



# MONTANA FISH, WILDLIFE & PARKS

## Targeted Elk Brucellosis Surveillance Project February 2019 Update

### BRUCELLOSIS SURVEILLANCE

In an effort to increase understanding of brucellosis in elk populations, MFWP initiated a targeted elk brucellosis surveillance project in 2011. Sampling efforts are focused on 1 – 2 elk populations every year. Elk in targeted herds are captured and sampled to evaluate the prevalence and spatial extent of brucellosis exposure in elk populations. GPS radio collars are deployed on a subset of those elk to document movements to evaluate the extent of spatial overlap with livestock and interchange between elk herds. Elk capture and sampling efforts for the Targeted Elk Brucellosis Surveillance project occurred January 8<sup>th</sup> through January 22<sup>nd</sup>, 2019 in the Tendoy Mountains (HD302 and 328) and Bangtail Mountains (HD93, Figure 1). Blood was collected and screened for exposure to brucellosis at the Montana Department of Livestock (DOL) Diagnostic Laboratory. Brucellosis seroprevalence estimates from this project are reported at the hunt district level based on capture location.

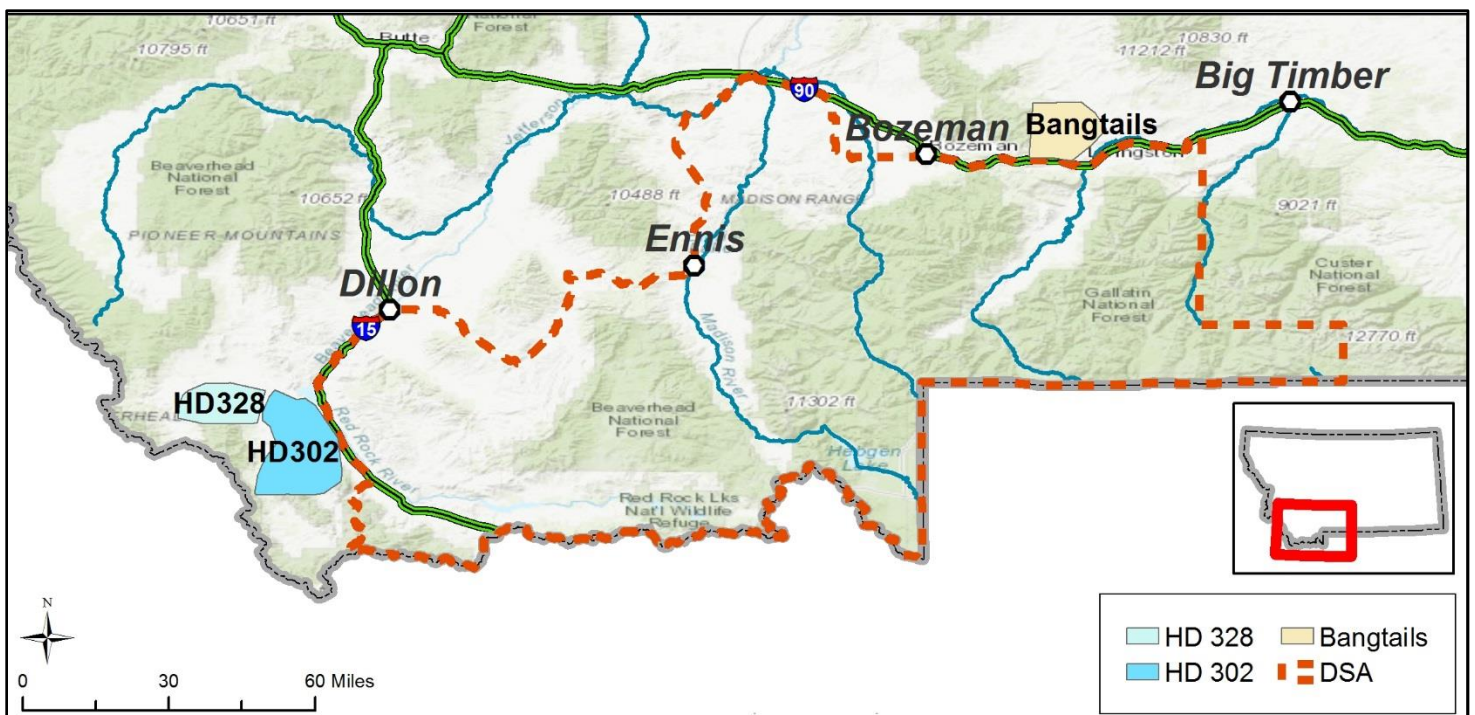
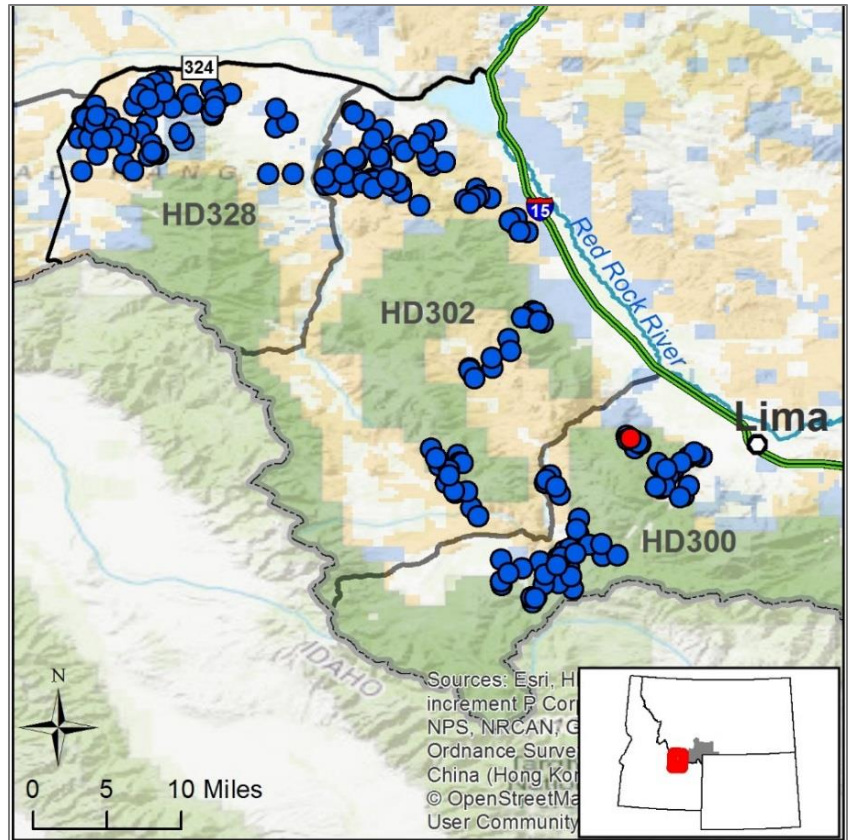


