

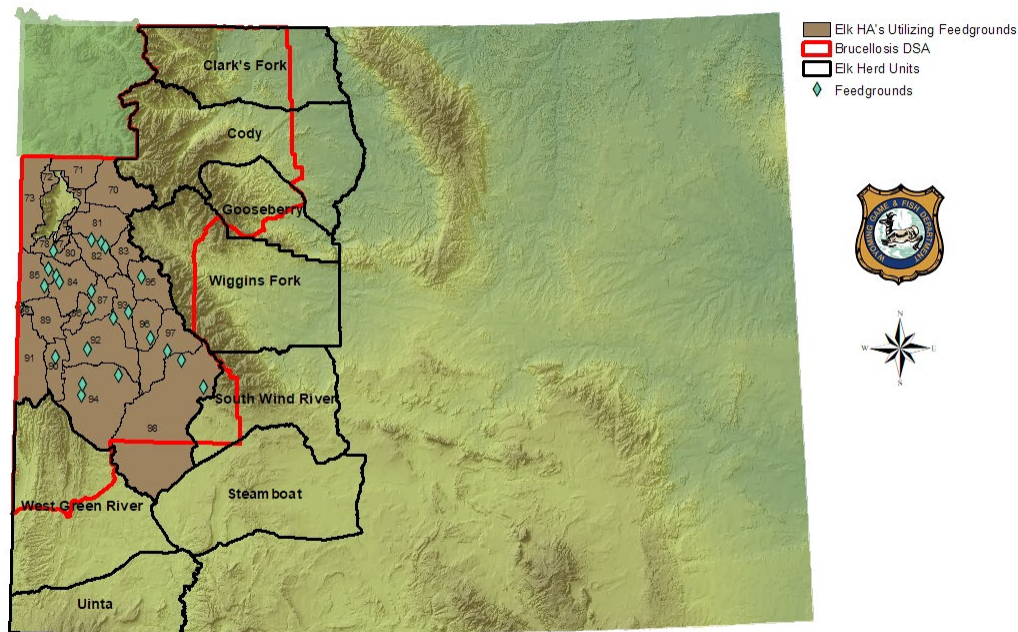


Wyoming Game and Fish Department 2022 Brucellosis Surveillance in Non-Feedground Elk Herds March 2023

Overview:

Each year the Wyoming Game and Fish Department (WGFD) monitors the distribution and prevalence of brucellosis within the state's elk populations by utilizing blood samples collected by hunters from their harvested animal. Between 8,000 and 9,000 blood collection kits are mailed to elk hunters successful in acquiring limited quota licenses within target surveillance areas. Annual surveillance is generally concentrated in