Brucella canis

MT Surveillance

Who to test:

- Dogs that originate from areas with large numbers of stray and sexually intact dogs.
- New intakes at shelters and adopted/rescued animals if testing history is unavailable.
- Periparturient dogs that were not tested prior to breeding.
- Sexually intact dogs as part of a routine pre-breeding examination.
- Dog with symptoms consistent with *B. canis* infection which cannot be explained by other disease.

When to Test:

- >6 months of age (wait for maternal antibodies to drop off)
- Exposure to a known positive dog
- Prior to adoption/foster
- Prior to breeding

Reminders

- Testing for *B. canis* is a serial process
- Screening tests include:
  - MVDL ELISA (preferred, detects lower levels of antibodies earlier in infection)
  - MVDL IFA (quicker turn around time, can be used first when for pre-breeding)
  - Cornell Multiplex
- Confirmatory tests include:
  - PCR
  - Culture
    - Negative result on confirmatory testing is not considered a true negative given that this bacteria is extremely difficult to isolate

DOL Case Definitions/Diagnostic Guidance

SUSPECT:

Positive screening test without symptoms

- Positive ELISA S/P 0.800-1.999
- Positive IFA 1:50
- Positive Multiplex

Management: Isolate and retest after 30-60 days

PROBABLE:

Positive screening test w/ these criteria OR an asymptomatic dog with increasing titers

- Positive ELISA with symptoms OR an S/P >2.000
- IFA 1:50 with symptoms
- IFA 1:200 any dog
- Positive AGID

Management: Isolate and retest after 30-60 days; euthanasia is an acceptable option

CONFIRMED:

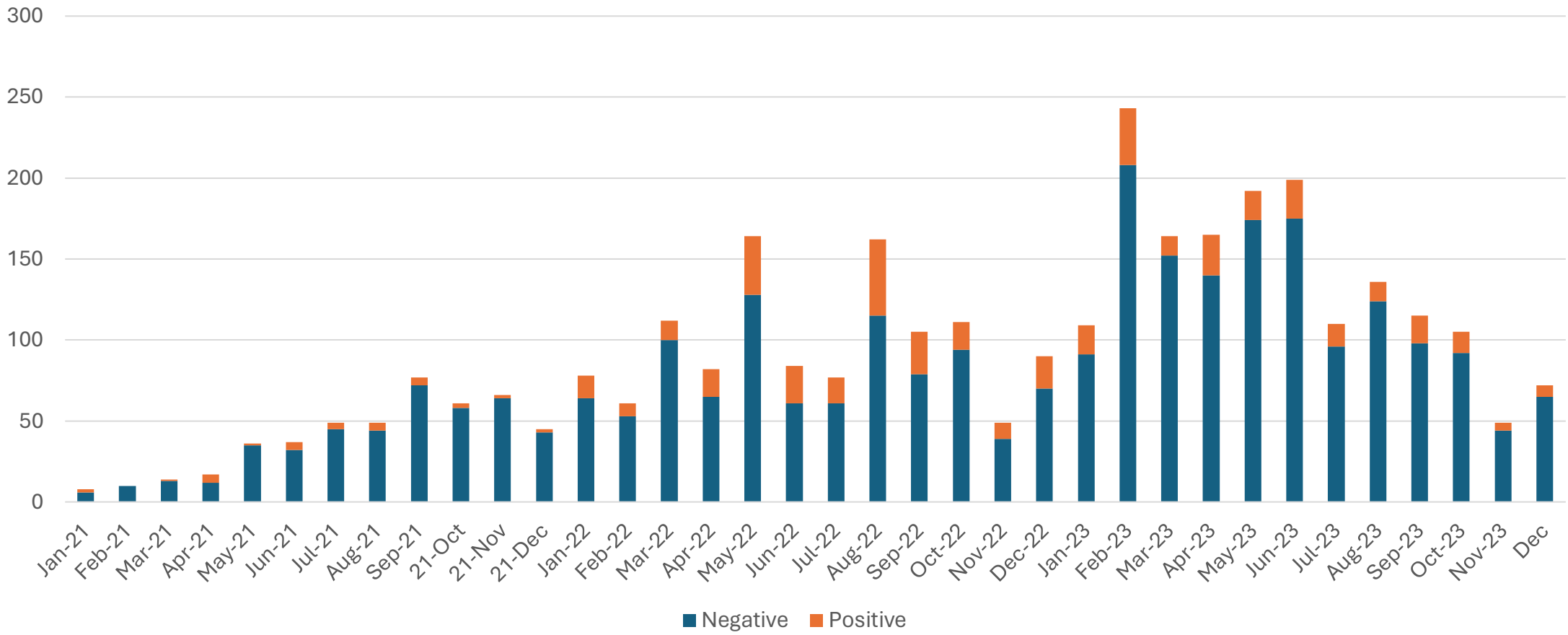
Definitive laboratory test positive with/without symptoms

