Wyoming Game and Fish Department
2018/2019 Chronic Wasting Disease Surveillance Report
May 2020

Overview:

2018 CWD Surveillance.
Chronic wasting disease (CWD) is a fatal disease of the central nervous system of cervids caused by abnormal proteins called prions. This disease was first identified in free-ranging populations in the southeastern corner of Wyoming in 1985 and has since slowly spread north and west; now covering most of the state (Fig. 1). The Wyoming Game and Fish Department (WGFD) recently increased surveillance efforts to better understand statewide distribution and prevalence of this disease after research in Wyoming and Colorado found that CWD may lead to declines in some deer and elk populations. To monitor prevalence of the disease within the endemic area, the 2018 surveillance focused on collecting at least 100 hunter harvested adult mule deer bucks from each of the following herd units: Sheep Mountain, Laramie Mountain, Goshen Rim, Platte Valley, Baggs, Bates Hole, South Converse, Cheyenne River, Black Hills, Upper Powder River, and Southwest Bighorns. In addition, teeth were collected whenever possible to evaluate age structure, and age specific CWD prevalence of the herd units. Samples from other areas of the state were collected opportunistically.

2019 CWD Surveillance
In consideration of the wide distribution of CWD across Wyoming, the CWD program shifted from a detection based program, to a monitoring based program. Continued monitoring of this disease over time is necessary to understand the potential population impacts as well as evaluate future management actions. Unfortunately, many hunt areas in the state have insufficient samples to accurately estimate CWD prevalence, and there are a few areas in Wyoming where CWD prevalence is unknown. To achieve adequate sample sizes for monitoring endemic areas, CWD sample collection is focused in only two to three herd units within each WGFD region each year, allowing for coverage of the entire state every four to five years. This approach focuses on adequate sample sizes to monitor the disease without exceeding the WGFD's Wildlife Health Laboratory (WHL) capacity. Monitoring efforts are concentrated on hunter-harvested adult male deer or adult elk (both sexes), with a sample size target of 200 (in 1-3 years) in most deer and elk herd units. In areas where CWD has not been detected in deer, active surveillance will continue and will utilize a weighted method for samples collected from multiple surveillance types. A weighted system accounts for the "surveillance value" of a sample and assigns a point value accordingly (e.g. samples from adults are worth more points than a juvenile, and a road-killed animal is worth more than hunter harvested). A total point-goal is then used to monitor a hunt area rather than a set sample size of hunter harvested animals.

The CWD testing capacity of the WHL was increased from 8,000 to 15,000 samples per year by splitting the WHL into two sections. A processing section, housed at the Laramie Regional Office (during hunting season only), focuses on sample processing, data entry, and mapping. Analysis continues in the main laboratory housed within the Wyoming State Veterinary Laboratory complex. Two temporary technicians were hired this season for the processing section.

Hunter harvested deer, elk, and moose samples were collected at points of concentration (i.e., meat processors, check stations, and regional offices). Samples were also collected from road-killed and targeted (those showing signs of the disease) animals, and from any deer or elk taken with a WGFD issued lethal take permit. Predominantly retropharyngeal lymph nodes were sampled due to their ease of extraction and suitability as a diagnostic tissue. The WGFD used an enzyme-linked immunosorbent assay (ELISA) as the primary diagnostic assay, but also utilized immunohistochemistry (through the Wyoming State Veterinary Laboratory/Colorado State University) when necessary. Data was entered into the CWD database either through the WGFD's Checkstation application, and/or the new web-based program built by the WGFD's IT section (2019). Results were reported to hunters in less than three weeks of sample submission, and hunters could obtain results by accessing the WGFD's website. Hunters having deer or elk test positive for CWD were individually notified by a letter (or email - 2019) within 48 hours of confirmatory test results.

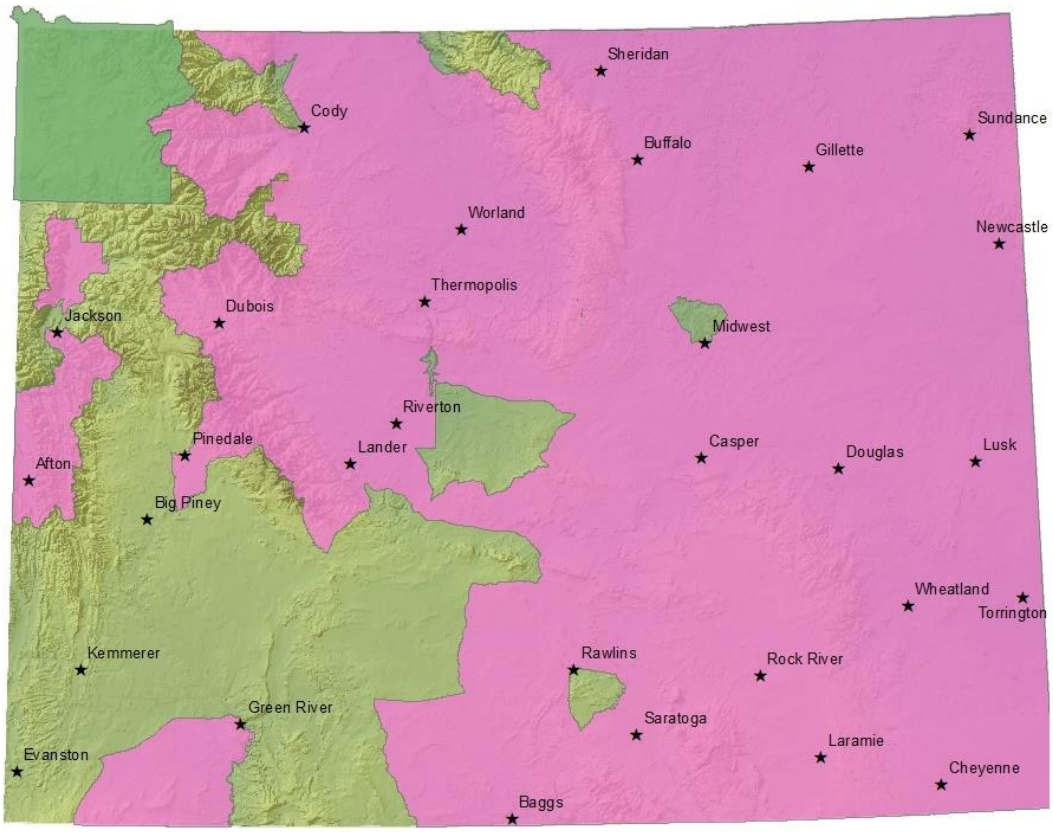

Fig. 1. Statewide CWD distribution as of 05/01/2020

2018 Results and Discussion:

A total of 5,694 deer, elk, and moose samples were analyzed by the WHL. From the total samples received, 3,688 were from hunter-killed adult male mule deer, adult male white-tailed deer, adult elk, and adult moose. Of these, 370 tested positive for CWD representing 263 mule deer, 67 white-tailed deer, and 40 elk (Table 1). All moose tested for CWD were negative. The 2018 surveillance effort identified four new CWD positive deer hunt areas (HA): HA 5 in the northeastern corner of the state, HA 32 and 169 near Kaycee, 161 northeast of Rawlins, and Grand Teton National Park (GTNP) (Fig. 2). Chronic wasting disease was also documented for the first time in three elk HAs: 37 west of Sheridan, HA 66 in the Bighorn Basin, and HA 9 west of Laramie (Fig. 3).

