



A West Nile Virus Outbreak in Eared Grebes and Bald Eagles in Utah: Enhanced Surveillance and Outcomes

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Learning Objectives

- At the conclusion of this presentation, participants will be able to:
 - Demonstrate knowledge of the transmission cycle of West Nile virus (WNV)
 - Describe the events of the WNV outbreak among grebes and bald eagles
 - Consider potential new routes of WNV transmission not previously discussed in literature

West Nile Virus (WNV)



Transmission Cycle of WNV

West Nile Virus Transmission Cycle

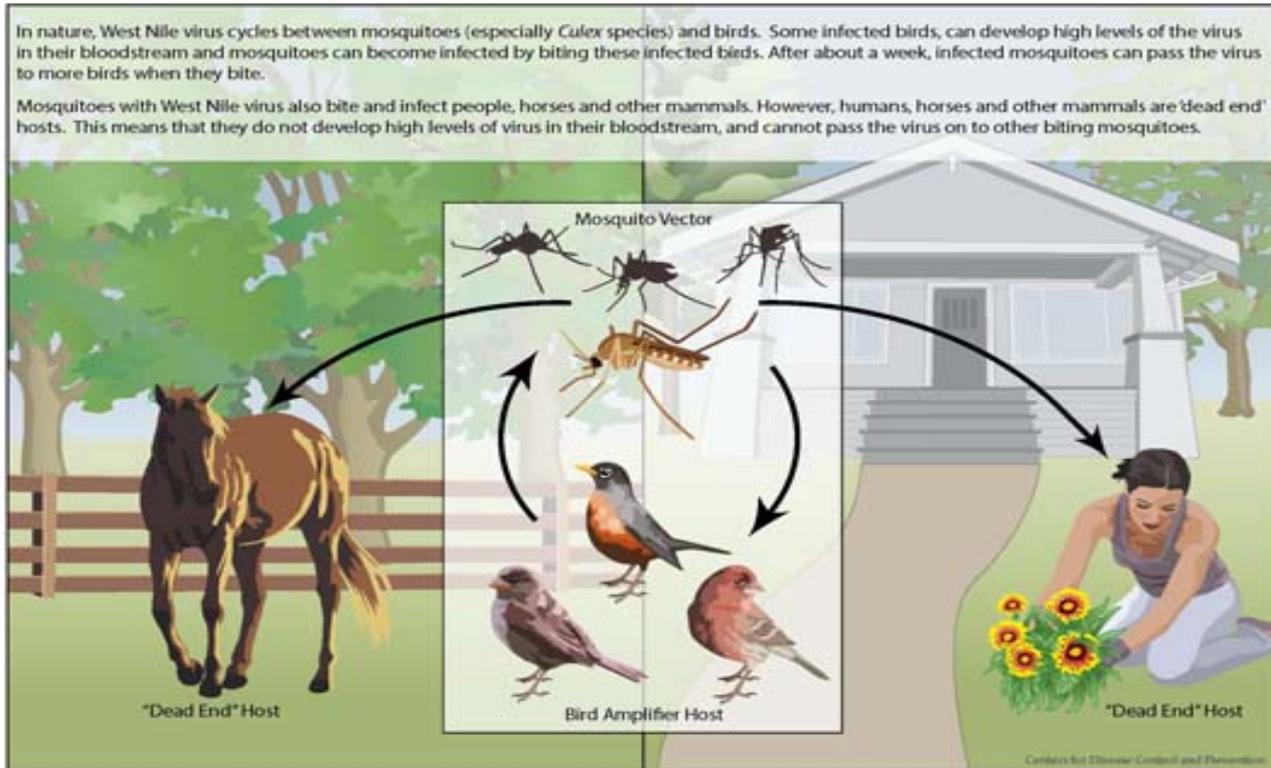


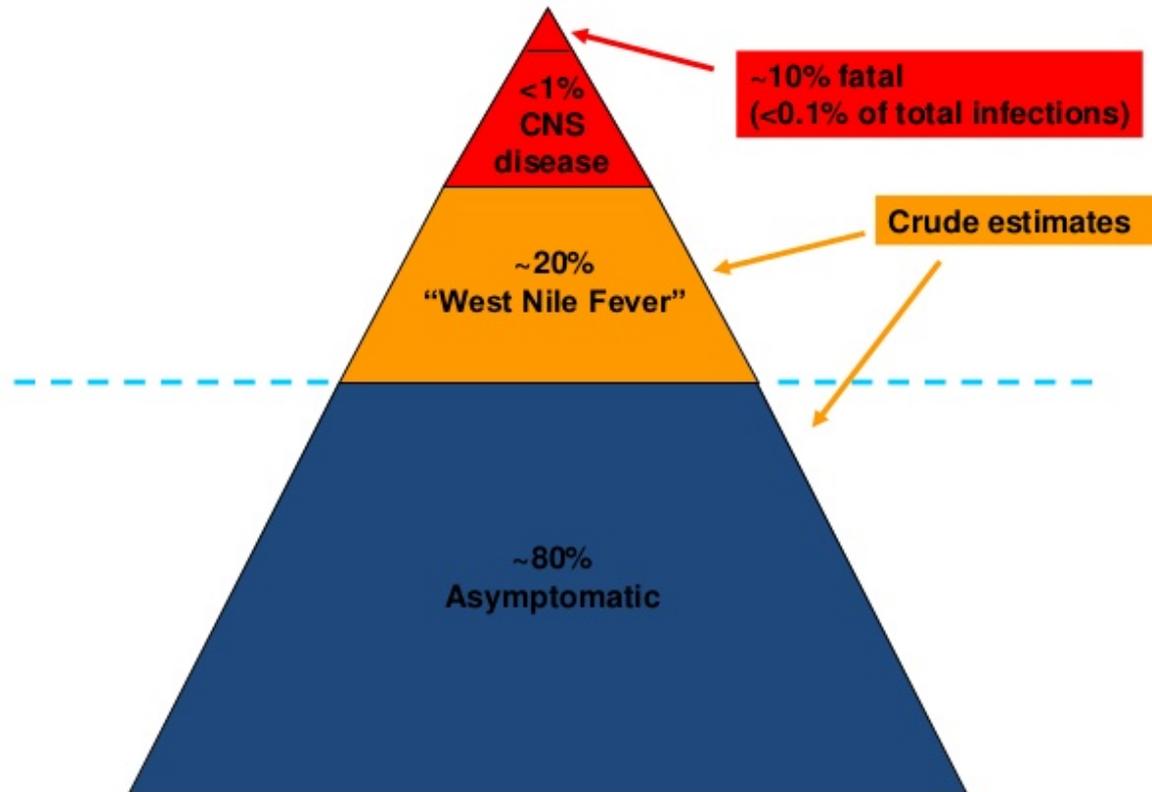
Photo found on cdc.gov

WNV Fever



WNV Neurological Disease

WNV Human Infection “Iceberg”



Utah's WNV Program



FIGHT *the* BITE!