- Positive Culture
- Positive PCR

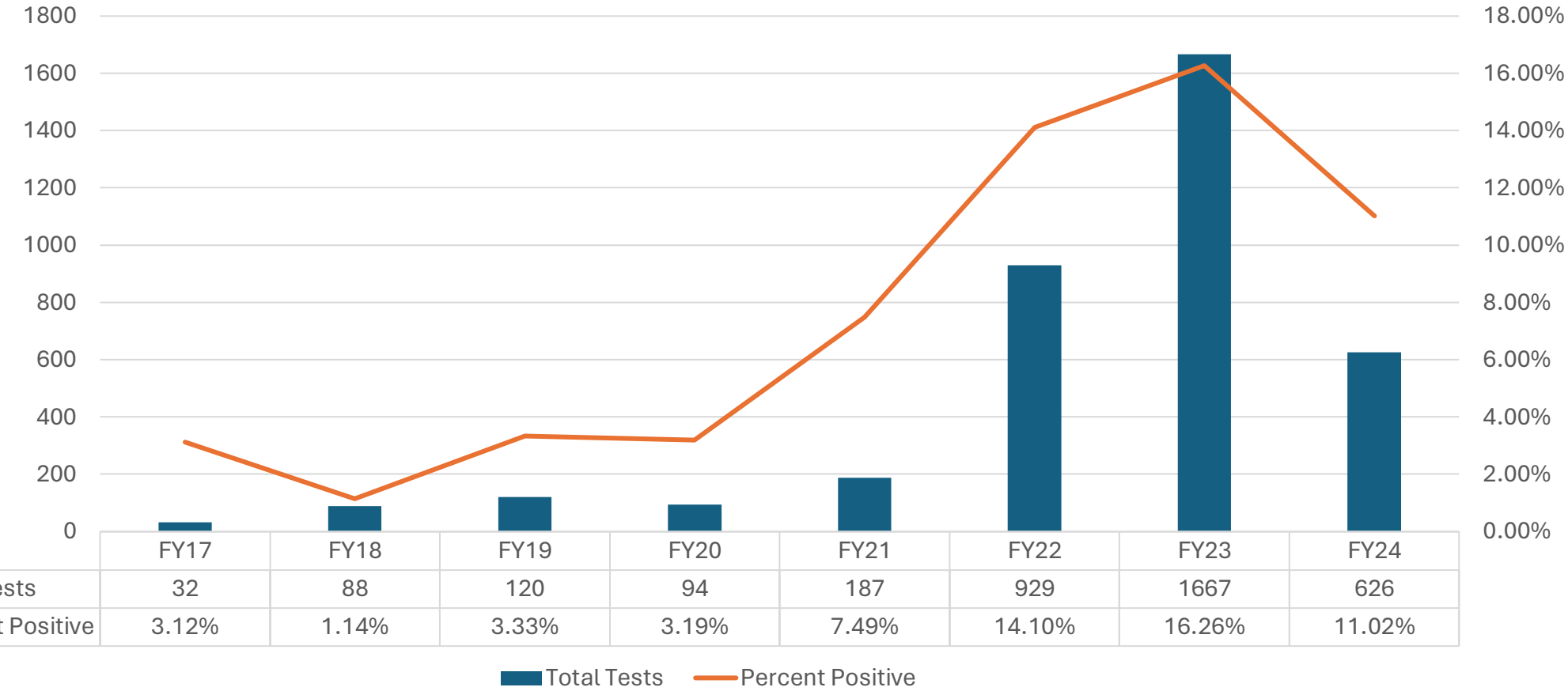
Management: Euthanasia strongly recommended; alternative option is lifelong quarantine, spay/neuter, and adhere to Prevention and Control Guidelines

MT *B. canis* Epidemiology

B. canis Tests Performed by MVDL by Month 1/2021-12/2023



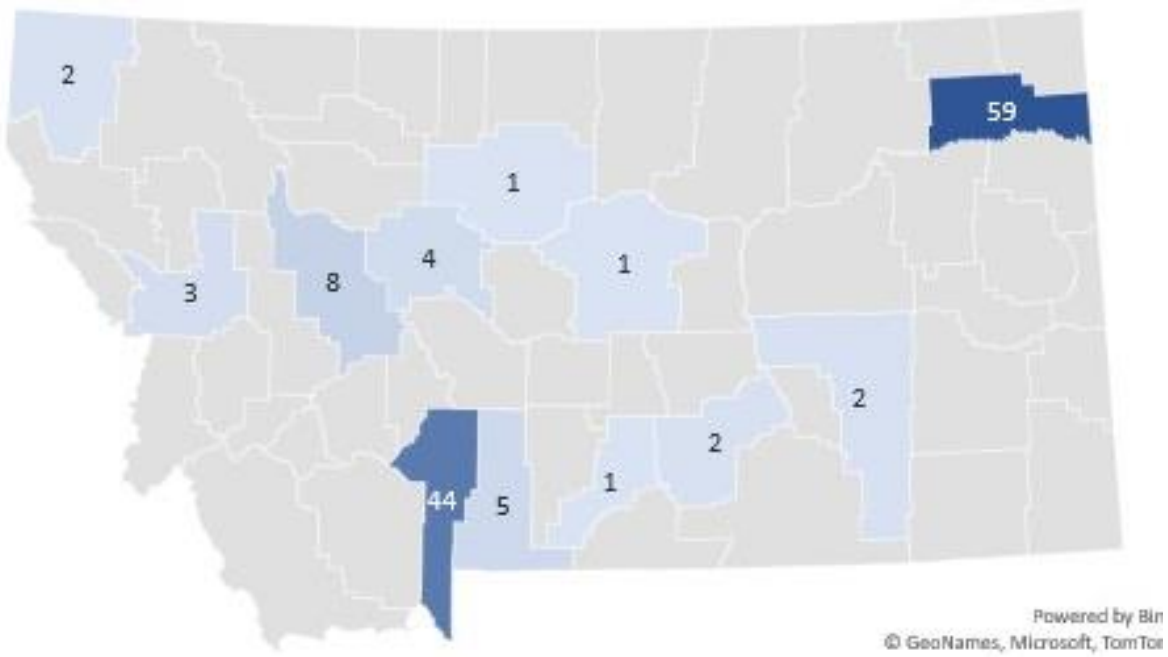
Number of Total *B. canis* Tests and Positive Results by FY Through Current (Jan 24) From MVDL Testing Only



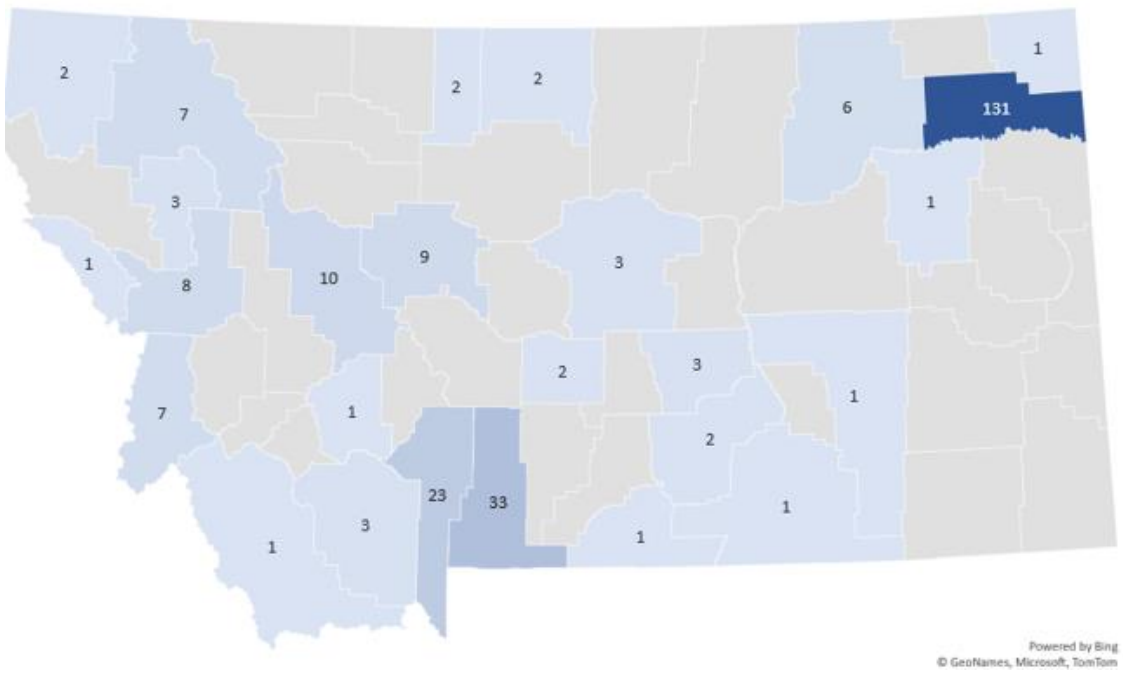
	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24
Total Tests	32	88	120	94	187	929	1667	626
Percent Positive	3.12%	1.14%	3.33%	3.19%	7.49%	14.10%	16.26%	11.02%