Table 1. Distribution of hunter-killed samples and proportion of positives according to species

Adult Male Mule Deer		Adult Male White-Tailed Deer		Adult Elk		Adult Moose		Total	
Total	CWD Pos	Total	CWD Pos	Total	CWD Pos	Total	CWD Pos	Total	CWD Pos
1879	263	409	67	1364	40	37	0	3,688	370

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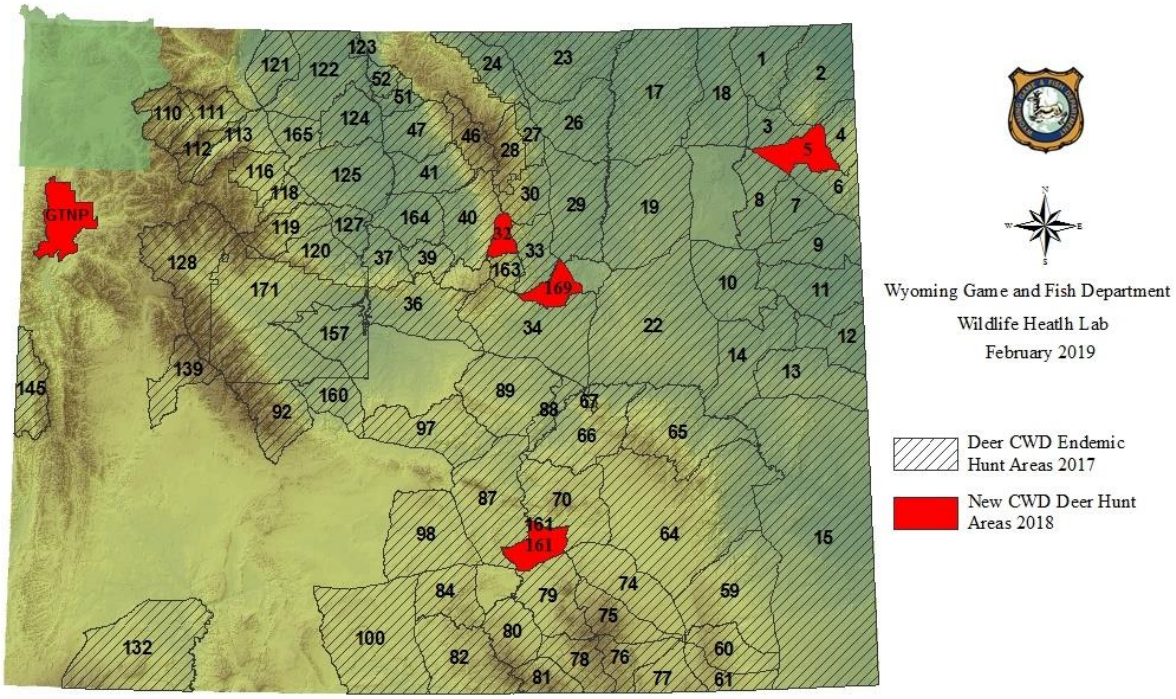

Fig. 2. 2018 New and Endemic CWD Deer Hunt Areas

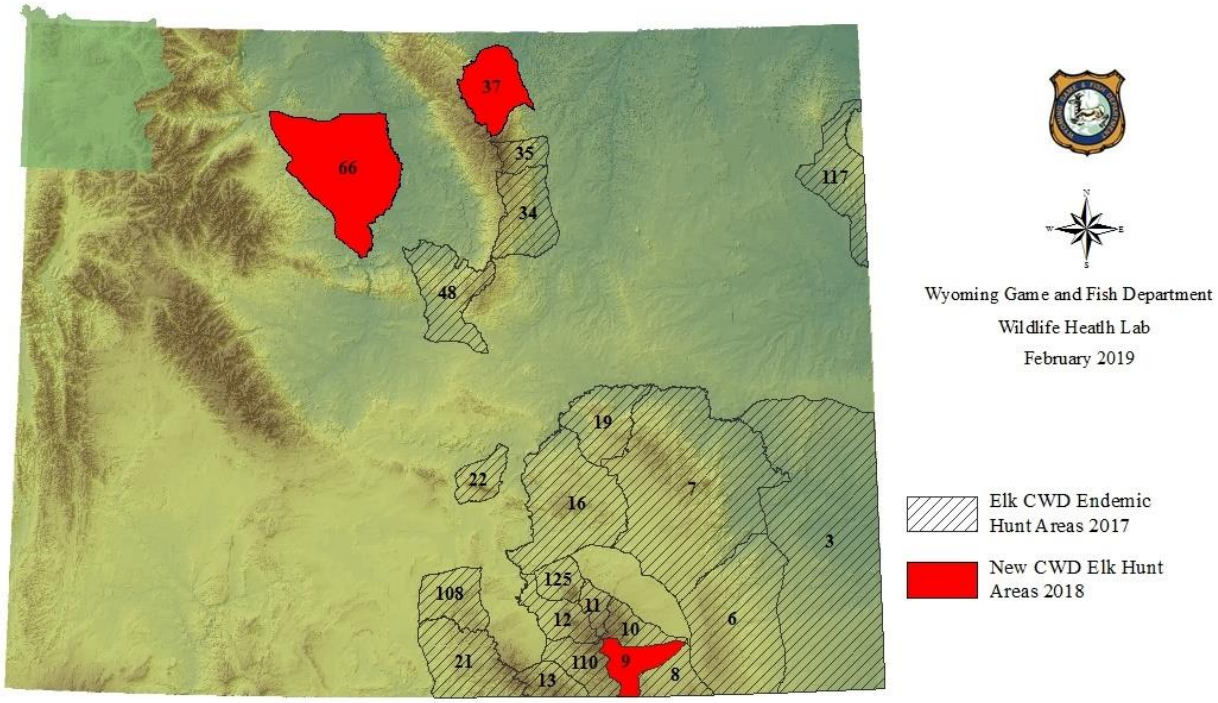

Fig. 3. 2018 New and Endemic CWD Elk Hunt Areas

Of the total samples received, 89.4% were derived from hunter-killed animals, 5.4% from road-killed, and 5.2% from targeted deer, elk, and moose. Surveillance totals from road-killed and targeted animals collected from CWD non-endemic hunt areas are reported in Table 2.

Table 2. Non-Hunter harvested chronic wasting disease surveillance in non-endemic areas by species, age, and sex

	Road Killed		Targeted		Total	
	Total	**CWD Pos**	**Total**	**CWD Pos**	**Total**	**CWD Pos**
Adult Male Mule Deer	31	1	4	0	35	1
Yearling Male Mule Deer	16	0	1	0	17	0
Adult Female Mule Deer	50	0	10	0	60	0
Adult Male White-tailed Deer	0	0	0	0	0	0
Adult Female White-tailed Deer	0	0	0	0	0	0
Adult Elk	17	0	61	0	78	0
Adult Moose	13	0	7	0	20	0
Total	127	1	83	0	210	1

Target Deer Herd Units for 2018. Six of the eleven targeted herd units reached the goal of 100 adult mule deer buck samples including: Black Hills, Laramie Mountains, Platte Valley, Baggs, Upper Powder River, and Southwest Bighorns (Figure 4). The Cheyenne River, Bates Hole, Goshen Rim, Sheep Mountain, and South Converse herd units were unable to attain 100 samples (Table 3).