WEST NILE VIRUS

Take the bite out of camping

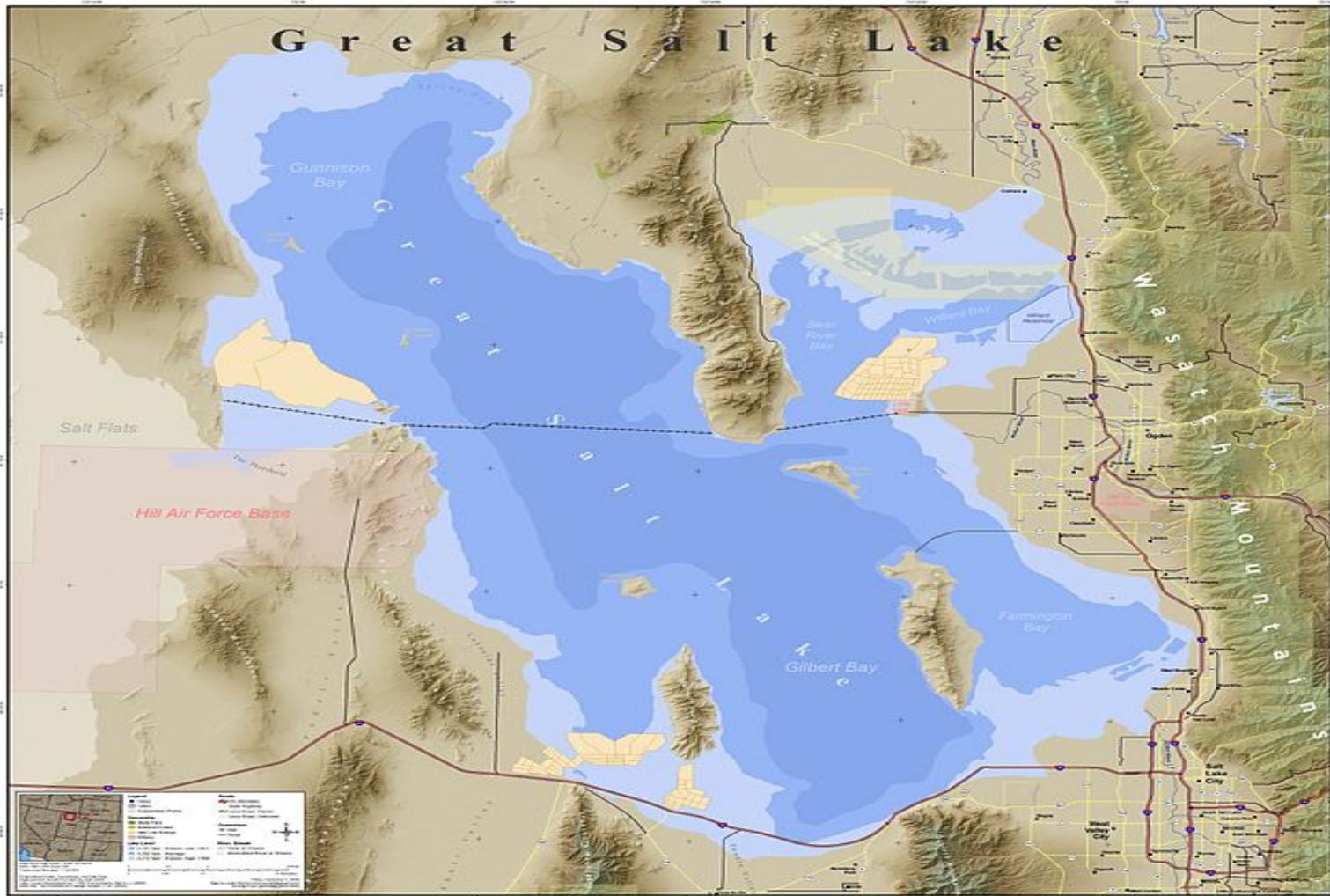
Evening through morning:

- Use bug spray with DEET
- Cover up when bugs are biting
- Wear long pants and long sleeves
- Use a tent with screened doors and windows

Call your doctor if you have fever, headache or stiff neck

For more information, visit www.health.utah.gov/wnv
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The Great Salt Lake



Eared Grebe (*Podiceps nigricollis*)