B. canis Positive Results by County

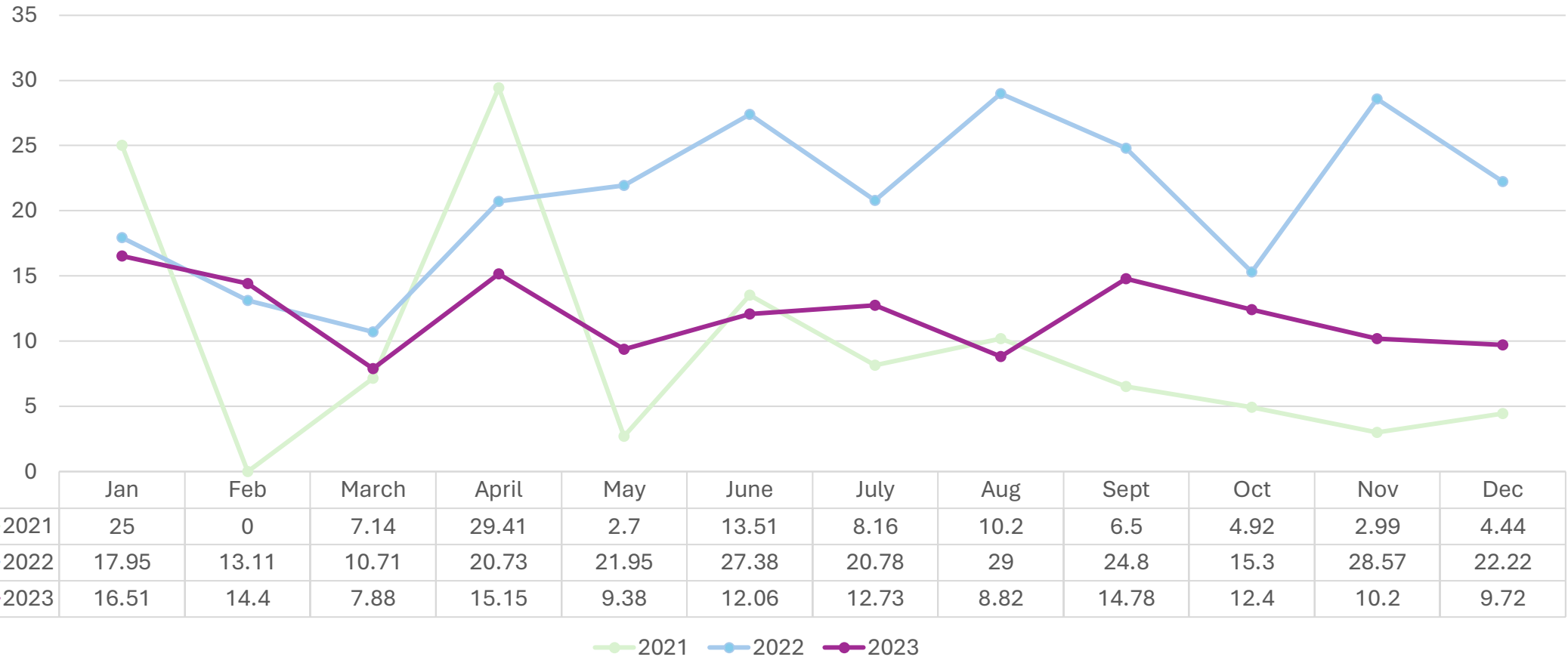
FY22



FY23



B. canis test results from MVDL: Percent Positive by Month and Calendar Year



	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2021	25	0	7.14	29.41	2.7	13.51	8.16	10.2	6.5	4.92	2.99	4.44
2022	17.95	13.11	10.71	20.73	21.95	27.38	20.78	29	24.8	15.3	28.57	22.22
2023	16.51	14.4	7.88	15.15	9.38	12.06	12.73	8.82	14.78	12.4	10.2	9.72

Conclusions/Interpretations

- Calendar year 2022 showed a significant increase in percent positive rate compared to 2021
- Calendar year 2023 had a lower percent positive rate compared to 2022
  - Suggesting that increased surveillance and removal of infected animals has been working to decrease exposure and new infections
- MT continues to have a problem with *B. canis* infection especially in populations of dogs that originate from areas with large numbers of stray and intact animals

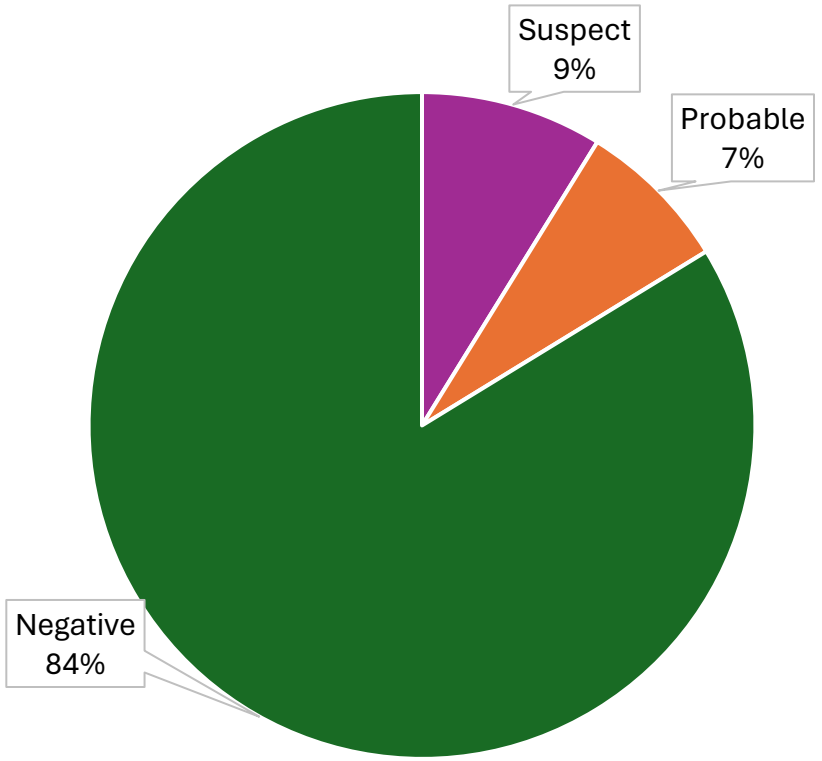
Year	Percent Positive
2021	9.58%
2022	21.0%
2023	12.0%

