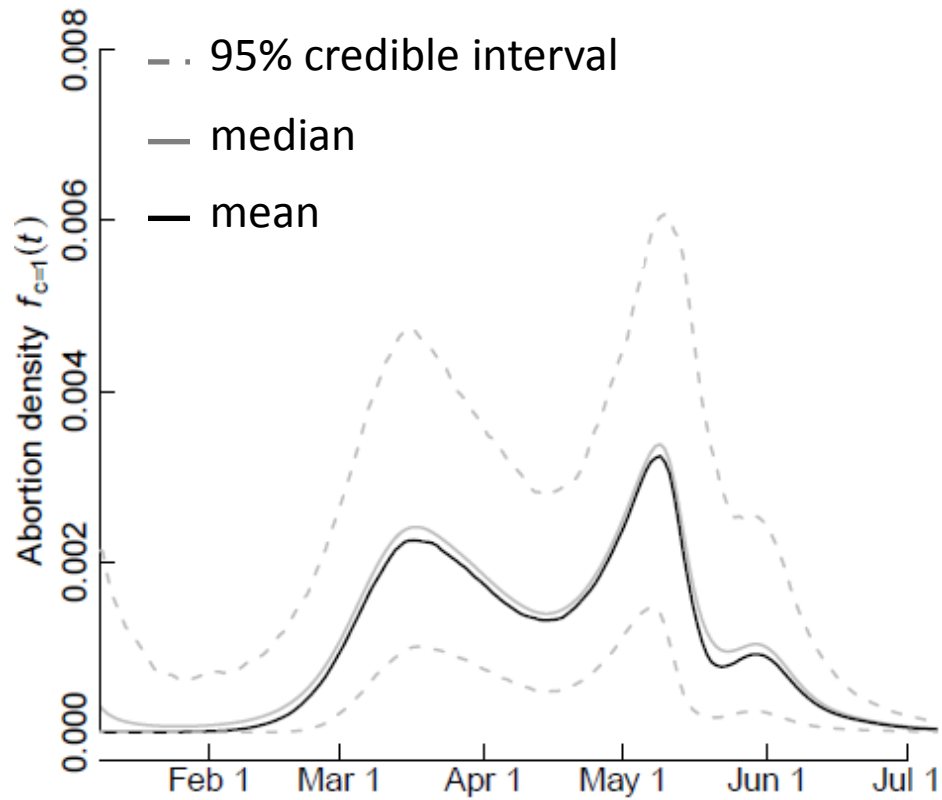
- Feedground dispersers
- Shifting age structure
- High densities/Large groups

Elk Aggregation

- Density transmission relationship
- What is the best measure of density
- Knowing this could help inform management

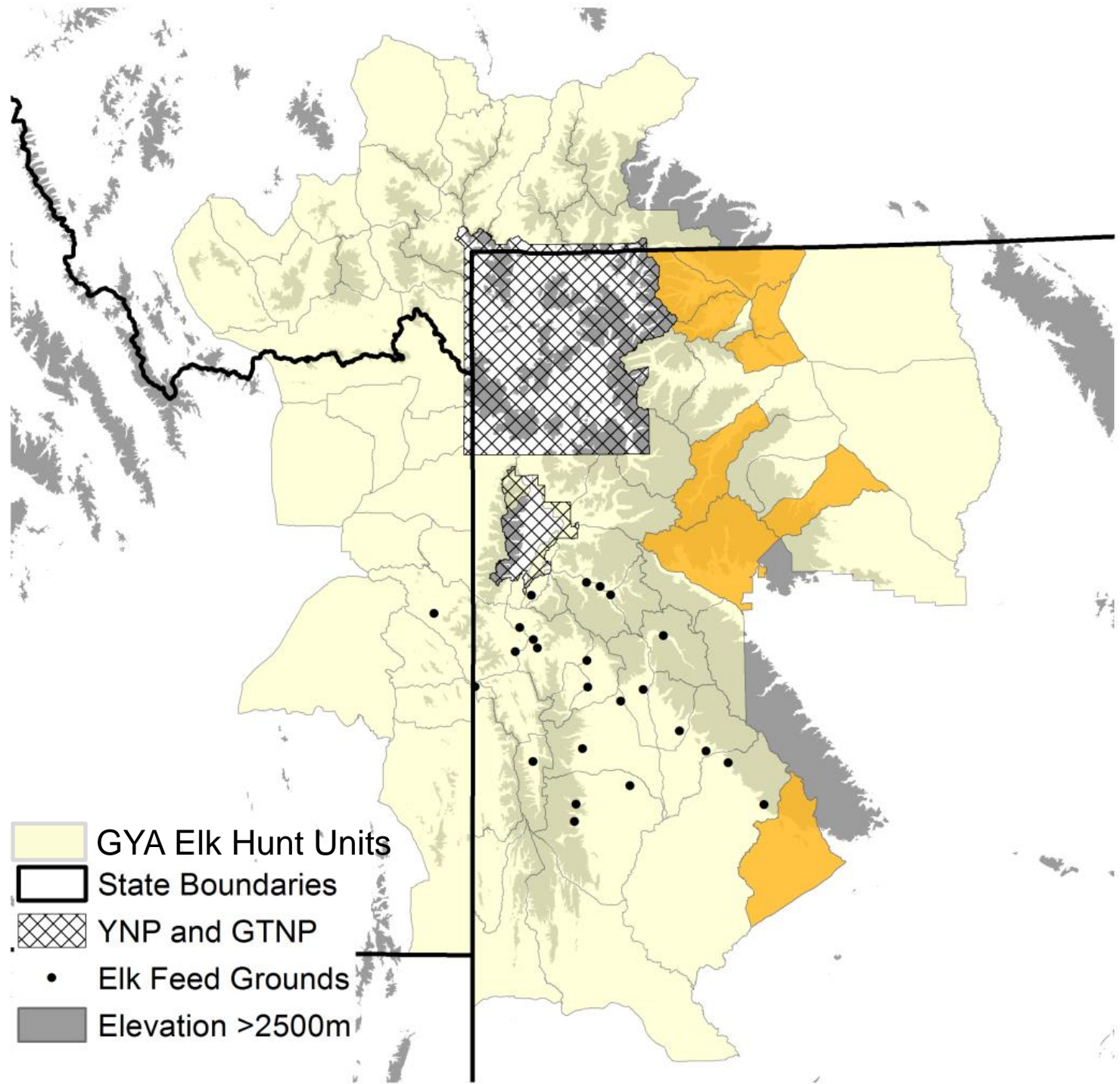


Transmission Period



Elk Density – Brucellosis Relationship

- What about density during the transmission period?
- What about elk groups?








-  GYA Elk Hunt Units
-  State Boundaries
-  YNP and GTNP
-  Elk Feed Grounds
-  Elevation >2500m





