

Effects of Single and Multiple Applications of Mosquito Insecticides on Nontarget Arthropods

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ABSTRACT

Mosquito management plans have been implemented in the United States and globally to manage mosquito vectors of West Nile virus and many other diseases. However, there is public concern about ecological risks from using insecticides to manage mosquitoes. Two studies were conducted during the late summers of 2004 through 2006 at Benton Lake National Wildlife Refuge near Great Falls, MT. The first experiment was conducted in 2004 and 2005 to assess acute impacts of mosquito adulticides (permethrin and d-phenothrin) and larvicides (*Bacillus thuringiensis israelensis* and methoprene) on nontarget aquatic and terrestrial arthropods after a single application. The second experiment was conducted in 2005 and 2006 to assess longer-term impacts of permethrin on nontarget terrestrial arthropods after multiple repeated applications. For aquatic samples, in the first study, no overall treatment effects were observed despite a potentially deleterious effect on amphipods on sample date 1 in 2004. During the same study, 1 of 54 responses had a significant overall treatment effect for sticky-card samples. Many of the responses for sticky-card samples suggested significant time effects and time \times treatment effects. Three response variables were associated with fewer individuals present in the insecticide-treated plots in a multivariate analysis. For the multiple-spray study conducted in 2005 and 2006, 6 of the response variables collected via sticky cards exhibited significant overall treatment effects, but none was associated

with fewer individuals in the insecticide-treated plots. None of the responses collected using sweep-net sampling suggested overall treatment effects. Time and time x treatment effects were prevalent in 2005, but no discernable pattern was evident. In general, nearly all of the responses evaluated for either study indicated few, if any, deleterious effects from insecticide application.

Keywords: Mosquito control, adulticide, larvicide, ecological risk, nontarget organisms, West Nile virus

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