Figure 1. Elk brucellosis surveillance was conducted in the Tendoy Mountains (HD302, HD328) and Bangtail Mountains (HD93).

Capture and surveillance in the Tendoy Mountains southwest of Dillon occurred in both 2018 and 2019 (Figure 2). In 2018, we captured 40 elk in HD302 and 60 elk in HD300. One elk from HD300 tested seropositive for brucellosis. The purpose of the 2019 effort was to increase our sample size of elk in the northern half of the Tendoy Mountains to assess seroprevalence and identify elk movement patterns and interchange between populations. In 2019, 99 elk in HD302 and HD328 were captured and screened for exposure to brucellosis. In HD302, 0 out of 43 elk in 2019 and 0 out of 40 elk in 2018 tested seropositive giving the population an estimated seroprevalence of 0 (95% confidence interval: 0.00 – 0.04; Table 1) for both years combined. In HD328, 0 out of 56 elk tested seropositive giving the population an estimated seroprevalence of 0 (95% confidence interval: 0.00 – 0.06; Table 1). GPS radiocollars were deployed during both years and are programmed to record locations every hour for 65 weeks when an automatic release mechanism will drop the radiocollars for retrieval and redeployment in another herd. In 2018, 16 elk in HD300 and 14 elk in HD302 were outfitted with radiocollars and should drop in March. In 2019, 13 additional elk in HD302 and 17 elk in HD328 were outfitted with radiocollars.