Photo Credit: C. Butler

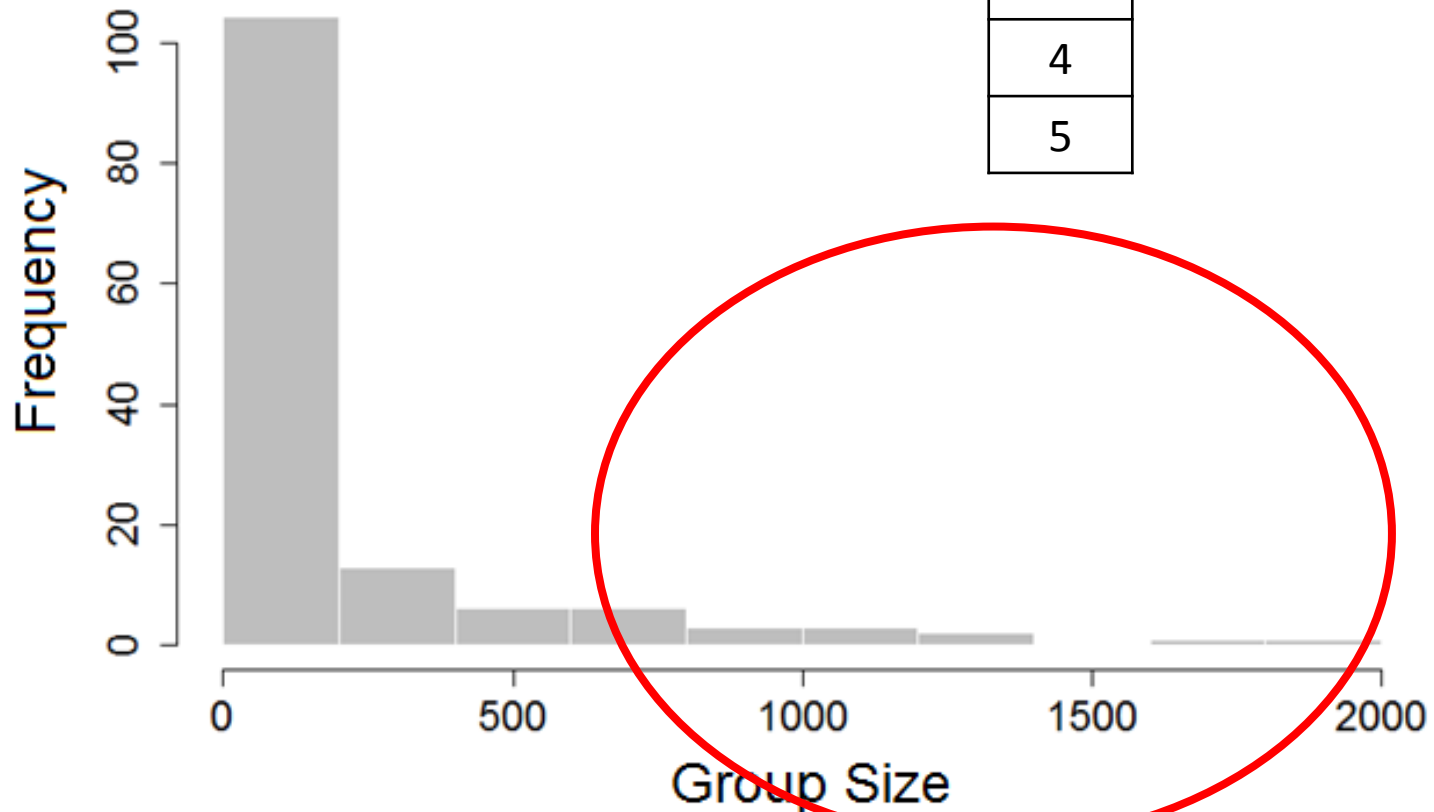


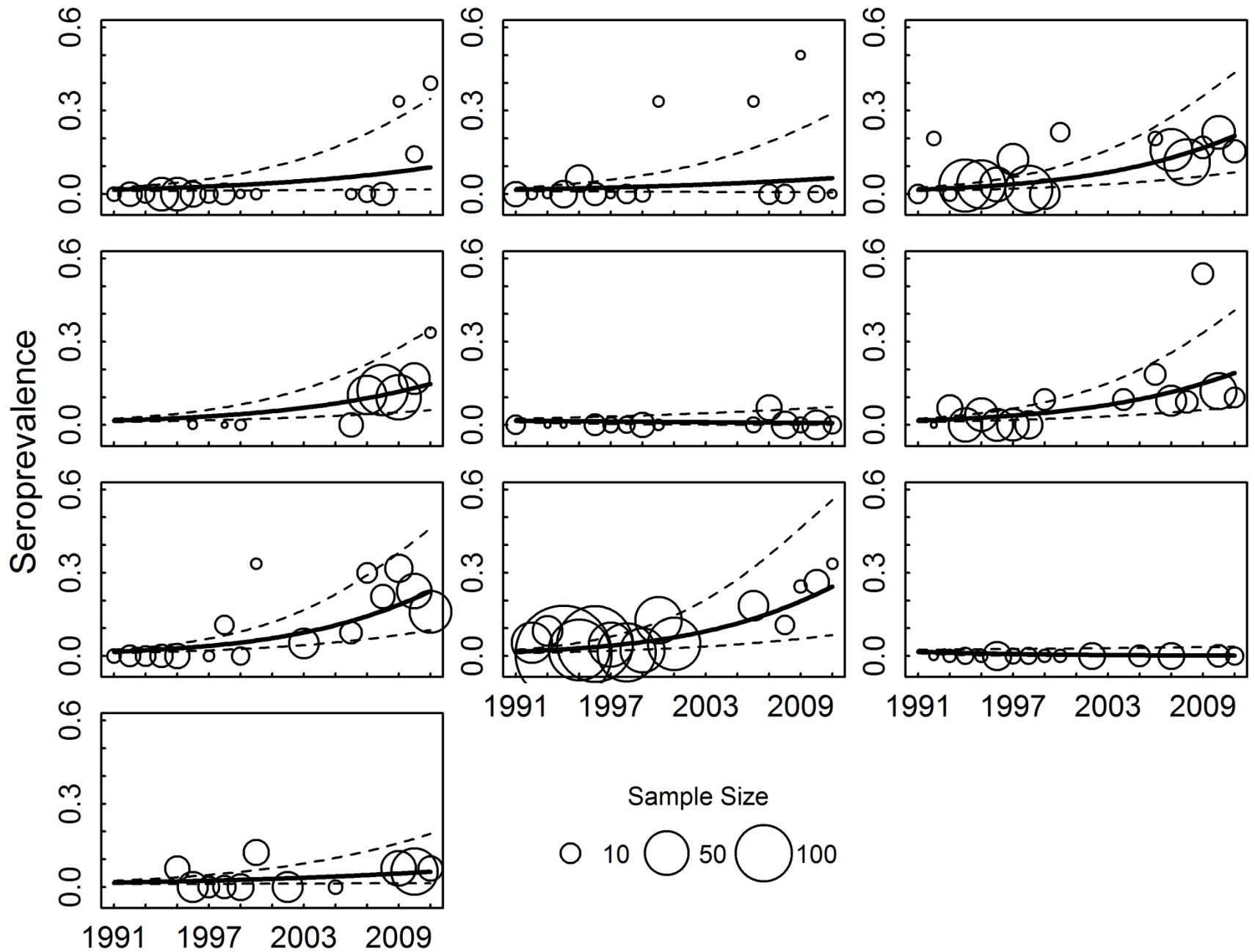
Elk Group Size

Elk Groups =

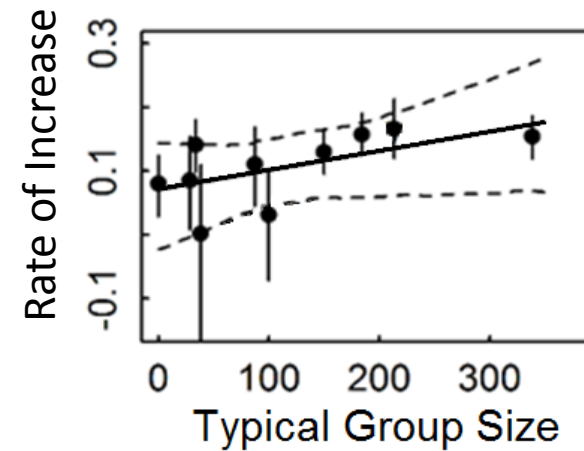
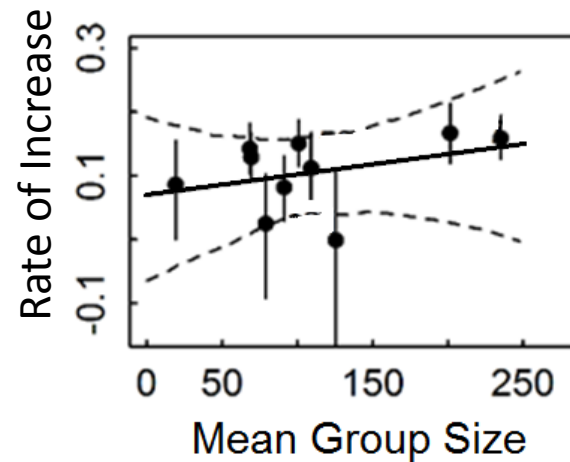
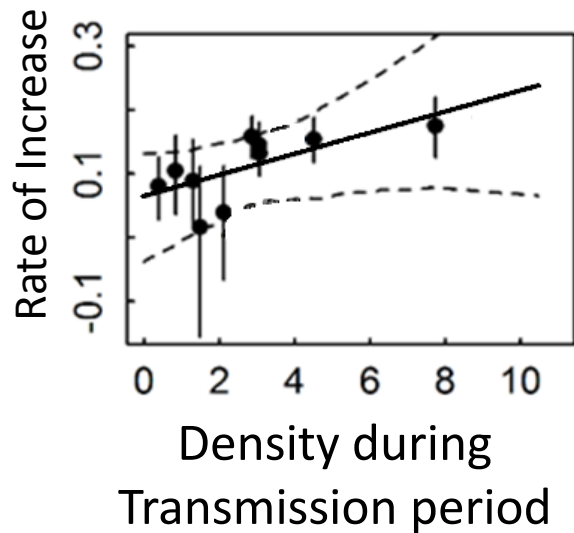
5
5
60
8
4
5

Mean = 14.5
TGS = 47.9





Winter Density and Group Size Effects on Brucellosis Transmission



Winter Density and Group Size Effects