Test Data from MVDL FY23

1667 total tests

- 1396 tests were Negative
- 271 tests were Positive (16.26%)
- Based on DOL case definitions
  - 147 were considered Suspect
  - 124 were considered Probable

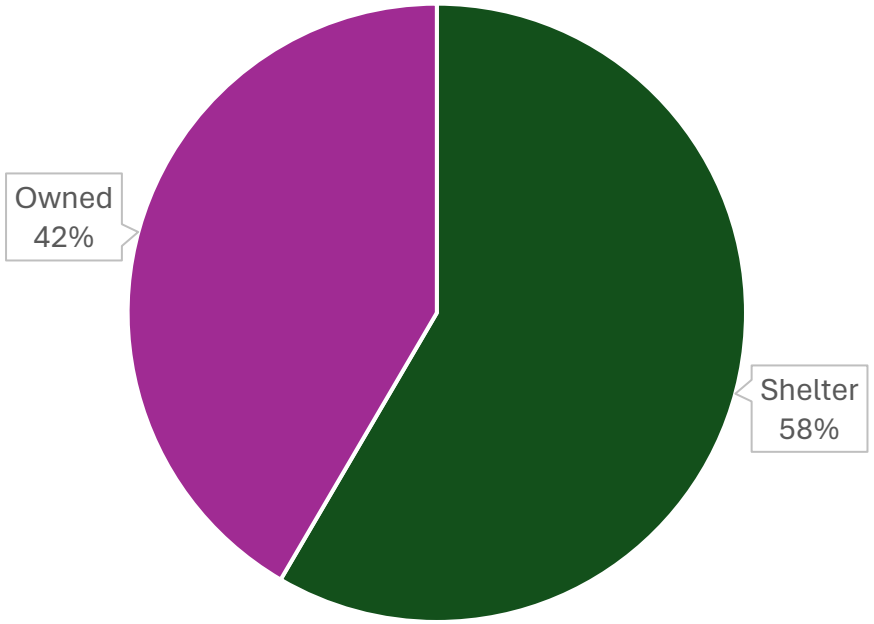
- 10 dogs had positive confirmatory testing (0.6%)