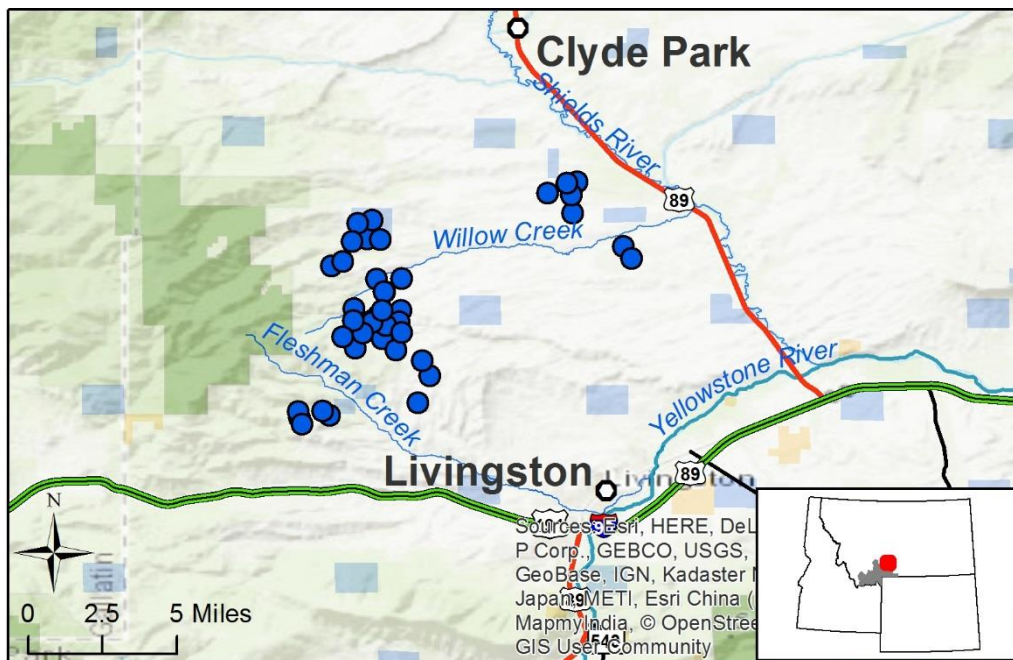


**Figure 2. Capture locations of seronegative (blue) and seropositive (red) elk in the Tendoy Mountains southwest of Dillon, MT during January 2019 and February 2018.**

**Table 1. The total number of elk sampled for exposure to brucellosis, the number of seropositive elk, estimated seroprevalence, and the number of GPS collars deployed in the HD300, HD302, and HD328 elk populations in the Tendoy Mountains in 2019 and 2018 combined. The numbers in parentheses represent the lower and upper bounds of the 95% confidence interval on the seroprevalence estimate.**

<b>Population</b>	<b>Total Elk</b>	<b>Seropositive</b>	<b>Seroprevalence</b>	<b>GPS Collars</b>
<b>HD300</b>	60	1	0.02 (0.003, 0.09)	16
<b>HD302</b>	83	0	0 (0.00, 0.04)	27
<b>HD328</b>	56	0	0 (0.00, 0.06)	17

Forty-nine elk in the southern Bangtail Mountains in HD393 were captured (Figure 3) and screened for exposure to brucellosis. In addition, we tested 7 blood samples from hunter harvested elk, increasing our sample size to 56 elk. In HD393, 0 out of 56 elk tested seropositive giving the population an estimated seroprevalence of 0 (95% confidence interval: 0.00 – 0.06; Table 2). Fifteen elk were outfitted with GPS radiocollars programmed to record locations every hour for 65 weeks. After 65 weeks, an automatic release mechanism will drop the radiocollars for retrieval and redeployment in another herd.



**Figure 3. Capture locations of 49 elk in the Bangtail Mountains in HD393 northwest of Livingston, MT.**

**Table 2. The total number of elk sampled for exposure to brucellosis (including hunter samples), the number of seropositive elk, estimated seroprevalence, and the number of GPS collars deployed in HD 393 in the Bangtail Mountains in 2019. The numbers in parentheses represent the lower and upper bounds of the 95% confidence interval on the seroprevalence estimate.**

<b>Population</b>	<b>Total Elk</b>	<b>Seropositive</b>	<b>Seroprevalence</b>	<b>GPS Collars</b>
HD393	56	0	0 (0.00, 0.06)	15

## EPIDEMIOLOGY STUDY: SEROPOSITIVE ELK REMOVAL AND NECROPSY

A goal of the Targeted Elk Brucellosis Surveillance Project is to understand the epidemiology of the disease post-infection, and to evaluate the risk of seropositive elk shedding and potentially transmitting *Brucella abortus*. To accomplish that goal seropositive elk captured and collared during the first 5-years were recaptured and sampled annually for five years to monitor their brucellosis serological status (i.e., seropositive, seronegative), reproductive status (e.g., pregnancy, abortion, live birth), and to evaluate their ability to shed *Brucella abortus* on the landscape (i.e., culture test tissues for *Brucella abortus*). Following 5 years of monitoring, elk are removed from the population, necropsied, and tissues are sampled to determine if they are actively infected with brucellosis. Active infection is determined by culturing (i.e., growing) *Brucella abortus* bacteria from tissue samples, as opposed to serological testing which only detects antibodies to the bacteria in the blood. In addition, we will be submitting tissue samples for a new Polymerase Chain Reaction (PCR) test developed at the University of Wyoming that will evaluate if samples contain *Brucella abortus* based on DNA. The PCR test detects bacterial DNA and does not require the bacteria to be alive.

