Gallatin Local Water Quality District
215 W. Mendenhall, Suite 300
Bozeman, MT 59715
(406) 582-3168 www.glwqd.org

West Nile Virus: Wetlands and Waterways

Public concern over the spread of West Nile Virus (WNV) in Montana has brought attention to mosquitoes and their habitat.

An attitude may prevail that any type of standing water, such as wetlands and waterways, may be producing large numbers of virus-infected mosquitoes and that all potential mosquito production sites should be drained, filled, sprayed or managed in such a way to eliminate the possibility of WNV transmission.

Background on West Nile Virus.[1]

West Nile Virus is a mosquito-borne virus that first appeared in the northeast United States in 1999. The virus, probably with the aid of migrating birds and mosquitoes, spread as far west as Montana in three years. The first case of equine WNV in Montana was reported in August 2002 and the first documented human infection occurred later the following month.

Most people who become infected with WNV will have either no symptoms or mild flu-like symptoms. Even in areas where the virus is circulating, very few mosquitoes are infected with the virus, according to the Centers for Disease Control (CDC). Even if the mosquito is infected, less than 1% of people who get bitten and become infected will get severely ill. The chances that you will become severely ill from any one mosquito bite are extremely small. While WNV can be contracted by anyone of any age, it is more likely to develop into a serious condition in older people with compromised immune systems.
When compared to other causes of death, the risk of death from WNV infection is relatively low. The CDC reported about 250 deaths nationwide from WNV between 1999 and early 2003. During that same time frame, there were approximately 10,400 deaths due to talking on a cell phone while driving, 80,000 deaths due to influenza, and 160,000 deaths from cancer.

Not all mosquitoes are capable of transmitting WNV, not all mosquitoes feed on humans, and the mosquito-producing habitats vary for mosquito species.
For example:

- Species of *Aedes* and *Ochlerotatus* are produced in irrigation and flood waters in early spring and summer.
- Species of *Culex* (container mosquitoes) deposit eggs in water-holding containers (tires, bird baths, buckets, etc.)
- *Culex pipiens* is a common household mosquito and the primary vector of WNV.[2]

Importance of Wetlands

In a 2002 survey of Montana residents, 84% and 83% of respondents agreed or strongly agreed with the statements, "Wetlands and riparian areas are important resources in Montana" and "It's important to me that wetland and riparian areas in Montana are conserved and protected"[3]

Wetlands are considered important because of the contributions to society they provide:

- ***Improve Water Quality*** - Wetlands contribute to better water quality by physically, chemically and biologically cleansing water of pollutants and debris.
- ***Flood Control*** - Wetlands contribute to flood attenuation by retarding the flow of fast-moving water that can be erosive and destructive and by reducing sedimentation that contributes to the pollution of water bodies.
- ***Water Storage*** - Wetlands can store large volumes of water during spring runoff and during storms and release it slowly back into the water channel and into the ground to recharge aquifers.

Gallatin Local Water Quality District
215 W. Mendenhall, Suite 300
Bozeman, MT 59715
(406) 582-3168 www.glwqd.org

- ***Ground Water Recharge*** - Wetlands often contribute to ground water recharge by allowing it to infiltrate into deeper ground layers.
- ***Forage Habitat*** - Wetlands can provide water and forage for livestock. Wet meadows can produce excellent hay crops.
- ***Wildlife Habitat*** - Wetalnds are wildlife habitat for wetland-dependent species that include imperiled, threatened, endangered, increasing and stable species. Fish, amphibians, mammals and birds may use wetlands during part of all of their life cycles.
- ***Biological Diversity*** - Wetlands sustain biological diversity of plant and animal species and plant and animal communities wherever they are located in the landscape.
- ***Recreational Opportunities*** - Wetlands provide recreational opportunities including photography, wildlife watching, hunting, fishing and nature walks.
- ***Open Space*** - Wetlands provide open space; therefore, protection of wetlands simultaneously protects open space and provides all the benefits derived from open space.
- ***Education & Research*** - Wetlands lend themselves to be studied and observed at many levels and provide tremendous informal educational opportunities and formal educational opportunities in the fields of biology, botany, zoology, ecology and chemistry.
- ***Economic Value*** - Wetlands provide economic value by providing all of the above nad providing food, fish, and medicines. Some of the functions wetlands perform would otherwise cost society.

In Montana, because of our arid environment, wetlands are relatively rare features on the landscape, representing less than 1% of the land surface. This makes each wetland that much more valuable and important for the benefits listed above.

Mosquitoes and Wetlands

Mosquitoes are an important part of the food chain, providing a food source for many birds, bats, amphibians, other aquatic insects and some fish species. In addition, healthy wetlands typically have a balanced predator-prey relationship that provides natural mosquito control measures.

Research has shown that impaired wetlands had higher mosquito populations than unimpaired wetlands.[5] Impaired wetlands also demonstrated lower invertebrate and plant diversity than reference (unimpaired) wetlands. Altered or degraded wetlands often have stagnant water, increased nutrient levels and fewer natural mosquito predators. Therefore, natural and well-restored wetlands contribute to minimizing mosquito production by:

1. Preventing or reducing floods and pooled water in areas not normally wet which support mosquitoes but not their predators.
2. Providing habitat for natural enemies of mosquitoes. Maintaining the natural function of wetlands should be of vital concern to the public and mosquito control agencies.