herds that surround the Brucellosis Designated Surveillance Area (DSA) and that do not use state or federal feedgrounds (Figure 1). Additionally, a quarter of the all hunt areas (HAs) located outside of the DSA are surveyed each year, providing coverage of the entire brucellosis non-endemic area every 4-5 years.

Elk Feedgrounds and Surrounding Herd Units



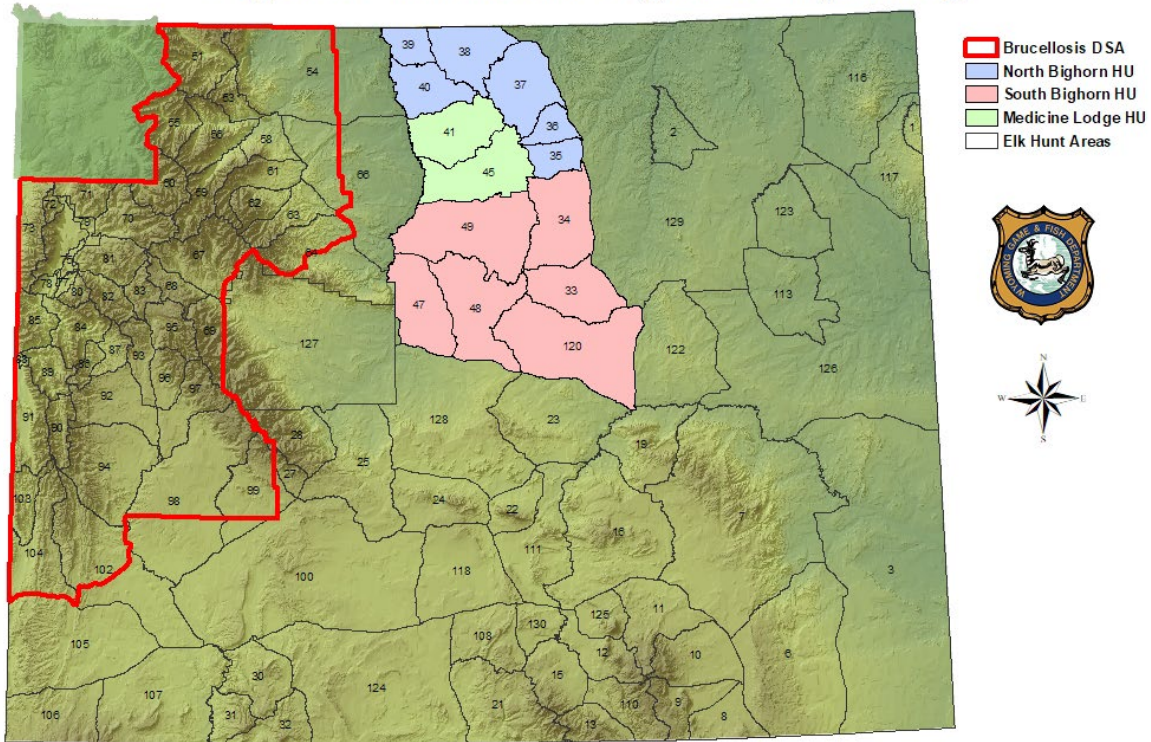
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Figure 1. Locations of Wyoming feedgrounds, surrounding non-feedground elk herd units, and the Designated Surveillance Area (DSA)