- Density and group size predicted increases in brucellosis
- More than one way to be dense and spread disease
- Any one management strategy may not be sufficient to reduce transmission

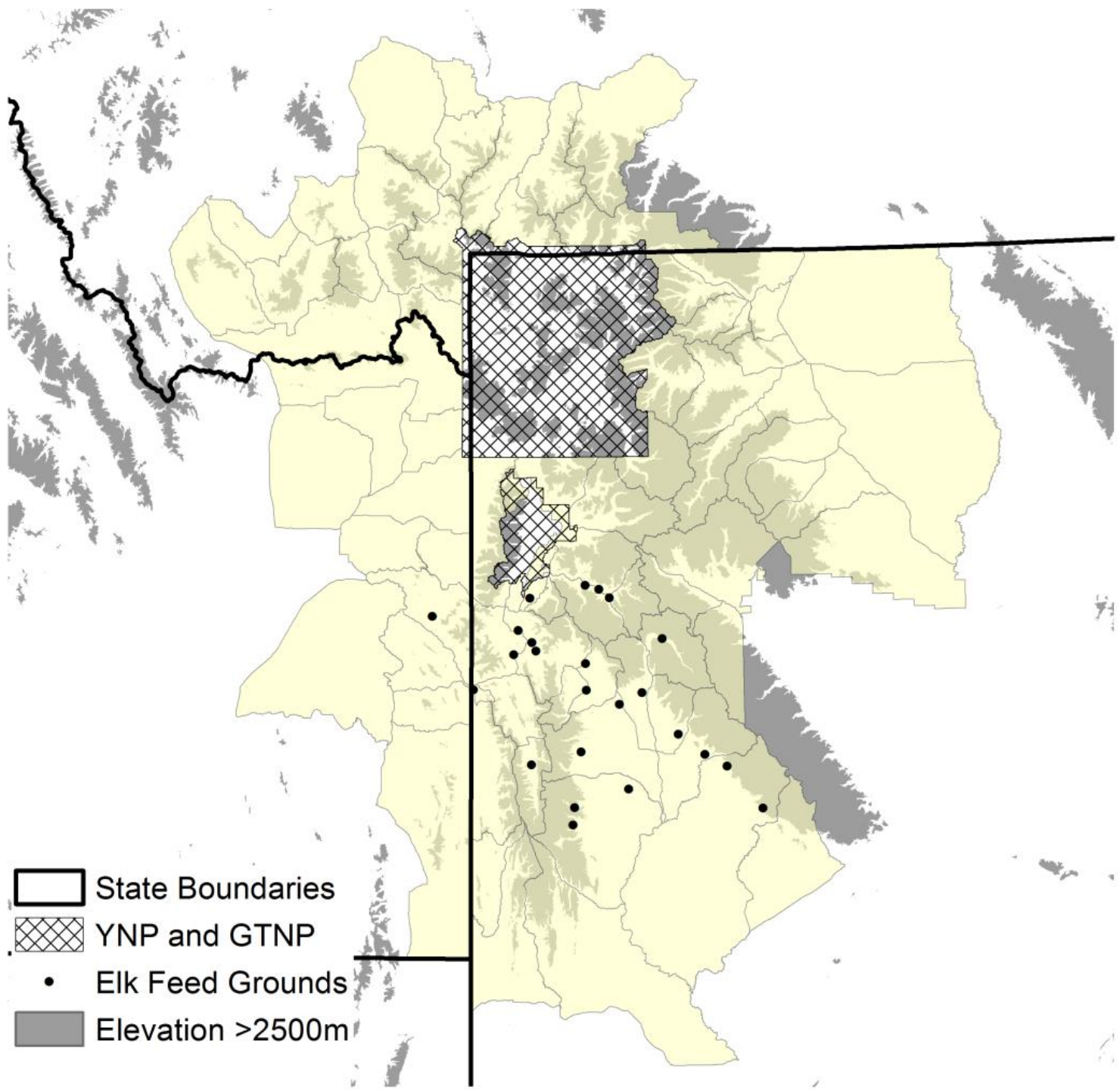




Elk Connectivity

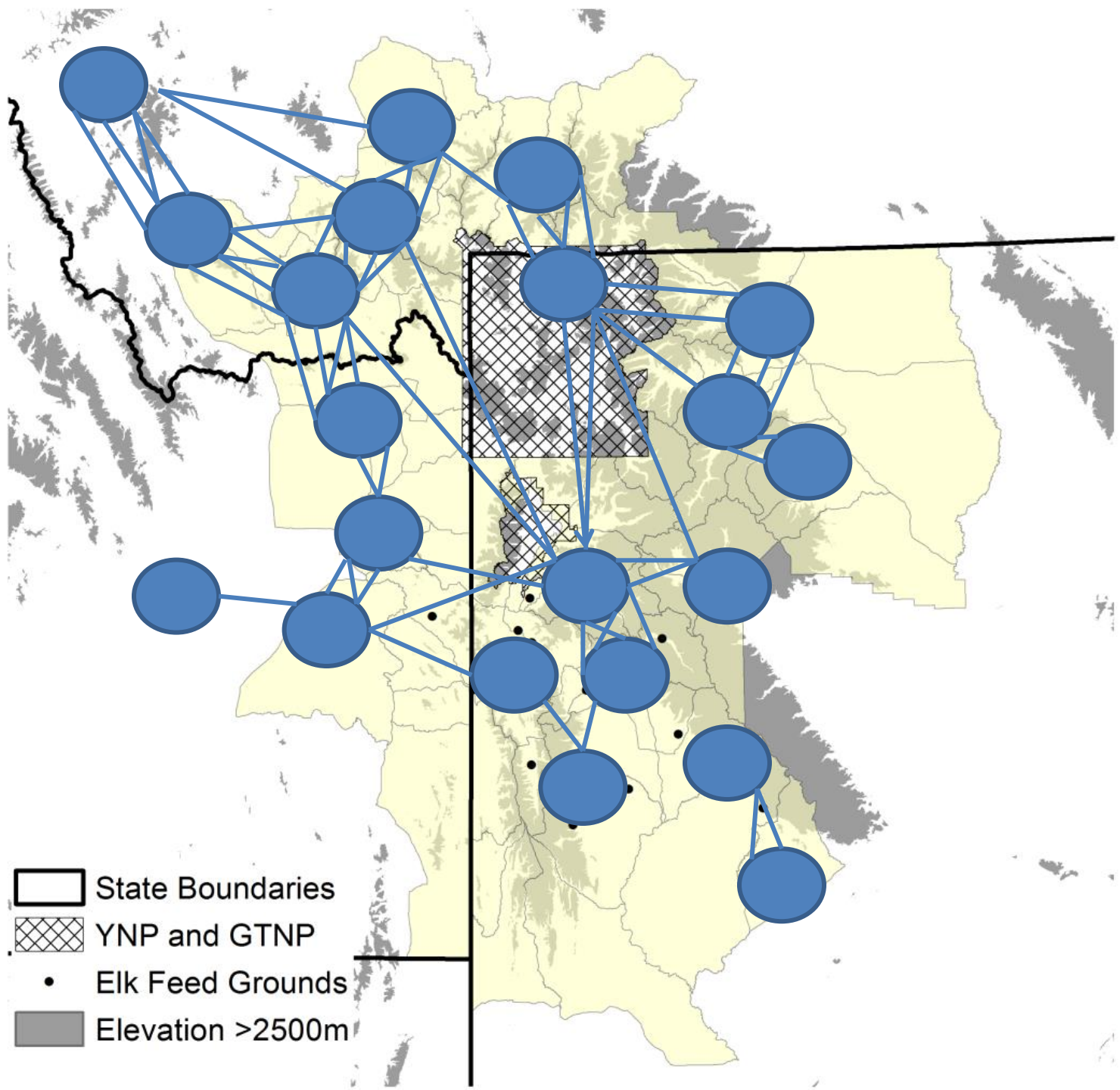
- How connected are elk across the GYA to build a contact network
- Apply a disease model to examine spread