The average flight range of adult mosquitoes is up to 2 miles from hatch sites.[6] This highlights the importance of eliminating mosquito habitat in backyards as the primary role in minimizing mosquito population booms. Any water that stands for more than a week is sufficient to breed mosquitoes. Mosquito habitat in your backyard can be reduced by:

1. Dumping rain barrels, changing standing water in bird baths, animal water troughs, and wading pools weekly.
2. Drill holes in or get rid of spare tires.

More tips on reducing mosquito producing areas around your home can be found at www.ncpmc.org/NewsAlerts/westnilevirus.html. As

Gallatin Local Water Quality District
215 W. Mendenhall, Suite 300
Bozeman, MT 59715
(406) 582-3168 www.glwqd.org

a final note, most wetlands are typically far from housing and urban centers, so the mosquitoes produced in wetlands tend to stay in wetlands.

Irrigation Canals

Flood irrigation, drainage ditches, and irrigation tail water provide prime mosquito producing habitat because these areas typically contain standing water with high nutrient levels. More importantly, these areas do not have mosquito predator populations to naturally control mosquito populations like healthy wetlands do. Minimizing time spent in these areas during dusk and dawn when mosquitoes are most active and taking other mosquito protection measures is advised.

Protection Measures

Self-protection is still the best way to reduce your risk of contracting WNV.[7] The CDC has developed a list of self-protection measures which include:

- Apply insect repellant containing DEET when you're outdoors.
- When possible, wear long-sleeved clothes and long pants treated with repellents containing permethrin or DEET since mosquitoes may bite through thin clothing. DO NOT apply repellents containing permethrin directly to exposed skin. If you spray your clothing, there is no need to spray repellent containing DEET on the skin under your clothing.
- Consider staying indoors at dawn, dusk and in the early evening, which are peak mosquito biting times.
- Limit the number of places available for mosquitoes to lay their eggs by eliminating standing water sources from around your home.
- Install or repair window and door screens so that mosquitoes cannot get indoors.

Mosquito Control

Mosquito control programs are not intended to eliminate mosquitoes entirely, but rather to reduce their numbers below human annoyance thresholds and therefore reduce the risk of disease transmission. Controlling mosquitoes where they are produced is more effective than attempting to control adult mosquito populations through aerial spray programs. Biological larvicides are target species specific, meaning that beneficial insects, fish and other organisms that live in the water are virtually unaffected while mosquito larvae is destroyed. Montana Department of Agriculture (406-444-5400) has a list of mosquito control products currently registered for use in the State of Montana.

Pesticide application requires a permit and other regulatory considerations. In order to apply pesticides to state waters, a 308 permit from MT Dept. of Agriculture is required (406-444-3080). State waters include "a body of water, irrigation system or drainage system, either surface or underground." State waters do not include a pond or lagoon used solely for treating, transporting or impounding pollutants or irrigation waters when waters are used up and not returned to state waters.

Gallatin Local Water Quality District
215 W. Mendenhall, Suite 300
Bozeman, MT 59715
(406) 582-3168 www.glwqd.org

For More Information:

1) The Montana Department of Public Health and Human Service (http://www.dphhs.state.mt.us/news/west_nile_virus/west_nile_virus.htm)
2. Centers for Disease Control (http://www.cdc.gov/ncidod/dvbid/westnile/index.htm)
3. American Mosquito Control Association (http://www.mosquito.org/)
4. The USDA Regional Pest Management Centers National Pest Alert brochure on WNV (http://www.ncpmc.org/NewsAlerts/westnilevirus.html)

References

1) Information summarized from the Montana Department of Public Health and Human Services and the Department of Entomology at Montana State University.

2) U.S. Department of Agriculture. 2003. Regional Pest Management Centers, National Pest Alert, West Nile Virus in North America.

3) Lewis, Hinz and King, February 2003. Montana Department of Fish, Wildlife and Parks. Summary of Research. Montana Wetland and Riparian Areas: A 2002 Survey.

4) Lake Sosin Snell Perry and Associates, January 1998. Clean Water Network. A Presentation of Findings.

5) Chipps, S., D. Hubbard, K. Werlin, N. Haugerud, K. Powell. December 2002. Development and Application of Biomonitoring: Indicators for Floodplain Wetlands of the Upper Missour River Basin, North Dakota. South Dakota State University.

6) AMCA 2002. American Mosquito Control Association. www.mosquito.org

7) CDC 2003. Center for Disease Control. www.cdc.gov/ncidod/dvbid/westnile/index.htm

This fact sheet has been modified and adapted from "West Nile Virus--Wetlands and Waterways", April 2003, prepared by Lynda Saul, Wetland Coordinator, Montana Department of Environmental Quality, 1520 E. 6th Avenue, Helena MT 59620; (406) 444-6652; ***lsaul@state.mt.us***