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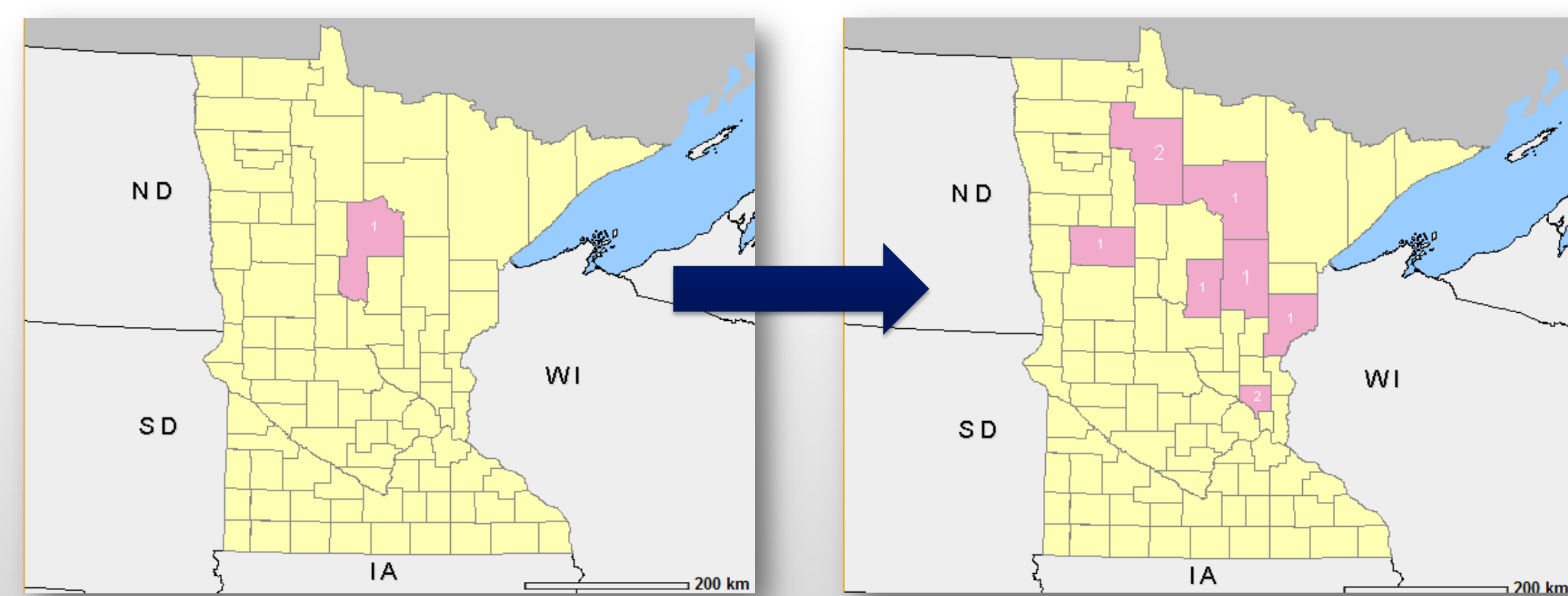
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## Powassan Virus?



- Tick-borne arbovirus, family *Flaviridae* (1)
- First identified in Ontario in 1958 (1)
- Identified in MN in 2008 (2)
- Transmission requires 15 minutes of tick attachment (Lyme disease may take 24-48 hours) (3)
- Can be asymptomatic or mild, but can also cause encephalitis leading to long-term neurological disorders or death (4)