FY23 Results by Case Definition

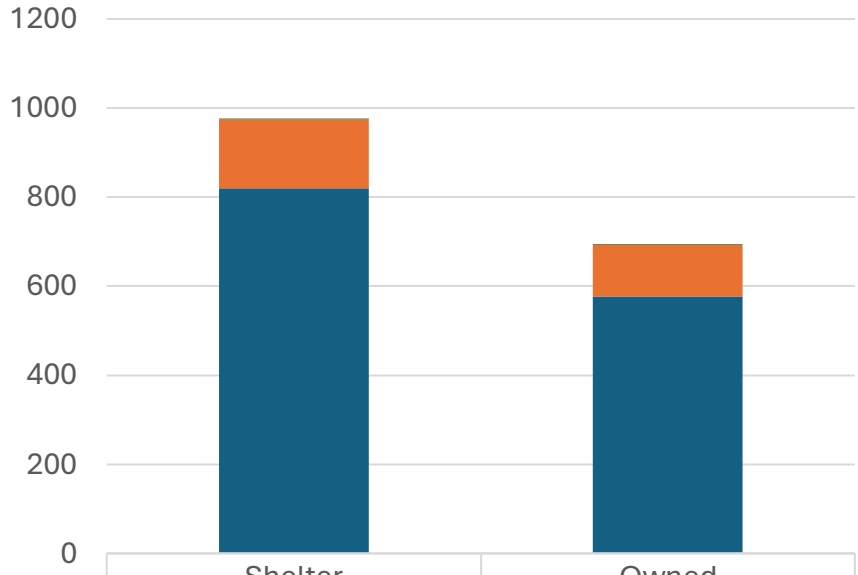
Test Data from MVDL FY23

693 owned vs 974 shelter



15.91% positive rate in shelter dogs

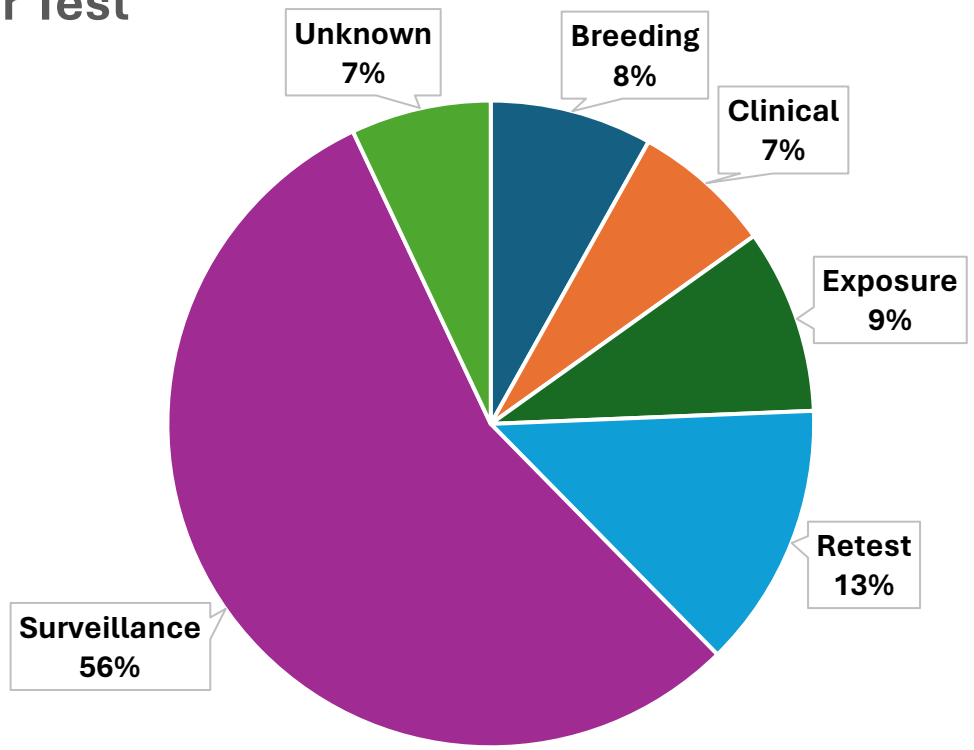
16.74% positive rate in owned dogs



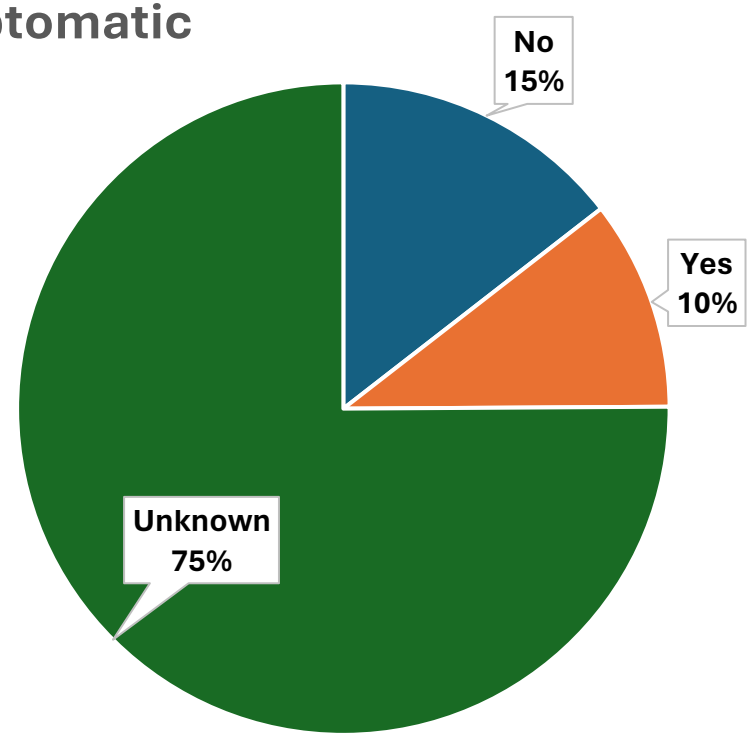
	Shelter	Owned
Positive Percent	15.91%	16.74%
Positive	155	116
Negative	819	577

Information from the 271 positive test results from FY23

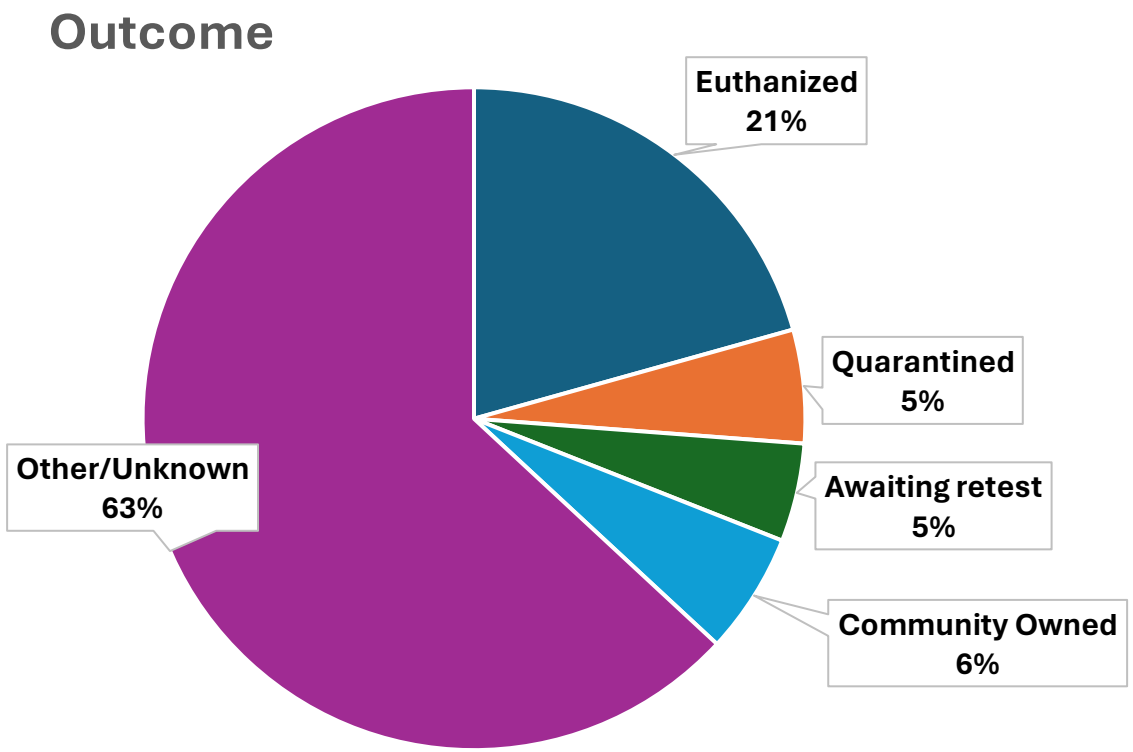
Reason for Test



Symptomatic



Information from the 271 positive test results from FY23



One Health Case Study: Dawson County

- Family of four
  - Mom, dad, 2 yr old, and infant
- Went to physician for vomiting and flu-like symptoms
  - Mentioned that their dog was diagnosed with *B. canis*
  - Mom was the only person with direct contact with the dog and puppies during the whelping process

Dawson County Case Study

- Pregnant, female mixed breed dog from Dawson County
- ELISA positive, S/P of 4.273
- Went home with family and whelped shortly after
- No abnormalities with pregnancy or birthing
- Birthing took place in a kiddie pool in the family's home

Dawson County Case Study

- The family elected to euthanize the dog and the 7 puppies
- DPHHS, MVDL, and MDOL coordinated getting the remains to the lab and to NVSL for culture
  - DPHHS covered the cost given the possibly human exposure
- NVSL did isolate/confirm *B. canis*
  - Isolates determined in uterus and ovary and was suspected in most lymph nodes, liver, and spleen

Tissue / Lymph Node- Mandibular	
Brucella Isolation Result	No Isolation Made
Tissue / Lymph Node- Internal Iliac	
Brucella Isolation Result	Suspect
Tissue / Lymph Node- S. Cervical	
Brucella Isolation Result	Suspect
Tissue / Lymph Node- Prescapular	
Brucella Isolation Result	No Isolation Made
Tissue / Lymph Node- S. Inguinal	
Brucella Isolation Result	Suspect
Tissue / Mammary Gland	
Brucella Isolation Result	No Isolation Made
Tissue / Uterus	
Brucella Isolation Result	Isolate Determined
Brucella Identification Result	Brucella canis
Tissue / Ovary	
Brucella Isolation Result	Isolate Determined
Brucella Identification Result	Brucella canis
Tissue / Liver	
Brucella Isolation Result	Suspect
Tissue / Spleen	
Brucella Isolation Result	Suspect

Dawson County Case Study

The isolate, B23-0163_23BC_MT-021_DG, has accumulated two SNPs since sharing the a most recent common ancestor with three other dog isolates from Montana in 2021. This suggests the same or similar source.

