West Nile Virus Surveillance In Pierce County

By Colton Kerns

Work done in conjunction with the Tacoma Pierce County Health Department and Washington State Department of Health

Abstract

During the summer of 2019, the Tacoma Pierce County Health Department (TPCHD) partnered with the Washington State Department of Health (DOH) to take over collection of mosquitoes for West Nile Virus monitoring in the local area. The state delegated two sites in Pierce county, one at the Snake Lake Nature Preserve and another in Bonney Lake at the Public Works building. Traps were set once a week and retrieved the following day. The collection resulted in the capture of 2166 mosquitoes in Pierce County between June 4th and August 6th, 2019. This season was part of an ongoing monitoring program by DOH designed to protect Washington residents from the dangerous effects of West Nile Virus. No cases of West Nile positive vectors were detected during the 2019 summer sampling period in Pierce County. However, as positive vectors were discovered in two Eastern Washington counties (Carry, 2019), more funding should be allocated towards studies that provide better vector detection sites based on geographic factors and the mitigation of those potential vector populations.

Objectives

• To obtain a baseline understanding of West Nile Virus and its spread across the United States.
• How to identify West Nile Virus positive vectors and identify possible habitats for vector reproduction.
• Capture possible vectors to monitor for West Nile Virus in the local vector population.
• Use gathered data to better use resources in the continuation of monitoring programs.

Vectors

West Nile Virus (WNV) is an Flavivirus arbovirus; In short, the virus is transmitted mainly by arthropods. The natural life cycle of WNV is between arthropod hosts (mosquitoes) and Avian carriers. Most species of birds are adversely affected by WNV and die shortly after contraction.

• Humans and non-avian life stock (horses) are incidental hosts, meaning once the virus is transmitted to us, it has reached a dead end for its reproduction.
• The Most competent vectors are Mosquitoes of the Culex family in North America this is Culex pipiens and Culex tarsalis.

Human Health Concerns

• Only 20% of infected humans display symptoms, these ranging from fever, headache and/or body aches, and skin rashes.
• Only 1% of infected develop more severe infections of West Nile encephalitis or meningitis, which if untreated can lead to death.
• Median age of those at risk is around 70 years old.
• Because most infected do not display symptoms, and those who do display symptoms have minor ailments; Most cases of WNV go unreported.
• Reporting process is complicated, and tests take long periods of time to complete. Most cases are misdiagnosed.

Methods

• There are three main methods for monitoring: dead bird detection, sentinel flocks, and vector trapping (Wheeler et al 2016). In this study, only vector trapping was used.
• Two sites had been picked in past seasons by Washington State Department of Health (DOH). The Snake Lake Nature Reserve in West Tacoma and The Bonney Lake Public Works building near Lake Tapps and Lake Jane, see figure 1 and 2.
• The requirements for the sites were: Must be near stagnant slow-moving water, must be accessible by staff for timely recovery of traps, and must be on government/publicly owned land.
• DOH also maintained traps in Gog and Tapps which were used mostly between the beginning of June until the end of the month.
• To obtain a baseline understanding of West Nile Virus and vector activity in the area. In doing so, the goal of lowering chances of an outbreak can be achieved. Now that the virus has been detected in far Eastern Washington (Carry 2019), the time for accurate monitoring is now. Implementing the changes above learned by other agencies (Hartley et al 2012, City Of Boulder 2016) can help our state mitigate risk to those affected and save the lives of those who symptoms may go from unnoticed to serve. Detection allows medical staff to know what illnesses are spreading, thus ensuring better treatment. Safe and healthy communities are after all the goal of the Tacoma Pierce County Health Department’s Food and Community Safety.

Results

In total, 2166 mosquitoes were captured between June 6th to August 4th, see figure 5.

• Of these, 1179 were C. pipiens, the main target vector for the Northwestern United States (figure 5)
• Over the collection season, most of the vector trapping happened early between the beginning of June until the end of the month. July started with reduced catch numbers (figure 4)

• No West Nile Virus positive vectors were detected during the collection period.

Conclusions

West Nile Virus is a concern in our area. It can have dangerous effects on the older members of our community as well as the immuno-compromised. Therefore, monitoring for the virus in its vector populations should be a priority not only for state level agencies but local public health agencies as well. By detecting the virus early, local agencies can then inform the populace about both virus and vector activity in the area. In doing so, the goal of lowering chances of an outbreak can be achieved. Now that the virus has been detected in far Eastern Washington (Carry 2019), the time for accurate monitoring is now. Implementing the changes above learned by other agencies (Hartley et al 2012, City Of Boulder 2016) can help our state mitigate risk to those affected and save the lives of those who symptoms may go from unnoticed to serve. Detection allows medical staff to know what illnesses are spreading, thus ensuring better treatment. Safe and healthy communities are after all the goal of the Tacoma Pierce County Health Department’s Food and Community Safety.

Future Studies

This was the first year for WNV monitoring in Pierce County by TPCHD, in order to better monitor for the virus somethings should be studied to determine both better trapping locations and procedures.

• Of the two sites TPCHD was assigned by the state, only 1 managed to be productive for most of the season. A site assessment should be conducted of the Bonney Lake site to determine if a better location is available near by. This could be done by comparing known preferred locations for vector reproduction to government land using a tool like GIS.

• Another method which may be affective in increasing vector trap yield would be diversifying trap types. Instead of relying on a single type of trap, multiple types should be implemented to see which produces the highest yield per location.

References

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