## Emergence in MN



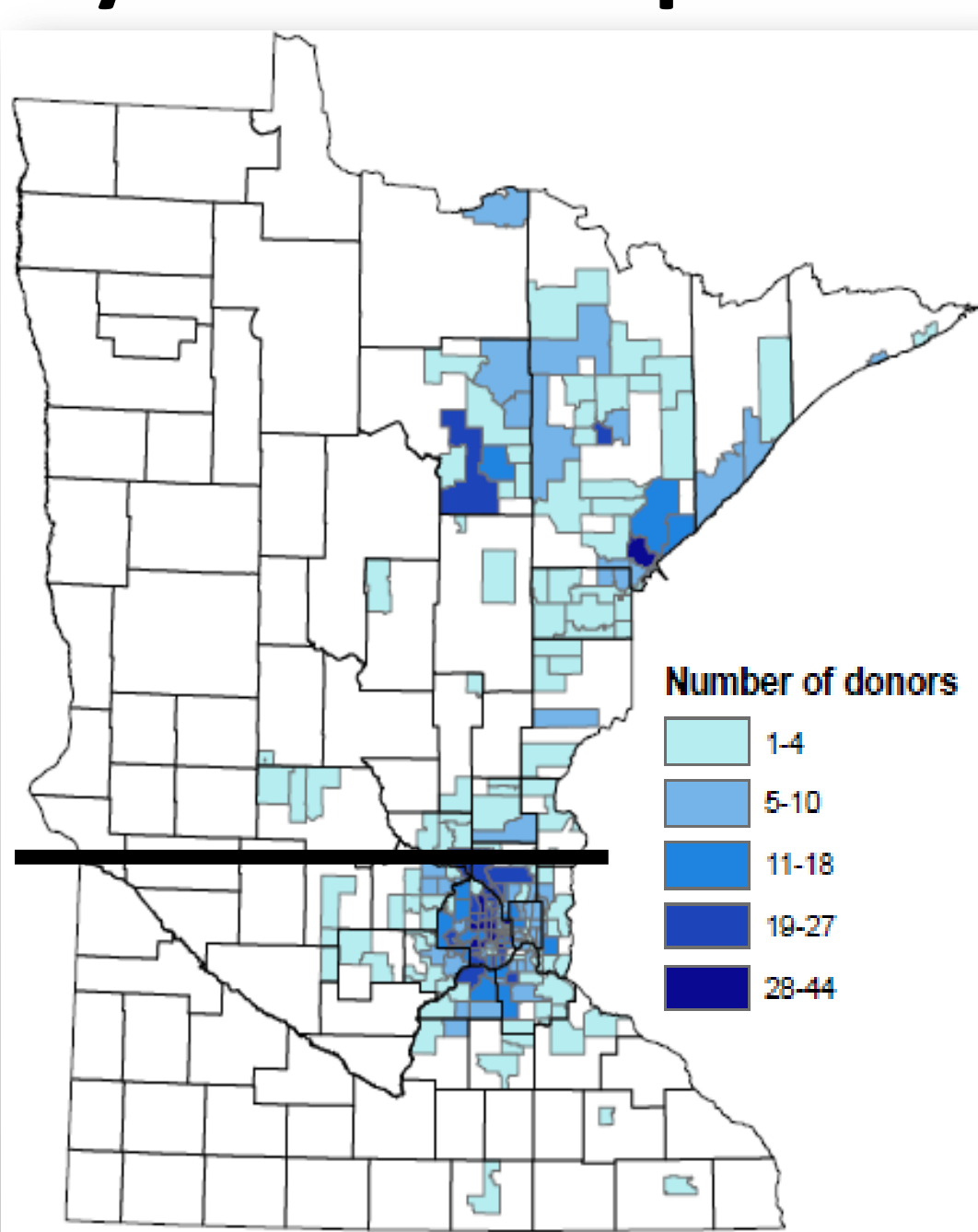
1 Reported Human Case

9 Reported Human