The attached appendix contains a phylogenetic tree for all B. canis from the NVSL database, a high resolution tree showing the relationship of this isolate to others within the same group, and a table showing the SNP calls for a portion of the group. The isolate of interest is in red font.

Results authorized by: Dr. Tyler C. Thacker, Section Head, Mycobacteria and Brucella Section
NVSL MB General Phone: 515-337-7526
NVSL MB Email: NVSL-MB.caseManager@usda.gov

Dawson County Case Study

	NC_010103.1:685713	NC_010103.1:171916	NC_010104.1:564907	NC_010103.1:895975	NC_010103.1:1389770	NC_010103.1:1517615	NC_010103.1:220187	NC_010103.1:1459020	NC_010104.1:179012	NC_010103.1:999233	NC_010104.1:651802	NC_010103.1:637847	NC_010103.1:1592223	NC_010104.1:635725	NC_010103.1:586903	NC_010104.1:973963	NC_010103.1:1182475	NC_010104.1:104075	NC_010103.1:660592	NC_010103.1:461193	NC_010104.1:158148	NC_010103.1:2103727	NC_010103.1:46931	NC_010104.1:233859	NC_010103.1:242555	NC_010103.1:370430	NC_010103.1:722476	NC_010103.1:965455	NC_010104.1:984782	NC_010103.1:1628368	NC_010103.1:370429	NC_010103.1:685823	NC_010103.1:748157
root	C	A	C	G	C	G	G	G	C	C	C	G	G	C	C	G	G	T	C	C	C	C	C	G	G	C	C	C	G	G	C	G	G
B21-0085_21BC_MT-031_DG	T	G	T	T	T	A	G	G	C	C	C	G	G	C	C	G	G	T	C	C	C	C	C	G	G	C	C	C	G	G	C	G	G
B21-0178_21BC_MT-063_DG	T	A	C	G	C	G	T	A	C	C	C	G	G	C	C	G	G	T	C	C	C	C	C	G	G	C	C	C	G	G	C	G	G
B19-0184_19BC_MT-063_DG	T	A	C	G	C	G	T	G	G	T	T	G	G	C	C	G	G	T	C	C	C	C	C	G	G	C	C	C	G	G	C	G	G
B21-0042_21BC_MT-049_DG	T	A	C	G	C	G	T	G	C	C	C	T	A	T	C	G	G	T	C	C	C	C	C	G	G	C	C	C	G	G	C	G	G
B21-0223_21BC_MT-013_DG	T	A	C	G	C	G	T	G	C	C	C	G	G	C	T	A	A	T	C	C	C	C	C	G	G	C	C	C	G	G	C	G	G
B21-0076_21BC_MT-111_DG	T	A	C	G	C	G	G	G	C	C	C	G	G	C	C	G	G	C	T	A	C	C	C	G	G	C	C	C	G	G	C	G	G
B21-0092_21BC_MT-031_DG	T	A	C	G	C	G	G	G	C	C	C	G	G	C	C	G	G	C	T	C	T	C	C	G	G	C	C	C	G	G	C	G	G
B20-0184_20BC_MT-067_DG	T	A	C	G	C	G	G	G	C	C	C	G	G	C	C	G	G	C	T	C	C	T	C	G	G	C	C	C	G	G	C	G	G
B20-0185_20BC_MT-067_DG	T	A	C	G	C	G	G	G	C	C	C	G	G	C	C	G	G	C	T	C	C	T	C	G	G	C	C	C	G	G	C	G	G
B21-0131_21BC_MT-031_DG	T	A	C	G	C	G	G	G	C	C	C	G	G	C	C	G	G	T	C	C	C	C	A	A	T	T	T	T	A	T	C	G	G
B21-0174_21BC_MT-031_DG	T	A	C	G	C	G	G	G	C	C	C	G	G	C	C	G	G	T	C	C	C	C	A	A	T	T	T	T	A	T	C	G	G
B21-0166_21BC_MT-031_DG	T	A	C	G	C	G	G	G	C	C	C	G	G	C	C	G	G	T	C	C	C	C	A	A	T	T	T	T	A	T	A	G	G
B23-0163_23BC_MT-021_DG	T	A	C	G	C	G	G	G	C	C	C	G	G	C	C	G	G	T	C	C	C	C	A	A	T	T	T	T	A	T	C	A	A

Dawson County Case Study

- DPHHS encouraged the provider to rule out other possible causes for the family's symptoms
- A month after exposure, the mom underwent PCR testing and was negative
- County health advised the family to continue to monitor for symptoms and seek medical care should any start

Looking Forward

- USAHA has started a *B. canis* working group
- Current objectives include:
  - Ask to human health counterparts to work on creating better human testing to determine true prevalence in humans
  - Ask to federal partners to revise the Best Practices for *B. canis* Prevention and Control Document (last updated in 2015)
    - Currently aimed at breeding facilities
    - The ask would be to include shelter/rescue/stray populations
  - Development of consistent messaging for SAHOs to provide private practice veterinarians

