

EXECUTIVE SUMMARY

This Long-Term Plan's primary goals are to decrease potential risks to human health and public welfare from mosquitoes and mosquito control measures, and to reduce the use of pesticides for vector control. An ambitious target of a 75 percent reduction in larvicide usage (as measured in the number of acres treated) has been set. The area treated with adulticides has already been reduced by more than 50 percent in the past five years, and this Long-Term Plan seeks to further reduce use of adulticides.

The Long-Term Plan also seeks to use a series of Best Management Practices (BMPs) to restore approximately 4,000 acres of tidal wetlands that were grid ditched in the 1930s, and which now require routine larvicide applications by air. When implemented, the BMPs will reduce or eliminate the need for larvicide on these lands, and improve wetland values by enhancing biodiversity and limiting invasive species, including *Phragmites*. Wetland restoration strategies will be tailored to the specific needs of individual marshes with mosquito control as one element considered in the overall restoration strategy. The greatest reductions in larvicide use can be achieved by prioritizing project sites where mosquito production is greatest, the most pesticide is used, and relatively simple measures will reduce or eliminate larval habitat. Once a site is chosen, however, the design process should consider the preservation and/or enhancement of natural resource values as the most important factor in choosing which BMPs will be used for mosquito control.

Among the significant policy commitments contained in the Long-Term Plan are:

- The continuation of the “no new ditching” policy, and establishment of a presumptive interim policy of ditch reversion as opposed to ditch maintenance. It is expected that less than 50 acres of salt marsh per year will be subject to machine ditch maintenance, and then only when necessary to address a critical ecological or public health need (e.g., to restore tidal circulation or to eliminate a severe infestation).
- Institution of a framework for continuing coordination and input by the Citizen and Technical Advisory Committee structure to help guide the preparation of Triennial Plan updates.

- The creation of a Wetlands Stewardship Committee comprised of agencies, policymakers, estuary program representatives, and non-profit institutions. The Stewardship Committee will receive early notice of all potentially significant wetlands management projects (except for the most minor initiatives, such as maintenance of culverts). The Stewardship Committee will also approve all major wetlands restoration proposals, with the overarching goal of enhancing salt marsh functions and values. Building on accomplishments of the Wetlands Management Plan, the Committee will also be charged with developing a strategy to begin addressing the management needs of all of the County's 17,000 acres of tidal wetlands, irrespective of Vector Control significance. This process will include refinement of preliminary wetland health indicators described in the Wetlands Management Plan.

Critical Long-Term Plan recommendations include the continued use and refinement of integrated pest management (IPM) procedures, and improvements in surveillance (e.g., better documentation of mosquito populations and post-spray efficacy, and the establishment of additional mosquito traps at Fire Island National Seashore locations). In order to improve source control at breeding sites, the Long-Term Plan calls for enhanced catch basin larviciding. Expansion of public education and outreach is highlighted through improved used-tire management, greater use of providing information through Internet contact, and promoting source control methods at businesses and homes.

Early action projects are a hallmark of the Long-Term Plan. Examples include implementation of a new technology to guide pesticide applications. The "Adapco Wingman" system uses a computer model and real-time meteorological data to minimize pesticide usage and to optimize mosquito control.

In another early action, a progressive Integrated Marsh Management (IMM) project restored 80 acres of grid-ditched salt marsh at the Wertheim National Wildlife Refuge, thereby controlling mosquito breeding and enhancing wetland values such as biodiversity. IMM improves habitat for wildlife, native vegetation and larvae-eating fish by creating ponds for aquatic habitat channels for proper tidal circulation, eliminate and filling obsolete ditches that altered marsh hydrology. At the same time, IMM controls

mosquito production by a combination of fish predation and elimination of stagnant pools where mosquito predators can not survive. The project was conducted in cooperation with the US Fish and Wildlife Service, and is the first of its kind on Long Island. Supported by extensive monitoring, this initiative will serve as a test of the viability of future IMM projects on Long Island.

Tidal wetlands restoration strategies will proceed in accordance with three-year work plans. With the possible exception of Wertheim, no new major IMM projects are expected during the 2007-2009 timeframe. Future IMM recommendations will be subject to Wetlands Stewardship Committee approval, as part of the Triennial Plan update process.