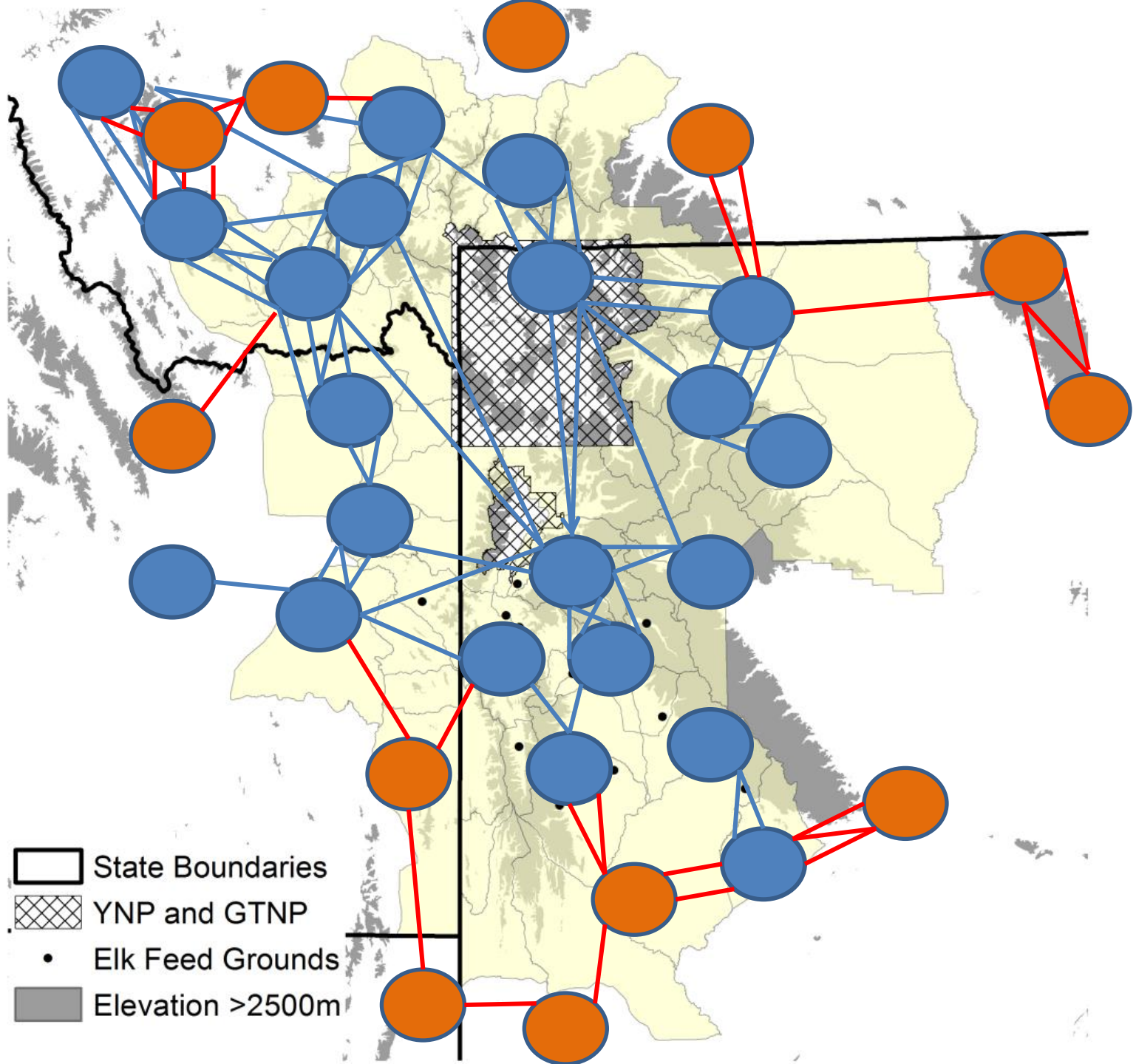




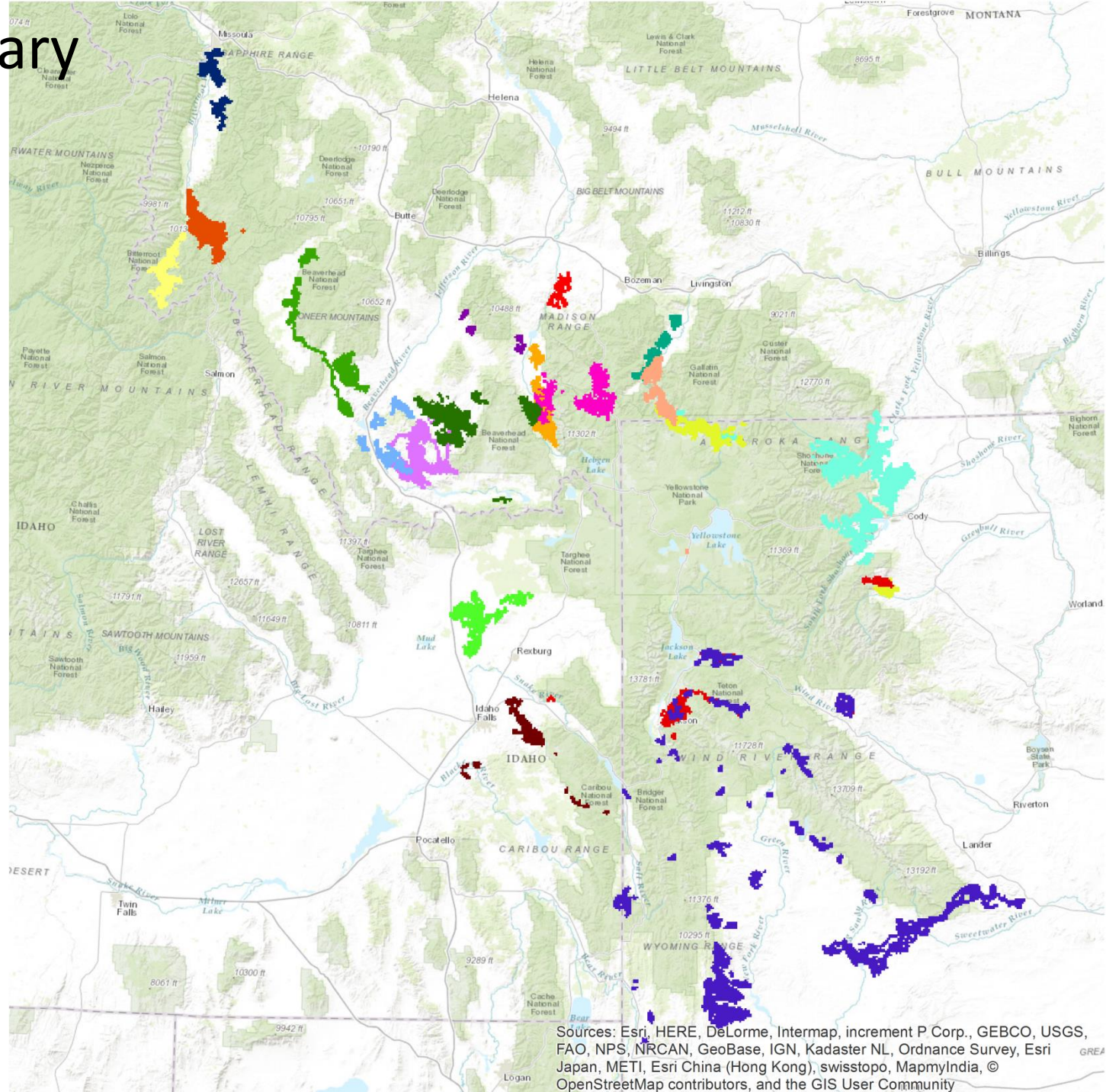
-  State Boundaries
-  YNP and GTNP
-  Elk Feed Grounds
-  Elevation >2500m