Cases, 1 Fatality

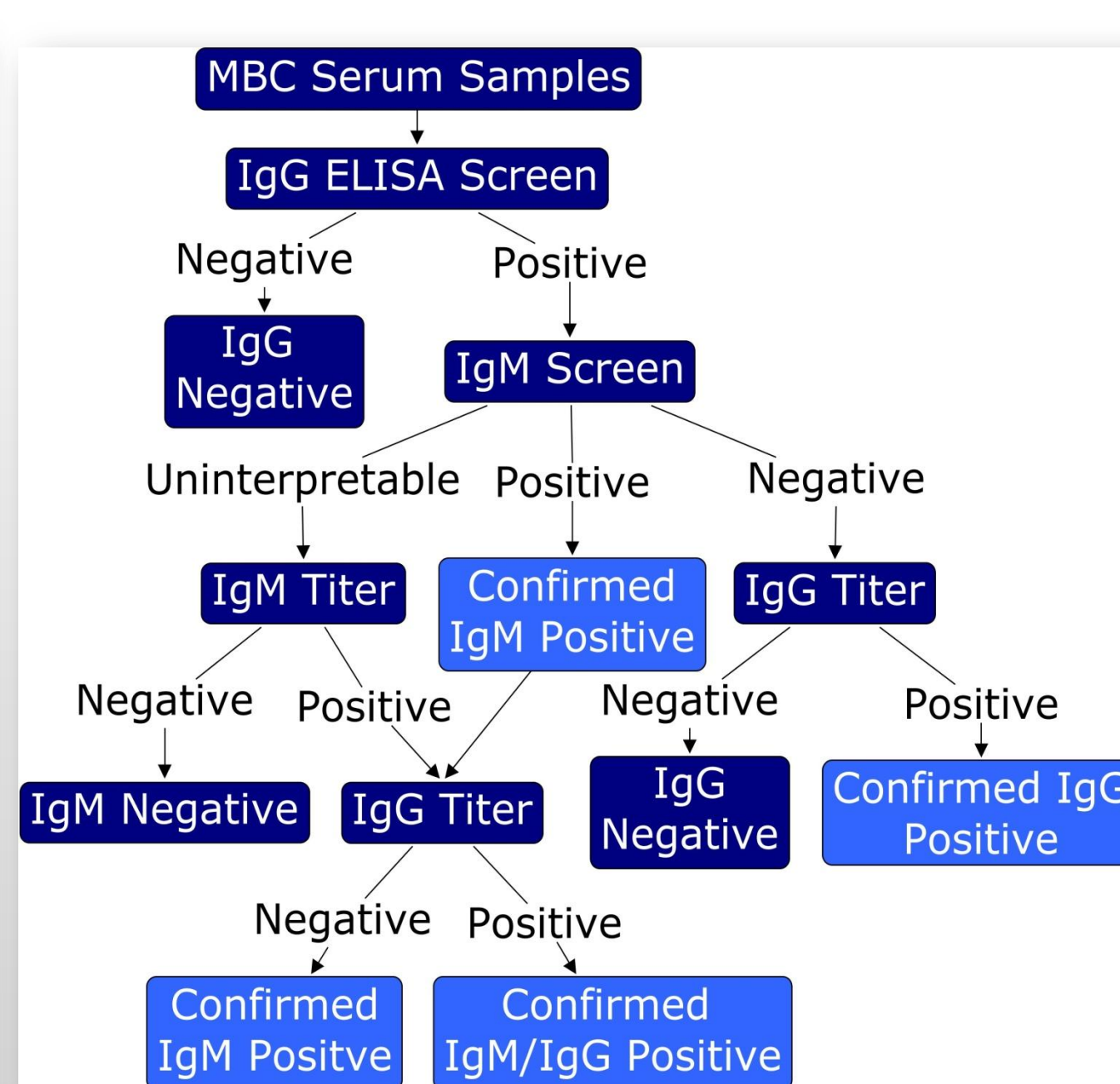
Maps courtesy of USGS Disease Maps Project