*Table 3. Hunter harvested adult mule deer buck CWD samples tested, CWD samples positive, and CWD prevalence in priority mule deer herd units. * Upper Powder River*

	Baggs	Bates Hole	Black Hills	Cheyenne River	Goshen Rim	Laramie Mtns	Platte Valley	Sheep Mtn	SW Bighorn	South Converse	UPR*
Tested	263	63	130	96	80	169	112	42	113	51	119
Positive	22	18	9	9	35	44	10	0	24	20	18
Prevalence	8.4%	28.6%	6.9%	9.4%	43.8%	26.0%	8.9%	0%	21.2%	39.2%	15.1%

Trends in chronic wasting disease prevalence varied greatly between these herd units when compared to the average prevalence from 2014-17 (Fig. 5). The Bates Hole, South Converse, and Baggs units were similar to 2014-2017, or had a slight increase in prevalence (<2 percentage points over average). The Laramie Mountains, Platte Valley, and Upper Powder River saw a more moderate increase of between 3-5 points. Large increases in prevalence (>5 points) were observed in Goshen Rim, Black Hills, and the Southwest Bighorns, but sample sizes were limited in 2014-17 surveillance making meaningful comparisons difficult. Limited sample sizes over the past five years also hampered evaluation of the Cheyenne River and Sheep Mountain herd units, where prevalence decreased from the previous four-year average. It is important to note that hunter harvest of mule deer is primarily male and therefore prevalence estimates mainly reflect male prevalence. Chronic wasting disease prevalence in female mule deer within each herd unit is largely unknown across Wyoming but has been shown to be lower than that of males in the State's road-killed surveillance data as well as in other states where CWD is endemic.

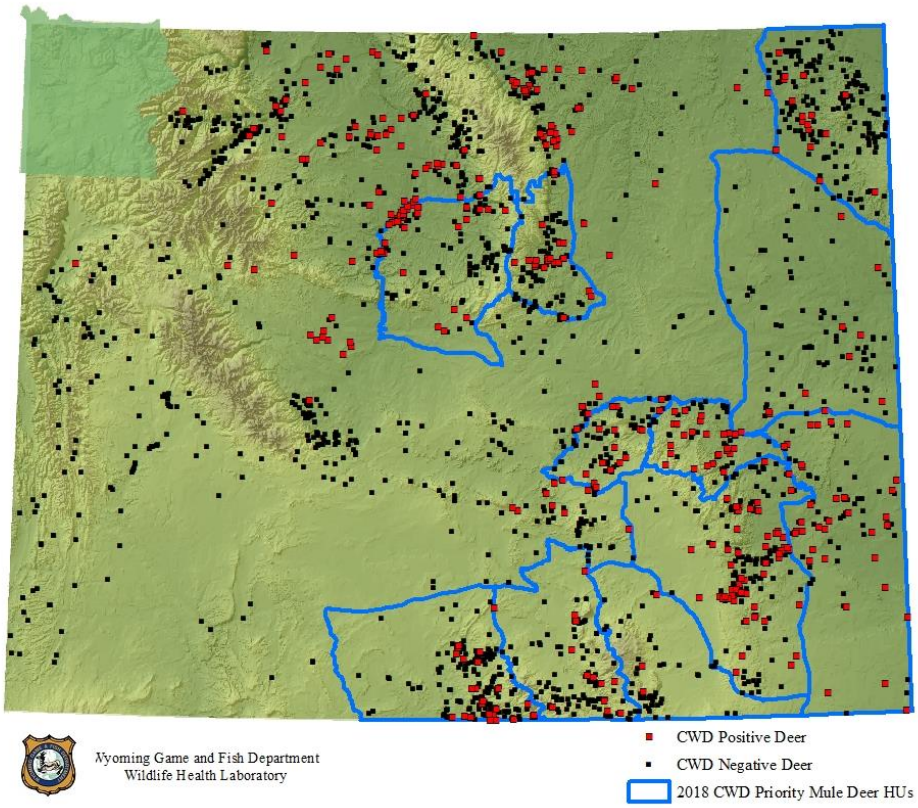

Fig. 4. 2018 Wyoming CWD sampling of mule deer and white-tailed deer in priority mule deer herd units (HU).

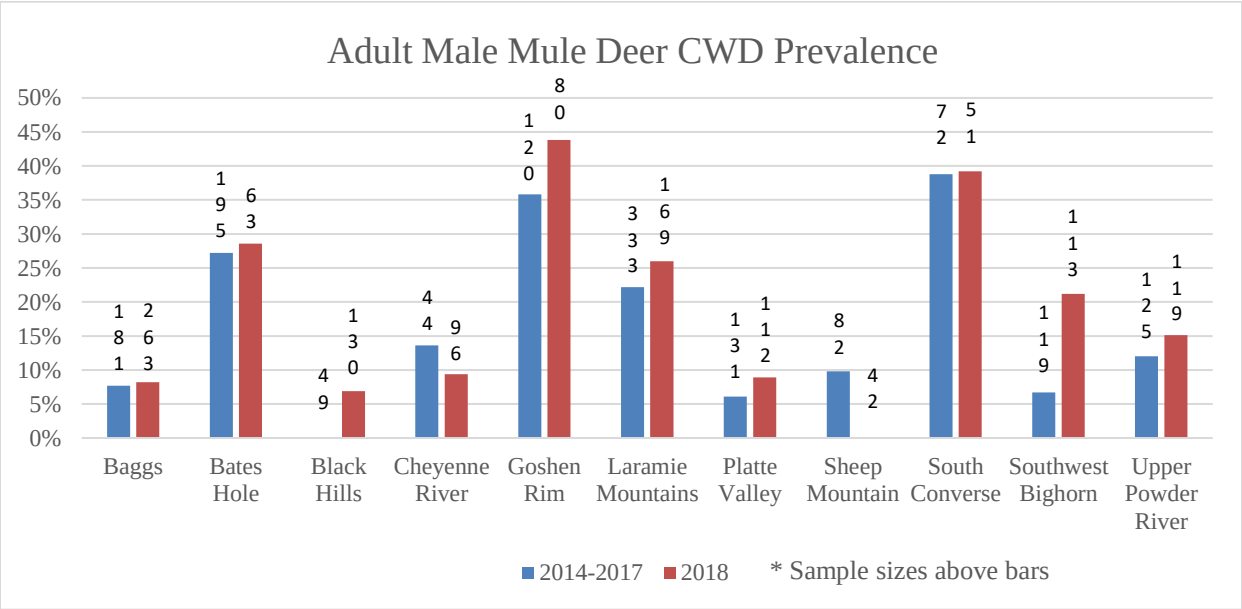

Fig 5. CWD prevalence in hunter harvested adult male mule deer; average of 2014-2017 vs. 2018.

