TrailMark Metropolitan District Integrated Mosquito Management 2016 Annual Report

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1.0 INTRODUCTION

For the 2016 season, TrailMark Metropolitan District (TrailMark) contracted OtterTail Environmental, Inc. (OtterTail) to operate an Integrated Mosquito Management (IMM) program to protect public health from the transmission of West Nile Virus (WNV) and other vector-borne diseases, and to suppress local populations of nuisance mosquitoes. On June 26, 2016 OtterTail Environmental's mosquito control assets and operations were acquired by Vector Disease Control International, LLC (VDCI). As such, the operation of the 2016 TrailMark IMM program prior to June 26 was conducted by OtterTail, while operations conducted after June 26 were conducted by VDCI, with considerable cooperation between both entities throughout the transition.

TrailMark is a community of approximately 800 homes located just west of the Chatfield Reservoir in Littleton, Colorado (TrailMark, 2011). The goal of TrailMark was to protect local residents from the effects of WNV and to suppress the populations of nuisance mosquitoes. To accomplish this goal, TrailMark wanted to identify possible mosquito habitats on the community's properties and then monitor and treat those sites when mosquito larvae were present.

Following Integrated Mosquito Management principles, TrailMark and VDCI/OtterTail focused on controlling and reducing mosquito populations and thereby protecting public health by decreasing the likelihood of WNV transmission. Through surveillance of potential mosquito breeding sites (larval sites), areas found to be producing mosquito larvae were identified and treated with control materials known as larvicides. Larvicides prevent the mosquitoes from developing into adults, and next to eliminating the source, is the most efficient way to reduce mosquito populations.

The State of Colorado experienced a third consecutive year of relatively low WNV activity in 2016. The climate patterns and temperatures that occurred during the 2016 season caused mosquito populations to remain at average levels throughout the majority of the season; consequently, there was relatively low WNV activity within the region. TrailMark's IMM program coupled with education and personal protection measures, also likely continued to help reduce mosquito populations and WNV activity in the area during 2016.

This report explains the methods used in the mosquito management program and provides a summary of the results for the 2016 season.

2.0 LARVAL MOSQUITO SURVEILLANCE AND CONTROL

LARVAL SURVEILLANCE METHODS

The following is a summary of the procedures used by VDCI/OtterTail during larval surveillance. To inspect a mosquito source, a plastic dipper cup with a 3-foot wooden handle was used to collect water from the site. Each sample (dip) was closely examined for mosquito larvae presence. Many of the sites inspected had mosquito-sustaining habitat around the perimeter of the site, but the middle remained mosquito free due to water circulation and/or natural predators. At these sites, the dipping effort was completed using a *linear approach* (walking around the perimeter and sampling the margins).

In sites with widespread mosquito habitat, the entire site was methodically sampled using the *surface area approach*. With this approach, sites were dipped approximately every 10 to 20 square feet. Since each site's characteristics could vary as the season progressed (e.g., become drier, wetter, increased vegetation), there were changes made during the field season to adjust the appropriate number of dips.

LARVAL CONTROL METHODOLOGY AND APPLICATION METHODS

Larval mosquito control methods employed by VDCI/OtterTail staff were aimed at reducing the threat of WNV and the annoyance level of mosquitoes to local residents. The threshold for larval control was presence of any mosquito species. The objective of larval mosquito control is to prevent the need for adult mosquito control spraying, which is much less effective and more expensive than larval control.

The application of *Bacillus thuringiensis israelensis* (*Bti*), *Bacillus sphaericus (Bs),* and BVA-2 mosquito larvicide oil (BVA-2) are VDCI/OtterTail's primary methods used for larval mosquito control. Control materials were applied within the labeled rates, thereby minimizing any potential adverse impacts to areas being treated. Routine post-treatment checks were conducted to ensure the larval control was effective. If any larvae were found during the post-check, a second application was applied.

In balancing environmental resources, cost effectiveness, and public health needs, *Bti* was selected as the primary treatment product. *Bti* is a naturally occurring protein that is toxic to mosquito larvae upon its ingestion. It provides a residual treatment that lasts for approximately two days. Since new mosquito larvae may hatch after the product dissipates, the sites must be inspected for mosquito larvae every one to two weeks. The presence of mosquito larvae between monitoring periods has the added benefit of allowing these larvae to continue to be part of the aquatic food web, but be eliminated before they can emerge as adults. This helps protect the public from potential WNV transmission while still providing a food source for many aquatic animals.

Bacillus sphaericus is a larvicide very similar to *Bti* but has a longer residual time. The protein in *Bs* products is able to provide continuous treatment of mosquito larvae for up to four weeks and was typically used on sites that were found to be continuously producing mosquitoes. Although the longer residual time of this larvicide allows for fewer site checks and cost savings in labor and travel, it is only practical in certain situations because it costs substantially more than *Bti*.