## Methodology

### Donor Distribution By Resident Zip Code



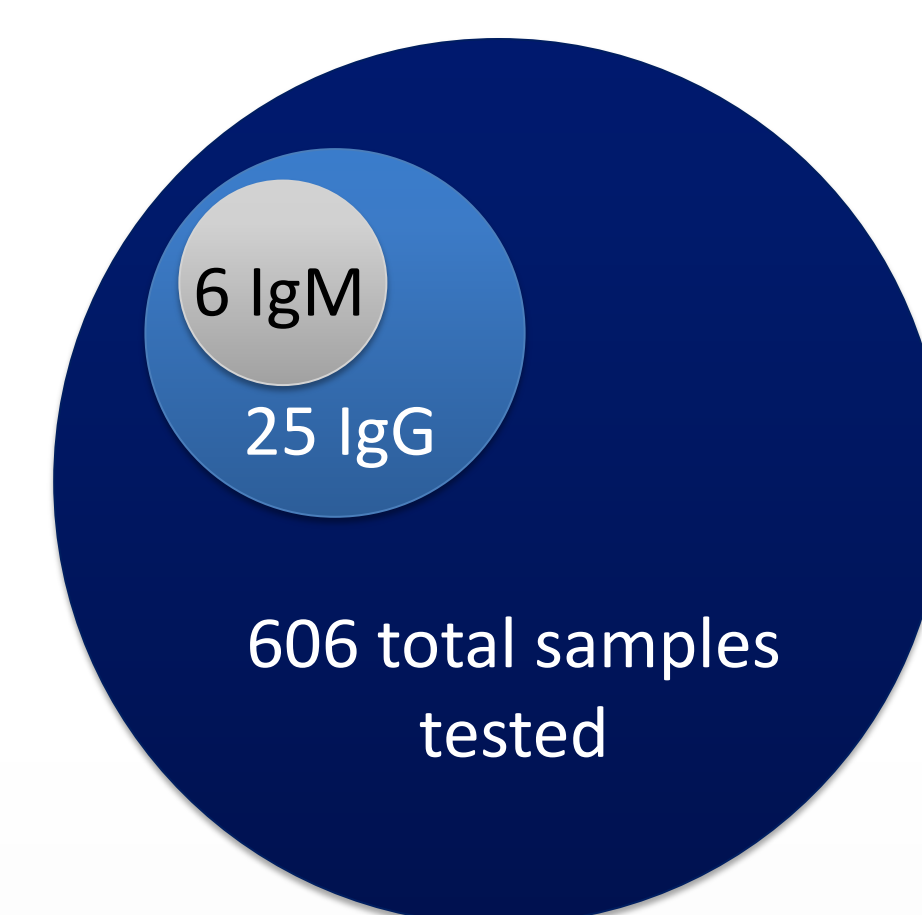
### Experimental Design



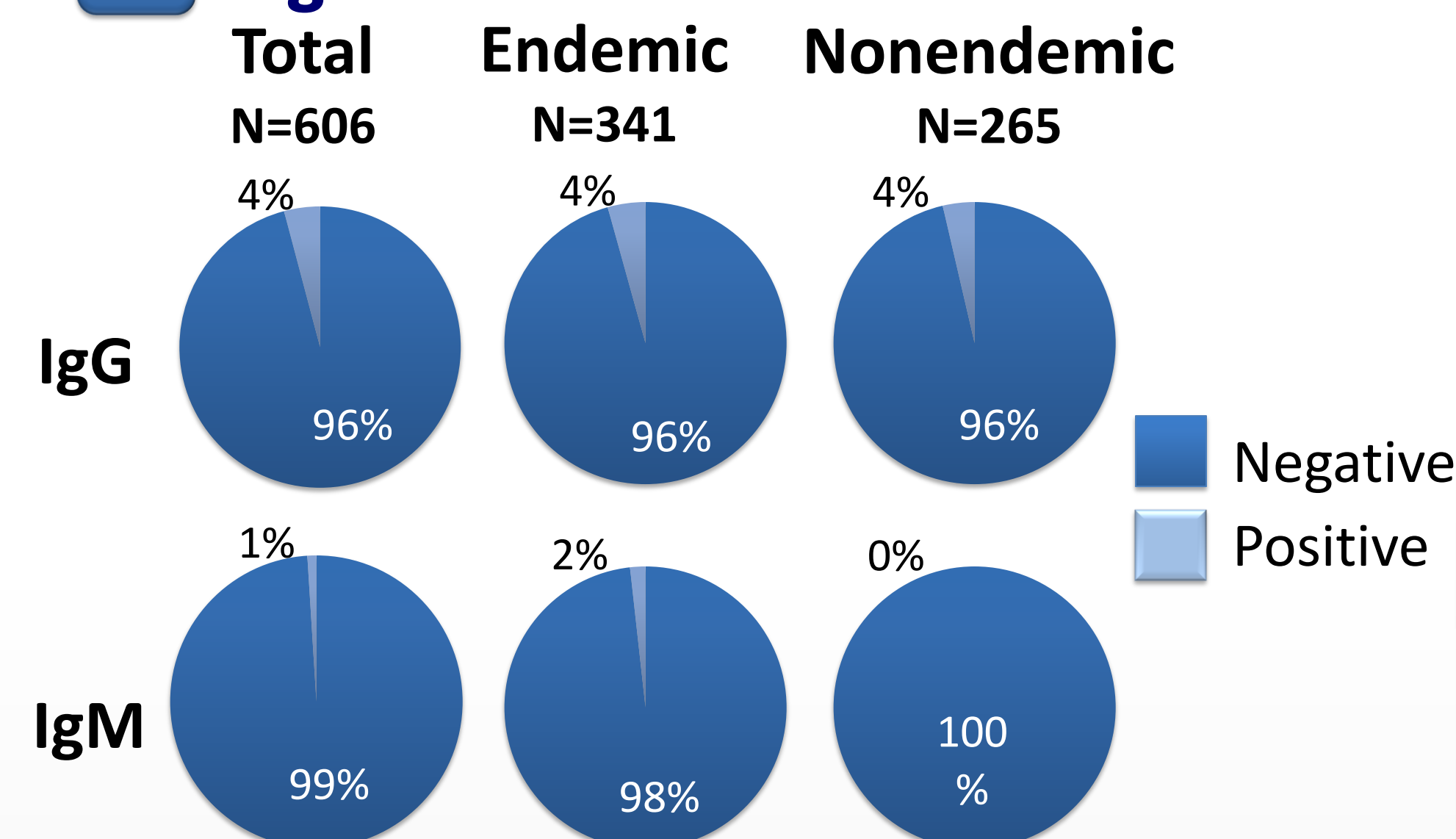
- Samples collected 5/14/2009-6/23/2009
- Black line divides non-endemic from endemic sample populations.
- Samples were tested for IgG and IgM activity against POW.