The brucellosis surveillance program in non-feedground elk began in 1991, and approximately 21,500 blood samples have been analyzed for brucellosis since its inception. Brucellosis prevalence south of the Greater Yellowstone Area (GYA) in elk herd units (HUs) in the southern DSA, varies yearly between 0-6% (i.e. South Wind River and West Green River), and 8-22% in HUs east of the GYA (i.e. Clark’s Fork, Gooseberry, Cody, and Wiggin’s Fork).

The western slope of the Bighorn Mountains first had detections of this disease in 2012, from a hunter-harvested elk in hunt area 40. Surveillance from 2012 to 2016 yielded a total of 11 seropositive elk detected in four of the fourteen hunt areas covering the Bighorn Mountains region (Figure 2, Figure 3). There were no detections of *B. abortus* specific antibodies from 2017 to 2021 in this region. Due to the lack of effective control measures to mitigate the spread of this disease, the documentation of seropositive elk outside of the GYA is concerning to both livestock and wildlife managers.

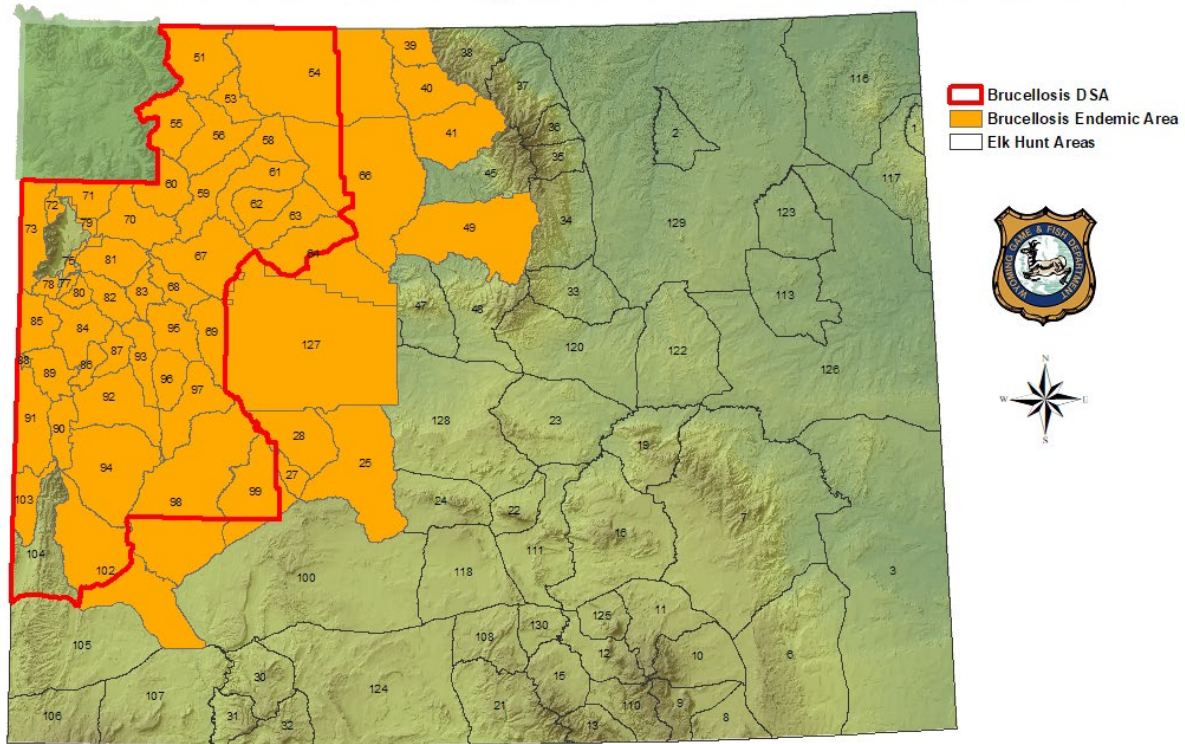
Bighorn Mountains Region in Wyoming



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Figure 2. Herd Units (HU) within the Bighorn Mountains region of Wyoming

Hunt Areas Where Seropositive Elk Have Been Identified



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Figure 3. Hunt Areas with known seropositive elk and Brucellosis DSA.

Methods:

Blood collection kits were mailed or directly handed out to elk hunters in targeted hunt areas. Kits consisted of a 15ml sterile polypropylene conical tube, a paper towel, an instruction/data sheet, and a prepaid mailing label for return shipping. Samples were also obtained opportunistically in association with various research efforts where animals were captured and sampled for disease testing.

All useable samples were analyzed at the WGF D Wildlife Health Laboratory (WHL). Serologic assays for exposure to *Brucella abortus* were conducted and interpreted using current assay kit protocols for FPA plate tests and National Veterinary Services Laboratories (NVSL) protocols for fluorescence polarization assay (FPA) tube tests. The FPA plate test was used to screen all samples, and all positive or suspect reactions on the plate assay were confirmed with the FPA tube test. Any samples outside of the endemic region (Figure 3) testing positive were sent to NVSL for confirmation. Serologic data (seroprevalence levels) on elk within the known endemic area are based on yearling and adult females, but males and juveniles are included in surveillance data outside of the known endemic area. Including serologic data from males and juveniles offers improved detection of brucellosis in areas where this disease is not known to occur.

As serologic tests have improved and become less subjective, most hemolyzed serum samples are now suitable for testing and can contribute to increased sample size in those areas outside the known endemic area (Jennings-Gaines et al., 2021). Hemolyzed serum samples received from within the DSA are discarded.

2022 Surveillance:

In 2022, 8,500 test kits were mailed to or directly handed out to hunters with licenses within targeted surveillance areas. Surveillance included the Bighorn Mountains region, the eastern border of the DSA, and down to the southwestern corner of the state (Figure 4).