Eared Grebes



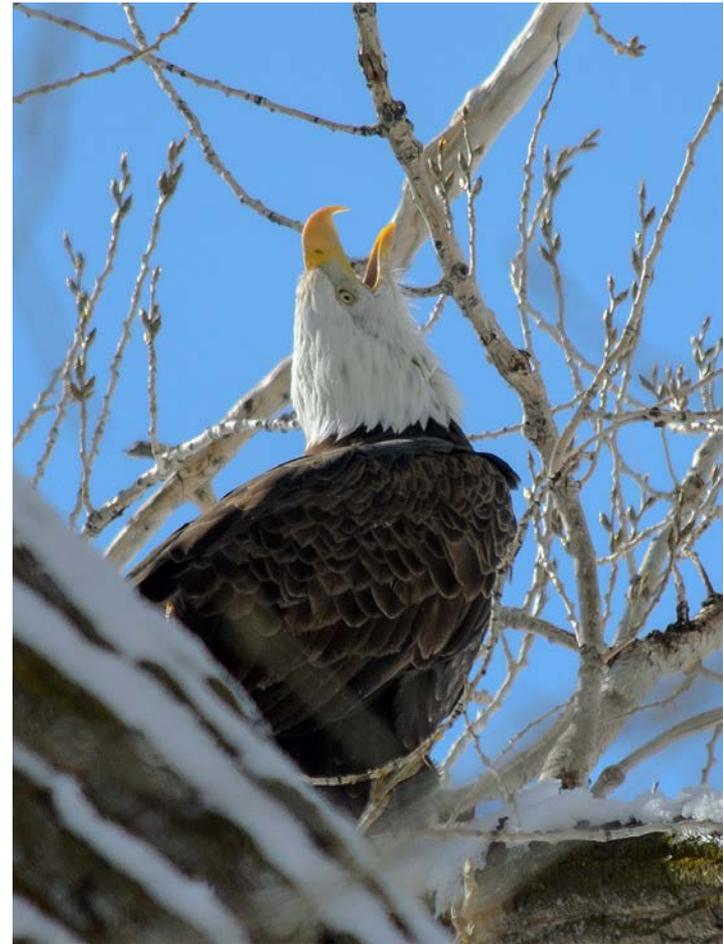
Eared Grebes



Eared Grebe Die-off



Bald Eagle (*Haliaeetus leucocephalus*)



What was found



Photo Credit: Wildlife Rehabilitation Center of Northern Utah – Dalyn Erickson-Marthaler

What was found



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What was found



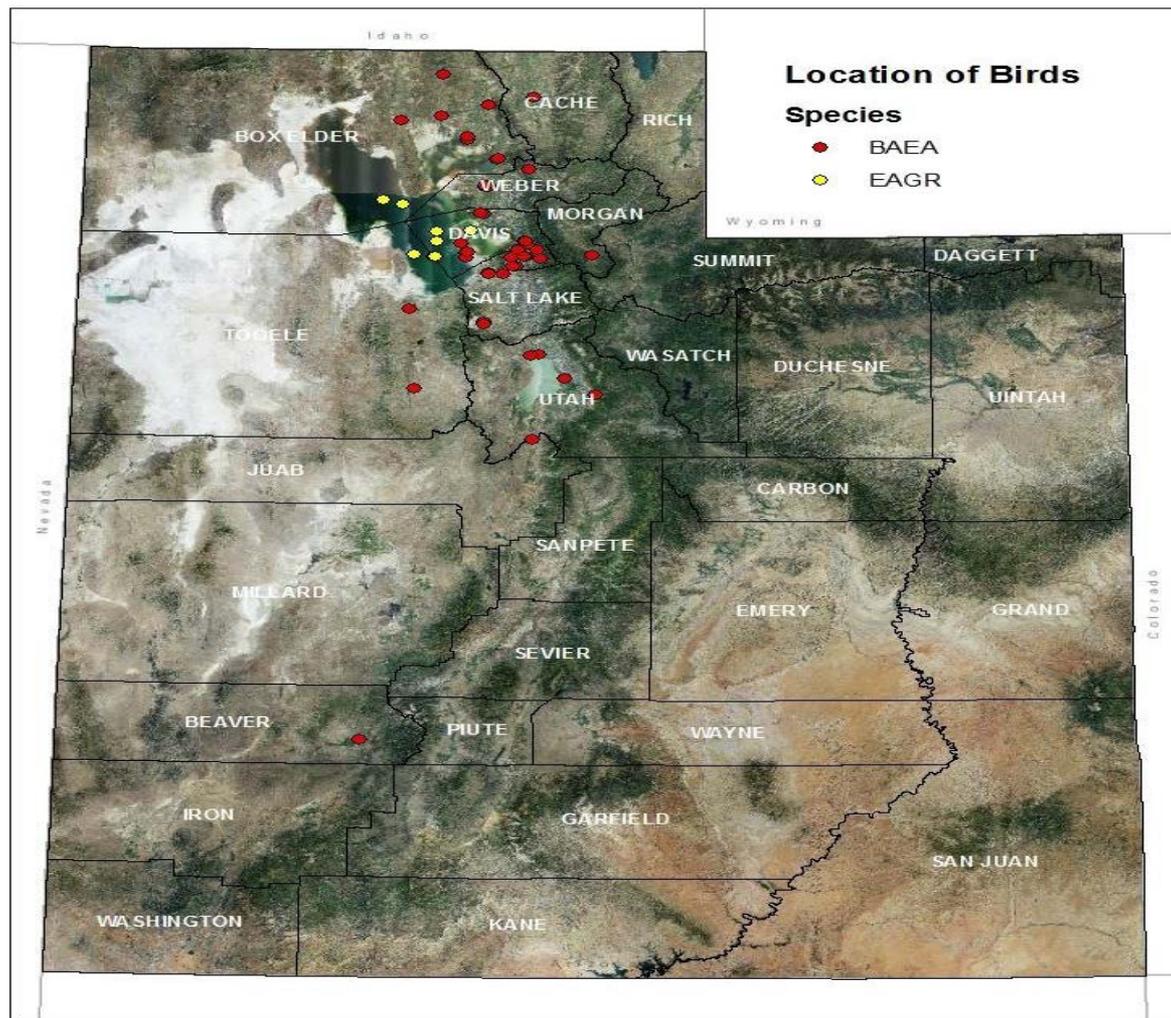
Photo Credit: Wildlife Rehabilitation Center of Northern Utah – Dalyn Erickson-Marthaler