Non-Target Deer Herd Units 2018.
In non-target deer areas with a sample size of ≥ 40 (80% CI); mule deer prevalence of CWD increased in the Paintrock herd, from 8.2% to 16.2%, and the Upper Shoshone from 1.4% to 3.7%. Prevalence of CWD decreased in the North Bighorn herd from 9.0% to 7.8% and stayed constant in the South Wind River herd.

Historic Endemic Area Elk. Trends in CWD prevalence in elk herds within the historic endemic area were also examined. Prevalence decreased in the Laramie Peak/Muddy Mountain elk herd, from 10.9% in 2014-2017 (n=396), to 5.5% in 2018 (n=211). The Iron Mountain elk herd increased in prevalence in 2018 to 16.7% (n=92), over the 2014-17 (n=396) prevalence of 10.9%.

CWD in Northwestern Wyoming. The identification of a CWD positive mule deer buck in GTNP greatly extended the northwest distribution of this disease. Most importantly, the location within a national park, the proximity to Yellowstone National Park, and the elk feedgrounds in northwestern Wyoming is concerning. To further determine the distribution of this disease, surveillance efforts were expanded in GTNP and the neighboring National Elk Refuge, with no further positives identified. Enhanced surveillance will continue in GTNP and the surrounding area. The detection in GTNP highlights the value of road-killed surveillance in detecting this disease in new areas.

2019 Results and Discussion:
A total of 5,067 deer, elk, and moose samples were analyzed by the WH Lin 2019. From the total samples received, 3,018 were from hunter-killed adult male mule deer, adult male white-tailed deer, adult elk, and adult moose. Of these, 354 tested positive for CWD representing 213 mule deer, 124 white-tailed deer, and 17 elk (Table 4).

Table 4. Distribution of hunter-killed samples and proportion of positives according to species.

Adult Male Mule Deer		Adult Male White - Tailed Deer		Adult Elk		Adult Moose		Total	
Total	CWD Pos	Total	CWD Pos	Total	CWD Pos	Total	CWD Pos	Total	CWD Pos
1404	213	546	124	1027	17	41	0	3,018	354

All moose tested negative for CWD. This year's surveillance effort identified three new CWD positive deer hunt areas: HA 50 on the western slope of the Bighorn Mountains, HA 105, near Clark, and HA 152, along the Hoback (Fig. 6).

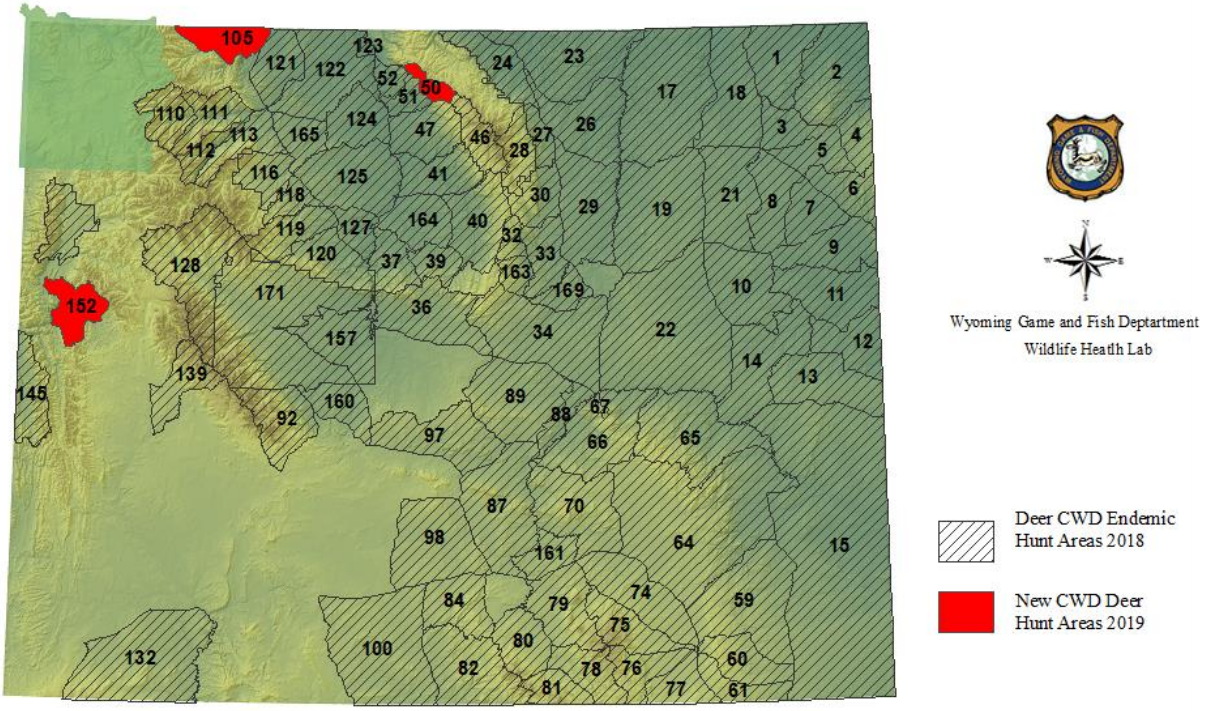

Fig. 6. 2019 new and endemic CWD deer hunt areas

Of the total samples received, 87.7% were derived from hunter-killed animals, 5.5% from road-killed, and 6.7% from targeted deer, elk, and moose. Surveillance totals from road-killed and targeted animals collected from CWD non-endemic hunt areas are reported in Table 5.

Table 5. Non-hunter harvested chronic wasting disease surveillance in non-endemic areas by species, age, and sex

	Road Killed		Targeted		Total	
	Total	CWD Pos	Total	CWD Pos	Total	CWD Pos
Adult Male Mule Deer	21	0	2	0	23	0
Yearling Male Mule Deer	5	0	2	0	7	0
Adult Female Mule Deer	36	0	5	0	41	0
Adult Male White-tailed Deer	2	0	0	0	2	0
Adult Female White-tailed Deer	2	0	0	0	2	0
Adult Elk	30	0	61	0	91	0
Adult Moose	6	0	16	0	22	0
Total	102	0	86	0	188	0

Target Deer Herd Units for 2019.

Only one (Powder River) of the nine targeted herd units reached the goal of 200 adult mule deer buck samples in the first year. Shoshone River just exceeded a hundred samples (Table 6, Fig. 7).