- State Boundaries
- YNP and GTNP
- Elk Feed Grounds
- Elevation >2500m

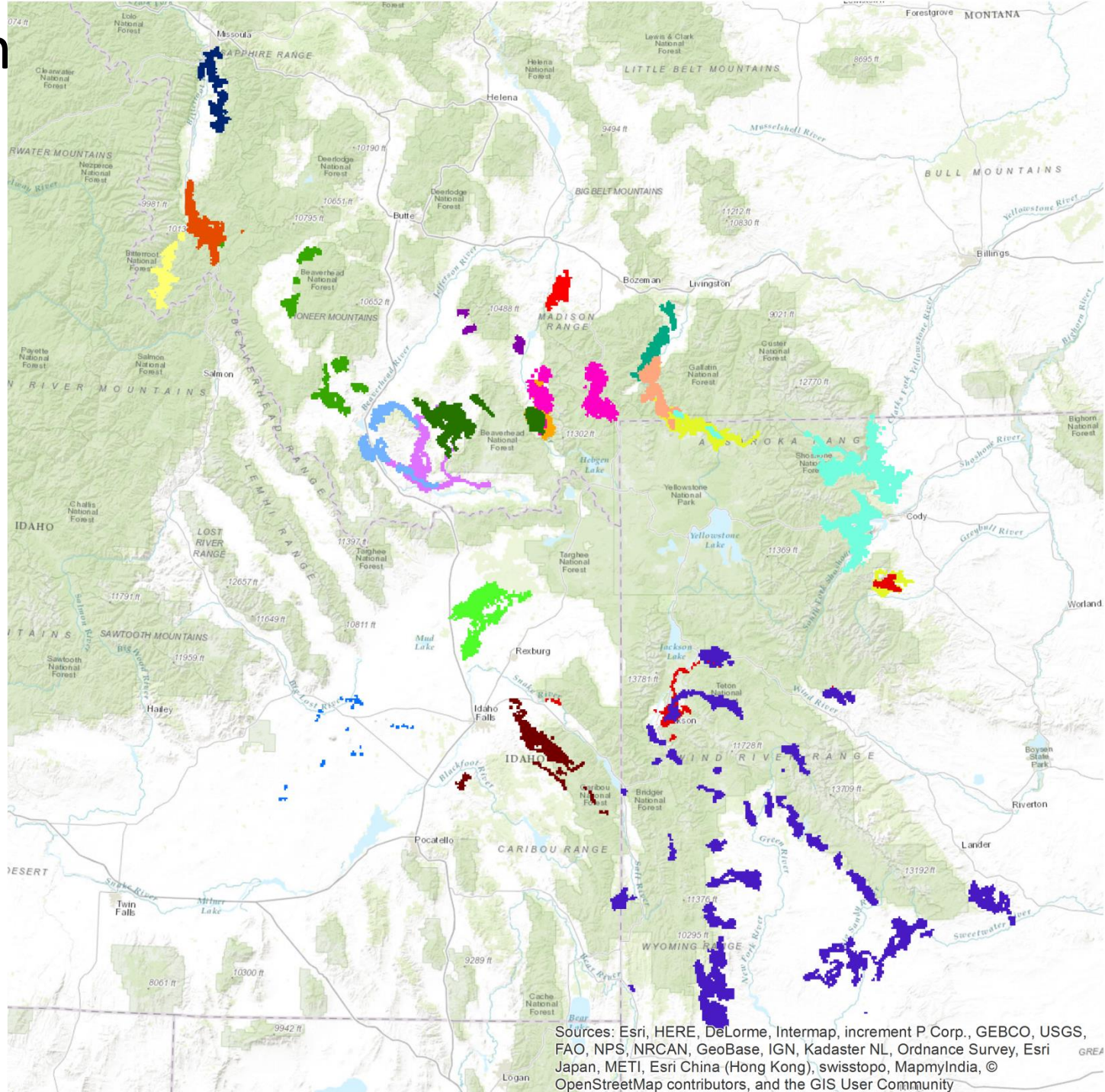


February



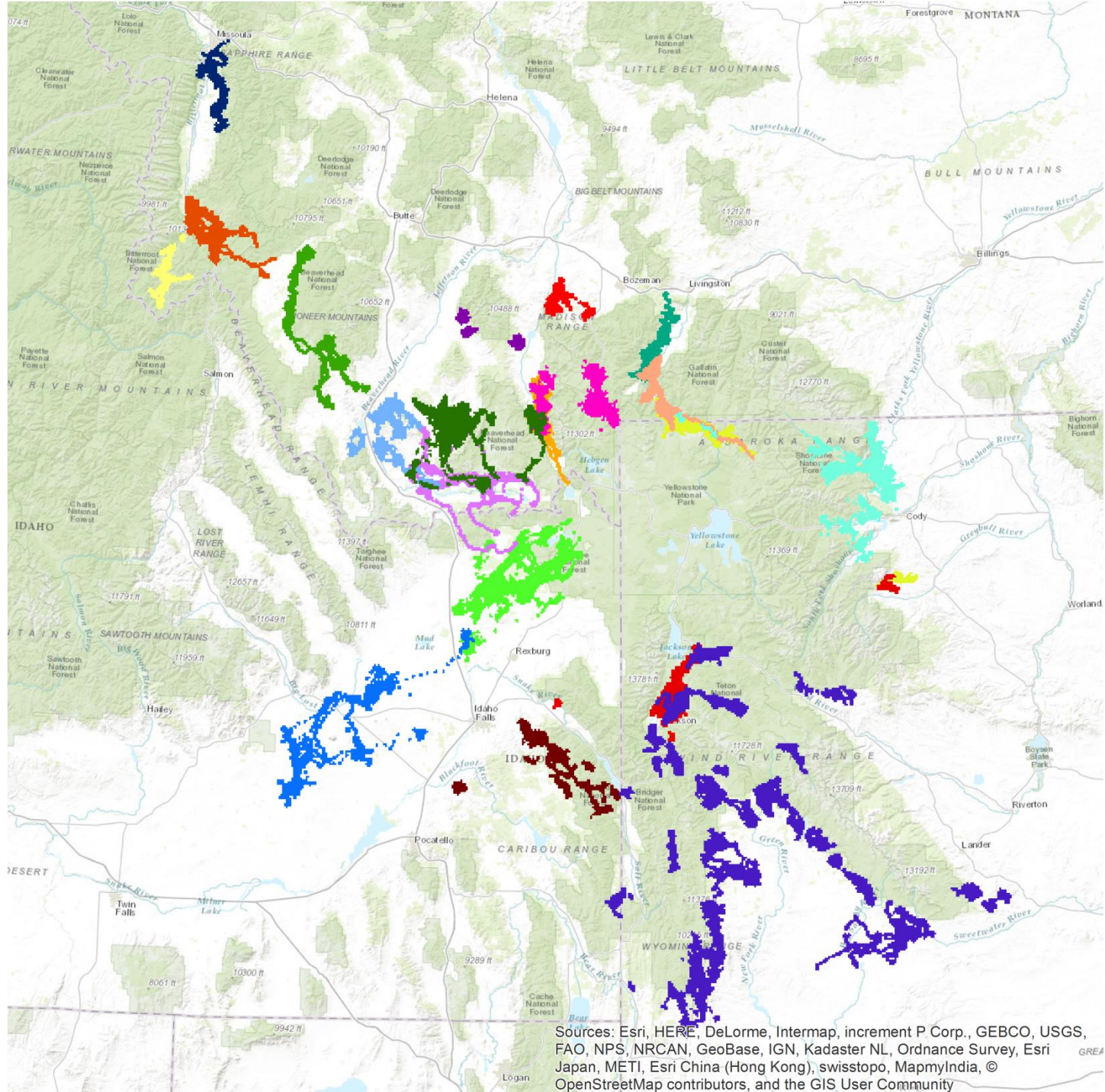
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