What was found

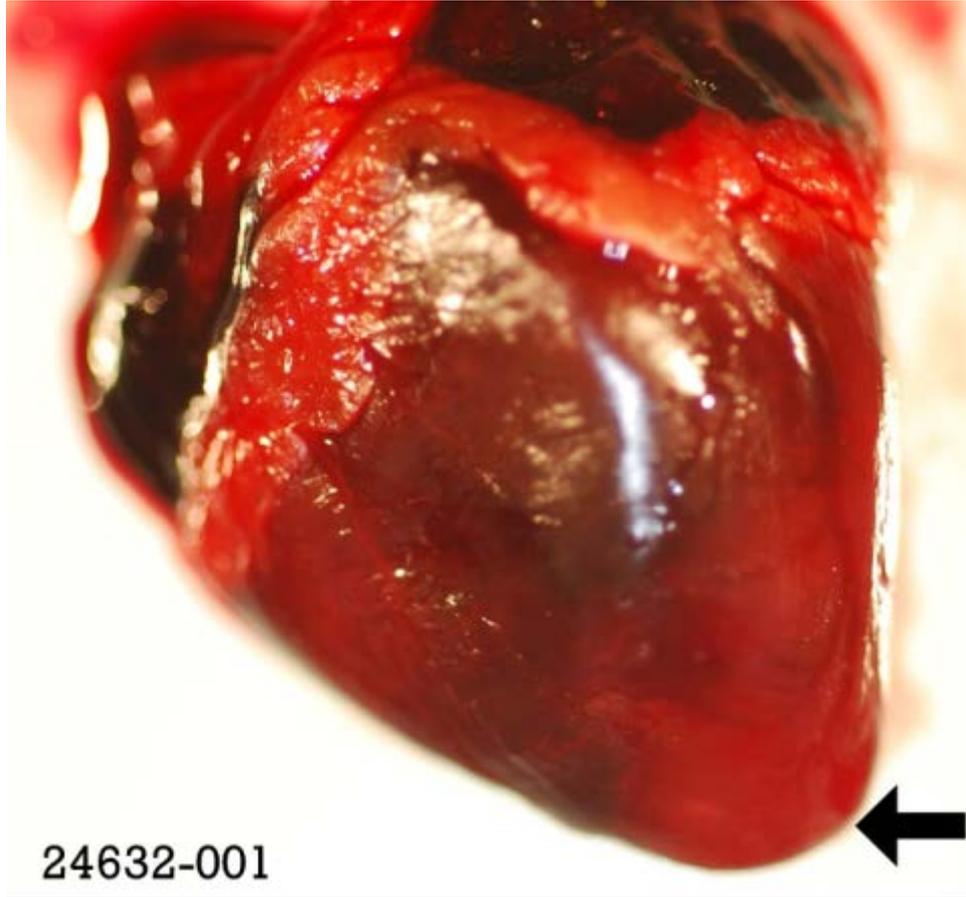


Photo Credit: Wildlife Rehabilitation Center of Northern Utah – Dalyn Erickson-Marthaler