Table 6. Hunter harvested adult mule deer buck CWD samples tested, CWD samples positive, and CWD prevalence in targeted deer herd units

	Clark's Fork	North Natrona	Powder River	Project	Rattlesnake	Sheep Mountain	Shoshone River	Uinta
Tested	36	58	297	77	33	67	106	70
Positive	4	3	33	44	4	9	27	0
Prevalence	11.1%	5.2%	11.1%	57.1%	12.1%	13.4%	25.5%	0%

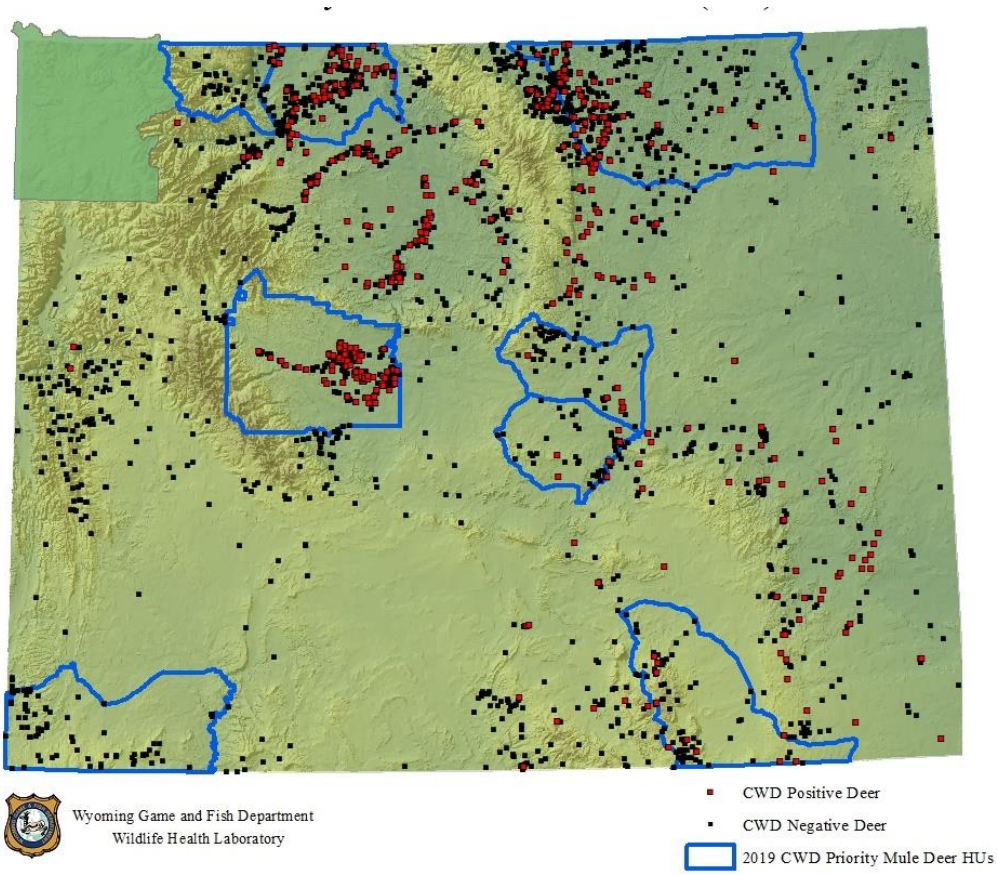

Fig. 7. 2019 Wyoming CWD sampling of mule deer and white-tailed deer in targeted mule deer herd units (HU).

There was some variation in CWD prevalence in these herd units when compared to the average prevalence from 2015-18 (Figure 8). Chronic wasting disease remained undetected in the Uinta herd unit. The Rattlesnake, Powder River, and Shoshone River herd units had small increases in prevalence, whereas large increases in prevalence (≥ 9 percentage points) were observed in Clark's Fork, Project, and Sheep Mountain. Within the Project herd unit, prevalence increased to 57.1% which is likely attributed to the low sample size over the previous four years. The Clark's Fork herd unit saw its first CWD positives this year, and North Natrona saw a reduction in prevalence to 5.2%. Statewide 5-year CWD prevalence per deer herd unit is shown in Figure 9.

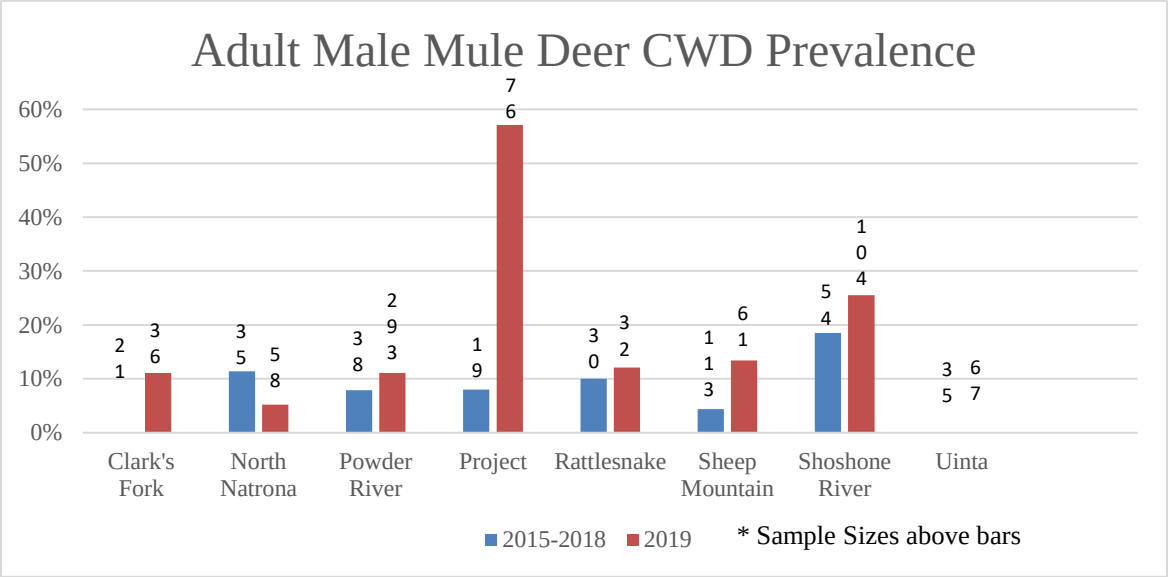

Fig. 8. CWD prevalence in hunter harvested adult male mule deer; average of 2015-2018 vs. 2019