March



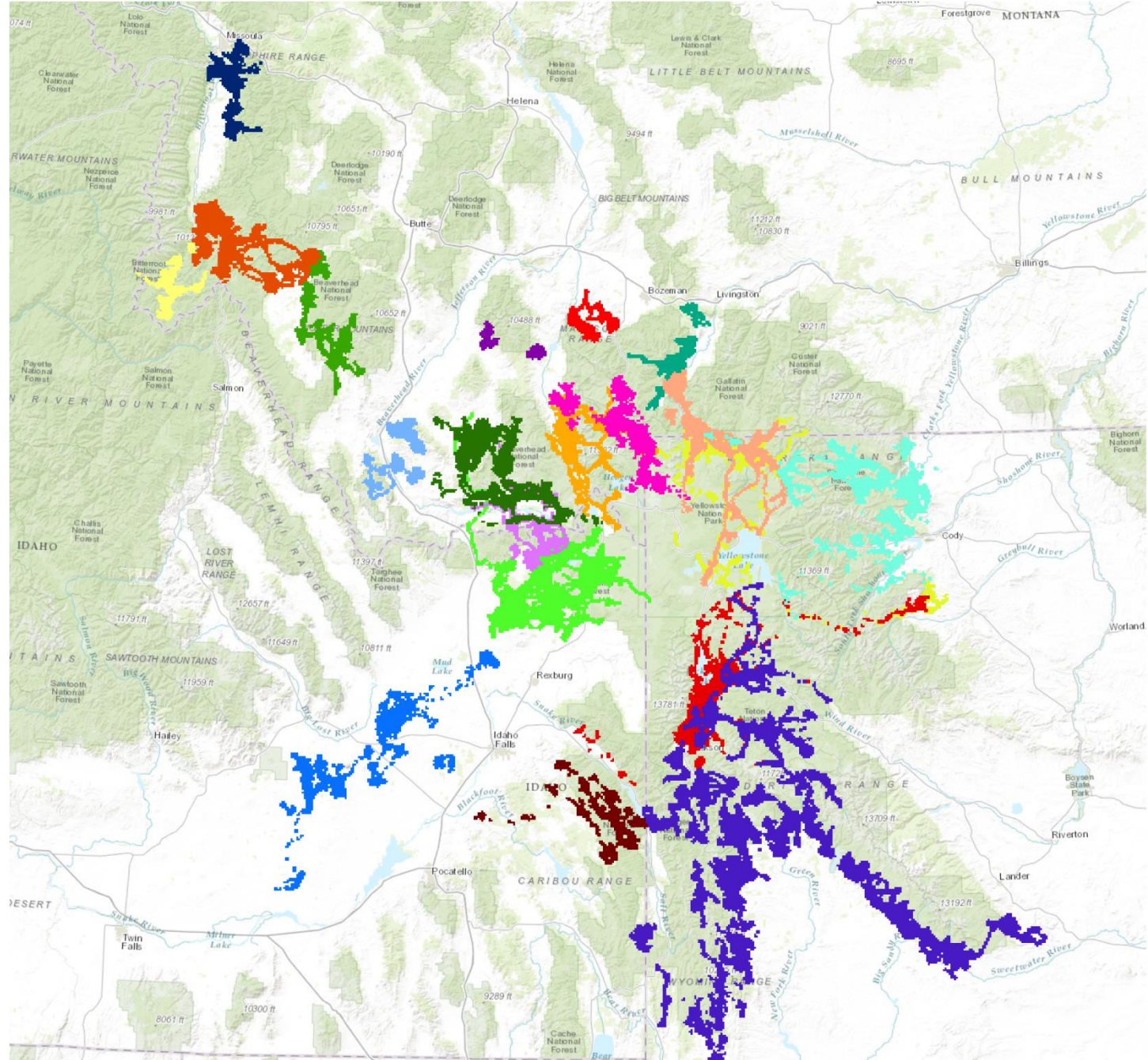
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

April



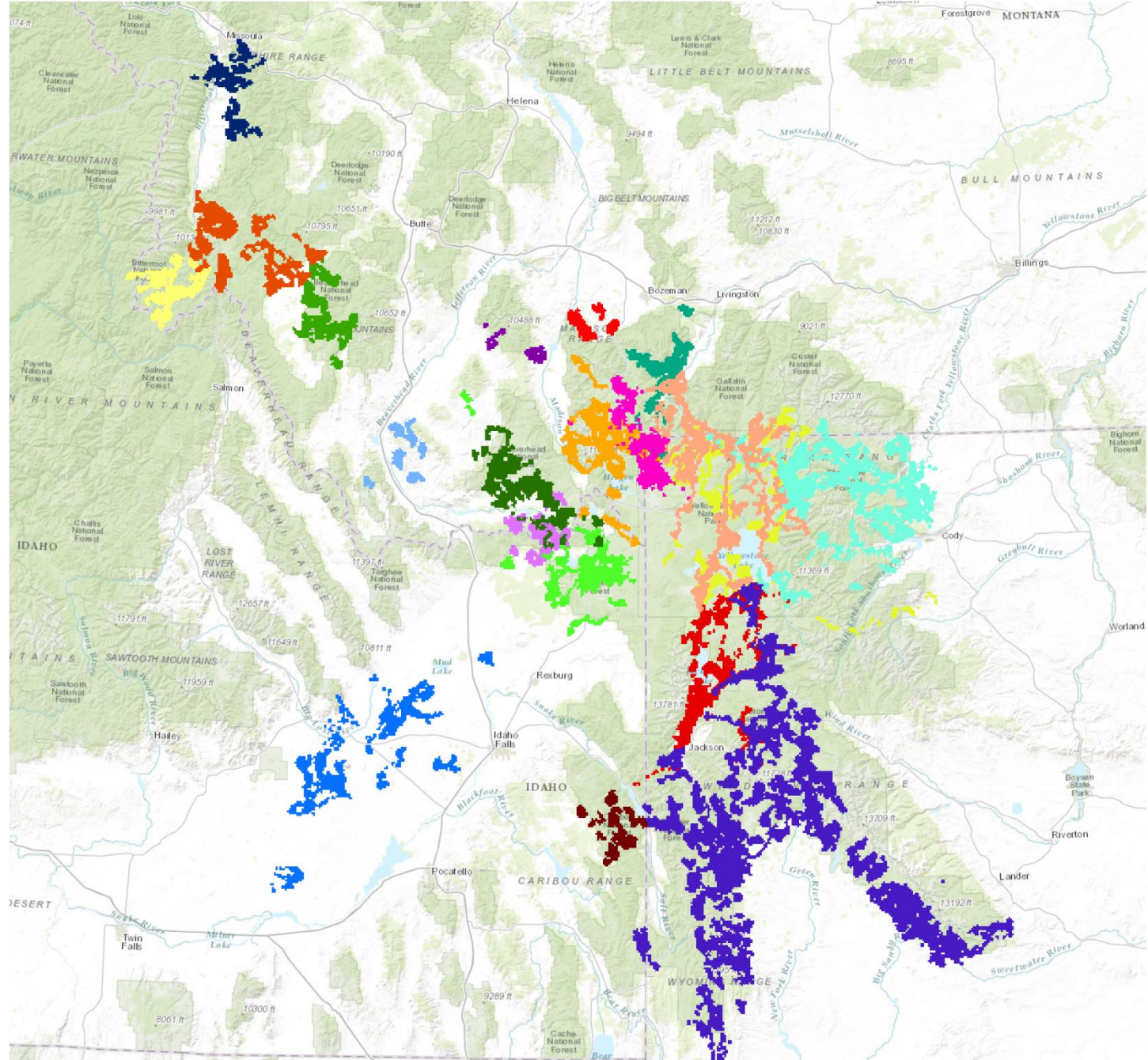
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