Locations of Bird Mortality/Morbidity Events through March 2014



Eared Grebe Necropsy





Histopathology & Immunohistochemistry

- Eagles
 - Heart: Necrosis & inflammation
 - Brain: Encephalitis & gliosis
 - Viral distribution: Heart, brain, peripheral nerves, lung, oral mucosa, kidney, thyroid gland, ventriculus, intestine

Bald Eagle Necropsy

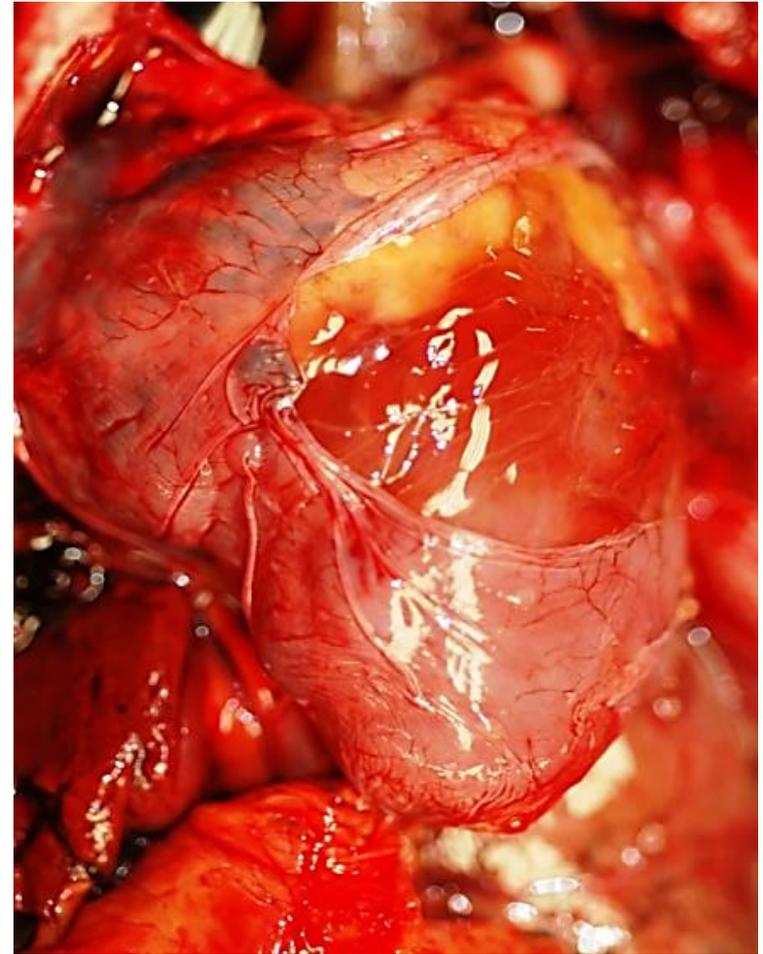
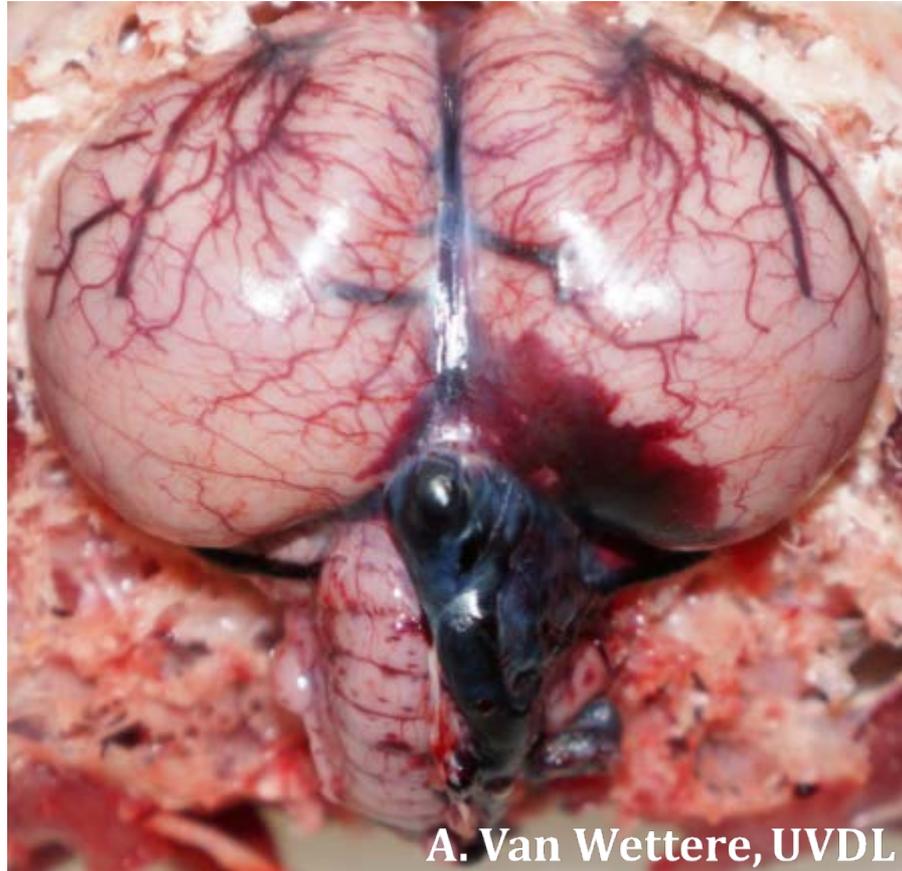


