NATURAL INFECTION RATE OF WEST NILE VIRUS IN A COLONY OF CAPTIVE DIVING DUCKS: MONITORING WNV IN THE TRIBE MERGINI AND THE GENUS *AYTHYA*

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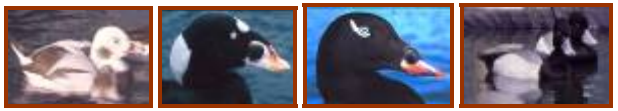


Long-tailed duck, surf scoter, white-winged scoter, and lesser scaup at US Geological Survey-Patuxent Wildlife Research Center, Maryland

INTRODUCTION

- Since the emergence of West Nile Virus (WNV) on the Atlantic seaboard in 1999 researchers have conducted studies to determine susceptibility and effects of the virus on different migratory species (Rappole et al. 2000), but due to remoteness of diving ducks little is known about the infection rate and effects of WNV on these species.
- There have been incidences of mortality in diving ducks reported to the Centers for Disease Control and Prevention (CDC) WNV avian mortality data base since 1999 (CDC 2007), but the effects and natural infection rate of WNV on Mergini and *Aythya* are unknown.
- Research was needed to determine if diving ducks were naturally susceptible to WNV infection, which might be a factor contributing to their decline or contribute to the spread of the virus.

OBJECTIVES

1) Monitor WNV infection prevalence, serology, and viremia in captive diving ducks.
2) Determine the presence of WNV mosquito vectors and the WNV activity in the mosquito population in captive diving duck facility.

METHODS

Study population

- 16 long-tailed duck (*Clangula hyemalis*), 9 surf scoter (*Melanitta perspicillata*), 18 white-winged scoter (*Melanitta fusca*), and 37 lesser scaup (*Aythya affinis*); M/F of each species; 9mo. to 4 yrs.
- Raised in open-air pens at USGS-Patuxent Wildlife Research Center.

Bleeding and swabbing a captive white-winged scoter for WNV

Sample collection and processing

- The captive diving ducks were initially sampled for evidence of antibodies against WNV early April 2006, prior to the Maryland mosquito-borne WNV transmission season.
- Blood was collected from each duck by jugular venipuncture and blood smears were made.
- The diving ducks were sampled again early in the WNV transmission season, mid-transmission season, and the end of transmission season for WNV antibodies, and oropharyngeal swab samples were collected from each duck proceeding the bleeding.
- Serum was tested using an ELISA and PRNT, and swabs were tested for viremia using PCR.
- Ducks that died during study were necropsied. Tissues were examined histologically for evidence of WNV and tested using PCR.

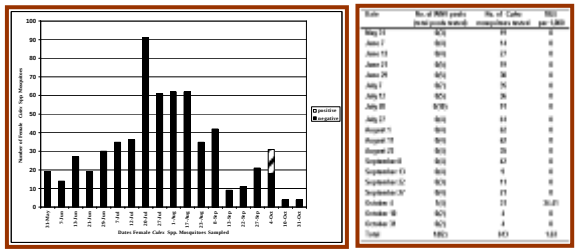
Trapping, identifying, and testing *Culex* mosquitoes for WNV

Mosquito sampling

- Female *Culex* mosquitoes are the primary vectors for WNV transmission (Hayes 1989).
- Four CDC Gravid Traps were set out at the beginning of mosquito season in the four corners surrounding the duck pens [35x35m].
- Mosquitoes were trapped, identified, and tested weekly.
- Female *Culex* spp. mosquitoes were pooled and tested for presence of WNV antigen using the VecTest, a field assay with test strip.
- Mosquito pools that tested positive with the VecTest were retested with confirmatory PCR.
- The maximum likelihood estimation (MLE) was calculated using PooledInfRate to determine WNV activity in mosquito populations around duck pens.

RESULTS

- WNV exposure rates appear to be low.
- Only 1 seropositive female lesser scaup all four sampling seasons; titers: 1:80, 1:320, 1:80, and 1:160, respectively.
- No evidence of WNV in the sera or swab samples from any of the other lesser scaup or seaducks.
- No evidence of WNV in the 5 necropsied ducks.
- Mosquito-borne blood parasite, *Plasmodium relictum*, existed on the blood smears for all 4 species.
- *P. relictum* also carried by *Culex* (Huff 1965).
- 613 pooled female *Culex* tested, 19 weeks of sampling.
- One positive pool the first week in October.
- MLE for first week in October: 34.41; overall MLE: 1.63.



Summary of female *Culex* mosquitoes tested and the MLE

CONCLUSION

- Study suggests WNV is not a serious threat to diving ducks in Chesapeake Bay area, but more studies needed.
- WNV season along Chesapeake Bay could extend into the fall and be present when ducks return for winter.
- WNV might be more of a threat to lesser scaup, found on inland bays, than seaducks wintering on deeper water.

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