May



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

June



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

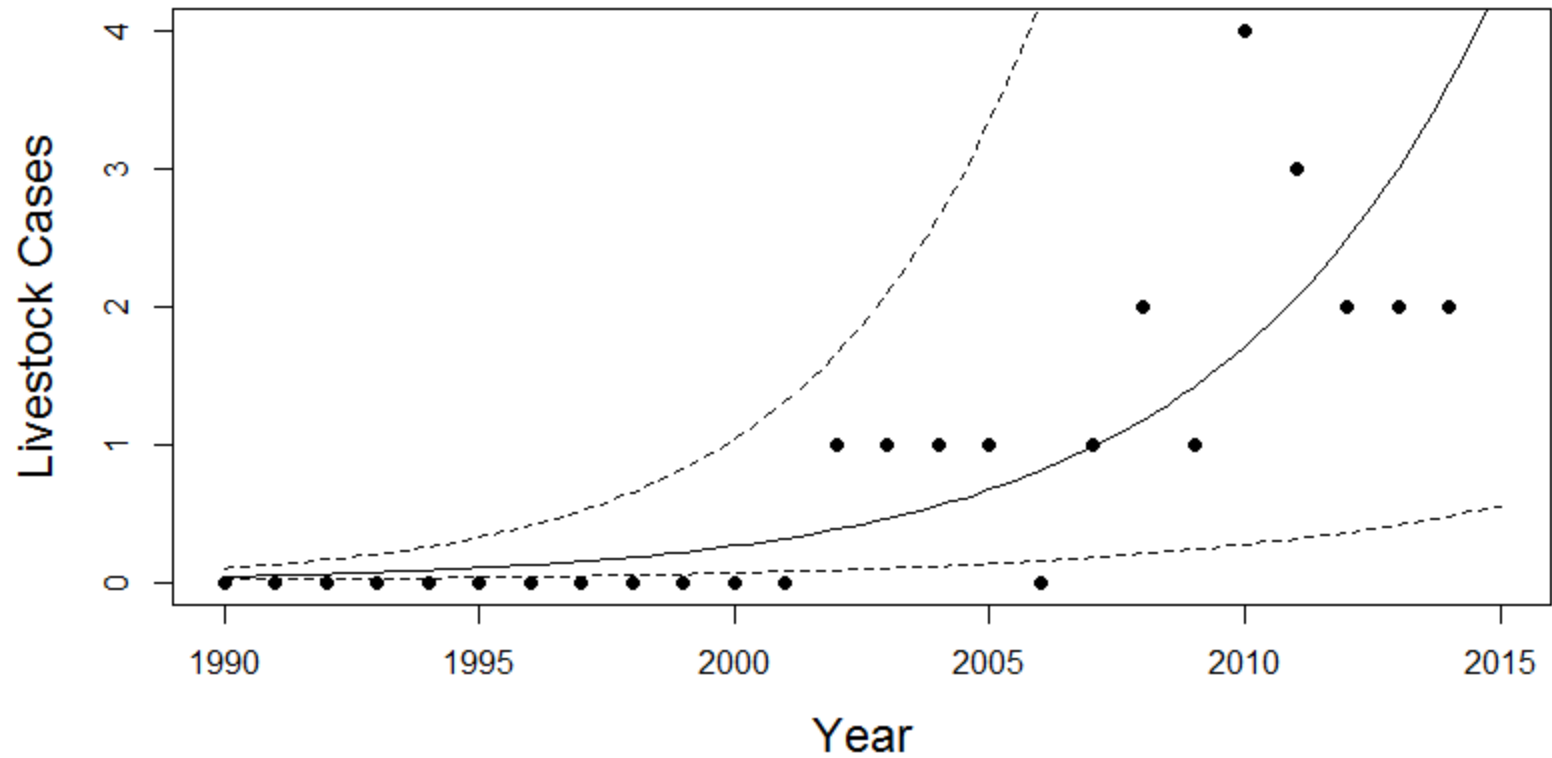
Livestock Brucellosis

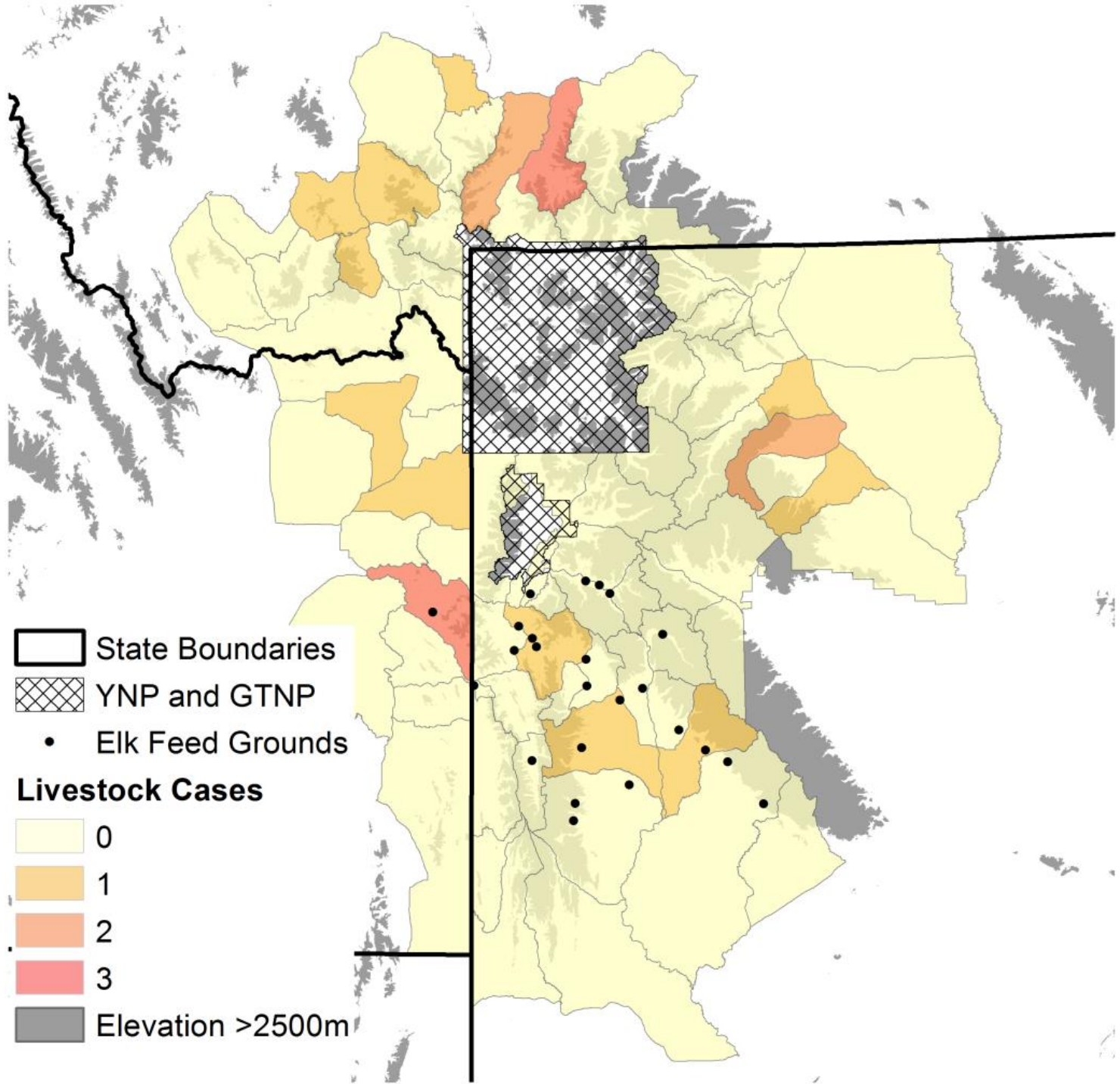
- GYA supports roughly 450,000 cattle
- 21 Cases since 2002
- 0 Cases between 1990 and 2001