The scope of this Long-Term Plan addresses wetlands that are subject to Vector Control operations. Approximately 4,000 acres of grid-ditched salt marsh are proposed for “reversion” via natural processes, i.e., no management for vector control is needed. As previously stated, another 4,000 acres of wetlands which are routinely larvicided will be evaluated for restoration via minor Best Management Practices (BMPs) (e.g., maintain/repair existing culverts) or, in the long-term, major restoration (subject to Stewardship Committee review). The county’s remaining 9,000 acres of wetlands require additional assessment, and any major restoration projects proposed will be subject to SEQRA review. Remote sensing is expected to allow for cost-effective monitoring of the County’s wetlands and supplement field visits.

It is envisioned that the process of assessment and enhanced wetland management be completed within 12 years. For individual projects, wetlands management goals for mosquito control must be adapted to the management goals set by landowners and natural resource managers, and may not be driven by vector control considerations. The ability to successfully implement Long-Term Plan objectives will be dependent upon cooperation by many agencies and stakeholders.

The Long-Term Plan will continue to be a cooperative effort administered by Suffolk County Department of Health Services (SCDHS), in cooperation with Suffolk County Department of Public Works (SCDPW). The Suffolk County Department of Environment and Energy (SCDEE) will be a lead partner. Suffolk County has already

budgeted several new staff positions to begin implementation of the Long-Term Plan's recommendations although most can begin to be accomplished with existing resources. Grant programs and supplemental funding sources will be sought, in particular for wetland restoration projects.

Impetus for Long-Term Plan

Suffolk County sponsored this comprehensive evaluation of its Vector Control program to develop strategies to best protect public health, while optimizing environmental quality. Reasons for initiating the Long-Term Plan included:

- The West Nile virus threat, intermittent reappearance of Eastern Equine Encephalitis, and other vector-borne diseases, e.g., malaria. Suffolk County has had four deaths and 25 severe neurological illnesses attributable to West Nile virus between 1999 and 2006. Nation-wide, deaths total 891 through 2004, with over 7,000 severe neurological cases, with an average of 1,212 severe cases and 109 fatalities in the years 2004-2006.
- A long-standing need to better manage the legacy of grid-ditched wetlands to optimize environmental quality and reduce pesticide usage. By the end of the 1930's, over 90 percent of the County's 17,000 acres of salt marsh were grid-ditched for mosquito control purposes. The ditch network is substantially intact, but over 4,000 acres of marsh still require routine larvicide applications.

Background - Plan Approach

The Long-Term Plan followed a classic management plan approach rather than just evaluate impacts of a pre-determined outcome, i.e., a Generic Environmental Impact Statement on a pre-specified plan. It was based on data collection, evaluation of alternatives, and quantitative health and ecological risk assessments. The process was transparent, with extensive involvement by both Technical and Citizens Advisory Committees.

A comprehensive literature review was undertaken to determine the state-of-the-art in the fields of mosquito control, disease transmission, toxicology, wetlands biology, marine ecology, and environmental chemistry. Critical information was collected on mosquito

biology and diseases, innovative mosquito control practices, mosquito control pesticides including their application technologies, formulations, and potential impacts, and wetlands and salt marshes.

Extensive local information was also collected and organized. This process included establishing a mosquito control-oriented Geographical Information System (GIS), digitized mapping of the County's wetlands, and analyzing past and current mosquito control practices in the County. To support the analyses of potential impacts, four sections of the County were exhaustively described in terms of human use and ecological values, and 21 marshes were comprehensively studied.

Scientific studies and demonstration projects were conducted. Hundreds of samples were taken from air, water, sediment, and biota, and pesticides were measured to research level accuracy, i.e., one part-per-trillion. Mosquito control effectiveness of garlic oil, rosemary, and mosquito traps was tested. None of these "alternative techniques" showed promise for the County vector control program. Other studies were performed on benthic invertebrates, salt marshes with various larviciding histories, and stormwater in relation to ditches; vector control impacts were not found. Catch basins were evaluated, and documented to be problem mosquito breeding sites.

Health or Nuisance?

