Using a Geographic Information System (GIS) as an Important Component of a Comprehensive Integrated Vector Control Program

Eric Ghilarducci and Steve Schutz

Contra Costa Mosquito and Vector Control District, 155 Mason Circle, Concord, CA 94520, eghilarducci@ccmvcd.net

ABSTRACT: The ability to identify disease transmission "hot spots" is a key element in predicting areas where elevated risk of human exposure to vector-borne diseases may occur. The Contra Costa Mosquito and Vector Control District has been using our internally developed Vector Control Information System (VXS) Microsoft Access Database interfaced with ESRI's ArcGIS® 9.3 in order to visualize data collected in the field as map layers. This provides a way of rapidly examining spatial relationships among those layers. Data layers are created in-house or are available to us through data sharing and use agreements with both county and local government departments and districts. The integration of ArcGIS® with our in-house database has allowed us to document locations of mosquito adult and larval sources, dead bird reports, service requests, trap sites and counts, mosquito population density, surveillance and control actions, WNV positive locations, property parcel boundaries, County Assessor's data, etc. Any or all of these layers can be displayed in conjunction with high-resolution aerial photographs of the entire county. By visually displaying locations that meet defined risk assessment criteria, this has enabled us to predict the occurrence of disease transmission "hot spots" before they appear. This "hot spot" analysis allows us to concentrate our attention and efforts quickly in response to real-time surveillance data and to be proactive with public education, source reduction, and active control of vector populations. The ultimate goal of VXS is to interrupt disease maintenance cycles prior to human exposure.

Additional operational advantages have included enhanced ability to:

- Provide quality printed and digital maps displaying field collected data.
- Identify property parcels with un-maintained swimming pools by using Assessor's data together with aerial surveillance photos/video.
- Generate mailing lists of property owners in specific high-risk areas
- Reference other agencies' unique data layers to communicate intentions and coordinate actions effectively and accurately.
- Assist new or seasonal employees to locate and learn of existing source locations in their zones to rapidly.

We have found a few limitations and implications of increased GIS use, including:

- Initial and maintenance cost of GIS software licensing and hardware.
- "Learning curve" associated with acquiring the necessary skills.
- Personnel time involved with database and GIS development, maintenance and use.
- "Technophobia" of staff who may fear or dislike advanced technology or complex devices, especially computers, or simply dislike change.
- Difficulty with data acquisition. It may be difficult to create new layers or to gain access to existing layers used by other organizations.
- Need to review and modify existing database structure and record keeping protocols to ensure compatibility.

Overall, the benefits of adopting GIS as an integrated part of our programs have far outweighed the costs and have significantly enhanced our ability to fulfill our mission to protect public health.