Photo credit: Dalyn Erickson-Marthaer, WRCNU



Bald Eagle Necropsy



A. Van Wettere, UVDL

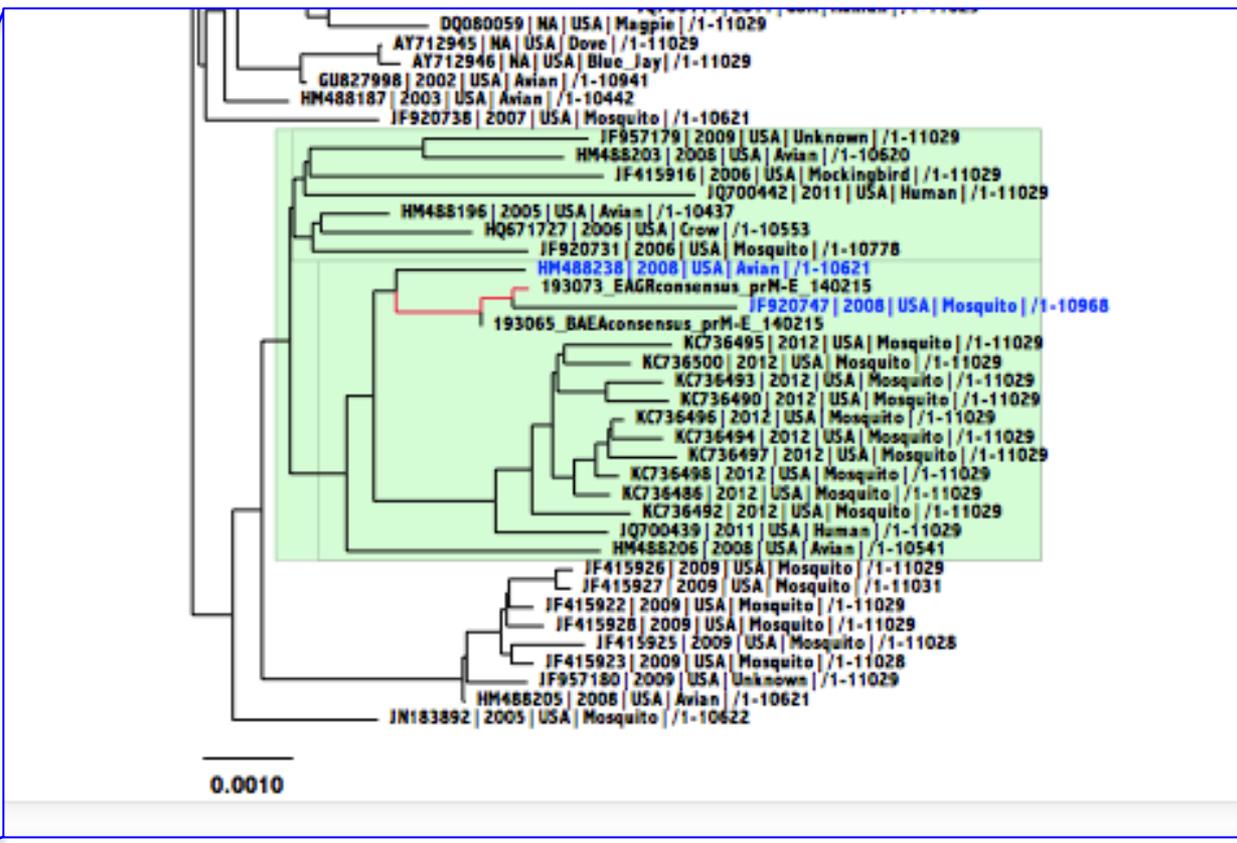
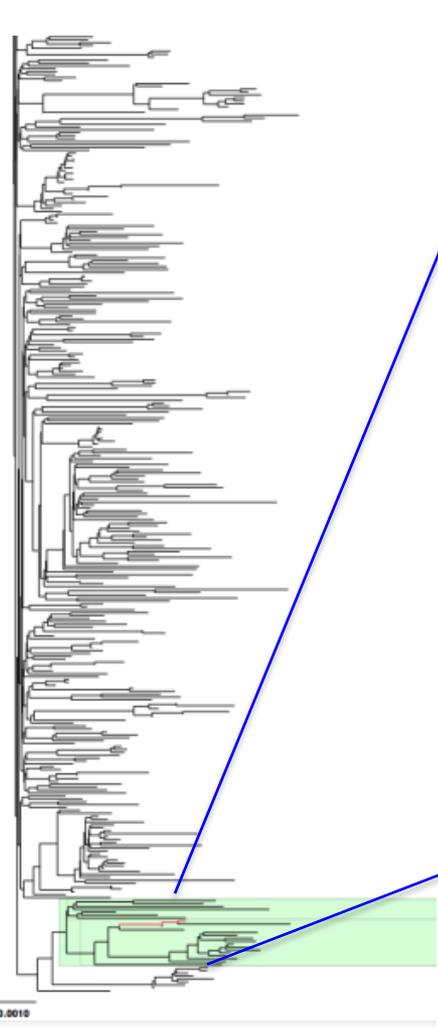