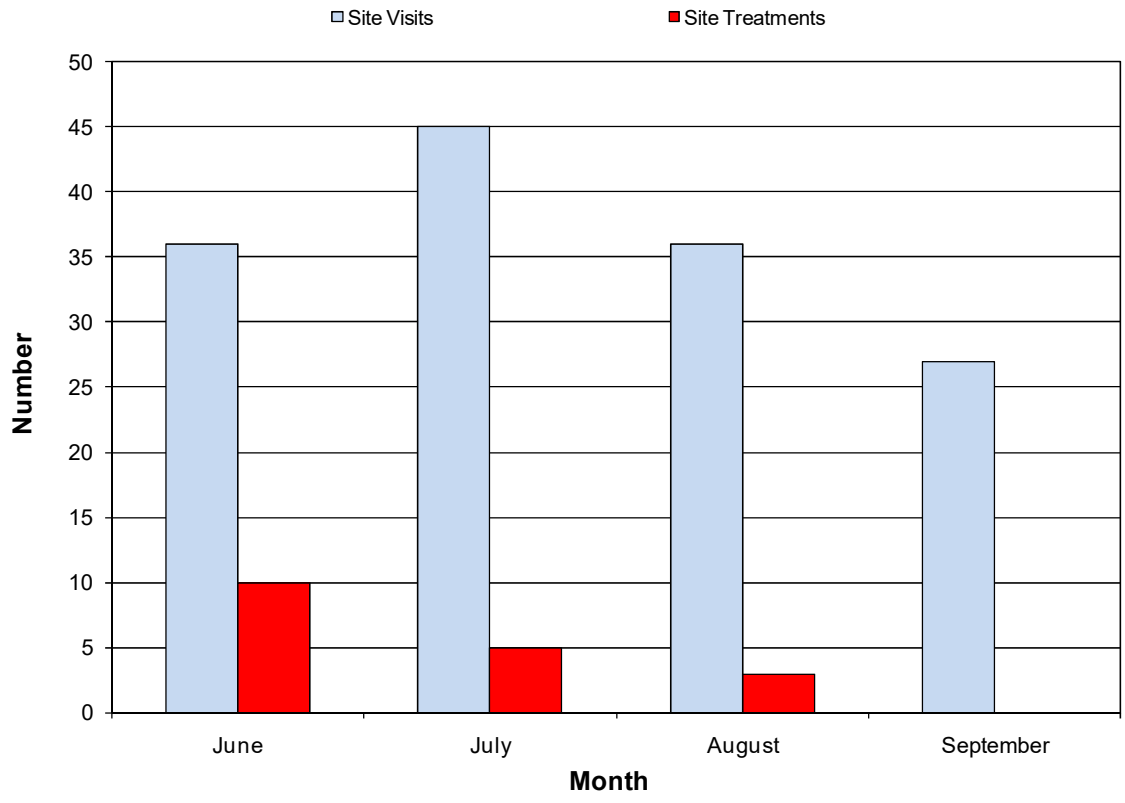
It should be noted that *Bti* was the primary control material used, but this product is not effective if pupae are found at a site. Mosquitoes do not feed during their pupal stage; therefore, the use of *Bti* and *Bs* is

ineffective against mosquito pupae since these proteins must be ingested. In these instances of pupae occurrence BVA-2 is used. BVA-2 is a highly refined mineral oil that creates a thin film on the water surface that interrupts the air and water interface during the mosquito's larval and pupal development stages, causing them to drown.

LARVAL SURVEILLANCE AND CONTROL RESULTS

The 2016 larval surveillance season started in May and continued through September. During the season, a total of 144 individual larval site visits were performed on the potential breeding sites within the program area. Approximately 5.0 acres of active breeding habitat was identified and treated during 18 site treatments within the project area in 2016. **Figure 1** shows the number of site visits and treatments performed each month during 2016.

Figure 1 Number of Larval Site Visits and Treatments per Month, 2016



3.0 2016 CONTROL PROGRAM REVIEW AND RECOMMENDATIONS

The 2016 season consisted of identifying and monitoring sites for the presence of mosquitoes, followed by treatments with the appropriate products when mosquito larvae were found. During the season, VDCI/OtterTail performed 144 site visits and 18 treatments on larval habitat sites within the program area. The larviciding program was a likely reason for keeping the area adult mosquito populations and WNV case counts at low levels.

The mosquito control program for 2017 should continue to concentrate on larval mosquito control and to have any possible adult control based on adult population surveillance, WNV activity levels, and community complaints. Recommendations for 2017 include the following:

- Continued concentration on larval mosquito surveillance and control
- Efforts in public education informing residents on methods of personal protection and property maintenance to help lower the threat of WNV and the annoyance of nuisance mosquitoes

4.0 REFERENCES

TrailMark 2011. [Web page]. Located at http://TrailMark.org. Accessed December 7, 2011