## Geographic and Demographic Powassan Seroprevalence

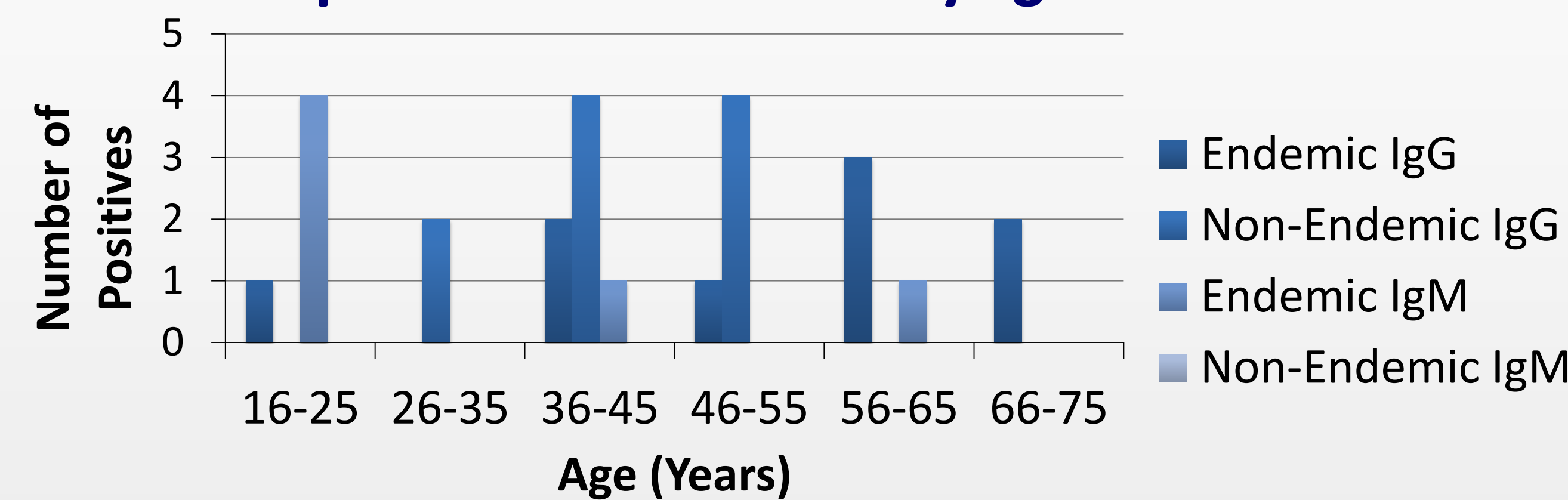
### 1 Overall putative POW seroprevalence by antibody