What Was Ruled Out

- Lead poisoning and other heavy metals
- Organophosphate and poisoning
- Avian cholera
- Avian botulism
- Avian vacuolar myelinopathy
- Avian paramyxovirus and exotic Newcastle virus
- Other bacterial and viral infections

Testing Summary

- 44 birds from 7 counties tested
 - 10 Bald eagles (7 counties)
 - 9/10 WNV positive by RT-PCR
 - 30 Eared grebes (all from Davis County)
 - 30/30 WNV positive by RT-PCR
 - 4 Eurasian collared doves (Utah County)
 - 0/4 ECDO WNV-positive by RT-PCR
- Apparent titer is higher in cloacal swabs than tracheal swabs





WNV Activity Near Great Salt Lake, Utah, 2013

- 2 humans in Weber County
 - 1 human in Salt Lake County
 - 2 equine cases and 7 positive mosquito pools in Box Elder County
 - 2 positive mosquito pools in Utah County
 - 2 sentinel chickens placed near Antelope Island Causeway in Davis County

What was blamed for the event

- Fukushima Daiichi nuclear disaster in Japan
- Mercury and heavy metals
- Obama's policy on wind power
- Obama in general
- Oil and gas wells
- Fracking
- Contrails made by airplanes
- Other Government conspiracies



The Perfect Storm



Management Activities



Photo Credit: Scott Root

Next Steps

- Examine the phylogenetic relationship of the WNV strains affecting bald eagles and grebes in Utah in 2013-14
- Deriving isolates from WNV-positive mosquito pools from counties surrounding the Great Salt Lake
- Deriving isolates from WNV-positive raptors in adjacent regions

Next Steps

- Final list of viruses to be sequenced will be selected once a total set of viruses is available.
- Experimental infection trials
- Human health impact
- Climate change and mosquito transmission

Acknowledgements

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