**2022 Wyoming Brucellosis Surveillance
In Non-Feedground Elk**

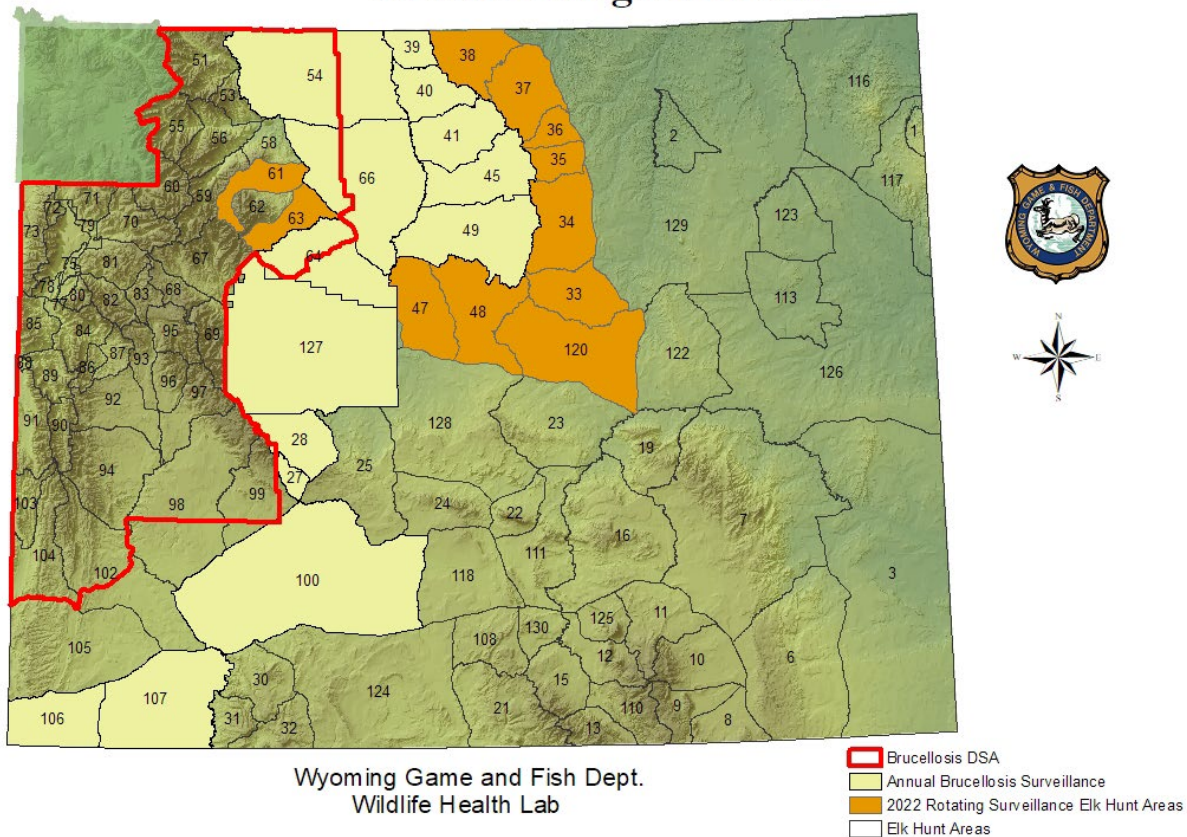


Figure 4. Elk Hunt Areas surveyed in 2022 for brucellosis in hunter-killed elk.

The number of HAs surveyed and the number of blood collection kits mailed to hunters was based on the priorities of the WGFD and the Wyoming Livestock Board, while balancing the capacity of the WHL. The 2022 surveillance effort was supported by the Department, and by a cooperative agreement with the Animal and Plant Health Inspection Service.

Results and Discussion:

In 2022, 1,003 elk blood samples were received by the WHL. Of those, 972 were suitable for testing. These sample numbers are slightly lower than the average returns seen in previous years, with an average return rate of 1,353 from 2018-2020.

From the 972 blood samples tested for *B. abortus* specific antibodies, 46 were classified as positive. Of those positives, all but 2 samples were within the DSA. One positive detection outside the DSA was in hunt area 45, on the western slope of the Bighorn Mountains and the other in hunt area 28 on the southern tip of the Wind River Range.

Northern DSA Surveillance:

Brucellosis surveillance in the combined northern HUs (Clark’s Fork, Cody, Gooseberry, and Wiggins Fork) of the DSA (see Figure 1) reported a slight increase in seroprevalence over the past five years (15.9%, n=900) compared to the 2017-2021 five-year average of 15.3% (n=927).

The five-year average seroprevalence varied between the four northern HUs (Figure 5). It is important to note that sample sizes are generally low and affect the accuracy of prevalence estimates for the individual HUs. Therefore, prevalence figures are combined into five-year totals to improve sample size and allow for statistical analysis