One of the goals of the Long-Term Plan, which addresses human health and public welfare, was to evaluate the possibility of differentiating "health-based" vector control from another commonly used term: "nuisance" control. A true distinction proved to be impossible because all the major mosquito species found in Suffolk County that bite people are capable of spreading disease, and therefore, the public health risks from biting mosquitoes can never be said to be zero. Control prior to the actual detection of pathogens can also reduce the need for, and mitigate risks in, emergency response situations. Finally, health concerns from mosquito infestations exist (pain, itching, possibility of infections, etc.), irrespective of detected pathogens. Vector control clearly results in ancillary quality-of-life benefits, but this is not the primary reason for a mosquito control program. The Long-Term Plan thus approaches mosquito control in terms of the continuum from "vector control" (e.g., low but present disease and health

concerns) to “public health emergency” (e.g., pathogen response in accordance with federal and state guidance). “Vector control,” in this context, can be used synonymously with “*public health* nuisance control.” Indeed, the Public Health Law and the New York State Department of Health utilize the “public health nuisance” model to characterize mosquito infestations in the absence of a detected pathogen.

For vector control scenarios, strict numeric criteria for adulticiding have been adopted which require that quantitative mosquito thresholds be met prior to any adulticide application. Vector Control will keep records to document all pesticide application decisions. Emergency response actions will be conducted in conformance with West Nile virus response guidelines.

Vector Control Agents: Results of Risk Assessment

The Long-Term Plan evaluated risks to public health associated with vector control alternatives from vector-borne diseases as well as exposure to pesticides, and weighed these risks against potential impacts to the environment. The approach is especially noteworthy in that it addresses physical, chemical, and biological stressors. The public health risk assessment determined that, in the absence of any vector control, Suffolk County could expect to see as many as 16 deaths from West Nile Virus each year, and 150 persons could contract serious West Nile illness. Impacts from EEE and other diseases could not be quantified, but the threats are grave.

The exhaustive toxicological (pesticide) risk assessment was based on extremely conservative, worst-case assumptions and showed negligible human health impacts and minimal ecological impacts (i.e., not significant). The results for Vector Control agents are summarized as follows:

- Human health: negligible impacts (acute, chronic, or carcinogenic) from any larvicide or adulticide agent.
- Ecological impact: no impacts for mammalian, avian, or reptilian wildlife from any pesticide. Possible aquatic impacts were associated only with the adulticides permethrin, and potentially more so from malathion. However, the invertebrate

impacts do not propagate up the food chain, and the model showed recovery to be complete by the following spring.

Bees are the standard for understanding agricultural pesticide impacts to flying insects and, based on theoretical potential effects to bees, all adulticides posed a potential risk to non-target flying insects. However, vector control adulticides are generally not applied when bees are flying (day time). No study has attributed significant impacts to insect populations from vector control adulticides at the concentrations and methods in which they are applied. Also, the literature suggests that effects of transient stressors on insect populations are fleeting, with populations recovering within days.

Part of the effort to develop the Long-Term Plan was to evaluate typical risk from the use of pesticides in everyday life. The exposures and corresponding human health risks from the use of pesticides for vector control purposes are small relative to other risks, such as those associated with exposure to pesticides in food, indoor residential use and some pet flea and tick products. The insect repellent DEET was also evaluated. Proper use of DEET products should not result in adverse health impacts.

An extensive “Caged Fish” study found no lethal or sublethal impacts to organisms attributable to applications of resmethrin and methoprene. In fact, researchers found that the pesticides actually decayed more rapidly in the environment than prior laboratory based studies suggested.

Conclusion

It is the policy of Suffolk County that pesticides should always be used sparingly, and only when needed. This study has demonstrated that the benefits of carefully controlled Vector Control program, conducted within an Integrated Pest Management framework, clearly outweigh the potential adverse impacts, which have not been found to be significant and which are mitigated by the IPM measures described in the Long-Term Plan. Moreover, marsh restoration can have a significant positive environmental impact, while controlling vectors and reducing or eliminating the need for pesticide usage. Therefore, implementation of the Long-Term Plan should achieve its major goals of reducing impacts to human health while significantly improving overall County ecological conditions.