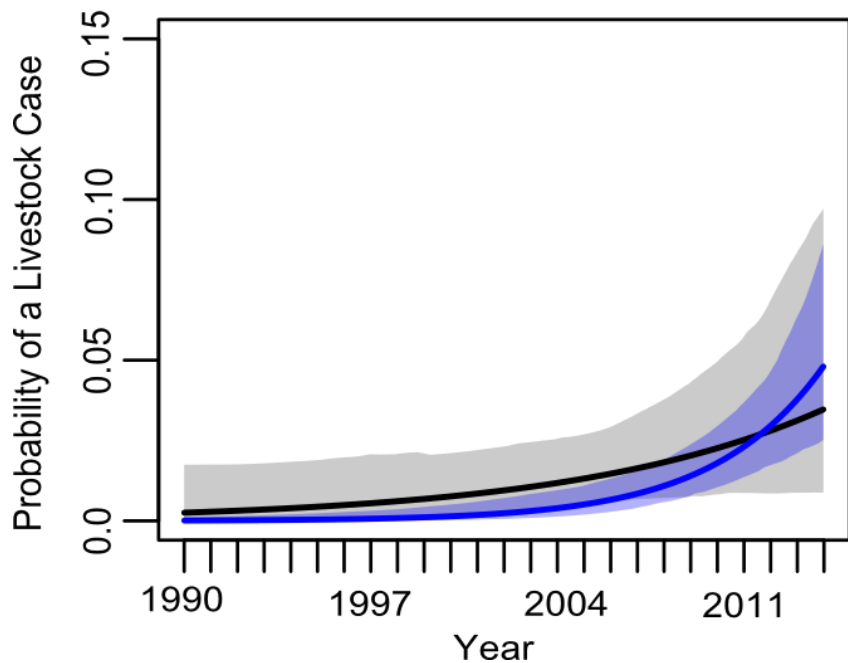
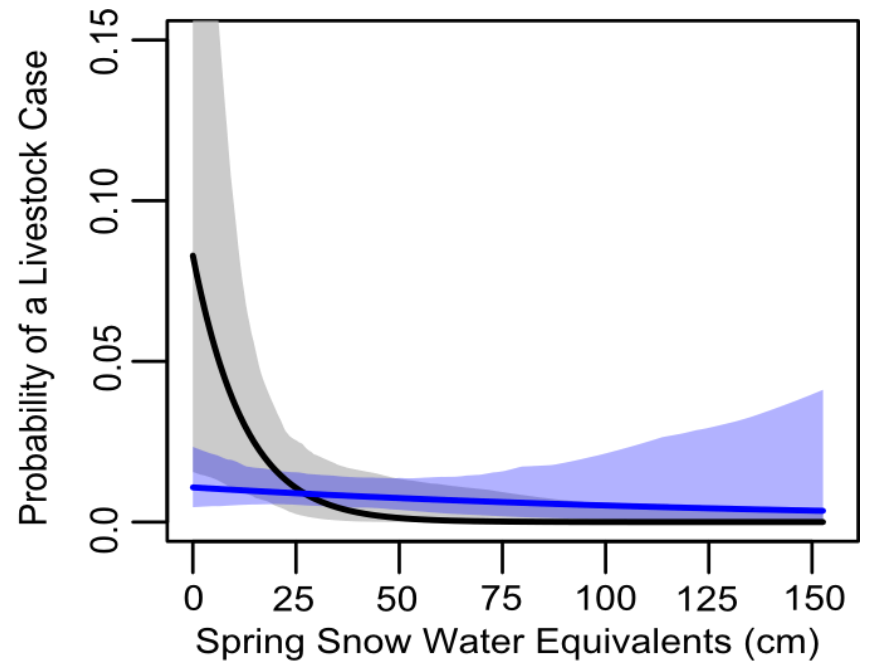
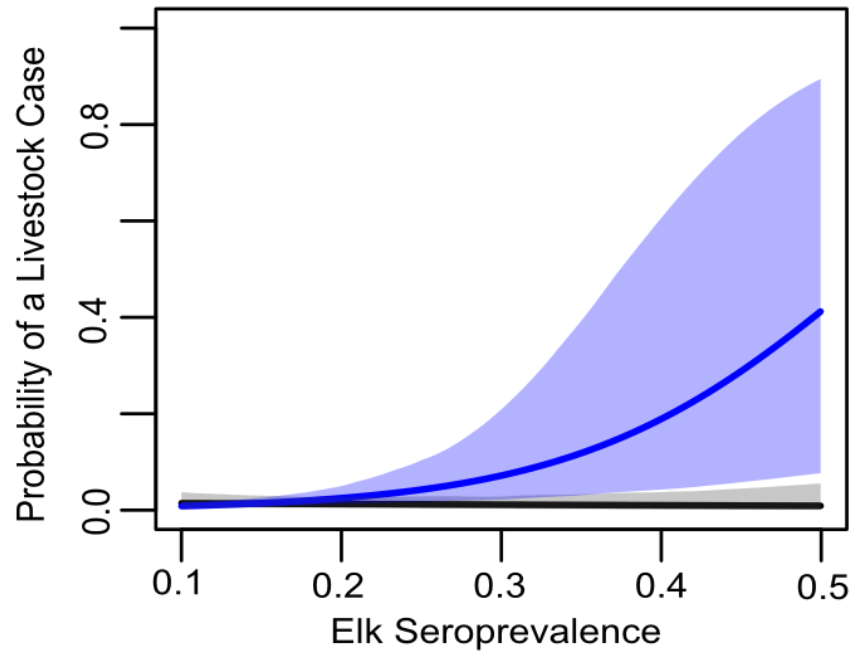


State	Number of Livestock Cases
MT	9
ID	5
WY	7

Livestock Brucellosis







Blue = Unfed Elk
 Black/Grey = Fed Elk

Elk and Livestock Disease Management

- Focus surveillance and mitigation in areas of high risk
 - High elk seroprevalence, areas of potential disease spread
 - For livestock the costs of mitigation may outweigh the risk.
- Help us refine our understanding of risk
 - Fine scale studies

Questions?