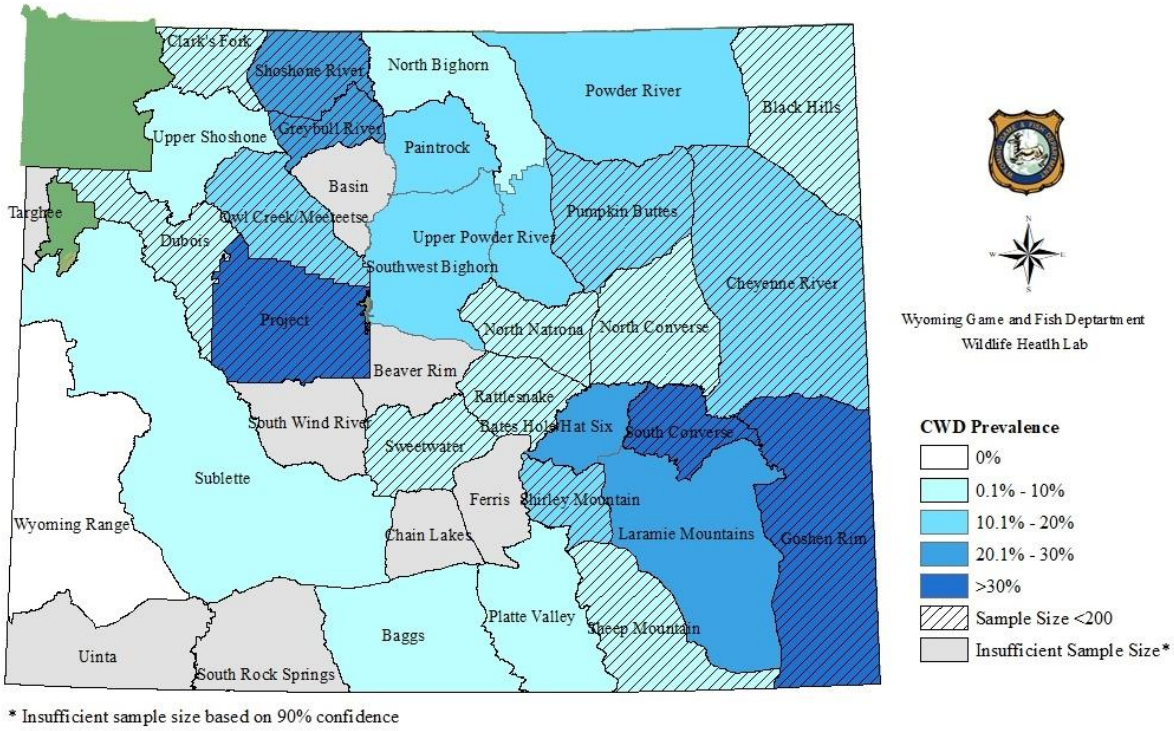

Fig 9. Chronic wasting disease prevalence in hunter harvested adult buck mule deer by herd unit 2015-2019

Non-Target Deer Herd Units 2019.
Chronic wasting disease was documented for the first time in the Sublette herd unit, which resulted in an initial CWD prevalence of 2.8%. In areas with a sample size of ≥ 40 (80% CI), prevalence in the Laramie Mountains herd increased from 23.5% (avg. 2015-2018) to 28.6% in 2019, prevalence in the Upper Shoshone remained constant, Pumpkin Buttes prevalence dropped from 8.8% to 4.8%.

CWD in Western Wyoming. The identification of two, hunter harvested, CWD positive mule deer bucks in deer HA 152 this year extended CWD's distribution in western Wyoming. Other positives in the general geographic area include GTNP, where a positive road-kill mule deer was discovered in 2018, deer HA 145 which had a positive CWD targeted mule deer in 2016, and deer HA 139 near Pinedale, which had one positive CWD targeted mule deer in 2017, and another in 2019.

Target Elk Herd Units for 2019.
Three elk herd units were targeted for the 2019 season (Fig. 10); only the Snowy Range herd unit reached the 200 sample goal in the first year (Table 7). CWD prevalence in the Snowy Range showed a slight decrease from the previous four-year average of 2.8%.

Table 7. Hunter harvested adult elk CWD samples tested, CWD samples positive, and CWD prevalence in targeted elk herd units

	Afton	Pinedale	Snowy Range
Tested	68	56	224
Positive	0	0	3
Prevalence	0%	0%	1.3%

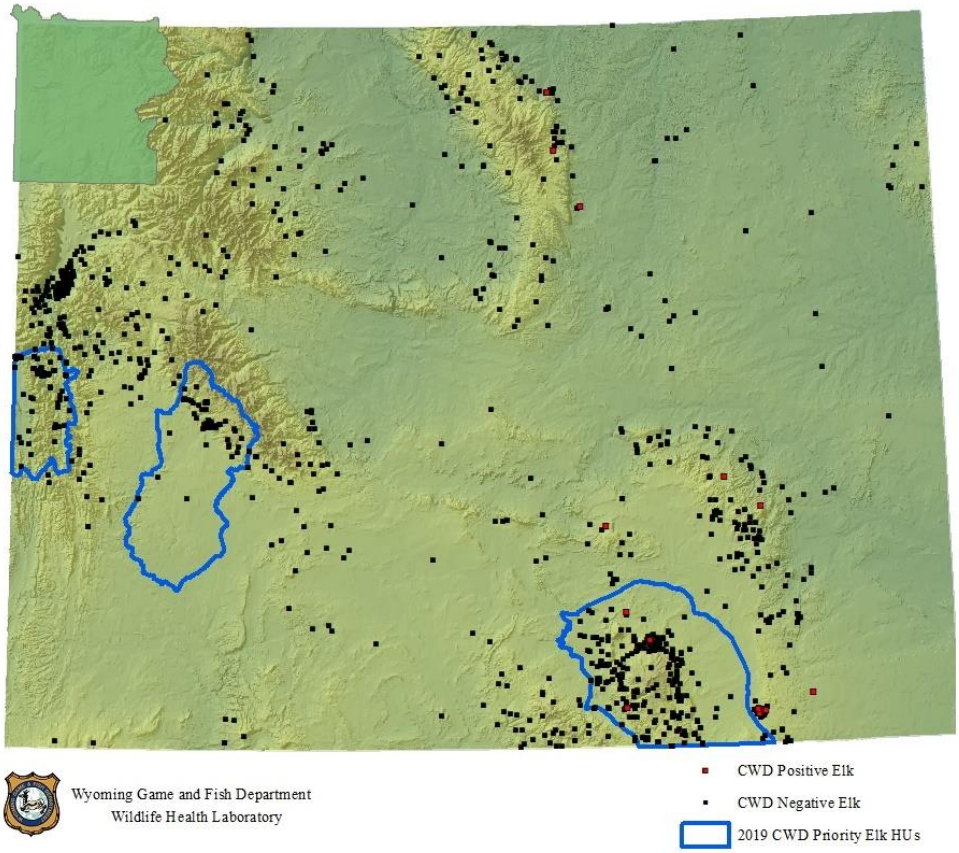

Fig. 10. 2019 Wyoming CWD sampling of elk in targeted elk herd units (HU).

Non-Target Elk Herd Units 2019.

There were some changes in prevalence as compared to the average over the previous four years. In areas with a sample size of ≥ 40 (80% CI), the Iron Mountain herd unit had a slight increase to 13.8, up from 11.8%, and the Laramie Peak/Muddy Mountain herd unit saw a decrease in prevalence, from an average of 7.7% to 2.4%. Increasing prevalence trends in the Iron Mountain herd is concerning, particularly in comparison to the Laramie Peak herd which have averaged around 5% prevalence for many years. Statewide 5-year CWD prevalence per elk herd unit is shown in Figure 11.