Highly Pathogenic Avian Influenza

February 2022 – January 2024

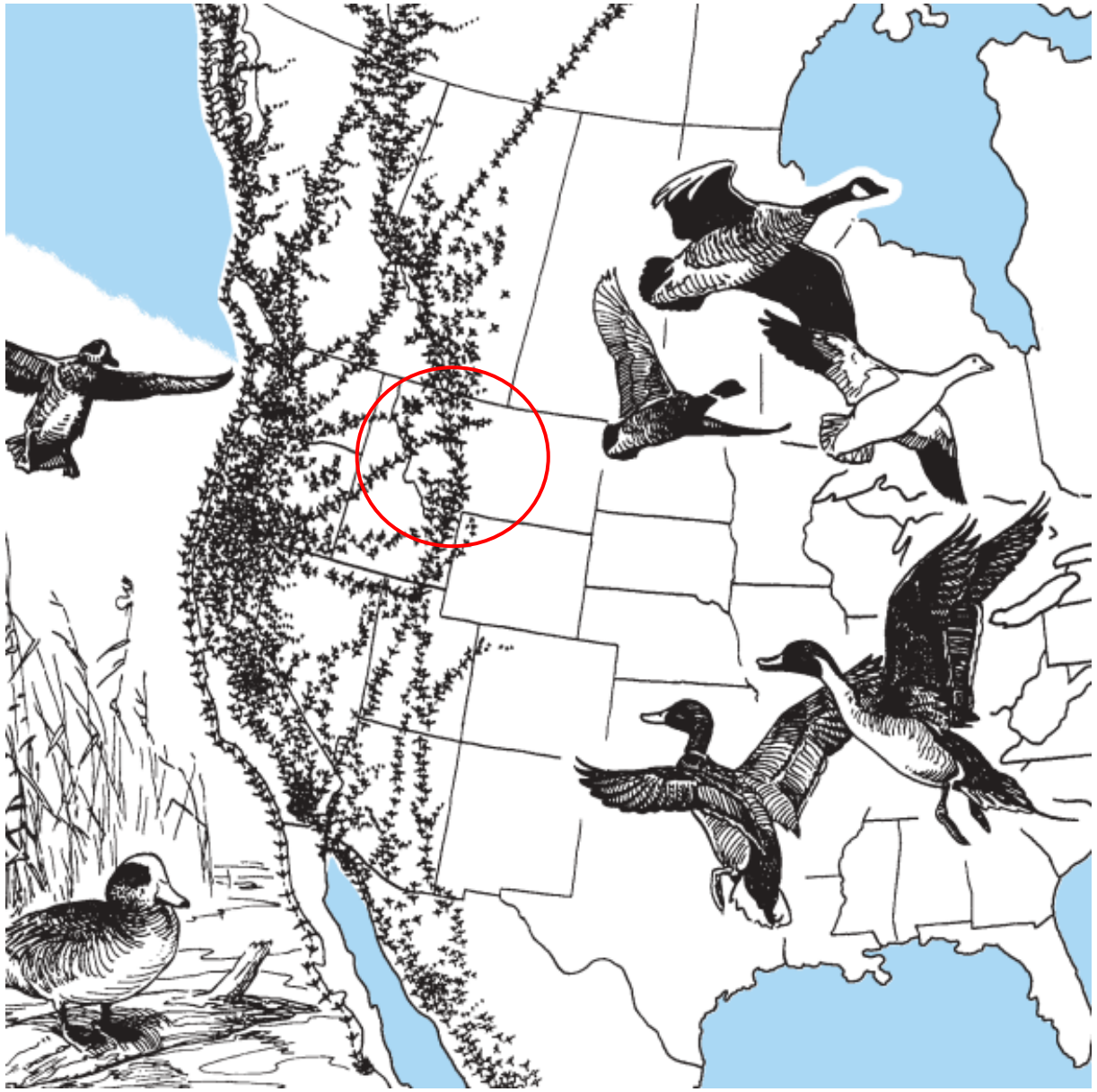
National HPAI Update

- Birds affected: 81,370,000
- Flocks affected: 1,070
- Commercial flocks affected: 456
- Backyard flocks affected: 614
- States affected: 47

- USDA compensation to farmers: $1 billion
- Depopulation/disposal/C&D costs: $183 million

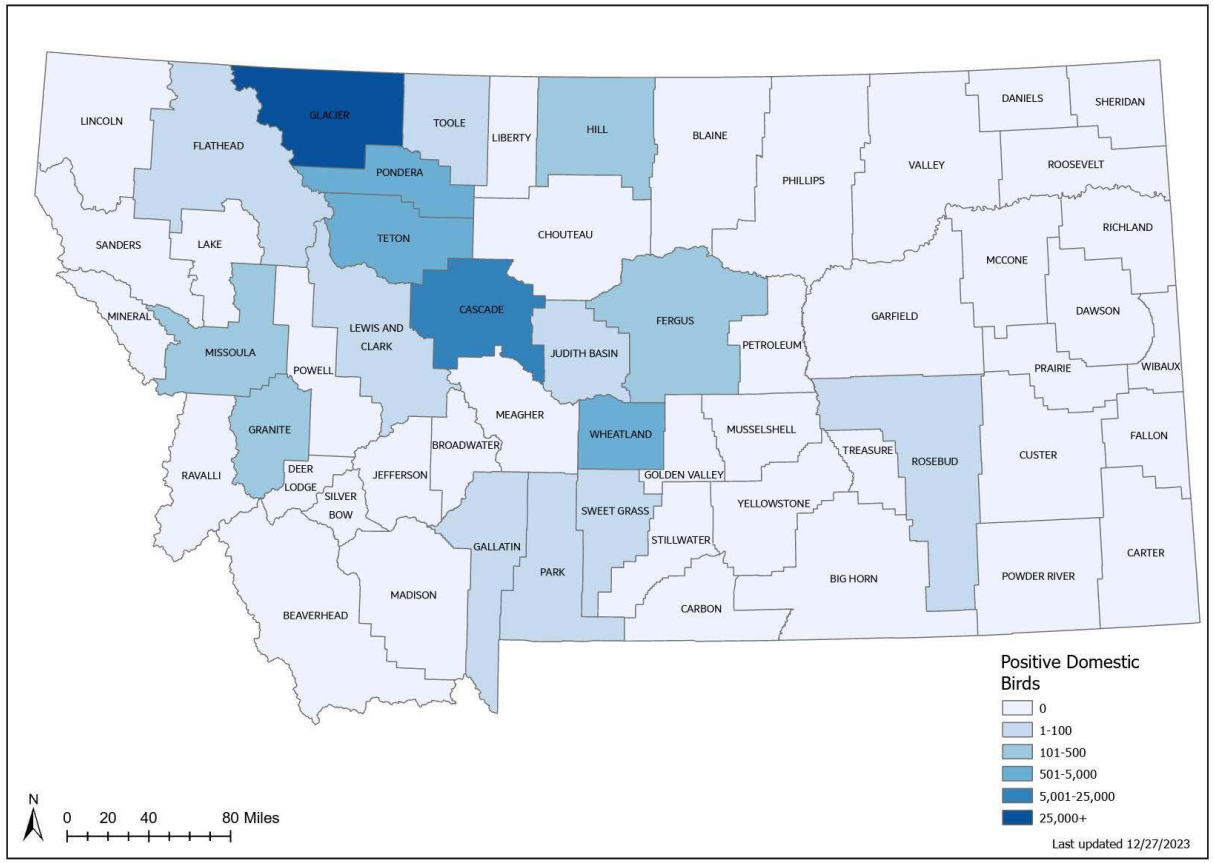
Montana HPAI Update

- Birds affected: 164,704
- Flocks affected: 26
- Commercial flocks affected: 7
- Backyard flocks affected: 19