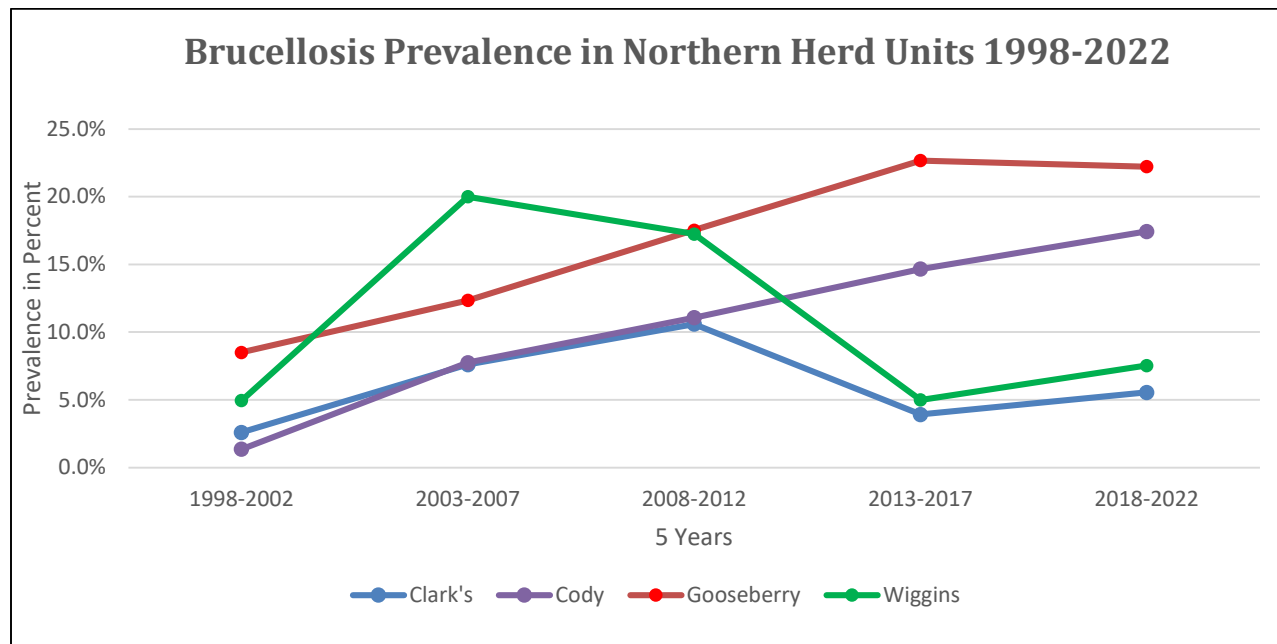


Figure 5. Seroprevalance over time in cow elk from the Northern HUs.

Many of the subpopulations in the northern HUs have been examined to determine if the increase in seroprevalence can be attributed to increasing elk density. Research found that the rates of increase were positively related to both large and small groups at high density, as well as larger groups at low densities (Brennan et al., 2014). These authors note that disease management strategies aimed at reducing population density or group sizes are unlikely to reduce transmission of the disease. Continued monitoring of all HUs along the southeastern slope of the Absaroka

Range is warranted, as well as exploration of management actions that affect the prevalence of brucellosis in these populations.

Southern DSA Surveillance:

In 2018, enhanced surveillance efforts were initiated in southern HUs bordering the DSA. A combined 25 samples were tested from the South Wind River and the West Green River herd units in 2022 with one seropositive elk identified. This increased the 5-year seroprevalence in the southern HUs to 0.8% (n=262) from 0.4% in the previous 5 years (2017-2021).

Rotating Statewide Surveillance:

From the statewide rotating surveillance program target areas in 2022 (33, 34, 35, 36, 37, 38, 39, 40, 41, 45, 47, 48, 49, 61, 63 and 120), 563 useable samples were collected. Twentyone samples tested positive for exposure to *Brucella abortus* on serological tests with only one of those being outside the DSA border. In the past 10 years, 5,485 samples from non-endemic areas statewide have been tested with only 5 positive detections in that time. It is important to continue this rotating surveillance in non-endemic areas to catch detections early as this disease is difficult to manage in free ranging populations and can have significant economic impacts statewide.

Bighorn Mountains Brucellosis Surveillance Summary

Since 2012, 5,079 samples have been tested in the north bighorn, south bighorn and medicine lodge herd units. In that time 12 samples have been seropositive for *Brucella abortus* with the most detections in a single year being in 2016 (n = 4). Approximately half of the total sampling kits distributed each year focus in the northern bighorn, southern bighorn and medicine lodge herd units (61%, 62%, 62%, 46%, 2017-2020 respectively). In 2021, it was decided to decrease that amount (31%) and only focus on the western slope due to the lack of seropositive detections since 2016. The focus of rotating statewide surveillance was again in the Bighorn Mountains in 2022, and the proportion of kits distributed was increased to 62% of the total.

One seropositive elk was detected in 2022 in HA 45. This is the first positive detection in the Bighorn Mountains since 2016 and the first detection within this specific hunt area. Sampling efforts will continue to be a priority on the western slope of the Bighorn Mountains in the 2023 surveillance effort and the increase in kits distributed to this area is likely to remain in place for the next few years.

2023 Surveillance:

In 2023, the rotating surveillance area will focus on the southwestern portion of the state. This encompasses elk hunt areas 21, 22, 23, 24, 25, 30, 31, 32, 102, 103, 104, 108, 118 and 124. Efforts to survey around the eastern border of the DSA will continue as well as the western slope of the Bighorn Mountains (Figure 6).