Seven seropositive elk captured in previous years of this project were recaptured on January 19<sup>th</sup> and 20<sup>th</sup> for removal and necropsy (Figures 4 & 5). In the Northern Madison area, we recaptured the remaining 2 seropositive elk (Figure 4, Table 3) originally captured in 2014. In the Mill Creek area, we recaptured the remaining 5 seropositive elk (Figure 5, Table 3) originally captured in 2015. The Mill Creek elk were removed after only 4 years of monitoring due to logistical constraints and increasing capture difficulty. Samples have been submitted for testing, and results will be available in the October 2019 annual report. This concludes the seropositive elk monitoring and VIT tracking portion of the project.

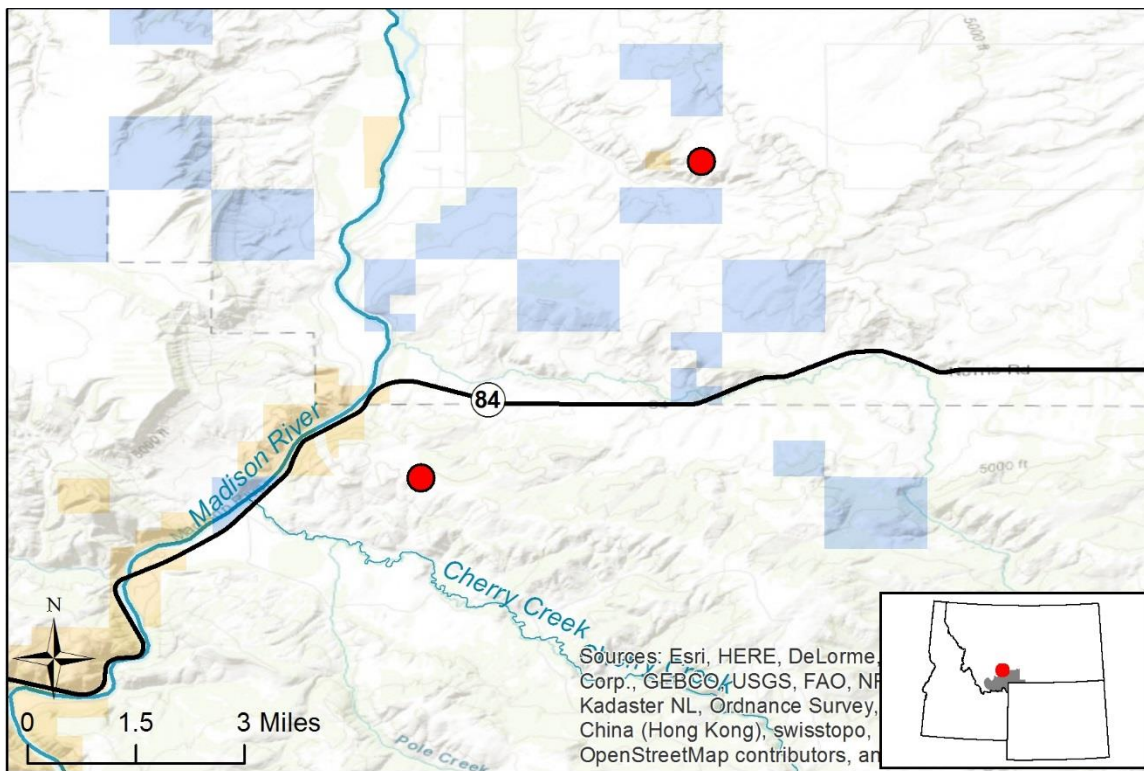
**Table 3. Annual serology status for seropositive elk removed and necropsied in 2019 to test for *Brucella abortus* (--- indicates elk was not captured that year).**

Elk ID	Population	2014	2015	2016	2017	2018	2019
31113001	N. Madison	Pos	Pos	Pos	Pos	<b>Neg</b>	Pos
31113027	N. Madison	Pos	Pos	Pos	Pos	Pos	Pos
EC14006	Mill Ck	---	Pos	Pos	---	Pos	Pos
EC14014	Mill Ck	---	Pos	Pos	Pos	Pos	Pos
EC14018	Mill Ck	---	Pos	Pos	Pos	Pos	Pos
EC14020	Mill Ck	---	Pos	Pos	Pos	Pos	Pos
EC14025	Mill Ck	---	Pos	Pos	Pos	Pos	Pos

