

Prepared in cooperation with the
 Suffolk Department of Environment and Energy
 Suffolk County Department of Public Works Division of Vector Control
 Suffolk County Department of Health Services

Monitoring of Waterways for Mosquito Insecticides, Suffolk County, New York

Continued monitoring by USGS will provide Suffolk County with information needed for optimal application of mosquito-control insecticides.

Introduction

Mosquitoes are the principle vector of the West Nile Virus (WNV) which causes infections in humans and animals and has emerged as a public health threat throughout Long Island, NY. The WNV was first detected among birds and mosquitoes by the Suffolk County Department of Health

Services (SCDHS) in 2000. In response to the public health concern, the USGS in cooperation with the SCDHS, began a 3-year study in 2002 to sample surface waters in selected wetlands for insecticides which were sprayed seasonally from a truck or helicopter as part of the county's vector-control program. These insecticides include

Altosid (methoprene) and Scourge [1:3 ratio of resmethrin and piperonyl butoxide (PBO)]. Methoprene is a larvicide that prevents larval mosquitos from maturing and breeding. Resmethrin is a pyrethroid insecticide used to kill adult mosquitos and is applied when mosquito samples test positive for WNV.

Suffolk County formed the Vector Control Pesticide Management Committee (VCPMC) in 2007. One of the objectives of this committee has been to evaluate the impacts of vector control pesticides and make recommendations to the County Executive on pesticide reduction and management alternatives. Previous USGS research results show that suitable concentrations of mosquito-control insecticides are delivered to targeted areas following Suffolk County's mosquito-control application processes (Abbene and others, 2005). However, recent (2009-10) USGS collection efforts at several sites in Suffolk County (Figure 1) indicate that environmental factors, such as organic carbon content of bed sediment, can lead to variability in the concentration detected in bed sediments following an aerial insecticide application (Figure 2). Continued monitoring will provide SCDHS and the VCPMC with information needed for optimal application of mosquito-control insecticides.

Approach

This project follows sample collection and analysis as published by the USGS National Water-Quality Assessment (NAWQA) Toxic Substances Hydrology Program—Pesticide National Synthesis Project (<http://water.usgs.gov/nawqa/pnsp/>). The USGS collects whole-water and

Sampling Sites in Suffolk County, NY

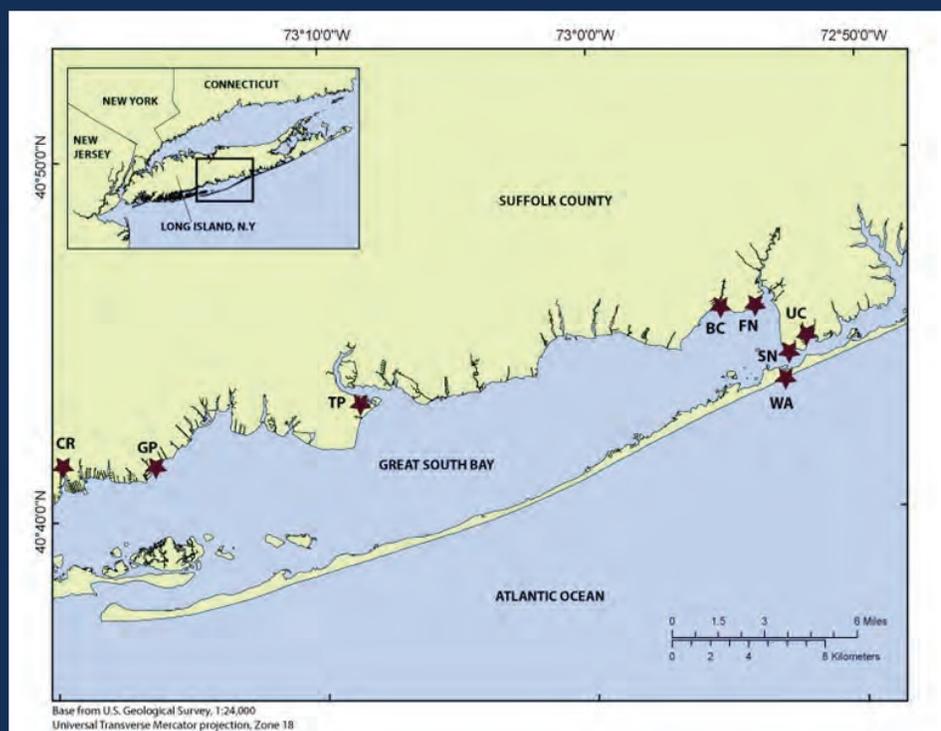


Figure 1. Sampling sites in Suffolk County, N.Y: Carlls River (CR), Gardiners Park (GP), Timber Point (TP), Beaverdam Creek (BC), Fireplace Neck (FN), Unchachoque Creek (UC), Smithpoint North (SN), and Wilderness Area (WA).