2023 Wyoming Brucellosis Surveillance IN Non-Feedground Elk

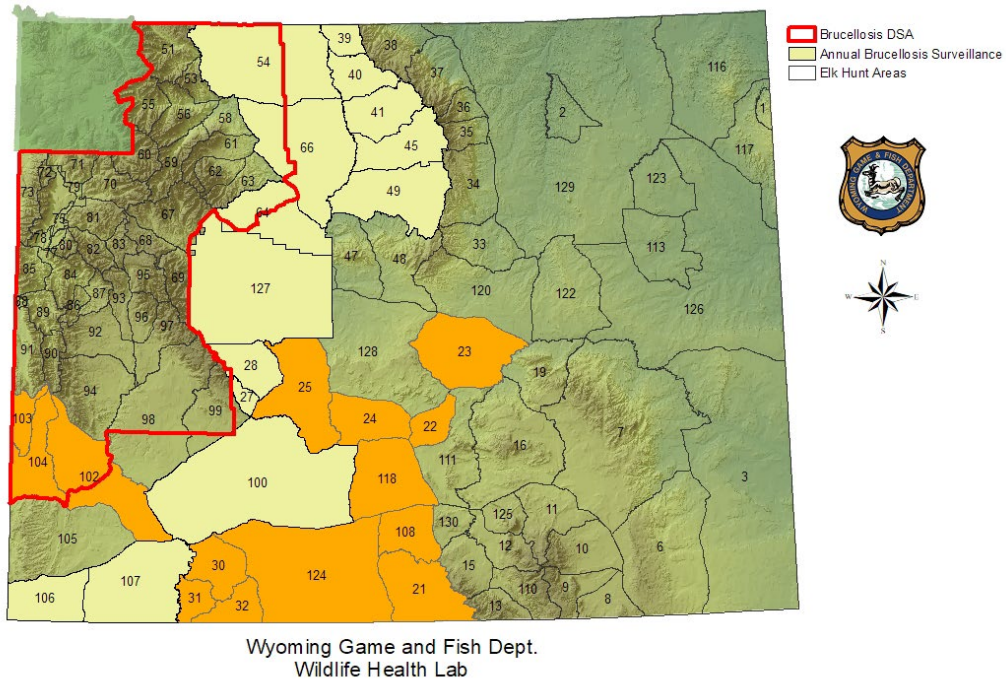


Figure 6. Proposed elk hunt areas to target for brucellosis surveillance in 2023

Wyoming Non-Feedground Elk Brucellosis Surveillance

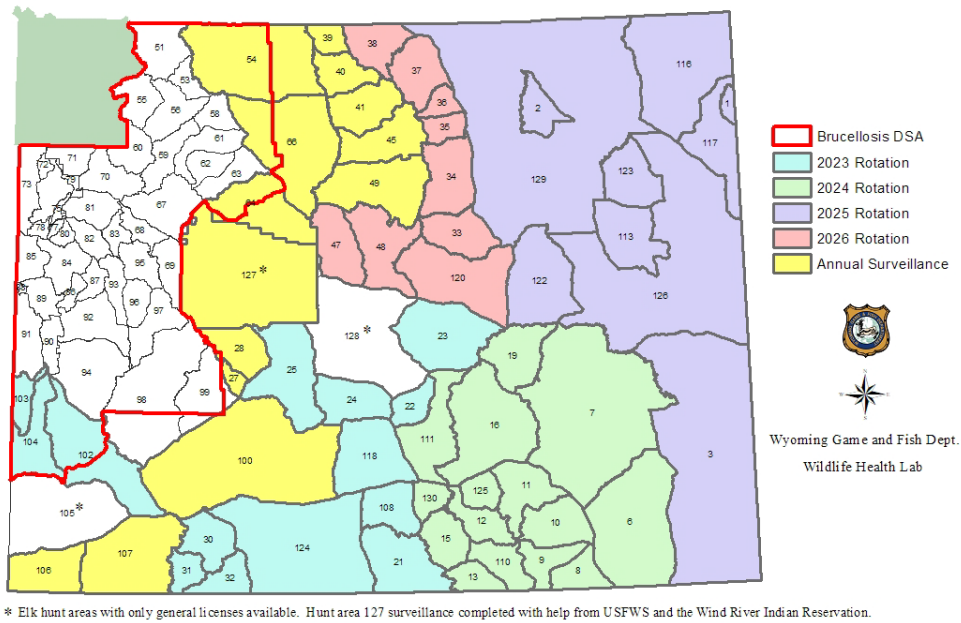


Figure 7. Proposed 4-year rotation schedule of elk hunt areas to target for brucellosis surveillance.

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