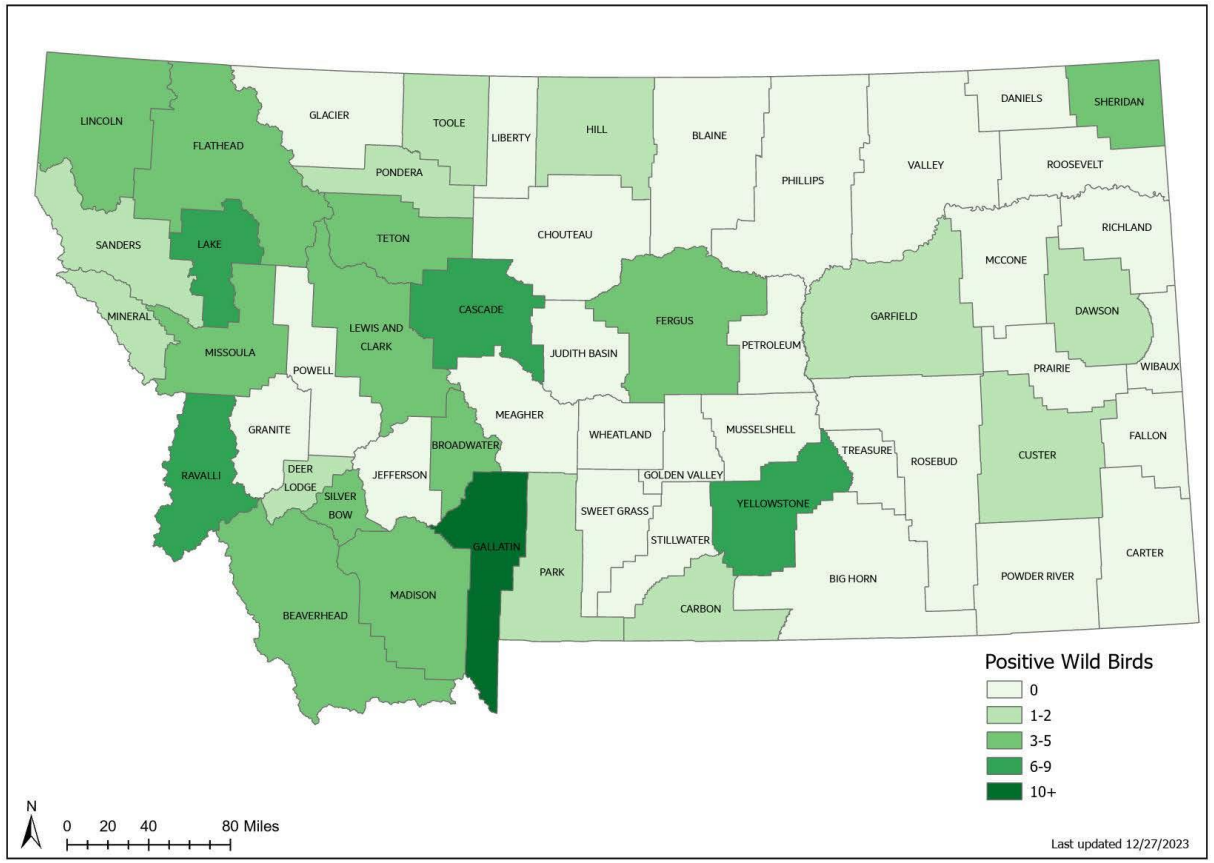


Domestic Bird Detections vs Wild Bird Detections

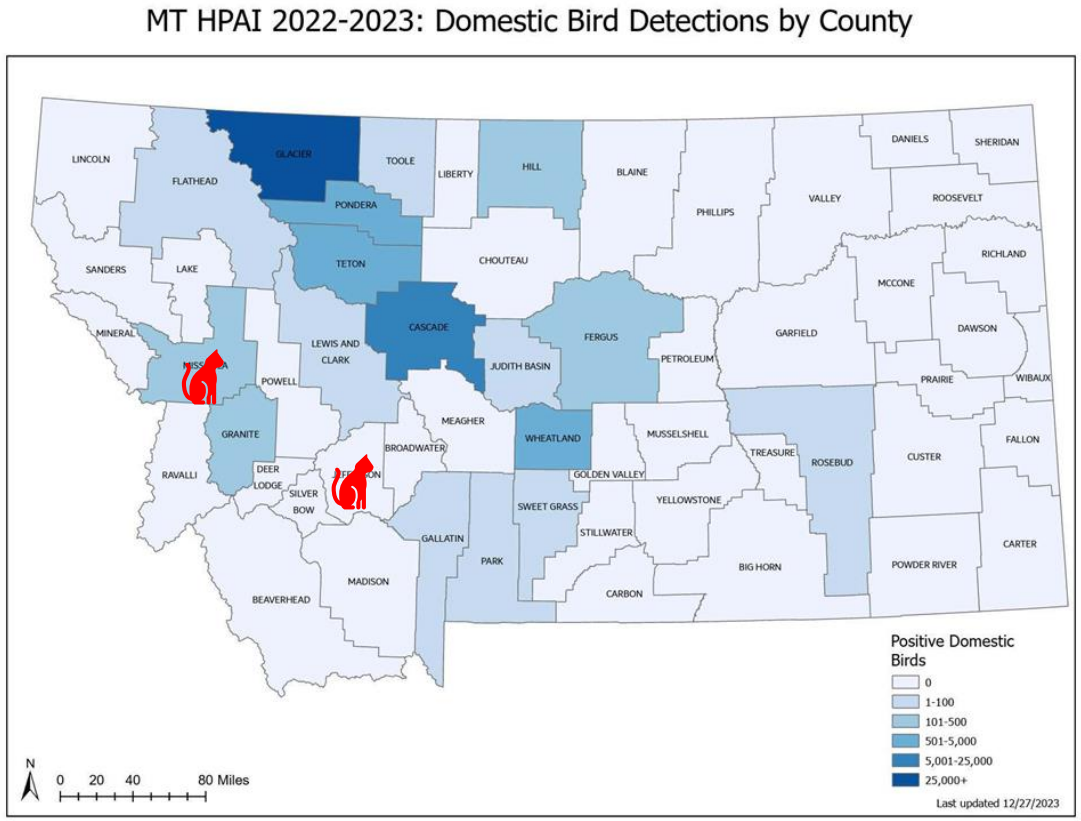
MT HPAI 2022-2023: Domestic Bird Detections by County



MT HPAI 2022-2023: Wild Bird Detections by County



HPAI Domestic Mammal Detection



- Carnivorous mammals can become infected with HPAI after ingestion of infected bird or bird by-products
- MT has had 2 domestic cat detections
  - Missoula County (linked to a known HPAI detection in backyard chicken flock)
  - Jefferson County
- Clinical signs: acute and progressive neurologic abnormalities, upper respiratory symptoms
  - MVDL is currently doing a retroactive HPAI study on domestic mammal samples that were negative for rabies