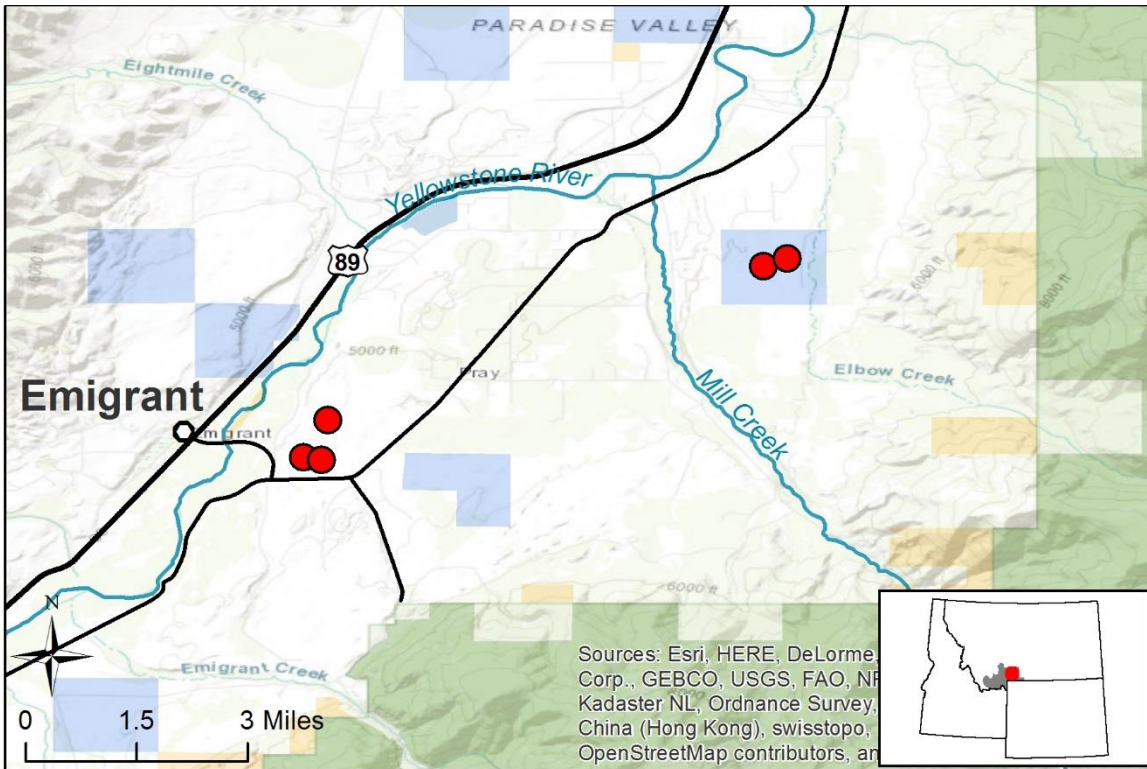
**Table 4. Annual pregnancy fate for seropositive elk removed and necropsied in 2019 to test for *Brucella abortus*. Detections of *Brucella abortus* at abortion and live birth sites are noted, and otherwise *Brucella abortus* was not detected at the birth event. (--- indicates elk was not captured that year)**

Elk ID	Population	2014	2015	2016	2017	2018	2019
31113001	N. Madison	Open	Live Birth	Live Birth	Open	Live Birth	Open
31113027	N. Madison	Abortion (detected)	Open	Open	Preg – VIT failure	Open	Preg
EC14006	Mill Ck	---	Live Birth	Live Birth	---	Preg – VIT failure	Preg
EC14014	Mill Ck	---	Live Birth	Live Birth	Preg – VIT failure	Live Birth	Preg
EC14018	Mill Ck	---	Open	Live Birth	Live Birth (detected)	Abortion (unknown*)	Preg
EC14020	Mill Ck	---	Live Birth	Live Birth	Live Birth	Live Birth	Open
EC14025	Mill Ck	---	Live Birth	Open	Open	Preg – VIT failure	Preg

\*Limited samples at abortion site, fetus mostly consumed.



**Figure 4. Capture locations of 2 seropositive elk removed from the Northern Madison population west of Bozeman, MT.**



**Figure 5. Capture locations of 5 seropositive elk removed from the Mill Creek population south of Livingston, MT.**

A sincere thank you to all FWP personnel, the Quicksilver helicopter capture crew, and landowners within the study areas. Funding was provided by Montana Fish, Wildlife and Parks, Montana Department of Livestock, and the Rocky Mountain Elk Foundation. This project would not be possible without your efforts and support. For additional information, please contact Jenny Jones 406-868-2637, [jennyjones@mt.gov](mailto:jennyjones@mt.gov).