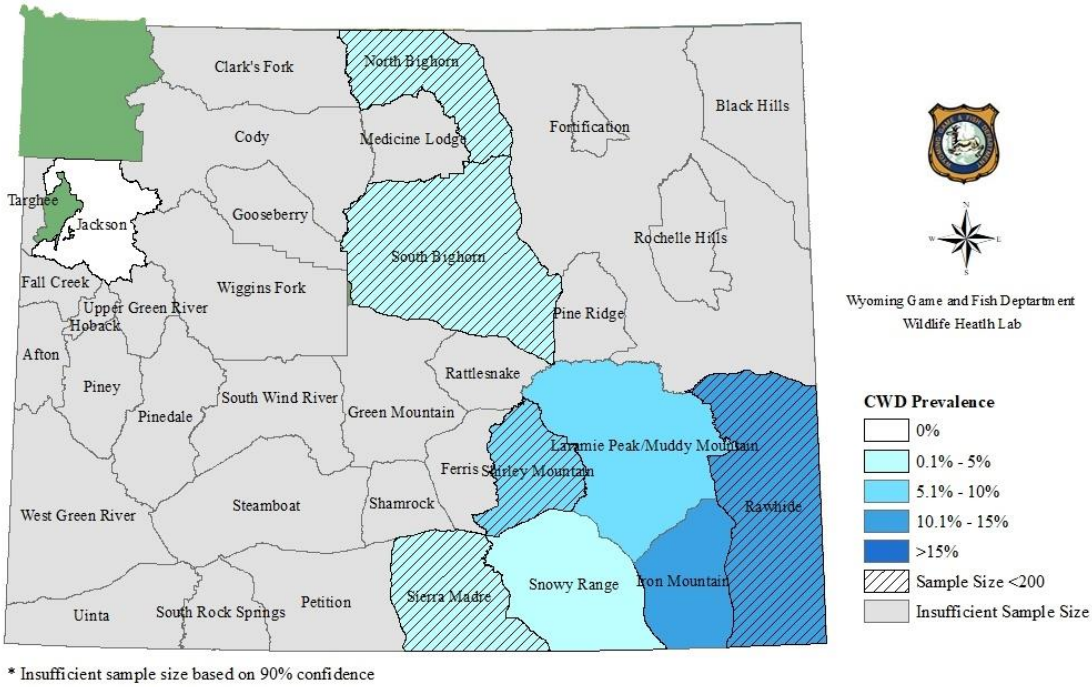

Fig 11. Chronic wasting disease prevalence in hunter harvested adult elk by herd unit 2015 – 2019

Sampling Effort in Non-Endemic Hunt Areas

For hunt areas where the disease has not been detected, a weighted score is used to maximize the benefit of samples collected from multiple CWD surveillance types These relative weights (Table 8.) are translated into points allowing for a total point-goal. Following calculations outlined by Walsh et al 2012, 230 total points are required for 90% confidence and 300 points are required for 95% confidence to detect the disease if it is present at 1% prevalence, assuming even distribution of disease on the landscape. Non-endemic area points are shown in Figures 12 and 13. Wyoming focuses yearly surveillance for detection at the hunt area level.

Table 8: Points for demographic categories of samples. Point totals are calculated separately for each species (Walsh et al 2012).

	Weight/Points	
Group	Mule Deer	Elk
Targeted female	13.6	18.75
Targeted male	11.5	8.57
Road-kill (male or female)	1.9	0.41
Other Mortality	1.9	0.41
Harvested adult male	1	1.16
Harvested adult female	0.56	1
Harvested yearling male	0.33	0.23
Harvested yearling female	0.19	0.23
Harvested fawns or calves	0.001	0

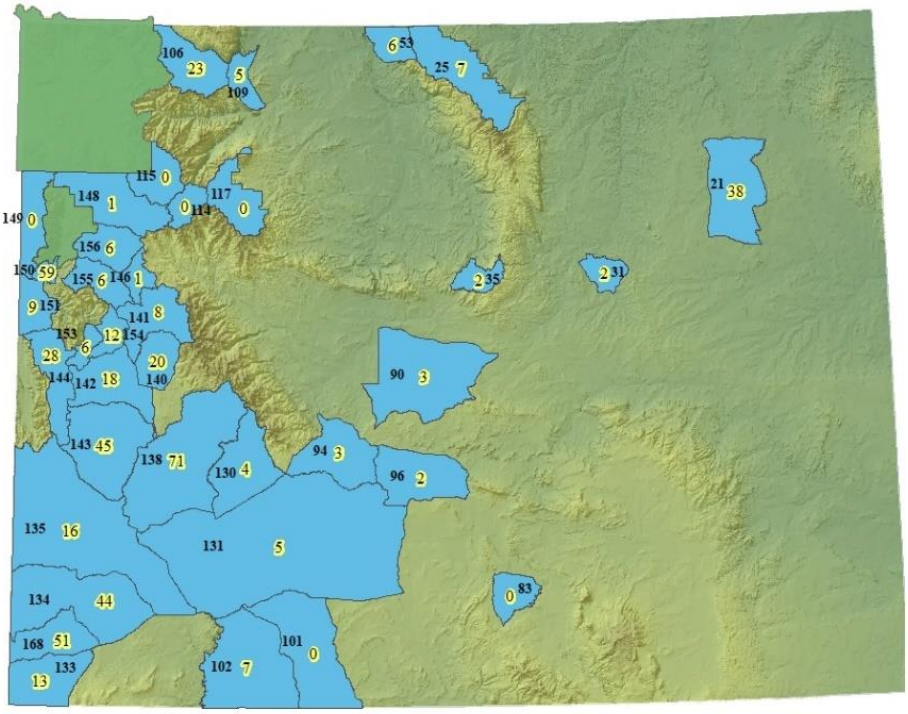

Fig. 12. 2019 Non CWD endemic mule deer hunt areas with weighted score (highlighted)

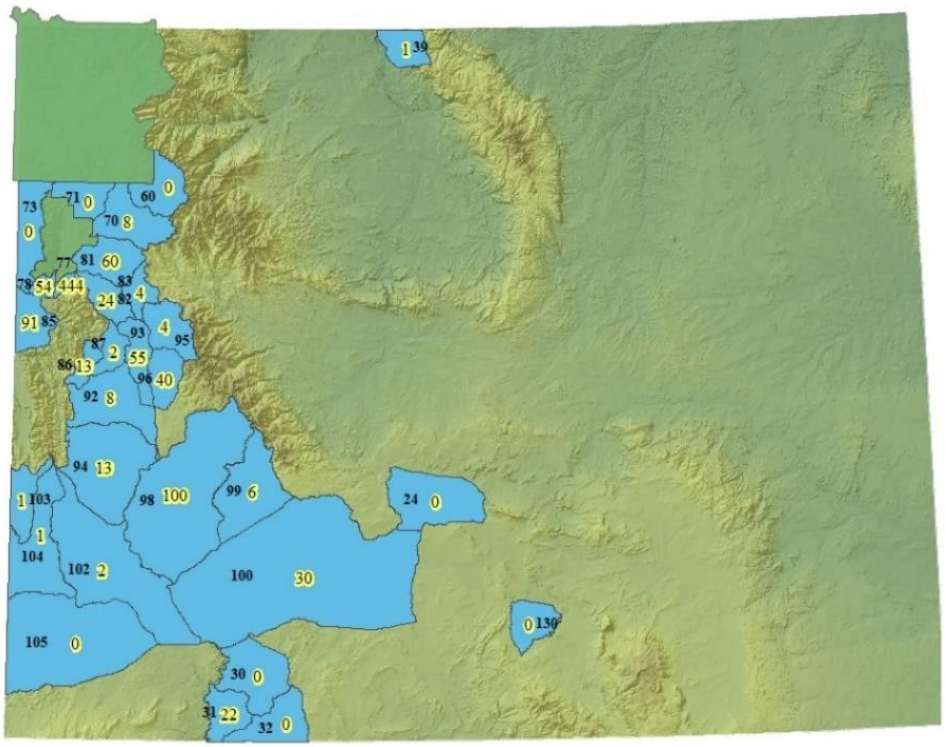

Fig. 13. 2019 Non CWD endemic elk hunt areas with weighted score (highlighted)

Continuation of New Monitoring Plan and Future Sampling.