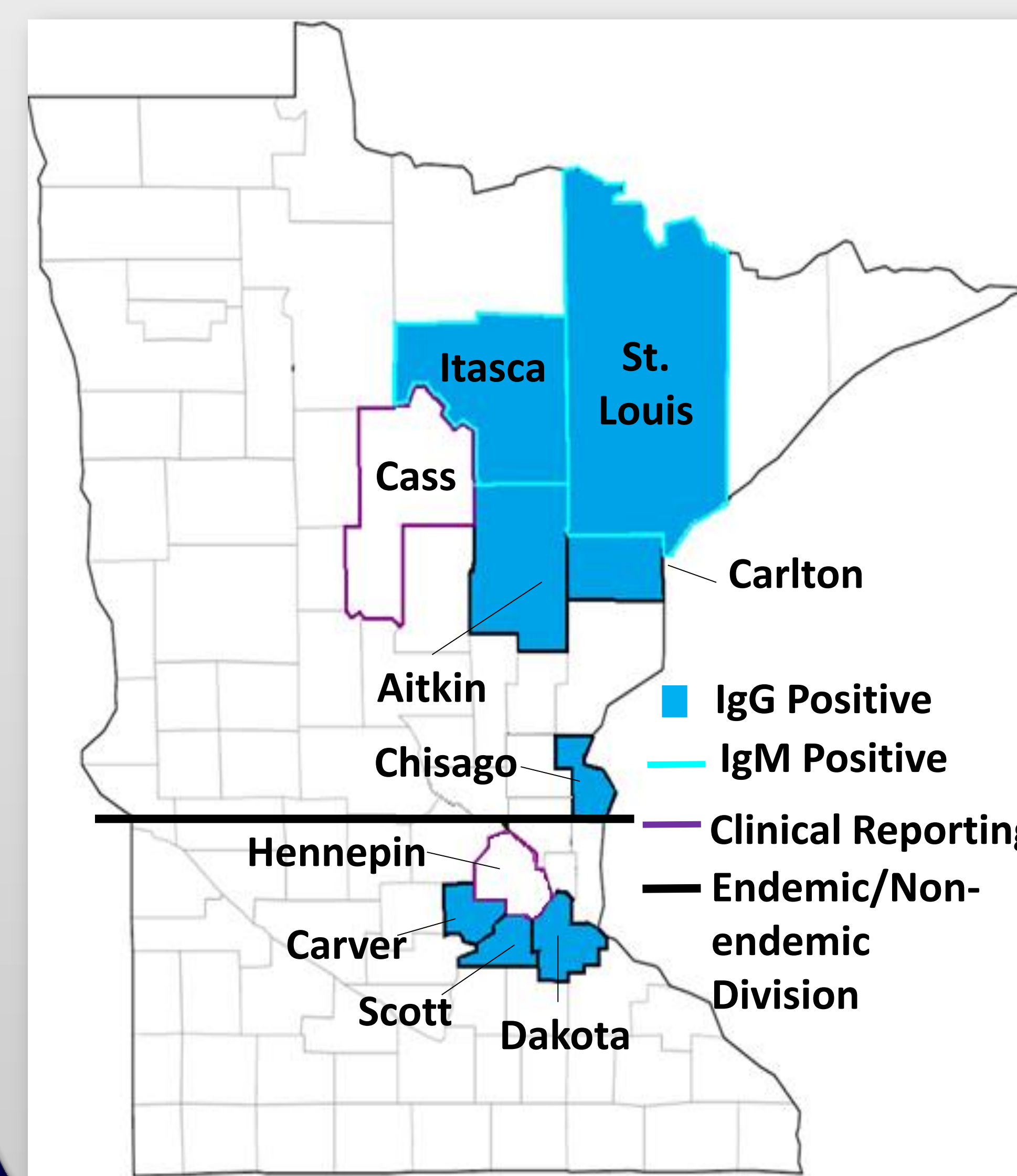
### 2 Seroprevalence by antibody and region



### 3 Putative POW-positive blood donors by age



### 4 IgM and IgG putative positives in comparison to 2009 reported POW cases by county.



County	# IgG Positive	# IgM Positive	Total Tested
Aitkin	1	0	3
Carlton	1	0	16
Carver	3	0	40
Chisago	1	0	1
Dakota	4	0	89
Itasca	2	2	35
Scott	3	0	51
St. Louis	10	4	140

Numerical representation of data presented in map

## Conclusions

“Cabin culture” may contribute to POW exposure of non-endemic residents.

Antibody evidence of exposure to POW was found in healthy Minnesota blood donors. All non-endemic POW-positive donors only have evidence of IgG activity. Based on IgM duration models in West Nile Virus, this indicates exposure happened at least 5 to 6 months prior to collection (5). Considering dependence of ticks on climate, this likely means exposures occurred the previous summer, perhaps during a trip to a cabin or other travel in an endemic area.

As of 2009, POW had emerged over a wider geographic range than indicated by clinical reporting.

Two Powassan infections were reported in 2009, one in Cass County and one in Hennepin County (the latter is likely travel-associated). However, this surveillance project suggests Powassan is endemic beyond Cass County, including Itasca, Aitkin, St. Louis, and Carlton counties.

There was no difference in POW seroprevalence by age.

There may be a correlation with early-season infections and younger donors, but a larger sample size is necessary before any strong conclusions can be drawn.

## Future Directions

The value of this study lies in unearthing evidence to justify a broader population-based surveillance project that addresses some of the limitations of this study. A follow-up study would consist of a more representative population than blood donors, including samples from north- and southwestern regions, span a larger portion of the summer, including peak recreation and traffic periods around Fourth of July and Labor Day, and include personal identifiers like age, sex, and travel and recreation habits. Also of interest is determining the utility of continued IgG assay use considering its high false positivity rate.

## Acknowledgements

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## References

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