bed-sediment samples primarily from mosquito ditches and salt water pannes in estuarine wetlands (Figures 1 and 3). Samples are collected approximately 30 minutes after aerial applications of methoprene and resmethrin to determine the presence and concentration of these insecticides. Water samples are collected at the waters' surface by dipping the sample container to maximum depth of 0-2 cm below the surface ("grab samples") to minimize the potential for sample contamination or to disturb the natural stratification of the water column. Each field site is different which will force the use of a variety of collection methods for the bed sediment samples. In each case, only the top 2 centimeters (cm) of bed sediment are collected to obtain the sediment most recently exposed to insecticides. Samples are analyzed at the USGS Pesticides Research Laboratory in Sacramento,

Data Collection and Equipment

A



B



Figure 3. Photographs showing data collection and equipment. (A) USGS hydrographers monitoring select physical and chemical parameters at Timber Point in Great River, N.Y. (B) USGS hydrographers with sediment sampling equipment at Unchachogue Creek in Shirley, N.Y.

Comparison of Methoprene Concentrations

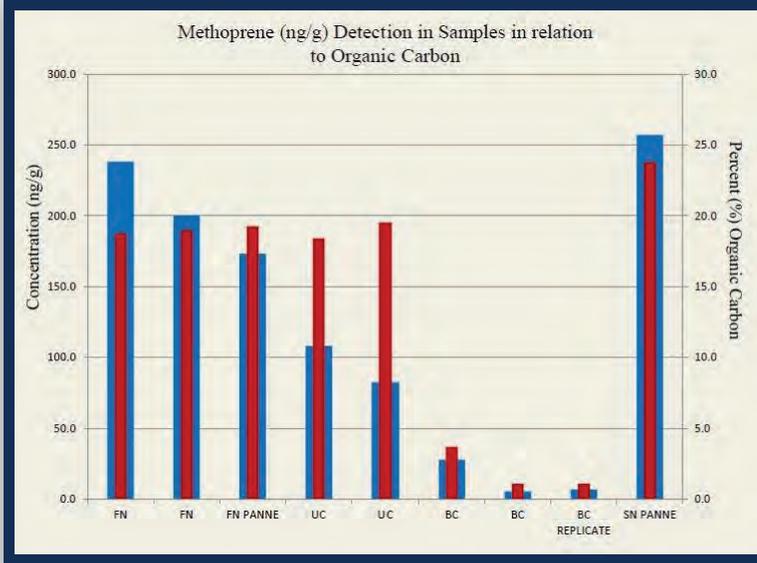


Figure 2. Comparison of methoprene concentrations (blue) in bed sediment to percent organic carbon (red).

CA. Each sample is analyzed for methoprene, resmethrin, PBO, sumithrin, permethrin, p,p'-dichlorodiphenyltrichloroethane (DDT), p,p'-dichlorodiphenyldichloroethylene (DDE) and p,p'-dichlorodiphenyldichloroethane (DDD), and organic carbon content plus 11 additional pyrethroids. Concentrations of insecticides detected in whole water, suspended sediment, and bed sediment are reported and published online at the [USGS National Water Information System: Web Interface \(NWISweb\)](http://waterdata.usgs.gov/usa/nwis) and in the [USGS New York Water-Data Report for Long Island \(Volume 2\)](http://waterdata.usgs.gov/usa/nwis).

Benefits

Data collected as part of this study will help SCDHS optimize their mosquito-control insecticide application processes. Continued monitoring of concentrations of insecticides in surface water and bed sediment samples after aerial applications will help to determine a range of realistic environmental concentrations. Subsequently, these data may be used to determine ecotoxicological susceptibility of local aquatic organisms and other non-target species based on actual environmental exposure potential. These data will also serve as the foundation for a planned environmental risk assessment (to be done by the VCPMC) and will aid the

SCDHS in making informed decisions about (reducing) application of mosquito-control insecticides.

Related Publications

Abbene, I.J., Fisher, S.C., and Terracciano, S.A., 2005, Concentrations of Insecticides in Selected Surface Water Bodies in Suffolk County, New York, Before and After Mosquito Spraying, 2002-04: U.S. Geological Survey Open-File Report 2005-1384, 14 p., online only.

NWISweb: <http://waterdata.usgs.gov/usa/nwis>

Tagliaferri, Tristen, 2011, The Occurrence, Concentration, Persistence, and Toxicity of Mosquito Insecticides in Salt Marshes in Suffolk County, N.Y. (Unpublished M.S. Thesis). Green Mountain College, VT.

Tagliaferri, T.N., and Abbene, I.J., 2011, Monitoring of Waterways for Mosquito Insecticides in Suffolk County, New York. Poster session presented at: 5th USGS/DEC Summit: New York Cooperative Program; Troy, NY.

Primary Researchers

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For Additional Information

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