Surveillance efforts will continue for the 2019 priority herds for the next two years until sampling goals are achieved. In 2020, four new deer herd units and four new elk units will be prioritized (Fig. 14 and 15) depending on availability of field personnel to assist with sampling efforts. Fewer samples were received in 2019 than expected. Continuing issues with low hunter participation and the new monitoring strategy which only focused on a small number of herd units, may have limited sampling availability outside of target surveillance areas.

For complete information on CWD in Wyoming please go to: https://wgfd.wyo.gov/Wildlife-in-Wyoming/More-Wildlife/Wildlife-Disease/Chronic-Wasting-Disease

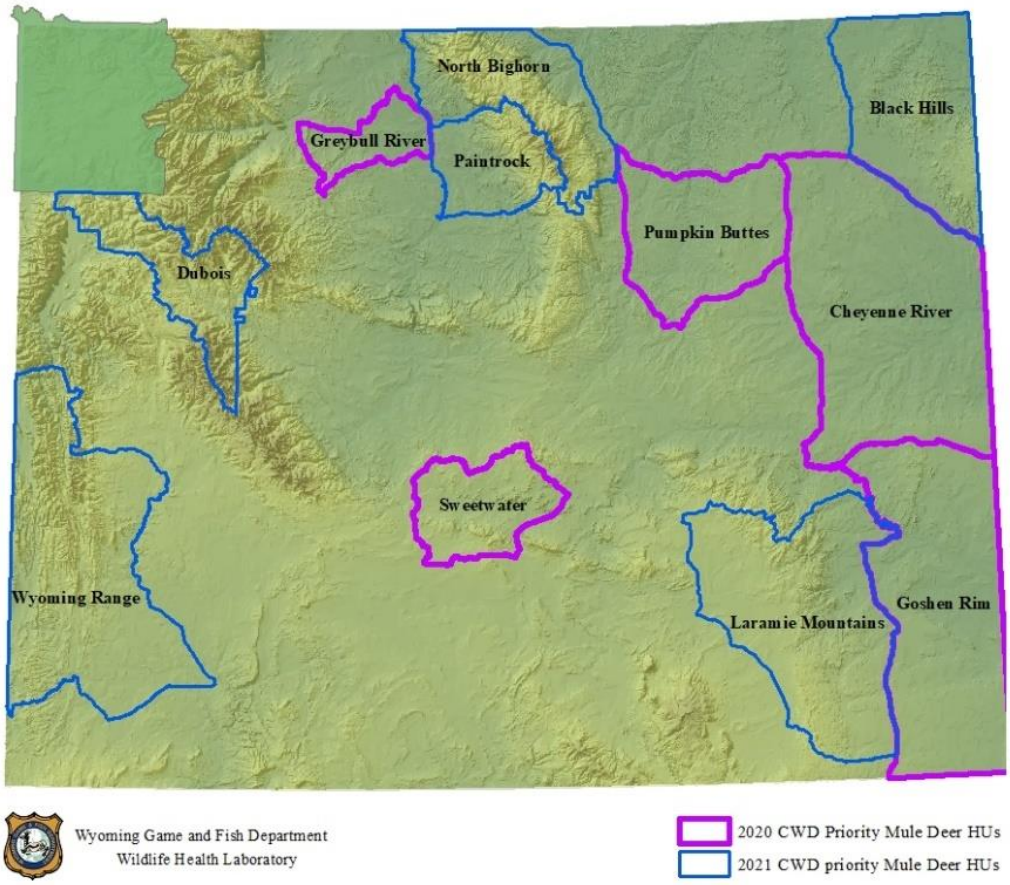

Fig. 14. Wyoming CWD targeted mule deer herd units (HU): 2020 - 2021

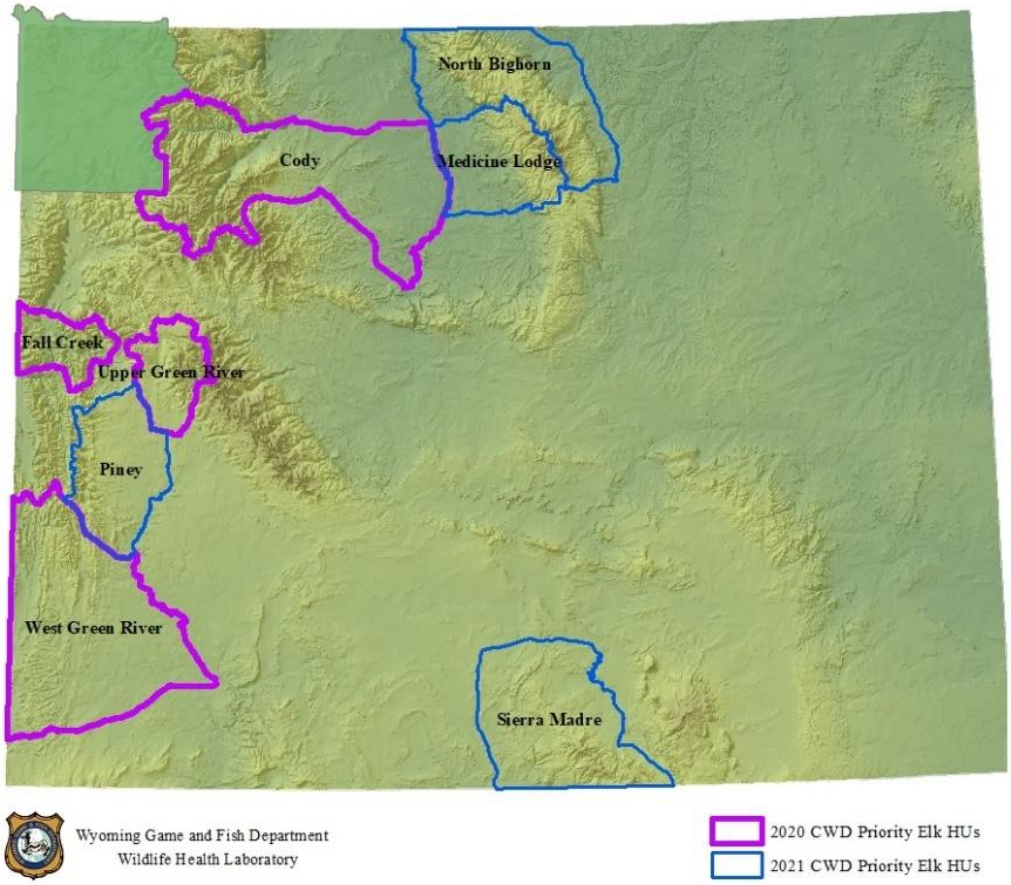

Fig. 15. Wyoming CWD targeted elk herd units (HU): 2020-2021